EXPERIMENTAL STUDY ON CONCRETE BY REPLACEMENT OF FINE AGGREGATE WITH COPPER SLAG, GGBS AND M- SAND

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Abstract **- Concrete is the most undisputable and indispensable material being used in infrastructure development throughout the world. Realization on the increasing demand for river sand supply in construction sector has inspired the current research to find alternative material to reduce the use of natural sand in concrete. Natural sand was partially replaced (0%-100%) with copper slag, GGBS and M-sand in concrete. Tensile strength, Compressive strength (cubes and cylinders) and Flexural strength up to 28 days and 7 days of age were compared with those of high performance concrete made with natural sand.**

I. INTRODUCTION

Concrete is a widely used material in the world. Based on global usage it is placed at second position after water. Aggregates considered as one of the main constituent of concrete and occupy more than 70% of concrete mix. In which fine aggregate (sand) is about 35%of volume of concrete used in construction industry. Sand is a prime material used for preparation of mortar and concrete and which plays a major role in mix design.

Now a day's erosion of rivers and considering environmental issues, there is a scarcity of river sand. The non-availability or shortage of river sand will affect the construction industry; hence there is a need to find the new alternative material to replace the river sand, such that excess river erosion and harm to environment is prevented. Many researchers are finding different materials to replace sand. One of the major materials is copper slag (CS), GGBS (Ground Granulated Blast Furnace Slag) and M-sand (Manufactured sand). Using different proportion of these copper slag and GGBS along with sand the required concrete mix can be obtained.

One of the main objectives of this project is to determine the concrete strength of M30 Grade by partial replacement of sand by copper slag and GGBS. The concrete cubes were cast for different replacement level at an interval of 20 percent to determine compressive strength of concrete at different level of fine aggregate with copper slag, GGBS and M-sand.

II. PROPERTIES OF MATERIALS

A.Cement

A powdery substance made by calcining lime and clay mixed with water to form mortar or mixed with sand, gravel and water to make concrete.it is a binder, a substance that sets and hardens independently, and can bind other materials together.

S.No	Parameter	Test results
1	Type	PPC
2	Consistency	36%
3	Initial setting time	30mins
4	Final setting time	10hours

B. Aggregates

The relevant tests are to identify the properties of the aggregates that were intended to be used in this research were carried out. After that, corrective measures were taken in advance

before proceeding to the mix proportioning. In general, aggregates should be hard and strong, free of undesirable impurities, and chemically stable. If these materials coat the surfaces of the aggregate, they will isolate the aggregate particles from the surrounding concrete, causing a reduction in strength.

1) M-sand

Fine aggregate normally consists manufactured sand. The Manufactured Sand (MS) is a by-product of the crushing and screening process in the quarries. Quarry generates considerable volumes of quarry fines while crushing the rock into aggregates. It is also referred to as crushed rock sand, stone sand, crusher sand and crushed fine aggregate.

S.No	Parameter	Test results
1	Specific gravity	2.94
2	Fineness modulus	3.83%
3	Water absorption	0.74%

2) Coarse aggregate

As coarse aggregates in concrete occupy 35 to 70% of the volume of the concrete. Gravel or crushed stone used as a coarse aggregate. Particle sizes larger than 4.75mm.Coarse Aggregate can come from several sources. Each of these sources can produce satisfactory aggregates depending on the intended use. Each parent material has advantages and disadvantages associated with it.

S.No	Parameter	Test results
1	Specific gravity	2.85
2	Fineness modulus	7.93%
3	Water absorption	0.5%

3) Copper slag

Copper slag is considered as one of the waste materials which can have a promising future in construction industry as partial or full substitute of fine aggregates. For each ton of copper production, about 2.2 tons of copper slag is generated. The chemical traces such as copper, sulphate and alumina present in the slag are not harmful.

S.No	Parameter	Test results
1	Specific gravity	4.06
2	Fineness modulus	3.44%
3	Water absorption	0.35%

4) GGBS

Ground granulated blast furnace slag (GGBS) is a by-product from the blast furnaces used to make iron. In India we produce 7.8 million tons of blast furnace slag. The temperature is about 1500 degrees centigrade can operated and fed with the mixture of iron ore, coke and limestone in careful manner.

And tapping off the slag in periodically as a molten liquid and if it is to be used for the manufacture of GGBS it has to be rapidly quenched in large volumes of water. The quenching optimizes that the cementations properties and produces granules similar to coarse sand. Then dried the granulated slag and make it to fine powder.

S.No	Parameter	Test results
1	Specific gravity	2.85
2	Fineness modulus	3.18%
3	Water absorption	0.25%

D) Water

The quality of water plays a significant role in concrete production. Impurities in water may interfere with the setting of the cement, may adversely affect the strength of the concrete or cause staining of its surface, and may also lead to corrosion of the reinforcement.

III. MIX DESIGN

In this study, mix of concrete grade (M30) were produced with partial replacements of the fine

aggregate by 0%,20%,40%,60%,80% and 100% of the CS, GGBS and M-sand. Moreover, a control mix with no replacement of the fine aggregate was produced to make a comparative analysis. The mix design process adopted was the Indian Standard Method. However, a certain amount of the fine aggregate was replaced by an equal volume of CS, GGBS and M-sand. Mix design for M30 (The mix design proportion is1:1.58:2.7:0.45) as per IS-10262-2009 and IS: 456 – 2000. The main reason for selecting this concrete grades is that these are by far the most commonly used concrete grades for most of the concrete construction works and hence application of the research can be more feasible .

IV. REPLACEMENT PROPORTIONS

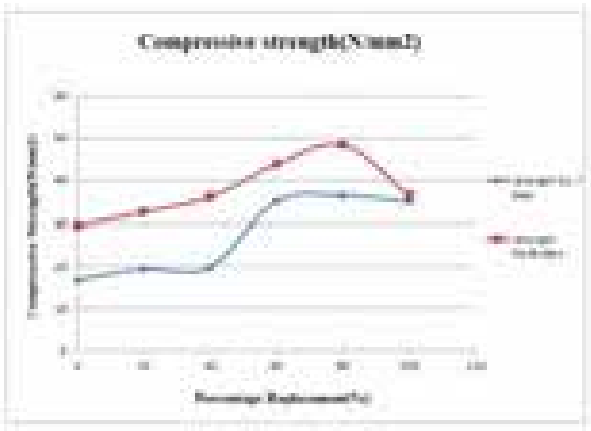
S. No	Replacement proportion	Mix designation
1	0%CS+0%GGBS+100% M-sand	M0
2	10%CS+10%GGBS+80% M-sand	M1
3	20%CS+20%GGBS+60% M-sand	M2
4	30%CS+30%GGBS+40% M-sand	M3
5	40%CS+40%GGBS+20% M-sand	M4
6	50%CS+50%GGBS+0% M-sand	M5

V. EXPERIMENTAL INVESTICATION

1. COMPRESSIVE STRENGTH

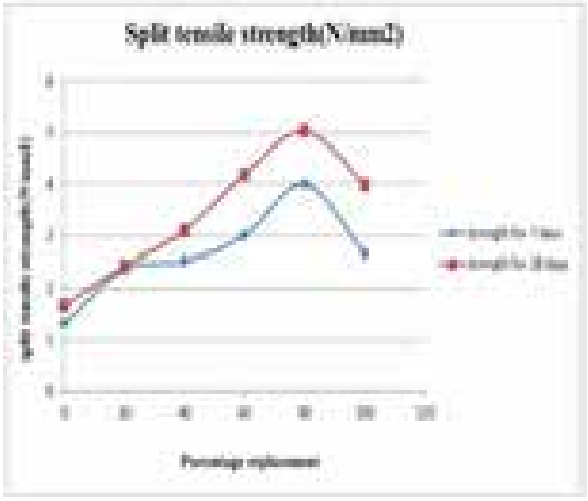
The cube specimens were tested in the compression testing machine with the capacity of 200 tonnes. The upper / bearing surface of the machine is cleaned and kept free from the other loose particles and the; load is applied constantly at increased rate until the specimen got broken. The 28 days strength of cubes with various proportions is compared below.

Cube of size 150 mm X 150mm X 150mm concrete specimens were casting**.**



2. SPILT TENSILE STRENGTH

Split tensile strength of concrete is usually found by testing plain concrete cylinders. Cylinders of size 100mm x 200 mm were casting using M50 grade concrete. Specimens with Nominal concrete and glass powder concrete (glass powder is partially replaced with Natural sand) were casted. During moulding, the cylinders were manually compacted using tamping rods. After 24 hours, the specimens were removed from the mould and subjected to water curing for 28 days. After curing, the specimens were tested for compressive strength using a calibrated compression testing machine.



3. FLEXURAL STRENGTH

Flexural strength is the one of the measure of tensile strength of concrete. It is the ability of a beam to resist failure in bending. The beam specimens were tested in the universal resting machine to obtain the flexural strength of the beam. The beam specimens were tested in the universal resting machine to obtain the flexural strength of the beam is compared below.



VI. DISCUSSION

Based on the results of the experimental investigation on concrete made with CS, GGBS and M-sand, the reason for the variation observed is summarized as follows.

1. The compressive strength of concrete with CS, GGBS and M-sand is more than the conventional concrete.
2. Split tensile strength of concrete increases forces and GGBS. The reason for variation is the shape and texture of CS and GGBS.
3. Flexural strength (modulus of rupture) of concrete increase. The reasons for variation are the shape and texture of the CS and GGBS.

VII. CONCULSION

From this experimental study following points can be drawn: After testing of 5 blended cement samples (0% to 100 % replacement of fine aggregate by CS, GGBS and M-sand) with an increment of 20 %, it can be said that the optimum use of alternate material is 80% as a partial replacement of fine aggregate by CS, GGBS and M-sand.

In the production of HSC, industrial wastes played a predominant role in replacement of fine aggregates. For sand replacement, CS and GGBS was satisfied strength factor.

VIII. ACKNOWLEDGEMENT

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POWER PRODUCTION FROM WASTEWATER BY MICROBIAL FUEL CELL

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Abstract **- Microbial fuel cell (MFC) is a new technology that not only generates energy but treats wastewater as well. A air-cathode MFC was operated under laboratory conditions. Wastewater samples from chemical industries were collected and treated for 312 h in MFC. The treatment efficiency for COD removal in MFC was in range of 85–90% at hydraulic retention time (HRT) of 310 h and had significant impact on wastewater treatment as well. The maximum voltage of 1130 mV was generated .The minimum voltage was produced in wastewater which was 139 mV. There was positive significant co-relation between COD concentration and generated voltage. Further research should be focused on the organic contents of wastewater and various ionic species affecting voltage generation in MFC**.

I. INTRODUCTION

Microbial fuel cells (MFCs) are a promising technology for sustainable wastewater treatment. In an MFC, biochemical reactions are carried out by electro genic bacteria in an anaerobic anode chamber, generating electrons and protons through the degradation of the organic substrates embedded in wastewater; concurrently, electrochemical reactions occur in the aerobic cathode chamber, whereby electrons and protons are accepted through an oxygen reduction reaction (ORR). Anaerobic treatment of wastewaters is substantially less energy intensive than aerobic treatment, however it takes longer to accomplish due to the inherently slow growth process of anaerobic microorganisms. Because of this, there has been little interest in applying anaerobic processes to dilute wastewaters (e.g., domestic wastewater).

MFC systems operate on the fundamental mechanisms of microbiology (e.g. biofilm growth on electrode), biochemistry (e.g. COD removal inside biofilms), and electrochemistry (e.g. electron generation and transfer on anodes and cathodes), which make it truly challenging to achieve effective power generation simultaneously with effective wastewater treatment.

Microbial fuel cell is found to be an alternative technology for direct power generation. It is clean power generation technique which does not generate secondary e pollutants. Power generation of an MFC is affected by many factors including microbe type, ionic strength, pH, temperature, and reactor configuration. These operating parameters can be regulated to decrease the polarizations in order to enhance the performance of an MFC. Use of wastewater in the anode chamber reduces the cost of treatment and reduces the problem of sludge deposal. Other than power generation application of MFC it has many other application such production of bio hydrogen from MFC and used as biosensor offset the large power demand from aerobic treatment, it is important that cost-effective processes be developed that can convert the contaminant loads in domestic wastewater to useable forms of energy. Over the past several years, a great amount of effort has been invested in testing MFCs at bench-scale, successfully converting the organic substrates inherent in the wastewater treatment to power.

II. MATERIALS AND METHODS

1.SURGICAL WASTEWATER

Surgical wastewater from chemical industry is one of the most difficult industrial wastewaters to treat since Surgical wastewater are degradation organic molecules. It adversely affects environment due to its immense colour and toxicities.

Chemical industry generates high-volumes of wastewater containing various chemical used is bleaching and Drycleaning. Since, effluents of Bleaching units are highly polluted and dangerous, they have to be treated with right technologies to nullify its harmful effect on the environment. Since characteristics of effluents varies with the type of raw materials used in the Bleaching process, adopting right wastewater treatment technology is a challenge.

2.ELECTRODE

Zhang et al., (2009) described the electrode materials in MFC have some general characters and also its self-characteristic. For all the types of electrodes, their base materials must generally of good conduction, good chemical stability, high mechanical strength, and low cost. Carbon materials and non-corrosive metals, which can basically meet the general requirements above, are currently the most-widely used base materials. In addition, there are some specific requirements for each group of electrodes. Bio-electrodes function not only as a conductor, but also as a carrier of bacteria, and some special surface characteristics of electrode materials, such as high surface roughness, good biocompatibility, and efficient electron transfer between bacteria and electrode surface, are essential for high bio-catalytic activity. In order to improve bacterial adhesion and electron transfer, electrode surface modification has become a new topic of interest in the research field of MFCs. The electrode material for air–cathodes with a catalyst is composed of a base material, a catalyst, a binder, and a waterproof coating. Material characteristics and functions are specific for each part. The base material generally only serves as supporting material and current collector. High conductivity and mechanical strength are critical for it. But there is no special requirement for bacteria adhesion. A catalyst is important for air–cathodes, but not absolutely necessary.

If necessary, the catalyst is immobilized on the substrate surface with a binder, and a hydrophobic coating is regularly added onto the cathode to avoid water loss. To reduce the cost of air–cathodes, several highly specific materials, such as activated carbon, that do not require a catalyst have been developed and reported. For aqueous air–cathode, only base material, catalyst and binder are needed.

Another great challenge in making MFCs a high performance and scalable technology is electrode configuration. Commonly used electrodes can be classified according to their configurations: the plane electrode and the three-dimensional electrode. A good configuration for bio-electrodes must provide a large surface area for bacterial adhesion and ensure efficient current collection. Plane electrode is more common for air–electrode. When the air–electrode contains a chemical catalyst, an effective configuration is necessary to ensure the oxygen reduction into a three-phase reaction involving the catalyst, the air, and water.

3.MICROBIAL FUEL CELL

B.E.Logan, (2008) clarified that microbial fuel cells (MFCs) are devices that use bacteria as a catalyst for the conversion of organic matter into electricity. An MFC typically consists of anode (anaerobic) and cathode (aerobic or aerated). In MFCs, microbes on the anode surface oxidize substrates (organic

matter) and generate electrons and protons. These electrons are transferred to the anode and pass towards the cathode through an external circuit to generate electricity. The generated protons diffuse through the solution towards the cathode.

S.No	Parameter	Test results
1	pH	10.58 ± 0.2
2	Total solids	8130 ± 150
3	Total dissolved soilds	3135 ± 100
4	Total susbended soilds	681 ± 20
5	Chemical oxygen demend	4000 ± 50
6	Total alkalinity	1200 ± 50

Mfc Operation

Several disadvantages of batch operation for the purpose of power generation in MFCs. The nutrients available in the working volume become depleted in batch mode. The substrate depletion in batch MFCs results in a decrease in bioelectricity production with respect to time. This problem is solved in continuous MFCs that are more suitable than batch systems for practical applications. The advantages of continuous culture are that the cell density, substrate and product concentrations remain constant while the culture is diluted with fresh media. The fresh media is sterilized or filtered and there are no cells in the inlet stream. The batch operation was switched over to continuous operation mode by constantly injection of the prepared substrate to the anode compartment. The other factors were kept constant based on optimum conditions determined from the batch operation.. The system was operated for 314 h with the fixed HRT. Produced power and current were recorded after 12, 24, 36 up to 302 h. The obtained data had no significant improvement in power and cell condition for any time after 120 h. Production of bioelectricity reached to steady-state condition after 4 HRT.

Electrochemical measurment

Chong yang Gao et al., (2014) reported that the Current (I) was calculated from I = U/R, and cell power output (P) was calculated from P = U * I. The power density (P_V) was calculated using the equation: P_V (W m^{-3}) = P/V, where P is cell power output, V is the volume of the anodic chamber.

4.Result and discussion

COD removal

The Surgical cotton wastewater is often complex with high COD concentration. COD removals at the MFC were measured at different HRTs. 120 h of HRT, 65% COD was removed at the MFC .The Surgical cotton wastewater was treated anaerobically in the anode chamber where the anaerobic bacteria degraded biodegradable organic– inorganic materials and the high COD removal was achieved because the cathode process acted as an additional aerobic polishing step following the standard anodic treatment. MFC anodes do not have ability to thoroughly remove slowly biodegradable COD.

EFFECT OF COD CONSUMPTION RATE ON POWER GENERATION

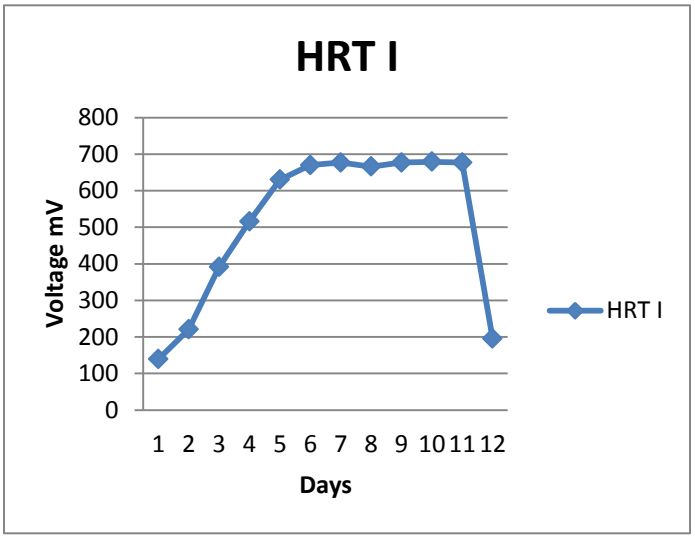
The power generation in the Air cathode MFC was analysed by varying different HRT from 24 days to 7 days. Surgical cotton wastewater COD was in the range of 4000 ± 300 mg L^{-1}., voltage of 1130mV was achieved in MFC. At the starting HRT of 24 days, voltage

was at 139mV.The highest voltage of 1130mV was achieved at 6 days HRT. The Surgical cotton wastewater is often complex with high COD concentration. COD removals at the MFC were measured at different HRTs. The Surgical cotton wastewater was primarily treated anaerobically in the anode chamber where the anaerobic bacteria degraded biodegradable organic– inorganic materials and the high COD removal was achieved because the cathode process acted as an additional aerobic polishing step following the standard anodic treatment. When a higher output power density is produced, more energy is derived from the respiratory chain. This compels microorganisms to consume more carbon sources to maintain their rate of metabolism.

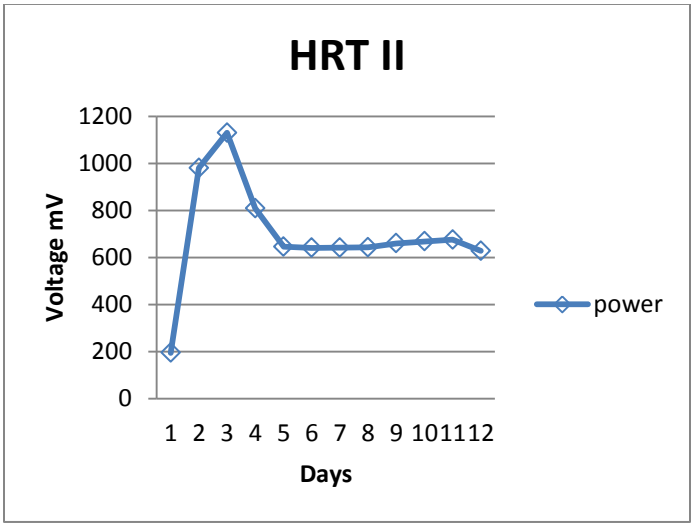
Figure 4.3 shows the maximum COD removal of 71% obtained at 12 days HRT. At the time of 24 days HRT, organic loading was sufficient therefore the microorganisms consumed enough carbon as their food. So at 24 days HRT the COD removal was high as 66%. Overall COD removal decreased from 66% to 30% with an increase in Surgical cotton concentration and organic loading. In this experiment increase in the HRT from 24d to 7 d enhanced the performance of total COD removal from 66% to 30%. At the time of 7 days, organic loading was high compare to 24 days HRT, so the removal decreased to 30%.

COULOMBIC EFFICIENCY

The Coulombic efficiency or charge acceptance is a measure of how much usable energy is available during discharging compared with the energy used to charge the cell. The coulombic efficiency was increased due to the presence of electro genic bacteria, but it may decrease due to high saturation condition in anode surface. At the time of 24 days HRT the coulombic efficiency is low, because at the time production of power density is low. Figure 4.6 shows the coulombic efficiency at different HRT with power density. Due to the effective role of electro genic bacteria at the anode chamber. The power generation was maximum at the HRT of 6 days with the coulombic efficiency of 45%. The minimum efficiency obtained at the HRT of 7 d was found to be 14 %.



Organic loading rate for 1000mg/l of cod



Organic loading rate for2000mg/l of cod

CONCULSION

The present study explains that air cathode MFC operated in continuous mode with surgical cotton industry waste water proved to be efficient for generating electricity.the continuous air cathode MFC achived maximum efficiency at OLR 1000gCOD/l where the highest power density of 34.63 Mv/cm^2 and maximum cod removal of 66% was observed . Hence it is concluded that MFC could be feasible obtion as primary treatment to treat and generate electricity from surgical cotton industry wastewater.

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EFFECT OF HARITAKI AS A RETARDING AND WATER REDUCING ADMIXTURE FOR CONCRETE

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Abstract - Concrete is one of the most important composite materials in construction industry. This paper deals with the study of concrete in hot weather condition and aims to increase the performance of concrete and its workability. To improve the workability and to retard the setting time of concrete, the paper suggests using an admixture called Haritaki which is eco-friendly to environment. The thesis also deals with the properties and reaction of another retarding agent called sulphonated naphthalene formaldehyde (CPLAST 144) and a comparison study is carried out. Setting times of cement pastes prepared with Haritaki at different dosages were determined and it was found that Haritaki addition causes considerable increase in both initial and final setting times. Split tensile and compressive strength were determined on hardened concretes at both early ages (7 days and 28 days). Further the respective tests are proposed to find the optimum content of retarders on the basis of Setting time, Compressive strength and Split tensile test.

1. INTRODUCTION

Concrete is a material composed of coarse granular material embedded in a hard matrix of material that fills the space among the aggregate particles and glues them together. Globally, the ready-mix concrete industry, the largest segment of the concrete market, is projected to exceed $150 billion in revenue by 2017. A large number of retarding admixture products are available in the market. Overdosing of retarders may result in decrease in strength of concrete or failure of structures. Most of the constructions require pumpable and workable concrete. Thus, chemical admixtures are required to be added to the fresh concrete mix. To increase the setting time, achieve high workability in fresh state and desired compressive strength in hardened state of normal concretes, Sulphonated naphthalene formaldehyde and Haritaki based admixture has been incorporated. The setting behavior varies significantly from one brand of cement to another. Hence, it is required to study the compatibility between the retarder and Haritaki replaced concrete before a suitable combination is used, especially when increase in time, high workability, slump retention and required strength are to be obtained.

2. PROPERTIES OF MATERIALS

2.1 *Haritaki*

Haritaki (*Terminalia chebula*) possesses a great therapeutic value and is widely distributed in India. It is an admixture used in medicinary plant. This plant leaves powder, which can be replaced partially with cement. Detail Experimental investigation is done in the laboratory to determine the optimum usage of these herbal products in Concrete, Reinforced concrete structures as well as in prestressed concrete.

Table 2.1 Properties of Haritaki

pH Value	3.5 to 4.1
Cost of Haritaki	50 per kg

2.2 *Sulphonated Napthalene Formaldehyde*

Sulphonated Napthalene formaldehyde is a major ingredient of super plasticizers. It takes role in neutralizing the surface charges on the cement particles and enhancing water tied up in the cement agglomerations and thereafter reducing the viscosity of the paste and concrete. It promotes dispersing of cement particles and reduce water requirements without affecting the workability, thus resulting high strength concrete and lower permeability.

Table 2.2 Properties of Sulphonated Napthalene Formaldehyde

pH value	7.0 to 9.0
Appearance	Brownish colour
Specific gravity	1.19 to 1.24
Cost	190 per litre

2.3 *M-Sand*

Manufactured sand (M-Sand) is a substitute of river sand for concrete construction. It is used as a partial replacement of fine aggregate. It is produced from hard granite stone by crushing. The crushed sand is of cubical shape with grounded edges, washed and graded.

Table 2.3 Properties of M-sand

Bulk density	1.75kg/m³
Specific gravity	2.73 to 4.66
Slump value	55 mm
Sieve size	150 micron to 4.5 mm
Water absorption	2.2

3. MATERIAL TESTING

3.1 S*pecific Gravity*

Specific gravity is the ratio of the density of a substance to the density of a reference substance; equivalently, it is the ratio of the mass of a substance to the mass of a reference substance for the same given volume.

$$G = \frac{M_2 - M_1}{(M_2 - M_1) - (M_3 - M_4)}$$

1.	Fine Aggregate	**2.94**
2.	Coarse Aggregate	**2.85**
3.	Cement	**2.9**

3.2 Water Absorption

Water absorption is the amount of water taken up by the fine or coarse aggregate to achieve the desired consistency or optimal end result.

Water absorption = [(B – A)/B] x 100%

Water Absorption of Coarse Aggregate = **0.5%**

3.3 Particle Size Distribution

Particle size distribution also known as gradation refers to the proportions by dry mass

of a soil distributed over specified particle size ranges. Gradation is used to classify soils for engineering and agricultural purposes.

Fineness Modulus = **8.14**

4. MIX DESIGN

In this study, mix of concrete grade (M_{30}) were produced with partial replacement of Haritaki with water (5%,10%,15%,20% and 25%) The mix design process adopted was the Indian Standard Method. However, a certain amount of water was replaced with Haritaki by its weight of cement. Mix design for M_{30} as per IS 10262:2009 and IS 456:2000 is **1 : 1.58 : 2.71**

5. REPLACEMENT PROPORTIONS OF SETTING TIME TEST

5.1 Haritaki

Replacement (%)	5	10	15	20	25
Initial Setting Time (mins)	30	45	55	75	95

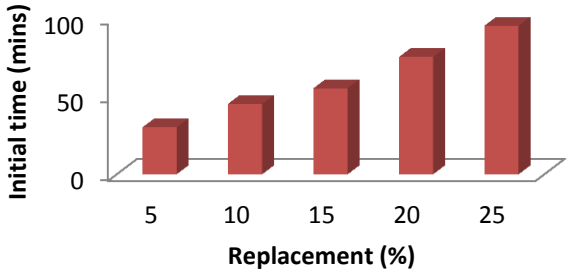


Fig 5.1 Replcement vs Initial Setting time of Haritkai replaced concrete

5.2 Sulphonated Napthalene Formaldehyde

Replacement (%)	0.4	0.6	0.8	1.0	1.2
Initial Setting Time (mins)	45	50	50	80	95

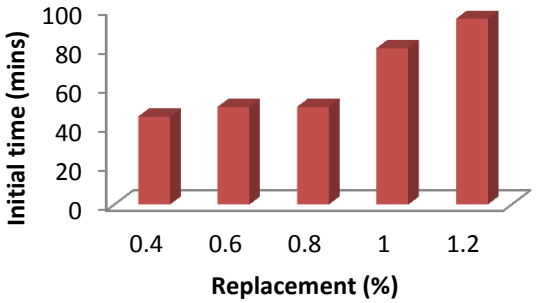


Fig 5.2 Replacement vs Initial Setting Time of retarder replaced concrete

6. REPLACEMENT PROPORTIONS OF COMPRESSION TEST

6.1 Haritaki

Replacement (%)	*Average Compressive Strength of 3 cubes (N/mm²)*	
	7 days	*28 days*
5	20.49	33.93
10	21.6	34.9
15	20.2	31.8
20	19.1	31.3

6.2 Sulphonated Napthalene Formaldehyde

Replacement (%)	*Average Compressive Strength of 3 cubes (N/mm²)*	
	7 days	*28 days*
0.8	23.55	34.48

7. REPLACEMENT PROPORTIONS OF SPLIT TENSILE STRENGTH TEST

7.1 Haritaki

Replacement (%)	*Average Split Tensile Strength of 3 cylinders (N/mm²)*	
	7 days	*28 days*
5	2.56	4.12
10	2.76	4.26
15	2.23	3.84
20	2.14	3.58

7.2 Sulphonated Napthalene Formaldehyde

Replacement (%)	*Average Split Tensile Strength of 3 cylinders (N/mm²)*	
	7 days	*28 days*
0.8	2.86	4.15

8. EXPERIMENTAL INVESTIGATION

8.1 Compressive strength

The cube specimens were tested in the compression testing machine with the capacity of 200 tonnes. The load is applied constantly at increased rate until the specimen is broken. The 28 days strength of cubes with various proportions is compared below. Cube of size 150 mm x 150 mm x 150 mm concrete specimens were casting**.**

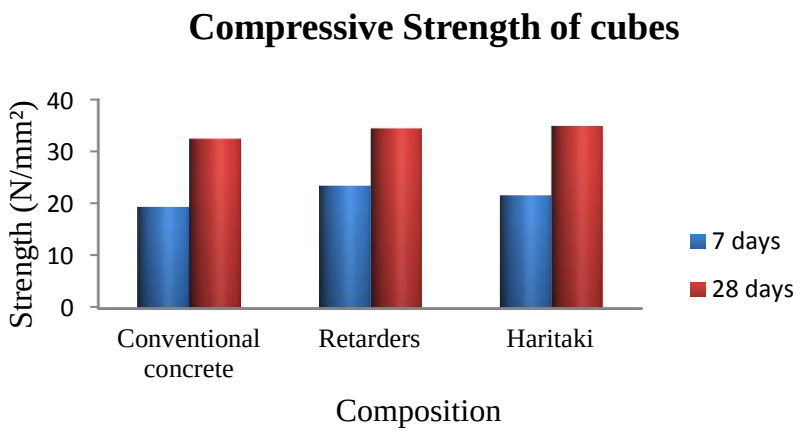


Fig 8.1 Comparison graph for compressive strength of cubes

8.2 Spilt tensile strength

Split tensile strength of concrete is usually found by testing plain concrete cylinders. Cylinders of size 150 mm x 300 mm were casting using M_{30} grade concrete.

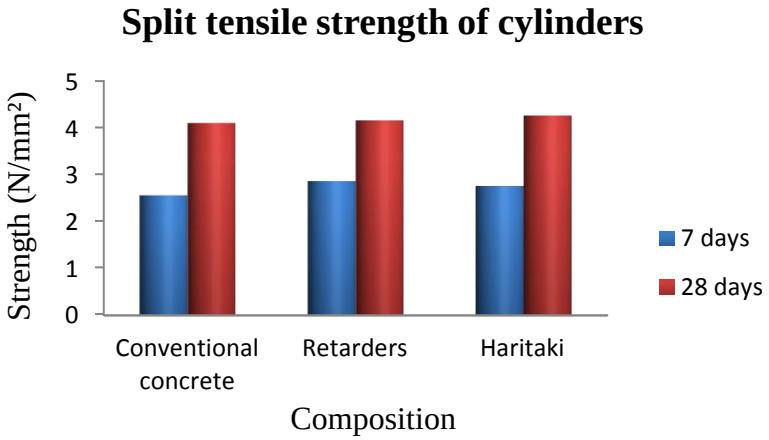


Fig 8.2 Comparison graph for split tensile strength of cylinders

8.3 Setting time

Within the hardening time of cement, it continues to react with water and slowly starts losing its plasticity. This complete cycle is called Setting time of cement. Retarders and Haritaki shows increase in setting time.

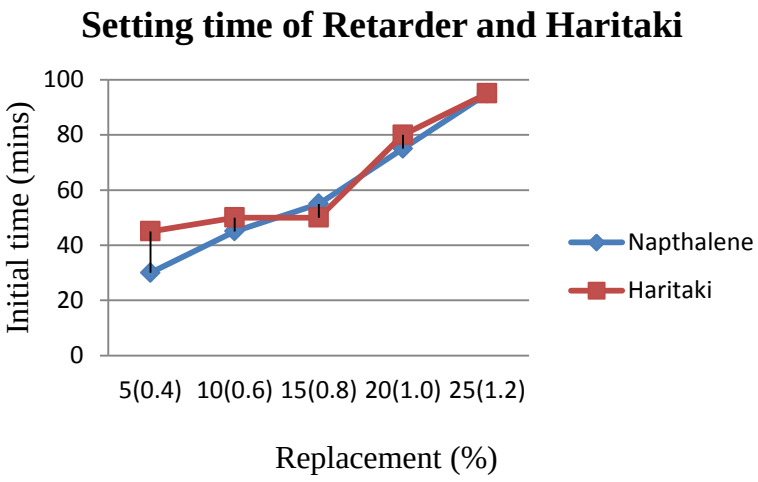


Fig 8.3 Comparison graph for setting time

9. DISCUSSION

- M_{30} concrete mix was designed.
- Consistency and setting time for various replacement of retarders and Haritaki based on mass of cement was determined.
- Compressive strength and split tensile strength was checked for the M_{30} concrete, retarders and Haritaki replaced concrete cubes which was found to be satisfiable.
- Comparison graphs were drawn on the setting time study between the various replaced concrete cubes.
- From the comparison it was inferred that the setting time of concrete gets increasing but 10% replaced concrete has a high strength capacity.
- Hence 10% - 15% replacement of concrete is found to be the Optimum content from all the trial methods carried out.

10. CONCLUSION

The retarder was used as an admixture in concrete at hot weather condition to extend the initial setting time of concrete. The properties of specifications are studied carefully to manufacture the concrete with retarding admixtures. The initial setting time was extended and the improvement in compressive strength was also achieved at an appropriate level of using the retarders. The setting time of Haritaki is gradually increasing for each 5% replacement, but 10% is suitable for achieving the required high strength of concrete. Hence the optimum dosage of Haritaki in replacement with water is found to be 10% - 15%. It is evident that the over dosage of admixture results in the decrease in strength of concrete.

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EXPERIMENTAL STUDY ON DURABLE CONCRETE BY PACKING DENSITY METHOD USING MSAND

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ABSTRACT

Packing density method is new kind of mix design method used to design different types of concrete. Concrete is widely used construction material. There has been phenomenal growth in research and development activities to develop high performance concrete. However, high standards of durability are not being achieved in practice. We have witnessed large number of existing structures which after a few years of construction have started showing signs of distress. This remains a big challenge for the engineer's technicians to ensure the proper quality control of the raw material. This experimental project gives the service life of reinforced concrete. This papers also gives an overview of the factors that make the concrete durable starting from the mix design process to the selection of suitable materials, mixing, transporting, placing, compaction and efficient curing. Emphasis needs to be given during process of concreting to obtain desired fresh and hardened properties of concrete by way of conducting proper checks and trails.

Key words: *Durability; strength; service life; mix design; packing density*

1. INTRODUCTION

The normal economic life of a RCC structure in India is 75 years (CPWD works manual 2014). If the structures last for this lifespan or more it helps in reducing the depletion of natural resources and wastes. This reduces the environmental impact and the cost of repairs and replacement. Hence durability has to be insured in an RCC structures. Since environmental factors differ from place to place, durability is site specific. The ingredients of concrete, their mix proportion, interaction between the material, placing compaction, curing and external environment determine the durability and life of concrete.

In construction of project if good practice is not adopted that would affect the durability. This would need regular repair and rehabilitation work and would also reduce the design service life .therefore such extra cost due to lack of quality would consume more resources.

It is really alarming that some of the RCC structure which were constructed 35-40 years ago are in very bad conditions and even at many places had to be pulled down due to safety requirements and large rehabilitation costs. Corrosion has been noticed in many structures. Reasons of corrosion due to bad quality of construction without quality assurance and quality construction such as w/c ratio ,quality cement chlorides in water quality of reinforcement cement content chlorides in water ,quality of reinforcement ,cement content ,impurities in concrete and other to the external environment such as moisture, oxygen ,humidity, temperature, etc.,

1.1 Scope Of The Study

- Strength and performance increase in concrete
- Environmental protection by using m-sand
- Economical consideration

1.2 Objectives

- The main objective of this project is to study the influence of fully replacement of M-sand in concrete.
- To determine the mechanical and durability properties of concrete like flexural strength, tensile strength, Compressive strength.
- To experimental study and compare the performance of conventional concrete.

2. MATERIALS AND METHODOLOGY

2.1 Coarse Aggregate

The coarse aggregate which is used throughout the experimental investigation are naturally irregular and partly rounded (angular) at the edge having 12.5mm and 20 mm size of aggregate. Sieve analysis of coarse aggregate is performed on both the samples to determine the particle size distribution of coarse aggregate. As per IS: 383-1970 grading of coarse aggregates were confirmed as well graded aggregate for both sample**.** The specific gravity of 12.5 mm and 20mm coarse aggregates was found to be 2.9122 and 2.9376.

The role of aggregate in concrete countertop mix formulas. Aggregate in concrete in structural filler but role is very important its carry the load. Aggregate occupies most of the volume in concrete. It is the stuff that cements paste coats and bind together.

2.2 *Cement*

In the study, Portland pozzolana cement (PPC) is a kind of blended cement which is produced by either inter grinding of OPC clinker along with gypsum and pozzolanic materials. PPC confirm to IS: 1489:1991-part-1. The cement used was fresh and without lumps. Advantages of PPC: Low heat of hydration, Reduction in water demand, Reduced bleeding due to high fineness of cement and Resistance to chloride attack. The specific gravity of cement was found to be 3.14.

Cement is a binder material, a substance used for construction that sets, hardens and adheres to other materials, binding them together cement used in fine aggregate to produce the mortar for masonry, or with sand and gravel aggregate to produce concrete.

2.3 Fine Aggregate

The sand is to fill the voids between coarse aggregate. The voids in the sand is filled by the cement the main function is to reduce the shrinkage of mortar of concrete. Manufacture sand can be of a coarse and angular texture than natural sand, which is smooth and rounded due to natural gradation. This can lead to more water and cement requirement to achieve the workability, and strength of concrete. Sieve analysis of M-sand is carried out and it belongs to zone II. The specific gravity of M-Sand is 2.678.

2.4 Water

Water fit for drinking is generally considered fit for making concrete. The water should be free from acids, oils, alkalis, vegetables or other organic impurities. Soft water also produces weaker concrete. Water has two functions in a concrete mix. Firstly, it reacts chemically with the cement to form a cement paste in which the inert aggregates are held in suspension until the cement paste has hardened. Secondly, it serves as a vehicle or lubricant in the mixture as fine aggregates and cement. Portable water is used for both mixing concrete and also for curing.

2.5 Mix Design

The mix was designed by referring the journal IOSR dept. civil vol.11 issue 2 for M25, M30, M50 grade concrete with 0.54, 0.50, and 0.38 water cement ratio. Concrete mixes are prepared by fully replacement of natural sand by manufactured sand respectively.

2.6 Test procedure

The cubes, beam and cylinders are casted and cured for 7-days and 28-days to achieve the desired strength. Cubes are tested under compressive loads using compression testing machine (CTM) beam are subjected to flexural using universal testing machine(UTM) and cylinders are subjected to tensile load i.e; load perpendicular to the axis line using CTM. Thus compressive strength, flexural strength and split tensile strength are tested.

3. RESULT AND DISCUSSION

It is clear that fine aggregate particles are required more in case of packing density method compared to IS code method. Therefore, water and cement required in case of packing density method is more. In case of IS method coarse aggregate 20mm and 12.5mm down sizes are graded based on sieve analysis results but in case of packing density method aggregates quantity are decided based on actual packing of particles. Coarse aggregate particle 20mm and 12.5mm downsize required will be more in case of packing density method compared to IS method. But both the methods have resulted in nearly same compressive strength, split tensile strength, flexural strength at 7days and 28 days curing. Coarse aggregate particle may also contribute towards the strength along with bond. In case of packing density, finer aggregate particles required are more and paste required is also more. In this case contribution to the strength due to bond area may be more.

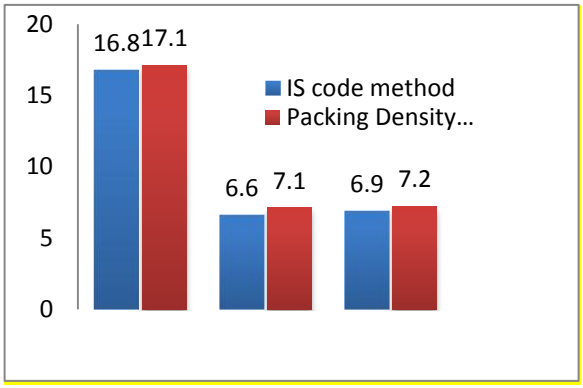


Chart1: 7 days curing test for M25

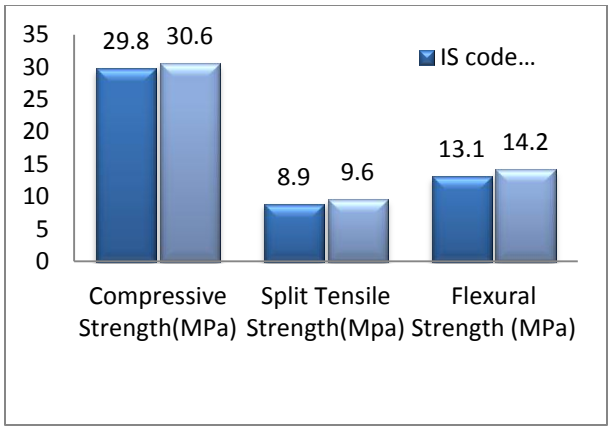


Chart 2: 28 days curing test for M25

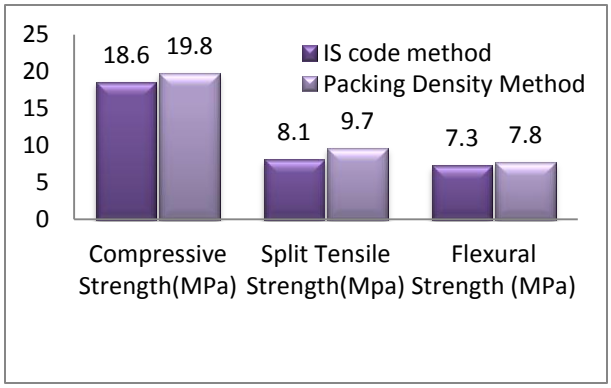


Chart 3: 7 days curing test for M30

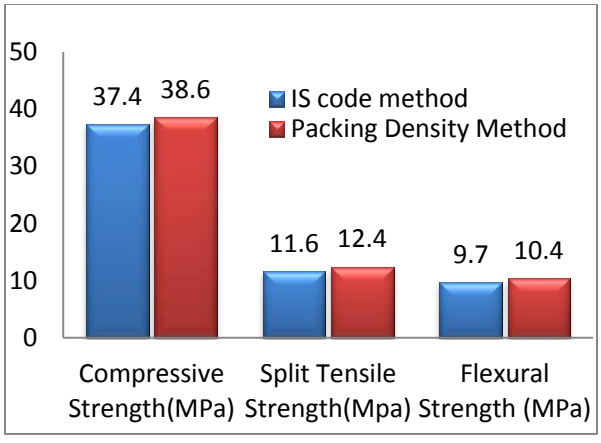


Chart 4: 28 days curing test for M30

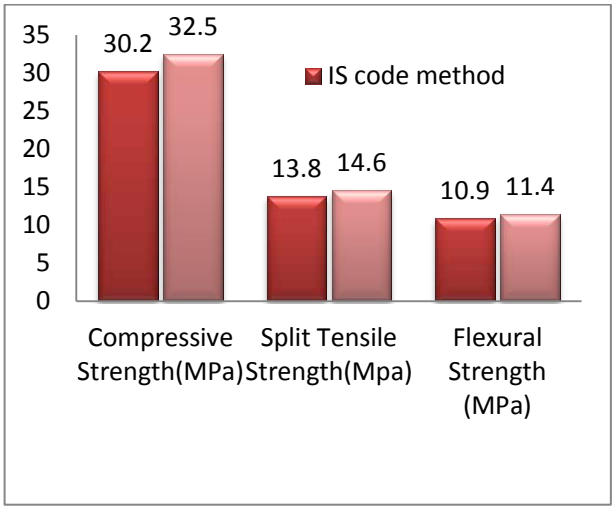


Chart 4: 28 days curing test for M50

4.Conclusion

Durability of concrete needs major consideration while designing, construction and maintenance RCC structure. Factors deteriorating durability include poor design, poor construction in terms of high w/c ratio, inadequate compaction, inadequate curing, inadequate cover, wrong placement of reinforcement, inadequate precaution of chlorides, sulphates, use of reactive aggregate, use of poor graded aggregate , use of hard water, not taking adequate precaution for shrinkage, thermal movements, deflection and environmental factors.

Finalized Mix Proportions Designed By Packing Density Method

Grade of concrete	w/c ratio	Excess paste content (%)	Water content (kg/ m^3)	Cement content (kg/ m^3)	Wt. of fine aggregate (kg/ m^3)	Wt. of 12mm coarse aggregate (kg/ m^3)	Wt.of 20mm coarse aggregate (kg/ m^3)
M25	0.54	15	148.797	275.55	789.623	355.33	828.26
			0.54	1	2.865	1.28	3
M30	0.50	20	150.89	301.078	778.48	350.31	817.4
			0.5	1	2.586	1.164	2.715
M50	0.38	40	156.126	410.859	771.66	330.71	771.69
			0.38	1	1.878	0.804	1.878

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1. In packing density method, paste content in excess of void content will increase with the increase in grade of concrete.
2. In case of packing density method water cement ratio decreases with increase in grade of concrete.
3. The water and cement content for packing density and IS code method is nearly same for any particular grade of concrete.
4. The fine aggregate particles required are more in case of packing density method compared to IS code method. Therefore, water and cement required in case of packing density is more.
5. The fine aggregate and coarse aggregate 20mm down size required is more in packing density method and coarse aggregate 12.5mm down size required is more in IS method. But the cube compressive strength results at 7 days and 28 days curing age obtained by both the methods are nearly same.

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A SYSTEM TO ANALYSE AND SUGGEST HEALING METHODS FOR CRACKS IN RCC STRUCTURES USING IMAGE PROCESSING ALGORITHMS

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Abstract

Cracks on the concrete are like warning to the failure of the structure. It is like cancer to the building if ignored or diagnosed wrongly it may leads to critical damage. So it is necessary to detect the crack initially and repair it with correct method. In fact, early detection allows preventive measures to be taken to prevent damage and possible failure. By considering the morphological approach in MATLAB, this project designs software which reads the image of the crack given by the user and predicts the width of the crack. Repair and rehabilitation plays the major role in civil engineering. But the awareness among the people is very low and hence the wrong healing methods are suggested. Thus, the main aim of the project is to inform the user about the behavior of cracks in various structural elements like beams, columns, walls, etc., and remedial measures to be taken to rectify the defect using software without causing further development of the crack. The user has to upload the picture of the damaged structure into the software along with the certain information regarding the crack. It processes the image and provides the results in the order of crack width, crack type, possible causes and the remedy. This software is a timely help for the residents as well as construction workers in early detection of damage to the buildings.

Keywords: *Crack; Image processing; Grayscale; Edge detection; ROI mask (Region of Interest); Spur pixels.*

INTRODUCTION:

Practically, no buildings are ideal. Every building will undergo various effects like wear and tear, soil settlement, climate etc,. Thus cracking in buildings may occur. The cracks in buildings cannot be avoided but it can be controlled from further development. The appearance of distortions and cracks can be visually unattractive and disconcerting for occupants, and if left untreated, they can affect the integrity, safety and stability of the structure. The characteristics of the cracks on the structural surface show the earliest degradation level and carrying capacity of the concrete structures. Traditional human inspection procedures are very slow. The owners who do not know about the repair of cracks may cheat by masons or contractors by the maintenance. This may lead to failure of the structure in a short period of time. But it is not possible for all to study about the cracks and its repairing

methods. Now-a-days people are interested in using software because of its easy working. Processing the image and giving the results are very easy and also user friendly

OBJECTIVE:

- To determine physical mechanisms by which cracks form and to identify the root causes of the occurrence.
- To classify the various crack types by establishing a crack formation database that includes the mechanism, cause and geometrical characteristics of the crack.
- To develop a software that can be used to detect and rectify cracks by suggesting healing measures.

METHODOLOGY:

Our project flows through image acquisition, pre-processing, image processing, crack detection and parameter estimation.

The **Image acquisition** is defined as the process of retrieving image from any sources. The image is then used for processing further steps. The image should be clear enough to process and to get required details.

The **Pre-processing** is a common name for operations with images at the lowest level of abstraction both input and output are intensity images. The aim of pre-processing is an improvement of the image data that suppresses unwanted distractions or enhances some image features important for further processing.

The **Image processing** is processing of images using mathematical operations by using any form of signal processing for which the input is an image, a series of images or a video, such as a photograph or video frame; the output of image processing may be either an image or a set of characteristics or parameters related to the image. Most image-processing techniques involve isolating the individual color planes of an image and treating them as two-dimensional signal and applying standard signal-processing techniques to them.

The **crack detection** refers as the analysis of the crack based on the inbuilt images. The process involves the detection of the characteristics of the crack. Then, the user given crack is matched with the inbuilt crack. The detection is based on image processing software and other image based software.

The **Parameter estimation** is the process next to the crack detection. Various parameters like length of crack, width of crack, environmental condition, reason for crack, etc., are estimated by comparing with the inbuilt images.



Fig. 1: *Overall process*

BLOCK DIAGRAM:

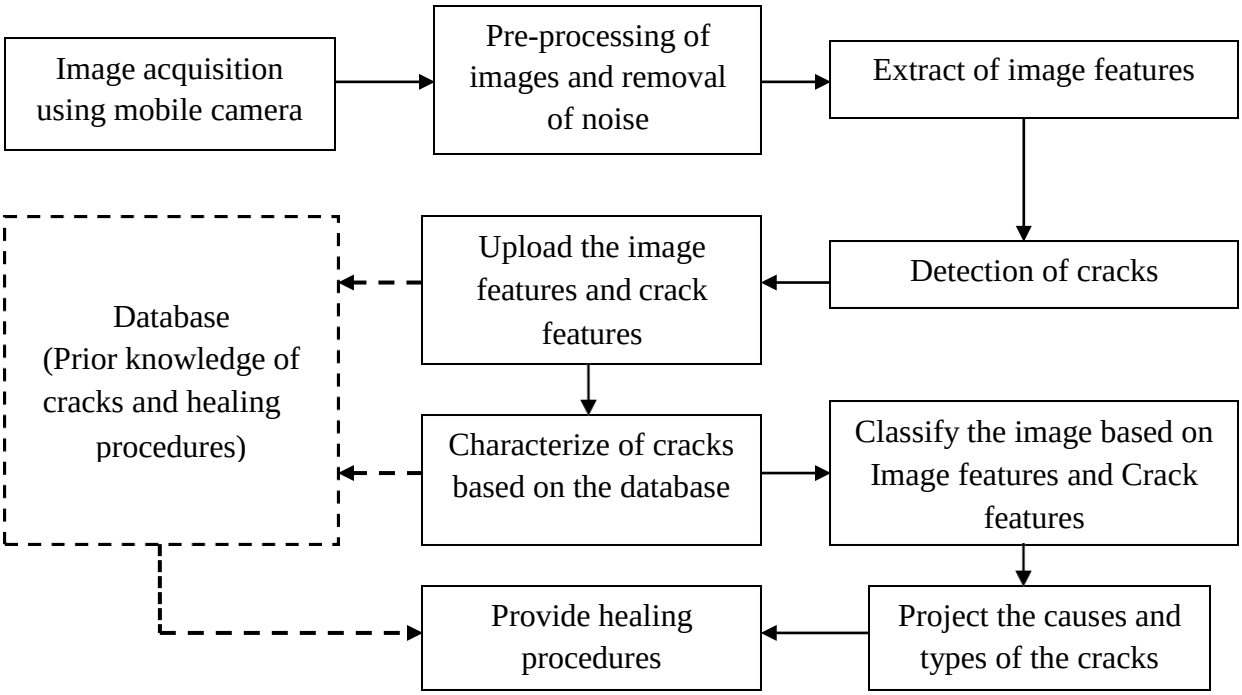


Fig. 2: *Overall architecture of the proposed system*

DETECTING THE WIDTH OF THE CRACK:
STEPS INVOLVED:

- Grayscale conversion.
- Cleaning, Thinning, and Filling.
- Laplace of Gaussian (Edge detector).
- Region of Interest (mask).
- Hough transform.
- Pixel to Universal standards (mm).
- Graphical User Interface (GUI).

DATA ACQUISITION:

The data that were used for this research comprised of a total of 500 images of various resolutions and aspect ratios. Most of the images were taken from the residential buildings, in and around Sivakasi and Srivilliputtur and some of the images were downloaded from the internet using Google image search. The image of the concrete should not contain any object other than concrete. Otherwise, due to the use of the edge detection technique, the models detect the edges of the objects as cracks. Also, if the human eye itself cannot see the crack in the image, neither can any of the models in this research. The crack has to be at least visible no matter how much noisy the surface of the concrete is, only then it is possible to detect cracks using these models.

IMAGE PROCESSING:

Any image contains irrelevant extra information which needs to be removed by preprocessing to facilitate the process of crack recognition by making it more efficient and time saving. Various approaches in preprocessing of images have been used till now, of which the following steps have been adopted.

Resizing:

All the images are resized to a size of 256 X 256 pixels. This step provides uniformity and saves computational time at the cost of loss of some information in the image. Also, with the kind of crack detection models that have been developed till now, resizing the image is a necessity for the models to work.

RGB- Grayscale Image Conversion:

An image can be represented in terms of three color components: red(R), green(G) and blue(B). Each pixel in a RGB image is made up of an integer value of each of R, G and B that lies between (and includes) 0 and 255. In grayscale images, each pixel is represented with a single value between 0 and 255, where 0 corresponds to black and 255 to white. This value indicates the degree to which each pixel lights up, or the luminance (Y) of that pixel. The formula for conversion of images from RGB to grayscale is given by:

$$Y = 0.299R + 0.587G + 0.114B$$

The images are converted from RGB image to grayscale after resizing them. This is necessary to eliminate the effects of most of the color differences in the images.

LOG Edge detection:

This method of edge detection is based on the calculation of the gradient in an image. This operation detects an edge wherever there is a steep gradient, i.e., a change in color or luminance. A binary image is an image which is either strictly black or strictly white in color and can be represented as a matrix of 0's and 1's. All images are automatically converted to binary images by MATLAB while detecting edges.

Morphological Operations:

Several morphological operations are then performed on the detected edges for noise reduction and for joining some of the cracks that appear fragmented upon edge detection. Following are the steps involved:

- **Close:** This is the morphological process by which small holes in the objects are filled. It is the process of dilation followed by erosion.
- **Bridge:** Bridging sets '0' valued pixels to '1' if they have two non-zero neighbors that are not connected. This is a useful operation as using edge detection sometimes results in a fragmented crack. Some of these fragmented cracks are then joined with this operation if they are very close to each other. This operation may also result in the joining of two nearby objects that are noise, but the pros of joining cracks that are fragmented far outweigh the cons of joining noise because joining results in a

negligible increase in the area or ratio whereas joining two cracks drastically increases the area and ratio of the objects, which in turn increases the accuracy of the models.

- **Spur:** This removes individual pixels that are only diagonally connected at the border of an object in a binary image, called 'spur pixel'. This process ends up removing pixels from cracked objects as well as noise, but the benefits of removing spur pixels from noise outweigh the disadvantages of removing those from cracks because removing the pixels results in a much larger percentage – wise reduction in the area of noise than of cracks. This, like bridging, is helpful for the models.
- **Clean:** This process converts isolated 'on' pixels (single 1's surrounded by 0's) to zero. These objects are the easiest to classify as noise, so this step has been used only because it helps in noise reduction. This reduces the number of objects to be classified in the image (for the object approach) and saves computational time.
- **Connected – component Labeling:** In this operation, all the connected regions of an image are numbered serially. Labeling facilitates the identification of continuous, connected regions i.e., objects and their various properties in the next step.
- **Object properties:** The final step in image processing is to identify the object properties. These properties form the basic for crack detection. The choice of properties should be such that it enables and facilitates the differentiation between noise and cracks.

Following are the properties chosen:

- **Area:** The area of any object in an image is the total number of pixels that make up the object. The reason behind choosing this property is that in general, the area of
- cracks is higher than the area of noise.
- **Major- Minor Axes Ratio:** The major and minor axes are the longest dimension of any object and the longest dimension perpendicular to the major axes at its midpoint such that the ellipse of these two dimensions as major and minor axes completely contains the given object. This property is chosen because the major- minor axes ratio is generally high for cracks as they are elongated whereas it is low for noise.

OUTPUT:

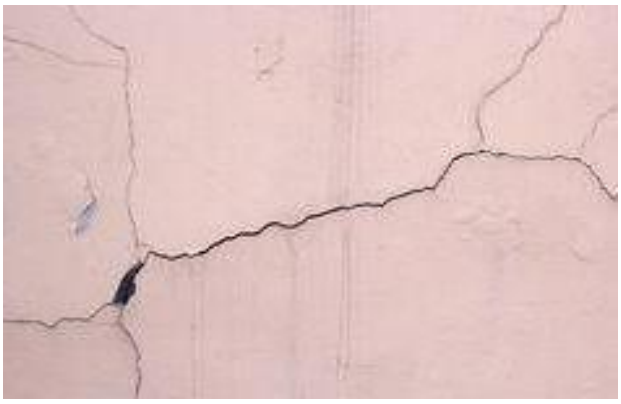


Fig.3 : Image taken for analysis

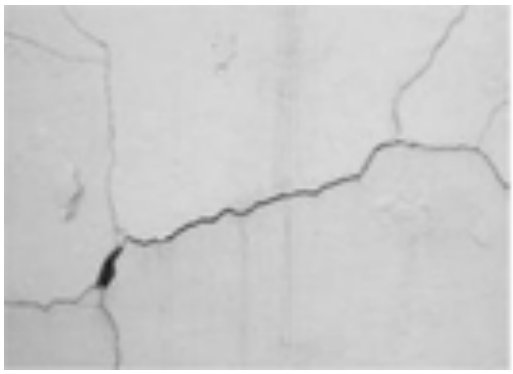


Fig.4 :Grayscale Image



Fig.5 : LOS Edge detector



Fig.6: ROI image

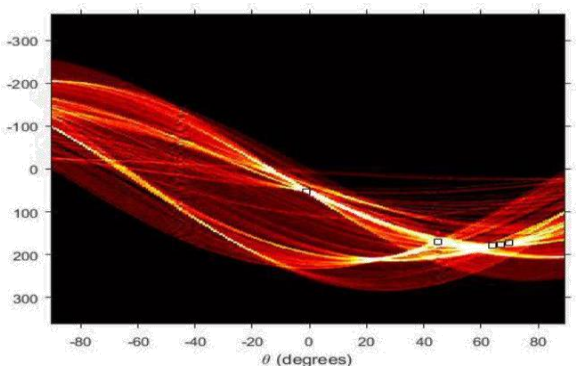


Fig.7: Super imposed image representing pixels

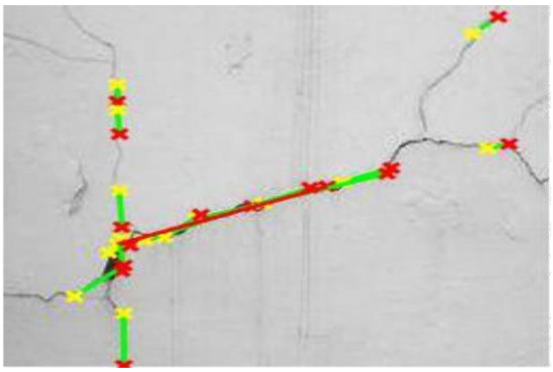


Fig.8: Super imposed image representing the crack

CRACK DETAIL
width of the crack is 7.21 mm

REASON:
Improper plastering/low quality material

REMEDY
CUTTING AND GUNITING
remove loose particles, dust, dirt, grease etc..Use wire brush.Rub old surface with sand paperfill the holes and cracks with gypsum.Distempered is applied after the prime coat.Allow to dry.

Fig.8: Suggesting Healing measures to the Crack

CONCLUSION:

This paper presents a digital image based crack detection method to inspect and to quantify cracks due to their high significance in making an assessment of structural damage in the aging civil infrastructure. In this method, images patches which are created by forming a grid for original images of equal size are used for both training and testing purpose. The proposed crack detection system tested on different datasets of the concrete surface images prepared in the real environment. From the obtained results, it is envisaged that the proposed system is robust enough to detect crack efficiently with improvement to the current inspection procedure resulting a reliable approach to access the civil concrete infrastructure for structural deformation. Analysis of a 3D image for predicting the depth of the crack and according to that determining the volume of healing materials to be used will be the theme for the future researchers.

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Shape and Size effect on Mechanical Properties of Pervious Concrete

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Abstract-In this paper, influence of the different shape and size of specimens on the properties such as compressive strength, split tensile strength and flexural strength of pervious concrete was investigated. The value of aggregate-cement ratio and water-cement ratio was kept constant as 3.2 and 0.4. It also focuses on permeability of pervious concrete. In order to find out the result of specimen size on mechanical properties, "cubes" of size 100 x 100 x 100 mm, 150 x 150 x 150 mm, 200 x 200 x 200 mm, "cylinders" of size 50 x 100 mm, 100 x 200 mm, 150 x 300 mm were casted. Beams" of size 100 x 100 x 200 mm, 150 x 150 x 300 mm, 200 x 200 x 400 mm were also casted to check the size effect on flexural strength. Testing was carried out at a period of 28 days. Size of the aggregate used was 10 mm. The slenderness ratio of 1, 2, and 2 was adopted for cube, cylinder, and prism respectively. Experimental results indicate that smaller the size of specimen compressive strength, split tensile strength and flexural strength increases. The reduction aspect of properties of pervious concrete, particularly with increasing the slenderness ratio (L/D) was seen as a matter of great worry. With the results achieved the correction factor has been developed for the further experimental investigations in pervious concrete.

Keywords: Size effect, Specimen Shape, Pervious Concrete, Slenderness ratio

1 Introduction

Pervious concrete which is also known as the no-fines, porous, gap-graded, and permeable concrete and enhance porosity concrete has been found to be a reliable storm water management tool. By definition, pervious concrete is a mixture of coarse aggregate, cement, water, little to no sand (fine aggregate) ,with or without admixtures. It has just enough cementitious paste to coat the coarse aggregate particles while preserving the interconnectivity of the voids. It consists of 15% to 35% voids, allowing for quick drainage. Due to increased void ratio, water is conveyed through the surface and allowed to infiltrate and evaporate whereas conventional surfaces will not do so. In late 1940s and early 1950s the no-fines concrete had been used for the construction of high rise buildings due to its light weight. For porous concrete, water permeability is the main specification requirement instead of its strength and continuity of the open porous is the main concern in the production of porous concrete. The high water permeability of porous concrete makes it to be considered as an environmentally friendly concrete.

Pervious concrete can be used in a wide range of applications, although its primary use is in pavements which are in: residential roads, alleys and driveways, low volume pavements, low

water crossings, sidewalks and pathways, parking areas, tennis courts, slope stabilization, sub-base for conventional concrete pavements etc.

The proposed laboratory work is intended to study the effect of specimen size and shape on the mechanical properties of the pervious concrete. Specimens of various sizes and shapes were cast with square and circular cross sections i.e, cube, prism, cylinder to investigate the compressive strength, flexural strength, split tensile strength at 28 days. Subsequently the compressive strength will decrease with increase in the size of the specimen.

2 Experimental Program

2.1 Physical Properties of materials

Pervious concrete mixes with aggregate cement ratio of 3.2:1 and water cement ratio of 0.4 were prepared containing Portland pozzalano cement (PPC), aggregate of 10 mm, water in a stable form. The physical properties of aggregate were studied experimentally and it is tabulated below.

Table 1. Physical properties of aggregate

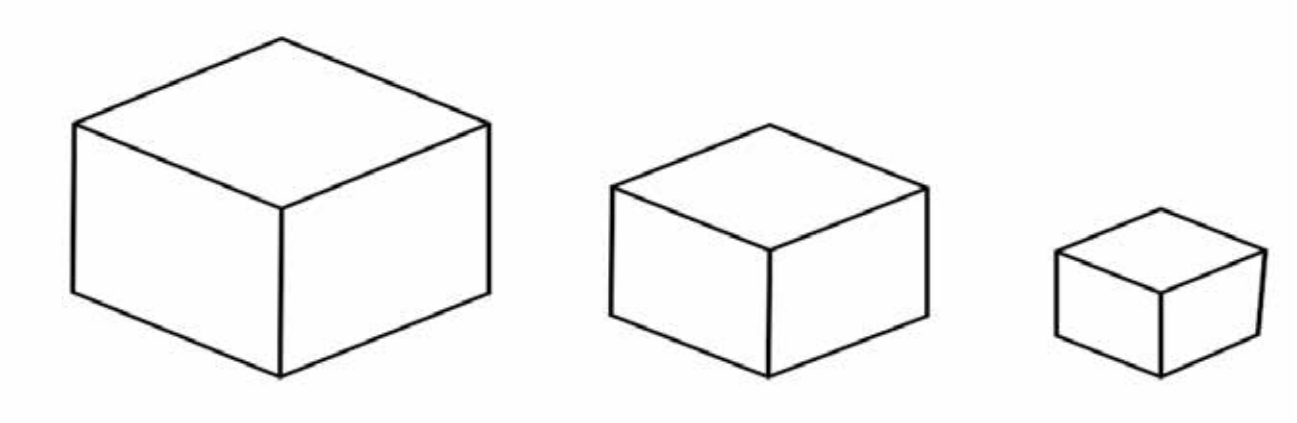
Specific gravity, G	2.39
Impact value	13.46%
Crushing Strength	24.46%
Abrasion value	57.2%
Water Content	0.5%
Fineness Modulus	7.93%

2.2 Specimens

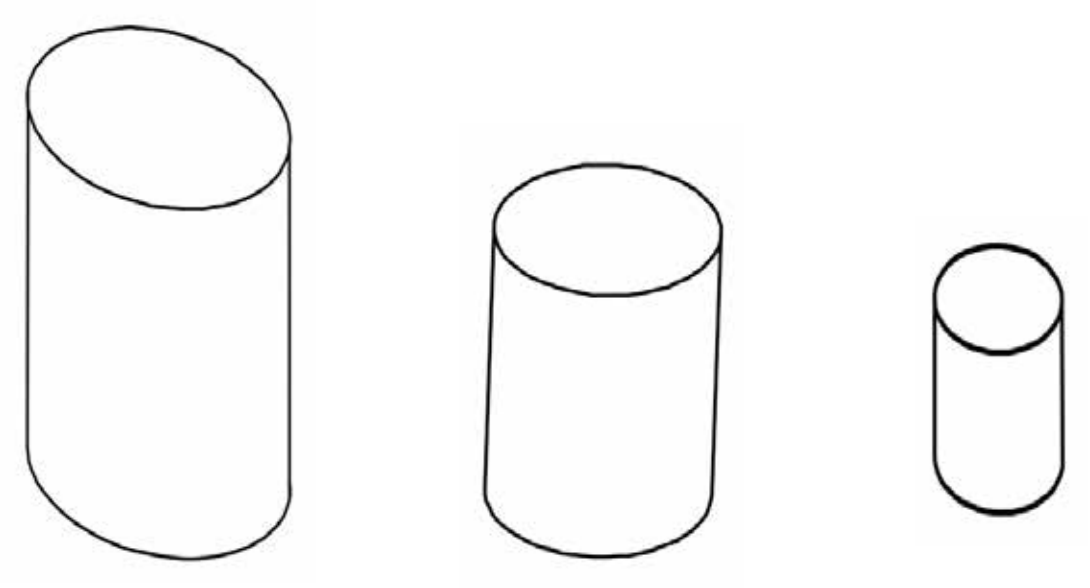
Three different shapes of specimen (cube, cylinder, and prism) with l/d of 1, 2, 2 respectively with mix ratio 1:3.2 and the water cement ratio 0.4. Three sizes of specimen were cast for each shape of specimen which is listed in the table below.

Table 2. Size of Specimen

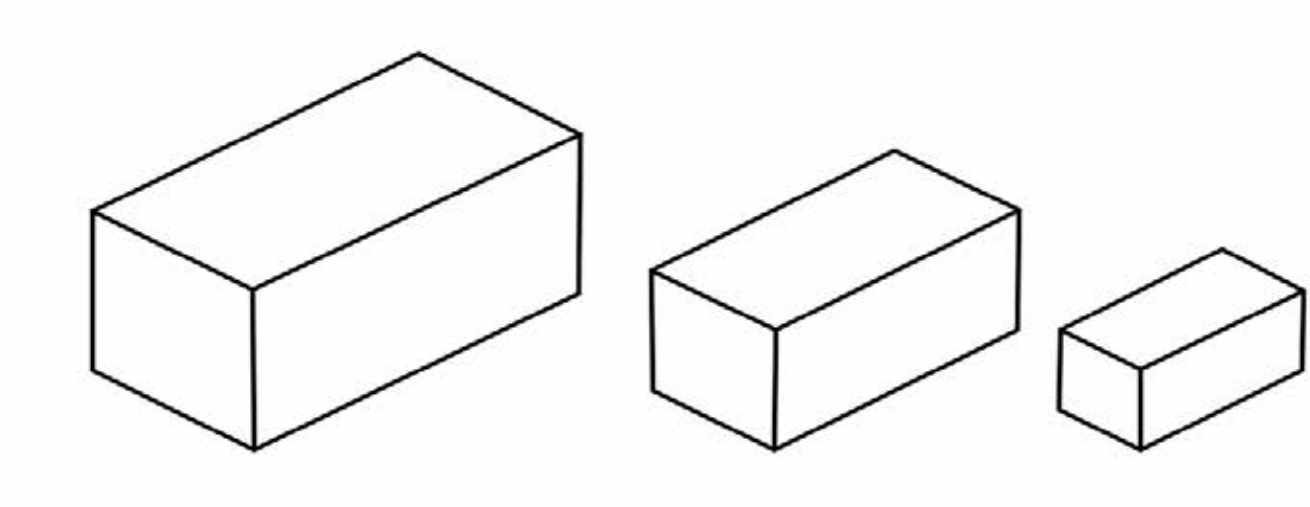
Cube	100x100x100 mm, 150x150x150 mm, 200x200x200 mm
Cylinder	50x100 mm, 100x200 mm, 150x300 mm
Prism	100x100x200 mm, 150x150x300 mm, 200x200x400 mm



(a) 200x200x200 mm (b) 150x150x150 mm (c) 100x100x100 mm



(d) 150x300 mm (e) 100x200 mm (f) 50x100 mm



(g) 200x200x400 mm (h) 150x150x300 mm (i) 100x100x200 mm

2.3 Curing

After demoulding, samples were wrapped with the gunny bag and water was sprayed five times a day (as shown in figure 2). Samples were unwrapped on day 27(28 day strength) and it is allowed to dry under sunlight for 24 hours before the samples are tested.



Figure 2. Samples wrapped in gunny bag for curing

3 Results and Discussions

The compression test was carried out in accordance with MS 26: Part 2: 1991. Testing was carried out in the compression testing machine (Figure 3) with a loading rate of 0.3 N/ (mm^2.s)



Figure 3. Compression testing machine, with 2000 kN loading capacity

Table 3.Experimental results for the samples

Shape	Specimen Size in mm	Density in kg/m^3	Load in kN	Compressive Strength at 28 days in N/mm^2
Cube	100 x 100 x 100	2010	73.1	7.31
	150 x 150 x 150	1822	115.2	5.12
	200 x 200 x 200	1694	181.6	4.54
Cylinder	50 x 100	2280	14.78	7.53
	100 x 200	2095	49.22	6.27
	150 x 300	1821	95.73	5.42
Prism	100 x 100 x 200	2450	27.33	5.47
	150 x 150 x 300	2320	49.48	4.40
	200 x 200 x 400	2041	75.71	3.78

Table 4. Compressive Strength comparison between Samples A

SAMPLE A	Cube 100	Cube 150	Cube 200	Cylinder 50	Cylinder 100	Cylinder 150
Cube 150	-29.96%		+12.78%	-32.01%	-18.34%	-5.54%
Cylinder 150	-25.85%	+5.86%	+19.38%	-28.02%	-13.56%	

Inference:

From Table 4, there is 5.54% compressive strength increases, when the l/d ratio of cube and cylinder increased from 1.0 to 2.0. For comparison of same l/d ratio 29.96% compressive strength increases for 100 mm cube and 12.78% compressive strength reduction in 200 mm cube with respect to standard size of cube (150 mm cube). There is 5.86% compressive strength reduction, when the l/d ratio of cylinder and cube reduced from 2.0 to 1.0. For comparison of same l/d ratio 28.02% and 13.56% compressive strength increases for both 50 mm cylinder and 100 mm cylinder respectively with respect to 150 mm cylinder.

Table 5. Correction Factor for Cube

S.No	Specimen Size in mm	Average Compressive Strength in N/mm^2	Correction Factor
1.	100 x 100 x 100	7.31	1.43
2.	150 x 150 x 150	5.12	1
3.	200 x 200 x 200	4.54	0.89

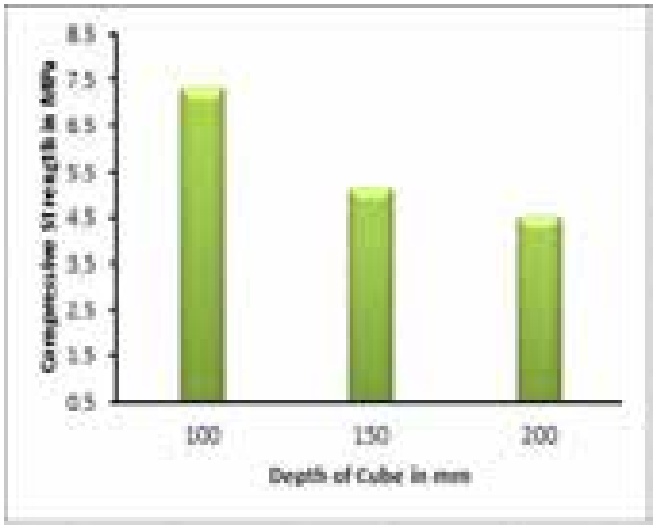


Figure 4. Decreases of compressive strength with the increase of depth

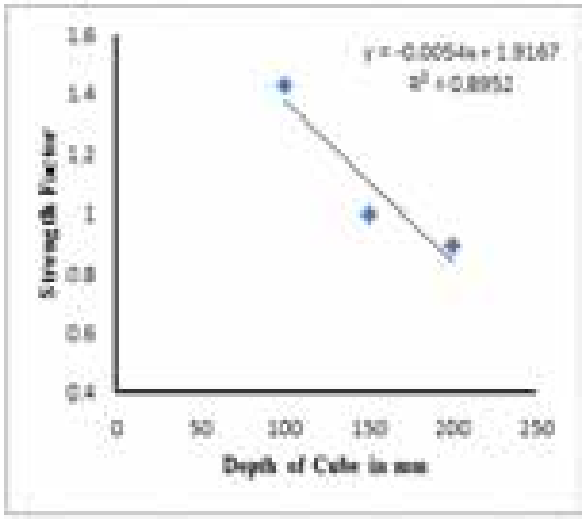


Figure 5. Strength Factor (w.r.t., 150 mm cube) vs Depth of cube

Inference:

From Figure 4 and Figure 5, it can be concluded that the compressive strength of concrete decreases linearly with the increase of cube depth. This also confirms the presence of a size effect where the nominal compressive strength at failure decreases with the specimen size increases. From Figure 5, the following empirical equation can be proposed:

$$y = -0.0054\,x + 1.9167$$

Where,

y = the ratio of the given sample strength to 150 mm cube strength

x = Depth of cube in mm

Table 6. Correction Factor for Cylinder

S.No	Specimen Size in mm	Average Compressive Strength in N/mm^2	Correction Factor
1.	50 x 100	7.53	1.39
2.	100 x 200	6.27	1.16
3.	150 x 300	5.42	1

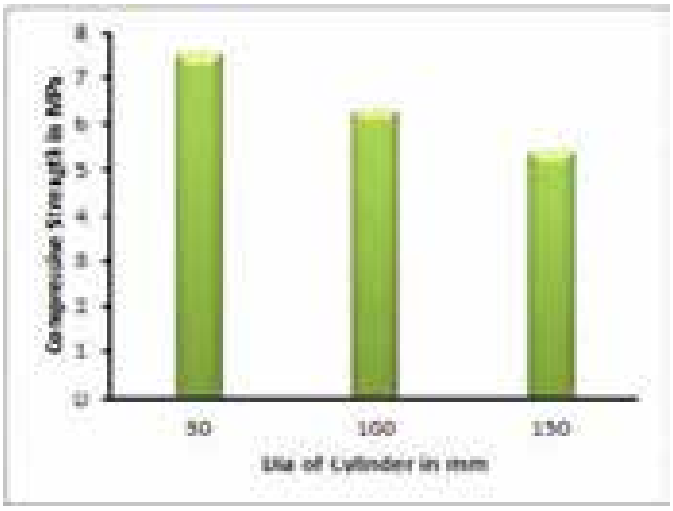


Figure 4. Decreases of compressive strength with the increase of depth

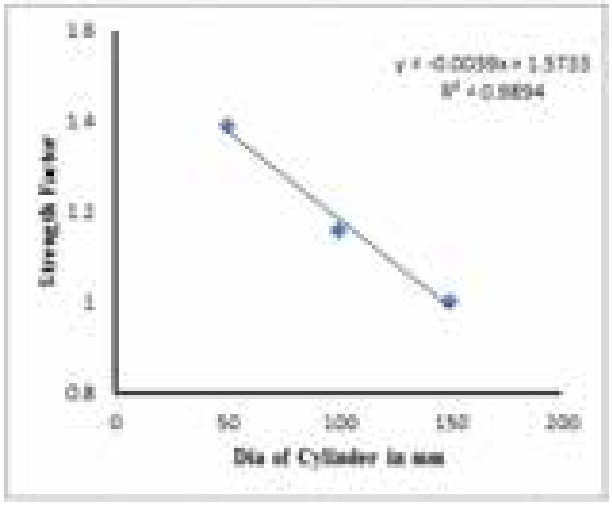


Figure 5. Strength Factor (w.r.t., 150 mm cube) vs Depth of cube

Inference:

From Figure 4 and Figure 5, it can be concluded that the compressive strength of concrete decreases linearly with the increase of cylinder diameter. This also confirms the presence of a size effect where the nominal compressive strength at failure decreases with the specimen size increases. From Figure 5, the following empirical equation can be proposed:

$$y = -0.0039\ x + 1.5733$$

Where,

y = the ratio of the given sample strength to 150 mm cylinder strength

x = Diameter of cylinder in mm

4 Conclusions

The effect of size and shape of a specimen on the pervious concrete compressive strength was examined. From the experimental test results, the following conclusions may be derived:

1. The strength of cube specimens increases with the decrease of specimen sizes of same slenderness ratio due to frictional effect.
2. The strength of cylinder specimens increases with the decrease of specimen sizes of same slenderness ratio due to frictional effect.
3. The ratio of the 28 days compressive strength of non –standard cubes compared that of standard 150 x 150 x150 mmcubes varied from 0.89 to1.43
4. The ratio of the 28 days compressive strength of non –standard cylinders compared that of standard 150 x300 mm cylinders varied from 1 to1.39

5. Specimen sizes decreases with increases the compressive strength, split tensile strength and flexural strength.

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EXPERIMENTAL STUDY ON INCREASING THE STRENGTH OF BLACK COTTON SOIL BY USING RICE HUSK ASH AND WOOD WOOL

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ABSTRACT: Expansive black cotton soil, also called shrink – swell soil, is a very common cause of foundation problems. Depending upon the moisture in the soil, shrink – swell soils will experience change in volume of up to thirty percent or more. These problematic soils can be modified to meet the design requirements using soil stabilization techniques. Utilization of industrial waste materials as a conventional stabilizers such as rice husk ash and wood wool, to increase the strength and stability of soil and to reduce the construction cost by making best use of the locally available waste materials. rice husk ash is one such product obtained during the smelting and refining of rice husk ash. The test is based on the varying percentage of wood wool and rice husk ash with the clayey soil to stabilize the soil and the optimum content required is ascertained by studying the variation of unconfined compressive strength (UCS). The rice husk ash is mixed with soil in the proportion of 5%, 10%, 15%, 20%. Various tests are conducted on these proportions and optimized proportion is arrived. Then the wood wool is added with the optimized rice husk ash and the soil is stabilized in the proportion of 5%, 10%, 15% and 20% respectively.

KEYWORDS: Rice husk ash, Soil stabilization, Chemical stabilizer, Index properties, California bearing ratio, Cation Exchange Capacity(CEC), Clay

1. INTRODUCTION

Soil is the indispensable element of this nature. Without the soil it is just next to impossible to think about life on this earth. The word ‘soil’ is derived from the Latin word solium which according to Webster’s dictionary means the upper layer of the earth that may be dug or plowed. The term soil is defined as an unconsolidated material, composed of solid particles produced by disintegration of rocks. The voids space between particles may contain air, water or both. The solid particles may contain organic matter. Soil deposits in nature exist in an extremely erratic manner producing thereby an infinite variety of possible combination which will affect the strength of the soil and the procedures to make it purposeful.

Wood wool and Rice husk ash stabilization improves the compressibility characteristics of clayey soil and helps to reduce plasticity index, increase optimum moisture content and decrease maximum dry density. Industrial waste like Copper slag, fly ash, blast furnace slag, steel slag etc is also used for soil stabilization along with or without

2. LITERATURE SURVEY

Rice husk ash containing about 60 to 90% silica, which is highly chemically reactive. Several experiments and review studies is already documented by various different authors on rice husk ash as a soil stabilizer with and without other stabilizing materials.

1. **Stability of clayey Black Cotton Soil by Using rice Husk Ash**

   By -Shyam bhushan ,Rajesh kumar ,Ved parkash

- Says that an addition of 6% wood wool to black cotton soil cuts down it's plasticity, shrinkage & swelling characteristics considerably.
- The compressive strength rises to about 15.22 kg/cm^2 under wet condition.
- The treated black cotton soil can be safely used as a sub-grade, sub-base or base material.

2. **Stabilization of black cotton soil with addition of rice husk ash**.

   Professor Jai Prakash

- Rice husk ash containing about 60 to 90% silica, which is highly chemically reactive.
- Several experiments and review studies is already documented by various different authors on rice husk ash as a soil stabilizer with and without other stabilizing materials.

3.EXPERIMENTAL WORK

To study the effect of rice husk ash on soil as a soil stabilizer it mixed in various proportions with soil. These mixers are further tested to find index properties (specific gravity, liquid limit test, plastic limit test and standard Procter compaction test) and Engineering properties (California bearing ratio test).

4.RESULTS AND DISCUSSIONS

Liquid Limit: This test is done by liquid limit apparatus designed by A. Casagrande. A soil sample which passing through 425 micron and air dried mixed with water to form paste. 1cm thick layer is levelled in cup. Then groove is cut in the soil in the cup and the handle is rotated at the rate of 2 blows per sec. Water content just sufficient to close the groove for 13mm length at 25blows gives liquid limit.

Table 1. Effect of RHA on Liquid Limit behaviour

DESCRIPTION	LIQUID LIMIT (%)
Soil alone	54
Soil + 5% RHA	51
Soil + 10% RHA	50
Soil + 15% RHA	47
Soil + 20% RHA	45

Table 1 shows the effect of Liquid Limit behaviour on different percentage of RHA.It can be seen that with addition of RHA, the liquid limit continuously decreases from a water content of 54% to 45%.

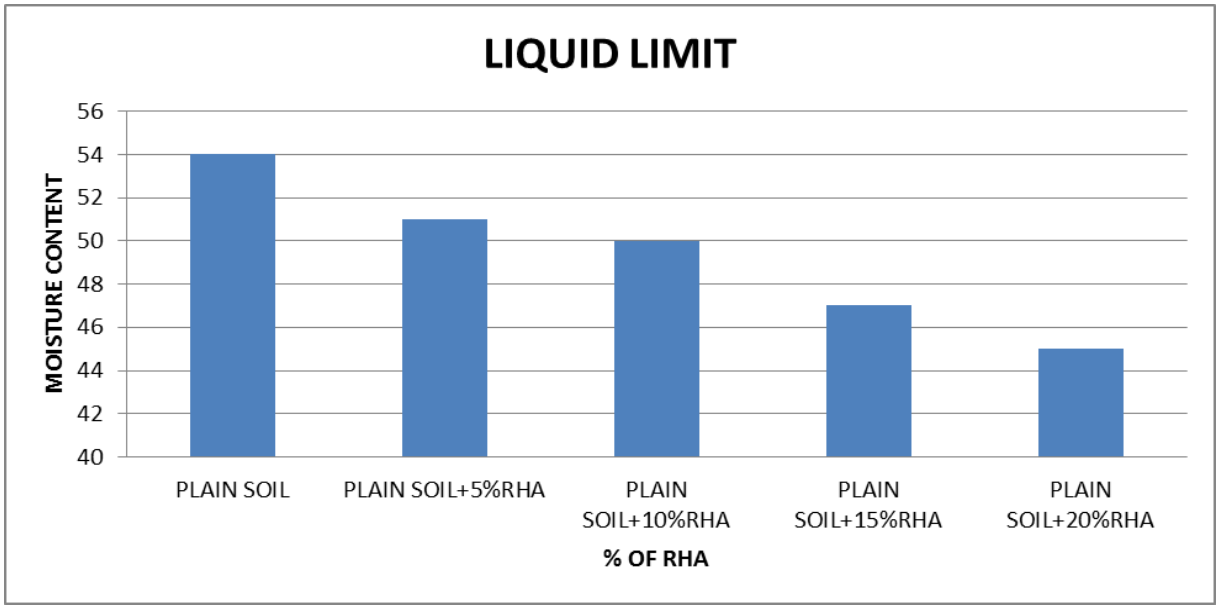


Figure 1. Effect of RHA on liquid limit behaviour of Natural soil

Figure 1 Show the variation of liquid limit of a soil with increasing percentage of RHA. Increase or decrease in liquid limit highly effect the compressibility and swelling characteristics of soil. Generally reduction in the liquid limit means reduction in the compressibility and swelling characteristics which is beneficiary for sub grade soil. Increase or decrease in liquid limit mainly depends on clay minerals present in soil.

Unconfined Compression Test: The soil sample is placed in a loading frame on a metal plate; by turning a crank, the operator raises the level of the bottom plate. The top of the soil sample is restrained by the top plate, which is attached to a calibrated proving ring. As the bottom plate is raised, an axial load is applied to the sample. The operator turns the crank at a specified rate so that there is constant strain rate. The load is gradually increased to shear the sample, and readings are taken periodically of the force applied to the sample and the resulting deformation.Finally compressive strength and the cohesion of the soil is determined.

Table 2 Effect of RHA for Natural soil for UCC

DESCRIPTION	UCC Strength(N/mm2)	Cohesion
Soil alone	0.48	0.236
Soil + 5% RHA	0.868	0.434
Soil + 10% RHA	0.770	0.385
Soil + 15% RHA	0.764	0.382
Soil + 20% RHA	0.739	0.370

Table 2 shows that while adding 5% RHA the ucc test was found to be incresed about 0.49 than the plain soil.while adding 10% RHA the value was found to be decreased about 0.98 than the previous result. The compressive value was decreased about 0.006for the addition of 15% and 20%.

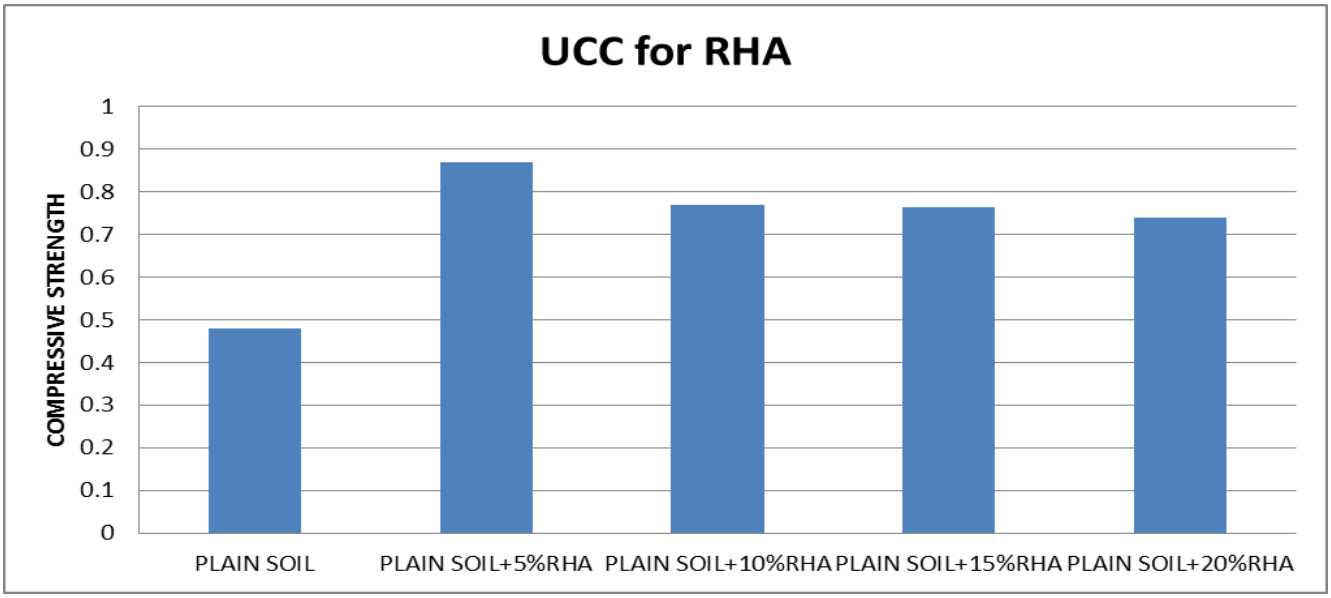


Figure 3. UCC for wood wool

Figure 3 shows the variation in Strength on adding wood wool in different proportion.

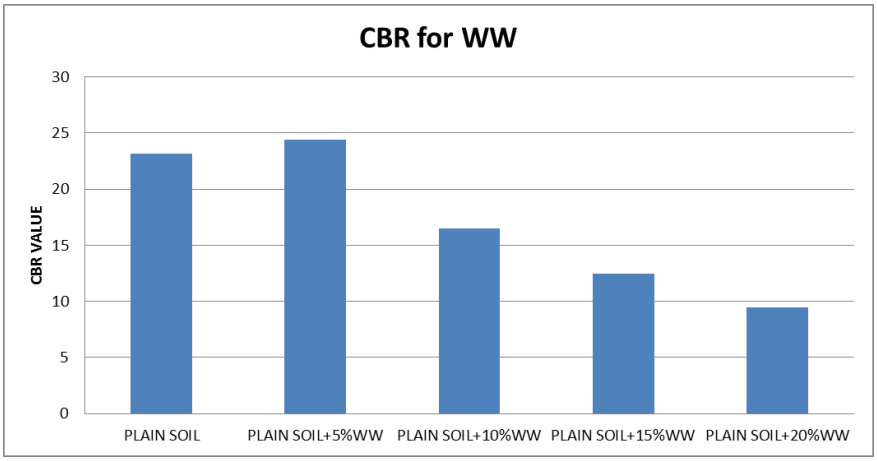
CBR Test: In CBR test soil sample passing through 4.75mm sieve mixed with water. Amount of water used is equal to OMC. After preparing soil sample it is filled in 2110cc mould in five layer and each layer is compacted by standard hammer. Finally the plunger of CBR test equipment penetrates the prepared soil specimen in the mould @ 1.25mm/minute. Analysis of the test result gives the CBR values.

Table 3 Effect of RHA for Natural soil on CBR values

DESCRIPTION	LOAD IN KN	CBR VALUE
Soil alone	2.92	23.14
Soil + 5% RHA	3.48	25.90
Soil + 10% RHA	4.64	23.02
Soil + 15% RHA	2.62	19.4

While adding 10% RHA the CBR test was found to be incresed than the plain soil.while adding 15% RHA the value was found to be decreased about than the previous result.

CBR for WOOD WOOL :



5. CONCLUSION

The main objective of this research work was to study the effect of adding RICE HUSK ASH and WOOD WOOL on the engineering properties of soil sample. Extensive experimental work was carried out on the engineering properties of the test soil. Major changes were observed in some of the engineering properties of the test soil on the addition of RICE HUSK ASH and WOOD WOOL.Finally comparsion of results is done.

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EXPERIMENTAL STUDY ON COCONUT FIBRE REINFORCED CONCRETE BEAM WRAPPED WITH FRP SHEET

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Abstract

This paper focuses on comparative study in the behaviour of coconut fibre reinforced concrete beam wrapped with FRP sheet. The coconut fibres were mixed into the concrete in the form of reinforcement into the concrete with uniform orientation of the fibres. The casted concrete beam were wrapped with FRP sheet to study the flexural behaviour of the coconut fibre reinforce concrete beam. The tests on the concrete were conducted by adding coconut fibres into the concrete in different contents, i.e.; 1%, 3%, 5% of the cement mass. It was observed that the composite with 3% of coconut fibre demonstrated the highest compressive, flexural and split tensile strengths when compared to the other contents of fibres. The optimum result acquired Fibre reinforced concrete is fixed or wrapped with FRP sheet at its bottom side to accomplish additional flexure strength in the concrete beam.

Keywords**:** *Coconut fibre, Flexural behaviour, Fibre reinforced Polymer Sheet.*

1. INTRODUCTION

Recent studies are being made in the field of Fibre reinforced concrete in order to improve the property of concrete. In general various types of fibres like steel fibres, carbon fibres, and glass fibres are being used. Natural fibres such as coconut, flax, hemp, jute and linen are used as reinforcement in the concrete. Generally natural fibres are cheap and are locally and abundantly available in many countries. Their use as the construction material improves the property of the concrete. Compared to other types of fibres such as steel, synthetic or glass fibres these natural fibres i.e., coconut fibres are easy in handling due to their flexible nature especially when there is the need of usage of high volume of fibres. Fibre content can be part of total weight/mass of composite or the percentage of any ingredient of the concrete.

The coconut fibre that is used is extracted from the outer shell. The fibres that are extracted from the matured coconut are known as brown fibres which are strong and thick and they said to have good abrasion resistance. Using of coconut fibre in the concrete improves the ductile property of the concrete and resists the crack.

2. MATERIALS USED

CEMENT

Cement used in this investigation was 53 Grade Ordinary Portland cement confirming to IS: 12269 [18]. The specific gravity of cement was 3.2. Initial and final setting time for the was 35 minutes and 560 minutes.

COURSE AND FINE AGGREGATE

Aggregates are inert mineral material used as filler in concrete which occupies 70% to 85 % volume. Sand passing through 4.75mm IS sieve conforming to grading zone III of IS 383:1970 was used. Its specific gravity is 2.74. Locally available stone aggregate of size 20 mm passing and retained in 19 mm, was used and the specific gravity and fineness modulus for the same are 2.74 and 2.47as per IS: 2386- 1968 Part III. Both the Aggregates compiled with the requirements of IS: 383-1970.



COCONUT FIBRE

Coconut fibre is a natural fibre extracted from the outer part of the coconut shell. Generally there are two types of coconut fibres extracted one is brown fibres, extracted from matured fibre and the other is white fibres extracted from immature coconuts. The husks of these coconut fibres are mainly used in various applications like making in products such as floor mats, door mats, brushes and mattresses. Using of matures fibres (brown fibres) seems to better than using the white fibres extracted from the immature fibres.

The long bristles of the fibres are separated from the clusters; this separation process is termed as wet- milling. These fibres are undertaken into the process of removing the dusts and unwanted materials from the fibres in order to clean them and free them from dusts. These fibres especially the brown fibres are elastic enough to get twisted without breaking and it holds a curl through permanently waved. The coconut fibres may then be cleaned and 'hackled' by steel combs to straighten the fibres and remove any shorter fibre pieces.



FIBRE REINFORCED POLYMER SHEET

Fibre-reinforced polymer (FRP) (also called fibre-reinforced polymer, or fibre-reinforced plastic) is a composite material made of a polymer matrix reinforced with fibres.

The fibres that are reinforced in the sheet are usually glass (in fibreglass), carbon (in carbon-fibre-reinforced polymer), aramid, or basalt. Rarely other fibres such as paper, wood, or asbestos have been used. The polymer is usually an epoxy, vinyl ester, or polyester

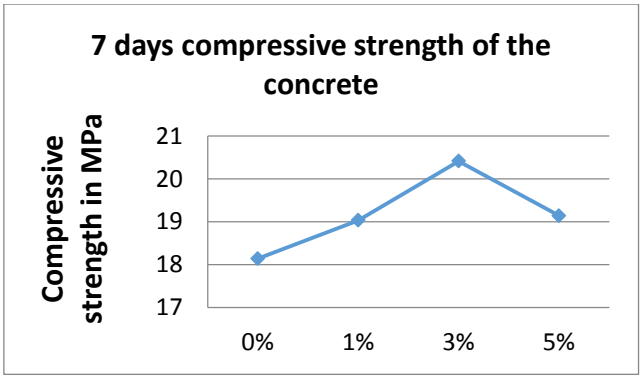
thermosetting plastic, though phenol formaldehyde resins are still in use. FRPs are commonly used in the aerospace, automotive, marine, and construction industries. They are commonly found in ballistic arm or as well.

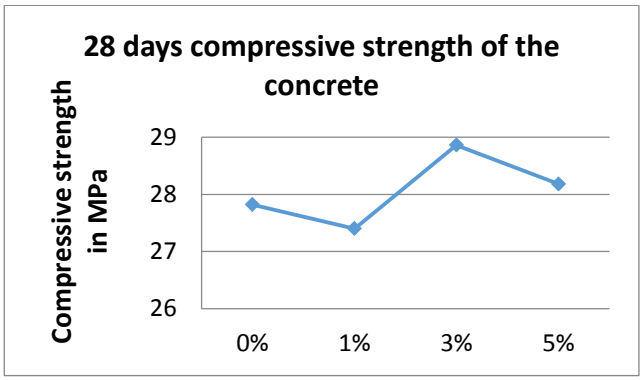


3. TESTS CONDUCTED

COMPRESSIVE STRENGTH

The cube specimens were tested in the compression testing machine with the capacity of 200 tonnes. The upper / bearing surface of the machine is cleaned and kept free from the other loose particles and the; load is applied constantly at increased rate until the specimen got broken. The 28 days strength of cubes with various proportions of coconut fibre is compared below.

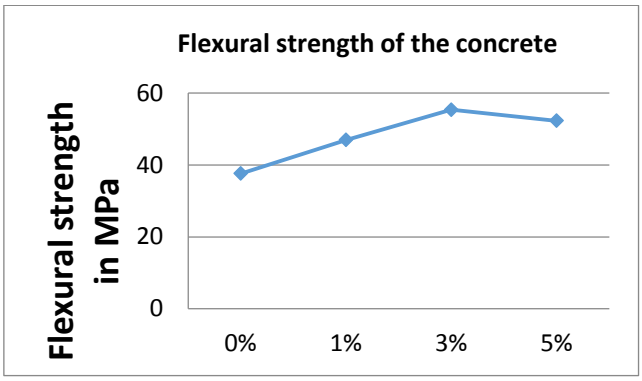






FLEXURAL STRENGTH

The beam specimens were tested in the universal resting machine to obtain the flexural strength of the beam casted with the coconut fibre reinforcement. The 28 days flexural strength of beams with various proportions of coconut fibres and the result of the beam wrapped with FRP sheet is also compared below



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4. CONCLUSION

Based on the experimental investigation, the following conclusions have been drawn;

Optimum result of high compressive strength and compressive strength has been achieved in 3 % of coconut fibre in the concrete.

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Kyoto Institute of Technology Mail - Review result for the manus... https://mail.google.com/mail/u/0/?ui=2&ik=...

Belal Gaeeni-Yhossein <belal@yhossein@mogan.ac.ir>

Review result for the manuscript submissions in WCECS 2017

IAENG Conference - WCECS <wcecs@iaeng.org>
To: belal@yhossein@mogan.ac.ir; rabbaniamiri@gmail.com

Mon, Aug 7, 2017 at 2:56 AM

Dear Dr.Ir. Apoorv Alex Balamurugan

Review result for the manuscript submissions in WCECS 2017

Thanks for your submission to the World Congress on Engineering and Computer Science 2017 (WCECS 2017). It is our pleasure to tell you that your manuscript

- paper number: CSPRE_22
- title: A robust frame work to detect moving vehicles in different road conditions

has been accepted with minor revision after peer review for oral presentation in WCECS 2017. Please read the attached review report.

There is an appeal system that we will arrange two other reviewers for your submitted paper if you do not agree with the grading or comments in this review.

For the accepted and registered papers, they will be included in the conference proceedings published by IAENG (ISBN: 978-988-14047-5-6) in hardcopy. The length of each camera-ready paper will be limited to 6 IEEE style, double-column pages. Each conference participant will be entitled to one proceedings at the conference. The accepted papers will also be considered for further publication, e.g. in the science issues of the IAENG journals and in edited book. The proceedings will be indexed in major established indexes so that it can be assessed easily.

Important Dates:
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Tuesday, 2017/8/1, 11:56

The World Congress on Engineering and Computer Science 2017
(WCECS2017)

Paper No.: CSPRE_22 [International Conference on Signal Processing and Imaging Engineering 2017]
Paper Title: A robust frame work to detect moving vehicles in different road conditions

Reviewer: Dr.Ir. Apoorv Alex Balamurugan, Ingenieur, Ir. ungenieurio

1.	Content			
Technical quality (1-5):	4	3	2	1
Technical originality (1-5):	4	3	2	1
2.	Presentation			
Overall format (1-5):	4	3	2	1
Abstract (1-5):	4	3	2	1
English (1-5):	4	3	2	1

3. Recommendation (tick one):

Accept:	4		
Accept with minor revision:	3	yes	✓
Accept with major revision:	2		
Reject:	1		

Recommendation for Best Paper Award (yes/no):

4. Brief summary and further comments for the improvement of the paper.
(Use a separate sheet if necessary)

The authors should [illegible]
further validation using [illegible]
The authors must check the [illegible]
authors have to further improve the [illegible]
of the paper for example [illegible]
"Proper Shadow detection and Tracking [illegible]
Comparative analysis should be [illegible]

IMAGE FORGERY DETECTION

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***Abstract*—Digital images play a vital role in many areas such as social networking (facebook, twitter etc) where the views of people are expressed through images, in newspaper publications, crime investigation. However, the advancement in image editing technology helps to edit the image without any visible traces of forgery. In recent forgery attack, the duplicated regions were blurred, to make confusion with the actual blurred and forged-blurred regions. In this paper, we propose a method for identifying forgery attack done by blurring the duplicated regions in image. In the proposed method, from the input forgery image, region of interest was segmented. For each region of interest, a new method was proposed for estimating degree of blur to seperate the blurred and non-blurred regions. Then, from each blurred and non-blurred regions, Fourier coefficients and gradient based features were extracted to form feature vectors. The feature vectors are matched to identify forged blurred region. The experimental evaluation is done on MICC-F220 Dataset. The experimental results shows that the proposed approach is superior to existing approaches in terms of true positive and false positive rate.**

Keywords— Segmentation; Blur metric; Fourier; Gradient magnitude.

I. INTRODUCTION

An illegal modification in the content of image is known as Image Forgery. In this digital era, the addition or removal of elements in the image may happen to modify the image information and also the techniques such as scaling, rotation, blurring, resampling, filtering, cropping, etc may used to create number of forgeries. It is difficult to trace these types of forgeries as it cannot be able to noticed by the naked eye of human being.. There are several techniques to detect the tampered regions present in the image.

In general, the techniques can be divided into two methods such as Active Method and Passive Method [1]. Active methods requires prior information about the original image and it belongs to the preprocessing concept. Watermarking is one of the example of Active method. In Watermarking method, at the time of image creation, watermark is inserted. So that the image can be authenticated using the watermark by verifying the extracted watermark is same as that of the one at insertion. Hence such a method does not work for most of the cases. Hence, Passive techniques are the best method to detect tampering in images.

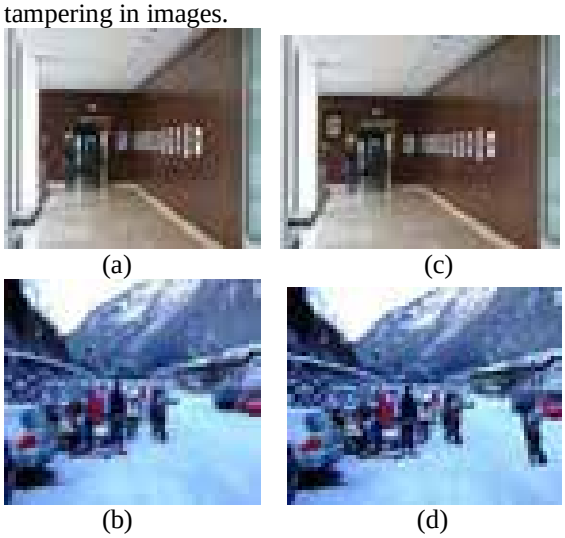


Figure 1. (a)(b) The original image (c) and (d) The forged image

Gajanan K. Birajdar [2] proposed the detection of forgery in image using passive techniques. Passive technique does not require any prior information about the image. It assumes that the forgeries may highly disturb the statistical property of the image even though it does not leave any traces.

L Zhou [3] proposed the method for the detection of blur edge. It is based on the analysis of edge processing using edge preserving smoothing filtering and mathematical morphology. It does not require any watermark or digital signature to locate tampered regions present in the image. The main advantage of this paper is it was more essential for discriminating defocus blur from manual blur.

Zheng, J [4] proposed the method to detect the forged regions in image using wavelet homomorphic filtering. In this method, at first, after the blurring process, a wavelet homomorphic filtering is applied to enhance the edges which have higher frequency. Secondly, the mathematical morphology was used to erode the natural edges and enhanced artificial blurred edges were preserved. Finally, the region labeling method was used to locate the forged

regions. To create a forgery image, when using some artificial blur operations, it reduce the detecting errors but it was not capable of handling different blurred attacks.

Y. Huo [5] proposed the method which involves two stages to identify tampering with high probability under general tampering, collage attack and hybrid attack. In first stage of detection, the presence of collage attack was detected by the indentification parameter which was defined by General Tampering Watermark(GTW) and Collage Attack Watermark(CAW). If the parameter is larger than the particular threshold then the second stage detection is performed to detect the collaged regions.

Huang [6] proposed that the boosting scheme which will increase computation efficiency for detecting the tampered regions in digital images. The boosting scheme involves the evaluation of dark channels, histogram equalization and grayscale layering. Then, features of each block was extracted using SVD. Similar blocks are obtained using lexicographical sort. Finally, the similarity measure of Euclidean distance is used to locate the duplicated regions.

Wang, Tang, & Luo, [7], proposed the concept of using four combined blur and affine moments to detect the blurred duplicate regions and to extract features of blocks. In this method, to measure the the stability of invariant features relative error was used. Detection rate was high with lower feature dimension.

Mahdian [8] proposed blur invariant moments method. To reduce the dimension for the representation of blocks, it uses principal component analysis and a k–d tree is used for detecting the duplicated regions. The disadvantage of the above methods are they does not handle different blurred attacks and the estimation of degree of blur is ignored by these methods. Therefore, it was motivated to propose a method for detecting blurred forged region by using the process as follows: SRM Segmentation, Blur metric estimation, Feature Extraction and the Similarity matching.

The remaining of this paper is as follows. Different steps for forged region detection are discussed in Section II. Section III provides experimental results on datasets. Conclusions are given in Section IV.

II. PROPOSED METHOD

Due to the movement of camera or object motion there may be some occurrence of blur in images. In this work, the duplicate regions were blurred to create confusion with the natural blur. This type of forgery was identified by the process as follows. For input forged image, SRM segmentation was performed to segment the image. For segmented regions, estimate the amount of blur to separate the blurred and normal regions. To indentify the forged blurred region from actual blurred region, features such as phase congruency and gradient magnitude are extracted from each region of interest to form feature vector. Then the feature vectors of each region was matched using Euclidean distance measure to locate the forged blurred region.

A. SRM Segmentation

The image segmentation is carried out using Statistical Region Matching (SRM) algorithm where, the input image is segmented into homogenous regions.The idea is to start with the couple of pixel using 4-connectivity. At each iteration, merging predicate is computed between adjacent segments. If the merging predicate is smaller than the particular threshold, then the segment and its similar adjacent segment are merged. If the fusion of segments is not possible, the merging process stops.

For input image I, that contain |I| pixels, the three channels such as R,G and B color spaces are obtained where each of the three values belongs to the set (1,2,…, g_n) and represented by an eight bit image g_n =256 .To segment the region of interest, the proposed method finds uniform color in each space as denoted by b(R) shown in Eq. (1).

$$b(R) = g_n \sqrt{\frac{1}{2Q|R|} \ln \frac{|S_{|R|}|}{\delta}} \quad (1)$$

Where, $\delta = \frac{1}{6|I|^2}$ -To avoid over-segmentation

$S_{|R|}$ - Set of regions with |R| pixels

Q - in range 1-256

To merge neighbour regions, say, R and R' with color averages , $|\bar{R}_a'|$ and $|\bar{R}_a|$ for channel a, predicate can be given in Eq. (2).

$$P(R,R') = \begin{cases} true, & \forall a \varepsilon \{R,G,B\} \\ & \left|\bar{R}_a' - \bar{R}_a\right| <= \sqrt{b^2(R') + b^2(R)} \\ false, & else \end{cases} \quad (2)$$

If P(R,R') is true, then R and R' can merge into a large region.



(a (b)

Figure 2. Sample region of interest segmentation

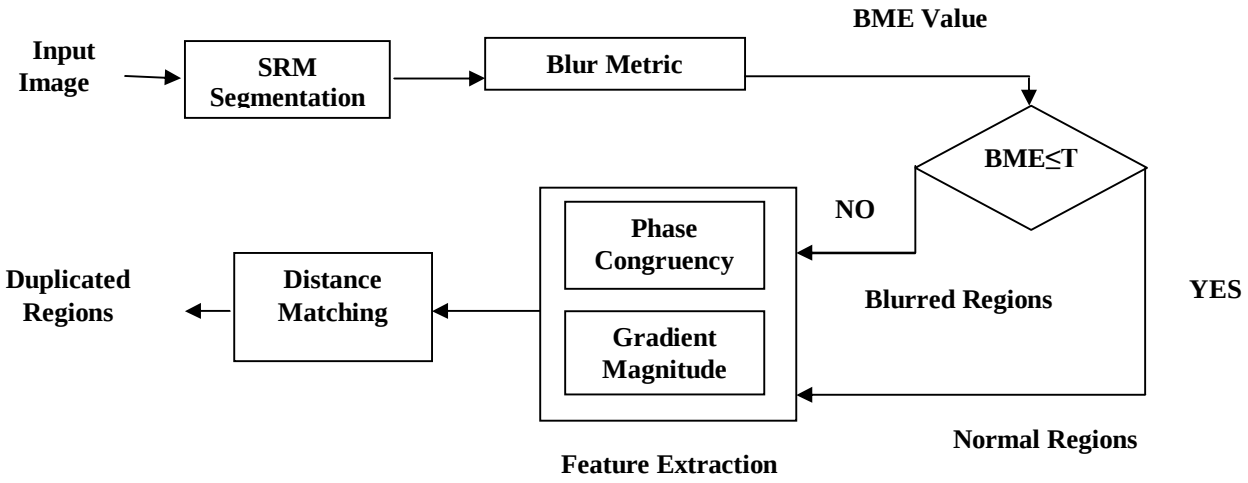


Figure 3.SystemDesign

B. Blur Estimator

For the segmented regions, the degree of blur was estimated by comparing the intensity variations between neighboring pixels in the original image. Then the low-pass filter was applied to obtain the blurred image. Again, compare the intensity variations between neighboring pixels in the blurred image. If there is high variation between the original and the blurred image which shows that the original image was sharp whereas a slight variation between the original and the blurred image means that the original image was already blurred.

The algorithmic steps of the blurred region detection are as follows.

STEP 1

Horizontal and vertical low pass filters H_{hor} and H_{ver} are applied to each region I_{reg} with size m × n. Blurred regions B are obtained as shown in Eq. (3).

$$B_{ver} = I_{reg} * H_{ver}$$
$$H_{hor} = I_{reg} * H_{hor} \quad (3)$$

where, |*| - Convolution operator.

STEP2

Compute the intensity variation between neighbouring pixels in the segmented image and blurred image in horizontal and vertical direction using Eq. (4).

$$D_{Iver}(i,j) = \sum_{i=1}^{m-1}\sum_{j=0}^{n-1} | I_{reg}(i,j) - I_{reg}(i-1,j) |$$

$$D_{Ihor}(i,j) = \sum_{i=0}^{m-1}\sum_{j=1}^{n-1} | I_{reg}(i,j) - I_{reg}(i,j-1) | \quad (4)$$

$$D_{Bver}(i,j) = \sum_{i=1}^{m-1}\sum_{j=0}^{n-1} | B_{ver}(i,j) - B_{ver}(i-1,j) |$$

$$D_{Bhor}(i,j) = \sum_{i=0}^{m-1}\sum_{j=1}^{n-1} | B_{hor}(i,j) - B_{hor}(i,j-1) |$$

STEP 3

The horizontal and vertical absolute difference variations is evaluated by the Riemann integral using Eq. (5).

$$V_{hor} = \max(f(x),0) = \begin{cases} f(x) = D_{Ihor} - D_{Bhor} & f(x) >= 0 \\ 0 & otherwise \end{cases} \quad (5)$$

$$V_{ver} = \max(f(x),0) = \begin{cases} f(x) = D_{Iver} - D_{Bver} & f(x) >= 0 \\ 0 & otherwise \end{cases}$$

STEP 4

The variations in the difference images D_{Iver}, D_{Ihor}, D_{Bver}, and D_{Bhor} are normalized to find the vertical and horizontal blur measures using Eq. (6).

$$Blur_{Iver} = \frac{\sum D_{Iver} - \sum D_{Vver}}{\sum D_{Iver}} \quad where, D_{vver} = \sum D_{Vver}$$

$$Blur_{Ihor} = \frac{\sum D_{Ihor} - \sum D_{Vhor}}{\sum D_{Ihor}} \quad where, D_{vhor} = \sum D_{Vhor} \tag{6}$$

STEP 5

The maximum value among the vertical and horizontal blur measures is chosen as the final blur value.

$$BME=Max(Blur_{Iver}, Blur_{Ihor}) \tag{7}$$

where BME is in the range of (0-1). 0 indicates that the image is sharp and 1 indicates that it is blurred.

C. *Feature Extraction*

Phase congruency (PCy) coefficients was obtained for each blurred region using Eq. (8).Phase congruency enhance the image by suppressing the blur.

$$PCy(x,y) = \frac{\sum_n \sum_\theta W(x,y)\lfloor A_{n\theta}(x,y)\Delta\Psi_{n\theta}(x,y) - T \rfloor}{\sum_n \sum_\theta A_{n\theta}(x,y) + \varepsilon} \tag{8}$$

At first, the image, f(x,y) is convoluted with even and odd symmetric filter $M^e_{n\theta}$ and $M^o_{n\theta}$ as shown in Eq. (9) at scale n=4 and orientation θ=6.

$$[e_{n\theta}(x,y), o_{n\theta}(x,y)] = [f(x,y) * M^e_{n\theta}, f(x,y) * M^o_{n\theta}] \tag{9}$$

The amplitude of the response at point (x,y) is calculated using Eq. (10).

$$A_{n\theta}(x,y) = \sqrt{e_{n\theta}(x,y)^2 + o_{n\theta}(x,y)^2} \tag{10}$$

And phase at point (x,y) and sensitive measure of phase deviation was measured using Eq. (11) and Eq. (12).

$$\psi_{n\theta}(x,y) = a\tan(e_{n\theta}(x,y), o_{n\theta}(x,y)) \tag{11}$$

$$\Delta\psi_{n\theta}(x,y) = \cos(\psi_{n\theta}(x,y) - \bar{\psi}_{n\theta}(x,y)) - \left|\sin(\psi_{n\theta}(x,y) - \bar{\psi}_{n\theta}(x,y))\right| \tag{12}$$

where,

W(x,y)- Measure of frequency spread.

$A_{n\theta}(x,y)$ -Amplitude of Fourier component at scale n & orientation angle of filter θ

$e_{n\theta}(x,y), o_{n\theta}(x,y)$ -Responses between image f(x,y) and log Gabor filter.

* - Convolution Operator

T - Estimated noise energy

ε - 0.0001,small constant that prevents division by 0.

$\Delta\psi_{n\theta}(x,y)$ -Sensitive measure of phase deviation.

$M^e_{n\theta}$ $M^o_{n\theta}$ - even and odd symmetric wavelets at scale , n=4 and θ=6

From the enhanced ROI, the proposed method extract 3 moments namely mean(μ),variance(υ) and contrast(c) and it is considered as feature vector F=(μ,υ,c). Gradient Magnitude features are extracted as secondary features using Eq. (13) from each image region in the forged image and are then combined with PCy features.

$$GM = \sqrt{\nabla I_x^2 + \nabla I_y^2}$$

$$\nabla I_x = \frac{L(x+1,y) - I(x-1,y)}{2}$$

$$\nabla I_y = \frac{L(x,y+1) - I(x,y-1)}{2} \tag{13}$$

where, L(x,y) – Derivative of image I with Gaussian Kernel.

D. Distance Matching

Finally, the the distance between regions Rx and Ry was measured using Euclidean distance D(Rx, Ry) as shown in Eq. (14) .

$$D(R_x, R_y) = \sqrt{\sum_{i=1}^{N} (FX_i - FY_i)^2} \tag{14}$$

where, FX, FY – Corresponding feature vectors of Rx and Ry.The regions which have high degree of similarity are classified as forged blurred regions.

III. EXPERIMENTAL RESULTS

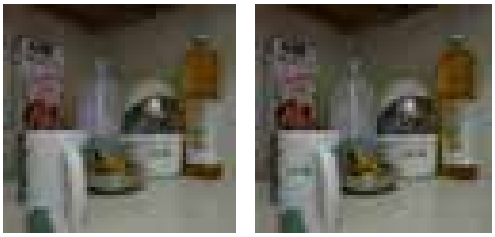
The images from MICC-F220 datasets were used for the analysis. The dataset consists of 100 forged images and 100 original images.. Some of the sample images from the MICC-F220 dataset are given in Fig 4.



(a)



(c)



(b) (d)

Figure. 4. Sample images from MICC-F220 dataset

Fig. 4 (a) and (b) shows the original image and (c) &(d) shows the forged image.The process of segmentation result is illustrated in Fig. 5 .



Figure 5. Segmentation Result

For each segmented region, blur measure value was calculated which results in the separation of blurred and normal regions. Blurred regions are shown in Fig. 6 and normal regions are shown in Fig. 7.

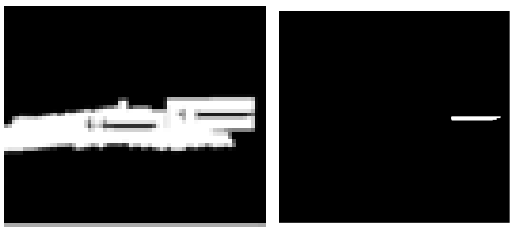


Figure 6. Blurred Regions

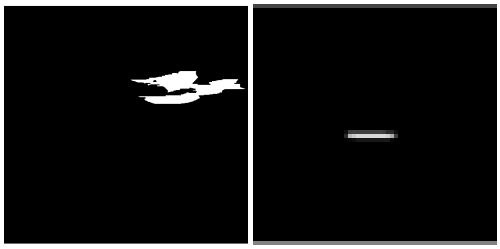


Figure 7. Normal Regions

For each blurred region, phase congruency feature was obtained which is shown in Fig. 8.

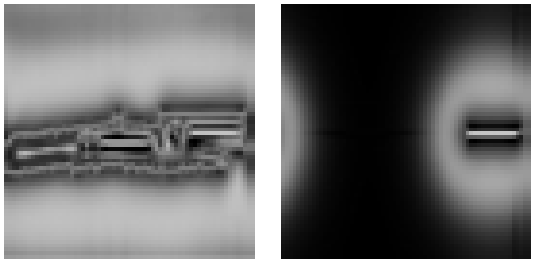


Figure 8. Phase Congruency for blurred Regions

Gradient magnitude features are combined with phase congruency features which is matched using Euclidean distance measure to indentify the forged blurred region. The detected forged region was shown in Fig. 9.



Figure 9. Detected Forged Region output

IV. PERFORMANCE EVALUATION

To evaluate the performance of the proposed method, True Positive Rate and False Positive Rate are used.

TABLE I. PERFORMANCE ANALYSIS

Total Images	**TP (%)**	**FN (%)**	**TN %)**	**FP (%)**	**Accuracy (%)**
100	**90**	**10**	**89**	**11**	**90**

V. CONCLUSION

The proposed work is used to check whether the image is forged one or not. This work deals with detection of forged blurred region. To find the forged blurred region, the input forged image is segmented into multiple regions using SRM Segmentation. Then, the degree of blur was estimated for each segmented regions which results in the separation of normal regions and blurred regions. After that, the PCy coefficients was extracted for each blurred region to suppress the blur and to enhanced the region of interest. From the enhanced ROI, the proposed method extract three moments

namely mean, variance and contrast and it is considered as feature vector. In the same way, the proposed method extracts gradient magnitude features as secondary features from each image region in the forged image and then combined with the PCy coefficients to classify whether the given region is forged blurred region or unaltered blurred region using Euclidean distance measure. Finally, the forged blurred regions were localized.

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Mobile Application To Help Tribal Parents To Locate the Tribal Schools And Hostels

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Abstract- *A tribe is viewed, developmentally or historically, as a social group existing outside of or before the development of states. A tribe is a group of distinct people, dependent on their land of their livelihood who are largely self-sufficient, and not integrated into the national society. There is a need to provide the education among the large group of Tribal. The central government has provided many schemes exclusively for education of tribal people and the problem is that they are unaware about those schemes. In order to provide complete awareness about the Eklavya Model Residential Schools (EMRS) schools, managed by the central government, and their details along with their locations, an application has been created. The application is to help tribal parents locate the tribal schools, hostels, information about the admission procedure, eligibility, availability, vacant seats and so on based on their location. In order to increase the literacy rate of our country the application has options for the tribal students to register to a desired tribal school and get enrolled in it.*

I. INTRODUCTION

Education is a tool of transmission of culture, accumulated knowledge and experience of a society. It is also the tool for economic betterment and societal change. Today all educationists are talking of uniformity in design, content and structure of education. There is no wonder that there is such confusion about the purpose and goal of general education, not to speak of tribal education. There are many ST parents who have little idea about the location of the EMRS schools' details but they are not clear about where to get their children enrolled. The present study aims at mapping the existing provisions for primary education in the tribal areas provided by the government of India as well as their utilization by providing the location through the Google map. Eklavya Model Residential Schools (EMRS) and their details are particularly aimed in this paper. The EMRS were initiated in India by the Ministry of Tribal Affairs, Government of India for providing free high quality education to meritorious tribal children. These schools aim to bridge the gap in literacy levels between the general female population and tribal women, through facilitating 100% enrolment of tribal girls and reduce drop out ratio in low literacy blocks. The application therefore provides the awareness about the details of the schools like facilities and admission procedures along with the distance between the current location and the EMRS school's location so that it will be convenient for the parent to know the school that is nearest to them. The importance is given to the improvement in education and creating an application is one way through we can achieve it.

II. RELATED WORK

The information about the village wise locations of around 200 EMRS schools with their names, the infrastructure facilities of the EMRS tribal schools all over India and the student enrolment details in available tribal schools were collected. The Ministry of Tribal Affairs provided the location details of all the EMRS schools present all over India. Literacy Trends of Scheduled Tribes in India from 1961 to 2011(in Percent) is shown in Fig:1.

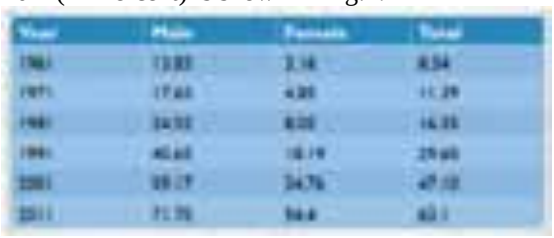


Fig:1 *Source: Challenging issues of Tribal education in India.*

The above study shows that the literacy rate of the tribal people has increased and so this application will be properly utilized.

A related work named as MobiMonitor is implemented for Amazon region that allows instrumenting course mediators with tools for monitoring students' behavior and performance, especially monitoring student participation in special activities (assignments and forums) and provides support in advance to identify students who need a

direct pedagogical intervention in order to avoid possible course evasion, failure or dropout. MobiMonitor enables mediators to check these data on the fly, classifying students' participation into four levels (excellent, good, low and very low). The mediators access this report by monitoring through mobile application and send alert messages to students according to their attendance status.

The annual report generated by the Ministry of Tribal Affairs annually provides a detailed insight into the facilities provided to the tribal people and the education enrollments of the male and female in percent that will be useful for this paper to understand the education level and the involvement of government in it.

III. SYSTEM ARCHITECTURE

The application opens with the Hybrid map that shows the current location and other tribal schools' locations all over India. The zoom in option is provided for the user to view the locations in detail. The user can view the name of the tribal school on hovering over the particular tribal school. On clicking the desired tribal school, the details like name, location (village, block, district, and state), vacant seats, facilities, eligibility, and admission procedure are displayed along with the option to view more details. The user is provided with an option to register to a particular school that suits after looking into the details provided. On registration, the details like name of the student, age, course of study and contact details have to be filled and they are stored so that the next time any other user registers for the same school, the number of vacant seats is reduced. The same student is not allowed to register to more than one EMRS school. This is to increase the availability of seats for all the tribal students.



Fig: 2 System Architecture

IV.METHODOLOGY

The GPS (Global Positioning System) is used to track the location of the places. The application uses API's to fetch the user's location that is obtained by enabling the Google play services. With Google Maps installed on the device, one can view street and satellite maps of the whole world. It can also be used to plot routes, find local places of interest, socialize with people around you and walk along roads with Google's street view. It is easy to use on an android device. One can move around by holding the finger and dragging the screen and zoom in and out by pinching with the fingers. There are different map types like MAP_TYPE_NORMAL, MAP_TYPE_HYBRID, MAP_TYPE_SATELLITE, and MAP_TYPE_TERRAIN. This paper works with MAP_TYPE_HYBRID. The ACCESS_FINE_LOCATION which includes both ACCESS_FINE_LOCATION and ACCESS_COARSE_LOCATION is added in AndroidManifest.xml. Internet permission is also added in the xml file. The API key is obtained from the console.developers.google.com.

JSON (JavaScript Object Notation) is a lightweight data-interchange format and is the best alternative for XML. Android provides four different classes to manipulate JSON data. These classes are JSONArray, JSONStringer, JSONObject, JSONTokenizer.The details like name , id, location that includes village, block, district, State and facilities, vacant seats, availability etc are stored in json format and stored in json server and retrieved using JSONObject. The location that is clicked by the user is compared with the json name and the details are thus displayed as shown in Fig: 6b. The json online server is connected with the android studio by adding the URL of the particular json file in the java file that does the actual implementation. The distance between the current location and the desired school clicked by the user is also displayed for their convenience. This is done by using the latitude and longitude of the current location and the school location as an input and the radius of Earth is used to calculate the distance in kilometer and this distance is shortest.

V. WORKFLOW

To achieve the objectives of the paper, Android Studio and JSON is used. The hybrid map is used and setcurrentlocation is enabled using GPS that makes the current location visible using the getlatitude and getlongitude function as shown in Fig:3. An icon is provided which on clicking shows the current location along with the name of it. The multiple markers are used that represents the EMRS tribal schools and they are made visible using the latitude and longitude of its location as shown in Fig 4.



Fig: 3 Hybrid map showing the current location.



Fig: 4 Hybrid map with markers at all EMRS Schools.

The json structure is shown in Fig 5 and the details are stored in an online json server that is available in a json format. The user who has now viewed the current and tribal schools' locations can click a desired school to see all the details of the school that is retrieved from the json server. The user also has an option to look into the other details like facilities and admission procedure. The user can then register to the particular school and enters the details after which the registration is confirmed.



Fig: 5 System Architecture.

The details of a particular EMRS School that is obtained by clicking on the tribal school at kodavaluru, Andhra Pradesh is shown in Fig:6a and 6b.



Fig:6aClicking on a marker Fig:6bInformation about the school

The distance betweem the current location and the chosen tribal location is displayed along with the other details as a text on clicking the school as shown in Fig:7



Fig:7 The details along with the distance in kilometer.

The Fig:8a and 8b shows the prime details, Teachers and students details, Facilities of school and admission procedure which is obtained after clicking on the button provided. This is designed using HTML and the additional styles are provided using css. This html file is stored in the project folder of android studio. The contents are kept static since the admission procedure and facilities are common for all the EMRS Tribal schools of India. Any changes needed may be updated in the particular file if required. This is particularly increase the readability among the users.



Fig:8a Details of the school 'click to see more details' button **Fig:8bOn clicking along with a button**

The Fig:9a and 9b shows a similar page that is displayed by clicking another marker. Any change in the details about the Teachers is periodically updated by the admin which is the central government in our case.



Fig:9a **Fig:9b**

Firebase is a technology that allows us to make web applications with no server-side programming so that the development turns out to be quicker and easier. It supports the web, iOS, OS X, Android clients. Firebase is a Backend-as-a-service. Firebase Analytics is a cost-free app measurement solution that provides insight into app usage and user engagement. There are features like Firebase cloud messaging, Firebase Auth, Realtime Database, Firebase Storage, Firebase Hosting etc. Cloud Firestore is used for our application to store in the details of the registered students and the modifications on the vacant seats are made using this database. A Firebase project has to be created using the account created. Authentication is done if needed. The Cloud Firestore stores the data and performs CRUD operation using it. The Firebase is connected to the Android Studio using the Assistant window available in Android studio 2.2 or later. A sample Firebase window is shown in the Fig: 10.



Fig: 10 Firebase account that shows the database.

VI CONCLUSION AND FUTURE WORK

The current paper is aimed at increasing the overall literacy rate of our country. This is achieved by improving the education among the tribal population which constitutes the highest of the overall population of India. The central government has taken this as a concern and has provided various schemes particularly for Tribal people. The problem is that though the literacy rate among the Tribal have increased to some extent , they have not yet realized the benefits of the schemes provided for them by the government. This was the problem identified and the application provides a complete awareness about the EMRS schools and their locations. The tribal people are assumed to have little knowledge about using the smart phone. This is assumed based on the increase in the literacy rates as shown in the Fig:1. The application has to be installed and on opening the user will be able to see the current location in a pink colored marker and other red colored markers that represents the tribal schools' locations all over India. The locations are tracked using GPS and the type of map used is hybrid. The user can now select any one school and view the details about it and then can decide of enrolling in it. The details like vacant seats, admission procedure, facilities etc are displayed along with the distance from their current location. The distance is included so that the tribal parents can choose the tribal school nearest to them and ensure the safety of their wards. The process of registration uses the backend database that is stored in cloud using Firebase. The number of vacant seats are updated so that the next time any other user tries to register for the same school, the number of vacant seats are reduced. A user is allowed to register to a particular school only once to ensure the availability. The present work concentrates only on awareness and registration. The future work is aimed at the school drop out rates . Once after the registration, the user will get the confirmation in the mobile as a message or as a mail. The reason for the drop out can be studied and can be reported to the Ministry of Tribal

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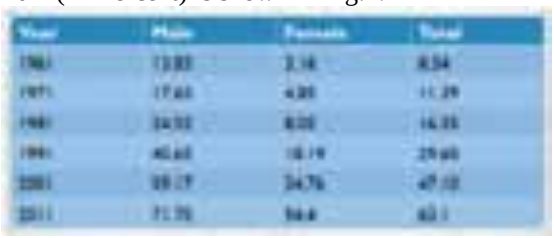


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458. SMART HOME BIG DATA: HUMAN ACTIVITY AND BEHAVIOUR BASED PREDICTION MODEL FOR MEDICAL APPLICATIONS.

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These days, there is a consistently expanding movement of individuals to urban regions and because of this present individuals' wellbeing gets influenced by action changes. In such change, a huge number of homes are being furnished with smart gadgets which produce enormous volumes of fine-grained and indexical information that can be broke down to help smart city administrations. In this paper, propose a model that uses smart home huge information as methods for learning and finding human activity designs for healthcare applications. We propose the utilization of successive pattern mining, cluster analysis and forecast to quantify and analyze vitality use changes started by inhabitants' conduct. Since individuals' routines are generally distinguished by ordinary schedules, finding these schedules enables us to perceive a typical exercises that may demonstrate individuals' challenges in taking look after themselves, for example, not planning food preparation or not utilizing shower, to address the need to inspect fleeting vitality utilization designs at the machine level, which is specifically identified with human exercises. The information from smart meters are recursively mined and the outcomes are kept up crosswise over progressive mining works out. The aftereffects of distinguishing human action designs from machine use are introduced in points of interest in this paper alongside precision of short and long period expectations.

459. APPLICATION OF MULTILEVEL ARM AND TREE INDUCTION TO MODEL GRADUATE EMPLOYMENT OPPORTUNITIES

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Employment of Engineering Graduates is the hour of concern for all the stake holders of the society, as employability plays a vital role in any nations GDP. As the information regarding the number of employed engineering graduates is distributed, it seems to be a tough task for the stake holders to improve the employability potential. To increase the potential of the Engineering Graduates, we need to perform a predictive analytics from the distributed data stores which has past 5 years data. In this project, we have designed a predictive data analytics engine, which will predict employability of Engineering Graduates with respect to their skill sets (Aptitude, Verbal, Reasoning, Technical) and demographic location by applying Decision Tree Induction, Multi-level Association Rule Mining Algorithm followed by Clustering to figure the number of Engineering Graduates got employed in different domains in the past 5 years.

Index TermsStudent career prediction, Data Mining, Association rule Mining, Predictive Analytics, Decision Tree Induction

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Data Mining Approach for Anomaly Detection in Social Network Analysis

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K.Arun Priya, A.Kanaka Lakshmi, A.Kruthika, D.Lakshmi Priya
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Abstract- *With the booming trends in various domains of the online social network; there is a need for security and privacy concerns. As there is a massive population of online social network users, it is difficult to detect anomalous behavior of the users. The present study aims at detecting the abnormal activities exhibiting different behaviors in social media application using Behavior-based anomaly detection approach. Anomaly detection is a technique to identify the anomalous activities from the social media. In this paper, we have used the unsupervised method to detect anomalies. For detecting such anomalies, we group the users into clusters using K-Means clustering algorithm. From the graph, the abnormalities have been detected. The Risk score is estimated by the Expectation Maximization algorithm to identify the abnormal activities of the user. This analysis is carried out using Facebook dataset.*

Keywords-*Online Social Network, Data Mining, Anomaly Detection, Clustering, Risk Analysis, Facebook.*

I. INTRODUCTION

The popularity of online social network is ever increasing. The social media are exposed to many security and privacy concerns because of the threats and attacks in it. These attacks exploit the infrastructure to collect and expose personal information of users. Lack of knowledge about the social media leads public to suffer. To prevent this, we prepare a framework to analyze the abnormal user in the online social network. Our paper proposes a solution to predict the abnormal behavior of the user whose behavior diverges from the normal user. An anomaly is a set of activities that deviate from the normal behavior of the user. Anomalies are also called as outliers, abnormities. Anomaly detection is the processing technique for removing anomalous data from the dataset. Therefore, in this paper technique to analyze and detect the anomalous behavior is covered. The paper is organized into various sections. In section II data mining topic is discussed. In section III related works are discussed. In section IV data mining approaches to anomaly detection are discussed. Section V will discuss the anomaly detection techniques available. Section VI presents the risk assessment based on user behavior. Section VII risky behaviors in online social networks are discussed. Section VIII tells how the system is implemented. Section IX Clustering approaches is discussed. Section X conclusion for the paper is discussed.

II. DATA MINING

Data mining is the process of discovering the patterns, associations, changes, anomalies from large amounts of data stored in datasets. The discovery process consists of an iterative sequence of the following steps:

Data cleaning – This handles noisy, erroneous, missing or irrelevant data from the collection.

Data integration – In this stage multiple, heterogeneous are combined in a common source.

Data selection – The data relevant to the analysis task are retrieved from the dataset.

Data transformation – Where the data are transformed are consolidated into forms appropriate for mining by performing aggregations operations.

Data mining – It is a crucial step, where intelligent methods are applied to extract data patterns.

Pattern evaluation – In this step, interesting patterns representing knowledge are identified based on given measures.

Knowledge representation – It is a final phase, where visualization and knowledge representation techniques are used to present the mined knowledge to the user.

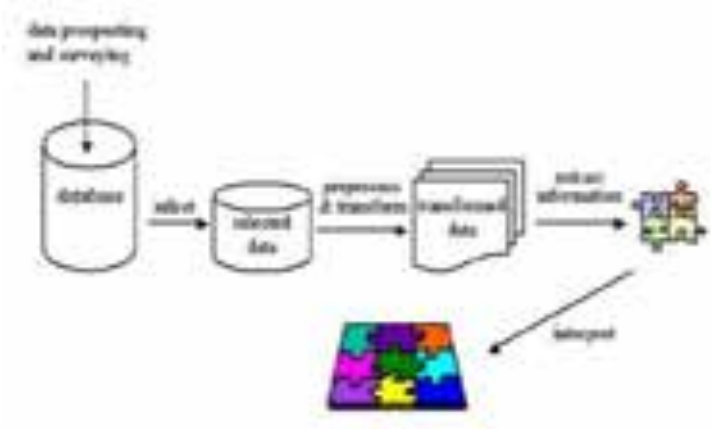


Fig II: Data mining process

III. RELATED WORK

Since information can spread rapidly and widely more than ever on online social network, they have become new hot beds of false rumor diffusion. Due to the potential harm this false information may bring to the public, false rumor detection has become a significant but challenging research topic. While previous research work mostly views it as a classification task, we treat it as an anomaly detection problem. The false rumors are viewed as anomalies and we perform factor analysis of mixed data on our proposed features to detect these anomalies. Two strategies based on Euclidean distance and cosine similarity are proposed to describe the deviation degree. A rank based on deviation degree is computed which can facilitate further rumor detection. We show our method can achieve good performance and can shed light on automatic detection of false rumors on online social networks.

IV. DATA MINING APPROACHES TO ANOMALY DETECTION

Anomaly detection is defined as "an observation that deviates so much from the other observation". From data mining perspectives, anomaly detection is classified into the following categories:

- Supervised method
- Semi-supervised method
- Unsupervised method

A) SUPERVISED METHOD

It involves studying anomaly detection as a classification problem with the pre-labeled data, labeled either as normal or as anomalous. These methods model both the normal and abnormal behaviors. There are two applicable approaches for it.

- One, experts may pre-label the normal data and any such data which is not analogous to this model is considered anomalous.

The other way is to do the opposite i.e. have the predefined set of anomalous data and any objects not corresponding to the set of anomalous data are considered as normal.

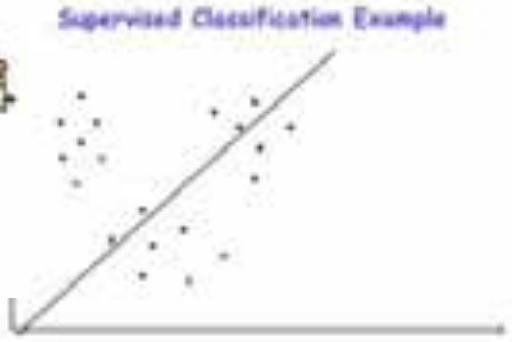


Fig IV: A(1) Supervised method

B) SEMI-SUPERVISED METHOD

Semi-supervised method, where the model is trained using the normal data, only to build the profile of normal activity. Semi-supervised methods work with two sets of data, labeled and unlabeled. So, these methods are used when out of the complete data set only few instances of data labeled as normal are available. Using the small amount of labeled data a classifier can be constructed which then tries to label the unlabeled data. Hence, a model for normal data objects is built which is used to detect the anomalies in a way that the objects not fitting the normal model are classified as anomalies. This is the simplest approach called self-training used under semi-supervised model.

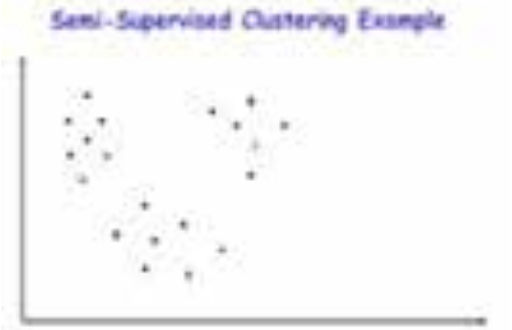


Fig IV: B(1) Semi-supervised method

C) UNSUPERVISED METHOD

Unsupervised methods, where the anomaly detection model is trained using unlabeled data that consists of both normal as well as abnormal data. Unsupervised anomaly detection methods are used when labeled data objects are not available i.e. no predefined labels as "anomalies" or "normal" are attached to the data objects. Unsupervised methods are usually studied as a clustering problem.

Finding the group of objects such that the objects in the group will be similar to one another and different from the objects in other group. Two major

challenges faced by unsupervised methods are as follows:

- First, a data object not belonging to any cluster is considered as anomalous but many times this deliberation can be false because, such a data object can be a noise rather than an anomaly.
- Secondly, what is usually practiced is to firstly find the clusters and then the anomalies. But this methodology seems to be quite expensive as number of anomalies present in a data set is pretty less than normal data objects.

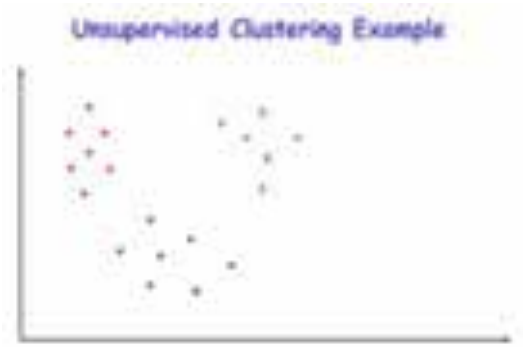


Fig IV: C(1) Unsupervised method

V. ANOMALY DETECTION TECHNIQUES

In social networks, the node disobeying these similarity measures by following behavior which is deviates from the other nodes are detect as anomalous. Anomaly detection techniques in social networks can be categorized as follows:

- Behavior based techniques
- Structural (graph) based techniques
- Spectral based techniques

A) BEHAVIOR BASED TECHNIQUES

Behavior based techniques handle the behavioral properties of the users such as number and content of message, content of the items shared, number of likes or comments on a post and duration of a conversation.

B) STRUCTURAL BASED TECHNIQUES

Structural based methods work on the basic principle of using structural properties to check the characteristics of normal and anomalous users. A particular graph metric is figured out for different nodes and structure and the nodes showing different values than other users are considered as anomalous. Just like supervised approach, here also a predefined normal pattern is already known and any deviation from that known pattern depicts the anomalous behavior. These techniques help to identify dynamic unlabeled anomalies by predicting future events and analyzing previous network behavior which is a precondition for dynamic anomalies.

C) SPECTRAL BASED TECHNIQUES

Spectral anomaly detection techniques help in detecting anomalies using some spectral characteristic in the spectral space of the graph.

VI. RISK ASSESSMENT BASED ON USER BEHAVIOR

Our main goal is to associate a risk score with the user based how he/she behaves in online social networks. The key idea is that the more the user behavior diverges from what is considered to be a normal behavior, more it should considered being risky. Therefore we first define a user behavioral profile.

In an online social network variety of activity are possible, such as post, comment, share, like and different types of interaction. In designing this behavioral profile, there is no need for monitoring all the users' activities. But only those that might reveal risky behavior is monitored. For example, writing more comments/posts without receiving any likes on them. Can we consider as a warning and they might be victim of an attack. On the contrary, having huge number of friends, posts, comments, likes in a short period is also consider as risky. The online social network population is heterogeneous in observed behavior, so it is not possible to define unique standard behavioral model that fits all online social network user behaviors.

However, we expect similar people tend to follow similar rules which results in similar behavioral model. For this reason, we propose risk assessment organized into two phases: The first phase aims at identifying the groups in online social network. This is achieved by clustering techniques. The second phase aims at creating behavioral model for each group identified by first phase.

VII. RISKY BEHAVIORS IN ONLINE SOCIAL NETWORKS

Due to the popularity of social network sites, cyber criminals or attackers started to exploit them in propagating malwares and carry out scams. The discrepancy is defined in terms of frequency, number, as well as type of activities.

In general, attackers use online social network infrastructure to collect and expose personal information about a user and their friends by making the user to click on some specific malicious links so as to propagate them in the network. In the following, we illustrate the most notable types of attacks:

Sybil attack: Sybil attack is one of the practical attacks in online social networks. As an example

there are more than thousand social bots has been detected on Facebook. To launch this attack, a malicious user has to create multiple fake identities known as Sybil's, with the purpose to legitimate his/her identity. After that, the attackers initiate their work by sending friend requests to users in the community. Once the request has been accepted, the social bot can gather the user's private data.

Identity clone attack: In this attack, malicious user creates similar or identical profiles. The key goal is to obtain personal information about the victim's friend after successfully forging the victim and established an increased level of trust with the victim's social circle. Afterwards, he/she sends friend requests to the victim's contacts. Once the friend requests have been accepted, he builds the victim's friend network and gains access to the profiles of the victim's friends.

Socware attacks: In this attack, an adversary creates malware items, called socware, in the form of applications, pages or events containing malicious link to be propagated in the online social networks. This attack lures victims by offering false rewards to who will install/accept the socware. Once users have installed the socware, it is not only gets access to the user's personal information but also gains ability to post them on the victim's wall. As a consequence the users unknowingly end up sending socware messages or post to their friends, essentially assisting the socware's viral spread.

VIII. METHODOLOGY

Our Methodology flows through the concepts of the collection of the dataset, removing the null values, categorizing the data, clustering, risk analysis.

1. A dataset is a collection of data corresponds to the content of single database table.
2. From the dataset remove the null values.
3. Risk assessment approach is based on the idea of estimating the user's risk on the basis of how much his\her behavior deviates from the normal user. Risk assessment is composed of two phase clustering :
    a. The first phase consists of organizing the users according to group identification features.
    b. In the second phase, users are categorized using behavioral features using K-means and Expectation Maximization algorithm.
4. The risk score is estimated using Membership probability based on a value of group identification features.
    a. High membership probability-normal user.
    b. Low membership probability-abnormal user.

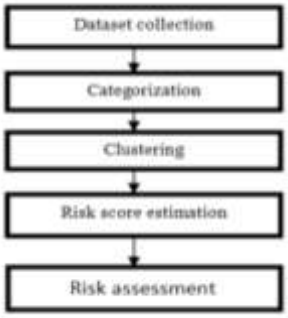


Fig VIII: Methodology

IX. CLUSTERING

- Clustering is a task of partitioning a set of data based on their characteristics into clusters.
- It is used for pattern recognition; image processing and data analysis. It discovers structures and patterns in high dimensional data.

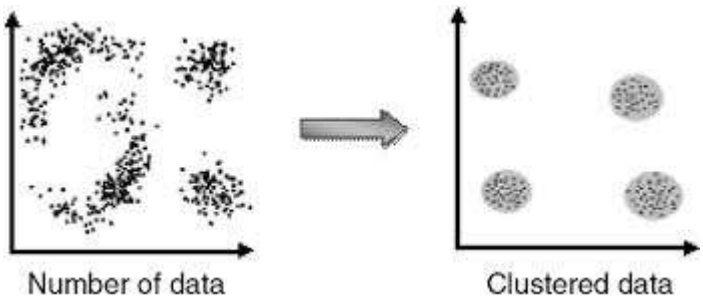


Fig IX: Clustering

A) K-Means Clustering Algorithm

- K-Means is one of the simplest unsupervised learning algorithm to cluster n objects based on attributes into k partitions where k>n.
- The goal is to find groups in data, with the number of groups represented by variable K.

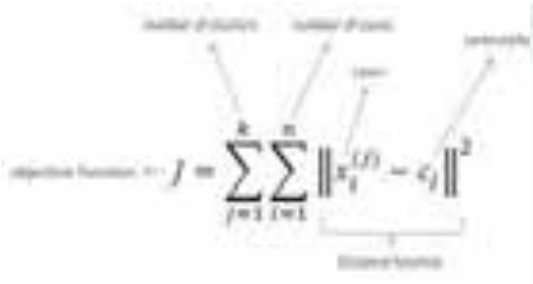




Fig IX: A(2) Removing of outliers

- Step1 - **Initialization:** Randomly choose k vectors from the dataset and make them initial cluster centers.
- Step2 - **Assignment:** Assign each vector to its closest center.
- Step3 - **Updating:** Replace each center with a mean of its members.
- Step4 - **Iteration:** Repeat step 2 and 3, until there is no more updating.

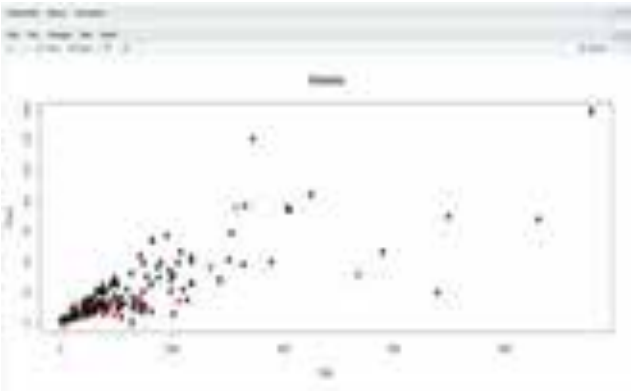


Fig IX: A(3) K-Means Clustering

IX.A (1) BOX PLOT

It is method of representing statistical data on a plot in rectangle for depicting groups of numerical data through their quartiles and vertical line inside to indicate the median value.

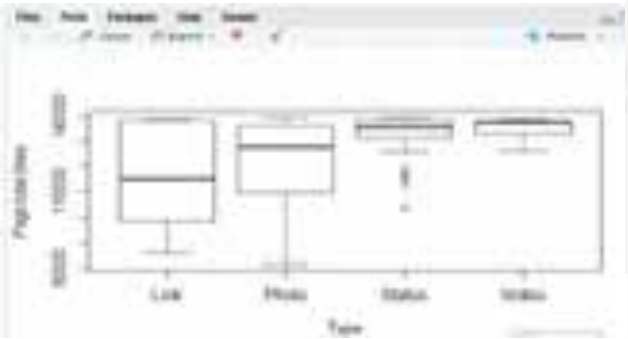


Fig IX: A(1) Box plot

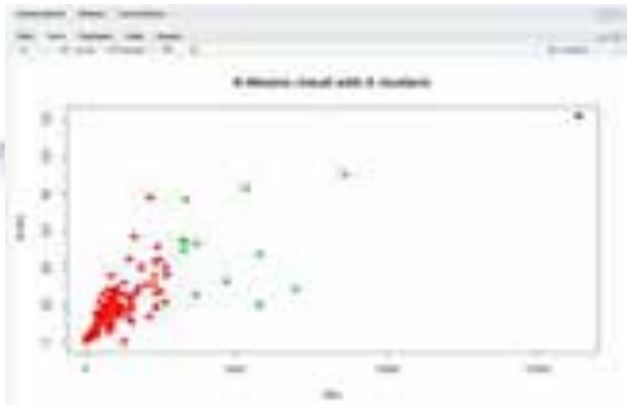


Fig IX: A(4) K-Means Clustering

IX.A(2) OUTLIERS

It is an observation point that is distant from other observations.It may indicate experimental error or variability in the measurement.It can cause problem in statistical analysis.

B) Expectation Maximization Algorithm

It is a iterative method to find the maximum likelihood function that estimates for model parameters when your data is incomplete or has unobserved latent variables.

- Step 1 - Parameters are initialized by random positive values.
- Step 2a - The membership probability for each user in each cluster is calculated using **Expectation step**.

$$w_l^j(\vec{u}) = \frac{w_l^j \cdot p_l(\vec{u}|\theta_l^j)}{\sum_{i=1}^{K} w_i^j \cdot p_i(\vec{u}|\theta_i^j)}$$

- Step 2b – The parameter is optimized based on current membership property using **Maximization step**.

$$w_l^{j+1} = \sum_{\vec{u} \in N} w_l^j(\vec{u})$$

$$\vec{\mu}_l^{j+1} = \frac{\sum_{\vec{u} \in N} w_l^j(\vec{u}).\vec{u}}{\sum_{\vec{u} \in N} w_l^j(\vec{u})}$$

$$\Sigma_l^{j+1} = \frac{\sum_{\vec{u} \in N} w_l^j(\vec{u})(\vec{u} - \vec{\mu}_l^{j+1})(\vec{u} - \vec{\mu}_l^{j+1})^T}{\sum_{\vec{u} \in N} w_l^j(\vec{u})}$$

IX.A (5) HISTOGRAM

A histogram is an accurate representation of distribution of numerical data. It is an estimate of the probability distribution of a continuous variable.

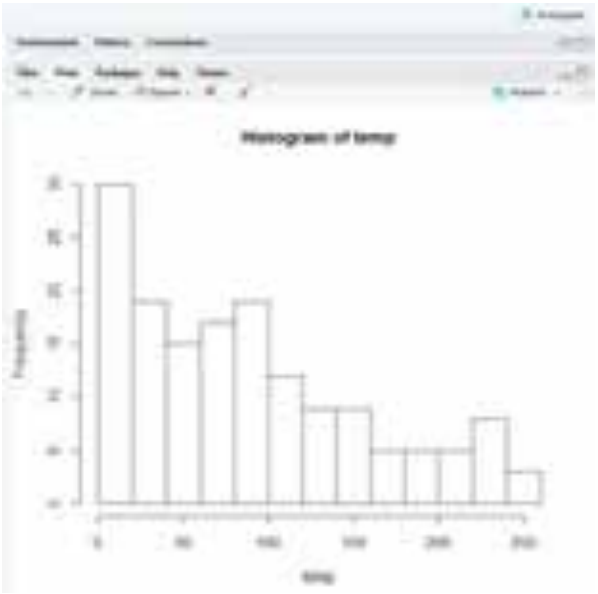


Fig IX: A(5) Histogram

X. CONCLUSION

In this paper, we proposed risk assessment approach to assign risk score to each OSN user. This assessment is based on user behavior under idea more user behavior diverge, it is considered to be risky. This analysis is carried out in Facebook dataset for effectiveness of our estimation.

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Medical Image Compression Using Contourlet Transform

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Abstract— *Compressing medical image is required for remove redundancy in imaging for reliable storage and fast transmission. Since the medical imaging techniques produce prohibitive amounts of data, compression is necessary for communication purposes. Many current compression schemes provide a very high compression rate but with considerable loss of quality. On the other hand, in some areas in medicine, it may be sufficient to maintain high image quality only in the region of interest. The Lossless compression is used for medical imaging. Choosing the ROI and NON-ROI plays a major role in medical image compression. It is used with the ROI technique to compress the medical image. In the proposed method The Image Decomposition using Contourlet transform. The coefficients of contourlet transform analyzed and extracted the Region of Interest and then coded using EZW. The performance of the proposed system analyzed using various parameters such as PSNR(Peak Signal to Noise Ratio),CR(Compression Ratio).*

Keywords— *Lossless Compression, PSNR, Region of Interest, Contourlet Transform, MRI and CT*

I. INTRODUCTION (*HEADING 1*)

Image compression addresses the problem of reducing the amount of data required to represent a digital image. It is a process intended to yield a compact representation of an image, thereby reducing the image storage/transmission requirements. Medical image analysis and data compression are rapidly evolving field with growing applications in the healthcare services e.g. teleconsultation, e-health, telemedicine and statistical medical data analysis . Not only it has brought a drastic change in the health care systems but also it has made the concept of tele-consultation and telemedicine a reality. For the telemedicine, medical image compression (MIC) and analysis may even be more useful and can play an important role for the diagnosis of more sophisticated and complicated images through consultation of experts. As in telemedicine, videos and the medical images are transmitted through advanced telecommunication links, so the help of medical image compression to compress the data without any loss of useful information is immense importance for the faster transfer of the information. The image transmission time depends on the bandwidth and the data transfer rate, so for the optimum use of the channel bandwidth and the faster data transfer, it is necessary to transmit the medical image data in compressed form. There are many medical image compression techniques are available and evolving in day to day basis. The study of all such compression techniques are important, different techniques uses different medical images like Magnetic resonance images (MRI) and Computed tomography (CT) etc.. DICOM (digital imaging and communications in medicine) is used for storing, transmitting and viewing of the medical images. Now-a-days wavelet based compression techniques have become more popular because they provide exceptional image quality at high compression rate. Technically, all image data compression schemes can be broadly categorized into two types. One is ***reversible compression,*** also referred to as "**lossless**" A reversible scheme achieves modest compression ratios of the order of two, but will allow exact recovery of the original image from the compressed version. An ***irreversible scheme,*** or a "**lossy**" scheme, will not allow exact recovery after compression, but can achieve much higher compression ratios. Currently, lossy algorithms are not being used by the radiologists in clinical practice. In lossless compression, the reconstructed image remains identical to the size of the original image, after compression. It can only achieve reserved amount of

compression. These are also called noiseless since they do not add noise to the image. It is known as entropy coding since it uses statistics/decomposition techniques to eliminate/minimize redundancy. Lossless compression is used only for a few applications with strict necessities such as medical imaging. Following techniques are incorporated in lossless compression:

- Run length encoding
- Huffman encoding
- LZW coding
- Area coding

The first step of an ROI based system is segmentation. In the proposed system the medical image segmented using Binary mask to extract ROI part of the image. Mohammad AI-Rababah et al[2016] In the proposed system medical images must be compressed using lossless compression. DWT algorithm was used for decomposition and SPIHT algorithm for compression. This algorithm provides essential PSNR values for MRI images. This algorithm is applying to compress medical image 3D and 4D.The results obtained by our compression codec are incredibly agreeable in terms of compressed image quality(PSNR) and compression ratio. [1]

Loganathan R et al[2013] The system proposed, the Region of Interest (ROI) – representing the diseased part in a medical image is segmented using active contours. The ROI extracted are then compressed using lossless compression to maintain the integrity. A novel Biorthogonal wavelet and Embedded ZeroTree (EZW) is proposed for compression technique. To overcome the limitations of lossy compression, ROI of the image is compressed using different techniques. It was proposed to segment ROI using Active Contour and apply Biorthogonal wavelet and Embedded ZeroTree (EZW) for compressing the image. After testing the algorithm on different image it was seen that the Peak Signal to Noise Ratio (PSNR) is consistently in the region of 40 which is very feasible.[2]

AshwinDhivakar M.R et al[2016] **The proposed system employs** to investigate and explore the viability of Embedded Zerotree (EZW) wavelet coder for therapeutic and medical image compression and highlights its performance .The proposed algorithm implemented, investigated and researched the quality performance of the best in class EZW coder in view of wavelet transform for a selected set of restorative pictures and medical images of different modalities, for example, Brain MRI, Hand X ray and Liver US . This shows the quality of the reconstructed image not only reckons on the sort of wavelet based image compression algorithms but also
depends on the image characteristics and picture attributes. The future direction of the work will be to study on implications and ramifications of coding performance based on evolutionary computation such as Genetic Algorithms (GAs) and Fuzzy Logics.[3]

Yanjun Liu et al[2012] **In The proposed system** algorithm improves the coding efficiency on the one hand; and on the other hand the quality of reconstructed image is also not significantly decreased. Wavelet image compression coding with the advantages of its high compression rate and higher quality of image restoration, makes it have great application in the image compression field. This algorithm through analysis of coefficients characteristics after the wavelet transform, deals with the duplicate data in wavelet coefficients, makes the number of scans reduced, and thus shortens the output code streaming, according to the encoding which has good compression effect.[4]

Salih Burak Gokturk et al[2016] **This System** discusses a hybrid model of lossless compression in the region of interest, with high-rate, motion-compensated, lossy compression in other regions. First, They have designed a compression scheme that automatically segments and utilizes ROI in order to get efficient and accurate results. Second, common compression schemes have been applied to CT abdomen images and the performances are compared. After surveying common compression schemes, They have chosen motion-estimating coding as a prediction scheme for each medical abdomen slice. There are many possible directions for future investigation. In order to obtain better compression rates, ROI can be lossly encoded, *i.e.*, by DCT compression. Future study will include the design of lossy compression schemes in ROI and a clinical case study with radiologists to observe the effect of lossy compression on diagnostic performance.[5]

Sarvarinder Singh et al[2015] **focused on** medical image. In medical image when some portion of image is to be selected, then ROI is selected with the help of Discrete Cosine Transform. It is used with the ROI technique to compress the medical image to remove the blocking effect. In the future work the image compression is performed on the medical color image with the help of different techniques and morphological operator. [6]

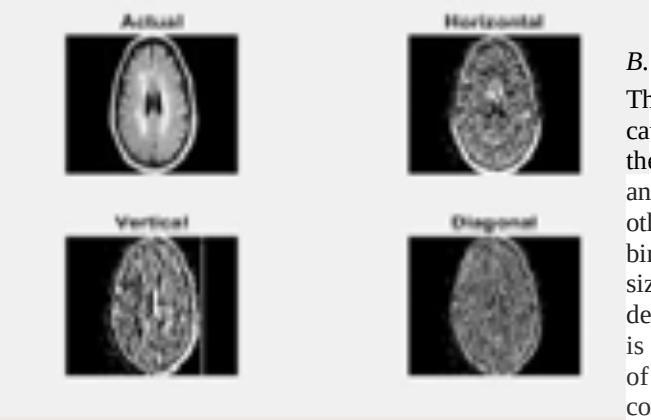


Fig. 1 First Level Of Decomposition

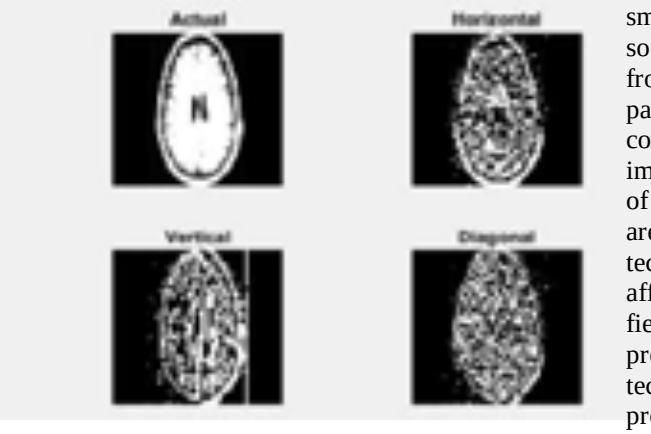


Fig. 2 Second Level Of Decomposition

II. ROI BASED SYSTEM

This section describes a hybrid compression system for lossless compression of ROI in MRI/CT brain images. The overall flow of the system is given in Figure 1. The first stage is the segmentation of ROI. Edges are those places in an image that correspond to object boundaries. Edges are pixels where image brightness changes abruptly. To avoid ringing artifacts we use edge detection. Edge preserving algorithm is applied to detect the edge.Sobel operator is used to detect the edges of the images [8]. The image consists of smooth variation, termed as low frequency variations and the sharp edges as high frequency variations[9].

A. Countourlet Transform

The image is decomposed using Contourlet transform. The results of decomposition will be in the form of four subbands. The subbands are Low-Low,Low-High,High-Low,High-High. The coefficients of contourlet transform analyzed extracting the Region of Interest and then coded using EZW.

B. ROI Based Compression Scheme

The region of interest is that part of the image which catches our attention instantly than the other parts of the image. A **region of interest** (**ROI**) is a portion of an image that you want to filter or perform some other operation on. You define an **ROI** by creating a binary mask, which is a binary image that is the same size as the image you want to process with pixels that define the **ROI** set to 1 and all other pixels set to 0.It is sometimes of interest to process a single sub region of an image, leaving other regions unchanged. This is commonly referred to as region-of-interest (ROI) processing. A topic of interest for better compression has been the Contourlet based ROI with wavelet transform of digital signals and images. ROI is the most critical part of the image that located over very small regions of the image. Non ROI is also included so that user can easily find out the most critical part from the whole image. In medical field, these critical parts needed to be compressed with high quality compression without any loss than other parts of image. Compression reduces the size of images. It is of two types i.e. lossy and lossless. Lossy techniques are used where loss can be accepted and Lossless techniques are used for the application that cannot afford any loss of information for example in medical field. Lossless compression for medical images has proposed in this work and compared with other techniques i.e. Integer wavelet transform. The proposed algorithm includes two compression techniques i.e. Fractal is used for the non ROI part of an image and Context tree for ROI part which cannot afford any loss [7] For compressing the ROI part, the proposed method uses EZW encoding technique and for NON-ROI part,the proposed method uses Discrete Wavelet Transform for encoding the image.



Fig. 3 Choosing ROI part

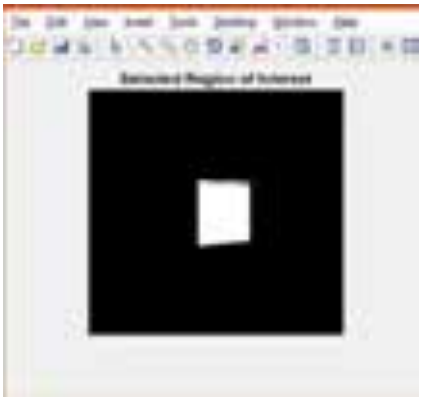


Fig. 4 Selected ROI

III. PROPOSED ALGORITHM

A. EZW Algorithm

The EZW coder is the state of the art image compression framework. In other words, an EZW algorithm generates a bit stream of an image based on dynamic and progressive encoding with increasing accuracy or extending precision. The primary points of interest of EZW coder is that bits can be created altogether of significance or in order of importance. Secondly, the encoder can end encoding anytime when an objective rate to be met precisely.

A.1 Characteristics of Encoding Algorithm

A piece of image does not compress the original image after wavelet transformation, but the energy of the whole image is redistributed, and carrying on the compression must also be quantitatively and entropy coding. In general, in the process of wavelet image compression quantification is one of the most crucial parts, it preferably organizes the wavelet coefficients of image to realize effective compression; entropy coding is forming wavelet coefficients coding after quantification to output bit torrent. As Zero-tree represents visually less significant image regions,watermark bits can be placed at zero-tree coefficients without visual degradation of originally image quality.As zero-tree and watermark are both scattered over the image,the image is thus made robust.

The EZW coder is the state of the art image compression framework.In other words,an EZW algorithm generates a bit stream of an image based on dynamic and progressive encoding with increasing accuracy or extending precision.The primary points of interest of EZW coder is that bits can be created all together of significance or in order of importance.Secondly,the encoder can end encoding anytime when an objective rate to be met precisely.

The EZW coder is well suited and gives better performance for the scalability applications such as progressive transmission . The EZW algorithm is based on four key concepts :

1. Discrete wavelet transform (hierarchical subband decomposition)
2.Prediction of the absence of significant information across scales by exploiting the self-similarity inherent in images
3. Entropy-coded successive-approximation quantization
4. "Universal" lossless data compression which is achieved via adaptive arithmetic coding.

With the output of decomposed image , the unit cell will be generated . The generated unit cell is performed through Dominant pass and Subordinate pass.If all the unit cells are scanned then it leads to check whether the threshold value is equals to desired value and finishes its encoding process

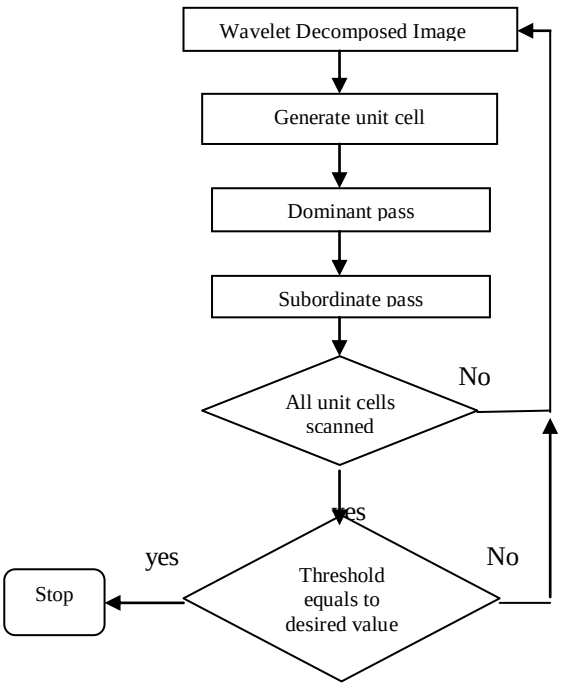
Otherwise it repeats the same process.An encoder terminates encoding at any given time allowing a target rate/target distortion metric to be met on the dot.

The EZW encoder is based on two observations:

1. Natural images have a low pass spectrum. when an image is wavelet transformed, the sub bands energy decreases as scale decreases(low scale means high resolution);hence wavelet coefficients will be smaller in the higher sub bands

On average than in lower sub bands.This proves that progressive encoding is an automatic choice to compress wavelet transformed images,as higher sub bands only provide more details;

2.Large wavelet coefficients carry more importance than smaller wavelet coefficients.



IV. EXPERIMENTS

The method of separate transforms to the two regions proves better results compared to the ordinary way of applying only single transform to the whole image.

The proposed technique of EZW for 8-bit 256*256 images were tested. In the proposed method of compression ,to take the whole value as array of bytes,the medical image values having similar attributes are coded and taken as a sequence of bits. The region of Interest region is encoded using the Binary Mask and the Non Region Of Interest coded using Discrete Wavelet Transform.

The compression ratio for contourlet based EZW increases than the normal EZW algorithm.





V. CONCLUSION

The proposed system, uses the Embedded Zerotree Wavelet along with the Discrete Wavelet Transform to compress the image that is obtained from the MRI and CT scanned medical images. This algorithm has produced better results for the medical image compression. The calculated PSNR(peak signal to noise ratio)is high and there was a good progressive image transmission. Hence it is expected to have wider application in the compression of images. The algorithms are less complex and the compression is efficient with reduced computational time. The resulting compressed image perfectly reconstructs the original image and in the proposed encoding technique the subbands incurs some complexity and so the insignificant bands are neglected.

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Gender Classification using Face Detection

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Abstract—*Gender classification system used in various real time applications such as surveillance system, super market, demographics collection, biometrics, and human computer interaction. The proposed gender classification system consists of six modules, they are video to frame conversion, face detection, preprocessing, masking, feature extraction (edge and texture) and classification using SVM (Support Vector Machine). In this project, video is converted into frames then the face is detected by using viola-Jones face detection algorithm. After detecting the face preprocessing can be done by using illumination and edge enhancement. Then masking can be performed by using 8-dimensional kirsch compass masks. Then LDN (Local Directional Number Pattern) algorithm is used to obtain LDN image. This feature vector can be given to SVM. The classifier gives the given input is male or female. Experimental results can be obtained by using Real time video dataset and I-BUG video dataset, shows this system is effective and efficient in recognizing gender for various illumination condition, occlusion, pose variation, and facial expression by using MATLAB.*

Keywords- *Support vector machine, viola jones algorithm, kirsch compass algorithm, Local directional number pattern.*

I. INTRODUCTION

A gender classification technique using face images is a hot research topic. Recognizing and classifying a person is very easy for humans, but it is very difficult for a machine. So, a machine cannot understand the person is male or female. So it is necessary for understanding the intelligent machine, to classify the given person is male or female. Motivation, needed for the gender, recognizing system, they inquire into the new design, a real time gender classification system. Comparing both research and engineering, gender classification is a matured and active field. So, this gender classification system plays a significant role in human computer interaction, demographics, facial recognition, and in video surveillance etc. Gender recognition is a problem of pattern recognition. Pattern recognition is generally divided into two stage, one and two stages pattern recognition methods. One stage pattern recognition method classifies input data directly. Two stage pattern recognition method consist of feature extractor, followed by some form of classifier. The classification accuracy with affordable complexity, Haar-like features and AdaBoost trained classifier are applied to the face detector while Eigen face features and collaborative representation classifier are embedded to the gender classifier [1]. Recently, local binary patterns (LBP) are learned from the real world face images to classify the gender in [2,4]. Gender classification is a fairly active and matured field of research, vivid in both research and engineering communities. It has always been a significant role that gender classification plays in various applications such as face image search [1] Deep Dense Face Detector (DDFD), a method that does not require pose/landmark annotation and is able to detect faces in a wide range of orientations using a single model based on deep convolutional neural networks. This method is able to detect faces from different angles and can handle occlusion to some extent [5]. This study [6] proposes an illumination-invariant face-recognition method called adaptive homomorphic eight local directional pattern (AH-ELDP). AH-ELDP first uses adaptive homomorphic filtering to reduce the influence of illumination from an input face image. It produces eight directional edge images using Kirsch compass masks and uses all the directional information to create an illumination-insensitive representation. In this paper [7] they propose an illumination robust face recognition system via local directional pattern images. Usually, local pattern descriptors, including local binary pattern and local directional pattern have been used in the field of the face recognition and facial expression recognition, since local pattern descriptors have important properties to be robust against the illumination changes and computational simplicity. Gender classification is a fairly active and matured field of research, vivid in both research and engineering communities. It has always been a significant role that gender classification plays in various applications such as face image search [8],

artificial intelligent system, surveillance etc. For robustness, local directional patterns (LDP) are used instead of LBP in [9]. This paper [10] achieves the robustness against acceptable partial occlusions and facial postures using a component based approach, and insensitivity toward illumination conditions via the grayscale image-based methods. However, facial analysis is a challenging task because of illumination variations, pose changes, facial expressions, age variations and occlusion. Illumination variation, considered as one of the crucial problems among these factors, has attracted much attention in the face recognition community in the last decade [12]. This paper [11] proposes a novel local feature descriptor, Local Directional Number Pattern (LDN), for face analysis: face and expression recognition. LDN encodes the directional information of the face's textures (i.e., the texture's structure) in a compact way, producing a more discriminating code than current methods. They divide the face into several regions, and extract the distribution of the LDN features from them. Then, they concatenate these features into a feature vector, and they use it as a face descriptor. The LDP, EnLDP and LDN methods operate in the gradient domain to produce illumination-invariant representations. They could also be considered as LBP approaches. However, they use edge, directional information instead of intensity changes, since edge responses are insensitive to lighting variations. For robustness, local directional patterns (LDP) are used instead of LBP in [13]. Facial gender classification can be classified into two categories [14]: geometric-based [15] and appearance-based [16]. Here in this paper proposes an appearance based approach. Humans make use of the face as an important cue for identifying people. This makes automatic face recognition very crucial from the point of view of a wide range of commercial and law enforcement applications. Although significant work has been done [17], the current systems are still not close to the human perceptual system. In this [18] work it is describes a framework for classifying face images using Adaboost and domain-partitioning based classifiers. The most interesting aspect of this framework is the capability of building classification systems with high accuracy in dynamical environments, which achieve, at the same time, high processing and training speed. In this paper [19], they present a novel method to gender classification using a new simple feature extraction which extracts geometric and appearance features at the same time. In this paper [20] feature extraction is performed by computing the derivative in all pixels of face images and then constructing a histogram based on edges magnitudes and directions. The features selected by our proposed gender classification experiment are robust to ethnicity and moderate changes in expression.

II. Systematic Representation

In this proposed method automatic gender detection for unconstrained video sequence is done. The proposed methodology consists of six principle modules. They are video into frame conversion, face detection, preprocessing, masking, using kirsch compass mask, feature extraction using LDN (local directional number pattern), classification using SVM (support vector machine) as illustrated in Figure.1. A camera is used to capture the real-time video. first the video is converted into frames, from the frames face can be detected by using a viola Jones algorithm. when a face is detected, it's sent to preprocessing that contain gray scale converter, cropping and image adjusting and image sharpening. After preprocessing masking can be performed, after that feature vector can be extracted, then the test video is classified by gender classification system using LDN (Local Directional Number Pattern).

III. PROPOSED METHOD

A. Video to Frame Conversion and Face Detection by Viola-Jones

At first videos are converted into frames. From the frames, the face can be detected by using viola Jones face detection algorithm. The face detection algorithm can be divided into two steps, they are first Haar-like features is used to give each and every input image frame. Second, for finding the face region, Haar-like features are generated, then classifier is trained by using adaboost algorithm. It works in step by step manner.



Fig. 1. *Proposed real time gender classification system*

B. PREPROCESSING

After face detection, the next step is preprocessing. Image adjusting is used to adjust the brightness and poor illumination of the image. The output obtained after preprocessing reduced the illumination effect and it makes the image brighter. This function expands the values of the dark pixels and compresses the bright pixels in the image. The edges of the image are very clear. Preprocessing step also consists of converting a color image to grayscale image and cropping of images. The below figure 2 shows that the result of preprocessing.



(a) (b) (c) (d)

Fig.2.*Result for Preprocessing(a),(c)Cropped face (b),(d)preprocessed image*

C. MASKING-KIRSCH COMPASS MASK

To produce LDN code, we need the help of kirsch compass mask, which is used to compute the eight directional edge information. In this work, we analyze our LDN code using this mask. The kirsch compass mask is a derivative mask is used to find the eight directional edge information. To compute the eight edge response to the face image, kirsch compass mask can be represented by (M0, M1,……, M7). Kirsch compasses mask operates in a gradient domain which gives the structure of the face. Figure 3 shows that the eight dimensional kirsch compass mask that produce eight edges by rotating each mask at 45°. This rotation can be given by 0°, 45°, 90°, 135°, 180°, 255°, 270°, 315°. This convolution generates eight edges, directional image. The below diagram shows that the Kirsch compass masks in eight directions.



Fig.3. Kirsch compass masks in eight directions

D. LDN(FEATURE EXTRACTION)

LDN is a six-bit binary code. This six-bit binary code is assigned to each and every pixel of an input face image, that obtain the structure of the texture of facial image and intensity transition. Our pattern is created by computing the edge information on neighborhood using a kirsch compass mask. LDN code can be represented by selecting top directional numbers by taking the most positive and negative direction of the edge information. We represented the output of the coding scheme in figure4.The positive and negative information about the structure of neighbor, they disclose the gradient direction of bright and dark region in neighboring. This dark and bright regions are used to differentiate between blocks with the positive and negative directions by producing a dissimilar code. Moreover, the transition occurs in face i.e, the bottom and top edges of eyebrow, mouth and nose have a such dissimilarity intensity transition. So, LDN can fulfill this difficult task by a specific code to each of them. And it's used to classify the gender.

LDN Coding Scheme:

1. Load the detected face image and convert it into gray scale image and preprocessing step is applied to that image.
2. Apply the kirsch compass mask to the face image to get the eight directional edge information.
3. Select the maximum 3bit top positive directional number and minimum 3bit top negative directional number position.
4. Then concatenate the top positive and negative direction to obtain the LDN code and corresponding LDN image is generated. Figure 5 and 6 shows LDN image of male and female.
5. Then split the LDN image into 10bins using histograms.
6. Concatenate the histogram from each block to generate the feature vector.
7. Then compare the feature vector of the training image with the feature vector of the test image by using the above algorithm. Then classifier gives the output as male or female.

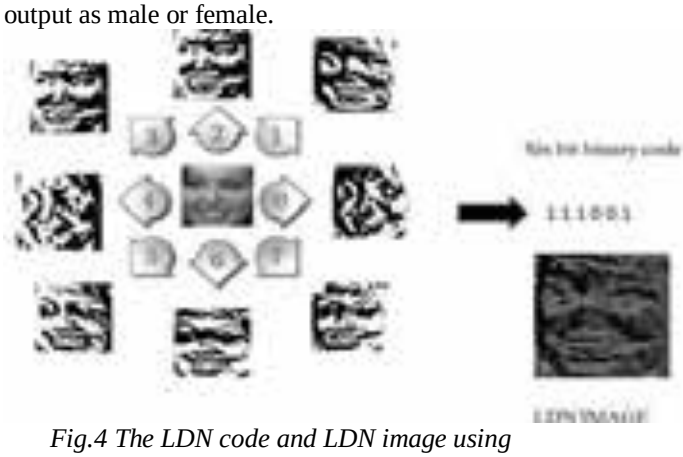


Fig.4 The LDN code and LDN image using compass mask.

Mathematical equation of LDN

LDN coding can be generated by analyzing the edge response of each mask, (M_0, M_1,……, M_7). This represents the edge information in a certain

direction by the combination of directional number. Figure 4 shows the code and LDN image using compass mask. To encode the prominent region[11] we simply use the sign information, and we should fix a position for top positive directional numbers as the 3MSB bits in the LDN code and the 3LSB bits are the top negative directional numbers, shown in figure 4. LDN code can be defined in mathematical equation as,

$$LDN\ (x, y) = 8 i_{x,y} + j_{x,y}, \quad (1)$$

where (x,y) is the central pixel of the neighborhood being coded, $i_{x,y}$ is the directional number of the maximum positive response, and $j_{x,y}$ is the directional number of the minimum negative response defined by:

$$i_{x,y} = \arg \max_i \{ \Pi^i (x, y) \mid 0 \le i \le 7 \}, \quad (2)$$

$$j_{x,y} = \arg \min_j \{ \Pi^j (x, y) \mid 0 \le j \le 7 \}, \quad (3)$$

where Π^i is the convolution of the original image, I, and the ith mask, M^i, defined by:

$$\Pi^i = I * M^i. \quad (4)$$



Fig. 5. *Samples of the LDN image. The first image samples of The original image of female and the second image is the samples LDN image of the female.*



Fig. 6. *Samples of the LDN image. The first row is the samples of The original image of male and the second row is the samples LDN image of the male.*

E. Gender Classification via Support Vector Machine

Gender classification is achieved by distinguishing male faces from female faces. Gender classification is a binary classification problem which we have given by extracting feature vector from each face and classifying them with support vector machine (SVM).Support vector machines (SVMs, also support vector networks) are supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis. Given a set of training examples, each marked for belonging to one of two categories, an SVM training algorithm builds a model that assigns new examples into one category or the other, making it a non-probabilistic binary linear classifier.

IV. Experiments and Analysis

The experiments were carried for video taken from my college which contains both male and female. Recognizing gender of a person from large illumination variation videos is a challenging task in video surveillance system. Here poor illumination videos are taken with different conditions such as pose variation, occlusion, facial expression. The video is converted into frames using Matlab and from the frame face is detected by using viola Jones face detection algorithm. After face detection preprocessing is done. In a next step masking can be done by using a kirsch compass mask. Then after masking, edge feature vector can be extracted by using LDN (local directional number pattern). LDN edge features are comparable for both male and female and these features are given to the SVM. In the final step classifier shows the given face is male or female.

A. Introduction of Database (Video)

Two databases are used to test the performance of our system, including the real time video database and I-bug video database. We choose a subset of the real time database containing 416 face images of 27 people (216male, 200 females) and these images with different facial expressions, pose variation, occlusion with illumination conditions.
The video is converted into frames using Matlab. Video is a sequence of image or sequence of frame. Here the length of the video is 20 second, frame width and height is about 640 and 480.Data rate up to 3647kpbs and total bit rate is 4000kpbs.Frame rate up to 30 frames/second.



Fig.7. *Female input video with(illumination condition) posevariation,occlusion,and facial expression.*

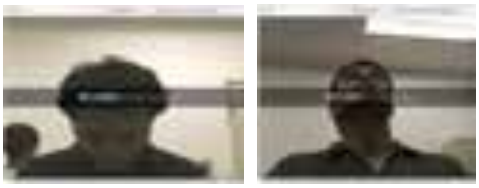


Fig.8 .*Male input video with(illumination condition) posevariation,occlusion,and facial expression.*

B. FACE DETECTION-OUTPUT

The face detection is done in the frame using Viola and Jones face detection algorithm. This viola jones algorithm is able to detect side pose, occlusion, and facial expression video.

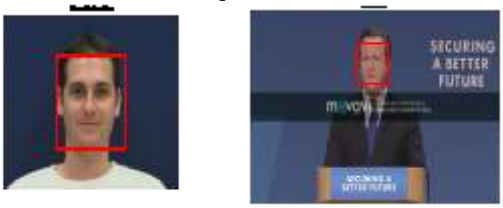


Fig.9. *Face detection using viola jones algorithm with(illumination condition) pose variation,occlusion,and facial expression.*

C.RESULT OF I-BUG DATABASE

The below figure shows that the samples of classified result of I-BUG dataset.



Fig.10. *Performance of the proposed system via I-BUG Database.*

D. OVERALL CLASSIFICATION RATE IN(%)-WITH AND WITHOUT ENHANCEMENT OF REAL TIME DATABASE

The below table fig10 shows that the gender classification rate with and without illumination (with and without enhancement) training 100 images and testing 100 images. In that 100 image training contain 50 male and 50 female images. Testing also contain 50 male and 50 female image. The 100 images are mixed datasets with occlusion, facial expression, and pose variation. The figure 10 shows the performance analysis of support vector machine using real time video dataset. The gender classification rate without enhancement using SVM is 95% accuracy and error rate is 5%. The gender classification rate with enhancement using SVM is 96% accuracy and error rate is 4%. The images with enhancement obtained better accuracy than the images without enhancement.

TABLE FIG.10 COMPARISON OF OVERALL CLASSIFICATION RATE IN(%)-WITH AND WITHOUT ENHANCEMENT IN REAL TIME DATABASE CONTAINING 100 TRAINING AND 100 TESTING IMAGES.

classifier	Classification rate(in %)
SVM (image Without enhancement)	95%
SVM (image With enhancement)	96%

V.CONCLUSION

This project proposes a novel technique for automatic human gender classification for unconstrained video sequence using extracted feature vector. First the video is converted into frames. By using viola Jones face detection algorithm face can be detected from the frame. Then the face image is converted in to gray scale image and cropped. Then the face image is preprocessed by illumination methods which partially reduced the illumination effect and make the image brighter. The eight edge directional information of the face is get through the kirsch compass masks. Then LDN algorithm is an illumination invariant and it is a six-bit binary code used to represents the structure of the texture and its intensity transitions, and it produces a more discriminative code. Support Vector Machine classification algorithm are used for classifying the given input video is male or female. The experiments are carried out by videos with occlusion, pose variation and facial expression using real time video database and I-BUG video database achieves high recognition rate.

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Online Shopping Based on Customer Behaviour and Product Review

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Abstract - In everyday life, the user comes are in needs to buy products which might not be available at the same place. In order to satisfy user needs and to increase the convenience, E-commerce website displays and supplies all types of products as per user demands. The main problem is that the user is always attracted to a particular company though other companies provide the same product that is latent to the user due to lack of proper opportunities. In order to solve the problem faced by the companies, the primary requirement is to analyze customer interest and requirement for a particular product from the reviews submitted. The analysis can be done using Opportunity Algorithm from which report can be generated and suggestions are provided to respective companies. By this, we can avoid unwanted production of products and make a new product available to all.

Index Terms - Web Scraping technique, Topic Modeling, Sentimental Analysis and Opportunity Algorithm.

I. INTRODUCTION

There are lots of products that are being released on a day to day life. Those products what the customer is in need of may not be available all in one place so this problem is solved using the E-commerce websites. Although products have equal features similar to other products those products are not known to the customer. In order to overcome the problem faced by the customer in E-commerce websites, the primary requirement is to analyze customer interest and requirement for a particular product from the reviews submitted.

Analyse their view submitted based on the reviews the drawbacks of the product are collected and suggestions are provided to the particular company.

The paper proposes the idea to apply the analysis can be done using Topic Modeling[3], Sentimental Analysis[7] and Opportunity Algorithm[8] from which report can be generated and suggestion is provided to respective companies.

II. RELATED WORK

Data Mining is been used every place and every case for obtaining results as required.

A. This would be applied to Movies success after release. Reviews which have been submitted by the audience would be considered from the website or by an oral statement submitted. Once those reviews of collected they are analyzed based on the various aspect that is related to the movies features for example (comedy sense, action, an attraction of audience) on this basis the conclusion would be derived and the results may be positive or negative which can be used for improving the upcoming movies. This analysis would support many people in this field such as director, actor, cameraman etc.

B. This would be applied to E-book websites to knowing the reach of author views to the reader. Reviews which have been submitted by the reader would be considered from the website or from the mail received from the reader. Once those reviews of collected they are analyzed based on various aspect that is related to the book features for example (driving the attenuation of the reader) on this basis the conclusion would be derived and the results may be related or unrelated which can be used for improving the writing skill and this would even improve the E-book website to display or sell readers interested books. This analysis would support many people in this field such as writer, librarian, etc

C. This would be applied to online courses websites for knowing trending course required for the learner. The opinion of the learner is collected when feedback is asked from the learner. The analysis of the feedback and views of the learner

that is been send is collected. Once that requirement is collected they are analyzed based on various aspect that is related to the course features for example (modes of courses delivery, testing the knowledge gained) on this basis the conclusion would be derived and the results may be related or unrelated which can be used for improving the learner skill and this would even improve the Course website to display related course for the learner based on the interest. This analysis would support many people in this field such as lecturer, website owner etc.

III. METHODOLOGY

Our Methodology of development flows through the concepts of **Web Scraping technique, Topic Modeling, Sentimental Analysis and Opportunity Algorithm** is shown in Figure1**.**

Using the **web scraping** technique, the reviews of the products from the customers are extracted from the websites. (E.g.-Instant Data Scraper). **Topic modeling [4]** finds those products that have good features and are being hidden to the customer. Those products features are known to the customer using topic modeling [6]. **Sentimental Analysis** customers may have different opinions and according to the opinions of the customer the products are being listed to satisfy the user needs. **Opportunity Algorithm** finds products that are latent[1] to the customer and provides an opportunity for latent products.

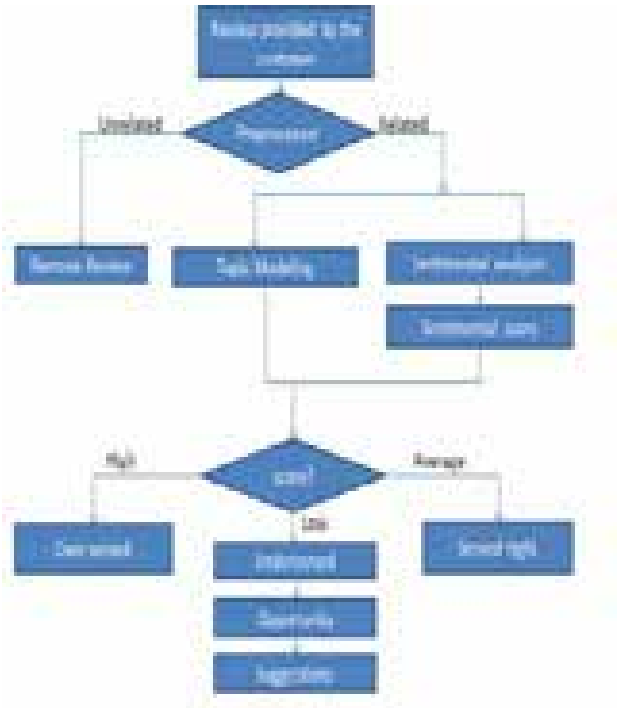


Figure 1: **Project Specification**

DATA GATHERING:

Web scraping is a method used to collect information across the internet. This is done with help of the tool to collect specific bits of information required. The tool used is **instant data scrapper** which can access the world wide web using the hypertext transfer protocol. The tool will automatically fetch and extract the information from the website which will be easy for the collection of reviews from the e-commerce website. With the use of the tool, we can fetch the required information and extract. We can save the extracted information in the required file format and saved on the local disk of our computer. The data extracted will contain numbers, punctuations, stop words and emoticons. This is removed in the pre-processing step. The fetched reviews can also be unrelated to the particular product and this also to be removed during the further steps.

PREPROCESSING:

The pre-processing is a component of Web-mining. The data collected may be inconsistent and may contain errors which may not be compatible with our processing. The authorized reviews of the product that are given by the customer are collected using web scraper. Thus in the pre-processing step, the stop words, emotional words, and connectives in the reviews given by the customer are removed. The pre-processed data will be suitable for future processing.

CLASSIFICATION:

The pre-processed data may contain unrelated reviews. These unrelated reviews are to be removed using this classification step. The classification step is done with the use of a dictionary which has the related words for a particular product. The particular product related words and reviews are given by customer are matched with the related words of the product. If the reviews given by the customer matches with the product related words those words are given as input for topic modeling [5]

1. TOPIC MODELING:

In Machine Learning and Natural language processing, a topic model is a type of statistical model for discovering the abstract topics that occur in a collection of documents. It is a frequently used text-mining tool for discovery of hidden topics. Topic modeling is a technique used to infer hidden topics in text documents. Topic modeling requires three input for an execution: corpus (Collection of documents), Word Dictionary and Number of topics. Now In this

process, the information gathered would be analyzed and latent[2] words would be identified using different approaches such as LDA algorithm. LDA Algorithm is a statistical model that allows set observation to be explained which is not known. This method can be used for various other purposes.

2. SENTIMENTAL ANALYSIS:

The process that defines user's opinion or feelings towards the particular product in order to determine the satisfaction level of the product. In this method classification of the dataset is done based on the positive, negative or neutral words in the reviews given by the customer. For the particular product, the reviews are collected from E-commerce websites, Social media and it is being classified into positive, negative or neutral are shown in Figure 2. The classifications of these reviews are done using Lexicon-based approach. In this lexicon-based approach, has a set of predefined dictionaries which includes the positive, negative or neutral words, customer reviews are matched with these predefined dictionaries.

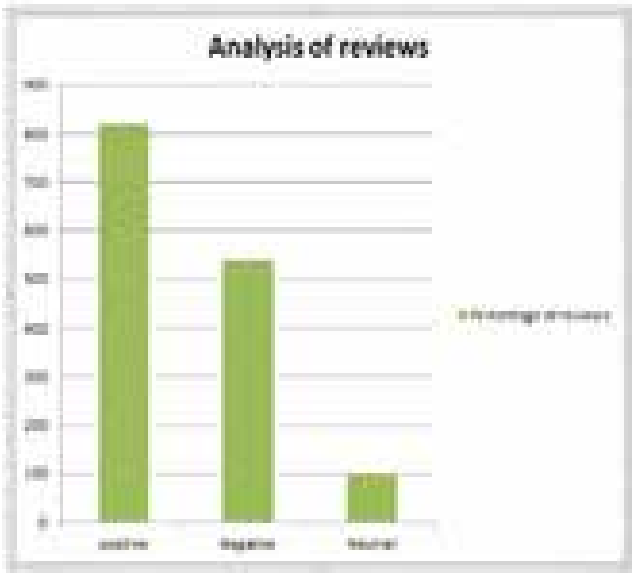


Figure 2: Review Analysis

3. OPPORTUNITY ALGORITHM:

In this algorithm is used to identify the extent to which each product topic is the potential opportunity for improvement from customer-centered view. In this algorithm the opportunity for value creation increases as the customer's need becomes more important and as customer satisfaction decreases. Using this algorithm the improvements for those latent products are identified and the product's opportunities are made known to the customer. This algorithm also uses importance and satisfaction as two factors to compute opportunity on the scale of 0-10 from a customer perspective from this perspective, the opportunity algorithm enables firms to find opportunities for growth by ranking these opportunities in a priority sequence. From the set of words given by the customers the sentimental scores are analyzed and are categorized into three (Overserved, underserved and served right) is shown in figure3. If the customer is served the exact product which satisfies the need then those come under the category of served right. If the demand of the customer is not to the requirement what the customer expected then those come into the category of underserved and solutions are given in order to improve the product's opportunity and suggestions are provided for that particular product that is being underserved. If the product satisfies the need more than what the customer expected then those products come under the category of Overserved.
The needs that are most important can be defined as:

Opportunity =
Importance + Max (Importance Satisfaction, 0)

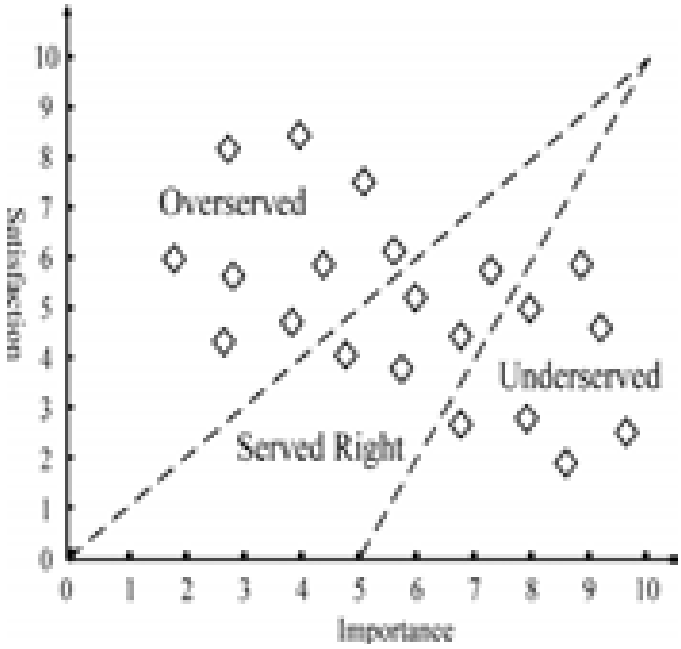


Figure3: Opportunity for the product.

IV. RESULTS AND DISCUSSION

The output of this paper would provide the conclusion to different product based companies neither the product has reached to the customer as predicted in both acceptances and importance level nor the product has dropped the profit level without satisfying the customer requirements.

V. CONCLUSION

In the proposed method, the latent product is given opportunity and degree of the product importance and its satisfaction is being revealed to the customer. This would bring profit to all the product based companies and this would avoid the customer being impressed by the particular company. The proposed domain-independent approach contributes the explorations of new products opportunity across various domains. This method can be applied to many fields such as Books, Movies, Electronic Gadgets and Industrial Outcomes.

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Modern Face Recognition with Deep Learning

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Abstract- *Facial recognition systems are commonly used for verification and security purposes but the levels of accuracy are still being improved. Errors occurring in facial feature detection due to occlusions, pose and illumination changes can be compensated by the use of hog descriptors. The most reliable way to measure a face is by employing deep learning techniques. The final step is to train a classifier that can take in the measurements from a new test image and tells which known person is the closest match. A python based application is being developed to recognize faces in all conditions.*

Keywords*—Histograms of Oriented Gradients, Deep Learning, classifiers*

I. INTRODUCTION

Lost Cost sensors are available and several new techniques have been employed to do face recognition but efficiency and accuracy still needs to be improved manifold. Central to the success of face recognition are the feature representation and the classification method. In this paper we will focus on both the techniques. Though the face recognition errors have decreased over the past decades, many new systems and organizations have adopted facial recognition for their work related purposes however these systems have shown to be sensitive to lightning, expression, occlusion and aging which increase the error rates and deteriorate their performance in recognizing people.

Histograms of Oriented Gradients (HOGs) are image descriptors invariant to 2D rotation, occlusion, and extreme lightning conditions. HOG Descriptors have been successfully applied to face recognition. Deep Learning techniques have been employed to distinguish people by training classifiers. By doing so we design a very powerful face recognition system which could work at what was considered most inappropriate situations in employing a facial recognition system.

The rest of the paper is organized as follows. Section II describes the related works which are carried out in the related fields. Section III describes the HOG, Deep learning and Classification. Section IV describes the System Architecture. Section V outlines how the system is implemented. Section VI describes the conclusions and future work.

II. RELATED WORK

VahidKazemi*et al.*,[1] did research on finding the 68 landmarks on any face, one millisecond face alignment with an ensemble of regression trees which had the potential to find the 68 landmarks within milliseconds.

Mohsen Ghorbani*et al.,* [2] built a robust Face Recognition system using HOG and LBP

III. METHODOLOGY

HOG relies on the idea that local object appearance and shape can often be characterized rather well by the distribution of local intensity gradients even without precise knowledge of the corresponding gradient or edge positions.It can be implemented by dividing the image window into small spatial regions, for each region accumulating a local histogram of gradient directions over the pixels of the region. All the above histogram entries are combined to form the representation.

There are numerous advantages of using the HOG feature. It captures gradient structure that is very characteristic of local shape and possesses very little invariance to local geometric and photometric transformations. The end result is we have the original image turned into a very simple representation that features the basic structure of a face. The measurements that look so clear and distinguishing to us humans do not really make sense to a machine looking at individual pixels in an image. Research suggests that Deep learning techniques can be employed in these cases where measurements are required by the machine. The complicated raw data like a picture or a video can be reduced into a list of computer-generated numbers which comes up with a lot of machine learning (especially in languagetranslation). We can train a Deep Convolutional Neural Network. Training a convolutional neural network to output face embedding requires a lot of data and computer power. But once the network has been trained, it can generate measurements for any face, even ones it has never seen before. So all we need to do is run the images of

the faces through trained networks to get the 128 measurements for each face.

The last step is to search for the name of the person in the database of known people which has the closest measurements to our test image.

IV. System Architecture

Face Recognition is a technology that is employed in most organizations to identify the person for security and verification purposes.

A server can be designed to take as input an image or a video stream to recognize faces within seconds. Database is used for Authentication and Real time data storage for better performance.

In this paper,we developed a python based applicationthat is robust and accurate in recognizing the faces.

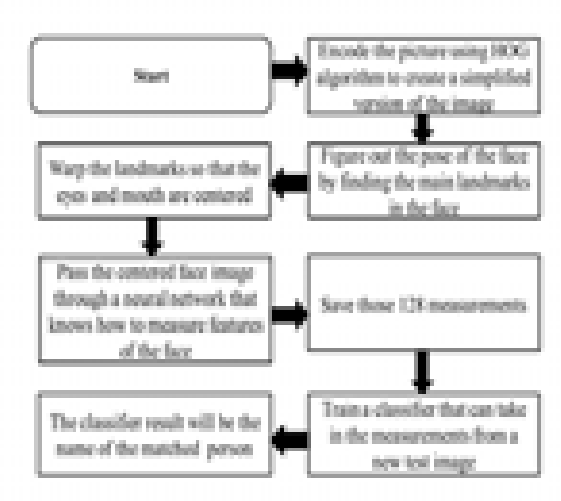


Fig.1: Proposed System

A. HOG

HOG is one of the best techniques used for analyzing the parameters that determine the faces. One of the greatest features in recent cameras is face detection that can automatically pick focus faces in an image.Paul Viola and Michael Jones invented a method in 2005 to detect faces that was fast enough to detect faces but much reliable solutions like HOG exist now. To detect the faces in an image we will start by making our faces black and white because color data is not required to find the faces.

We proceed by looking at every single pixel of the image and also the nearby and also the pixels that directly surround it. Our goal is to figure out how dark the current pixel is comparing to the pixels directly surrounding it. We draw an arrow in the direction in which the image is getting darker. These arrows are called gradients. We end up replacing every pixel with a gradient.

But saving every pixel detail is not necessary. It is enough to know in which direction the basic flow of lightness/darkness flows, so that we could get a basic pattern of the image. To accomplish this we will break up the entire image into small squares of 16x16 pixels each and replace all the gradients with a single stronger gradient in comparison with all other gradients.

On analyzing the pixels directly we see that really dark and really light images will have totally different pixel values. But by considering only the direction in which that brightness changes both dark and light images will have the same exact representation.

B. Face Landmark Estimation

After isolation of faces in an image, the problem is that faces turned in different directions look different to a computer. To mitigate the fact that differently turned faces does not belong to the same person, we use an algorithm called the face landmark estimation algorithm proposed by VahidKazemi and Josephine Sullivan. The algorithm helps in establishing the fact that faces turned towards different directions and looking differently from a computer's perspective may belong to the same person. The basic idea is to come up with 68 specific points on an image, and then we will train a machine learning algorithm to find any 68 specific landmarks in any image. After the application of this algorithm, no matter how the faces are turned we are able to center the eyes and mouth.

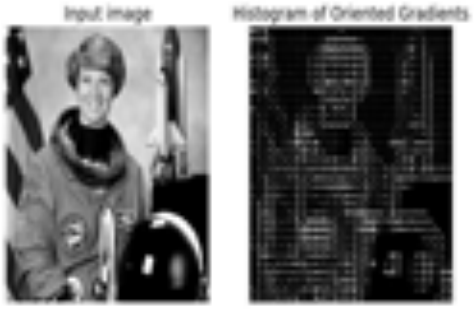


Fig.2: HOG image

C. Deep Learning

The easiest approach to face recognition is to directly compare the unknown faces with the known faces that has already been trained and placed in our database. We train a Deep Convolutional Neural Network to generate 128 measurements for a face. So

all we need to do is run our face images through the network to get 128 measurements for each face. We can run any number of images to train that is in different lightning conditions and positions to make these 128 measurements more accurate and easier for us to match with the unknown faces.

D. Recognizing Faces

This is the easiest approach in the entire process. All we have to do is find the person in our database of known people who has the closest measurements to our unknown face. This can be done by a machine learning algorithm.

We have to train a classifier that can take in the measurements from a new test image and tells which known person is the closest match. The result of the classifier would be the name of a person.



Fig.3: Match the faces

V. IMPLEMENTATION

A python application is developed for recognizing the faces of the persons that pass by the system or the image is feed into the system by the admin. The user interface is designed in such a way that the admin can decide whether the user can pass through the system or not, which can be automated.

A. Face Detection

We detect the faces using hog face fontal detector using an open library dlib used for face detection.

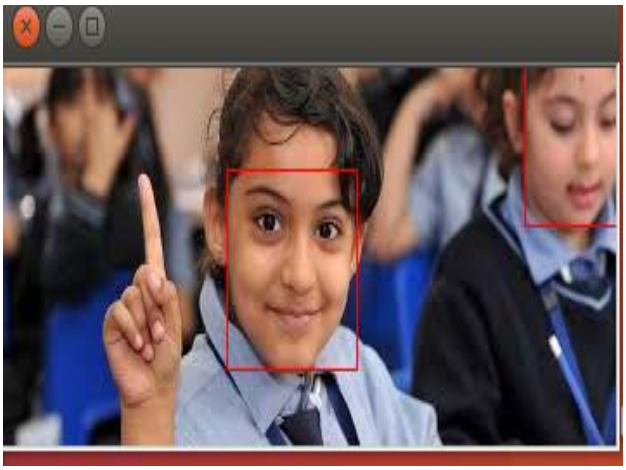


Fig.4: Detection of faces

B. Face Landmark Estimation

We implement the face landmark estimation algorithm to establish the landmarks in a face.



Fig.5: Landmark discovery

C. Machine Learning

We implement a deep convolutional neural network to train the images and store the 128 measurements using Openface.



Fig 6: Training of the images

D. Face Recognition

We can recognize face by training a basic SVM classifier to tell which person is the closest match.

VI. Conclusion andFuture Work

A robust face recognition system built using python for security and verification purposes which could recognize faces independent of the prevailing conditions.

In future, the same recognition system with the expression recognizer along with text to audio features can be implemented.

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frequency band to perform multi-level 2-D Discrete Wavelet Transform decomposition using Haar wavelet, except for the first level where no block memory is used. The first level low- low band output is used for the next level decomposition. The architecture is performed for three-level 2-D DWT decomposition and any other higher number of levels can be obtained. Using Design Vision of Synopsys, area and power reports are obtained. The area required for an efficient multilevel 2-D Discrete Wavelet Transform architecture using Haar wavelet is 23859.363988µm^2, dynamic power 4.4405mW and leakage power 144.8573 uW. Pipelining transformation leads to a reduction in the critical path. Which can be exploited to either increase the clock speed or sample speed or to reduce power consumption at same speed. The area required for pipelined multilevel 2-D Discrete Wavelet Transform architecture using Haar wavelet is 32992.026024µm^2, dynamic power 3.6301mW.

580. PROTECTED DATA STORAGE IN CLOUD ENVIRONMENT BY CRYPTOGRAPHIC TECHNIQUES

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Cloud computing is a new technology of distributed data processing in which storing and accessing data over the Internet. Software-as-a-Service has created today's work-from- anywhere culture, giving more securely access work from any device without any difficulty. In Cloud Storage, security and privacy can be achieved in ineffective manner. In the proposed work provide data security and it is achieved through Cryptography Splitting Algorithm. User file is encrypted and the encrypted files are divided into multiple chunks, and it will store on the cloud service provider. Cloud Manager enables users to maintain security and manage tracking and protect our Meta data. User data in cloud storage increases confidentiality and more flexible to use. Cryptography splitting technique is used to store the data in the cloud environment for secure data storage and achieves security as well as privacy to the user data.

581. PREDICTING VULNERABILITIES OF HEART DISEASE USING MACHINE LEARNING ALGORITHM

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The heart is an muscular organ that functions as the body's circulatory pump. Heart provides nutrients and oxygen to the body tissues by circulating the blood to the entire body. Heart attack arises when heart muscle dies due to the loss of blood supply. Heart attack is also caused when one or more coronary arteries one or more coronary arteries becomes narrowed because of gradual build-up of fatty deposits called atheroma. Approximately 90-95% of heart attack patients who reaches the hospital survive. The 5-10% die later because they have suffered major heart muscle damage, or suffer an "extension" or enlargement of their heart attack. A Recommendation System is proposed to

Balaji Ganesh R <balajiganesh@ritrjpm.ac.in>

IEEE TIAR 2018 notification for paper 100

IEEE TIAR 2018 <ieeetiar2018@easychair.org> Fri, Mar 16, 2018 at 10:06 PM
To: Balaji Ganesh Rajagopal <balajiganesh@ritrjpm.ac.in>

Dear Author,

Application of ARM and Linear Regression to model and predict Agricultural yield

Congratulations!!!
We are pleased to inform you that your paper mentioned above has been accepted for presentation in the conference.

You are cordially invited to present the paper at TIAR 2018 to be held on April 5 & 6 , 2018 in Easwari Engineering College, Chennai, India. This notification email serves as our formal acceptance of your paper as well as an invitation to present your work at TIAR 2018.

Papers submitted to the conference had been reviewed by experts. Kindly incorporate all suggestions given by reviewer(if applicable).
The accepted papers will be published in the TIAR 2018 Conference proceedings and will be published in IEEE Xplore(ISBN: 978-1-5386-2338-1).

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We look forward to seeing you and your presentation at the TIAR 2018 Conference on April 5 & 6, 2018 in Chennai, India.

Thanks & Regards
Support Team
IEEE TIAR 2018

---------- REVIEW 1 ----------
PAPER: 100
TITLE: Application of ARM and Linear Regression to model and predict Agricultural yield
AUTHORS: Balaji Ganesh Rajagopal, Nandhini P, Sindhu B and Vigneshwari S

Overall evaluation: 2 (accept)

---------- Overall evaluation ----------
1.The proposed work should be beneficial for agriculture or rural development so your work should be connected to agriculture only then the paper will be accepted for publication
2.Paper should be in IEEE Format.
3.Check your paper for plagiarism.
4.Implementation and results should be explained in detail.
5.Include Pseudo code or Algorithm of proposed method highlighting the novelty.
6.Include Figure captions and refer it in textual description

Application of ARM and Linear Regression to model and predict Agricultural yield

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Abstract **-** The growth of every nation and its GDP depends greatly on the Agricultural growth. The Indian government has taken steps to introduce modern agricultural practices with the inclusion of Computational Technologies. Recently, farmers have started to use modern technologies to increase the agricultural yield. The yield of the agricultural process depends upon the weather conditions and the amount of nutrients available in the soil. The agricultural and meteorological departments in India have collected a huge volume of data and the data has been distributed. More interesting patterns can be uncovered from the existing data sets. In this article, a framework is proposed which will transform the data into useful patterns by the application of data mining algorithms like Regression analysis and Multi-dimensional Association Rule mining. Then the recommender system based on association analysis will predict the outcome of the agricultural process with a contingency table consisting of types of crop and nutrient availability in the soil. An Android application will interface and help the farmers to predict the outcome of the process when the types of soil and nutrients are feed in.

Index Terms*-Smart Agriculture, ICT in Agriculture,Association Analysis, Machine Learning, Crop Yield Forecasting, Farmers Mobile Application*

I. INTRODUCTION

Agricultural production is significantly affected by environmental factors. Weather influences crop growth and development, causing large inter-seasonal yield variability. In addition, micro-level variation in soil properties, interacting with the weather, adds to the yield variability. Early information of rainfall can help the farmers to decrease crop damage. So a better weather prediction systemis required which gives prior intimation of losses due to natural calamitiesneed to be developed. Weather data is collected and stored in the datasets. These datasets contains the information about data combination of humidity, temperature, rainfall. Recommendation of crops is another major domain. Recommendation of crops is dependent on various parameters such as rainfall, soil nutrients and fertilizers.The objective of the research is to provide a learning agent that can aid in taking decisions to make farming more efficient and profitable through technology.

The paper proposes the idea of applying the Data mining techniques in the agriculture sector to predict the outcome of the agriculture yield. The real time data is collected from various sources and analyzed for better outcomes. The data is cleaned and preprocessed to acquire great knowledge patterns from it. The cleansed data is visualized as graphs and charts for better understanding.

II. RELATEDWORK

Many researches are going on in the field of automated farming. Precision agriculture provides the way for enhancement. Applying data mining algorithms to predict the agriculture outcome enhances productivity. Our nation is investing to promote smart agriculture, which includes usage of sensors, probes to acquire data from the agricultural fields. The data thus collected is large in volume and is distributed across multiple agents. Many researches are moving out with plans to integrate the data from multiple sources like meteorology, agricultural technology to leverage the influence of Smart Agricultural devices [3,4].

The FASAL network of Ministry of Agriculture and Farmers Welfare, Government of India has formed five units including Agricultural Information Group to predict the outcome of the agricultural process based on the parameters listed. It is expected that yield forecastingrepresents an important tool for optimizing crop yield and to evaluate the crop-area insurancecontracts [1,4].

In this background, FASAL is contributing towards this objective by providing timely cropforecast and other information. The project uses statistical Regression models to forecast the yield. The statistical forecast has been extended to all types of crops demographically[2].

The project further extends by developing a crop simulation model which will predict the outcome of the process after considering the relevant attributes. But this Crop model simulation outputs are valid at appoint or small farm. It does not representspatial feature because of large spatial variability in the soil, rainfall, management conditions etc[5,6]. Other factors are nutrients assumed to be in abundant supply in the soil, so as not to causeany stress on crop.Mechanical loss due to aberrant weather (hailstorm, highwind speed) is also not accommodated in the crop model[7,8].

It has been inferred that there is linear positivecorrelation between wheat crop yield and solar radiation; aswell as linear negative correlation with temperature. There are positive

correlations between the crop yield and weather conditions. As stated there is a high degree of correlation between the climatic conditions and crop yield. Many useful patterns may be extracted from the data available. Rainfall has also found a strong positive correlation with the increase in crop production[9,10]. As reported by a research there is monotonic correlation between soil nutrients and temperature and consequential influence on the yield of wheat, rice and maize.

With regards to temperature further, it has profound that Monthly average temperature and average annual rainfall data were used in most of the models [3,5]. Rainfall and temperature data were tested for normality using probability and residual plots because parametric data. It has been proved that plots are useful for normally distributed data.

III. METHODOLOGY

The proposed Methodology of development flows through the concepts of **data preprocessing, association rule mining, predictive analytics, recommender systems,** and finally **mobile app development**as shown in figure 1**.** Data preprocessing is a data mining technique that involves transforming raw data into an understandable format. **Data preprocessing** prepares raw data for further processing. Data goes through a series of steps during preprocessing.



Figure 1. Architecture of the Data Analytics system

In data mining, **association rules** are useful for analyzing and predicting. Association rules are created by analyzing data for frequent if/then patterns and using the criteria support and confidence the most important relationships are identified. **Predictive analytics** is a form of advanced analytics process which involves both new and historical data to forecast future activity, behavior and trends. The Patterns found in historical and transactional data can be used to identify risks and opportunities for future. The data analytics engine operates on the data available in the web server and deduced inferential patterns; it has been presumed that the farmers are some-how proficient in operating android based mobile phones. The patterns deduced by the data analytics engine are presented to the farmers through mobile application in an aesthetic manner as shown in figure 2.



Figure 2. Flow Diagram

*A. **Proposed Approach***

Data is gathered from or generated in different ways like documents, reports, books, observations, feedbacks and other media. This collected data needs to be analyzed just to search for qualifying material and negative cases.

1. Data preprocessing, includes,
   - i. Data cleaning which resolves the inconsistencies in the data.
   - ii. Data Integration in which conflicts within the data are resolved.
   - iii. Data Transformation which requires data to be normalized, aggregated and generalized.
   - iv. Data Reduction which aims to present a reduced representation of the data in a data warehouse.
   - v. Data Discretization which involves the reduction of a number of values of a continuous attribute by dividing the range of attribute intervals.

To make Non- available(NA) values zero
>org[is.na(org)]=0
To eliminate Non-available(NA) rows
>orgs<-na.omit(org) > orgs

2. Data Visualization

Visualization techniques provide means to understand and analyze complex data. An overview of visual analytics, its scope and concepts, and details of the most important technical research challenges in the field is provided by [4]. Research undertaken by [5] developed and discussed a systematic review on the diversity of methods for visualizing time-oriented data and it is available in figures 3 and 4. The proposed categorization was considered helpful for users to identify future tasks in visual analytics.

```
>View(org)
>attach(org)
>hist(org$Zn)
>plot(rain, main="Scatterplot", cex=2.0, col='blue')
```

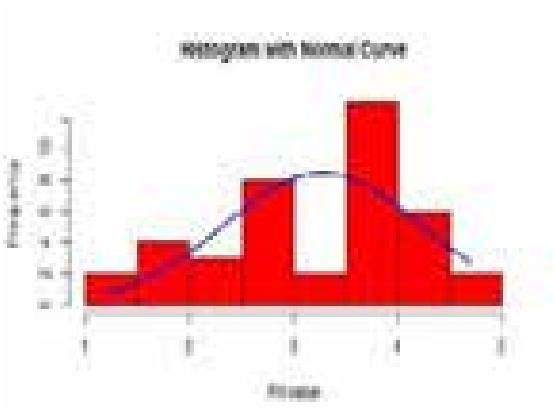


Figure3:Histogram for pH value available in the soil

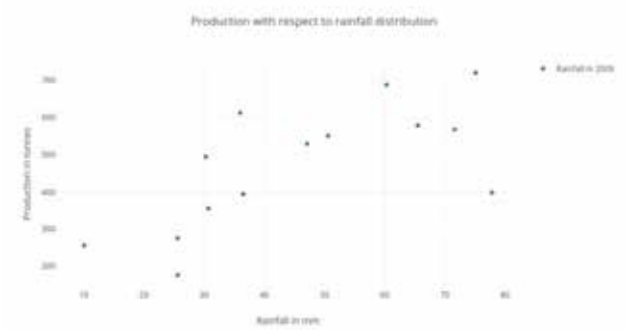


Figure 4. Scatter plot representation of the production with respect to rainfall during the year 2009.

3. Association Rule Mining

The application of association rule mining has been reportedfor many cases in agriculture for elucidating hidden patterns and associates between different climate and crop production. Sustainability of Indian agriculture is affected by droughts and floods. The relationship between extreme rainfall events and climatic indices was discovered using data mining algorithm.

Multi-level Association rule mining with adaptive apriori algorithm which uses multiple support and confidence values are applied at different levels of data abstraction. This process of Multi-level association analysis over the crop data, soil data as shown in figure 6(i) and 6(ii). The derived rules showed that the rice crop yield could be based on the nutrient level such as Nitrogen, Phosphorus, and Potassium present in the soil or the rainfall data from the weather websites.



Figure 6 (i). Association rules generated in R programming



Figure 6(ii). Association rules generated in R programming

The derived rules showed that the crop yield in the selected study area could be average, good or extremely poor when the end of the seasonal rainfall is very poor. The above derived rules are a good indication of the expected crop yield dependent on the rainfall and the nutrient level in the soil(pH).

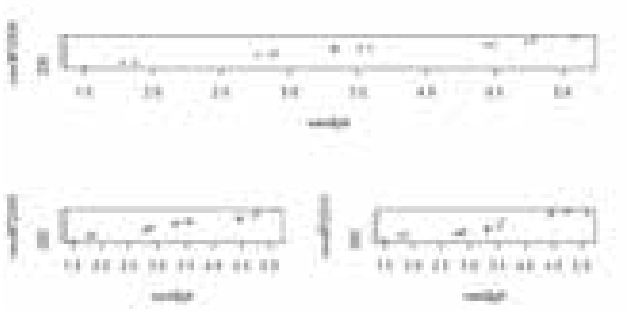


Figure 7. Scatter plot shows that productivity and pH value are linear for three consecutive years (2008-2010)

4. Prediction

Multiple Linear Regression

A regression analysis means generating an equation to describe the relationship between one or more independent variable(s) i.e. explanatory variable and the dependent variable i.e. response variable from which we can predict any new observations. Linear regression, many times, uses the ordinary least squares estimation method. If the independent variable is only one then it is called simple linear regression. For more than one independent variable that process is called as multiple linear regressions. A simple linear regression for pH value of the soil and Maize production is shown in Figure 8. The crop details and soil nutrients available are also modeled using Multiple linear regression.



Figure 8. Maize production with respect to pH value in the year 2008

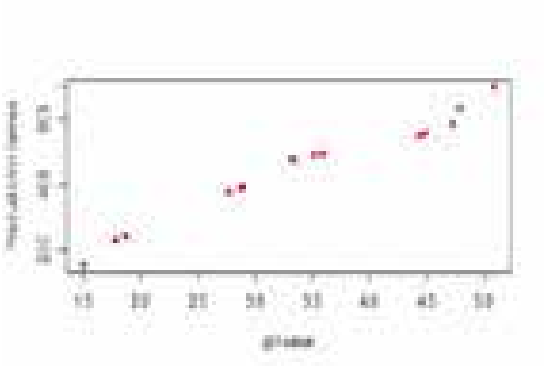


Figure 9. Production with respect to pH

It has been found that the multiple regression co-efficient shows a good impact for the Rainfall and pH value with respect to productivity of the crops. Figure 9 shows that the productivity for the crop maize is greatly influenced by the Rainfall and pH value of the soil.

In linear regression given in (1.1), the statistical relationships are estimated using a linear predictor functions. For this function, from the given data unknown model parameters are estimated. Such a model is called as a linear model. Most commonly, the mean of y given the value of X is considered to be an affine function of the given X. Less commonly, their median or the quantile of the conditional distribution of the y for given X is expressed as a linear function of X. In regression analysis, the linear regression focuses on to the conditional probability distribution of y given X, not on to the joint probability distribution of y and X, and it is the domain of multivariate analysis.

$$\hat{Y} = bX + a \qquad (1.1)$$

where ***X*** is the explanatory variable and ***Y*** is the dependent variable. The slope of the line is ***b***, and ***a*** is the intercept. The relationship between climate and the yield of major food crops is analyzed through correlation with the null hypothesis (Ho) that there is no statistically significant correlation between climate element (rainfall and temperature) and yield of the six major food crops. The correlation between Rainfall and pH value is deduced as given in (1.2)

Y = 102.087 + 0.012 * Rainfall (1.2)
Y = 89.195 + 0.054 * Rainfall
Y=98.456 + 0.023*Rainfall
Y=2.165 + 0.873*pH
Y=1.456 + 0.178*pH
Y= 2.964 + 0.043*pH



Figure 10. Linear curve fitting applied to the rainfall and crop productivity.

Comparing the coefficients of the each rule rainfall has more influence on the production yield of the crop as shown in Figure 10. The production for consecutive years may be considered for better predictions and insights into the data.

IV. RESULTS AND DISCUSSIONS

An android mobile application is developed for providing the farmers the future predictions about their yield. The user interface is designed in such a way that the farmer gains more information from the mobile application. The application is designed by considering the minimum knowledge level possessed by the farmers.

Registration: Registration is mandatory to progress with the application. The user can register once using an email and a password.

Login Page: It is used for the user to login to his account. The Authentication is done by Fire Base.

Crop suggestion: The android GUI interface collects the details from the farmers and passes the request to the server. The recommender system analyses the request and provides the required details for the production.

Crop Information: It provides a wide variety of technical information about the crop production, the nutrients required etc. Five important crops are noted such as Cotton, Paddy, Green gram, Groundnut and maize.



Figure 11. Navigation drawer interface & Crop Information Page

News and feeds: All the latest technology and modern improvement in Agriculture are notified to the farmers. The government schemes that improve the agriculture yield are furnished to the farmers.

Today's Weather: Daily weather forecast from the weather prediction websites is provided to the user.

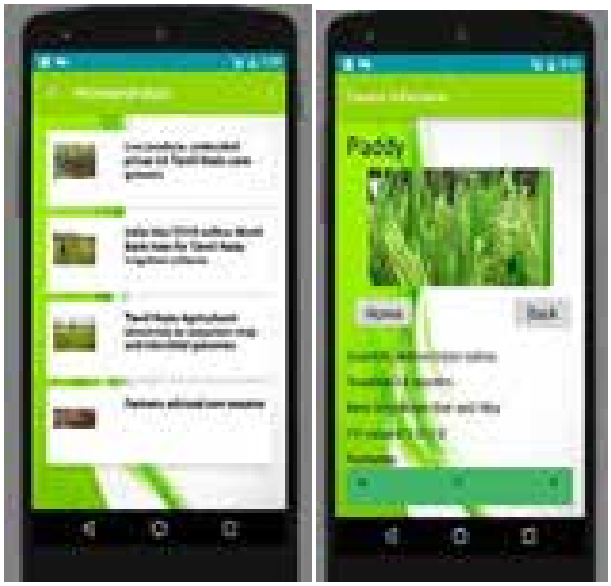


Figure 12. News and Feeds and Crop Information

Thus, the Android application makes it easier for the farmers to get the information from wide resources. Natural calamities like flood, heavy rainfall can be notified to the farmers well in advance using the notification methods.



Figure 13. Farmer's login page and daily weather forecast received from servers using web scrapping

Acknowledgement

The Authors wish to acknowledge the Agricultural office, Virudhunagar for providing the real time data regards to Soil, Crop and their productivity. Authors also wish to acknowledge the Tamilnadu agritech portal for supply of necessary information for the development of the system.

V. CONCLUSION AND FUTURE WORKS

The proposed system works in building agricultural information system to benefit the farmers. Using qualitative analysis of agriculture product, customers can easily differentiate between different farmers and their respective products. Regression analysis has been implemented to forecast the crop production and analyze the patterns between different sets of data. Different researchers can access the data to find and analyses different patterns. The cloud computing technology, if implemented in the agriculture field the data, would be saved on cloud so that data will be safe and easy to fetch at any time anywhere. Moreover the cost can also be minimized. In future, this system can be multiplied for more crops, vegetables and fruits. For analysis, the factors considered can be varied.

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Data Mining Approach for Anomaly Detection in Social Network Analysis

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Abstract: Nowadays, users are more addicted to the Online Social Networks (OSN's), a network in which many users, group of people, or a particular organization are Connected via network. Use of online Social Networks has exploded and thus, causing a need of studying and understanding user behavior. Several approaches have studied the identification of anomaly detection In this paper, We propose an efficient method for anomaly detection from social networks. The present study aims at detecting the abnormal activities exhibiting different behaviors in social media application using Behavior-based anomaly detection approach. Anomalous users are detected based on their behavioral dissimilarity from others. A rich feature set is proposed for outlier detection. A method for providing visual explanation for the results is also proposed. This analysis is carried out using Facebook dataset.

Keywords Online Social Network, Data Mining, Anomaly Detection, user's social behavior,

I. INTRODUCTION

With the advancements of technology there comes a great need of studying user behavior in social networks. With an increase in the use and benefits of OSNs comes an increase in various challenges. One of the major challenges facing such networks today is the anomaly detection. The user can be detected by analyzing the user's behavior. Various techniques are used to determine the user's behavior. The existing system includes the profile analysis method of differentiating behavior on the basis of keep tracking user's introversive behavior and extroversive behavior Online Social Network(OSN) provides sharing of one's views, ideas with others, uploading their photos, sending message in order to build connections, also can be able to see the other user's latest updates who are in connections. The existing approaches includes the method that analyzes the user online behavior by profiling user's social behavior so that the hacker can be easily differentiated from the original one. Profiling user's social behavior includes the analysis of user's updates, type of messages send by the user, click streams done by the user, types of photos uploads in the account, posts made in the account, comment made by the user on others post, etc. Our paper proposes a solution to predict the abnormal behavior of the user whose behavior diverges from the normal user. An anomaly is a set of activities that deviate from the normal behavior of the user. Anomalies are also called as outliers, abnormities. Anomaly detection is the processing technique for removing anomalous data from the dataset. Therefore, in this paper technique to analyze and detect the anomalous behavior is covered. The paper is organized into various sections. In section II data mining topic is discussed. In section III related works are discussed. In section IV data mining approaches to anomaly detection are discussed. Section V will discuss the anomaly detection techniques available. Section VI presents the risk assessment based on user behavior. Section VII risky behaviors in online social networks are discussed. Section VIII tells how the system is implemented. Section IX Clustering approaches is discussed. Section X conclusion for the paper is discussed.

II. DATA MINING

Data mining is the process of discovering the patterns, associations, changes, anomalies from large amounts of data stored in datasets. The discovery process consists of an iterative sequence of the following steps:

Data cleaning – This handles noisy, erroneous, missing or irrelevant data from the collection.

Data integration – In this stage multiple, heterogeneous are combined in a common source.

Data selection – The data relevant to the analysis task are retrieved from the dataset.

Data transformation – Where the data are transformed are consolidated into forms appropriate for mining by performing aggregations operations.

Data mining – It is a crucial step, where intelligent methods are applied to extract data patterns.

Pattern evaluation – In this step, interesting patterns representing knowledge are identified based on given measures.

Knowledge representation – It is a final phase, where visualization and knowledge representation techniques are used to present the mined knowledge to the user.

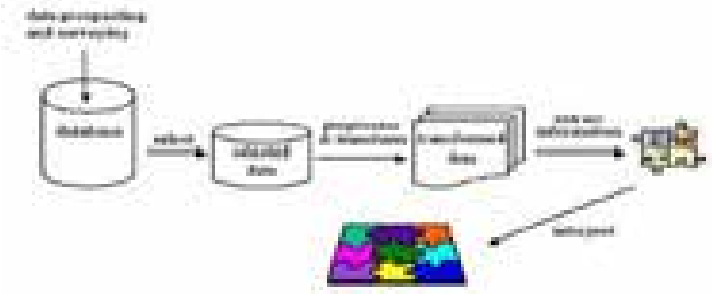


Fig II: Data mining process

III. RELATED WORK

Anomaly detection is a mature area of research. It has been successfully applied to various areas like network intrusion detection, credit-card fraud detection, email based network analysis etc. Anomaly detection algorithms work on the premise that normal behavior is more pre-dominant than abnormal behavior and will be exhibited by majority of the network entities. Chandola et al. [3] presents a comprehensive review of this. Wasserman and Faust [4] proposed theuse of centrality based measures for social network analysis. Lin and Chalupsky [5] had proposed the use of indirect connections to detect anomalous subscribers from mail data records. Chalupsky [6] used it to solve the VAST 2008 challenge [8]. While previous research work mostly views it as a classification task, we treat it as an anomaly detection problem. The false rumors are viewed as anomalies and we perform factor analysis of mixed data on our proposed features to detect these anomalies. Two strategies based on Euclidean distance and cosine similarity are proposed to describe the deviation degree. A rank based on deviation degree is computed which can facilitate further rumor detection. We show our method can achieve good performance and can shed light on automatic detection of false rumors on online social networks.

IV. DATA MINING APPROACHES TO ANOMALY DETECTION

Anomaly detection is defined as "an observation that deviates so much from the other observation". From data mining perspectives, anomaly detection is classified into the following categories:

- Supervised method
- Semi-supervised method
- Unsupervised method

A) SUPERVISED METHOD

It involves studying anomaly detection as a classification problem with the pre-labeled data, labeled either as normal or as anomalous. These methods model both the normal and abnormal behaviors. There are two applicable approaches for it.

- One, experts may pre-label the normal data and any such data which is not analogous to this model is considered anomalous.
-

The other way is to do the opposite i.e. have the predefined set of anomalous data and any objects not corresponding to the set of anomalous data are considered as normal

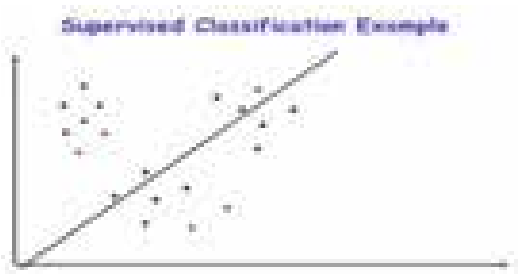


Fig IV: A(1) Supervised method

B) SEMI-SUPERVISED METHOD

Semi-supervised method, where the model is trained using the normal data, only to build the profile of normal activity. Semi-supervised methods work with two sets of data, labeled and unlabeled. So, these methods are used when out of the complete data set only few instances of data labeled as normal are available. Using the small amount of labeled data a classifier can be constructed which then tries to label the unlabeled data. Hence, a model for normal data objects is built which is used to detect the anomalies in a way that the objects not fitting the normal model are classified as anomalies. This is the simplest approach called self-training used under semi-supervised model.



Fig IV: B(1) Semi-supervised method

C) UNSUPERVISED METHOD

Unsupervised methods, where the anomaly detection model is trained using unlabeled data that consists of both normal as well as abnormal data. Unsupervised anomaly detection methods are used when labeled data objects are not available i.e. no predefined labels as "anomalies" or "normal" are attached to the data objects. Unsupervised methods are usually studied as a clustering problem. Finding the group of objects such that the objects in the group will be similar to one another and different from the objects in other group. Two major challenges faced by unsupervised methods are as follows:

- First, a data object not belonging to any cluster is considered as anomalous but many times this deliberation can be false because, such a data object can be a noise rather than an anomaly.
- Secondly, what is usually practiced is to firstly find the clusters and then the anomalies. But this methodology seems to be quite expensive as number of anomalies present in a data set is pretty less than normal data objects.

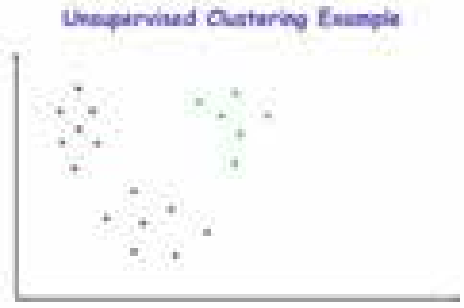


Fig IV: C(1) Unsupervised method

V. ANOMALY DETECTION TECHNIQUES

In social networks, the node disobeying these similarity measures by following behavior which is deviates from the other nodes are detect as anomalous. Anomaly detection techniques in social networks can be categorized as follows:

- Behavior based techniques
- Structural (graph) based techniques
- Spectral based techniques

A) BEHAVIOR BASED TECHNIQUES

Behavior based techniques handle the behavioral properties of the users such as number and content of message, content of the items shared, number of likes or comments on a post and duration of a conversation., shared, number of likes or comments on a post and duration of a conversation.

B) STRUCTURAL BASED TECHNIQUES

Structural based methods work on the basic principle of using structural properties to check the characteristics of normal and anomalous users. A particular graph metric is figured out for different nodes and structure and the nodes showing different values than other users are considered as anomalous. Just like supervised approach, here also a predefined normal pattern is already known and any deviation from that known pattern depicts the anomalous behavior. These techniques help to identify dynamic unlabeled anomalies by predicting future events and analyzing previous network behavior which is a precondition for dynamic anomalies.

C) SPECTRAL BASED TECHNIQUES

Spectral anomaly detection techniques help in detecting anomalies using some spectral characteristic in the spectral space of the graph.

VI. RISK ASSESSMENT BASED ON USER BEHAVIOR

Our main goal is to associate a risk score with the user based how he/she behaves in online social networks. The key idea is that the more the user behavior diverges from what is considered to be a normal behavior, more it should considered being risky. Therefore we first define a user behavioral profile.

In an online social network variety of activity are possible, such as post, comment, share, like and different types of interaction. In designing this behavioral profile, there is no need for monitoring all the users' activities. But only those that might reveal risky behavior is monitored. For example, writing more comments/posts without receiving any likes on them. Can we consider as a warning and they might be victim of an attack. On the contrary, having huge number of friends, posts, comments, likes in a short period is also consider as risky. The online social network population is heterogeneous in observed behavior, so it is not possible to define unique standard behavioral model that fits all online social network user behaviors.

However, we expect similar people tend to follow similar rules which results in similar behavioral model. For this reason, we propose risk assessment organized into two phases: The first phase aims at identifying the groups in online social network. This is achieved by clustering techniques. The second phase aims at creating behavioral model for each group identified by first phase.

VII. RISKY BEHAVIORS IN ONLINE SOCIAL NETWORKS

Due to the popularity of social network sites, cyber criminals or attackers started to exploit them in propagating malwares and carry out scams. The discrepancy is defined in terms of frequency, number, as well as type of activities.

In general, attackers use online social network infrastructure to collect and expose personal information about a user and their friends by making the user to click on some specific malicious links so as to propagate them in the network. In the following, we illustrate the most notable types of attacks:

Sybil attack: Sybil attack is one of the practical attacks in online social networks. As an example there are more than thousand social bots has been detected on Facebook. To launch this attack, a malicious user has to create multiple fake identities known as Sybil's, with the purpose to legitimate his/her identity. After that, the attackers initiate their work by sending friend requests to users in the community. Once the request has been accepted, the social bot can gather the user's private data.

Identity clone attack: In this attack, malicious user creates similar or identical profiles. The key goal is to obtain personal information about the victim's friend after successfully forging the victim and established an increased level of trust with the victim's social circle. Afterwards, he/she sends friend requests to the victim's contacts. Once the friend requests have been accepted, he builds the victim's friend network and gains access to the profiles of the victim's friends.

Socware attacks: In this attack, an adversary creates malware items, called socware, in the form of applications, pages or events containing malicious link to be propagated in the online social networks. This attack lures victims by offering false rewards to who will install/accept the socware. Once users have installed the socware, it is not only gets access to the user's personal information but also gains ability to post them on the victim's wall. As a consequence the users unknowingly end up sending socware messages or post to their friends, essentially assisting the socware's viral spread.

VIII. METHODOLOGY

Our Methodology flows through the concepts of the collection of the dataset, removing the null values, categorizing the data, clustering, risk analysis.

1. A dataset is a collection of data corresponds to the content of single database table.
2. From the dataset remove the null values.
3. Risk assessment approach is based on the idea of estimating the user's risk on the basis of how much his\her behavior deviates from the normal user. Risk assessment is composed of two phase clustering :
    a. The first phase consists of organizing the users according to group identification features.
    b. In the second phase, users are categorized using behavioral features using K-means and Expectation Maximization algorithm.

4. The risk score is estimated using Membership probability based on a value of group identification features.
    a. High membership probability-normal user.
    b. Low membership probability-abnormal user.

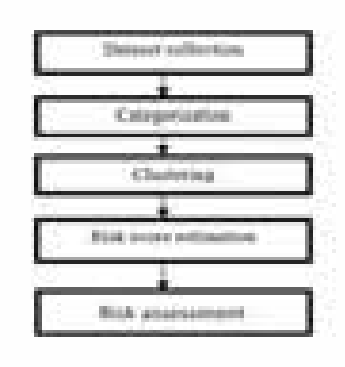
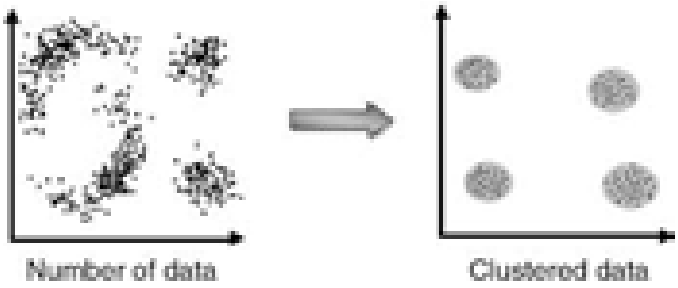


Fig VIII: Methodology

IX. CLUSTERING

Clustering is a task of partitioning a set of data based on their characteristics into clusters.It is used for pattern recognition; image processing and data analysis. It discovers structures and patterns in high dimensional data.



A) K-Means Clustering Algorithm

- K-Means is one of the simplest unsupervised learning algorithm to cluster n objects based on attributes into k partitions where k>n.
- The goal is to find groups in data, with the number of groups represented by variable K.

Step1 - **Initialization:** Randomly choose k vectors from the dataset and make them initial cluster centers.
Step2 - **Assignment:** Assign each vector to its closest center.
Step3 - **Updating:** Replace each center with a mean of its members.
Step4 - **Iteration:** Repeat step 2 and 3, until there is no more updating.

B) **Anomaly detection**
The anomaly detection algorithm proposed in this paper is based on the principle of outlier detection. An outlier in a dataset is defined as an observation which deviates so much from other observations so as to arouse suspicions that it was generated by a different mechanism.

In most real scenarios outliers are outnumbered heavily by the more commonly occurring observations. Unsupervised approaches to identify outliers are useful in detecting anomalies or nonconforming entities from large datasets. In this paper, an outlier is defined as follows [7]: Definition: Outliers of a set are the top n data elements that are farthest from their kth nearest neighbours.

IX.B (1) BOX PLOT

It is method of representing statistical data on a plot in rectangle for depicting groups of numerical data through their quartiles and vertical line inside to indicate the median value.

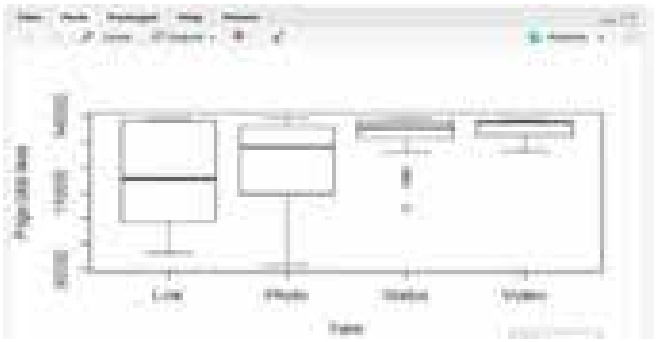


Fig IX: A(1) Box plot

IX.B (2) OUTLIERS

It is an observation point that is distant from other observations. It may indicate experimental error or variability in the measurement. It can cause problem in statistical analysis.

Outliers are extreme values that deviate from other observations on data , they may indicate a variability in a measurement, experimental errors or a novelty. In other words, an outlier is an observation that diverges from an overall pattern on a sample.

IX.B (3) HISTOGRAM

A histogram is a type of graph that is widely used in mathematics, especially in statistics. The histogram represents the frequency of occurrence of specific phenomena which lie within a specific range of values, which are arranged in consecutive and fixed intervals. The frequency of the data occurrence is represented by a bar It is an accurate representation of distribution of numerical data. It is an estimate of the probability distribution of a continuous variable.

X EXPERIMENTAL RESULTS

The proposed approach has been tested on considering the total interaction column in the face book dataset using R programming. The Maximum and minimum deviations of Total interaction column has been identified by Histogram. Then minimally deviated values are removed as outliers using Box plot. The Box plot graph should be validated in such a way that all the outliers are removed .Now ,the Histogram has been drawn for the current data will distributed in the bars eventually.

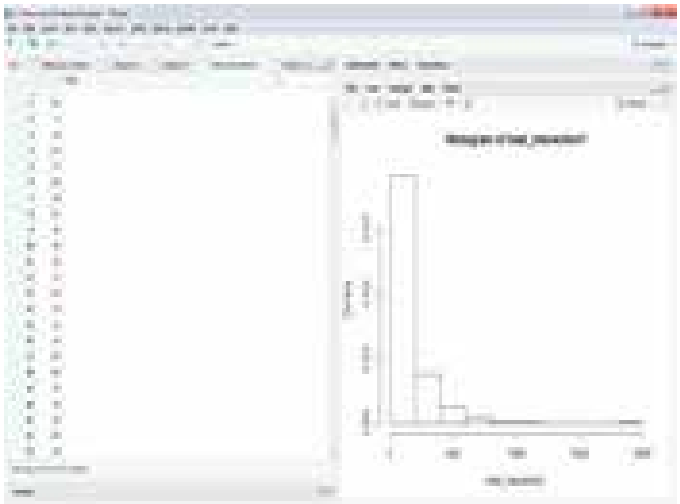


Fig : X(1) Histogram for Total interaction column

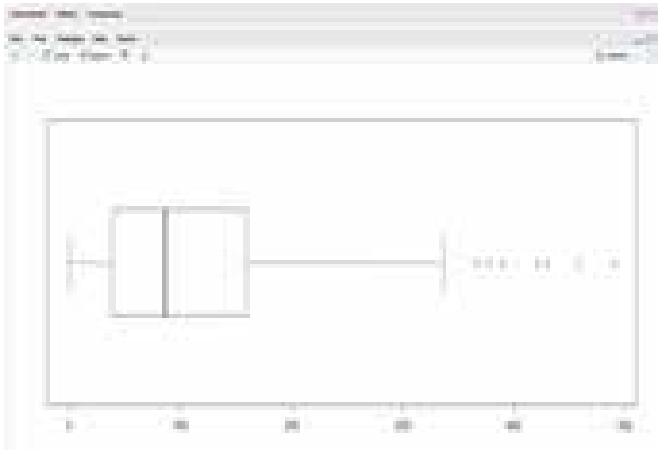


Fig : X(2) Box plot to identify the outliers

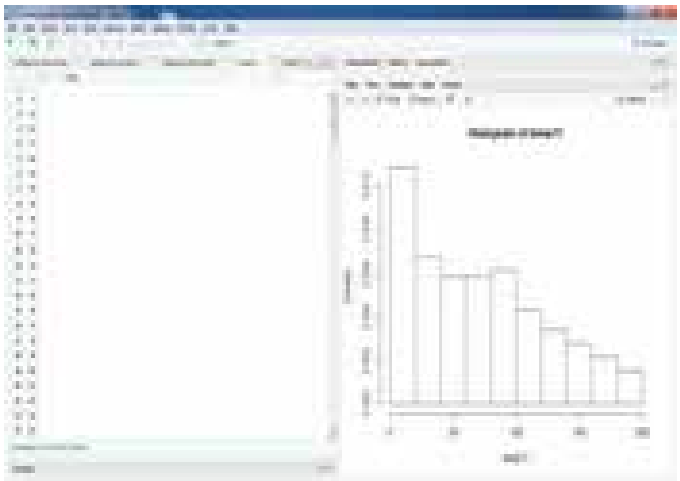


Fig : X(3) Histogram for the same Total interaction column with removed outliers

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XI. CONCLUSION

In this paper, we proposed the method to detect the anomalous users based on their behavioral dissimilarity from others by using the outlier detection. A method for providing visual explanation for the results is also proposed. This analysis is carried out using Facebook dataset assign risk score to each OSN user. This assessment is based on user behavior under idea more user behavior diverge, it is considered to be risky. This analysis is carried out in Facebook dataset for effectiveness of our estimation

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Modern Face Recognition with Deep Learning

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***Abstract* - Facial recognition systems are commonly used for verification and security purposes but the levels of accuracy are still being improved. Errors occurring in facial feature detection due to occlusions, pose and illumination changes can be compensated by the use of hog descriptors. The most reliable way to measure a face is by employing deep learning techniques. The final step is to train a classifier that can take in the measurements from a new test image and tells which known person is the closest match. A python based application is being developed to recognize faces in all conditions.**

Keywords—Histograms of Oriented Gradients, Deep Learning, classifiers

I. INTRODUCTION

Lost Cost sensors are available and several new techniques have been employed to do face recognition but efficiency and accuracy still needs to be improved manifold. Central to the success of face recognition are the feature representation and the classification method. In this paper we will focus on both the techniques. Though the face recognition errors have decreased over the past decades, many new systems and organizations have adopted facial recognition for their work related purposes however these systems have shown to be sensitive to lightning, expression, occlusion and aging which increase the error rates and deteriorate their performance in recognizing people.

Histograms of Oriented Gradients (HOGs) are image descriptors invariant to 2D rotation, occlusion, and extreme lightning conditions. HOG Descriptors have been successfully applied to face recognition. Deep Learning techniques have been employed to distinguish people by training classifiers. By doing so we design a very powerful face recognition system which could work at what was considered most inappropriate situations in employing a facial recognition system.

The rest of the paper is organized as follows. Section II describes the related works which are carried out in the related fields. Section III describes the HOG, Deep learning and Classification. Section IV describes the System Architecture. Section V outlines how the system is implemented. Section VI describes the conclusion and future work.

II. RELATED WORK

Vahid Kazemi *et al.,* [1] did research on finding the 68 landmarks on any face, one millisecond face alignment with an ensemble of regression trees which had the potential to find the 68 landmarks within milliseconds. They used two baselines for landmarks selection, one is random feature selection and the other correlation based feature selection. The complexity of the training time depends linearly on the number of training images used as input for this method.

Mohsen Ghorbani *et al.,* [3] built a robust Face Recognition system using HOG and LBP. In this paper, errors in facial feature detection due to occlusions, pose and illumination changes are rectified by extracting HOG descriptors from a regular grid. The fusion of HOG descriptors at different scales with the LBP captures the important structure for face recognition.

III. METHODOLOGY

HOG relies on the idea that local object appearance and shape can often be characterized rather well by the distribution of local intensity gradients even without precise knowledge of the corresponding gradient or edge positions. It can be implemented by dividing the image window into small spatial regions, for each region accumulating a local histogram of gradient directions over the pixels of the region. All the above histogram entries are combined to form the representation.

There are numerous advantages of using the HOG feature. It captures gradient structure that is very characteristic of local shape and possesses very little invariance to local geometric and photometric transformations. The end result is we have the original image turned into a very simple representation that features the basic structure of a face. The measurements that look so clear and distinguishing to us humans do not really make sense to a machine looking at individual pixels in an image.

Research suggests that Deep learning techniques can be employed in these cases where measurements are required by the machine. The complicated raw data like a picture or a video can be reduced into a list of computer-generated numbers which comes up with a lot of machine learning (especially in language translation). We can train a Deep Convolutional Neural Network. Training a convolutional neural network to output face embedding requires a lot of data and computer power. But once the network has been trained, it can generate measurements for any face, even ones it has never seen before. So all we need to do is run the images of the faces through trained networks to get the 128 measurements for each face.

The last step is to search for the name of the person in the database of known people which has the closest measurements to our test image.

IV. SYSTEM ARCHITECTURE

Face Recognition is a technology that is employed in most organizations to identify the person for security and verification purposes.

A server can be designed to take as input an image or a video stream to recognize faces within seconds. Database is used for Authentication and Real time data storage for better performance.

In this paper, we developed a python based application that is robust and accurate in recognizing the faces.

Fig.1 represents the system architecture of the proposed system. It comprises various steps such as face detection, landmarks identification, extraction of faces and finally matches the faces with the database.

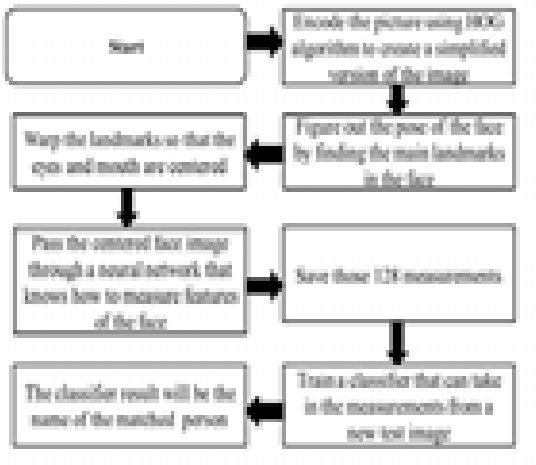


Fig.1: Proposed System

At first the input image which is a still image of various persons are subjected for face detection. Then the 68 landmarks of the detected image are estimated. The faces turned towards different directions and looking differently from a computer's perspective may belong to the same person can be easily matched by using these landmarks identification. Finally the classified images are directly compared with the known faces that has already been trained and placed in our database using deep learning.

A. HOG

HOG is one of the best techniques used for analyzing the parameters that determine the faces. One of the greatest features in recent cameras is face detection that can automatically pick focus faces in an image. Paul Viola and Michael Jones invented a method in 2005 to detect faces that was fast enough to detect faces but much reliable solutions like HOG exist now. To detect the faces in an image we will start by making the faces as gray scale image because color data is not required to find the faces.

We proceed by looking at every single pixel of the image and also the nearby and also the pixels that directly surround it. Our goal is to figure out how dark the current pixel is comparing to the pixels directly surrounding it. We draw an arrow in the direction in which the image is getting darker. These arrows are called gradients. We end up replacing every pixel with a gradient.

But saving every pixel detail is not necessary. It is enough to know in which direction the basic flow of lightness/darkness flows, so that we could get a basic pattern of the image. To accomplish this we will break up the entire image into small squares of 16x16 pixels each and replace all the gradients with a single stronger gradient in comparison with all other gradients.

On analyzing the pixels directly we see that really dark and really light images will have totally different pixel values. But by considering only the direction in which that brightness changes both dark and light images will have the same exact representation.

B. Face Landmark Estimation

After isolation of faces in an image, the problem is that faces turned in different directions look different to a computer. To mitigate the fact that differently turned faces does not belong to the same person, we use an algorithm called the face landmark estimation algorithm proposed by Vahid Kazemi and Josephine Sullivan[1]. The algorithm helps in establishing the fact that faces turned towards

different directions and looking differently from a computer's perspective may belong to the same person. The basic idea is to come up with 68 specific points on an image, and then we will train a machine learning algorithm to find any 68 specific landmarks in any image. After the application of this algorithm, no matter how the faces are turned we are able to center the eyes and mouth.

Fig.2 represents the trained image, in which the given image is subjected to identify the landmarks and also to center the eyes and mouth of the particular image that is turned in different directions.

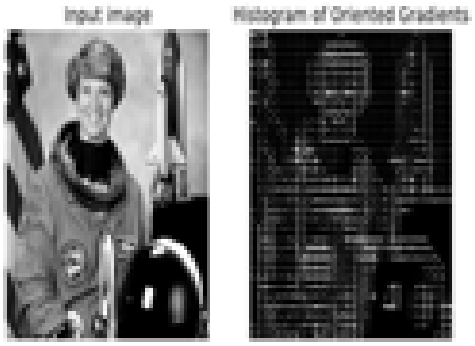


Fig.2: HOG image

C. *Deep Learning*

The easiest approach to face recognition is to directly compare the unknown faces with the known faces that has already been trained and placed in our database. We train a Deep Convolutional Neural Network to generate 128 measurements for a face. So all we need to do is run our face images through the network to get 128 measurements for each face. We can run any number of images to train that is in different lightning conditions and positions to make these 128 measurements more accurate and easier for us to match with the unknown faces.

D. *Recognizing Faces*

This is the easiest approach in the entire process. All we have to do is find the person in our database of known people who has the closest measurements to our unknown face. This can be done by a machine learning algorithm.

We have to train a classifier that can take in the measurements from a new test image and tells which known person is the closest match. The result of the classifier would be the name of a person.

Fig.3 describes how the trained image is matched with the image present in the database. After checking in the database, it will returns whether the particular image is matched with the image in the database or not.



Fig.3: Match the faces

V. IMPLEMENTATION

A python application is developed for recognizing the faces of the persons that pass by the system or the image is feed into the system by the admin. The user interface is designed in such a way that the admin can decide whether the user can pass through the system or not, which can be automated.

A. *Face Detection*

We detect the faces using hog face fontal detector using an open library dlib used for face detection.

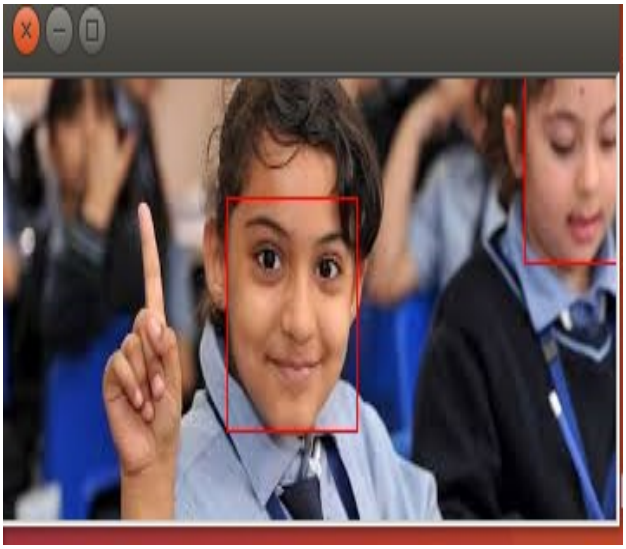


Fig.4: Detection of faces

Fig.4 represents the detection of faces in given sample input image. It can be detected by using the hog detector in the OpenCV. Only the faces present in a particular image is detected and used for further process.

B. Face Landmark Estimation

We implement the face landmark estimation algorithm to establish the landmarks in a face. Mainly the 68 landmarks are estimated to identify the images which were turned in different directions. Only the eyes, nose and the mouth of the detected image is identified for the same person's image but that is turned in different directions.

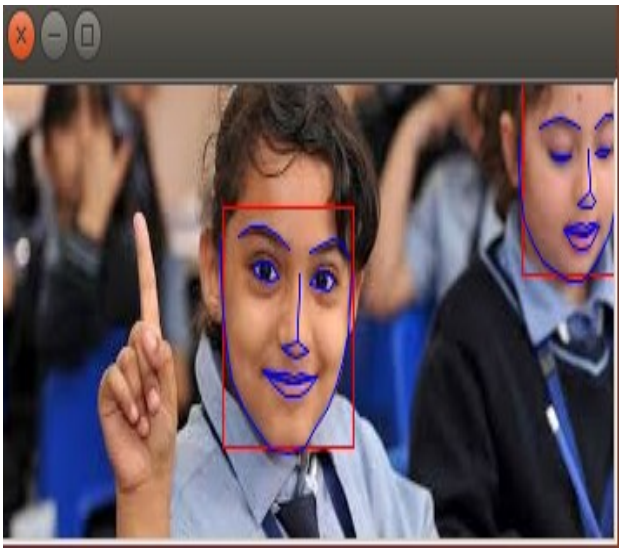


Fig.5: Landmarks discovery

In Fig.5, the landmarks of the detected image are identified. The image of the same person with poses in different angle can be subjected to identify the landmarks. This will results in perfectly matching the image in the databases by avoiding the errors occur in facial feature detection.

C. Machine Learning

We implement a deep convolutional neural network to train the images and store the 128 measurements using OpenFace. OpenFace is the python and torch implementation for facial recognition with deep neural network.

Fig.6 represents the output data training of images. This approach started by using a training set of labeled facial landmarks on an image. These images are manually labeled, specifying specific xy-coordinates of regions surrounding each facial structure. The probability on distance between pairs of input pixels can be determined.



Fig 6: Training of the images

D. Face Recognition

We can recognize face by training a basic SVM classifier to tell which person is the closest match.

Train a classifier that can be taken in the measurements from a sample image and tells which known person is the perfect match. The performance and accuracy is very effective in this approach to recognize faces of the persons.

VI. CONCLUSION AND FUTURE WORK

A robust face recognition system built using python for security and verification purposes which could recognize faces independent of the prevailing conditions. The accuracy of face recognition can be improved by increasing the number of images during training. The result of person identification using HOG techniques exhibits promising results.

In future, the same recognition system with the facial expression recognizer along with text to audio features can be implemented, which is mainly useful for visually challenged to identify the person in an organization or other places.

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Principal

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MOVING OBSTACLE AVOIDANCE FOR AN UNMANNED AERIAL VEHICLE

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***Abstract* — Tremendous improvement in applications of Unmanned Aerial Vehicle creates popularity in surveillance. In crowded airspace, there is a chance of collisions for UAV. To forge UAV to sense both static and dynamic obstacle, there is a need to emerge a collision avoidance system for to flight safety to reach the target. The crucial thing is to examine both obstacles and UAV movement in airspace using moving camera. This paper presents about the design and implementation of multiple moving obstacles recognition and avoidance by an UAV. Initially, detection approach is done by finding the strong corner points in every frame. Extraction of actual obstacle from the video dataset is obtained by combining the background subtraction and optical flow method. Here, tracking of moving object is done by Kalman filtering technique which deduces noise. Then, predict the obstacles trajectory of UAV and generate a new feasible trajectory for UAV using closed loop RRT technique to avoid collision from other flying vehicles. The implementation is validated using video datasets which is taken from moving camera which is mounted on UAV. The results show that the collision free trajectory are computed fast and satisfies dynamic feasibility.**

***Keywords*- Unmanned Aeria Vehicle, Object detection**

I. INTRODUCTION

An unmanned aerial vehicle (UAV) extends their applications from aerial targets and reconnaissance for military purpose to many different civilian areas such as aerial photography, rescue, agriculture, cargo transport. The main challenge for an UAV to fly on its trajectory without any interruption. Heavy lidars are able to detect the distance to the obstacle, but to carry them in an UAV will significantly increase the payload. A monocular camera has been used to detect and tracking moving obstacles, but it relies heavily on the image processing and computer vision algorithms in detection and tracking. Different techniques are emerged for collision avoidance for an UAV. But to develop a reliable algorithm for this purpose is still a research problem till today.

Multiple UAVs can perform various missions. To make UAV run automatically and make decision when the connection between UAV and control system is lost, reliable methods are needed to control the vehicle. Mostly dynamic obstacle avoidance methods include Velocity Obstacle based methods [1]–[3] and Optimal Control based methods [4], [5].

Some challenges associated with dynamic object avoidance algorithms involve the following: (1) Moving obstacle need to be detected even in the far distance to enable timely warning before collision. (2) Motion prediction of moving obstacle need to be accurate. (3) Generation of real time path planner for UAV. (4) Design of execution loop for UAV requites the faulty prediction of obstacles movement.

To solve this problem, methods discussed in this paper can able to predict moving obstacle motion and avoid it under the fast moving camera which is mounted on UAV. First, sequences of frames are parsed from video. Moving object is recognized by differentiating the frames. Because of moving camera, background image is not constant. So, background motion image is estimate by perspective transformation model and then it is fit into global transformation model. Then find the corner points and optical flow in the background subtracted image by Shi-Tomasi [6] and Lucas-Kanade optical flow [7] algorithm. Multiple objects are obtained and it is filtered using Extended Kalman filter algorithm [8] which avoids miss–detections. By knowing the state of a moving object, collision is estimated. Then Closed-loop rapidly exploring random tree [9] provides a path planner which generates a new trajectory when UAV and estimated obstacle path interferes. It is done by generating collision free paths. Each path is checked against constraints, if it satisfies then it added as candidate path. Intermediate way points also generated and added in to path only if satisfies constraints. The above process is repeated whenever collision occurs. The remaining paper discussed briefly about the methods to avoid collision.

II. RELATED WORK

Many approaches are evolved for collision avoidance of UAV. Some detection technique like frame differencing detect object by differencing the pixels between frames. But it is work well in static background. Also, few techniques need some specialized hardware to implement and it increases the payload of UAV. Moving object can be identified quickly using extraction of corner points in each frame. Susan corner

detection rely on brightness of pixel, fixed global threshold does not suit for general situation. Anti-noise and robustness of this algorithm is also weak. Markov Decision process based methods sense unreliability, but it cannot able to tackle when number of obstacles is large. Different methods developed to avoid obstacles like potential filed, cross entropy, elliptical search, but it works only in static. In challenging environment, obstacles are large and far and also covered with noise. So, there is a need to develop reliable techniques to alert the system before occurrence of collision.

Mostly, many techniques rely on moving obstacle motion for avoidance. Estimation of small moving object is identified using frames variation and noise elimination. In this paper, background subtraction method and optical flow are combined to detect object under moving camera with performance improvement. In Background subtraction method, background motion estimation is needed for fast moving camera which will helps for foreground detection. Optical flow matching of background subtracted image can extract spatio-temporal features of moving object. This helps to track moving objects. To track objects kalman filter is used, but it is used for linear systems. For non-linear systems or virtual reality applications, extended kalman filter (EKF) is best than previous. EKF paves the way to estimate state of object. Closed-loop Rapidly exploring random tree create smooth trajectories than RRT and also deduce the prediction error.

III. DESCRIPTION OF METHODS

As illustrated in Fig.1, we propose an efficient moving obstacle avoidance algorithm for UAV's.

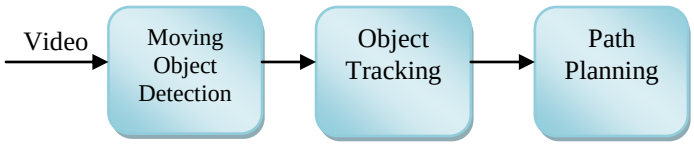


Fig.1. An overview of our proposed method

We first detect the moving obstacle from video. By using the result obtained from detection track the objects. Additional moving object detection operations are performed to differentiate target objects from spurious noise. Finally if there is any obstacle in path, finds new path by path planning.

We use spatiotemporal characteristics of each detected object to identify actual UAV and incorporate the temporal consistency of detected objects through tracking. In the following section, we describe each component of our algorithm in detail.

1. Moving Object Detection

The different approaches are suitable for characterizing small moving objects since their motions can be estimated in local regions between frames. Motion-based approaches are divided into two main categories:

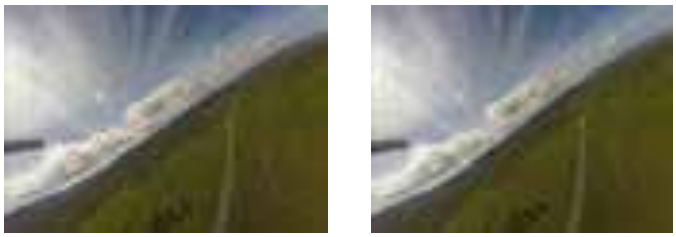


Fig.2. Extraction of frames from video data set

a) Background Motion Estimation:

For background motion estimation, we are going to assume that the background moves smoothly. From a sequence of video frames (Fig. 2), we extract a set of corner points (Fig. 3(a)) and estimate local motion fields (Fig. 3(b)) on those selected corner points. The computed local motion fields are then transformed into a global transformation which represents the background motion.



Fig.3. Snapshot of corner points in the frame (Figure 3(a)). Illustration of optical flow among moving objects in a frame Figure 3(b).

i) Identify Corner Points:

First we have to find corner points from a video frame. We are using shi Tomasi corner detector also called as minimum eigen value method, due to effiency,speed and finding of strongest corner points. Shi Tomasi corner detector is based on assuming the corners are associated with the local autocorrelation function.

Given a frame A, we define the local auto-correlation function C at pixel P as following.

$$C(P)= \sum_{w}[\nabla A(s)\cdot \delta s]^2$$
$$= \delta s^T \sum[\nabla A(s)^T \nabla A(s)]\delta s$$
$$= \delta s^T \Lambda \delta s$$

where ∇A is the first order derivative of the image and Λ is the precision matrix.

In Shi-Tomasi corner detection, a corner Q is calculated to eigenvalues of Λ

$$Q(s) = \min\{\lambda_1, \lambda_2\}$$

where λ_1 and λ_2 are eigenvalues of Λ.

After thresholding on Q, find a set of salient points. Discard points for which there is a stronger corner points at a certain distance.

ii) Using Corner Points, Finding Local Motion Field:

First step is finding the local motion field from the previous frame F_{t-1} to the current frame F_t on the identified corner points (Fig. 2). Then we take c_{t-1} as one of the Shi-Tomasi corner points in F_{t-1}.After that the motion vector is computed as M_t from the point c_{t-1} using Lucas-Kanade method [] by assuming that our local motion is optical flow.

In Lucas-Kanade method, all the points which are placed around the given pixel must have the same motion. So the local motion can be predicted by solving the least square problem.

$$M_t = \arg\min_{M} \sum_{s \in N(c_{t-1})} |X_t(s+M) - X_{t-1}(s)|^2$$

Where $N(c_{t-1})$ is the neighbourhood around the c_{t-1}. The above equation is easy to solve with the closed form solution. Further we use the bi-directional verification to obtain the accurate motion vector field such that $\|M_t + (M_t)^{-1}\|^2$ has small value.

iii) Local Motion Field Fitting into Global Transformation:

After local motion fields M_t is founded then fit them into global transformation. By using the optical-flow matching the corresponding point c_t in the current frame F_t is represented as $c_t = c_{t-1}+M_t$.

After finding the global transformation G_t, this G_t regularizes the local motion field to be smooth in the entire image.

$$G_t = \arg\min_{G} \sum_{c_t \in C_t,\, c_{t-1} \in Ct_{-1}} \| c_t - G \circ c_{t-1}\|^2$$

Where C_t and C_{t-1} represents a set of corresponding points in current frame F_t and F_{t-1} and o is the warping operation.

After, we have lots of global transformation model such as rigid or affine transformation model. Then we use the perspective transformation model which reflects the UAV occupy a small portion of the field of view. For computation we use a efficient model as perspective transformation which requires only 9 parameters to describe and it takes a projection which is based on the distance from the camera. At last the result of the perspective transformation in the above equation is assigned to the background motion between two consecutive frames.

b) Computation Of Subtracted Image:

By using the estimated background motion, background subracted image will be computed which highlight the moving objects that have more complex motion. After that we identify the corner points in the background subtracted image and local motion vector on those points to be found using the appearance information. By assuming that the motion of the target object is greatly different from the background motion we perform the additional test to prune the spurious noise.

i) Background Subtracted Image Computation:

We can subtract the background by using the original image and the background motion compensated image. If the background motion estimation may not be accurate as the assumption of the single plane on the perspective model can be violated in the video. For obtaining a more accurate background subtracted image, we use the estimation of background motions from the multiple previous frames.

Then the perspective transform between the two previous frames from F_{t-2} to F_{t-1} can be denoted as G_{t-1}. After that by taking the average of forward and backward tracing, the background subtracted image B_{t-1} for X_{t-1} is computed.

$$B_{t-1} = 1/2\, |F_{t-1} - G_{t-1} \circ F_{t-2}| + 1/2\, |F_{t-1} - (G_t)^{-1} \circ F_t|$$

Where the inverse transform of G_t is $(G_t)^{-1}$. Here the background subtracted image is computed for the previous frame F_{t-1} for symmetry.

ii) Find the Corner Points on Moving Objects:

In the background subtracted image B_{t-1}, the moving objects are highlighted. For detecting the moving object in the current frame we have to find the corresponding regions in F_t. For this we have to extract Shi-Tomasi corner points in B_{t-1} and propagate them to appearance image F_{t-1}. By using the Lucas-Kanade method we need to find the corresponding point in F_t for each propagated corner point from F_{t-1}.

By denoting the corner point as Q_{t-1} in F_{t-1} propagated from B_{t-1}. Then the local motion field L_t is computed as,

$$L_t = \arg\min_{L} \sum_{s \in N(P_{t-1})} |F_t(s + L) - F_{t-1}(s)|^2$$

Where the neighbourhood around P_{t-1} is $N(P_{t-1})$. It's worth noting that we use the appearance image to estimate the local motion not using the background subtracted image.

iii) Remove Salient Points based on Motion Difference:

For detecting the moving objects we have the corresponding points in F_t from B_t. Due to the incorrect background motion estimation there is a points on spurious noise (i.e. edge of background).

For that we need to remove the points based on the difference between the estimated background and local motion. This happens based on the assumption of target object has different motion compared with background.

The motion difference D_t between the background and moving object as follows:

$$D_t = g_t - L_t$$

Where interpolated motion vector is g_t from the perspective transformation G_t at the point P_{t-1}. Then based on the magnitude of motion difference we find the pruned point R_t.

$$R_t = P_{t-1} + L_t \quad \text{if } \|D_t\|^2 > T$$

Where empirical threshold for pruning is T .Then the Pruned points are cluster according to spatial proximity. By generate the bounding box for each cluster of points which represents our detection for a single moving object.



Fig.4. Illustrates about the detection of moving object which is indicates by red bounding box.

2. Estimation Of Moving Obstacle State:

To estimate the collision between UAV and obstacle, we have to find the position and velocity of the moving obstacle. For this estimation, extended kalman filtering technique is used. This filtering technique is required to neglect the miss-detections.

This filter analyse the previous state P_{t-1} and estimate the current state P_t by adding the current value C_t with current state as,

$$P_t = TP_{t-1} + S_t$$
$$C_t = MP_t + E_t$$

Where, T – transition control matrix,

S_t - controls transition error

M – measurement matrix

E_t - measurement error

Then, the current output P_t is estimated using kalman gain K_G.

$$P_t = TP_{t-1} + K_G(C_t - MP_t)$$
$$K_G = V_S M^T (MR_sM^T + V_E)$$

Where, V_S & V_E are covariance of S_t & E_t.

Using state P_t, we can obtain the position and velocity of the object by assuming constant velocity model on transition control and measurement matrix. In L previous frames, particular detected object (Fig. 4) is identify using optical flow matching and check for consistent. By using kalman output, correct the miss-detection in current frame.

3. Path Planning:

To avoid collision of UAV, we can use Motion planning in dynamic environments. For autonomous driving, the Closed-Loop RRT is developed.

To avoid dynamic obstacles we use a chance constraint RRT for planning a path. So a sampling based path planning method is proposed for UAV dynamic obstacle collision avoidance because of the following advantages: 1) Able to find a feasible motion plan in a short span of time. 2) Guarantees probabilistic completeness. 3) Applicable to different dynamic models. 4) Enables trajectory-wise checking.

Our algorithm is shown in the following steps: 1) Sample a point from 3D UAV work space. 2) Use the UAV's closed loop system to simulate a trajectory of the UAV and a linear motion model to simulate trajectories of dynamic obstacles and identify potential collisions. 3) Store collision free trajectories as candidate paths. After repeating this cycle for fixed amount of time, the shortest trajectory is chosen from the list of collision free candidates. This process is repeated at the next time step if collisions are identified with the previous generated collision free trajectory.

Constraints:

1) Dynamic obstacle should not enter into UAV's safety zone to ensure collision free.

2) Height limits and a geo-fence, must also be enforced.

a) The Closed-Loop RRT Based Method:

There are two main types of sampling-based methods: graph based and tree based planners. Graph based method uses random sampling in the state space to build a roadmap of the free state space. It can also be used to create paths from the roadmap. Tree based methods has a vertex selection method, which determines expansion among vertices in the graph. After that, a local planning method constructs an edge from the selected vertex, thereby extending the tree. Closed-Loop Rapidly Exploring Random Tree (CL-RRT) is chosen from tree-based planners.

Algorithm 1- TreeExpand()

1: for Δt do
2: Generate a sample z_s.
3: Sort the nodes in the tree by heuristics in ascending order.
4: **for** each node q in the tree, in the sorted order **do**
5: Simulate a trajectory $\chi(t)$, $t \in [t1, t2]$ from q to z_s using the closed-loop system and check the trajectory against constraints in the above mentioned.
6: **if** Satisfy the constraints **then**
7: Add the end of X(t) to the tree with q as their parent. Break.
8: **end if**
9: **end for**
10: **for** each newly added node q_n **do**
11: Calculate the cost of q_n by adding length of the trajectory from its parent and to the cost of its parent.
12: Simulate a trajectory from q_n to the goal using the closed-loop system and check it against constraints which is mentioned above.
13: **if** Satisfy the constraints **then**
14: Mark q_n as goal reachable.
15: Calculate cost-to-go of q_n as the length of the trajectory to the goal.
16: **end if**
17: **end for**
18: **end for**

First, the nodes in the tree are sorted in an ascending order by using heuristics (line 3). Heuristics is the approximate cost from each node to the sample node. The node q with the smallest heuristics is chosen and a trajectory from that q to the sample node z_s is simulated using the closed-loop system. Then the trajectory is checked against the constraint which is stated above. If the constraints are satisfied, the node q is added to the tree (line 7). For this newly added node q_n, its cost is calculated by adding the trajectory length from its parent q to q_n and the cost of q. Then an attempt is made to reach from q_n to the goal: a trajectory from q_n to the goal is simulated using the closed-loop system and checked against constraints (line 12). If it satisfies the constraints, q_n will be marked as reachable to the goal and its cost-to-go is the length of the simulated trajectory. To generate a path, the goal- reachable node $q*$ with smallest sum of cost and cost-to-go is selected. The node sequence connecting the start to the goal via $q*$ is the generated path.

b) Execution Loop:

In each loop, the algorithm predicts a collision between the UAV and the obstacle aircraft by simulating the UAV's trajectory up the time horizon Δt_m. Δt_m is determined by the time needed to make a turning movement for the UAV to avoid collision. If a collision is predicted, the path planners will help in generating an avoidance path. Otherwise a reactive avoidance action such as climbing up will be taken. Once a path is generated it' not immediately sent to UAV. Rather, a new trajectory is simulated using the closed-loop system along the waypoints representing the path. This waypoint is checked against constraints with updated states of the UAV and moving obstacles. If the constraints are satisfied, the waypoints will be sent. Otherwise, the planner needs to create a new path for collision avoidance. The loop is repeated until the UAV reaches its goal.

Algorithm 2 - ExecutionLoop()

1: **repeat**
2: Predict the collision up to a time horizon Δt_m
3: **if** A collision is predicted **then**
4: **if** Collision location is close to the start location **then**
5: take reactive avoidance action.
6: **else**
7: TreeExpand()
8: **if** No path is feasible **then**
9: Go to line 7
10: **end if**
11: Update the UAV and the obstacles' states and simulate a new UAV trajectory starting from the updated position to the goal and check against the constraints.
12: **if** Constraints violated **then**
13: Go to line 7
14: **else**
15: Send the path to UAV.
16: **end if**
17: **end if**
18: **end if**
19: until Finish the waypoint sequence

IV. CONCLUSIONS

In this paper, we proposed a method for Unmanned Aerial Vehicle to avoid moving obstacles. Our method first finds Shi-Tomasi corner points and Lucas-Kanade optical flow among frames. Then estimate the Background Compensated image by fitting the local motion vectors into global transformation. Next, use the background subtraction method to detect moving objects. Then filter and track the objects using kalman-filter technique to avoid spurious noise. Closed loop RRT based path planner is used to develop a reliable avoidance path. In this planner the generated way points and trajectories are able to avoid collisions. Using reachable set, prediction mismatch is avoided. This algorithm can be used to avoid large number of obstacles with high accuracy.

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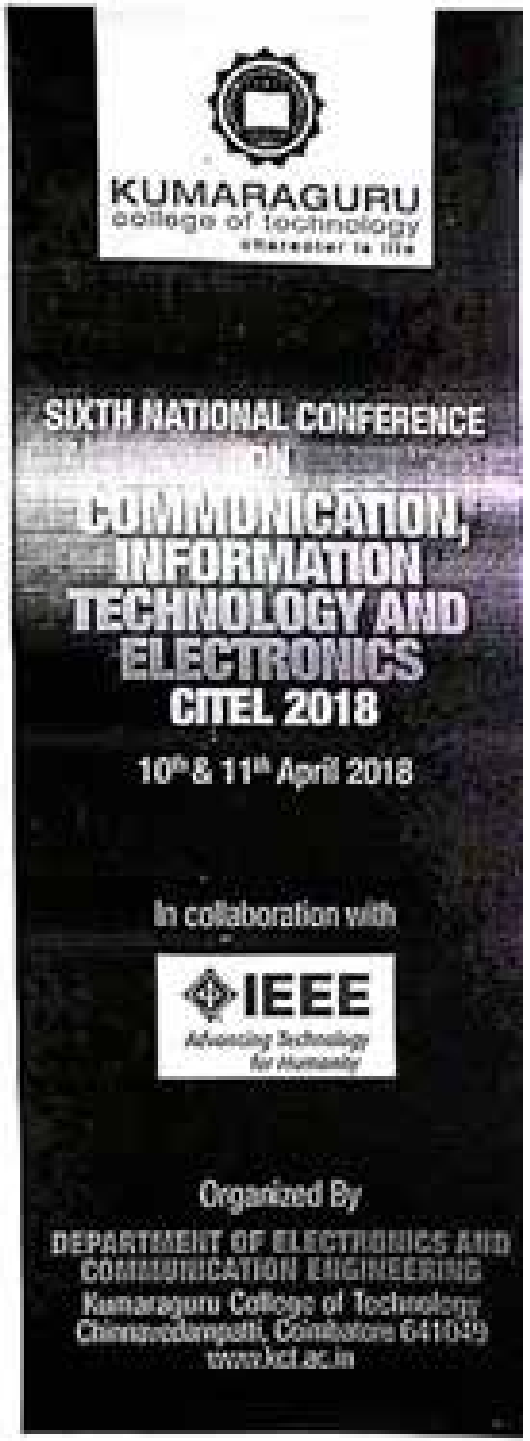
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HIGH SPEED ERROR TOL... NT MULTIPLIER USING ROUNDING BASE... PROXIMATION

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As multiplier is an important ... all portable devices and the slowest component of all, it is necessary to improve the sp... f multipliers, in such a way that the speed of the device can also be increased. In t... per, we propose the high speedand less power consuming approximate multiplier w... inimum error probability using RoBA multiplier. It is mainly used in Image Processin... plications.Here we use the rounding concept for approximation. The operands are rou... to the nearest power of two's exponent. Our main aim is to reduce the error probabili... nout increasing the area and time consumption of previous approximate multipliers, ... to improve the quality of image. By using this multiplier, the error probability is redu... from 0.25 to 0.13.

MONITORING PHYSIOLOGI... VARIABLES OF MINING WORKERS AND ENVIRONMENTAL V... RIABLES AT HIGH ALTITUDE

Gurunchanna P*, ... vakilakheni.R and Selvameena.M
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Miners working at high altitude must ... e extreme climatic and physiological hazards without specialized medical supervision. The p... ized system deals with implementing a supervision system for coal mining workers, whi... essential to avoid the workers illness and death. The proposed system presents the design ... mplementation of a continuous monitoring device to measure the physiological variables ... iners and environmental variables at high altitudes (>2,000m.a.s.l.).The proposed syst... includes physiological variable: heart rate and environmental variables: ambient tem... ure , relative humidity and concentration of CO. This system incorporates a non-invasive ... s, Arduino Uno , GSM module. The non- invasive sensors are embedded all through the ... rt and at critical situation, the Arduino microcontroller starts alerting the mine workers by ... alarm system and sends the alert messages to the ambulance services and monitoring st... by using GSM module.

DETECTIO... F FRESHNESS OF FISH BY USING CMOS METH... OLOGY FOR IOT APPLICATIONS

R.Divya*, S.Akalya Sakt... ...manikari, G.Girija and K.Jebapriyadharshini
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Fish is a unique as a substratefor m... ial growth when compare to other foods. Fish is an important food in our daily life. But it ... highly perishable commodity. They have less stable and low tolerance at ambient temper... . Fish can be easily spoiled by physical and chemical actions mainly due to bacteria hyp... sia, which reduces human consumption. There are many techniques to identify its fresh... s in previous days. But to reduce the cost, the Fish spoilage detector is proposed. Th... posed detector uses calibration circuits, it avoids nonlinearity arises from the analog p... essing circuits. Finally, the freshness of fish can be calculated based upon the time peri... d the linearity of fish resistance. So the Fish spoilage detector is tested and validated thr... measurements by using CMOS technology for IOT Applications.

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AUTOMATIC MOVABLE PLATFORM FOR RAILWAY TRACK CROSSING-A REVIEW

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Abstract

The proposed system is used for the passenger who can be able to reach one platform of the railway station to the other without use of staircase steps and excavators. The system consists of movable platform which connects the two platforms of the railway station. Sensors are placed on the two sides of the railway station. If the train arrives at one end of railway station, the sensor network indicates the movable platform through Zigbee protocol with the help of Arduino microcontroller then the movable platform will automatically close. When the train departures the station, the other end of sensor network indicates the movable platform through Zigbee protocol with the help of Arduino microcontroller then the movable platform will automatically open. Then the passenger who can be able to reach one platform of the railway station to the other using movable platform.

Key words: Zigbee, Arduino,IR sensor.

1 Introduction

The present railway systems in India are not automated which are fully manmade. In railway stations normally we use bridges. It is very difficult for the elderly persons or handicapped persons to use the bridge .This paper find a good solution. Mainly the tracking of a train is sensed by sensor, this is used for automatically close/open the mobile platform. Sensors are placed on two sides of track to sense the motion of train. The microcontroller will sense the presence of trains by using infrared sensors. So on sensing the train on one path, the controller will give pulses to the motor to close the mobile platform automatically.

2 METHODOLOGY

2.1 Transmitter section

The block diagram of the transmitter section is shown in the Figure 2.1. In the transmitter section the IR sensor is used to detect the arrival of train and pass the signal to the arduino.

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A SMART CONFERENCE HALL SURVEILLANCE SYSTEM USING IOT

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The significant changes happening in present technology can mostly be attributed to developments in Internet of Things. Developing smarter conference rooms in college or company have a great scope for innovation and digital transformation. Wastage of electricity is one of the main problems which we are facing now a days. In colleges or industry we can see that appliances are kept switched ON even if there is nobody in the room or area. This happens due to reluctance or because we forgot to turn the appliances OFF or when we are in urgent. In recent times the concept of smart things have gained great popularity. Based on the technology of the Internet of Things (IoT), a lot of solutions have been developed to control appliances without the need of accessing the electrical sockets or plug. This paper focuses on developing a smart conference hall for conservation of power. The Proposed idea aims at measuring the number of persons entering any room like seminar hall, conference room and classroom using pair of Infrared sensors, Arduino and IOT board. When a person enters the room, the IR sensor will act as a counter and the count will be incremented which makes the appliances in the rooms to get activated. When a person leaves the room, the count gets decremented by one. If the count reaches zero, the appliances inside the room will be turned off using a relay interface. Arduino serves as the brain and gateway for the control operations .It also provides users with additional features such as controlling the appliances from anywhere using IoTboard.

DESIGNING AND PLANNING OF RF NETWORK IN GSM TECHNOLOGY

S.S.Ajith Kumar, M.Hariharan, M.Aravindhan, P.Krishnakumar and R.Chitra*
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Designing of air interface in GSM is one of the vital part in GSM planning. The main objective of achieving the proper coverage depends upon the way in which the RF link is planned. This project involves in a study of how the air interface in mobile environment is planned and engineered. It involves hands-on simulation exercise on planning of RF network with the help of Atoll planning software tool. The main aim of radio network planning is to provide a cost effective solution for the radio network in terms of coverage, capacity and quality. Utilizing the available limited bandwidth very preciously so as to cater to millions in a vast area with good quality, coverage, and without interference using ATOLL planning tool is the cream of this project.

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This is to certify that .....B. DEEPALAKSHMI..... *from* .....RAMCO.....INSTITUTE.....OF.....TECHNOLOGY..... *has presented a paper titled* IMPLEMENTATION....OF....ARITHMETIC....COMPUTATION....USING....VEDIC..... .....ALGORITHM..... *in the "International conference on Engineering and Advancement in Technology" held on 22nd & 23rd, March 2018.*

Dr. P. Aravinthan, M.E., Ph.D., Technical Lead, OSIET, Secretary	Prof. A. Krishnamoorthy, M.E., Ph.D., Technical Lead, OSIET, Administrator	Dr. S.Vijayakumar, M.Tech., Ph.D, Vice-Chairman, IEEE Product Safety Engineering Society, Madras Chapter.	K.Jamuni, M.Tech., CEO, OSIET, Director

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ANNA UNIVERSITY

REGIONAL CAMPUS, COIMBATORE

IEEE

Department of Electronics and Communication Engineering

NCSCV'18

Certificate for participation

This is to certify that Dr./Mr./Ms. B. DEEPA LAKSHMI ..... of

RAMCO INSTITUTE OF TECHNOLOGY ..... has participated and presented

a paper titled AN AREA EFFICIENT SQUARE ROOT CARRY SELECT ADDER

USING LOGICORE HALF ADDER. 10th National Conference on Signal Processing,

Communication and VLSI design - NCSCV'18 held on 06th & 07th April 2018 at

Anna University Regional Campus, Coimbatore.

Organizing Secretary

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Regional Campus

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CERTIFICATE OF PARTICIPATION

This is to certify that Mr./Ms. Dr. PERIYANAYAGI S

of Rarece Institute of Technology, Rajapalayam

has presented the paper titled Smart Crop Selection Tech using Agri-App

in the Sixth National Conference on "COMMUNICATION, INFORMATION TECHNOLOGY AND ELECTRONICS" -CITEL 2018 organized by Department of Electronics and Communication Engineering on 10th & 11th April 2018 at Kumaraguru College of Technology, Coimbatore.

Dr.R.KAVITHA
Dr.K.PRAMASIVAM
Coordinators

Dr.S.A.PASUPATHY
HOD/ECE, KCT

Dr.J.SENTHIL
Principal, KCT

KUMARAGURU
college of technology

SIXTH NATIONAL CONFERENCE
ON
COMMUNICATION, INFORMATION TECHNOLOGY AND ELECTRONICS
CITEL 2018
10th & 11th April 2018

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CERTIFICATE OF PARTICIPATION

This is to certify that Mr/Ms. Dr. PERIYANAYAGI.S

of RMD Engineering College, RSM Nagar

has presented the paper titled Web based Waste Management System

in the Sixth National Conference on "COMMUNICATION, INFORMATION TECHNOLOGY AND ELECTRONICS" -CITEL 2018 organized by Department of Electronics and Communication Engineering on 10th & 11th April 2018 at Kumaraguru College of Technology, Coimbatore.

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ENVIRONMENTAL POLLUTION MONITORING AND DISPLAY SYSTEM FOR CEMENT INDUSTRY

M. Deepalurgadevi, R. Sathyapriya, M. Seethalakshmi and S. Sivagamathi
Department of Electrical and Electronics Engineering, Ranco Institute of Technology, Rajapalayam.

The level of pollution has been increased by a lot of factors like increase in population, increased vehicle use, industrialization and urbanization which results in harmful effects on human being by directly affecting the health of population exposed to it. The main aim of our project is to develop a Arduino microcontroller based low cost multi-sensor node for air pollution measurement, and to develop WSN(Wireless Sensor Network) protocol for data gathering and data aggregation. This project consists of a real time stand alone air quality monitoring system which includes various parameters like temperature, humidity, carbon dioxide and sulphur dioxide. The values of these parameters are transmitted by using a zigbee transceiver and the data is received by the another transceiver by using a wireless network. Further, the data will be communicated to the people through LED display(P10 module) as well as the people can access this data anywhere in this world by using IOT. The air pollution monitoring system overcomes the problem of the highly-polluted areas which is a major issue. This system has features for the people to monitor the amount of pollution on their mobile phones using this application.

SMART GAS SAFETY SYSTEM USING GSM

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Department of Electronics and Communication Engineering, Ranco Institute of Technology, Rajapalayam.
anupriyam1997@gmail.com

Gas stoves are now very common in all houses including rural and remote areas. The main source of energy for gas stoves are either LPG or Biogas. Therefore safety plays a major role in today's world and it is necessary that good safety system is to be implemented in homes. The leakage of hazardous gases like LPG and propane are sensed using gas sensors (MQ-6). If these gases exceed the threshold level, the alarm is generated immediately and an alert message is sent to the authorized person using GSM. In order to avoid explosion the regulator is automatically turned off and also the relay switch is used to trip the main power supply off which will prevent electrical sparks. In this project a smart gas system is proposed, that will automatically turn ON the gas cylinder's regulator when the vessel is present on the stove holder and in the absence of vessel, the knob will be turned to OFF position. Continuous weight measurement of cylinder is done using a load cell which is interfaced with a Microcontroller. When the gas cylinder reaches lower weight threshold, SMS is sent automatically to the gas provider using GSM.

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Rajapalayam - 626 117, Tamil Nadu.

National Conference on
Innovations in Communication Technology for Social Development
ICTSD-2018

CERTIFICATE

This is to certify that Dr./Mr./Ms. G. SIVA KUMAR *of* RAMCO INSTITUTE OF TECHNOLOGY *presented a paper entitled* GADGET FOR REAL TIME PERSONAL TRACKING VEHICLE THEFT CONTROL SYSTEM *in the National Conference on Innovations in Communication Technology for Social Development - ICTSD, organized by Department of Electronics and Communication Engineering in association with IETE student forum on 23rd March, 2018.*

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MICROCONTROLLER BASED GESTURE CONTROLLED CAR WITH OBSTACLE AVOIDANCE

Pavithra S, Pritha R, Sanghavi K and R.Hamsalakshmi*
Department of Electronics and Communication Engineering, Ramco Institute of Technology, Rajapalayam.
pavithrasankar@gmail.com

The gesture controlled car is a microcontroller based robotic car which can be controlled by simple human gestures. The user needs to wear a gesture pad or gloves in which the accelerometer sensor is placed. An accelerometer is used to detect the tilting position or the motion of your hand. The microcontroller gets different analogue values from the accelerometer and generates a command signals to control the car. The accelerometer sensor will record the movement of hand in a specific direction. The gesture instrument is connected to the receiver circuit wirelessly through radio waves. User can interact with the car in a more friendly way due to the wireless communication. The sensors are intended to replace the remote and joystick control. The gesture signal will be encoded before transmission. The receiver receives the signal and decodes it to control the car. It will allow user to control the forward, backward, leftward and rightward movements. The movement mechanism involves the rotation of both front and rear wheels of left or right side to move in the anticlockwise direction and the other pair to move in the clockwise direction which makes car to rotate about its own axis without any kind of forward or backward motion. When the obstacle is found on the path, the ultrasonic sensor can stop the car automatically. A camera module is also placed. It is used to record the path of the robot. This mechanism can be implemented for other military and gaming application.

SMART CITY APPLICATION BASED ON LoRa- WASTE MANAGEMENT

Divyadharshini.R, Jayalakshmi.A, Koushika.G and Periyanayagi.S*
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Waste management is the one of the primary problem that the world faces irrespective of developed or developing country. The major issue is that the garbage bin sometimes gets overflowed in advance before the next cleaning process. It causes bad odour and ugliness to the surrounding place which may cause various diseases. To improve the public health and to promote cleanliness, a smart waste management system was introduced. The previous methods of smart waste management have some disadvantages like increased power consumption and can control only small area. To overcome all these problems, the concept LoRa was introduced. LoRa is a low power technology. LoRa technology uses license free frequency bands. The practical coverage range of LoRa is 2 Km. LoRa gateway can control up to 1000 devices. Also, all the data from the devices can be sent to the LoRa gateway so that the status of each device can be monitored. LoRa gateway will send all the data to the web server so that they can be accessible from anywhere in the world. The proposed project uses ultrasonic sensor to get the level of garbage bins places in the cities. The level of garbage will be updated to the web server in the municipality through LoRa gateway, so that the periodic monitoring of garbage bins will be eliminated. The transportation cost will be eliminated.

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A WIRELESS HEALTH MONITORING SYSTEM USING MOBILE PHONE ACCESSORIES

D.Gopinath*, S.E.Padma Gokila, M.Shenbagavalli and P.Umamaheswari
Department of Electronics and Communication Engineering, Ramco Institute of Technology, Rajapalayam.

Health monitoring system is commonly implemented to continuously track human health condition. Heart rate and body temperature are two important parameters to maintain a vital life. The prototype of the wireless health monitoring is to focus on measuring real time ECG and temperature. In this paper describes the development and software to enable the use of android mobile phones equipped with Bluetooth to receive the incoming electrocardiogram(ECG) signal and temperature values from a user. The proposed hardware system consists of single chip microcontroller Arduino, ECG sensor , LM35 sensor , BLE module HC-05.

AUTOMATED GRASPING DISTALS

S.Nirmal Kumar, S.Padmanabah, M.Pauraj and S.Valai Ganesh*
Department of Mechanical Engineering, Ramco Institute of Technology, Rajapalayam.

Achieving development in end effectors to grasp the object and getting motion as like a human hand for material handling application which will be flexible with our requirement in different environment by means of programming and exploring Mechatronics knowledge.

SMART HELMET BY USING ARDUINO FOR TWO WHEELERS

R.Dineshkumar, R.Kanaga Raj, Kishore Kumar, M.Manicka Raj, Mr.M.Sivagaminathan* and T.Ramprakash*
Department of Mechanical Engineering, Ramco Institute of Technology, Rajapalayam.

Smart helmet is the idea that has been developed for the social responsibility towards the society. In current trends, two wheelers are increasing tremendously in which Helmet is most popular form of head protection. Smart Helmet is the adding of features for safety purpose in helmet. The smart helmet consists of ultrasonic sensor for the safety measurements if any obstacles are present while driving. The GPS and GSM900a module for finding the two wheeler's location after the accidents occurred. These sensors are connected with microcontroller which set in the helmet. The camera is used for the investigation purpose if any accident happens .The transparent visor has the better vision during fog conditions.

MODIFIED CASCADED MULTILEVEL INVERTER FOR HOUSEHOLD APPLIANCES

Dr.K.Karthikeyan*, P.Moses Stephen, M.Pauraj,N.Sathesh and K.Balamurugan
Department of Electrical and Electronics Engineering, *Ramco Institute of Technology, Rajapalayam.*

The inverter is used for DC to AC conversion. A multilevel inverter is one in which a complete cycle of output waveform contains more than three DC levels. Increasing the number of voltage levels in the inverter output can increase the power rating without requiring higher ratings on individual devices. These multilevel inverters requires split sources depending on the voltage levels that are meant to be produced. This project is mainly focused on the development of single phase cascaded type multilevel inverter for a domestic application using Pulse Width Modulation (PWM) technique and elimination of harmonic distortion and its effects.

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INTEGRATION OF RENEWABLE ENERGY RESOURCES IN MICRO GRID

M.Hari prasath, K.Muthukrishnan, G.Ramkumar, M.Mariselvam and N.Ganesh
Department of Electrical and Electronics Engineering, Ramco Institute of Technology, Rajapalayam.

Recently renewable energy power generation is gaining importance for domestic applications because of the growing power demand and increasing concern about the use of fossil fuels in conventional power plant in future. Micro grid provides economically attractive electricity supply to customers with less impact on the environment and installable in small localities or on the same building. By observing these advantages an aggregated model has to be proposed for integration of renewable sources such as wind and solar power. The power which can be produced from the renewable sources will be synchronized to the ac or to dc consumers through BESS (battery energy storage system). Relays along with the controller are employed to satisfy the load demands of the consumers. In these operations BESS are equipped with the system improving power quality and for maintaining the power balance. The wind and solar power integration for the micro grid is given with the battery energy storage for the storage of the surplus energy for the future use.

VLSI COMPUTATIONAL ARCHITECTURES FOR THE ARITHMETIC COSINE TRANSFORM

S.Puspavalli, T.S.Rashmica, S.Sivaranjani and A.AzhagujaludhanPazhani*
Department of Electronics and Communication Engineering, Ramco Institute of Technology, Rajapalayam.

A discrete cosine transform (DCT) a conventional signal processing technique and widely used signal processing tool expresses a finite sequence of data points in terms of a sum of cosine functions oscillating at different frequencies used in number of applications. For nearly-exact computation of DCT a fast algorithm is required. The fast algorithm requires floating point arithmetic and it is multiplier intensive. Moreover it accumulates round-off errors. Arithmetic cosine transform (ACT) is the recently proposed fast algorithm to calculate DCT using only additions and integer constant multiplications. ACT occupies less area and calculates for null mean input sequence. However this algorithm requires 10 non-uniformly sampled data points to calculate the eight-point DCT. This can be satisfied for applications dealing with spatial signals such as image sensors and biomedical sensor arrays. But it requires sensor elements to be placed in a non-uniform grid. Here the architecture for the null mean ACT is proposed. The architectures that extend the ACT for non-null mean signals are also proposed .The architectures are synthesized using the Xilinx ISE.

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SENSOR BASED AGRICULTURAL APPLICATION FOR CROP SELECTION

Periyanayagi.S*, R.Stefy, M.Uma Maheswari, V.Uma Rani
Department of Electronics and Communication Engineering, Ramco Institute of Technology, Rajapalayam.

Agriculture is the backbone of our economic system. It not only provides raw materials for food, but also provides large employment opportunities. The crop failures are due to the weather condition and pests provided to the soil. The objective of this paper is to develop an agricultural application which is used to help the farmers know about the soil parameters. Because of the changes in climatic conditions, the nutrients present in the soil will be varied. Farmers are not aware of the soil parameters present in their field. They are cultivating the crops based on their experience which leads to crop failure. In this paper, the soil parameters such as temperature, pH and moisture content in different types of soil are sensed by using sensors and the sensed analog values are converted into digital by using Arduino. From the Arduino the data is passed to mobile through GSM technology. The AGRI-APP has been developed to know about the suitable crops which can be cultivated by the farmers. In this application, the sensed value from the sensor is compared with the static value and suitable crops which can be cultivated in the soil is displayed.

IMPLEMENTATION OF MPLS L3VPN IN WIRELESS NETWORKS

Periyanayagi.S*, M.Dinesh kumar, A.Gnana guru, B.Karuthapandian and S.Kribore
Department of Electronics and Communication Engineering, Ramco Institute of Technology, Rajapalayam.

This paper gives the insight to implement MPLS L3VPN using GNS3. In long-distance communication, good routing protocols are used such as OSPF but achieving every successful transmission with efficient transmission time is difficult. Every single transmission the protocol has to check the IP address of every router in the network. This will prolong the time for transmission. In order to overcome this drawback and also concerning the security issues, in this proposed design Multi-Protocol Label Switching (MPLS)-Virtual Private Network (VPN) was implemented. MPLS technology is being widely adopted by service providers worldwide to implement VPNs to connect geographically separated customer sites. VPNs were originally introduced to enable service providers to use common physical infrastructure to implement emulated point-to-point links between customer sites. A customer network implemented with any VPN technology would contain distinct regions under the customer's control called the customer sites connected to each other via the service provider network.

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AN AREA EFFICIENT VLSI ARCHITECTURE OF BINARY DIVISION

A.Azhagu Jaisudhan Pachani*, M.Logeshwari, P.Mahalakshmi, B.Muthumeena
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Digit recurrence binary division use redundant representation of partial remainder and quotient digits. Divider modules are mainly used for digital signal processing and image processing applications. The former uses Carry Save (CS) representation for the floating point binary division where the number of iterations could be increased and also occupied more area. The goal is to reduce the number of iterations, consumed low power and utilize less area. Therefore, signed digit floating point binary division using carry increment adder (CIA) has been proposed. This new technique is to minimize the area using XILINX ISE 14.7 tool.

ARDUINO BASED ROCKET CRACKERS CHOKING MACHINE

R.Kanniga gopal, S.Manojkumar, P.Mohan raj, M.Praveen kumar and S.Rajakarunakaran*
Department of Mechanical Engineering, Ramco Institute of Technology, Rajapalayam.

To fabricate a fully automatic machine for rocket choking process with help of arduino UNO developed board. It is also explain about the creation of nozzle for rocket crackers. The paper emphasize on making rocket crackers nozzle choking machine cost effective, reliable and making it highly stabilized.

CONFIGURABLE INDOOR AIR QUALITY MONITORING SYSTEM

D.Gopinath*, I.Ashik Abdullah, R.Jothiram Karthick and B.MageshKumar
Department of Electronics and Communication Engineering, Ramco Institute of Technology, Rajapalayam.

With growing transportation and population density, increasing global warming and sudden climatic change, air quality is one of the critical measures that is needed to be monitored closely on a real time basis in today's urban ecosystems. The system aims to detect certain air pollutants (Co and dust particles) along with temperature and humidity and provide overall air quality alerts in a timely manner. The AQM uses an array of sensors to take measurements of the ambient air surrounding it and the acquired information are presented through different channels such as GSM and LCD display using Arduino microcontroller.

OBSTACLE IDENTIFICATION FOR VISUALLY IMPAIRED PEOPLE IN INDOOR ENVIRONMENT

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To overcome the travelling difficulty for the visually impaired people, this project proposes smart guidance device to identify the name of the obstacle for their independent life and reduces the risk factors in their life. There existing many projects to help them from obstacle avoidance with the help of ultrasonic sensors. Different from existing works, novel obstacle name identification is to be proposed with the help of MATLAB to solve problems for visually impaired people in indoor environment. The process involves in capturing the image and extracting the features of the image such as hue, value, intensity, area and boundary properties. Based upon the results, novel method is to be proposed for interfacing MATLAB with controller unit to identify the obstacle name and also avoiding the obstacles.

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REAL TIME SPECTRUM SENSING IN COGNITIVE RADIO USING RTL-SDR DEVICE

R.Senthil Kumar and S.Manikandan
Department of Electronics and Communication Engineering, AAA College of Engineering and Technology, Sivakasi.
sen81910@gmail.com

To find the WHITE SPACES which are done by collecting the real time signal with RTL-SDR and experimented on the platforms like MATLAB and spectrum analyser. Due to spectrum scarcity we go for spectrum sensing in cognitive radio. With the help of cognitive radio we can eliminate the spectrum scarcity problem. Due to spectrum scarcity we go for spectrum sensing in cognitive radio. With the help of cognitive radio we can eliminate the spectrum scarcity problem. Due to spectrum scarcity we go for spectrum sensing in cognitive radio. With the help of cognitive radio we can eliminate the spectrum scarcity problem.

GAIN IMPROVEMENT IN PATCH ANTENNA

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A patch antenna with shorting pins is proposed in this paper. Five shorting pins are used to electrically short the patch and ground plane. These shorting pins cause inductance effect along its length. Due to these shorting pins the resonant frequency gets increased, these in turn electrically enlarge the size of the patch antenna. Thus results in increase in the gain of the patch antenna without increasing its size. In this two patch antennas with and without shorting pins are designed and simulated. The simulated results evident that the 11.4 dB gain which is 4.1 dB greater than the conventional antenna.

DIAGNOSIS OF NEPHROLITHIASIS USING HYBRID METHODS

S. Sathyadevi*, M. Ramalakshmi, G. Rajapriyanka and E. Ramyasundareswari
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An bean shaped organ located at the left and right side of the abdominal cavity is kidney. The purpose is to remove liquid waste from the blood in form of urine. And also helps to regulate the blood pressure. Kidney function decreases leads to kidney failure which is caused by Nephrolithiasis. There are various techniques to diagnose Nephrolithiasis such as CT scan technology but minute stones not visible by this process. So, Here we are proposing Digital Image Processing to diagnose Nephrolithiasis. It is more efficient and easy way for this approach.

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BIOMETRIC SECURED ELECTRONIC VOTING MACHINE

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The basic concept of this project is to design a secured voting machine that will be used to demolish defrauding of the manual electronic voting system and precedent versions of electronic voting. This design includes biometric verification to ensure security. With the addition of biometric, each voter is allowed to vote only after being checked and recognized with the pre - stored database of enlisted voters. If the fingerprint matches with the provided information, the voter will be allowed to proceed for selecting their preferred candidates from the series of buttons. The Arduino counts the number of votes, it is then displayed on the LCD for the satisfaction of voters. The next phase consists of a GSM module which is used to send results to the corresponding authority, when people cast their vote the results will be updated automatically and the results can be published at the end of polling. This proposed system carries transparency and adds security for the operation.

DESIGN AND IMPLEMENTATION OF SINGLE BIT HYBRID FULLADDER USING TRISTATE INVERTER

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In this paper a low power hybrid single bit hybrid full adder circuit is implemented using tristate inverter. A new XNOR logic is designed using CMOS and pass transistor logic. CMOS tristate inverter improve the power consumption while pass transistors overcome voltage degradation problem. The proposed full adder is designed in 180nm technology using cadence virtuoso.

IMPLEMENTATION OF ARITHMETIC COMPUTATION USING VEDIC ALGORITHM

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The cubing and squaring computations have very high delay and power consumption in conventional methods. Vedic formula offers the algebraic problem solution techniques analogous to mental calculations to generate fast answer. Vedic maths provides methods with simple strategies that help us achieve low power consumption and less delay. Also in this method, the number of partial products is being reduced thereby reducing the memory. Vedic multiplier is implemented in vedic cubic formula- Yavadunam sutra to reduce the complexities in multiplication. Further, Carry Select Adder is used for vedic multiplier using Urdhva-Tiryakbhyam formula to implement the multiplier in cubing operation. The propose method is implemented using Xilinx ISE 14.7.

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HIGH SPEED ERROR TOL... NT MULTIPLIER USING ROUNDING BASE... PROXIMATION

A. Ashagu Jalaudeen Pathan*, ... Sangeetha, R.Sashi Sri Jeyam and K.Suruthi
Department of Electronics and Communi... Engineering, Ramco Institute of Technology, Rajapalayam.
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As multiplier is an important ... all portable devices and the slowest component of all, it is necessary to improve the sp... f multipliers, in such a way that the speed of the device can also be increased. In t... per, we propose the high speedand less power consuming approximate multiplier w... inimum error probability using RoBA multiplier. It is mainly used in Image Processin... plications.Here we use the rounding concept for approximation. The operands are rou... to the nearest power of two's exponent. Our main aim is to reduce the error probabili... nout increasing the area and time consumption of previous approximate multipliers, ... to improve the quality of image. By using this multiplier, the error probability is redu... from 0.25 to 0.13.

MONITORING PHYSIOLOGI... VARIABLES OF MINING WORKERS AND ENVIRONMENTAL V... RIABLES AT HIGH ALTITUDE

Gurunchanna P*, ... vakilakheni.R and Selvameena.M
Department of Electronics and Communi... Engineering, Ramco Institute of Technology, Rajapalayam.

Miners working at high altitude must ... e extreme climatic and physiological hazards without specialized medical supervision. The p... ized system deals with implementing a supervision system for coal mining workers, whi... essential to avoid the workers illness and death. The proposed system presents the design ... mplementation of a continuous monitoring device to measure the physiological variables ... iners and environmental variables at high altitudes (>2,000m.a.s.l.).The proposed syst... includes physiological variable: heart rate and environmental variables: ambient tem... ure , relative humidity and concentration of CO. This system incorporates a non-invasive ... s, Arduino Uno , GSM module. The non- invasive sensors are embedded all through the ... rt and at critical situation, the Arduino microcontroller starts alerting the mine workers by ... alarm system and sends the alert messages to the ambulance services and monitoring st... by using GSM module.

DETECTIO... F FRESHNESS OF FISH BY USING CMOS METH... OLOGY FOR IOT APPLICATIONS

R.Divya*, S.Akalya Sakt... ...manikari, G.Girija and K.Jebapriyadharshini
Department of Electronics and Commu... ... Engineering, Ramco Institute of Technology, Rajapalayam.
... ...kalya97@gmail.com

Fish is a unique as a substratefor m... ial growth when compare to other foods. Fish is an important food in our daily life. But it ... highly perishable commodity. They have less stable and low tolerance at ambient temper... . Fish can be easily spoiled by physical and chemical actions mainly due to bacteria hyp... sia, which reduces human consumption. There are many techniques to identify its fresh... s in previous days. But to reduce the cost, the Fish spoilage detector is proposed. Th... posed detector uses calibration circuits, it avoids nonlinearity arises from the analog p... essing circuits. Finally, the freshness of fish can be calculated based upon the time peri... d the linearity of fish resistance. So the Fish spoilage detector is tested and validated thr... measurements by using CMOS technology for IOT Applications.

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This is to certify that Dr./Mr./Ms. .....K.RAGAVAN..... of ...RAMCO..... INSTITUTE.....OF....TECHNOLOGY..... presented a paper entitled .SMART...HEALTH..MONITORING..SYSTEM...IN..... INTENSIVE...CARE...UNIT..BLUETOOTH...LOW..ENERGY..AND...MICROCONTROLLER....BURNING...TEMPERATURE..TRANSMIT.PRIMALSAYRAM.in the National Conference on Innovations in Communication Technology for Social Development - ICTSD, organised by Department of Electronics and Communication Engineering in association with IETE student forum on 23rd March, 2018.

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ICTSD-2018

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This is to certify that Dr./Mr./Ms. R.DIVYA *of* RAMCO INSTITUTE OF TECHNOLOGY *presented a paper entitled* EXACT TIMING ANALYSIS OF SEQUENTIAL CIRCUITS *in the National Conference on Innovations in Communication Technology for Social Development - ICTSD, organised by Department of Electronics and Communication Engineering in association with IETE student forum on 23rd March, 2018.*

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15. WATER MIST FIRE EXTINGUISHER WITH A SPEED INDICATING UNIT

National Conference on Innovations in Communication Technology for Social Development (ICTSD-2016),
Ramco Institute of Technology, Rajapalayam - 626 117, Virudhunagar District, Tamil Nadu.

VAWT BASED ENERGY EFFICIENT HIGHWAY LIGHTING SYSTEM

R.Thangam*, I.Aravinth, R.Stephen Franz, S.Vinoth kannan and P.Rajkumar
Department of Electrical and Electronics Engineering, Ramco Institute of Technology, Rajapalayam.

Wind energy is one of the non-conventional forms of energy and it is available in affluence. Electricity can be generated with the help of vertical axis wind turbine. This projects aims of utilizing this wind energy in most effective manner to get the maximum electric output, and therefore we selected highway as our installation site where we can take the advantage of the moving vehicles on both the sides of the road. In the present work, turbine is design and fabricated as per the specifications, the blades used are semi-circular shape and are connected to the disc which is connected to shaft. Shaft is then coupled with pulley with the help of bearing, and then pulley is connected to the alternator, which generates the power. The power developed is stored in battery and then can be used for street light, signal or toll. In this project a small model has been created for testing purpose. This project also aims for maximum output with minimum cost indulges, so that the government can think over this project and can implement this type of vertical axis wind turbine on highways at low cost.

DETECTION, LOCATING AND MONITORING OF FAULT IN DISTRIBUTION LINE USING LabVIEW

G.Hari Vignesh, S.Muraleswaran and B.Sankaralingam
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In India, the power sector faces lots of problems mostly in distribution lines occurs due to natural as well as manmade accidents this results in electrocution occurrence and causes many loss of life. Using this smart fault locating and monitoring system we can computerize and locate the correct fault location and control the electrocution by automatically shut down power supply on that particular area and gives information to service man by sending SMS and computerized voice calls. In this system we are using LabVIEW, virtual software which uses "G" programming in the substations and it is connected with array of Fault indicators in distribution lines. The interruption in line is sent to sub-station using wireless communication devices ZigBee it is connected to the software on substations or in local monitoring stations. It monitors the faults for every second if any area under fault the system will automatically generate the SMS and voice call to service man and also shut down the power on particular area which will reduce the electrocution. It helps the consumers to be feeling comfort and no need to call service man to complain about the faults.

A BETTER WAY TO COMMUNICATE THROUGH MORSE CODE FOR EXPRESSIVE APHASIA PATIENTS

M.Sangeetha, S.Pavithira, R.Saraswathi and R.Vedhaa
Department of Electronics and Communication Engineering, Ramco Institute of Technology, Rajapalayam.

Diseases and disabilities are growing much faster than anything in today's reality. Communicating with a person with speech and physical disabilities is challenging in a daily life. Some injuries hinder their ability to speak, write and type even though their brain is unaffected. One such disorder is called as expressive aphasia. So a Morse code based handheld device is designed for patients with speech disabilities to easily communicate to other people in order to fulfill their daily needs using Morse Key, ATmega328P microcontroller and GSM Technology.

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Least Cost Electricity Generation Planning for China with Low GHG Emission Using LEAP and EnergyPLAN

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***Abstract*— As the world's most populated country with a fast growing economy, China presently burns about two times as much coal and fossil fuels as the US and four times as much as India for generating electrical energy, which are the source of GHG emissions. The fossil fuels are expected to unavailable in 50 more years if the consumption rate remains to grow at a high incidence. With the unstable nature of international crude prices, it is important to reduce this dependence and look for alternatives. In this context, renewable energy sources (RES) play an important role in supplying sustainable energy without environmental emissions. This paper investigates the effects of using RES in generation expansion and estimates the CO_2 emissions by developing various scenarios namely Reference scenario and Optimization scenario, under the least cost approach. The Long-Range Energy Alternative Planning (LEAP) model is used to develop these scenarios until the year 2030. The electrical energy demand, capacity to be installed and electrical energy to be produced by each plant are predicted for the year 2030 by LEAP. The output from LEAP are fed into the energy modeling tool EnergyPLAN, to plan the same in monthly and hourly basis.**

Keywords—2030, China, Electricity Generation Planning, EnergyPLAN, LEAP.

I. INTRODUCTION

Nowadays, a lot of renewable energy sources (RES) has been introduced into generation systems to ease the energy crisis, improve the environmental condition and together meet the demand instead of the conventional power plants [1]. Nearly 80 percent of the electricity used in China is generated by coal [2]. So there is a threat that this capacity cannot be increased much more, which will make severe problems for China's future energy supply security. There is also a significant threat of lesser thermal capacity being installed due to a lack of indigenous coal in the coming years. Significant growth of gas reserves and production in recent years is able to satisfy power demands only to limited years. The problems of large hydro are increasing because of the displacement of people living in reservoir areas, and nuclear power is also harassed with problems due to international agreements for nuclear fuel. And China imports 7.44 Billion kWh of electricity in the year 2014 [3]. The conventional power generating plants emit harmful substances to the environment. These include mercury, sulfur dioxide, carbon monoxide, mercury, selenium, and arsenic. These harmful substances not only cause acid rain but also are very detrimental to humans. It is reported in Paris climate summit 2015 that China is the world's biggest emitter of CO_2, which emits 8715.31 Million Metric Tons of CO_2 per year. Moreover, it is around 28.1% of world's total CO_2 emission. And all the participated countries in Paris climate summit 2015 agreed to reduce their carbon output as soon as possible and promise to keep global warming below 2 degrees C. In order to achieve this, China need to plan an economic future electricity generation method with low emission of GHG, by concentrating the renewable energy sources (RES). The modeling studies carried out to demonstrate the impact of bringing in solar plants into the generating system as a technology alternative power plant is presented in [4]. The application of Differential Evolution algorithm to solve GEP problem with wind power plants has been presented in [5]. Recently, the present status of power generation in Panama, and various potential future scenarios and the associated impacts on the system marginal cost, global warming potential, and resource diversity index is presented in [6]. A sustainable scenario for Venezuelan power generation sector in 2050 and its costs are modeled in [7]. A study is made to analyze the economic and environmental impact of RES into an existing peak deficit power system, of Tamil Nadu, India, using LEAP by integrating Demand Side Management (DSM) and Supply Side Management (SSM) [8]. This paper presents the application of LEAP to investigate a range of various technologies for generating electricity at least cost for China till 2030, by considering GHG emission. And the EnergyPLAN is used to estimate monthly and hourly basis values electrical energy demand, capacity to be installed and electrical energy to be produced by each plant for the year 2030.

II. LEAP MODEL FOR CHINA

In the developed LEAP model, the electricity is set as the only demand. The electricity can be generated by the plants namely Small Hydro, Solar Thermal, Solar PV, Offshore Wind, Onshore Wind, Biomass, Nuclear, Large Hydro, Diesel, Natural Gas, Efficient Coal and Conventional Coal. And they are entered into the Process branch of LEAP model. The LEAP model for China has been developed by setting the base values shown in Table I.

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TABLE I. BASE VALUES OF LEAP FOR INCLUDING VARIOUS ELECTRICITY GENERATION TECHNOLOGIES

Name of the plant	Efficiency (%)	Maximum availability (%)	Capacity credit (%)	Capital cost ($\times 10^3$ $/MW)	Fixed OM Cost ($/MW)	Variable OM Cost ($/MW)	Life Time (years)
Small Hydro	80	80	90	2000	14	0	30
Solar Thermal	20	16	30	4500	67	0	30
Solar PV	20	20	30	5500	27	0	30
Offshore Wind	40	40	40	2600	74	0	30
Onshore Wind	40	27	35	1200	39	0	40
Biomass	60	60	52	2500	90	17.49	40
Nuclear	40	80	90	2600	90	2.14	50
Large Hydro	90	40	95	2000	14	0	50
Diesel	35	55	90	1500	50	8.2	30
Natural Gas	35	55	85	600	30	3.6	40
Efficient Coal	45	80	90	1800	40	7.22	40
Conventional Coal	30	60	85	1400	40	4.47	40

The historical data of electricity production in China are taken from [9], and they are the inputs for LEAP. And the electricity reserve margin is taken as 60% for developing the model. The model has been prepared using the historical data and extrapolated till 2030. The data for various electricity generation technologies is taken from [10-13]. These data are entered into the Transformation module called Electricity Generation in the LEAP model, which include Small Hydro, Solar Thermal, Solar PV, Offshore Wind, Onshore Wind, Biomass, Nuclear, Large Hydro, Diesel, Natural Gas, Efficient Coal and Conventional Coal. Its properties are fixed to Capital cost, Fixed Operation, and Maintenance (OM) Cost, Variable OM cost, Fuel cost, Efficiency, Maximum availability, Capacity credit, Lifetime, system load curve and a planning reserve margin. The discount rate is set as 5% while entering the cost data.

III. SIMULATION RESULTS AND DISCUSSION

The developed LEAP model for China having two different cases namely Reference scenario and Optimization scenario. If there are no steps taken to limit GHG emissions the reference scenario plans energy use and emissions over the selected time horizon, with the assumed development of the national economy and energy system. The reference scenario is defined with the assumptions for economic and demographic parameters, changes in energy use patterns, fuel costs, and technological data. These assumptions are based on available macroeconomic modeling projections, government energy sector investment plans, and analyst judgment. But, the optimization scenario simultaneously considers the main objectives as cost and emission minimization. The merit order is given to each power plants. It is fixed as 1 for RES based plants and 2 for conventional plants. The optimization scenario gives more priority to selects the power plants for expansion which having merit order 1. To perform Reference scenario, the long term integrating and modeling tool LEAP requires data for the base year. Then, using the function such as interpolation or extrapolation or the growth rate method, the future energy demand, and emissions are predictable for the other years. The fundamental concept in LEAP is an end-use driven scenario analysis.

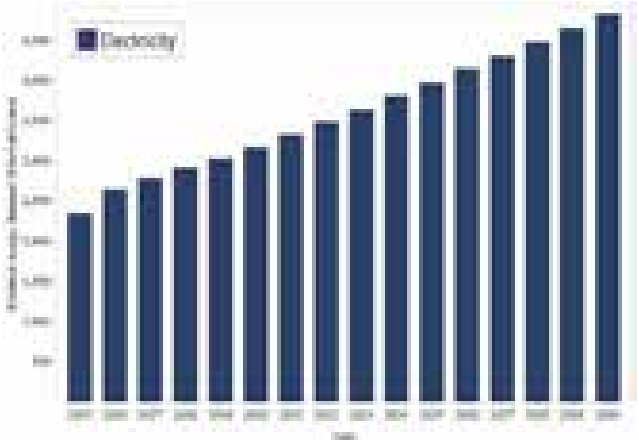


Fig. 1. Electricity energy demand predicted by LEAP

In Optimization scenario, the LEAP calculates the optimal expansion of power plants for the electricity system at least cost, subject to the constraints such as maximum GHG emission limit and minimum or maximum capacities for certain plant types. The electricity demand predicted by LEAP is shown in Fig. 1. It indicates that the electricity demand will be 4825 TWh in the year 2030.

A. Case 1: Reference scenario

In this case, a basic scenario has been simulated based on growth rate method. Based on standard simulation calculations, LEAP decides the types of power plants to be added and when to be added to meet out electrical energy demand. The predicted values of Capacity to be installed, Electrical energy to be produced, the overall cost for electricity production and GHG emission while producing electricity, till the year 2030 by Reference scenario are shown in Fig. 2 (a), (b), (c) and (d) respectively.

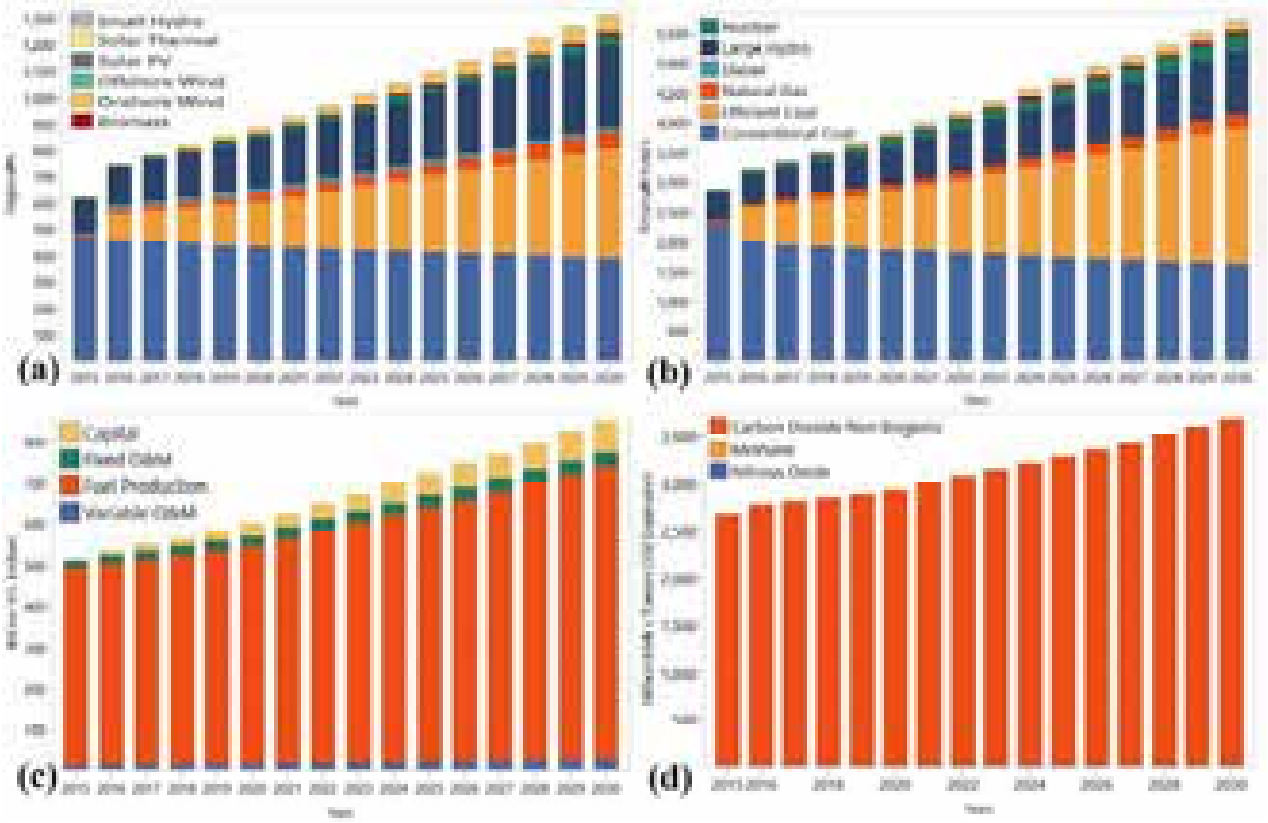


Fig. 2. Results of reference scenario (a) Installation capacity (b) Electrical energy to be produced (c) Overall cost (d) GHG emission

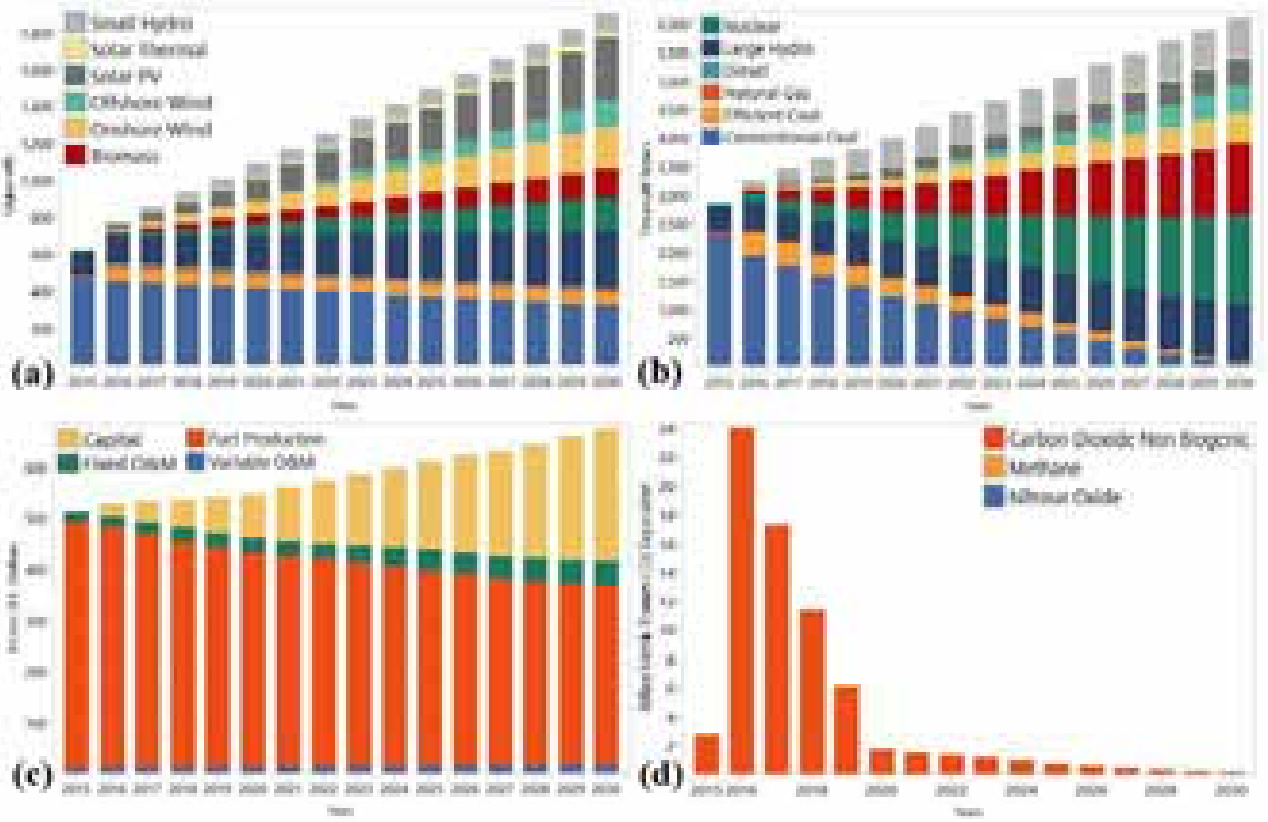


Fig. 3. Results of optimization scenario (a) Installation capacity (b) Electrical energy to be produced (c) Overall cost (d) GHG emission

The results from Reference scenario show that for most of the years, the coal plant will be installed in huge capacity to generate electricity. The fuel production cost for coal power plant is high, so the overall cost of producing electricity will be very high. The values of all GHG emission in Million Tonnes CO_2 Equivalent are shown in Fig. 2(d). The coal power plant emits more amount of pollutants, so the total GHG emission will be very high.

B. Case 2: Optimization scenario

The Optimization scenario allows LEAP to decide the combination of power plants which will meet demand at the lowest cost and lowest emission of GHG. The LEAP model runs the OSeMOSYS optimization model, which is used to simulate the Optimization scenario. The predicted values of Capacity to be installed, Electrical energy to be produced, electrical energy to be imported, the Overall cost for electricity production and GHG emission while producing electricity, till the year 2030 by Optimization scenario are shown in Fig. 3 (a), (b), (c) and (d) respectively. The main objective of this case is to give more preference to the renewable energy sources for generating electrical energy at least cost with low GHG emission. Fig. 3(a) and 3 (b) show the fuel mix of power plants and electrical energy output till the year 2030. It shows that the RES such as wind, solar, biogas and hydro will be installed more than other plants. The fuel cost of these power plant is very low, so the overall cost will be minimized compared to Reference scenario, and it is shown in Fig. 3(c). The total GHG emission will become very low due to the installation of more renewable energy sources and is presented in Fig. 3(d). The capital cost of generating electricity by Optimization scenario is higher than Reference scenario due to integrating more amount of renewable energy sources. But the fuel cost of RES are low, so the overall cost becomes low in Optimization scenario. The overall cost becomes low in Optimization scenario compared to Reference scenario. The emission of Carbon Dioxide Non-Biogenic and Nitrous Oxide will be reduced in optimization scenario than Reference scenario. And the emission of Methane will be increased in a small amount due to integrating Biomass plant. The total GHG emission will be reduced in Optimization scenario than Reference scenario. So the Optimization scenario gives better results than Reference scenario, and the output of Optimization scenario for the year 2030 are fed as the input to the EnergyPLAN to plan generation expansion in monthly and hourly basis.

C. Electricity generation planning for the year 2030 in monthly and hourly basis using EnergyPLAN

EnergyPLAN is based on analytical programming, with the same input, it will always come to the same results. This model performs the calculation on the basis of RES data of a stochastic and intermittent nature. It is an hour-simulation model as opposed to a model based on aggregated annual demands and production. Consequently, the model can analyze the influence of fluctuating RES on the system as well as weekly and seasonal differences in electricity. The results obtained by Optimization scenario in LEAP are given as input to the EnergyPlan. It involves the installation capacities of Small Hydro, Solar Thermal, Solar PV, Offshore Wind, Onshore Wind, Biomass, Nuclear, Large Hydro, Diesel, Natural Gas and Conventional Coal as 100 GW, 30 GW, 340 GW, 144 GW, 230 GW, 150 GW, 182 GW, 310 GW, 10.29 GW, 12.1 GW and 323.1 GW respectively. The predicted value of electrical energy demand for the year 2030 will be 4825 TWh, and given as the input in EnergyPLAN. In the EnergyPLAN model, the electricity is considered as the only demand. The available capacity in the year 2030 is given as the input in the supply branch of the EnergyPLAN model. The input is given to the EnergyPLAN in two branches. The first branch is having the central power plants such as Coal, Natural Gas, Diesel, Nuclear and Large Hydro, where Coal, Natural Gas and Diesel are combined together. The second branch is having the RES such as Small Hydro, Solar Thermal, Solar PV, Offshore Wind, Onshore Wind and Biomass.

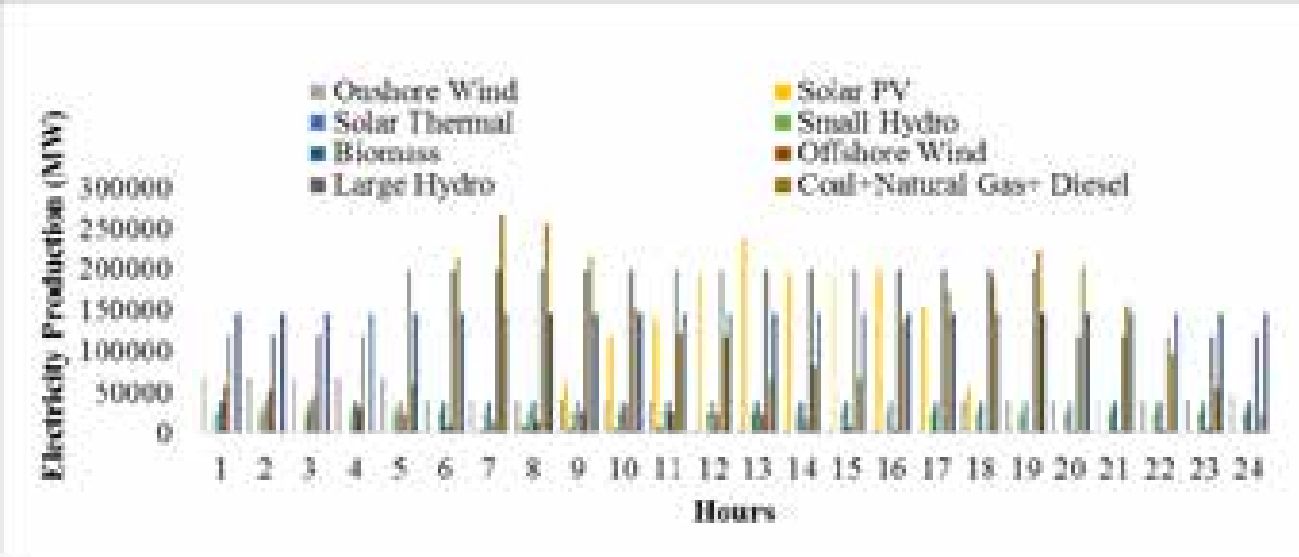


Fig. 4. Hourly electricity production during September 26 of 2030

The hourly distribution values (8784 hours) for China, of different power plants during the year 2030 are taken from [14] and given as input to the EnergyPLAN. The monthly, weekly and hourly based electricity generation to meet the demand using different power plants during the year 2030 can be planned using EnergyPLAN. The hourly basis electricity production of a randomly chosen day (September 26) of the year 2030 is shown in Figure 4. The availability of Hydropower will be high during the month of September, so it will be used in more amount to satisfy the demand. The Nuclear plant will generate consistent power throughout the day, and the conventional plants will generate more power during the peak demand hours. The Solar power will also be utilized during the day time. Thus the penetration of RES into power generation gives a great relief to economic and environmental issues arises in generation expansion. Maximizing RES based DGs in home [15], industries, educational institution [16] will definitely make a pollution free nation.

IV. CONCLUSION

China's fossil fuels are expected to unavailable in 50 more years if the consumption rate remains to grow at the existing rate. With the unstable nature of international crude prices, it is important to reduce this dependence and look for alternatives. Therefore, the renewable energy technologies must be expanded to supply secure electrical energy at least cost and low GHG emission. The renewable energy technologies have the capability to meet China's future energy needs. However, much action is still essential for a fast, large-scale implementation of renewable energy technologies. This will require time-bound and planned research to decrease their cost and increase their efficiency, and to make them reliable, long-lived, and easily accessible. In this paper, the LEAP model to estimate least cost electricity generation, including two scenarios and EnergyPLAN model to plan electricity generation expansion for China is proposed for the year 2030. The results show that the electricity demand with reserve margin will be 4825 TWh. There will be only 22% of renewable energy plants in the fuel mix of Reference scenario to satisfy this demand. But the Optimization scenario installs 70% of renewable energy plants in the fuel mix to meet the demand. It is approximately 50% more than the Reference scenario. The overall cost and the GHG emission are also reduced in Optimization scenario than Reference scenario. The Optimization scenario of LEAP model gives better results. With the results of Optimization scenario, the monthly and hourly basis electricity generation planning have been done using EnergyPLAN model successfully. So, the implementation of renewables in the power sector will give China more energy independence in the future and will reduce the GHG emissions in an economical manner.

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Explicit Finite Element Analysis of Abrasive Particle Impact on Aluminium Alloy (AA6063) in Abrasive Water Jet Machining

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Abstract

Abrasive water jet finds a wide area of applications for machining a wide range of difficult-to-machine materials such as titanium alloys, stainless steel, metal matrix and fibre reinforced composites, etc. Current applications of AWJs include machining of metal matrix composite (MMC) which is used as an excellent neutron observer material in the nuclear industry and used as support structure in the central part of the space shuttle orbiter. This work presents the application of an explicit finite element analysis (FEA) to model the erosion behaviour of Metal matrix composites(AA6063 -SiC) in abrasive water jet machining (AWJM) and also presents the application of simulation process using ANSYSwith LS/DYNA. The influence of abrasive particle impact angle and velocity on the crater sphericity and depth, and erosion rate has to be investigated for this process.

Keywords: *AA6603 – SiC, AWJM, ANSYS, Sphericity.*

1. Introduction

The global economy is becoming one of the more benefit targets in the manufacturing industry. Nowadays the need of manufacturing industry for rapid prototyping and small production batches is increasing. These trends have placed an increase on the use of new and advanced technologies for quickly turning raw materials into usable goods; with no time being required for tooling The most recent technology, which develops new non-traditional methods, is the abrasive water jetmachining (AWJ). It is used in industry for material processing with many advantages such as; no thermal distortion, high machining versatility, high flexibility, quick machining and small cutting[1].

In abrasive water jet (ABWJ) machining, the mechanism of material removal using water jet along with abrasive is rather complex. For ductile materials, such as aluminium alloy, stainless steel and titanium alloy material is mainly removed by low angle impact by abrasive particles leading to ploughing and micro cutting [2]. Which means the impact of hard particles causes localized plastic strain at the impact surface by which Material removal takes place when this strain value exceeds the material's strain-to-failure value[3]. For brittle materials, such as intermetallic compounds and ceramics , the force of abrasive particles causes localized cracking at the work surface and by the subsequent impacts, these cracks propagate and eventually link together to detach from the material [4].

2.2 Nomenclature

An erosion phenomena is amplified to the extremes in order to allow remove the any kind of work piece material and the hard abrasive particles such as garnet stainless steel etc areaccelerated in the cutting head by introducing a high-pressurized water jets. The head is consists of an orifice, a mixing chamber, an abrasive inlet and a focusing tube. Water pressures up to 400MPa and high pressure is passed through an orifice with size is about 0.1mm and 0.3mm diameter along which the pressurized water is generated. The velocity of the water jet is probably equal the square root of water pressure and usually up to 1200 m/s.

The main objective of this paper is to simulate the process of ABWJ machining by which, we can find out the amount material removal and depth of cut of work material (AA 6063). SO we decided to make a basic FEA model analysis using ANSYS 16.2 With LSDYNA software for a single abrasive impact on the work piece material in different angle.

2. Materials and methods

2.1material (Aluminium alloy 6063)

Aluminium alloy 6063 is a medium strength alloy commonly referred to as an architectural alloy. It is normally used in intricate extrusions.It has a good surface finish, high corrosion resistance, is readily suited to welding and can be easily anodised.

1. The critical time (Dt)

2. Depends on the elastic module (E)
3. Specific material density (r),
4. characteristic element length (LE),
5. Poisson's coefficient (n)
6. Strainrate $\dot{e}_{kk}$
7. Sound speed (c)
8. Function of the bulk viscosity coefficients (Q)
9. Viscosity coefficients (CB0 and CB1)
10. Deviatoric stresses (Sij)
11. Yield stress($\sigma_{y)}$
12. Strain rate dependent factor (β)
13. Cowper symondsconstans (C and P)
14. strain rate(ė)
15. velocity of abrasive water ($v_{abj)}$

2.3 FEA Analysis

FEA is a powerful tool for design, it is successfully used for many fields to evaluation and optimization of new products and constructions .using FEA, we can reduce the product development time and costs drastically. In this work, FEA was used for better understanding the Physics of AWJ machining process.

In FEA model, dynamic properties such as velocity and gravity are considered and also the elastic–plastic behaviour of workpiece material was correctly modeled as well. During modeling of an impact of abrasive jet in AWJ machining, the abrasive Particle speed is up to few 300 m/s, the particle size in range is atleast 100 mm). The fact that the impact takes place in a very short time so which may lead to different issues such as critical time step error, inertia property problems etc,To avoid these problems, we have to assign appropriate material properties and have to calculate time step size.Due to contact problems between the abrasive particle and the workpiece material, and because of the small duration of the impact, an implicit numerical code could not be applied. According to that, we have chosen explicit model in LS-DYNA, which is an explicit numerical programme designed to solve different types of impacts. Because the impact time of an abrasive particle is in the range of few to 1.0 ms, verify if a contact was established between the abrasiveparticle and the workpieceis very important. In case the critical time is too long, it various typesof material its depends on strain rate scaling effect. will take so much of time to simulate

Table 1

Material Property

property	Wokpiece material(6063)	Abrasive material (Garnet)
Density	2700 kg/m^3	4000kg/m^3
Poisson's ratio	0.33	0.27
Young modulus	69.5 Gpa	248Gpa
Yield stress	25Mpa	-

3. FEA ANALYSIS OF SINGLE ABRASIVE IMPACT

A.Material model

In LS DYNA software there are plenty of material models are available for the analysis of materials meanwhile **PIECEWISE LINEAR PLASTICITY (MAT 24)** for the wokpiece material has been used and **RIGID(MAT 20)** for abrasive particle is used in our work.In the piecewise linear Elasto-plastic model,deviatoric stresses (Sij) are determined that satisfy the yield function given by

$$\phi = \frac{1}{2}S_{ij}S_{ij} - \frac{\sigma_y^2}{3} \leq 0$$

This material model has been implemented, by elastically updating the deviatoric stresses and checking the yield function. the yield function was satisfied the deviatoric stresses were accepted, else an increment in plastic strain wascomputed[6].The trail deviatoric stress state is given by,

$$S_{ij}^{n+1} = \frac{\sigma_y}{\left(\frac{3}{2}S_{ij}^{*}S_{ij}^{*}\right)^{\frac{1}{2}}}S_{ij}^{*}.$$

B. Material model failure

The Cowper and Symonds model which scales the yieldstress by a strain ratedependent factor β given by Eq

$$\beta = \left[1 + \left(\frac{\dot{\varepsilon}}{C}\right)^{\frac{1}{P}}\right]$$

The constant C and P values are different to

For aluminium alloy (6063) C =1000 P = 4. Cowper symondsmaterial failures are

considered in this present work.

C. ***Part Model and Meshing***

The workpiece and abrasive part models are developed by the modeling software (Pro-E creo) and the components are fully meshed with the help of hyper mesh software 10.0.The work piece model is meshed in 3D linear hexahedral element (2,25,162) model and abrasives are meshed in 3D tetrahedral element (10,876).



Fig 2. Meshed model

E. Simulation procedure

The simulation of the the abrasive water jet impact process is carried out by using trhe software LSDYNA to Which many inputs are needed such as Boundary condition, Material model types, section type, Element type Termination time, Initial velocity, Gravity consideration, Contact type , Load curve values, Friction values and type of Output datas .

In this simulation process we used ERODING SURFACE TO SURFACE CONTACT type for simulating the errosionfailures[5] and coulomb friction also considered in this work because friction plays crucial role in impact analysis so it has to be considered in our dynamic analysis.

An abrasive impact on workpiece in abrasive water jet machining simulation is already carried out by the software ABAQUS/CAE [7] in which the practical readings of the process is taken and compared with simulation results.

The workpiece and abrasive particle they were taken as stainless steel (AISI 304) and garnet. All practicalz`experiments were performed on an OMAX type 2652A/20HP cutting system and a Bohler cutting head[5].

Impact angle	30	60	90
Measured sphericity at pressure 200 Mpa	0.4525	0.6034	0.7595
Ansys Simulated sphericity at velocity 180 m/sec	0.7530	0.9058	1
Relative difference(%)	39.9	33.4	24

Table2.Experimental and simulated values of sphericity

F.Sphericity

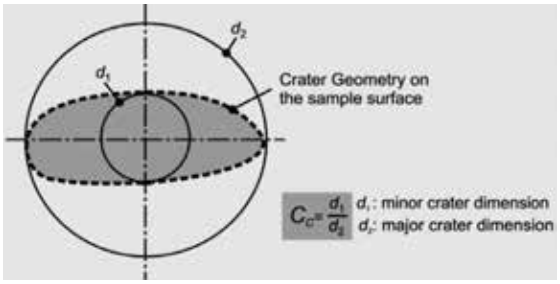


Fig 3. Crater sphericitygeomentry

Sphericity is an important factor to consider which provide the crater geometry shape after impacting the workpiece and also it is used for find out the simulation process is correct or not because we comparing the practical crater geometry shapes with simulation crater geometry results.

Sphericity can be defined as the ratio of d_1/d_2 and the major circularity is defined as the circularity measured at the target's top surface which is subjected to impact.

The pressure of the water jet in the ABWJ machine is very high and the jet velocity is probably proportional to particle velocity. To simulation process ,we need the abrasive velocity. the velocity of water jet can be calculated from the water pressure.



where, η = momentum loss factor.

R= loading factor

4. LSDYNA simulation

Before starting of our FEA simulation, we carried out the simulation process using LSDYNA to check out the appropriate results of the project which is carried out by M.junkara et all,[5] stainless and garnet were used in this work then result are plotted in the table 2. they used the software ANSYS to simulate the results. we tried the same process in LSDYNA which gives the accurate result than their simulated results.

Impact angle		30	60	90
Simulated sphericity result in ANSYS	Velocity at 180m/sec	0.753	0.905	1
Simulated result in LSDYNA	Velocity at 180m/sec	0.593	0.783	1

Tab 3. Simulation value comparison of single ball impact on workpiece (ASIS 304).

Finally our results are nearly closer to the practical values hence we extended the simulation process to the material aluminium alloy (AA 6063).

Material (AA6063) simulation Result



Fig4. 30 degree impact simulation and its crater sphericity geometry (impacted area)

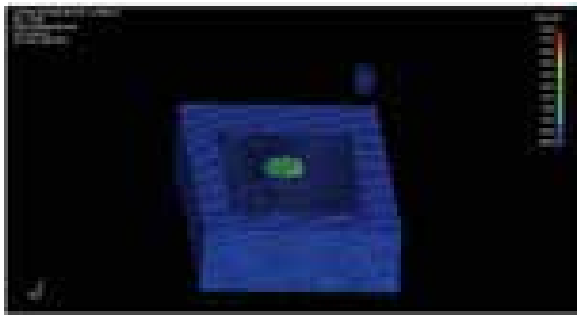


Fig.5. 60 degree impact simulation and its crater sphericity geometry (impacted area)

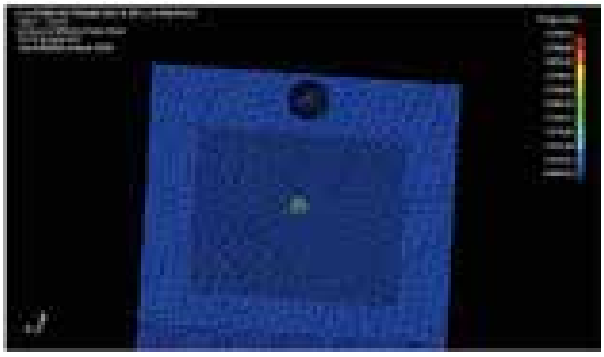


Fig6. 90degreeimpact simulation and its crater Sphericitygeometry (impacted area)

Observed depth of cut and sphericity values are also plotted in the graph (Fig 7).

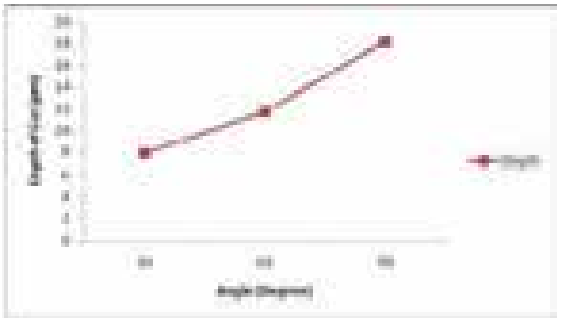


Fig 7. Depth of cut in various angle

The results are showed that (Fig.8) the sphericity value of the work material is changed with respect to the impact angle but in the angle of 90 degree, values remains same that is 1.

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An Overview of Corrosion in Al- Mg based Alloys in Ship Hull

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Abstract

Steel occupies a predominant space in the ship constructing engineering owing to its mechanical properties and relatively a lesser amount for manufacturing. Because of the expanding requests for taking down the heaviness of numerous ships as a consequence of their sizes, the usage of Al-alloys offered the possibility to bring down the heaviness of the ship by around half in examination with those prepared of low carbon steel. As known Al alloys cost greater than that of the steel, still it is being accepted as the sole replacement for the usage of steel due to its tremendous corrosion resistance which in turn reduces the maintenance cost. Aluminium-Magnesium (Al-Mg) alloy satisfies the common necessities of the ship constructing engineering owing to its low density and corrosion resistance. For the well bonding of the Al based alloys, they are developed through Powder Metallurgy technique, since this technique offers a relatively high pore free and uniform dissemination of the particles. This paper deals with the production stages associated in Powder Metallurgy and the corrosion interrelated problems that are associated with the Al-Mg alloys used in ship hull when exposed to marine environment.

Keywords: Corrosion, Al-Mg alloys, Powder Metallurgy (PM), Ship hull

1. Introduction

The most extensively recognized issues experienced today by the ship body structures are corrosion and fatigue crack. These issues if not correctly checked and monitored intermittently will prompt a serious calamitous disappointment. Generally, the corrosion results due to relative humidity, quantity of chloride content and atmospheric conditions. Soares, C. G., & Garbatov, Y. (1998) discovered that the impact of corrosion and fatigue crack development are monotonic functions of time incorporating an orderly reduction in the excellence of ship hull. Soares, C. G. (2009) et.al stated that during the stage of ship designing, the designers take account of corrosion that has a destructive effect on the hull. The result of corrosion is fatigue crack and unstable failure.

The aluminium alloy is an active material which will oxidize readily under the effect of the high free energy whenever the necessary conditions for oxidation prevail. Corrosion on the surface of aluminium alloy was prohibited by coating paints in aircraft structures and ship hull. However, the coating paints were not much effective. Hence the magnesium content in the binary alloys would be added in a petite amount to surge the corrosion resistance of the base aluminium alloy and was named as Al-Mg alloy.

Among the alloy materials based on light metals Aluminium and Magnesium possess the important properties like low density and high strength to weight ratio. Polmear, I. J. (2006) stated that Aluminium alloy is preferred for the automotive and marine applications. A widespread range of cast aluminium alloys is offered for marketable usage and nearly 300 compositions are recorded till date. Amongst from those compositions, Aluminium-Magnesium (Al-Mg) alloys have special features with great corrosion resistance, good machinability and gorgeous appearance which would be vital to inclusive endeavors particularly in the marine application of ship hull. In order to augment its resistance to corrosion, some more alloy elements such as Tin (Sn), Zinc (Zn), Zirconium (Zr) etc., were added. For the improvisation of mechanical properties such as wear resistance and tensile behavior, ceramic particles like Silicon Carbide (SiC), Boron Carbide (B_4C), Titanium Carbide (TiC), Molybdenum di Sulphide (MoS_2), Aluminium Oxide (Al_2O_3), Silicon Nitride (Si_3N_4) etc., were added.

There are many processing techniques for Aluminium - Magnesium alloy namely semi-solid processing, squeeze casting, liquid processing, solid processing and low pressure casting process. Amid these, the versatile processing technique when considering the near-net-shape product was achieved in Powder Metallurgy (PM). So the Powder Metallurgy technique was utilized to augment the properties of light metal Al-Mg alloys by the incorporation of secondary strengthening phase (e.g., Si_3N_4 in aluminium alloy).

2. Powder Metallurgy Process

Werner, J. K. (1961) invented a method to develop solid structures from metal particles. The experimentation of Powder Metallurgy has empowered complex metal structures to be delivered by strategies which are monetarily invaluable in examination with other metal-moulding systems. The establishment of a structure by Powder Metallurgy procedures by and large includes the means of squeezing a mass of metal particles into a coveted shape and afterward sintering the squeezed minimized to create the metal particles blend.When all is said and done, the density of a structure might be controlled over a widespread range by

prudent decision of the conditions under which it is delivered. For a specific group of metals, there existed a restriction in the earlier craftsmanship Powder Metallurgy processes which blocked the establishment of structures of not as much as a definite density. This restriction comes about because of specific necessities of the squeezing step. The squeezing step should essentially bring about the organization of metal-to-metal contacts among the particles with the goal that the grain improvement is essential to supply a densely packed mass to happen amid the sintering activity. In like manner, a high-thickness, low-porosity structure comes about. Metals in this class incorporate aluminum, magnesium, titanium, and zirconium.

2.1 Steps in Powder Metallurgy Process

Matt, R. E. et. al., (1973) gives a detailed study about the Powder Metallurgy process as stated below.

2.1.1 Impact pulverization

An especially viable means for accomplishing impact pulverization is to produce the ruptured powder particles. It has been discovered that the ruptured particles which got through impact pulverization are sporadically molded, not at all like atomized particles when squeezed effectively interlace and interconnect with one another.

2.1.2 Cleaning

After the powder leaves the impact pulverization process, a cleaning task is necessary. The materials commonly have 0.5 to 8 % oxides present as a contamination. Since the metal oxides are of low quality and fragile in nature, the composite compound joining has little durability. With a specific end goal to impact cleaning, the powder is hydrogen diminished, ideally at around $980^{o}C$; the material has a trend to sinter. A favored range for oxide expulsion is $950^{o}C$ to $1020^{o}C$. The time length isn't excessively basic as long as the entire process takes around 1 hour.

2.1.3 Pressing

Commonly, the cold pressing was passed on at a pressure in overabundance of 413 N/mm^2. Furthermore, for the utmost part in the span of 620 to 690 N/mm^2 pressing might be refined either mechanically or iso-statically at encompassing or close surrounding temperatures, with the pressing contraption regularly having no heating component.

2.1.4 Sintering

The sintering was supported on under conditions to limit grain development and phase separation of a degree obtuse to consequent processing. That is, to state, a raised sintering temperature which advances some constrained grain development and phase separation might be endured on the off chance that it is of a degree which might be adjusted by ensuing

working of the sintered material. It is infrequently attainable to accomplish a high, adequate hypothetical thickness, for instance densities of around 98% or extra with sintering alone, and in such cases there will be no further requirement to do hot work or manufacture sintered material to pick up a still higher thickness. Sintering is ideally carried on in a hydrogen environment or, if wanted, in a carbonaceous atmosphere. A vacuum climate isn't suggested since in the instrument steel combinations there might be a tendency to vaporize a portion of the material such as, chromium. A case of a normal sintering time is the temperature of 1260°C is around half an hour for a rectangular piece of hardware steel compound of 1" x 1" x 4".

2.1.5 Hot Deformation

Hot deformation alludes to working a material under high temperature conditions. Cases incorporate swaging, forging and hot rolling. Different methods are outstanding in the workmanship. This progression in the process is principally for densification of the material.

2.1.6 Heat Treatment

The last step involves heat treatment, a methodology traditional for device steel alloys. The standard conditions known to the craftsmanship incorporate warming at 1200^{0}C for 10 minutes followed by an oil quench which thus is trailed by double temper at 565^{0}C.

3. Al-Mg alloy using Powder Metallurgy

Kondoh, K, et. al, (2014) studied about the micro structural and mechanical behaviour of multiwalled carbon nanotubes reinforced Al-Mg-Si alloy through Powder Metallurgy technique. From this study, it was concluded, by surging the amount of MWCNT, the yield strength gradually decreases.

Kimura, A.,et. al, (1997) discussed about the diminishing mechanism of surface oxide in Aluminium alloy powders containing Magnesium which was deliberated by X-ray photo electron spectroscopy using synchrotron radiation and clarified the dispersal of Mg towards the surface of Al powder containing both elemental Mg and Si.

Harrell, T. J., et. al, (2014) examined the micro structural and mechanical behaviour of ultra-fine grained Al-Mg-Sc alloy by Powder Metallurgy and concluded that Sc significantly surges the strength of Al-Mg alloys. Also, they found by surging the processing time and temperature, the rate of grain growth increases.

Oskooie, M. S et. al, (2015) gave the microstructure, plastic deformation and strengthening mechanisms of Al-Mg-Si alloy processed through Powder Metallurgy technique. They concluded that the coarse grained Al-Mg-Si alloy experienced more plastic deformation than the ultra-fine grained Al-Mg-Si Alloy and furthermore signify the ductile

failure. Also stated that the ultra-fine grained matrix alloy has a high tensile stress, miniaturized scale voids and huge plastic strains are accomplished in the coarse grained region.

Sharma, M. M., et. al, (2015) studied about the ultra-fine grained and conventional Al-Mg alloys. They have observed that at low stress range, the induced crack demonstrates a pit approximately 30 microns deep designed on the outer surface of ultra-fine grained Al7.5 – Mg alloy.

4. Corrosion and fatigue failure in ship hull

During the earlier days, different steel alloys were used to build the ship hull structures because of its good mechanical strength, fabricability and weldability. Although, the steel gets corroded due to its continuous commerce to sea water which is an electrolyte of heterogeneous composition of salt, it gets corroded over a span of time. Corrosion is the vicious attack of a material by reaction with its surroundings. To overcome the corrosion, Al-Mg alloys have been used in place of steel in the ship hull structures and aerospace applications. Some of the common corrosion processes in Al-Mg alloys are intergranular corrosion, stress corrosion cracking and exfoliation.

Akpan, U. O., et. al, (2002) has done the hazard assessment of aging ship hull structures in the occurrence of corrosion and fatigue. From this approach, they displayed that time dependant unwavering quality is a superior valuation of the risk of working an aging degrading material.

Romhanji, E., & Popovic, M. cited the problems and prospect of application of Al-Mg Alloys in marine constructions. They stated that the most often and broadly used Al-alloys in ship constructing are 5083 type Al-Mg alloy which has a gradual development in its strength as the composition of Mg is increasing from 4-6 wt% and also with the supplementary addition of Mg, it leads to the increase in strength which is followed by the markdown in its resistance to corrosion.

Chernov. B. B. (2011) illustrated about the corrosion and metal protection in sea water. From this he confirmed that corrosion in metals depends upon the occurrence of oxygen, sea water temperature and pace of stream.

Sharma,M. M., et. al, (2015) established that at marine environmental surroundings, the fatigue life of ultra-fine grained Al-Mg alloy was decreased under repeated loading. Also, they indicated that the ultra-fine grained Al7.5-Mg alloy is further at risk to corrosion fatigue than the usual 5083 H1111 alloy.

Conclusion

An overview of corrosion property of Al-Mg alloy used in ship hull structures is discussed. From this it could be shortened that,

a. Al-Mg alloy act as a principal material in building ship hull structures due to their exceptional corrosion resistance property and makes sure that production cost is low when related with other suitable Al-alloys.
b. For the proper mixture of particles in an alloy, Powder Metallurgy acts as a root technique for fabrication.
c. To avoid the fatigue crack developed as a result of corrosion, reinforcements like Silicon Nitride (Si_3N_4), Silicon Carbide (SiC), etc can be used.

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Machining studies of Al7075 in CNC Turning Using Grey Relational Analysis

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The demand for light materials is increasing continuously and Aluminium plays a vital role in fulfilling that demand due to their light weight and high strength properties. Al7075 is a work material because of its wide applicability as material for Automobile and aerospace components. Turning is one of the most main manufacturing processes in metal removal. Therefore this paper represents the surface roughness and material removal rate of Al7075 with Tungsten carbide tool under dry and wet conditions. The grey Relational Analysis is carried out to find the minimum value of surface roughness where the Material Removal Rate is maximum. Suitable machining parameters for turning of Al7075 are suggested at end of the investigation based on GRA and confirmed by using ANOVA.

Keywords: **Grey Relational Analysis; Turning;Optimization; surface roughness; MRR; ANOVA**

I.Introduction:

Turning is a machining process in which a cutting tool, typically a non-rotary tool bit, describes a helix tool path by moving more or less linearly while the work piece rotates. Today the most common type of automation is computer numerical control, better known as CNC. (CNC is also commonly used with many other types of machining besides turning.).A large number of techniques have been implemented in the field of the manufacturing parameters optimization.An optimization problem may be either single or multi-objective, depending on the number of its quality targets[1]. When dealing with machining optimization problems, quality characteristics are usually more than one, due to high process complexity.In single-objective optimization problems, it is straightforward to find an optimal solution, multi-objective ones provide users with sets of solutions, out of which one should be chosen[5].Grey relational analysis (GRA) was developed by a Chinese Professor Julong Deng.[1]

GRA uses a specific concept of information. It defines situations with no information as black, and those with perfect information as white. A grey system means that a system in which part of information is known and part of information is unknown[1].At one extreme,

no solution can be defined for a system with no information. At the other extreme, a system with perfect information has a unique solution. In the middle, grey systems will give a variety of available solutions.Through the grey relational analysis, a grey relational grade is obtained to evaluate the multiple performance characteristics. As a result, optimization of the complicated multiple performance characteristics can be converted into optimization of a single grey relational grade[5].This paper describes use of GRA for optimization of process parameters of machining of Al 7075.Process parameters such as cutting speed, feed, depth of cut,dry and wet machining conditions were considered. Response variables such as roughness and material removal rate were considered for investigation.

Nomenclature:

D – Diameter

d – Depth of cut

f - Feed

N - Speed

SR1 – Surface Roughness (Dry Condition)

SR2 – Surface Roughness (Wet Condition)

MRR – Material Removal Rate

II. Experimental Details:

Experiments were performed on 18 work pieces of Al7075 T6 alloy of diameter and length 32 mm and 40 mm respectively. Tungsten carbide tool inserts were used for these experiments. CNC Turning centre machine MTAB (Figure 2) was used for experiments.



Fig.1 shows work piece and tool holder with insert



Fig.2. MTAB turning centre

Figure 1 shows work piece and tool holder with insert during machining. Figure 3 shows the schematic view of experimental setup. Different cutting parameters with dry and wet machiningconditions were used for experiments.

Details of all the process parameters with their levels are given in Table.1.After experiments surface roughness parameters SR1 and SR2 were checked by Mitutoyo SJ 201 roughness tester.Material removal rate was calculated by using equation[3],

$$MRR = \prod x\ D\ x\ d\ x\ f\ x\ N$$

All process parameters with their actual values and all the measured response variables are shown in Appendix A.

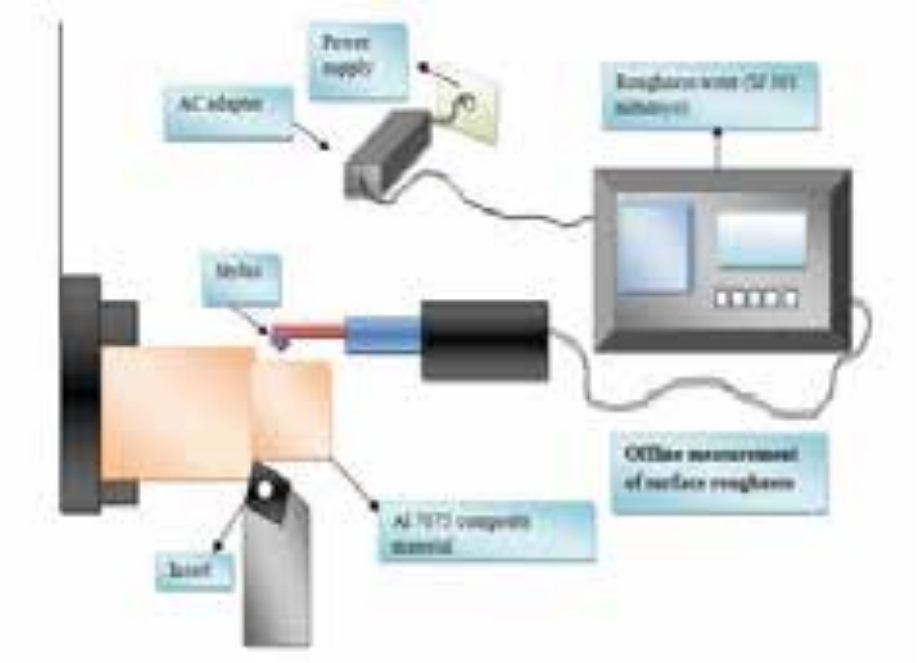


Fig.3. Schematic view of experimental setup

Table. 1. Process parameters and their levels

Parameters	**Level 1**	**Level 2**	**Level 3**
Spindle Speed (rpm)	800	1000	
Feed (mm/rev)	0.05	0.10	0.15
Depth of Cut (mm)	0.25	0.50	0.75

III. Methodology of Grey Relational Analysis

The procedure of GRA follows the steps described below [5]

Step 1: Normalization of S/N ratios:

The first step in Taguchi based grey relational analysis is normalization of the S/N ratio which is performed to prepare raw data for the analysis where the original sequence is transferred to a comparable sequence. Normalization of the S/N ratio in the range between zero and unity is also called as the grey relational generation .In this investigation "smaller-the-better" criterion is used for normalization of all the responses as except MRR where larger is better condition is used which are mentioned in Eq. 1 and 2 respectively.

Smaller is better

$$x_i(k) = \frac{x_i(k) - \min\ x_i(k)}{\max\ x_i(k) - \min\ x_i(k)} \qquad (1)$$

Larger is better

$$x_i(k) = \frac{\max\ x_i(k) - x_i(k)}{\max\ x_i(k) - \min\ x_i(k)} \qquad (2)$$

Step 2: Determination of deviation sequence

The deviation sequence $\Delta 0_i(k)$ is the absolute difference between the reference sequence $x_0(k)$ and the comparability sequence $x_i(k)$ after normalization. It is determined using Eq. 3 as:

$$\Delta 0_i(k) = \left| x_0(k) - x_i(k) \right| \qquad (3)$$

Step 3: Determination of Grey Relational Coefficient

GRC for all the sequences expresses the relationship between the ideal (best) and actual normalized S/N ratio. If the two sequences agree at all points, then their grey relational coefficient is 1. The grey relational coefficient ξ can be expressed by Eq. 4.

$$\xi_i(k) = \frac{\Delta \min + p\Delta \max}{\Delta x_i(k) + p\Delta \max} \qquad (4)$$

The distinguishing coefficient p is between 0 and 1. Generally, the distinguishing coefficient p is set to 0.5. Δ Min is the smallest value of $\Delta 0_i(k) = |x_0(k) - x_i(k)|$ and Δ max is the largest value of $\Delta 0_i(k) = |x_0(k) - x_i(k)|$.

Step 4: Determination of Grey Relational Grade

The overall evaluation of the multiple performance characteristics is based on the Grey Relational Grade (GRG). The grey relational grade is an average sum of the grey relational coefficients which is defined as follows:

$$\xi(x_0, x_i) = \frac{1}{m}\sum_{i=1}^{m} \xi_i(k) \qquad (5)$$

(The normalized data with grey relational coefficient and corresponding GRG with their ranks are mentioned in APPENDIX.B)

Step 5: Determination of Optimal parameters.

The grey relational grade calculated for each sequence is taken as a response for the further analysis. The larger-the-better quality characteristic was used for analysing the GRG, since a larger value indicates the better performance of the process. The response table of Taguchi method was employed here to calculate the average grey relational grade for each factor level (Table 2).

Table.2. Response Table for GRG

Response table for grey relational grade					
Process Parameter	**Grey relational Grade**			**Max – Min**	**Rank**
	level 1	**level 2**	**level 3**		
Speed	0.5153	**0.5804**		0.0651	3
Feed	**0.6791**	0.5228	0.4416	0.2375	1
Depth of Cut	0.5071	0.5620	**0.5745**	0.0674	2

IV. Result Analysis

The grouping of the grey relational grades was initially done by the factor level for each column in the orthogonal array and then by averaging them. From the response table of GRG (Table 2), it is clear that second level of speed (i.e. 1000 rpm), first level of feed (i.e. 0.05 mm/rev), third level of depth of cut (i.e. 0.75 mm) are the optimal parameters for the machining of Al 7075 for above conditions. It can be also seen from Table 2 and Figure 4 that feed is the most significant parameter in machining of Al 7075. After feed, the sequence of effect of process parameter in turning of Al 7075 is depth of cut and speed.

The results were confirmed using ANOVA test. The response table and graph of the results of ANOVA test were shown in the table 3 and figure 4.

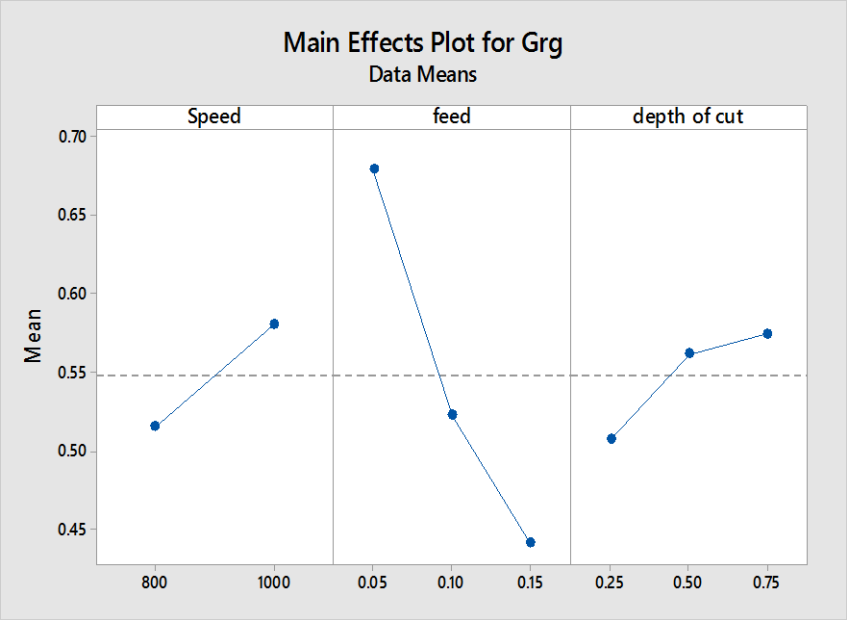


Fig.4.Plot of ANOVA results

Table.3.Response table of ANOVA

Source	DF	SS	MS	F - Value	P - Value	%C
Speed	1	0.0191	0.0191	9.63	0.009	8.19
Feed	4	0.1749	0.0875	44.19	0.000	75
Depth of Cut	12	0.0382	0.0077	3.90	0.050	16.38
Total	17	0.2332				100

V. Conclusion:

Optimization for High Speed Turning of Al 7075 Grey Relational Analysis is discussed in this paper. Based on the analysis following conclusions can be made.

- Grey Relational Analysis is very effective technique for optimization of machining processes which involves multiple responses.
- The recommended cutting parameters for turning of Al 7075 are Speed 1000rpm, feed 0.05 mm/rev and depth of cut 0.75 mm with Tungsten carbide insert.

APPENDIX.A

Process Parameters and Response Variables for L18 Array

S.NO	Spindle Speed (rpm)	Feed (mm/rev)	Depth of Cut (mm)	SR1	SR2	MRR (mm3/min)
1	800	0.05	0.25	0.568	0.489	942
2	800	0.05	0.5	0.338	0.571	1884
3	800	0.05	0.75	0.454	0.501	2826
4	800	0.1	0.25	0.892	0.744	1884
5	800	0.1	0.5	0.928	0.737	3768
6	800	0.1	0.75	0.912	0.794	5652
7	800	0.15	0.25	1.732	1.326	2826
8	800	0.15	0.5	1.710	1.317	5652
9	800	0.15	0.75	1.645	1.309	8478
10	1000	0.05	0.25	0.467	0.297	1138
11	1000	0.05	0.5	0.395	0.292	2277
12	1000	0.05	0.75	0.578	0.392	3415
13	1000	0.1	0.25	0.919	0.601	2277
14	1000	0.1	0.5	0.881	0.598	4553
15	1000	0.1	0.75	0.831	0.693	6830
16	1000	0.15	0.25	1.627	1.257	3415
17	1000	0.15	0.5	1.128	0.906	6830
18	1000	0.15	0.75	1.622	1.242	10244

APPENDIX.B

Sequence of S/N ratio

S.NO	MRR LB	SR1 SB	SR2 SB
1	0.0000	0.8352	0.8095
2	0.1013	1.0000	0.7305
3	0.2025	0.9168	0.7982
4	0.1013	0.6026	0.5632
5	0.3038	0.5770	0.5696
6	0.5063	0.5885	0.5145
7	0.2025	0.0002	-0.0003
8	0.5063	0.0160	0.0087
9	0.8101	0.0622	0.0164
10	0.0211	0.9075	0.9952
11	0.1435	0.9591	1.0003
12	0.2658	0.8281	0.9030
13	0.1435	0.5835	0.7012
14	0.3882	0.6107	0.7041
15	0.6329	0.6466	0.6125
16	0.2658	0.0751	0.0667
17	0.6329	0.4335	0.4062
18	1.0000	0.0789	0.0809

Processed Sequence

S.NO	MRR LB	SR1	SR2
1	1.000	0.165	0.191
2	0.899	0.000	0.270
3	0.797	0.083	0.202
4	0.899	0.397	0.437
5	0.696	0.423	0.430
6	0.494	0.412	0.485
7	0.797	1.000	1.000
8	0.494	0.984	0.991
9	0.190	0.938	0.984
10	0.979	0.093	0.005
11	0.857	0.041	0.000
12	0.734	0.172	0.097
13	0.857	0.417	0.299
14	0.612	0.389	0.296
15	0.367	0.353	0.387
16	0.734	0.925	0.933
17	0.367	0.566	0.594
18	0.000	0.921	0.919

APPENDIX. C

S.NO	Grey Relational Coefficient			Grey Relational Grade	Rank
	MRR LB	SR1	SR2		
1	0.3333	0.7522	0.7241	0.6032	6
2	0.3575	1.0000	0.6498	0.6691	3
3	0.3854	0.8573	0.7124	0.6517	5
4	0.3575	0.5572	0.5337	0.4828	14

5	0.4180	0.5417	0.5374	0.4990	13
6	0.5032	0.5485	0.5074	0.5197	10
7	0.3854	0.3334	0.3333	0.3507	18
8	0.5032	0.3369	0.3353	0.3918	16
9	0.7248	0.3477	0.3370	0.4699	15
10	0.3381	0.8438	0.9904	0.7241	2
11	0.3686	0.9244	1.0006	0.7645	1
12	0.4051	0.7441	0.8375	0.6622	4
13	0.3686	0.5455	0.6259	0.5133	11
14	0.4497	0.5622	0.6282	0.5467	9
15	0.5767	0.5859	0.5634	0.5753	7
16	0.4051	0.3509	0.3489	0.3683	17
17	0.5767	0.4688	0.4571	0.5009	12
18	1.0000	0.3518	0.3523	0.5681	8

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FINITE ELEMENT MODELING AND EXPERIMENTAL EVALUATION OF GFRP RADIUS ROD FOR AUTOMOBILE COMPONNENT UNDER STATIC AND DYNAMIC LOADING CONDITION

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In this research paper the Glass fibre is selected for radius rod component for automobile application. The main objective of the present paper is to numerically and experimentally evaluate the material under static and dynamic load behavior of radius rod structure using finite element Analysis tool ANSYS®. Initially material characterization is carried out for calculating the material property to carry out the numerical simulation. The test coupons were fabricated based on the ASTM standard for calculating the properties like young's modulus, shear modulus and Poisson's ratio in UTM. The test results were compared with existing material and other material for proper selection. In this work the scaled down radius rod structure was modeled using 3d software tool CREO®. The bending behavior of GFRP radius rod component is carried out numerically using ANSYS® and that results were compared analytically by Matlab® tool and these results were evaluated with experimental setup. These results give the ample guidance for selecting the GFRP material for automobile component. Based upon the results, finally we found that the maximum strength and bending behavior under static and dynamic loading.

Keywords: Finite Element Method, GFRP, Matlab®, ANSYS®, CREO®

I. INTRODUCTION

The radius rod enhances weight to the car and must be formed out of lightweight materials to retain it from distressing the car's movement. Typically, it is built from stamped steel, meaning steel frames that are manufactured in bulk and the strategy is stamped into the metal, or out of aluminum. These lightweight ingredients add little weight to the car, allowing the radius rod to work without hindering the functioning of other parts of the vehicle.

Here are many points in the project of the petrol-driven motor lorry which are might be called matters of opinion. There are to be found on the market, at the current time, several types of design, some of which use separate torque and radius rods for this persistence, some with a collective torque and radius rod member by way of the Leyland, and, again, some with neither torque nor radius rod, suitably so called, in which both these roles are assisted by the bearing springs.

As it may be called, arrived at the conclusion that, not only are the results suitable, but the use of any form of distinct torque or radius rod member is totally gratuitous, and, in fact, merely results in the addition of impractical weight, cost of building, and conservation of wearing parts.

The demands of material act are so prodigious and various that no one material is able to satisfy them e.g., light weight yet strong and stiff structures [1]. Composites materials offer advantages of an elastic design that can be custom-made to the design requirements. Year by Year, more and more creators and engineers diagnose the values of composites over other traditional materials like metal alloys, plastics etc. This is because composite material systems result in routine unattainable by their individual ingredients. Fiber reinforced (FRP) products are more reliable, more durable, easy and safe to use, more commercial to produce, and individually solve many problems and offer many reimbursements. As a result, manufactures are abandoning old materials and fabricating methods and go to composites. Composites are no extended just the pleasure of aerospace, defense and high-priced products. They are quickly becoming a way of realizing high structural recital at a low cost.

I. MATERIALS AND METHODS

I. MATERIALS

a. Glass Fibre

Fiber glass is used for aircraft structure, such as fairings, radomes, and win tips. Fiber glass replaced over the aluminium blade for helicopter rotor blades. There are several types of fiberglass used in the aviation industry. Electrical glass, or E-glass, is identified as such for electrical applications. Glass Fiber has resistance to current flow of the material. E – glass is made from borosilicate glass S0glass and S2-glass identify structural fiberglass that have a higher strength than E-glass. S-glass is produced from magnesia-alumina-silicate. It is cost effective material compare to other composite materials like Kevlar, carbon etch., chemical or galvanic corrosion resistance and electrical properties. Glass fibers are made from extremely fine fibers of glass based on silica. High strength glass fibers are from aluminosilicates attenuated at hight temperature s into fine ranging from 5 to 24 μm.

b. Epoxy Resin & Hardener

Epoxy Resin and Hardeners are polymerizable thermosetting resins and are available in a variation of viscosities from liquid to solid. There are many different types of epoxy, and the technician should use the maintenance manual to select the correct type for a specific repair. Epoxies are used widely in resins for prepare materials and structural adhesives. The benefits of epoxies are high strength and modulus, low levels of volatiles, admirable adhesion, low contraction, good chemical resistance, and effortlessness of processing [2]. The main disadvantage is more fragile and the reduction of properties in the existence of moisture. The handing out procedures include autoclave molding, strand winding, press molding, vacuum bag molding, resin transference molding, and pultrusion. Curing temperatures could be diverge from room temperature to around 350 °F (180 °C). The most common preserving temperatures range between 250° and 350 °F (120–180 °C).

c. *Material Properties*

The following material properties from Test Data results have been taken into account for analysis. Composites are the orthotropic material the property varies along the three directions [3]. The stiffness of a composite plate will

often depend upon the position of the applied forces and/or moments. Panel stiffness is also in need of on the design of the panel.

Table 1

Properties of Steel and Glass Fiber

Properties		**Glass / Epoxy**	**Structural Steel**
E_a	(Gpa)	505	210
E_b	(Gpa)	9.9	-
E_c	(Gpa)	9.9	-
G_{ab}	(Gpa)	3.7	77.22
G_{bc}	(Gpa)	1.4	-
G_{ca}	(Gpa)	1.4	-
γ_{ab}		0.063	0.3
γ_{bc}		0.080	--
γ_{ca}		0.103	-
Density	Kg/m^3	1960	7860

III. EXPERIMENTATION

3.1 Testing Composites

The testing is carried out to derive their mechanical investigation of behaviour of the materials under different loading condition. Information about the deformation behaviour, stress state and the failure behaviour of different composite in different forms is an important requirement for the effective use of these composite for different engineering applications. Different test techniques, specimen preparation and test data have been presented below:

- Tensile test
- Shear test

3.2 Tensile Test

A tensile load is applied to the specimen until it fractures. During the test, the load required to make a certain elongation on the material is recorded. A load elongation curve is plotted by an x-y recorder, so that the tensile behaviour of the material can be obtained. An engineering stress-strain curve can be constructed from this load-elongation curve by making the required calculations. Engineering

Stress is obtained by dividing the load by the original area of the cross section of the specimen.

Stress = P/Ao (Load/Initial cross-sectional area)

Strain e = l/lo (Elongation/Initial gage length)

Engineering stress and strain are independent of the geometry of the specimen

Table 2 Input data for the UTM machine

Specification		Specimen 1	Specimen 2	Specimen 3
Thickness	(mm)	1.50	1.40	1.70
Width	(mm)	26.80	26.60	26.00
Area	(mm^2)	40.20	37.24	44.20
Gauge length	(mm)	50.00	50.00	50.00

Table 3 Results from UTM machine

Specification		Specimen 1	Specimen 2	Specimen 3
F_{max}	(KN)	6.64	6.91	4.15
UTS	(MPa)	165.29	183.63	93.96

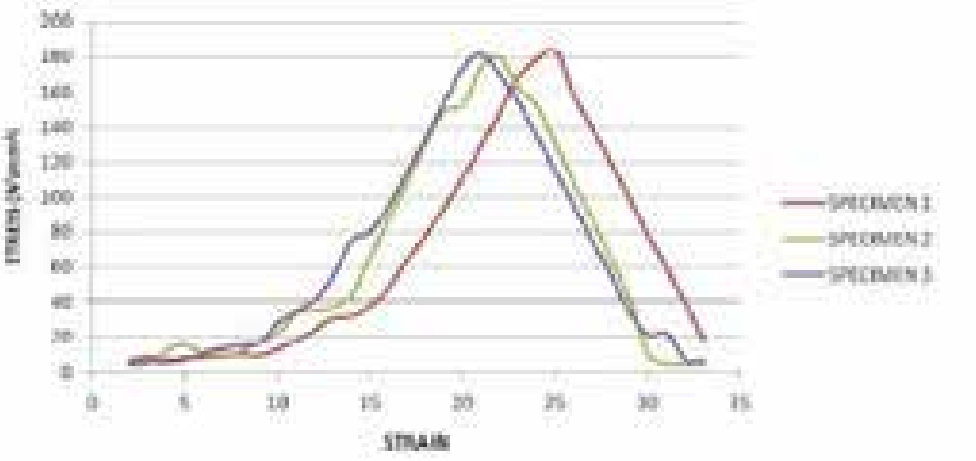


Fig.1 Graphical results for tensile test

IV. RESULTS AND DISCUSSIONS

In the present study, the finite element numerical package ANSYS® 17.0 is applied to study the effects of bending load condition [5].

The following finite element results shows that the selection of materials based on the output variables like deflection (Fig. 1-4) , bending moment (Fig. 5,6) and stress value (Fig. 7,8).

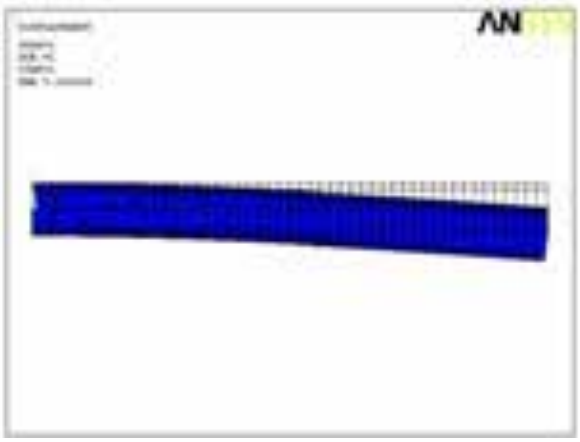


Fig.1 Displacement of the Steel radius rod with Minimum Load

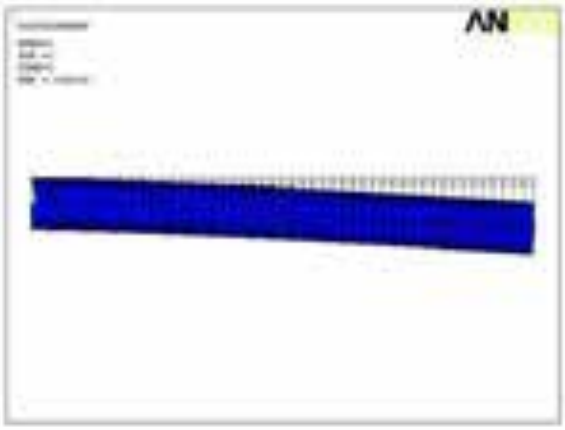


Fig.2 Displacement of GFRP Radius Rod with Minimum Load

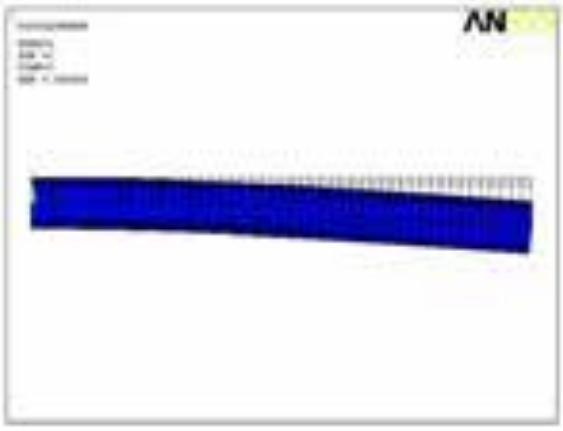


Fig.3 Displacement of steel radius rod with Maximum Load

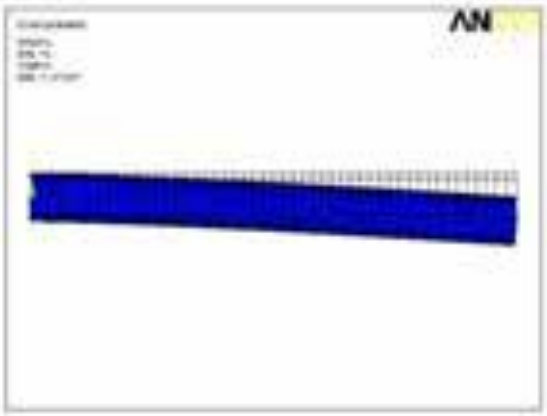


Fig.4 Displacement of GFRP radius rod with Maximum Load

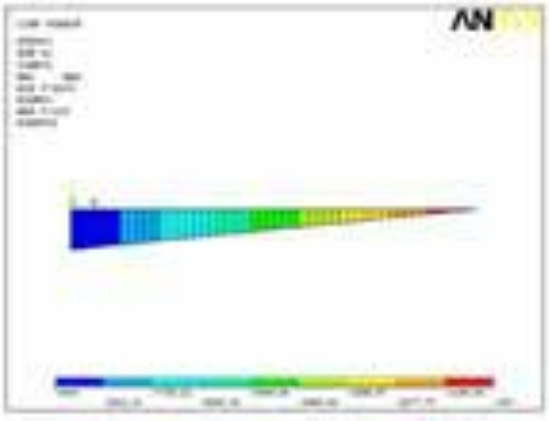


Fig.5 Bending Moment of steel radius rod with Minimum Load

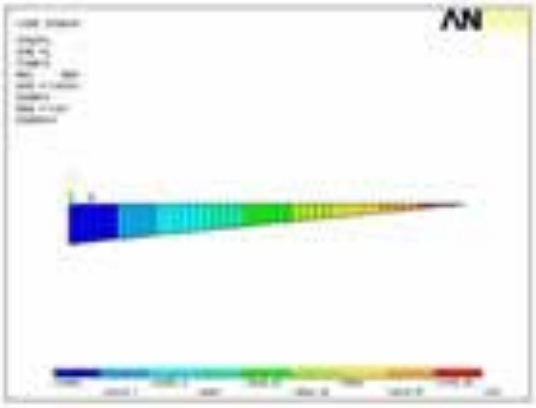


Fig.6 Bending Moment of steel radius rod with Maximum Load

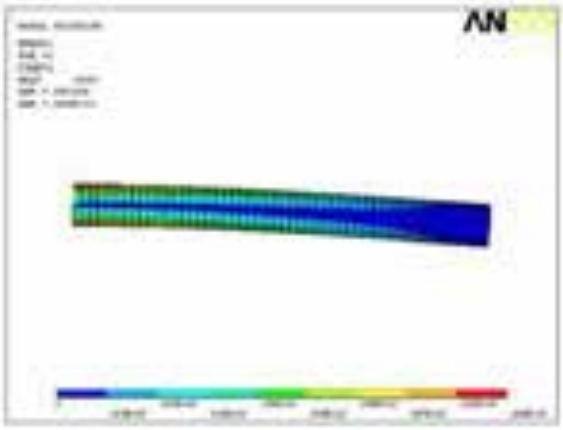


Fig.7 Von Mises Stress of the steel radius rod with Minimum Load

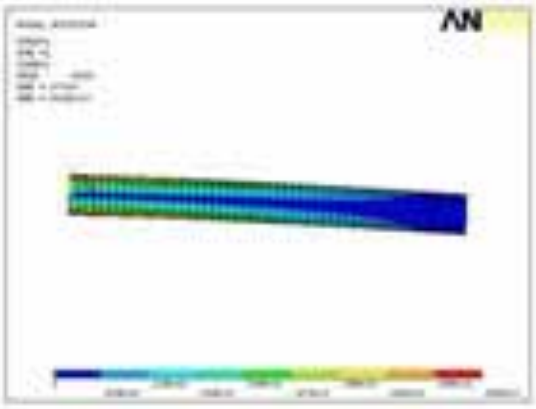


Fig.8 Von Mises Stress of the GFRP radius rod with Maximum Load

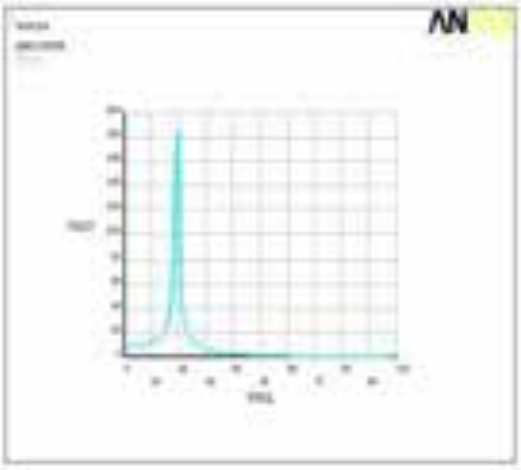


Fig.9 Harmonic analysis in x direction in steel

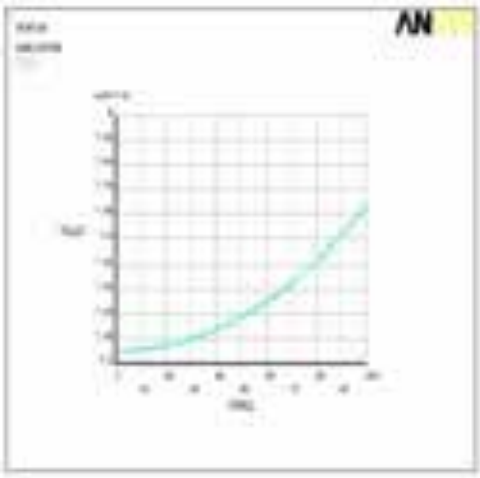


Fig.10 Harmonic analysis in x direction in GFRP

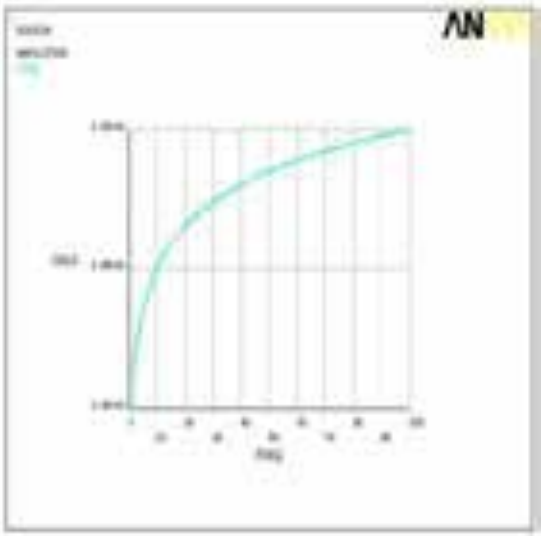


Fig.11 Harmonic analysis in y direction in steel

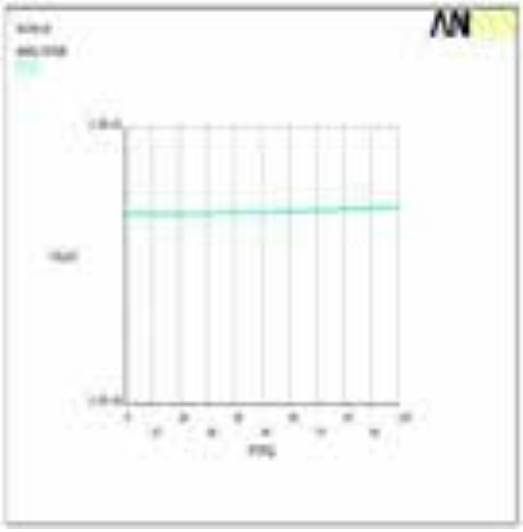


Fig.12 Harmonic analysis in y direction in GFRP

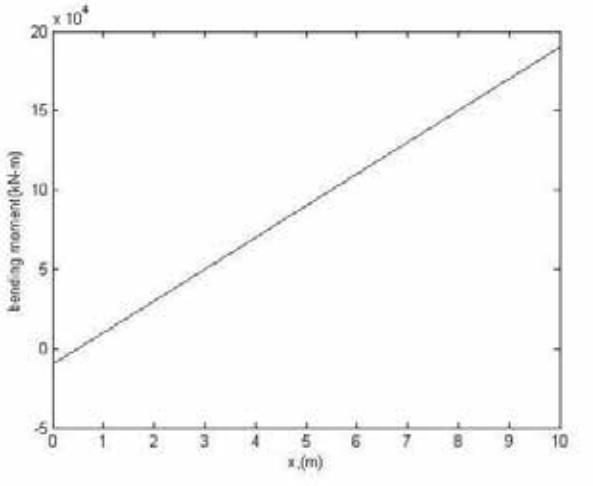


Fig.13 Bending Moment of GFRP radius rod using Matlab®

V. RESULTS AND DISCUSSIONS

The Finite Element Analysis is carried out for the estimation of the bending behavior of GFRP Radius Rod Structure by Finite Element Software package ANSYS® under bending load were considered for the present paper. The main suppositions that could be drawn from this analysis include:

1. The Finite Element results shows that GFRP Radius Rod structure support high loads at same indenter displacement Fig. (1-4).
2. The Static Response of Strength is compared with GFRP increased by 12% than that of the steel.
3. The use of GFRP Material can eliminate the maximum bending in the Radius rod for the Automobile.
3. The study of dynamic response of the GFRP and Steel material is carried out Fig. (9-12).

The static responses of the various Radius Rod Models have been studied in finite element analysis. The present study would give on ample suggestion for carry out experiments for the GFRP Radius Rod Structure under static loading.

ACKNOWLEDGMENT

All the praise goes to Almighty God for his source of all inspirations, for showering his divine and merciful blessings on us. We express our heartiest gratitude and the authors would like to thank The Principal/RAMCO Institute of Technology, Rajapalayam and The Principal/MEPCO SCHLENK Engineering College, Sivakasi for providing facilities to carry out this research work.

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SMART HELMET BY USING ARDUINO FOR TWO WHEELERS

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ABSTRACT:
This paper presents for the safety features in the helmet.
Smart helmet is the idea that has been developed for the social responsibility towards the society. Though two wheelers are increasing. So, we have altering the helmet with features for safety purpose. The smart helmet consists of ultrasonic sensor for the intimate if any obstacles are present while driving. The GPS and GSM900a module for finding the two wheeler's location after the accidents occurred. These sensors are connected with microcontroller which set in the helmet. The camera is used for the investigation purpose if any accident happens .The transparent visor has the better vision during fog conditions.

Keywords: GPS, GSM900A Module, Microcontroller, Ultrasonic sensor, Vibration sensor, Camera, Transparent visor

1. INTRODUCTION

The project aim is to give the safety systems against road accidents. According to the survey the number of two wheelers is more than the four wheelers. Now a days, In India the two wheeler accidents are happening by without wearing helmet because of rapid growth in population. The accidents which happen in the year of 2016 is 4,80,652 and the death is 1,50,785 among this persons were around 4 lakhs. In every day 1,317 accidents are taken place and 413 persons were killed on Indian roads. Among the states in India, Tamil Nadu takes place more in accidents .With the accident survey we noted the faults occurring on road accidents due to the problems happening is mentioned.

1. Not wearing Helmets
2. Fault of Driver of motor vehicle.
3. Mechanical Defect in motor vehicle.
4.Defect in Road conditions (surface condition of roads).
5. Stray animal.
6. Poor light condition.

Above the mentioned problems are to Minimize with the help of smart helmet. The Objective of this project is to build a safety system in a helmet and giving alert for a better safety of motorcyclists. The Safety helmet that develop by interfacing with the sensors.

2. SMART HELMET

For the rider of two wheelers, Helmet act as a basic protection device. But it does not ensure that whether the rider strictly follows the traffic rules or not. So, to overcome from this problem this smart helmet can be used. The smart helmet give buzzer sound when the distance between the riders exceeds below in certain meter. If someone unfortunately met with the accident then the signal will be send to his neighbor or friends by automatically with the sensors detection. With the help of Bluetooth we can ensure the severity of the accident. Suppose, if the persons could not call attended the call the message will be

send to the predefined number(nearby hospitals or ambulance).

3. BLOCK DIAGRAM



Fig.1: Block Diagram of Work Flow

4. SYSTEM DEVICES

The system having the devices for the smart helmet.

4.1 MICRO-CONTROLLER

In the system, Microcontroller is the small circuit device which is used for interfacing the other sensors. A typical Microcontroller includes a processor, memory and input/output peripherals on a single chip.

We use ARDUINO UNO as a micro-controller for the working system. It helps to store the program from embedded sensor system.It checks the data which altered with the programs for the operation of smart helmet.

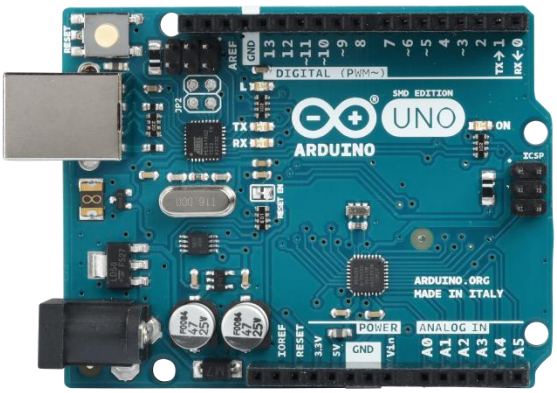


Fig. 2: Micro-controller

4.2 ULTRASONIC SENSOR

It is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back

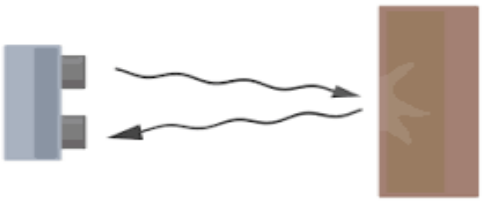


Fig.3. Working Module

Ultrasonic waves are generated by a transducer that includes a piezoelectric crystal that converts electrical energy to mechanical energy. The sensor which is connected through the pins to the microcontroller.

In this project ultrasonic sensor is set in front of the helmet for measuring the distance specification for giving the input to the devices for safety.



Fig.3.1. Ultrasonic sensor

4.3 GPS SENSOR

In Generally GPS known as Global Positioning System. By using the GPS sensor, you can get current information from the GPS receiver, such as latitude and longitude coordinates, bearing, and speed.

It is a satellite based navigation system which is used to detect the current location .The GPS used in this project where it is placed in the helmet is for helping to know the place of accident happen and it send the message signal to the numbers of GSM preferred.



Fig no.4.GPS Sensor

4.4 GSM 900A MODULE

Global system for Mobile Communication (GSM) modem is usually preferable to a GSM mobile phone. In project, the GSM900A model module is preferred for the comfortability.It used to send message through SIM.



Fig no.5.GSM MODULE

4.5. SIM

SIM is a device known as Subscriber Identity Module. It is a chip circuit which used to send signal and receiving calls or messaging. In our Project SIM will be inserted to the GSM 900A module modem for the purpose of signaling when accidents happen. Through this we can ensure the situation of the rider.

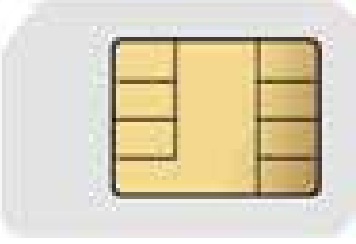


Fig no.6.SIM

4.6. BUZZER

The Buzzer is an electrical device that makes a buzzing noise and is used for signaling through audio. It kept in the helmet which nearer to the ear for hearing audio for the safety signaling which will connected to the circuit device.



Fig no.7. Buzzer

4.7. TRANSPARENT VISOR

Helmet Visors is optically correct for clear Vision.

Anti-fog and scratch resistant for a clear view, even in damp foggy conditions. The helmet visor helps to view the vision. It also helps the two wheelers for the safe ride.



Fig no.8. Helmet Visor

4.8. SOLAR PANEL

Solar panels absorb sunlight as a source of energy to generate electricity. It is an important source of renewable energy and its technologies are broadly characterized either passive solar or active solar depending on how they capture and distribute solar energy or convert it into solar power. Solar energy available makes it a highly appealing source of electricity. The solar panel consists with different sizes with variable Kilo Watt based. Here, we use the solar power for distributing the charge to the microcontroller and devices. The solar panel will be connected with the rechargeable battery for storing the charge. Solar panel and battery will be set to the helmet at the top.



Fig no.9. Solar Panel

4.9. BLUETOOTH HEADSET

` A Bluetooth headset that provides a two-way connection to the user's cell phone via Bluetooth by wireless communication. In the project, Bluetooth device plays a role for conforming the situation through calling to number installed in the program to the devices.

5. CONCLUSION

In this project, we have developed idea for trying to decrease the impact of accidents. With that our project work has the features of minimizing devices. Day by day the technologies are being developed. As a result the human safety is being deployed, so we did with the project for overcoming with the safety measure by Smart Helmet.

6. FUTURE SCOPE

We can add AADHAAR number for finding the person address who wearing the helmet.

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3. SMART HELMET

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4. SMART HELMET SAFETY SYSTEM USING ATMEGA 32

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DEVELOPMENT OF PLC BASED PNEUMATIC ARTICULATED ROBOT FOR SORTING OPERATIONS

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Abstract – In automation industries PLC based Pick and place robots automate the process of picking parts up and placing them in new locations. With many end-of-arm-tooling options available, pick and place robots can be customized to fit specific production requirements. The proposed pneumatic articulated robot is used to Pick and Place the objects on the conveyor belt based on input received from Optical sensor (to identify the presence of the object) and Metal detecting sensor (to identify the input material is metal/non-metal) and placing it in a specific location (output conveyor). This pick and place robot consist of four cylinders which are actuated with the help of pneumatic systems. This robot is using a pneumatic picking arm to pick the particular object from the conveyor belt and place it according to the metal and non-metal conveyor without any intervention of human presence. The input and output conveyors are actuated by motor drive arrangements. Finray gripper[1] is used to grasp from input conveyor and release the object in output conveyor. The major advantage of the developed robot is an adaptive finray gripper design which is specially designed to handle the objects with irregular shapes. This will lead to faster operation in industries.

Keywords – Pick and Place Robot, Optical sensor, Pneumatic Articulated Robot, PLC, Finray Gripper.

I. INTRODUCTION

The pick and place robot is a PLC[2] based mechatronic system that detects the object, picks that object from source station and places at desired station. For detection of object, infrared sensors are used which detect presence of object. The inductor sensor used to identify whether the object is metal/non-metal one. The object is metal means the robot will picks the metal object and place the metal object into one conveyor belt. The object is non-metal means the robot will place the non-metal object into another conveyor based upon input received from the sensor.

II. PLC BASED ARTICULATED ROBOT

A. Programmable Logic Controller

Festo PLC was used for the development of pick and place robot system. The robot motion is executed by building ladder diagram in PLC by using CodesysV2.3 software.

B. Articulated Robot

This robot manipulator has the general configuration of a human arm. The articulated arm consists of a vertical column that swivels about the base using a T joint. At the top of the column is a shoulder joint, whose output link connects to an elbow joint. This articulated robot[3] was notation is TRR joint. The components of this robot-like shoulder, arm, elbow was modelled [5] using Autodesk Inventor 2016 software and fabricated using Mild Steel.



Fig. 1. Robot Frame

C. Finray Gripper

The end effector was a challenging task while developing this pick and place object. The finray gripper is used to grip the object based upon object shape. This gripper changes its shape based upon objects being gripped. This gripper was modelled in Autodesk Inventor 2016 software and developed using ABS material.



Fig. 2. Finray Gripper

D. Pick and Place layout design

The proposed system is an integration of Electro Pneumatic system and PLC. PLC is the main controller which will accept the inputs from optical sensor and metal detecting sensor Accordingly the PLC will control the pneumatic robot. In addition, this system is controlled via Control panel. The system can be controlled using auto mode as well as in manual mode.

This robot consists of pneumatic actuators link together with the help of a mechanical frame controlled through PLC via Solenoid valves. The pressurized air is supplied through air compressor which is further regulated and filtered using Air Filter and Regulator (AFR) unit.

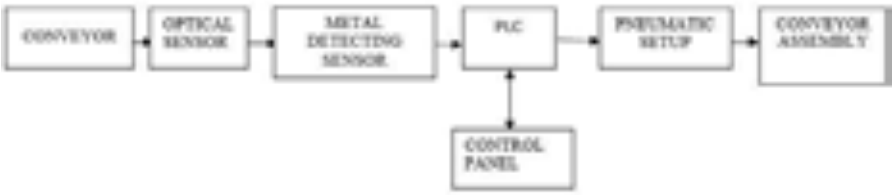


Fig. 3. Sequence of Operation

E. Design of Body

The body is used to position the object in the robot's work envelop. Thus, by employing the concept of value engineering proper design can help reduce the weight of the body and also the amount of materials used. Generally, to optimize both material cost and the manufacturing cost the arm is made up of different components and then assembled together.

F. Design of End Effector

Grippers, which are composed by two or more rigid fingers A gripper usually has a 1 to 3 degrees-of-freedom structure. Finray gripper is used to grasp the object which are in irregular shapes and sizes. The main advantage of finray gripper is flexibility in nature. Pneumatic operated finray gripper was designed to carry out the operation.

G. Design of Workspace

The designing of work space has been done by keeping following way: (i). Robot consume minimum time for completing the operation. (ii)Idle time should be reduced as much as possible. (iii) Efficient and safe transportation.

The design of work space includes a Belt conveyor which brings the object from the plant and it is been transferred to the Packing Center using the Robotic arm. There is moment of 90 degrees; the robot picks an object from source location and place it in desired location. Once an operation complete then the robot further moves towards the Belt conveyor to repeat the same procedure

III. OPERATION AND RESULTS

A. Metal Object

High-speed pick and place robots can be mounted on a stand to allow the robots to access their entire working envelope. The input conveyor is arranged parallel to the face of end effector. The output metal conveyor and non-metal conveyor arranged at 90 degrees with respect to the input conveyor position. The optical sensor and the metal sensors are mounted parallel to the path of the conveyor. When the product moves through the conveyor, then the occurrence of objects in the conveyor can be detected with the help of optical sensor. After the detection of objects by the optical sensor, the object moves through the inductive sensor which sends signal to the PLC when the metal object is detected. When the non-metal object moves through the conveyor, the inductive sensor do not send signal to the PLC.

The letters A, B, C and D are used to indicate the Shoulder, Elbow, Gripper and rotary cylinder movements. If add symbol appears means extension will takes place and subtraction symbol is used to indicate retraction position. For the metal objects, the pneumatic cylinders should be expanded in the (A+B+C-B-A-D+B+C+B-D-) sequence. When the metal object is detected the conveyor, motion is stopped at particular timing due to the program coded in the PLC using Codesys v2.3 software. When the conveyor is stopped then the pneumatic gripper moves nearer to the object by the expansion of (A, B) cylinders using solenoid valve. The pneumatic gripper holds the object(C-) in the conveyor as per the program given in the PLC software. Next the shoulder and elbow cylinder (B, A) moves to the initial position (B-A-) with the help of solenoid valve actuated by PLC programming. After the (C-A-B-) position is reached the robot is rotated to 90 degrees with the help of pneumatic rotary actuator, actuated by solenoid valve. Then the shoulder cylinder is expanded to reach the final position in order to reach the metal conveyor position, then the gripper releases the object from holding. After the object is placed on the conveyor 3 the pneumatic cylinders are brought to its initial position (B-A-D-).

B. Non-Metal Object

For the non-metal objects the pneumatic cylinders should be expanded in the (A+B+C-B-A-D+A+B+C+B-A-D-) sequence[4]. When the metal object is detected the conveyor motion is stopped at particular timing due to the program coded in the PLC using Codesys v2.3 software. When the conveyor is stopped then the pneumatic gripper moves nearer to the object by the expansion of (A, B) cylinders using solenoid valve. The pneumatic gripper holds the object(C-) in the conveyor as per the program given in the PLC software. Next the shoulder and elbow cylinder (B, A) moves to the initial position (B-A-) with the help of solenoid valve actuated by PLC programming. After the (C-A-B-) position is reached the robot is rotated to 90 degrees with the help of pneumatic rotary actuator, actuated by solenoid valve. Then the shoulder and the elbow cylinder are expanded to reach the final position in order to reach the non-metal conveyor position, then the gripper releases the object from holding. After the object is placed on the non-metal conveyor the pneumatic cylinders are brought to its initial position (B-A-D-).

C. Flow Diagram of Articulated Robot

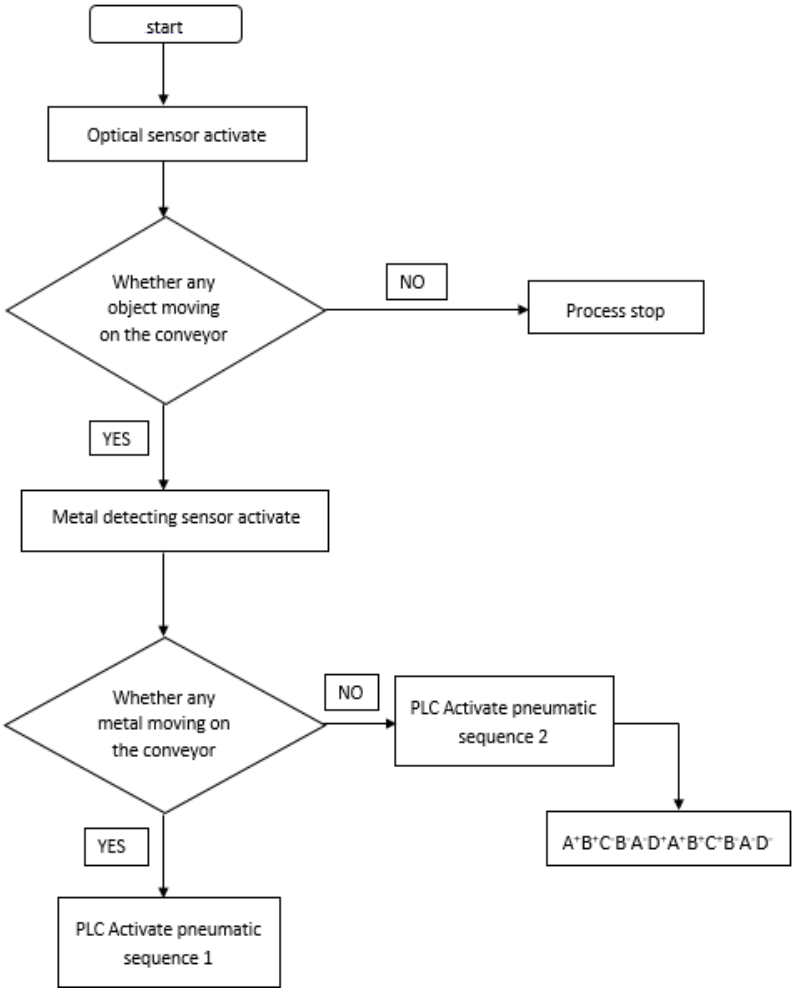


Fig. 4. Flow Diagram of Articulated Robot

D. Articulated Robot final design

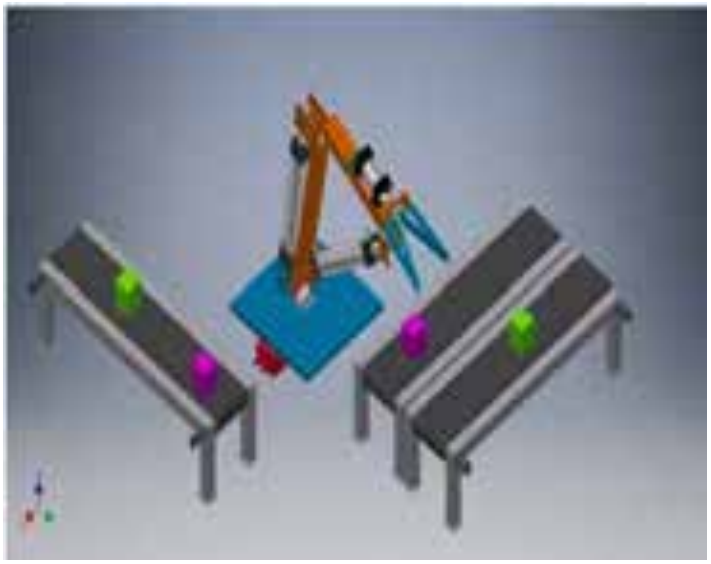


Fig. 5. Proposed design developed in Autodesk Inventor 2016

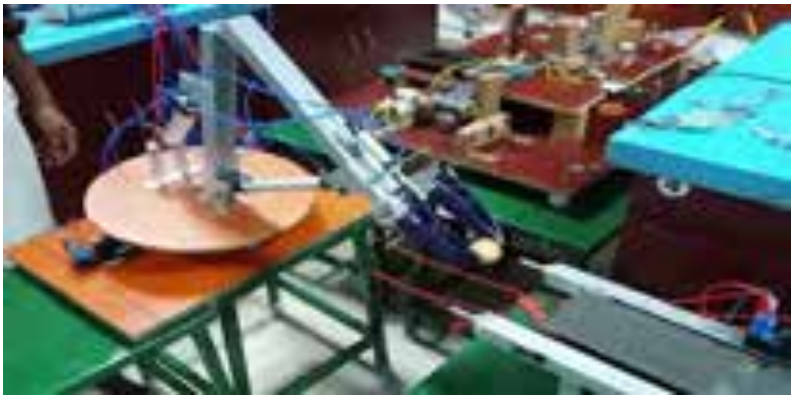


Fig.6. Robot picks potato vegetable



Fig.7. Robot picks metal object

E. Expected Results

This robot could be able to transform 25 objects/ minute by programming PLC using Ladder Diagram

F. Advantages

(i) Packaging could be done quickly.
(ii) The adaptive gripper can be able to hold both the regular and irregular workpiece without any damage.
(iii) Improved productivity and product quality by placing proper raw material in a proper conveyor before the raw material goes into the production.
(iv) Consistency in operation.
(v) Provides extremely high-speed delivery output.
(vi) It can be easily reprogrammed as per our need and specification.
(vii) The workpiece of size from 10mm to 100mm can be handled.

G. Applications

(i) It can be useful for handling horticulture products like tomato, egg, pear, apple, potato, etc.,
(ii) With the advancements in technology and affordability of robots, more pick and place robotic cells are being installed for automation applications.
(iii) Robot pick and place automation speeds up the process of picking parts up and placing them in new locations, while also increasing production rates.
(iv) Fast Assembly – robots can pick parts from incoming conveyor and assemble them onto work pieces carried by an outgoing conveyor with high precision.
(v) Inspection and Quality Control – robot visually inspects and picks out defective products moving on a fast conveyor.
(vi) Fast Packaging – vision spots products spread out on moving conveyor and then the robot transfers them into packaging containers at high speed.
(vii) Fast Sortation - robot instantaneously picks and separates different types of parts passing through its vision domain.

IV. SUMMARY

By using PLC, the robot has performed it task perfectly according program that being made. Beside than that, the adjustable gripper with sensors is able to open its grip according to the size of the object. Due to this advantage, the robot can pick object that without the gripper limitation. The sensor is key component of project which aids in distinguishing objects. Thus, it become vital that the sensor had a very high sense of sensitivity and ability to distinguish between metals and non-metals. The future advancements can be done by increasing the efficiency of the metal sensor.

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(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)

Rajapalayam - 626 117, Tamil Nadu.

National Conference on
Innovations in Communication Technology for Social Development
ICTSD-2018

CERTIFICATE

This is to certify that ~~Dr./Mr./Ms.~~ S. VALAI GANESH *of* RAMCO INSTITUTE OF TECHNOLOGY *presented a paper entitled* AUTOMATED GRASPING DISTALS *in the National Conference on Innovations in Communication Technology for Social Development - ICTSD, organised by Department of Electronics and Communication Engineering in association with IETE student forum on 23rd March, 2018.*

Convenor

Principal

P.S.R. ENGINEERING COLLEGE

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has presented a paper entitled

Robotic Grasping Arm (DIBOT)

in TNSCST Sponsored 5th National Conference on "Research Advances in Mechanical Engineering" RAME'18 Organized by Department of Mechanical Engineering, P.S.R.Engineering College, Sivakasi, Tamil Nadu on 29th March 2018.

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in TNSCST Sponsored 5th National Conference on "Research Advances in Mechanical Engineering" RAME'18 Organized by Department of Mechanical Engineering, P.S.R.Engineering College, Sivakasi, Tamil Nadu on 29th March 2018.

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PERFORMANCE STUDY OF SINGLE BASIN SOLAR STILL BY USING ZINC OXIDE NANO PARTICLE

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ABSTRACT:

The purpose of this project is to design a water distillation system that can purify all kind of water such as brackish water, sea water and all other hard water, a system that is relatively cheap, portable and depends only on solar energy. Solar distillation is a relatively simple treatment of brackish or impure water. In this solar energy is used to evaporate water then vapour condensed as pure water. This process removes salts and other impurities. The production of solar still can be improved by use of Nano particle, than any other absorbing materials such as Glass balls, Gravels and Pebbles. The Nano material gives more production rate while comparing to other absorbing materials. The glass balls gives minimum day yield of 1.120 L /m^2/day and the minimum yield efficiency of solar still is 1.7 %. The Nano material gives maximum day yield of 2.130 L /m^2/day and the maximum yield efficiency of solar still is 4.1 %. Hence to improve the efficiency of the solar still nano particle like metal oxides is preferred. These particles increase the surface area and hence we get more prodcuctivity. In this work the ZnOnano particle is mixed with black paint in varying concentration which is used to enhance the productivity of solar still. The solar radiations are transmitted through the glass cover and captured by a black painted base plate. Water absorbs heat and is converted into vapour within the chamber of the solar still. Here we use modifiedsingle slope solar still. The solar still is built with inbuilt condenser to improve the condensation rate.The Coating of nano particle in the base plate improves the evaporation rate.Entire set up is covered with polystyrene to prevent the heat loss and to increase the efficiency of the solar still.

I. INTRODUCTION

1.1 GLOBAL WATER SUPPLY AND DEMAND

Water is essential for all life forms on earth - human, plants, and animals. Water is one of the most abundant resources on earth, covering three fourths of the planet's surface. About 97% of the earth's water is salt water in the oceans and the remaining 3% (about 36 million km^3) is fresh water contained in the polar region (in the form of ice), ground water, lakes and rivers, which supply most human and animal needs. Less than 1% fresh water is within human reach. Even this small fraction is believed to be adequate to support life and vegetation on earth. Nature itself provides most of the required fresh water, through hydrological cycle. A very large-scale process of solar distillation naturally produces fresh water. The essential features of this process are thus summarized as the production of vapors above the surface of the liquid, the transport of vapors by winds, the cooling of air – vapor mixture, condensation and precipitation.

However, rapid industrial growth and a worldwide population explosion have resulted in a huge rise of demand for freshwater, both for household needs and for crops to produce adequate quantities of food. Added to this is the problem of the pollution of rivers and lakes by industrial wastes and the large amounts of sewage discharge. On a global scale, human–made pollution of natural sources of water is becoming one of the greatest causes of freshwater shortage. Uneven distribution of population is another problem. Then provision of freshwater is becoming an increasingly important issue in many areas of the world. According to World Health Organization (WHO), the permissible limit of salinity in water is 500 ppm and for special cases up to 1000 ppm while most of the water available on earth has the salinity up to 10,000 ppm whereas seawater normally has salinity in the range of 35,000–45,000 ppm in the form of total dissolved salts (Tiwari et al 2003). Global demand for water has tripled since the 1950s, but the supply of fresh water has been declining (Gleick 2003). Half a billion people live in water-stressed or water-scarce countries and by 2025 that number will grow to three billion due to an increase in population. Data on water supply and demand are startling: about 450 million people in 29 countries face severe water shortages (Serageldin 2001); about 20% more water than is now available will be needed to feed the additional three billion people by 2025 (Seckler et al 1999); as much as two-thirds of the world population could be water-stressed by 2025 (Seckler et al 1999); aquifers, which supply one-third of the world's population, are being pumped out faster

than nature can replenish them (Shah et al 2006); half of the world's rivers and lakes are polluted; and major rivers, such as the Yellow, Ganges, and Colorado, do not flow to the sea for much of the year because of upstream withdrawals (Richter et al 2003). About 40% of the world's populations live in regions that directly compete for shared boundary water resources (Yoffe et al 2004). (Rosegrant and Cai 2002) estimated that under their baseline scenario, total global water withdrawals for agricultural, domestic and industrial use will increase by 23% from 1995 to 2025. The availability of sufficient water resources is one of the major crises with overarching implications for many other world problems especially poverty, hunger, ecosystem degradation, desertification, climate change, and even world peace and security (Khan and Hanjra 2009).

1.2 WATER CRISIS IN INDIA

Although India occupies only 3.29 million km^2 geographical area, which forms 2.4% of the world's land area (Rakesh Kumar et al 2005). India has 16 % of the world's population and four % of its fresh water resources. Estimates indicate that surface and ground water availability is around 1,869 billion cubic meters (BCM). Of this, 40 per cent is not available for use due to geological and topographical reasons (Gupta Akhilesh et al 2006). Around 4,000 BCM of fresh water is available due to precipitation in the form of rain and snow, most of which returns to the seas via rivers (Gupta Akhilesh et al 2006). The fresh water crisis is already evident in many parts of India, varying in scale and intensity at different times of the year.

Rainfall in India is dependent on the south-west and north-east monsoons, on shallow cyclonic depressions and disturbances and on local storms. Most of it takes place under the influence of south-west monsoon between June and September except in Tamil Nadu, where it is under the influence of north-east monsoon during October and November. India is gifted with a river system comprising more than 20 major rivers with several tributaries. Many of these rivers are perennial and some of these are seasonal. The rivers like Ganges, Brahmaputra and Indus originate from the Himalayas and carry water throughout the year. The snow and ice melt of the Himalayas and the base flow contribute the flows during the lean season. Lal (2001) mentioned that more than 50% of water resources of India are located in various tributaries of these river systems. Average water yield per unit area of the Himalayan Rivers is almost double that of the

south peninsular rivers system, indicating the importance of snow and glacier melt contribution from the high mountains. Apart from the water available in the various rivers of the country, the groundwater is also an important source of water for drinking, irrigation, industrial uses, etc. Ninety two per cent groundwater extracted is used in the agricultural sector, five and three per cent respectively for industrial and domestic sector. Eight nine per cent of surface water use is for agricultural sector and two per cent and nine per cent respectively are used by the industrial and domestic sector (Indira Khurana and RomitSen). As per the international norms, if per-capita water availability is less than 1700 m^3 per year then the country is categorized as water stressed and if it is less than 1000 m^3 per capita per year then the country is classified as water scarce. In India per capita surface water availability in the years 1991 and 2001 were 2309 and 1902 m^3 and these are projected to reduce to 1401 and 1191 m^3 by the years 2025 and 2050 respectively.

The fresh water crisis is not the result of natural factors, but has been caused by human actions. India's rapidly rising population and changing lifestyles also increases the need for fresh water. Intense competition among competing user's agriculture, industry and domestic sector is driving the ground water table deeper and deeper. Widespread pollution of surface and groundwater is reducing the quality of fresh water resources. Fresh water is increasingly taking centre stage on the economic and political agenda, as more and more disputes between and within states, districts, regions, and even at the community level arises.

In India nearly 45 million people are affected by water quality problems caused by pollution, by excess fluoride, arsenic, iron or by the ingress of salt water (Arjunan et al 2009). Millions do not have adequate quantities of safe water, particularly during the summer months. In rural areas, women and girls still have to walk long distances and spend up to four hours every single day to provide the household with water (Kumar). Scarcity of fresh water problems are facing many arid zones of Gujarat and Rajasthan, luckily these places are getting more amount of solar energy, apart Gujarat and Rajasthan that in western India, which face water shortage and have huge underground saline water sources, certain regions in Haryana state and Maharashtra states also have underground saline water in spite of high rain fall (Gomkale and Datta 1973).

Khanna et al (2008) studied in details about quality and availability of drinking water in a village Chui, Rajasthan. The village peoples are facing lot of difficulties to get fresh water for their family needs. Water scarcity is projected to become a more important determinant of food

scarcity than land scarcity, according to the view held by the UNO. This process of getting fresh water from saline/ brackish water can be done easily and3economically by desalination.

APPROACHES TO HANDLE THE PROBLEMS

In order to address the problems discussed above, an attempt is made in the present study to suggest a few approaches and methodologies as follows:

*Rain water harvesting and subsequent recharge of groundwater can help lower the concentration of minerals in aquifers.

*Adoption of latest technologies in order to reduce the waste water generation and/or to treat them effectively.

*Dual water supply – The success of this system lies in the fact that filtered purified water is used only for drinking purposes while other source of water may be used for purposes other than drinking and cooking.

*Treatment of sea water and brackish water to convert fresh water by using desalination technologies.

1.3 DESALINATION TECHNOLOGIES

Desalination can be achieved using a number of techniques. Industrial desalination technologies either use phase change or involve semi permeable membranes to separate the solvent or some solutes. Therefore, desalination techniques may be classified into the following categories: phase change or thermal processes and membrane or single-phase processes.

Table 1.1 -Desalination Technologies

Phase change processes	Single-phase processes
Multi-stage flash (MSF)	Reverse osmosis (RO)
Multiple effect distillation(MED)	Electro dialysis (ED)
Vapor compression (VC)	Nano filtration
Freezing	Membrane distillation
Humidification-dehumidification	
Geothermal desalination	
Solar stills	

1.5 SOLAR STILLS

In solar still, the water is evaporated using solar energy. In solar still, impure water is taken in a well-insulated air tight basin covered with transparent plastic/glass cover. Water gets heated up, transfer heat to air inside the still and the air become unsaturated. The water evaporates and makes the air inside still saturated. This air subjected circulatory motion due to the temperature difference between water surface and cover lower surface. When high temperature air touches the cover, become cool and the water present in the air condenses at the lower surface of the cover. This condensed water slides down and collected using a drain. A schematic diagram of single basin Single slope solar still is shown in fig 1

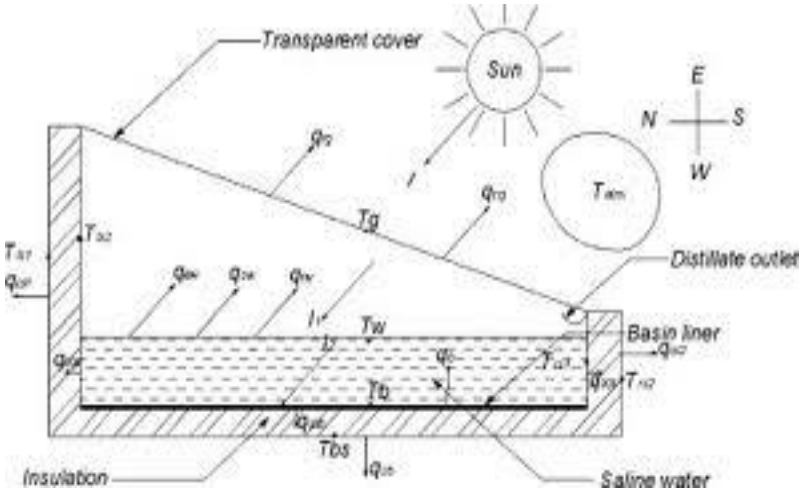


Fig 1.1 Schematic diagram of a simple solar still

1.6 INFERENCE BASED ON LITERATURE SURVEY:

The following are the outcome of the literature review:

*Still with insulation produce more fresh water than the still without insulation especially for higher value of insolation.

*Tilt angle of 30º of glass cover will be the second most optimum angle for maximum productivity after latitude angle of the location.

*The productivity of the still will increase, when the basin water depth decreases. It was found that the maximum productivity was obtained when the depth of basin water was 0.01m.

*Productivity of the still increases when wind speed increases. This is because as the wind blows faster, it reduces the heat of top glass cover which in turn increases the temperature difference between vapor and glass cover, thus leading to more amount of condensation.

*Productivity of the still can be improved by agitation effect which increases the surface area of contact between air and water surface leading to more amount of evaporation.

*Using external condenser will improve the condensation rate of the still. This will increase the difference in temperature between vapor and inner glass cover leading to more amount of condensation rate.

III. PROCEDURE

3.1 DESCRIPTION OF THE STILL

In single slope solar still, the height of the lower vertical side of solar still was kept at 0.01 m. For a 30^0 inclination of glass cover, the required height of the other vertical side was 0.42 m. The absorber area of basin and collector of solar still are 0.5 m x 0.5 m and 0.5 m x 0.59 m respectively. Design diagram of single slope is as shown in fig 6.1. The basin structure of the solar still was made of GI sheet. The inner side of the basin was painted black to maximize the absorption of solar radiation. The bottom and sides of the still basin were well insulated with a thermocol layer of 0.025 m thickness. An ordinary clear window with a glass thickness of 0.004 m was used as the top cover of the solar still and inclined at an angle of 30º from horizontal. The total experimental setup was arranged to face in the southern direction to receive the maximum solar radiation. The distillate water condensed from the glass cover was collected in a distillation trough fitted on the lower side of the solar still. Plastic tubes are used to discharge the distilled water.

3.2 MODIFIED STILL:

The modern still is of the same dimension but it is built with an in built condenser with a base dimension of about 195mm x 225mm.with an angle of 45^0.To improve the evaporation rate modern still is coated with ZnOnano particle .And the entire set up insulated with thermocol to prevent heat transfer to the surroudings.

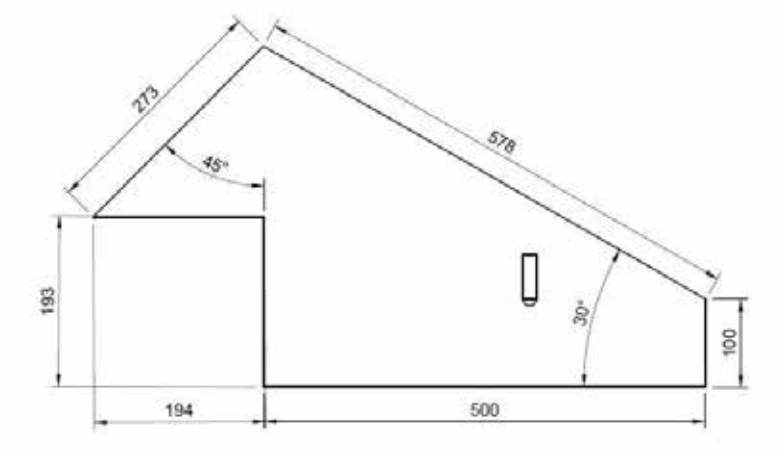


Fig 3.2 Schematic Diagram of Modern still

Table 3.1- Specifications of Modern Still

S.NO	SPECIFICATIONS	DIMENSIONS	UNITS
1	BASIN AREA	0.25	m^2
2	GLASS AREA	0.289	m^2
3	GLASS THICKNESS	3	mm
4	SLOPE OF GLASS	30°	Deg
5	INSULATION	25	mm

IV. PREPARATION OF NANO MATERIAL:

Materials Required: Chemicals (Ammonium Oxalate,ZincAcetate), Beaker, Galssrod, Weighing Machine, Mortar and Pestle.

Experimentation:

Zinc Acetate (2.195g,0.01M) is dissolved in 50ml of distilled water.To this solution 4 grams of ammonium oxalate powder is added with slow stirring.Stirring is continued till the dissolution of ammonium oxalate takes place. The ammonia solution is added drop wise to raise

the PHof the solution to about 10.AWhite precipitate of Zinc Oxalte is obtained immediately.The settled precipitate is collected by filteration,washed with distilled waterseveral times over a bucherfunnel,The Zinc oxalate precipitate is then transferred on a watch glass and kept in an air oven at 105^0C for period of about one hour.After cooling carefully collect the dried powder and transfer it into clean silica crucible.After that the silica crucible is heated in muffle furnace a 700^0C for three hours.The zinc oxide nano particle obtained and stored in vaccum.

V. TESTING OF NANO PARTICLE:

5.1 SCANNING ELECTRON MICROSCOPE:

A scanning electron microscope (SEM) is a type of electron microscope that produces images of a sample by scanning the surface with a focused beam of electrons. The electrons interact with atoms in the sample, producing various signals that contain information about the sample's surface topography and composition. The electron beam is scanned in a raster scan pattern, and the beam's position is combined with the detected signal to produce an image. SEM can achieve resolution better than 1 nanometer. Specimens can be observed in high vacuum in conventional SEM, or in low vacuum or wet conditions in variable pressure or environmental SEM, and at a wide range of cryogenic or elevated temperatures with specialized instruments

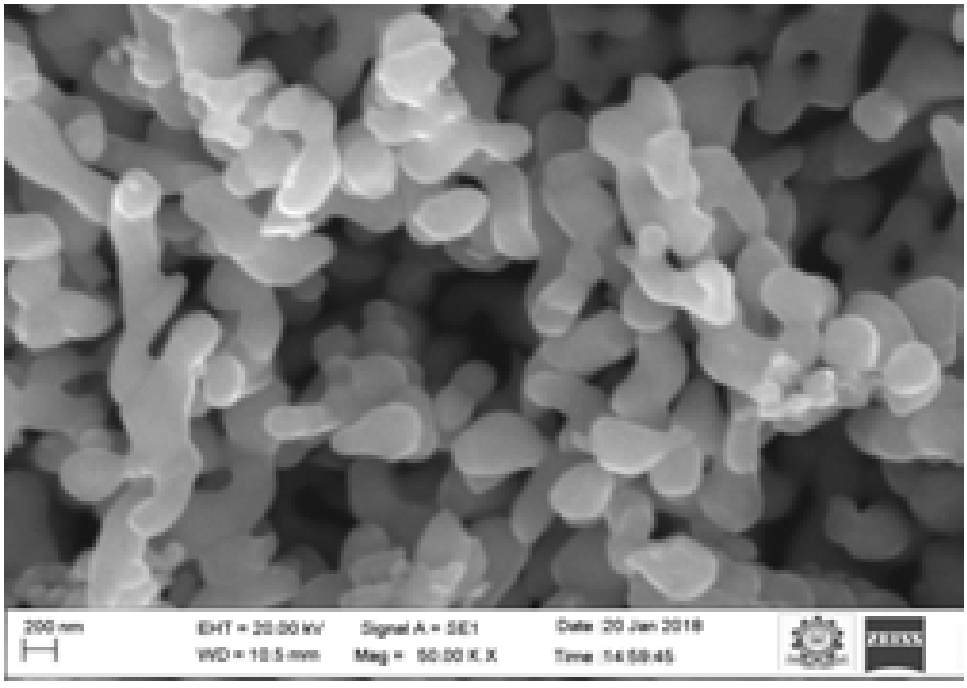


Fig:5.1 SEM image of ZnO Nano Particle

5.2 U V SPECTROMETRY:

UV spectroscopy is an important tool in analytical chemistry. The other name of UV (Ultra-Violet) spectroscopy is Electronic spectroscopy as it involves the promotion of the electrons from the ground state to the higher energy or excited state.UV spectroscopy is type of absorption spectroscopy in which light of ultra-violet region (200-400 nm.) is absorbed by the molecule. Absorption of the ultra-violet radiations results in the excitation of the electrons from the ground state to higher energy state. The energy of the ultra-violet radiation that are absorbed is equal to the energy difference between he ground state and higher energy states ($\Delta E = h_f$).

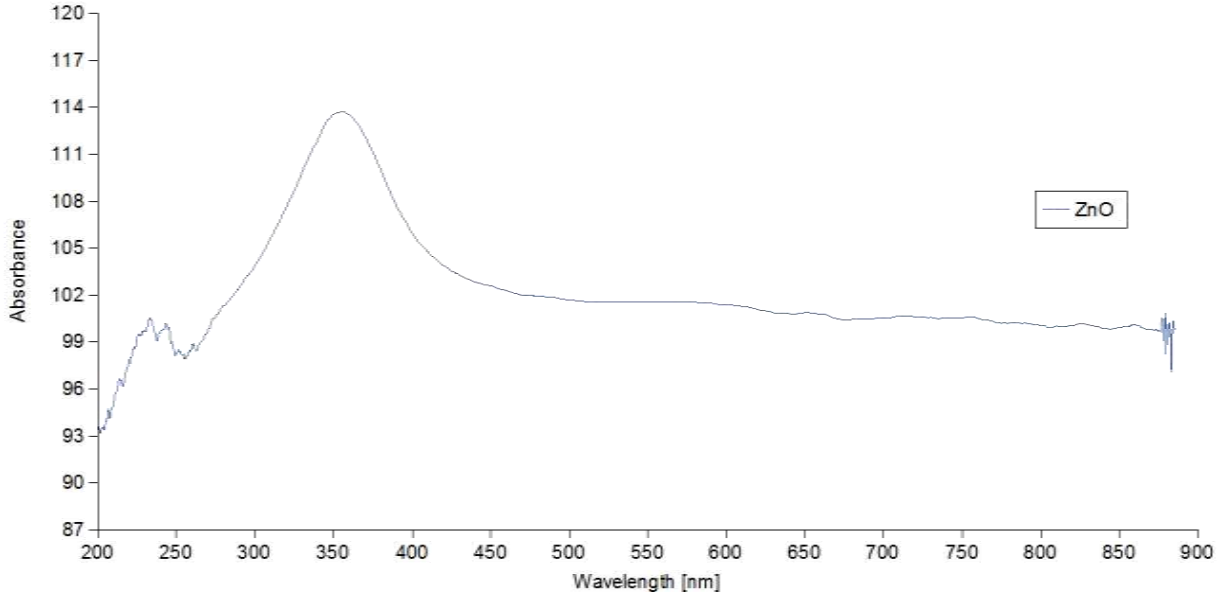


Fig: 5.2 UV Spectrometry of ZnO Nano Particle

VI. INSTRUMENTATION

Table shows the instruments used along with their specifications.

Table 6.1 Accuracy and error limits for various measuring instruments

Sl.No.	Instrument	Accuracy	Range	%error
1	Thermometer	+1°C	0 – 100 ^{o}C	0.25 %
2	Thermocouple	+ 0.1 ^{o}C	0 – 100°C	0.5%
3	PV type sun meter	+1 W/m^2	0 – 2,500 W/m^2	2.5 %
4	Measuring jar	+10 ml	0 – 1000 ml	10%

VII. EXPERIMENTATION

Experimentation was carried out to analyze the comparative performance of the conventional and modified stills(eith 1g and3gof nano particle) at Ramco Institute of Technology,Rajapalayam.(9 º11'N, 77 º52'E). The stills were tested under same atmospheric condition to study the exact improvement in performance of the still between 6:30am to 6:30pm. The stills were maintained at 1cm of water level depth.



Fig: 7.1 Experimental setup

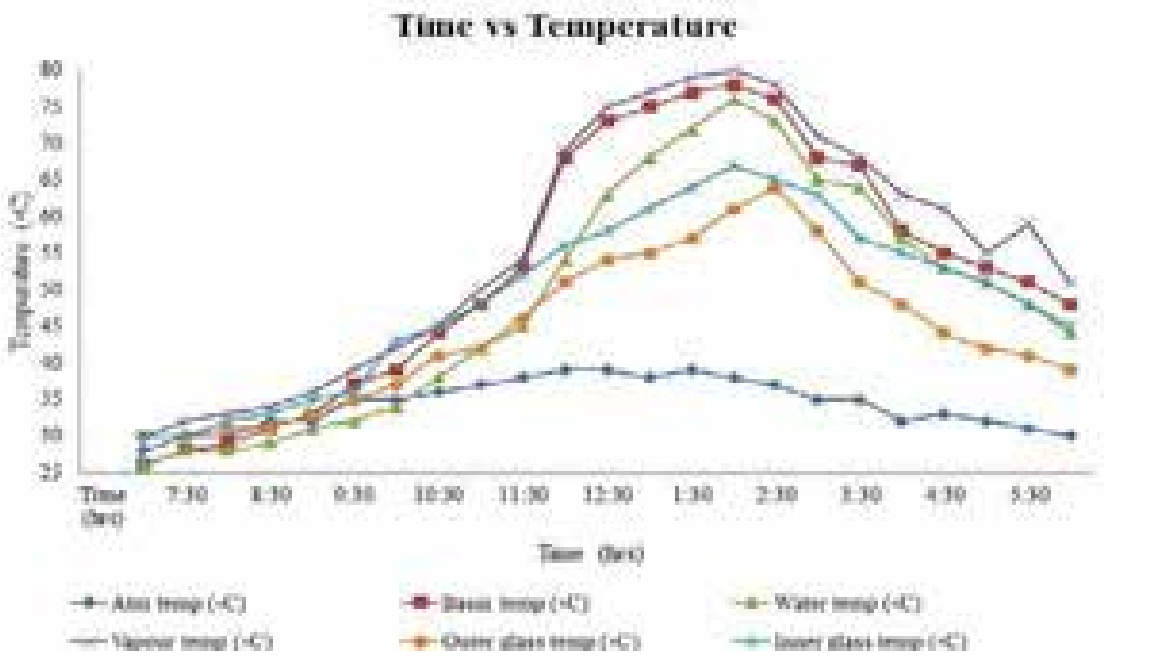


Fig 7.2 Experimental setup

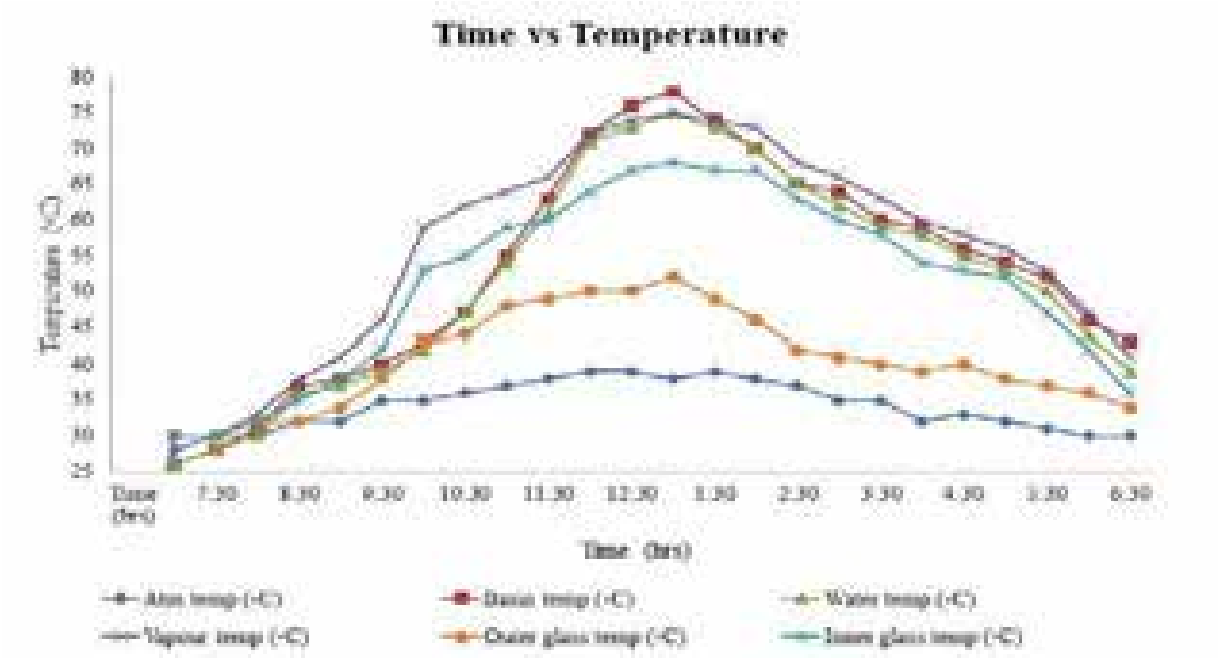
VIII. RESULTS AND DISCUSSION:

The following figures shows the result regarding Conventional and Modified Solar stills.

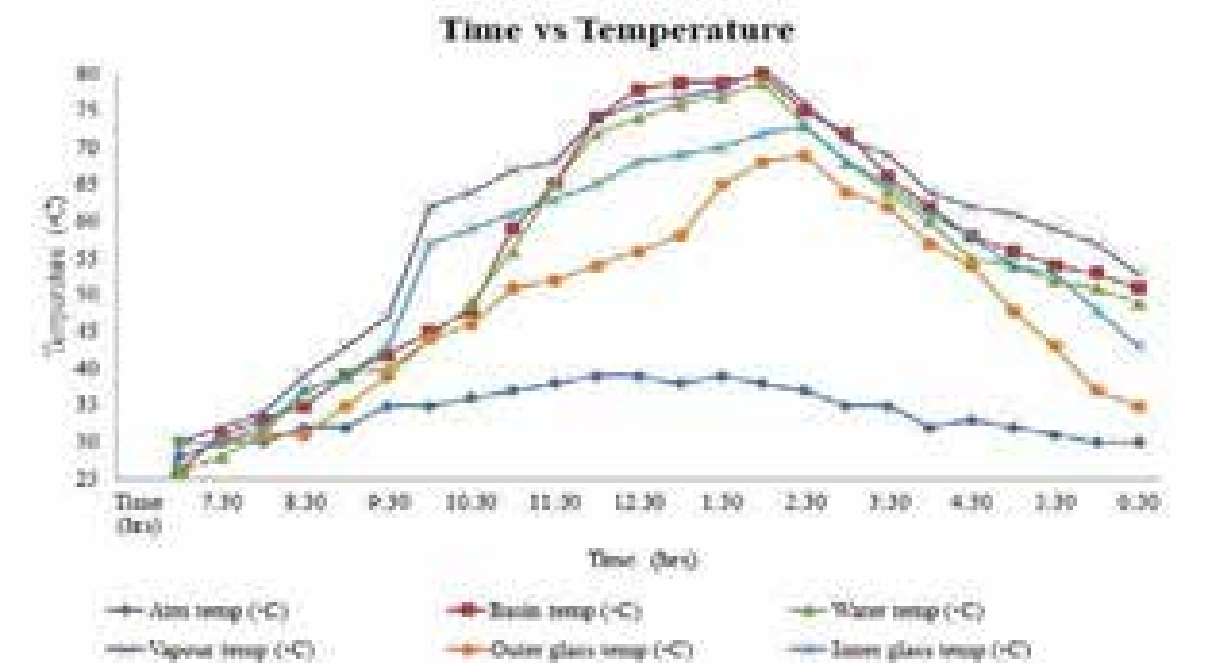
8.1 Still without ZnO coating



8.3 Still with 1gm ZnO coating



8.4 Still with 3gm ZnO coating



8.4 PRODUCTIVITY YIELD CALCULATION

Conventional Vs Modified Still(1G):

Conventional solar still output =595 ml

Modified solar still output =630 ml

(Modified solar still -s

Conventional solar still) =35 ml

Percentage of improved efficiency

595 x X/100 = 35

X = 5.88 %

Conventional Vs Modified Still (3G):

Conventional solar still output =595 ml

Modified solar still output =950 ml

(Modified solar still -

Conventional solar still) =355 ml

Percentage of improved efficiency

595 x X/100 = 355

X = 59.66 %

8.5 EXPERIMENTAL RESULTS

TESTINGS	RAW WATER	FRESH WATER
pH	7.69	7.01
Totally Dissolved Solids	1581 ppm	41 ppm
Total Hardness	900 ppm	65 ppm
Total Alkalinity	500 ppm	100 ppm
Chloride	486 ppm	12.5 ppm

- In conventional still the output has been about 595 ml , in modern Still (3G) the output has been increased at a rate 59.66%.
- The Water obtained is a pure water with pH at 7.
- If the concentration of Nano particle is varied then the output may increase.
- Thus modified stil has an increase productivity of 59.88%

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ENERGY AUDITING ON COMPRESSOR SYSTEM IN CEMENT INDUSTRY FOR ENERGY CONSERVATION

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ABSTRACT:

In modern world, there is a huge growth in industries and there is a demand for product and service to live a sophisticated life. So there is need for energy to run over lives in a better way. Energy audit will be helping in conserving energy. Also in an energy intensive industry like cement industry. Energy today has become a key factor in deciding the product cost at micro level as well as in dictating the inflation and the debt burden at the macro level. Energy cost is a significant factor in economic activity at par with factors of production like capital, land and labor. The imperatives of an energy shortage situation calls for energy conservation measure, which essentially mean using less energy for the same level of activity. Energy Audit attempts to balance the total energy inputs with its use and serves to identify all the energy streams in the systems and quantifies energy usages according to its discrete function. Energy Audit helps in energy cost optimization, pollution control, safety aspects and suggests the methods to improve the operating & maintenance practices of the system. It is instrumental in coping with the situation of variation in energy cost availability, reliability of energy supply, decision on appropriate energy mix, decision on using improved energy conservation equipment's, instrumentation's and technology. We will be doing energy audit on the required major mechanical utilities in the industry to minimize the energy consumption without affecting the output quantity and quality.

I. INTRODUCTION:

1.1 ENERGY AUDIT

An energy audit is an inspection, survey and analysis of energy flows, for energy conservation in a building, process or system to reduce the amount of energy input into the system without negatively affecting the output(s). In commercial and industrial real estate, an energy audit is the first step in identifying opportunities to reduce energy expense and carbon footprints. Energy audit is an effective tool in defining and pursuing comprehensive energy management programmes. It has positive approach aiming at continuous improvement in energy utilization in contrast to financial audit which stresses to maintain regularity. Energy audit helps in energy cost optimization, pollution control, safety aspects and suggests the methods to improve the operating and maintenance practices of the system. It is instrumental in coping with the situation of variation in energy cost availability, reliability of energy supply, decision on appropriate energy mix, decision on using improved energy conservation equipment, in-strumentations and technology

1.2 OBJECTIVES OF ENERY AUDITS

The Energy Audit provides the vital information base for overall energy conservation program covering essentially energy utilization analysis and evaluation of energy conservation measures.

It aims at:

- Identifying the quality and cost of various energy inputs.
- Assessing present pattern of energy consumption in different cost centers of operations.
- Relating energy inputs and production output.
- Identifying potential areas of thermal and electrical energy economy.
- Highlighting wastage's in major areas.
- Fixing of energy saving potential targets for individual cost centers.
- Implementation of measures for energy conservation & realisation of savings

1.3 INDUSTRIAL ENERGY AUDITS

Increasingly in the last several decades, industrial energy audits have exploded as the demand to lower increasingly expensive energy costs and move towards a sustainable future have made energy audits greatly important. Their importance is magnified since energy spending is a major expense to industrial companies (energy spending accounts for ~ 10% of the average manufacturer's expenses). This growing trend should only continue as energy costs continue to rise.While the overall concept is similar to a home or residential energy audit, industrial energy audits require a different skillset. Weatherproofing and insulating a house are the main focus of residential energy audits. For industrial applications, it is the HVAC, lighting, and production equipment that use the most energy, and hence are the primary focus of energy audits.

1.4 PRELIMINARY ENERGY AUDIT

The Preliminary Energy Audit focuses on the major energy suppliers and demands usually accounting for approximately 70% of total energy. It is essentially a preliminary data gathering and analysis effort. It uses only available data and is completed with limited diagnostic instruments. The PEA is conducted in a very short time frame i.e. 1-3 days during which the energy auditor relies on his experience together with all the relevant written, oral visual information that can lead to a quick diagnosis of the plant energy situation. The PEA focuses on the identification of obvious sources of energy wastage's. The typical output of a PEA is a set of recommendations and immediate low cost action that can be taken up by the department head.

1.5 DETALID ENERGY AUDIT

The detailed audit goes beyond quantitative estimates of costs and savings. It includes engineering recommendations and well-defined project, giving due priorities. Approximately 95% of all energy is accounted for during the detailed audit. The detailed energy audit is conducted after the preliminary energy audit. Sophisticated instrumentation including flow meter, flue gas analyzer and scanner are use of compute energy efficiency.

1.6 SCOPE OF WORK FOR DETAILED ENERGY AUDIT

- Review of Electricity Bills, Contract Demand and Power Factor: For the last one year, in which possibility will be explored for further reduction of contract demand and improvement of power factor
- Electrical System Network: Which would include detailed study of all the Transformer operations of various Ratings / Capacities, their operational pattern, Loading, No Load Losses, Power Factor Measurement on the Main Power Distribution Boards and scope for improvement if any. The study

would also cover possible improvements in energy metering systems for better control and monitoring.

- Study of Motors and Pumps Loading: Study of motors (above 10 kW) in terms of measurement of voltage (V), Current (I), Power (kW) and power factor and thereby suggesting measures for energy saving like reduction in size of motors or installation of energy saving device in the existing motors. Study of Pumps and their flow, thereby suggesting measures for energy saving like reduction in size of Motors and Pumps or installation of energy saving device in the existing motors / optimization of pumps.
- Study of Air Conditioning Plant: w.r.t measurement of Specific Energy consumption i.e kW/TR of refrigeration, study of Refrigerant Compressors, Chilling Units, etc. Further, various measures would be suggested to improve its performance.
- Cooling Tower: This would include detailed study of the operational performance of the cooling towers through measurements of temperature differential, air/water flow rate, to enable evaluate specific performance parameters like approach, effectiveness etc.
- Performance Evaluation of Boilers: This includes detailed study of boiler efficiency, Thermal insulation survey and flue gas analysis./li>
- Performance Evaluation of Turbines: This includes detailed study of Turbine efficiency, Waste heat recovery.
- Performance Evaluation of Air Compressor: This includes detailed study of Air compressor system for finding its performance and specific energy consumption
- Evaluation of Condenser performance: This includes detailed study of condenser performance and opportunities for waste heat recovery.
- Performance Evaluation of Burners / Furnace : This includes detailed study on performance of Furnace / Burner, thermal insulation survey for finding its efficiency
- Windows / Split Air Conditioners: Performance shall be evaluated as regards, their input power vis-a-vis TR capacity and performance will be compared to improve to the best in the category
- Illumination: Study of the illumination system, LUX level in various areas, area lighting etc. and suggest measures for improvements and energy conservation opportunity wherever feasible.
- DG Set: Study the operations of DG sets to evaluate their average cost of Power Generation, Specific Energy Generation and subsequently identify areas wherein energy savings could be achieved after analysing the operational practices etc. of the DG sets.

II.OBJECTIVES OF PRESENT WORK:

- To use energy efficient compressors replacing low efficiency compressors
- To identify areas of compressed air loss, energy loss and to minimize those losses
- To use energy efficient compressors replacing minimum efficiency compressors
- To identify areas of compressed air loss, energy loss and to minimize those losses

III. PROCEDURE

3.1 REASON FOR ENERGY AUDITING ON COMPRESSION SYSTEM IN CEMENT INDUSTRY

In cement industry, as in other energy intensive process industries, the more generic measures, like high efficiency motors and lighting, are either already done or are so small that their

impacts are “below the radar”. Significant energy savings projects typically involve major process and/or equipment modifications that are industry-specific and highly specialized. Often highly specialized expertise is necessary to identify and be able to quantify energy savings of technology improvements. Cement industry customers see their equipment vendors as “business partners” because the vendors tend to have the specialized expertise and experience in their particular area (e.g. crushers/classifiers, kilns, conveyors).

Some of the energy efficiency equipment opportunities identified by customers, with a primary focus on electricity savings, include:

• Efficient materials transport system: most notably conversion of pneumatic conveyors to mechanical conveyors, with a savings of around 1% of total plant electricity use.

• Conversion of ball mills to roller mills for both raw materials and finish grinding: energy savings in raw materials preparation can be in the order of 5% of total electricity consumption, while installation of advanced finish grinding systems can save achieve savings in the 20% range.

• High efficiency classifiers: these do a better job of separating out fine particles from coarse particles, which are returned to the mills. They prevent over-grinding of the fine particles that results in unnecessary power use in the mills. Savings can be around 8%.

• Conversion to more efficient kilns such as vertical precalciner kilns, which will primarily improve the thermal efficiency of the kiln, saving on coal consumption.

• Variable speed drives: for fans in the kilns, coolers, preheaters, separators, and mills, and for other drives associated with variable loads. A comprehensive conversion to VSDs could probably save about 5% of total plant electricity use.

• Compressed air system improvements: while not a large part of a cement plant’s total electricity use, there is often room for significant efficiency improvements in systems that have not been optimized.

COMPRESS YOUR AIR COSTS

Compressed air finds widespread and varied usage in the manufacturing industry and is considered the fourth utility. Due to its nature, compressed air is considered to be a free utility. On the contrary, according to a US Department of Energy study, generating compressed air consumes an average of 10% of electricity in any plant. For industries like automobiles and cement, it may be as high as 30%. Inefficient generation and leakages further add to the generation cost.

IMPORTANT FACTS

•You may be spending upto Rs 31 lakhs per annum on operating your 90kW compressor.

•30% of your electricity cost may be through compressed air.

• Cost of off-load running a 90kW compressor for 4 hours daily is Rs 1.3 lakhs per annum.

•Leakages contribute to upto 40% of your compressed air costs, costing upto Rs 15 lakhs per annum.

•A single1/8” leak at 6.5 bar drains out Rs 1.5 lakhs per annum.

•Over pressurization by even 0.5 bar costs you Rs 1lakh per annum.

•Compressed Air is costlier than Steam.

HOW CAN WE SAVE?

Achieving energy efficiency and cost savings on compressed air networks takes patience, expert guidance and meticulous planning. Compressed air as

a utility, is often disregarded, and becomes a large source of losses.

To address this issue one has to look beyond the just the obvious sources – leakages and compressor inefficiency – and closely look at other avenues:

1. Reduce over-pressurisation
2. Balance your air requirement
3. Eliminate improper usage
4. Add to insufficient storage
5. Correct piping issues

Present Savings hidden Savings by Proper Monitoring, Metering and Controlling of Compressed Air The steps taken towards energy savings by most companies, while being effective, only scratch the surface of the overall savings potential. In order to achieve greater efficiency and to tap hidden potential, one must delve deeper and go in for more thorough measures. Forbes Marshall's Air Efficiency Solutions help in identifying the necessary measures to achieve industry best practices.

SOLUTIONS AT A GLANCE AIR AUDITS

The air audit helps you identify various losses in compressed air networks and recommends solutions which help in reducing the compressed air costs.

MAC - Master Air Control (MAC) is a demand side load controller which helps reduce energy costs by eliminating artificial demand and ensures a steady delivery. SequenceAIR - SequenceAIR is an intelligent compressor sequencing controller which delivers an efficient and economical compressed air system.

CountAIR - CountAIR is a comprehensive monitoring solution for compressed air networks. It keeps track of compressed air from generation to consumption and aids in running the compressed air network in balance.

FAD Meter - The FAD meter with online pressure and temperature compensation is an ideal and highly accurate solution for monitoring compressor efficiency.

AirMon - AirMon is an innovative cost-effective flowmeter for monitoring of compressed air on plant lines.

WHY METER COMPRESSED AIR?

Monitoring your network from generation to consumption is the first step to achieving energy savings and an optimal compressed air network. Most utility managers are now looking at various ways to control rising energy costs. However, due to lack of information, most compressed air networks tend to be mismatched – the generation often outstrips the demand, and most utility managers provide air to processes based on an approximate or intuitive guess about the requirements.

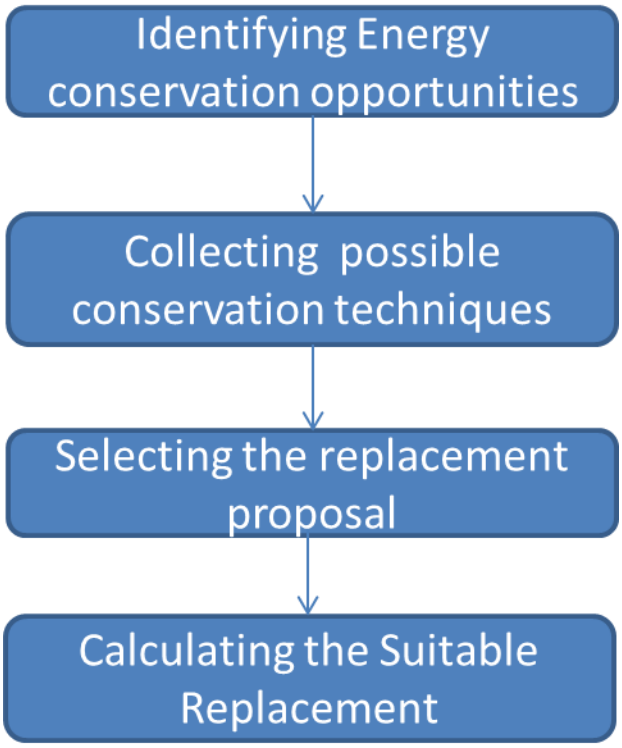
Benefits of metering compressed air

- Know your losses vs leakages
- Avoid periodical overhauls
- Reduce downtime through preventive maintenance
- Avoid over pressurisation.
- Annual power loss vs over pressure%

Solutions are:

- Demand and supply side load balancing
- Compressor sequencing
- Anti-surge control
- Compressor network monitoring

IV. METHODOLOGY



V. EXPERIMENTATION

F53 B/F COMPRESSOR UNIT

S.N0	LOAD		UNLOAD		LOADING %	UNLOADING %	LOAD POWER (KW)	ACTUAL POWER CONSUMPTION (KW/hr)
	Time (sec)	Pressure (bar)	Time (sec)	Pressure (bar)				
1	423	5.8	86	7.8	83	16.89	9.1	7.56
2	435	5.8	80	7.8	84.46	15.53	9.1	7.69
3	398	5.8	78	7.8	83.61	16.38	9.1	7.61
4	394	5.8	83	7.8	82.59	17.40	9.1	7.52
5	375	5.8	67	7.8	84.84	15.15	9.1	7.72
Avg Power Consumption (kw/hr)								7.62

R35 B/F COMPRESSOR UNIT

S.N0	*LOAD*		*UNLOAD*		*LOADING %*	*UNLOADING %*	*LOAD POWER (KW)*	*ACTUAL POWER CONSUMPTION (KW/hr)*
	Time (sec)	*Pressure (bar)*	*Time (sec)*	*Pressure (bar)*				
1	70	4.6	63	7.2	52.63	47.36	11.5	6.05
2	103	4.6	105	7.2	49.52	50.48	11.5	5.69
3	79	4.6	69	7.2	53.38	46.62	11.5	6.14
4	105	4.6	92	7.2	53.29	46.70	11.5	6.13
5	93	4.6	69	7.2	57.40	42.59	11.5	6.60
Avg Power Consumption (kw/hr)								6.12

R40-FK PUMP SEAL AIR UNIT

S.N0	*LOAD*	*LOADING %*	*UNLOADING %*	*LOAD POWER (KW)*	*ACTUAL POWER CONSUMPTION (KW/hr)*
	Pressure (bar)				
1	2.8	100	0	4.5	4.50
2	2.8	100	0	4.5	4.50
3	2.8	100	0	4.5	4.50
4	2.8	100	0	4.5	4.50
5	2.8	100	0	4.5	4.50
Avg Power Consumption (kw/hr)					4.50

R50 FK PUMP AIR SEAL UNIT

S.N0	LOAD Pressure (bar)	LOADING %	UNLOADING %	LOAD POWER (KW)	ACTUAL POWER CONSUMPTION (KW/hr)
1	2.8	100	0	6	6.00
2	2.8	100	0	6	6.00
3	2.8	100	0	6	6.00
4	2.8	100	0	6	6.00
5	2.8	100	0	6	6.00
Avg Power Consumption (kw/hr)					6.00

OVERALL POWER CONSUMPTION BY THE RECIPROCATING COMPRESSORS

S. N0	E.CODE	COMPRESSOR TYPE	MODEL	INSTALLED RATED POWER (KW)	RATED CFM	APPLICATION	LOADING %	UNLOADING %	LOAD POWER (KW)	ACTUAL POWER CONSUMPTION (KW/hr)
1	R40	RECIPROCATING	SC-100	5.5	30	FK PUMP SEAL AIR	100	0	4.5	4.50
2	F50	RECIPROCATING	TC-1000	7.5	30	FK PUMP SEAL AIR	100	0	6	6.00
3	F53	RECIPROCATING	TC-1000	11	30	UNIT BAG FILTER	83.70	16.27	9.1	7.62
4	R35	RECIPROCATING	TC-1500	15	51	COAL MILLBAG FILTER	53.24	46.76	11.5	6.12
									Total Power Consumption (KW/hr)	24.24

FORMULAE USED

Loading and Unloading Percentage

Loading Percentage=Load time/(Total Time)*100

UnloadingPercentage=Unloadtime/(TotalTime)*100

where, Total time=load time + unload time

Actual power consumption

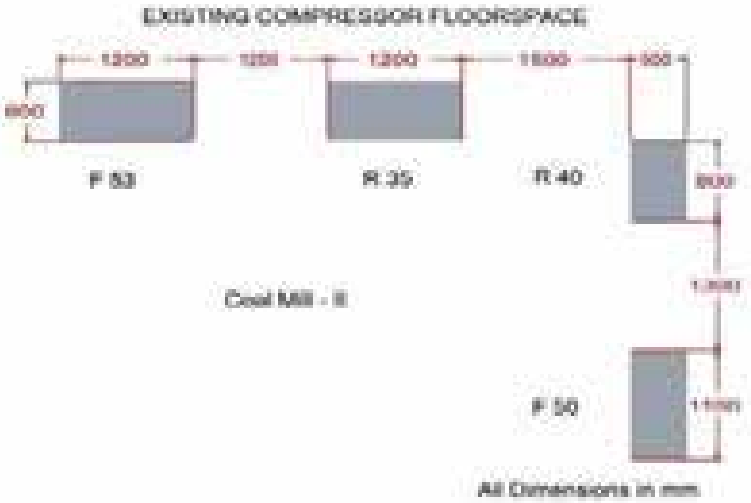
$$\left\{\begin{matrix}\text{Actual power} \\ \text{consumption}\end{matrix}\right\} =$$

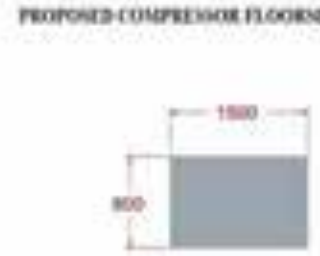
$$\left\{\begin{matrix}\text{Load power} * \text{loading Percentage} + \\ \text{unloading power} * \text{unloading percentage}\end{matrix}\right\}$$

where,

unit of load power is kW/hr

VI MODELING AND ANALYSIS





All Dimensions in mm

VII CALCULATIONS

RequiredFlowRate=

30*.1+30*.1+30*.8371+51*.53214 = 112.26 cfm

Installed Rated power = 5.5+7.5+11+15 = 39 kW

Actual power Consumption = 4.5+6+7.6167+6.123 = 24.24kW/hr

If E22-8.5 Compressor is taken for replacement then for 112.26 cfm

the loading ratio is 112.26/132=.85 i.e. 85% loading and 15%unloading

Proposed Power consumption is 22*.85+8.5*.15 = 19.975kW

Power savings per hour = 24.24 - 19.975 = 4.265kW/hr

Running hours = 8400 hrs

Total power savings = 8400*4.265 = 35826 kW

Annual Cost Savings = 35826*8 = Rs.2,86,608

where 1 unit cost is Rs.8

VIII PRESSURE LOSES IN PIPE

8.1 CFM CHART

Pressure Drop Chart for Compressed Air Line

Pressure Drop in Air Piping per 100 feet (psi)								
Air Flow (cfm)	*Pipe size in inches*							
	½"	¾"	1"	1 ½"	2"	3"	4"	5"
10	0.4	-	-	-	-	-	-	-
50	8.2	1.9	0.8	-	-	-	-	-
100	-	7.5	2.1	0.24	-	-	-	-
150	-	12	3.2	0.37	0.1	-	-	-
200	-	-	8.1	0.92	0.3	-	-	-
250	-	-	-	1.44	0.4	-	-	-
300	-	-	-	2.05	0.6	-	-	-
500	-	-	-	5.59	1.5	0.1	-	-
600	-	-	-	8	2.2	-	-	-
750	-	-	-	-	-	0.4	0.1	-
1000	-	-	-	-	5.9	0.8	0.2	-

8.2 MODEL CALCULATIONS

Pressure loss in pipe

1 feet = 0.3048 meter

1" pipe:

120 meter for 1" pipe=393.6 feet

In cfm chart 100 feet pressure loss = 3.2 psi

36.576 feet pressure loss = 393.6/100*3.2

= 12.592 psi

¾" Pipe:

40 meter for ¾ " pipe =131.2 feet

In cfm chart 100 feet pressure loss = 12 psi

12.192 feet pressure loss = 131.2/100*12

= 15.744 psi

Total loss = 12.5952+15.74

= 28.3392psi

2" pipe:

160 meter for 2" = 525 feet

In cfm chart 100feet pressure loss = 0.1 psi

525 feet pressure loss = 524.8/100*0.1

= 0.5248 psi

Pressure Drop Reduction

Pressure drop reduction = 28.339 - 0.525

= 27.8144 psi

= 1.9867 bar

IX PROJECT OUTCOMES AND CONCLUSIONS

Thus our project shows that if the existing reciprocating compreesor is taken for Replacement With Screw Compressor

Annual cost saving of Rs. 2,86,608 can be made

Noice level more than 8db can be reduced

Reduction in floorspace by 11,90,000 sq.mm

If the cost of the compressor is approximated to Rs. 4,30,000 the payback is less upto 1 Year 6 Months.

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4 Compressed Air Systems (CAS) Audit Standard (A standard for the auditing of the energy efficiency of electric motor powered compressed air systems) (Version 1.0)

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Nonlinear Optical Properties in II-VI Oxide Quantum Dot Nanostructure

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ABSTRACT

In the present work, some electronic and nonlinear optical properties are studied in a CdO/ZnO core/shell quantum dot nanostructure taking into account the spatial confinement effect. The binding energy of an electron-hole pair is computed using Smorodinsky-Winternitz potential and the second harmonic generation is studied with the function of photon energy. The potential used in the Hamiltonian is different on both the sides of the barrier involving a two parametrical potential. The exciton binding energy is obtained employing variational method within a single band effective mass approximation and the nonlinear optical properties are probed using density matrix approach within a two level system. The larger exciton binding energies of these materials bring out the stability of electron-hole pair at room temperature. The results show that these properties are enhanced in the strong geometrical confinement region. The resonant peaks in the second harmonic generation are strongly influenced by the geometrical confinement, confined potential, matrix elements and the structural parameters. Thus, the obtained results on nonlinear optical properties of wide band gap semiconducting material will be helpful for the response to the industrial demand for optoelectronic devices operating the entire spectral region in the visible spectrum.

1. Introduction

Inorganic nanocrystals with certain geometries exhibit unique shape dependent phenomena and subsequent Group II-VI oxide materials are given attention because of their exotic physical and chemical properties when their dimensions are reduced and they have been attracted much due to the novel potential applications in fabricating electronic and opto-electronic devices covering the entire visible spectrum. Wide band gap oxide semiconductors are considered to be very promising candidates for semiconductor applications. It is because they have larger free exciton energy and direct band gaps. The excitonic emission continues even at room temperature and above it. These materials possess larger band gaps with higher binding energies and they can serve as light emitting diodes, laser diodes, photo-transistors, high transmittance conductive oxide coatings for solar cells, optically pumped nano-lasers, gas nanosensors and field-effect transistors [1-3]. CdO and ZnO are the promising candidates in group II-VI materials showing unique nonlinear optoelectronic elements in controlling optical signals in devices. Tailoring the band gap with size dependent optical properties, within the nano-regime, will be useful for fabricating efficient optical devices [4-6]. Nanocrystalline ZnO/CdO composites have been prepared and the optical properties have been investigated earlier [7, 8].

In the present work, the electronic and optical properties of a wide band gap II-VI oxide core/shell quantum dot heterostructure are investigated. The spatial confinement and the incident photon energy are taken into consideration. The exciton binding energies and second harmonic generation are obtained with a new confinement potential. The variational formulism and the density matrix method have been applied to obtain those properties.

2. Theoretical Formulism

The taken system consists of an inner core surrounded by an outer core material. The core material is taken as CdO and the outer shell material is taken as ZnO which is the higher energy band gap than the inner material. Within the single band effective mass approximation, the Schrödinger equation, of an exciton, is obtained as

$$\left[\hat{H}_{exc} = \hat{H}_e + \hat{H}_h - \frac{e^2}{\varepsilon_0 r} + \frac{l(l+1)\hbar^2}{2m^*_{e(h)}r^2} + V(r)\right]\psi(r) = \mathrm{E}\,\psi(r) \qquad (1)$$

where m_e^* is the electron effective mass and m_h^* is the hole effective mass. ε_0 is the dielectric constant of the inner core material, $V(r)$ is the confined potential of the system, l is the angular momentum quantum number, and E is the energy eigen value. The Smorodinsky-Winternitz potential is taken as the confined potential of the system. Here, height of the potential is different on both the sides of the barrier and it involves a two parameters with the following form [9]

$$V(r) = \delta r^2 + \frac{\lambda}{r^2} - \sqrt{\delta\lambda} \qquad (2)$$

where δ and λ describe the materials taken in the present model. The lowest binding energies of the exciton and thereby the exciton binding energies are obtained. Using the following trial wave function, the Hamiltonian is minimized and the respective energies are found with the variation of dot size.

$$\psi_{nlm}(r,\theta,\phi) = R_{nl}(r)Y_{lm}(\theta,\phi)\exp(-\gamma r) \qquad (3)$$

with $R_{nl}(r)$ and Y_{lm} are the radial and the spherical harmonic wave functions respectively. Thus, the variational parameter is employed to obtain the exciton ground state energy by minimizing Eq.(1)

$$E = \min_{\gamma} \frac{\langle \Psi | H | \Psi \rangle}{\langle \Psi | \Psi \rangle} \qquad (4)$$

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The exciton binding energy of the system, using variational formulism, is given as

$$E_b = E_e + E_h - \langle H(\gamma) \rangle_{\min} \quad (5)$$

with E_e and E_h are the energy eigenvalues of the single electron and hole without the interaction term between them. $\langle H(\gamma) \rangle_{\min}$ is calculated by minimizing the (Eq.(1)) in respect of the variational parameters. Generally, it is known that the optical response of the material behaves nonlinearly when it is exposed by the intense radiation of light. The induced light wave on the semiconductor is described by the response of the electrical polarization which is a linear function of the applied electric field and it is obtained as

$$P = \chi^{(1)} \cdot E \quad (6)$$

where $\chi^{(1)}$ is the linear susceptibility. The nonlinear effect, with the high intense light, takes the form as given by

$$P = \chi^{(1)} \cdot E + \chi^{(2)} \cdot E^2 + \chi^{(3)} \cdot E^3 \ldots \quad (7)$$

where $\chi^{(2)}$ and $\chi^{(3)}$ are the first order and second order susceptibilities respectively. Within a three level system, the nonlinear optical properties are investigated with the incident photon energy. The second order nonlinear susceptibilities at double frequency in a three level system is given by [10]

$$\chi^{(2)}_{2\omega} = \frac{e^3 N}{\varepsilon_0} \frac{\mu_{01}\mu_{12}\mu_{20}}{(\hbar\omega - E_{01} - i\hbar\Gamma_{10})(2\hbar\omega - E_{20} - i\hbar\Gamma_{20})} \quad (8)$$

where N is the density of carriers in the quantum dot $E_{ij} = E_i - E_j$ and $\Gamma_{10} = \Gamma_{20} = \Gamma_0$ are the relaxation rates.

3. Results and Discussion

Numerical calculations are presented in order to investigate the electronic and optical properties of an electron-hole pair in the group II-VI core/shell quantum dot using a different kindly potential namely, Smorodinsky-Winternitzt. The spatial confinement and the incident photon energy are varied so as to obtain those properties. The atomic units are used throughout the calculations in which Planck constant is assumed, the electronic charge and the electron mass m_0 are assumed as unity. The second harmonic generation with the incident photon energy in a CdO/ZnO core/shell quantum dot is presented in Fig. 1. The inner radius of the core/shell quantum dot is taken as 40 Å. It is observed that the variation of maximum peak of plotted second harmonic generation shows two peaks one at $\omega = \omega_{10}$ and another one at $\omega = \omega_{20}/2$, explaining the energy spacing between energy levels and of course, it is effectively affected by the structural parameters of the system involved. The magnitude of the second order susceptibility is observed to be higher energies for longer relaxation time. The resonant peaks in the second harmonic generation are strongly influenced by the geometrical confinement, confined potential, matrix elements and the structural parameters.

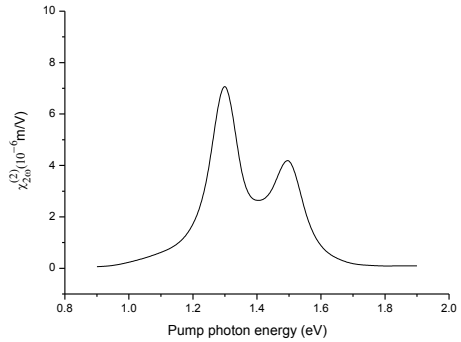


Fig. 1 Variation of second harmonic generation as a function of photon energy in CdO/ZnO core/shell quantum dot

4. Conclusion

In conclusion, the electronic and optical properties of a group II-VI oxide core/shell quantum dot heterostructure have been studied. The exciton binding energy and the second harmonic generation have been obtained. The excitons play an important role in nonlinear optical properties of group II-VI oxide wide band gap semiconducting materials even at room temperature and they are useful for the potential applications in ultraviolet-blue optoelectronic nano-devices.

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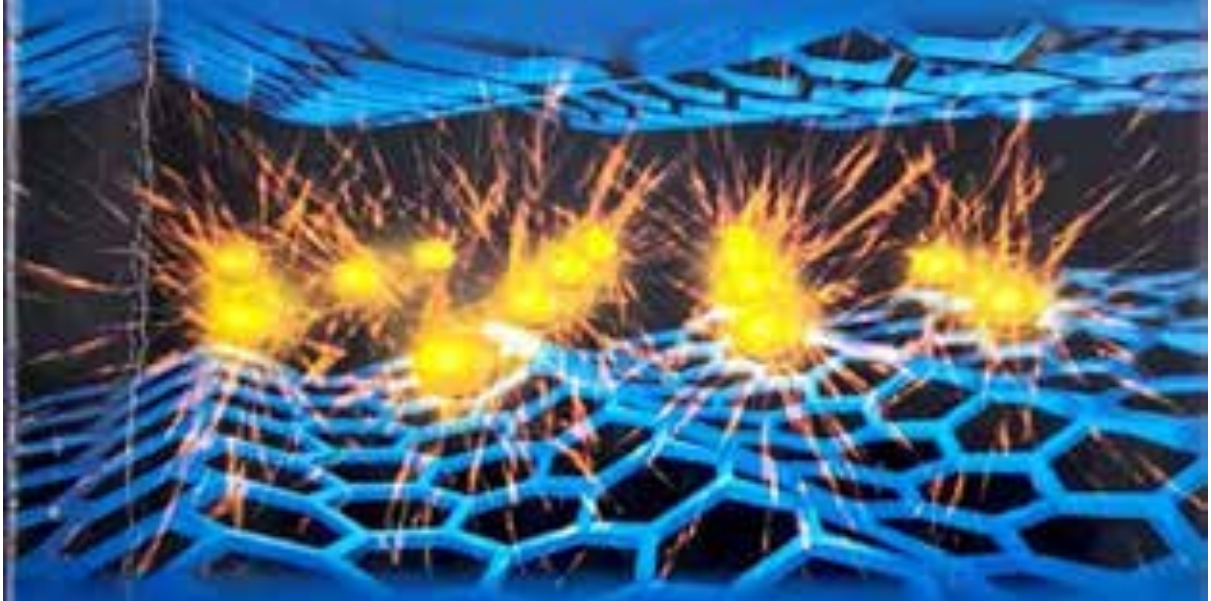


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IT2

COMPARING THE USE OF SILICON AND PLASTIC CHIPS IN INCUBATION TYPE PLANAR PATCH CLAMP

O. Senthilkumar and Tomeo Ueno*

Ramco Institute of Technology, Rajapalayam
* Nagoya University, Japan

Abstract

Pipette patch clamp is an important tool in electrophysiology for investigating ion channels present in the cells. This technique is useful for various diagnostic applications. Pipette patch clamp is considered as a tedious process which requires trained expert in handling. On the other hand, planar patch clamp is a slightly modified technique, useful in high throughput screening of cells. Planar patch clamp uses semiconducting chips as substrates for the cell seeding and current-voltage measurement. In this investigation, we have used both silicon and P9EMA chips in fabricating incubation type planar patch clamp technique. This device is useful for periodic monitoring of the cells and to know about the nature of ionic transport in cells with respect to different external influences. The device fabrication involves chips processing, use of micro-fluidics, functionalization of the substrates for cell seeding and growth. Channel Rhodopsin wide receiver cells (ChRWR) expressed with HEK 293 was taken into consideration which has light gated ion channels. The channel current was measured successfully with different membrane potentials under an applied laser pulse. The use of plastic chips over silicon chips were compared and discussed.

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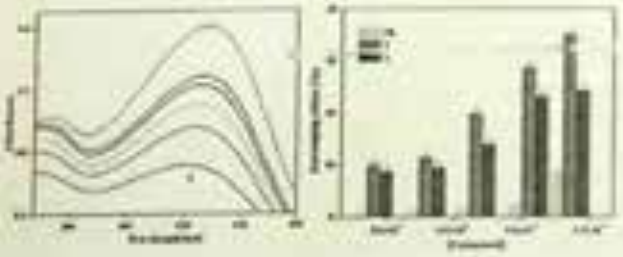
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PP-6: ANTIOXIDANT AND DNA INTERACTION STUDY OF MIXED LIGAND NICKEL(II) COMPLEXES BEARING PYRIMIDINE DERIVATIVE SCHIFF BASE

N. Revathi[a,b] and J. Dhaveethu Raja[c]*

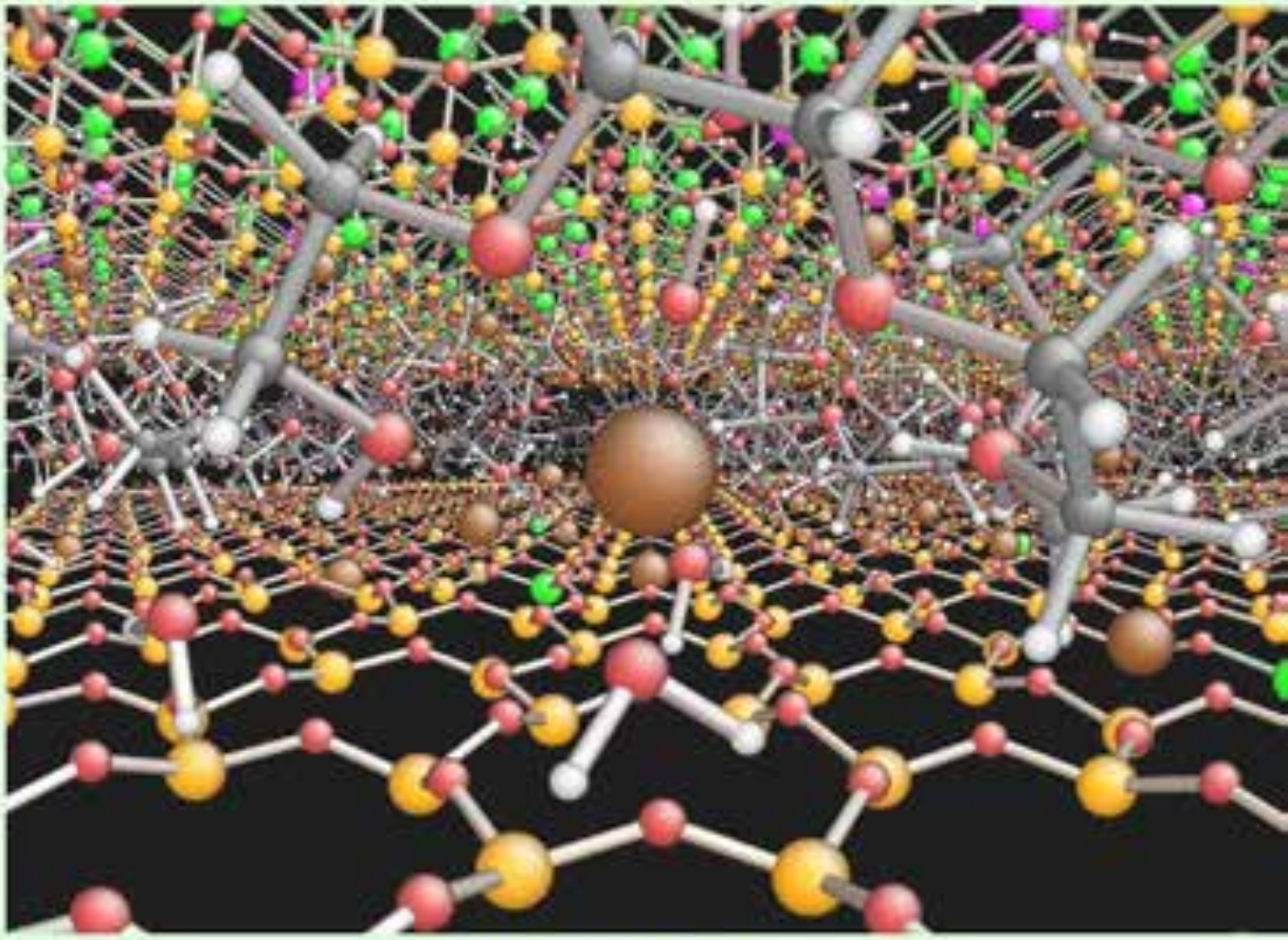
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Mixed ligand Ni(II) complexes [NiL(phen)](CH$_3$COO) **1** and [NiL(bpy)](CH$_3$COO)**2** have been synthesized using pyrimidine derivative Schiff base 2-(4,6-dimethylpyrimidin-2-ylimino)methyl)-4-nitrophenol (**HL**). 1,10-phenanthroline (phen) / 2,2'-bipyridine (bpy) with nickel(II) acetate. The structures of the complexes **1** and **2** have been elucidated by elemental analysis, molar conductance, FT-IR, UV-visible and mass spectrometric analysis. Complexes **1** and **2** have been screened for the antibacterial activity against Gram-positive bacteria like as *S. aureus, S. pneumoniae, Strep. pneumoniae, B. subtilis* and Gram-negative bacteria like as *S. flexneri, S. typhi, K. pneumoniae, H. influenzae*. The results indicated that complexes **1** and **2** act as good antibacterial agents. The antifungal activity of the complexes **1** and **2** has been analyzed using the fungi such as *A. niger, C. albicans, C. tropicalis* and *M. canis*. The complexes **1** and **2** have high antifungal activity due to chelating capacity of Schiff base (**HL**) with nickel(II) ion. Absorption and viscometric measurements have been indicated for the interaction of the complexes **1** and **2** with Calf-Thymus (CT) DNA that complexes **1** and **2** bind via an intercalation mode with binding constant 1.05 10^5 M^{-1} (**1**), and 3.64 10^7 M^{-1} (**2**). In addition, investigation of antioxidant property has been studied, it is concluded that complexes **1** and **2** have more antioxidant nature than **HL**.



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IL-1

NANOSTRUCTURED SEMICONDUCTOR FUNCTIONAL MATERIALS

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Functional materials are those which perform specific functions. They display physical properties which are exploited. Functional materials are of wide range. They find applications in several high-tech areas; form the basis for a wide range of technologies. Some of them are: computation, communication, storage, information display, energy generation and storage, mobility, sensing, catalysis and photocatalysis. These materials are classified not on the basis of their origin or nature of bonding or processing techniques but on the basis of the functions they perform. Functional materials cover different class of materials ranging from semiconductors, over polymers and molecular crystals to nanoparticles. It is their special electrical (including semiconducting devices and superconductors), optical (including lasers, Raman scattering, fluorescence and phosphorescence), dielectric (piezoelectrics, ferroelectrics, optical fibers, photocoping and liquid crystals), magnetic and thermal properties which are responsible for their action. Discovery and applications of semiconductors and other functional materials led to the development of modern information and communication technology based society. The synthesis, physical properties and various potential applications of nanostructured ZnO, CuO, TiO_2, SnO_2, etc., semiconductors will be addressed in the title lecture.

IL-2

WHITE LIGHT EMITTING MOLECULAR SYSTEMS

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There is a high level of interest in generation of white light emission (WLE) because of its importance in lighting device based on LEDs (almost 20% of the total worldwide energy consumption), tunable lasers display and chemical sensors etc[1].In recent times, WLE has been achieved from various systems such as inorganic, organic molecules and nanomaterials when photoexcited at near UV region[2]. For this purpose, WLE was successfully achieved from extracted natural pigments and organic fluorophore utilizing various photophysical phenomenon.

A mixture of extracts from two common vegetables, red pomegranate and turmeric, when photoexcited at 380 nm produced almost pure white light emission (WLE) with CIE chromaticity index (0.35, 0.33) in acidic ethanol, in PVA film (0.32, 0.25), and in gelatin gel (0.26, 0.33) utilizing cascade FRET strategy[2].Further, green emitting turmeric extract has been replaced by fluorescent carbon nanonparticles obtained from pomegranate extract to obtain WLE in acidic aqueous medium and in PVA film with good CIE value[3]. WLE was also achieved in pure aqueous medium by mixing RGB emitting pigments. It is shown that white light emitting cocktail are sensitive towards pH, the position of colour coordinates in the chromaticity diagram is sensitive to pH, and this can be used as a novel sensing method[4]. WLE from a single organic fluorophore is challenging because of the need to get fluorescence covering

entire visible region. We reported WLE from a butadiyne bridged pyrene−phenyl hybrid[5] and substituted diphenylbutadiynes[6] fluorophore in mixed-aqueous solvents as well as in polymer film matrices. The multiple emission comes fromlocallyexcited (LE; 400−500 nm), aggregate (excimer type; 475−600 nm), and chargetransfer (CT; 500−750 nm) states spanning the emission almost throughout thevisible range has made the generation of the white light to be possible.

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OP-1

PREPARATION AND APPLICATION OF DIALDEHYDE STARCH NANORODS FOR COLLAGEN STABILIZATION

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Collagen is widely used in various biomedical, tissue engineering and leather applications.But the stability of collagen is a major concern. Modified biopolymers such as dialdehyde starch and dialdehyde alginic acid are proved to be efficient, non-toxic stabilizing agents of collagen than the conventionally used aldehydes, metals and metal nanoparticles. Thus, our project aims to convert soluble starch to Dialdehyde Starch Nanorods (DASNR) by micro-emulsion method and use them to crosslink and stabilize collagen. The DASNR was characterized by FT-IR, XRD, SEM, UV analysis and MTT assay and the aldehyde content of DASNR was found to be 51.2%. The amount of collagen present in Type I collagen solution synthesized from RTT was found to be 103 µg/ml. The optimum concentration of DASNR needed to stabilize collagen was estimated to be 0.1 g/ml from the TNBS assay and the crosslinked collagen solution was characterized by SEM, FTIR and SDS PAGE. Gelling time, re-dissolution temperature, agar-well diffusion and micro-shrinkage assays proved that the DASNR-crosslinked collagen is more stable compared to pure collagen solution. The basic properties such as tensile strength, percentage elongation and swelling ratio of collagen and DASNR-crosslinked collagen membranes were found to be very efficient and from the MTT assay, it was also seen that the ratio of 10:0.1 DASNR-crosslinked collagen membrane is very effective for the cell viability, growth and proliferation. Thus, DASNR is an efficient cross-linking agent for collagen.

Keywords: Collagen stabilization, DASNR, FTIR, XRD, SEM, TNBS, MTT Assay

OP-2

SYNTHESIS AND CHARACTERIZATION OF UV ACTIVE PHOTOCATALYST Cd@SiO_2 FOR ITS PHOTOVOLTAIC PERFORMANCE

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We report on a new type of nanocomposite consisting of Cadmium (Cd) core and a Silica (SiO_2) shell. We developed and optimized these particles for photocatalytic and photovoltaic applications. The particle morphology was investigated by electron microscopy. Energy-dispersive X-ray analysis shows the presence of Cd, O, and Si elements. The Cd@SiO_2 NPs had a narrow size distribution with diameters in the size range of ~60 nm through TEM observation. The crystalline size is calculation by the Scherrer formula and TEM measurements.

N_2 adsorption and desorption isotherms gave further evidence that the Cd NPs were successfully incorporated into SiO_2 pore channels. Photocatalytic performance of SiO_2 and Cd-doped SiO_2 (Cd@SiO_2) were investigated using malachite green (MG) as a model pollutant under UV light.

Keywords: Sol–gel technique, Nanoparticles, Core-shell, High surface area.

OP-3

SYNTHESIS AND CHARACTERIZATION OF SILVER NANOPARTICLES USING TRIKATTU EXTRACT

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Silver nanoparticles have received considerable attention in recent years due to their wide range of applications in fields like biosensors, catalysis, medicine and microbiology. The size reduction of the metal nanoparticles by the plant extract which act as a reducing and stabilizing agent has attracted many researchers. At present, most studied metal nanoparticles include noble metal nanoparticles, in particular Ag, Pt, Au, Ru and Pd [1]. Plant based materials are considered as the best candidate for nanoparticle synthesis. Though we have many methods for producing metal nanoparticles, synthesis through green route is an upcoming field and is a very promising one. As it is an environmentally friendly, fast and simple methodology which includes clean, non toxic, cost effective. Plant based material is an excellent candidate for the reduction of metal nanoparticles. The reducing agent is considered as the presence of alkaloids, flavonoids and terpenoids in the plant extract [2]. This study investigates an efficient and sustainable route of silver nanoparticles preparation using Trikattu powder. Trikattu is a combined name of three plant products they are Black Pepper (Piper nigrum), Indian Long Pepper (Piper longum) and Ginger (Zingiber officinale). The reduction of $AgNO_3$ was verified using an UV–vis spectrophotometer. Spherical forms of silver nanoparticles are observed in the SEM image and the average particle size is found to be 15-27nm. FTIR studies analyses the bio-molecule capping agent. The crystalline structure of the prepared silver nanoparticle was characterized by XRD techniques. The synthesized silver nanoparticles showed effective antimicrobial activity against representative pathogens.

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OP-4

THE SYNERGISTIC INHIBITION OF CARBON STEEL CORROSION BY DTPMP- SG- Zn2+ SYSTEM IN NEUTRAL AQUEOUS ENVIRONMENT

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The corrosion behaviour of carbon steel were investigated in 60 ppm Cl^- for a period of three days immersion in presence and absence of Zinc ions. This work comprises of laboratory studies. The experimental methods included that the determination of inhibition efficiency (I.E.) of carbon steel corrosion by weight-loss method, electrochemical study. Increase in charge transfer resistance (R_{ct}) and decrease in double layer capacitance (C_{dl}) indicated that the protective film was formed on the carbon steel surface. The ternary inhibitor system functions as an anodic inhibitor which is confirmed by Polarization study. 25 ppm of SG, 25 ppm DTPMP and 10 ppm Zn^{2+} gave maximum I.E. of about 96%. For the same combinations, variation of pH and immersion period was also studied. The surface morphology of carbon steel was confirmed by SEM and AFM analysis. The hydrophobic nature of the surface was analysed by contact angle measurement.

Keywords: Carbon steel, Polarization, SEM, AFM, contact angle, neutral environment

OP-5

PRELIMINARY PHYTOCHEMICAL SCREENING ON CROTALARIA VERRUCOSA

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Bioactive compounds derived from plants have been focused on recent research due to their health promoting effects. Medicinal plants serve as the main source of medicine to poor communities that do not have access to modern medical services. The present investigation has been carried out to analyze the phytochemicals present in the leaves of crotalaria verrucosa medicinal plant. The hydro alcoholic extract was used for phytochemical screening revealed the presence of alkaloids, flavonoids, phenols, saponins, steroids, tannins and carbohydrates.

Keywords: Phytochemical analysis, Crotalaria verrucosa, and Hydro alcoholic extract.

OP-6

STUDIES ON THE CORROSION INHIBITOR PROPERTY OF SR(ZnZr)$Fe_{10}O_{19}$-PANI POLYMER COMPOSITE FOR MILD STEEL IN STRONG ACIDIC CONDITION

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Strontium Zinc Zirconium hexaferrite-polyaniline composite was synthesized by oxidative chemical polymerization of aniline. The structure and morphology of the composite was characterized by FTIR, XRD and SEM. The composite was evaluated as corrosion inhibitor for mild steel in 0.1N, 0.5N, 1N, 2N H_2SO_4 solution using gravimetric method. Inhibition increases with increase in concentration of inhibitors. For the first time strong acidic condition is adopted. Under this condition, inhibition efficiency decrease slightly after 2 hours. Results revealed that the composite act as inhibitor and could serve as an effective corrosion inhibitor for mild steel even in strong acid medium. Potentiodynamic polarization, Electrochemical Impedance spectroscopy (EIS) and Open circuit potential (OCP) techniques were carried out to prove corrosion efficiency of the composite at room temperature.

Key words: Sr(ZnZr)$Fe_{10}O_{19}$-PANI, Mild steel, Corrosion-inhibitor, Potentiodynamic Polarization, Electrochemical Impedance spectroscopy, SEM

OP-7

GREEN SYNTHESIS OF ZnO NANOPARTICLES USING SOLANUM TRILOBATUM LEAF EXTRACT AND THEIR ANTIMICROBIAL ACTIVITY

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Zinc oxide has been produced via a simple green method from zinc nitrate and leaf extract aqueous solutions. Prepared ZnO nanoparticles (NPs) were investigated by employing through UV–Visible diffuse reflectance spectroscopy (UV-DRS), photoluminescence (PL) spectroscopy, X-ray diffraction (XRD), Fourier transform infrared (FTIR), Field emission-scanning electron microscope (FE-SEM), and Transmission electron microscope (TEM) respectively. Moreover, the antibacterial activity of synthesized ZnO nanoparticles against S. aureus, S. paratyphi, V. cholerae, and E. coli are also screened.

Key words:, Biosynthesis, ZnO nanoparticles, Optical properties, antimicrobial activity.

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OP-8

SYNTHESIS AND CHARACTERIZATION OF Ce DOPED CdS/PEG NANOCOMPOSITE FILMS

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Ce doped CdS/PEG nanocomposite films were synthesized by in situ-spin coating method. The films were characterized using x-diffraction (XRD), scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), UV-Visible optical absorption spectra and photoluminescence studies to investigate the structure, morphology, absorption, emission and dielectric properties. XRD patterns confirm that all the nanocomposite films exhibits the cubic phase of CdS nanoparticles and the size of the nanoparticles are varying from 4.13 to 4.64 nm with Ce doping. SEM micrographs show that CdS nanoparticles are mono dispersed in the polymer matrix. FTIR spectra confirm the formation of CdS/PEG nanocomposite thin films. UV-Visible optical absorption studies exhibit the blue shifted phenomenon of title samples with the comparison of bulk CdS. The optical band gap energy is found to be decrease with increasing Ce dopant concentrations. Photoluminscence spectra show the single emission peak. It is attributed to the red emission due to the defect originated during the synthesis.

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OP-9

A STUDY ON THE LINEAR AND NONLINEAR OPTICAL PROPERTIES OF PURE AND DOPED THIOUREA BASED SINGLE CRYSTALS

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By means of solvent evaporation method, pure and Ni^{2+} doped tetrakis thiourea barium chloride (TTBC) single crystals have been grown. Single crystal X-ray diffraction analyses have been carried out on the pure and doped TTBC crystals to arrive at the values of their axial lengths and interfacial angles. It has been inferred from XRD analysis that the pure and doped TTBC crystals belonged to monoclinic system. The crystalline nature of the grown crystals has been ascertained by the powder X-ray diffraction technique which resulted in a diffractogram with sharp peaks. The concentration of the nickel dopant in the parent TTBC crystal has been estimated by using atomic absorption spectroscopy. It has been noticed from the UV-Vis spectrum of the samples that the doping effect increased the transmittance percentage of pure TTBC. The UV spectral studies have also been employed to deduce significant optical constant values of the crystals such as reflectance, refractive index, optical conductivity, electrical conductivity, extinction co-efficient, electrical susceptibility and band gap energy. In all the cases the values of Ni^{2+} doped TTBC exhibited increased optical constant values. The theoretical band gap energy values have also been verified experimentally by means of Tauc's plot. The crystalline nature of the crystals has also been attested by the calculated low values of Urbach's energy. Kurtz-Perry powder technique indicated that the Ni^{2+} doped TTBC has 1.07 times higher second harmonic generation (SHG) efficiency than that of the parent TTBC crystal. The phase matching nature of the pure and doped TTBC crystals has been ascertained by Kurtz-Perry technique.

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OP-10

NMR SPECTRAL STUDIES AND CATALYTIC SYNTHESIS OF AN IMIDAZOLE DERIVATIVE AS EFFICIENT FLUORESCENT CHEMOSENSOR

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An efficient potential chemosensor 2-(4,5-dimethyl-1-*m*-tolyl-1*H*-imidazol-2-yl)phenol (DMTP) has been designed and synthesized using nano SiO_2 as an efficient catalyst. Nano SiO_2 exhibited remarkable catalytic activity with respect to the reaction time, amount of catalyst and vast range of substrates usage. Synthesized compounds have been characterized by ^{1}H and ^{13}C-NMR spectral studies. Proton and ^{13}C chemical shift of the synthesized compounds were calculated. DMTP has been used to construct highly sensitive fluorescent chemosensor for sensing of metal ions. It can behave as a selective fluorescent sensor for the detection of Fe^{3+} metal ion. Addition and increasing concentration of Fe^{3+} ions into DMTP results excellent fluorescence quenching. Other cations, including Ca^{2+}, Al^{3+}, K^{+}, Cd^{2+}, Pb^{2+}, Zn^{2+} and Mg^{2+} had little influence in the fluorescence intensity. Surprisingly reversible fluorescence enhancement has been observed with the addition of H3PO4 due to the deactivation of iron complex.

Keywords: Chemosensor, Fluorescence, nano SiO_2, chemical shift.

OP-11

SYNTHESIS, SPECTRAL CHARACTERISATION AND BIOLOGICAL STUDIES OF 2-(4-METHOXYNAPHTHALEN-1-YL)-1-(4-METHOXYPHENYL)-1H-PHENANTHRO [9,10-D] IMIDAZOLE

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Synthesised 2-(4-methoxynaphthalen-1-yl)-1-(4-methoxyphenyl) -1H-phenanthro [9,10-d]imidazole has been characterized by ^{1}H, ^{13}C NMR and FT-IR spectral analysis and also biological studies were carried out. The imidazole nitrogen containing heterocyclic ring which possesses biological and pharmaceutical importance. The imidazole ring is ionisable aromatic compound, it improves pharmacokinetic characteristics of imidazole molecules and thus used as a medicine to optimize solubility and bioavailability parameters. There are several methods used for the synthesis of imidazole containing compounds and also their various structure reactions offer enormous scope in the field of medicinal chemistry. The imidazole possesses extensive biological activities such as antimicrobial and anticancer activities.

Keywords: imidazole; ^{1}H, ^{13}C NMR; FT-IR; Antimicrobial and Anticancer

OP-12

WATER QUALITY INDEX OF GROUNDWATER OF THIRUKKOVILUR AREA VILLUPPURAM DISTRICT, TAMIL NADU, INDIA

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Ground water samples were collected from different localities in and around Thirukkovilur area near Thenpennai River, Villuppuram District, Ten groundwater samples were collected and analyzed for Physico chemical parameter such as pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Dissolved oxygen (DO), Biological Oxygen Demand(BOD),Chemical Oxygen Demand(COD),Calcium(Ca),Magnesium(Mg),Total Hardness (TH), Bicarbonate (HCO_3), Chloride (Cl) and Nitrate (NO_3) in order to understand the different geochemical processes affecting the groundwater quality. The analytical data were compared with WHO. standard values. The analytical results indicate that the majority of groundwater samples are unsuitable for drinking purposes. The aquifers of the study area are polluted due to the intrusion of sewage and industrial effluents.

Keywords: Physicochemical parameters ground water and Water quality index.

OP-13

EFFECT OF Ni^{2+} AND Mg^{2+} CO-DOPING ON STRUCTURAL AND LUMINESCENT PROPERTIES OF ZNS NANOPARTICLES

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ZnS nanoparticles codoped with Ni^{2+} and Mg^{2+} have been synthesized at room temperature through soft chemical route. The nanostructures of the prepared nanoparticles have been anlysised using X-ray diffraction (XRD), Scanning election microscope (SEM) with energy dispersive diffraction (EDX), UV-Vis spectrophotometer, PL spectrophotometer and Fourier transform infrared spectroscopy. The sizes of the as codoped nanoparticles are found to be 5.2 – 7.8 nm range. Room temperature photoluminescent spectrum exhibits multiple emission peaks under UV excitation. The Mg^{2+} doped ZnS:Ni^{2+} samples enhanced the visibile light emission at optimal concentration and there after concentration quenching effect was observed.

OP-14

GROWTH AND CHARACTERIZATION OF 2,5-DIMETHYLANILINIUM DIHYDROGEN PHOSPHATE SINGLE CRYSTAL

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Single crystals of 2,5-dimethylanilinium dihydrogen phosphate (2,5-DADP) have been grown by a slow evaporation solution growth technique in room temperature. The single crystal XRD confirms the orthorhombic structure with the non-centrosymmetric space group $P2_12_12_1$. Solid state parameters such as plasma energy, Penn gap, Fermi energy and electronic polarizability were evaluated. Laser damage threshold studies were carried out for the grown crystal. The optical transparency and cutoff wavelength of the grown crystal was examined by UV-Visible spectral studies. The optical parameters such as optical band gap, absorption coefficient, extinction coefficient and refractive index of the grown crystal were calculated for optical device applications.

Keywords: Crystal growth, X-ray diffraction, Solid state parameters, Optical properties

OP-15

ENHANCED STRUCTURAL AND PHOTOLUMINESCENCE IN Ni DOPED ZnS NANOPARTICLES

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Nickel doped ZnS Nps were synthesized by chemical precipitation technique using various concentrations of Poly (ethyleneglycols) (PEG) as capping agent. Characterizations carry out to study different properties of the acquired particles crystalline size and shape analysis by X-ray diffraction, UV–Vis absorption spectroscopy show blue shift in absorption edge as compared to bulk ZnS and Nps size determined by using the mathematical model of effective mass approximation equation, Surface morphology with particle size by Scaning Electron Microscope, photoluminescence (PL) spectrum of the ZnS:Ni^{2+} Nps exhibits strong emission centered at 465 nm, with increase in SHMP concentration upto 0.6 wt % and decrease in intensity for higher concentrations of SHMP.

OP-16

GREEN SYNTHESIS OF SILVER NANOPARTICLES OF PIPERINE EXTRACT AND APPLICATIONS FOR ANTIMICROBIAL ACTIVITY AND LOW CYTOTOXICITY IN USING TRITON x100

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The silver nanoparticles (AgNPs) are synthesized by a green chemical approach using the piperine isolated from black pepper. The physicochemical properties of triton X-100 coated silver nanoparticles (Triton X-100 –Ag NPs) were well characterized by UV-Visible absorption spectroscopy, powder X-Ray diffraction (XRD), transmission electron microscopy (TEM), selected area electron diffraction (SAED) and energy dispersive X-Ray spectroscopy (EDS). The TEM images confirm the spherical shape of AgNPs. The PXRD analysis reveals the AgNPs exhibiting fcc crystal structure with an average crystallite size. The cytotoxic effects on HepG2 cells were also evaluated with a series of MTT assays. The effective toxic concentration of triton X-100 – piperine with AgNPs is too low to damage to HepG2 cells. The minimum inhibitory concentration (MIC) and the disk diffusion test were applied to evaluate the antibacterial activities. The antibacterial activity is effective on the two bacteria namely S.aureus and E.coli. The AgNPs-Triton is effective in inhibiting growth of both gram positive and gram negative bacteria S.aureus and E.coli.

Keywords: Triton X-100; HepG2 cells; MTT assays; TEM and PXRD.

OP-17

ELECTROSPUN POLYURETHANE NANOFIBROUS FILTERS FOR EFFICIENT $PM_{2.5}$ CAPTURE

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Particulate matter (PM), one of the major air pollutants and has caused many serious health issues. PM2.5 creates a serious risk due to its extremely small size, which can easily penetrate into human respiratory tract. It causes deleterious health issues like stroke, cancer, heart failure, and lung infections. Therefore, in the present work we have attempted to develop a polyurethane air filter for the efficient capture of particulate matters ($PM_{2.5}$). Polyurethane (PU) was prepared from the monomers Polycaprolactum diol and Isophorone diisocyanate. Electrospinning, a versatile fiber production technique was used in the development of continuous and interconnected fibrous network mats. Optimisation of the electrospinning parameters were carried out to obtain smooth and beadless nanofibers. The electrospun PU fibers were characterised using thermo gravimetric analysis (TGA), scanning electron microscopy (SEM), Static water contact angle measurements (SWCA) and $PM_{2.5}$ (particulate matter) study. Using the electrospun fiber mats as filters, particles with diameter of 2.5 µm were captured from the automobile exhaust. The results proved the fabricated filter to act as a potential candidate with good thermal stability and excellent $PM_{2.5}$ filtering capacity.

PP-1

PHOTODYNAMIC CANCER THERAPY AND DNA BINDING STUDIES OF $Ag@SiO_2$ OF CORE-SHELL NANOPARTICLES IN VITRO

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Photodynamic Therapy (PDT) is one of the emerging treatment modalities for cancer that takes the advantage of the interaction between light and a photosensitizing agent to initiate cell death. In the present work, core-shell type $Ag@SiO_2$ nanoparticles were prepared by Stober's method. They were characterized by UV-visible, XRD, HR-TEM and EDAX techniques. XRD patterns show the presence of amorphous SiO_2 and the noble metal (Ag). HR-TEM measurement revealed that their size is below 50 nm. EDAX studies show that coating of SiO_2 on the metal surface. The cell viability of HeLa cell lines studied using MTT assay method, indicates the requirement of lower light dose with increase in concentration. The photogeneration of singlet oxygen was confirmed by ESR technique. DNA binding studies were carried out in CT-DNA, shows that intercalation mode of binding between CT-DNA and core-shell nanoparticles. The above results confirm that $Ag@SiO_2$ core-shell nanoparticles can very well be used as nanophotosensitizer for PDT in the place of conventional organic photosensitizers.

Keywords: Core – shell nanoparticles; Reactive Oxygen species; Cell viability; MTT assay; DNA binding study.

PP-2

THERMAL, OPTICAL AND DIELECTRIC PROPERTIES OF METAL DOPED AMINO ACID OPTICAL SINGLE CRYSTALS

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Metal doped amino acid single crystals have been grown by slow evaporation solution growth method. The obtained transparent crystals are having the dimension of about (30 x 5 x3 mm^3). Crystal structure has been studied by single crystal X-ray diffraction analysis. FT-IR and EDAX spectrum of pure and doped crystals confirms qualitatively the presence of metal in the host crystals. Improvement in the SHG efficiency is studied by Q-switched Nd-YAG laser. Thermal analysis has been performed on the grown crystals and thermodynamic parameters are also calculated. Optical absorption spectrum shows very low absorption in the entire visible region and the cut-off wavelength is occurs at 250 nm. The optical behaviour of the grown crystal is analyzed by PL study. The frequency dependent dielectric properties of the crystal are studied for different temperatures.The effect of metal on various properties of grown crystal have been analyzed and reported here.

Keywords: Crystal growth; XRD; Thermodynamic parameters

PP-3

SYNTHESIS, SPECTRAL AND LUMINESCENCE STUDIES OF SOME BIS DIMEDONE DERIVATIVES

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Bisdimedone derivatives, acridines, acridinediones, xanthene derivatives show antimicrobial activities against certain bacterial and fungal strains. Xanthene, the parent compound of a number of naturally occurring substances. Xanthylium and the carbonyl compound xanthone are derived from xanthene. Xanthenes are important class of compound because of their use in medical field and they possess biological activities.

Organic molecules containing xanthene moieties are of biological importance and are useful in drug discovery.1 The xanthenes derivative, (9S)-9-(2-hydroxy-4,4-dimethyl-6-oxocyclohex-1-en-1-yl)-3,3-dimethyl-2,3,4,9-tetrahydro-1H-xanthen-1-one is a selective and orally active neuropeptide Y Y5 receptor antagonist. Chromenes are an important class of compounds, and are often found as the main components of many naturally occurring products employed as cosmetics, pigments, and as potential biodegradable agrochemicals. Some xanthene derivatives demonstrate photoactivated insecticidal and pest-control activity, and anticancer properties.

Keywords: Dimedone; anticancer; NMR; Biological activities.

PP-4

PREPARATION OF ZINC OXIDE NANOPARTICLES USING MURRAYA KOENIGII (CURRY LEAF) LEAF EXTRACT

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The present study focus on green chemistry in the synthesis of Zinc Oxide nanoparticles by Zinc nitrate and utilizing the bio components of leaves extract of Murraya koenigii (Curry leaf). The Zinc Oxide nanoparticles are known to be one of the multifunctional inorganic nanoparticles and Zinc Oxide crystallites have been synthesized by simple and eco-friendly method. There is a growing attention to biosynthesis the metal nanoparticles using organisms. Among these organisms, plants seem to be the best candidate and they are suitable for large scale biosynthesis of nanoparticles. Nanoparticles produced by plants are more stable and the rate of synthesis is faster than that in the case of other organisms. The particle size and morphology of the synthesized nanoparticles is characterized by using Scanning Electron Microscope (SEM) and X-ray Diffraction (XRD). Functional groups of the sample were identified by using Fourier transmission infrared (FT-IR) spectroscopy.

Keywords: Murraya koenigii (Curry leaf); ZnO; XRD; FT-IR; FE-SEM and EDS

PP-5

SYNTHESIS, SPECTRAL CHARACTERIZATION, FIRST ORDER HYPERPOLARIZABILITY AND MOLECULAR DOCKING STUDIES OF ETHYL-1,2,3,4-TETRAHYDRO-6-METHYL-4-(4-NITROPHENYL)-2-OXOPYRIMIDIN-5-CARBOXYLATE

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Organic nonlinear molecule ethyl-1,2,3,4-tetrahydro-6-methyl-4-(4-nitrophenyl)-2-oxopyrimidin-5-carboxylate (NTPC) has been synthesized. The molecular structure has been characterized using FT-IR, FT-Raman and NMR spectral studies. The molecular structure of the title molecule was theoretically investigated by DFT method using B3LYP/6-31G(d,p) basis set. The vibrational assignments of NTPC assigned with the help of potential energy distribution. ^{1}H and ^{13}C-NMR spectra were recorded and calculated using the gauge independent atomic orbital (GIAO) method. The intra-molecular charge transfer occurring in the molecule has been analyzed by natural bond orbital analysis. The nonlinear optical property of the title molecule has been calculated using first hyperpolarizability components. The electronic and charge transfer properties have been studied using frontier molecular orbitals. The binding mode of NTPC has been analyzed in the active sites of tyrosyl-tRNA synthetase from S. aureus and cytochrome p450 14-alpha-sterol demethylase from mycobacterium tuberculosis. Molecular docking results reveals the ligand binds at the active site of the proteins by weak non-covalent interactions most prominent of which are H-bonds and alkyl-π interactions. These results draw us to the conclusion that the compound might exhibit good anti-microbial activity.

Keywords: NTPC, DFT, GIAO, Molecular docking

PP-6

CRYSTAL GROWTH, CHARACTERIZATION AND THEORETICAL STUDIES OF TRIS(ALLYLTHIOUREA)CADMIUM(II) CHLORIDE

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Single crystals of tris(allylthiourea)cadmium(II) chloride (TATC) complexes were grown by conventional slow evaporation solution growth technique at room temperature. Lattice parameters are determined by single crystal XRD analysis. The structure and the crystallinity of the materials were confirmed by powder X-ray diffraction analysis. Optical properties of specimens are analyzed by UV-DRS spectroscopy and band gap energies are estimated. The modes of vibrations of functional groups present are identified by FT-IR studies. Surface morphology is examined by scanning electron microscopy. Thermogravimetric and differential thermal analysis reveal the purity of the sample and no decomposition is observed up to the melting point. Microhardness studies were also carried out to elucidate the mechanical behavior. Theoretical calculations were performed to derive the molecular geometry, first-order molecular hyperpolarizability (β), dipole moment (μ), polarizability (α), HOMO – LUMO energy, bond lengths and angles using B3LYP with LanL2DZ as basis set. The atomic charge distributions of the various atoms present are obtained by Mulliken charge population analysis. The second harmonic generation (SHG) efficiency of the as-grown specimens is estimated by Kurtz and Perry powder technique. It is interesting to observe that allylthiourea complex exhibits the maximum SHG efficiency. The Hirshfeld surfaces derived using single crystal X-ray diffraction data are analysed for the TATC complexes using HF method with 3-21G as basis set and investigation of the intermolecular interactions and crystal packing reveal that close contacts are associated with strong interactions.

PP-7

HUMIDITY SENSOR MEASUREMENT BY USING COPPER MOLYBDATE

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Monitoring and controlling environmental humidity is receiving wider attention mainly for physical comfort and for industrial processes. In this attempt copper molybdate is used as humidity sensor. It is synthesized by solution method. Using electronic sensor kit output voltages are measured for different output voltages are measured for different percentage of humidity. Standardization of the electronic sensor kit is done using known values of Rh. Resistive sensors measure the change of humidity. At low Rh levels the electronic conduction based on the electron donation from water molecule is the dominant mechanism. At medium Rh levels both electronic and ionic conduction are responsible with the dominant transition from electronic to ionic conduction mechanism. At high Rh levels ionic conduction based on proton hopping between water molecules is the dominant mechanism. Copper molybdate behaves as a good humidity sensor at all levels and the results of this compound as humidity sensor are presented and discussed in this paper.

PP-8

TRACE METAL POLLUTION ASSESSMENT IN THE SEDIMENTS OF PULIVINICHALLI ISLAND OF TUTICORIN, THE GULF OF MANNAR, THE SOUTHEAST COAST OF INDIA

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The aim of this study was to determine the concentration of heavy metals in the sediments of Pulivinichalli island of Tuticorin, the southeast coast of India using Inductively Coupled Plasma Atomic Emission Spectrometer (ICPAES) technique. Metal concentrations (Co,As, Cr, Ni,Fe,Mn, Cu,Cd, Zn, and Pb), grain size, and total organic carbon content in 12 surface sediment samples were analyzed to determine their distribution and pollution status. The average metal concentration level in sediments of the study area is in the following order Fe>Mn>Zn >Cu>Pb>Ni>Cr> Cd>As>Co. The degree of contamination by was evaluated using four metal pollution indices such as enrichment factor, a geo-accumulation index, a contamination factor and a pollution load index. The results were treated with SPSS software for statistical analysis like Correlation matrix and Principal Component Analysis to identify the source of heavy metals. The presented methodology was used to determine the anthropogenic origin of heavy metals in the sediment.

Keywords: Heavy metals, metal pollution indices, statistical analysis.

PP-9

UV LIGHT ACTIVE PHOTOCATALYST WITH ANTIPHOTOCORROSIVE PROPERTY FOR DETOXIFICATION OF TB DYE

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Utilization of UV light energy is an energy efficient process for dye wastewater treatment. Photocatalytic degradation of toxic azo dyes was carried out using modified semiconductors under UV light. Concerning this, the different wt% of Bi loaded ZnO catalysts were prepared by the simple precipitation – thermal decomposition method and used for degradation studies. The photocatalytic activity of 2 wt% Bi loaded ZnO was compared with single metal doped, undoped, and other commercial catalysts. The photodegradation of TB (Tryphan Blue) had been analyzed in detail. Mineralization of these dyes has been confirmed by chemical oxygen demand (COD) measurements. A mechanism has been proposed for the higher efficiency of Bi loaded ZnO at neutral pH under UV light. Antiphotocorrosive study reveals that bare ZnO suffers more dissolution by photocorrosion than our prepared photocatalyst Bi-ZnO. This catalyst is found to be more stable and reusable

Key words: Bi loaded ZnO, Photocatalysis, UV light, Tryphan Blue, Reusability.

PP-10

SYNTHESIS, CHARACTERIZATION MOLECULAR INFLAMMATORY STUDIES OF SOME NOVEL - MORBOLINE DERIVATIVES

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A series of new Morboline has been synthesized from their respective sulphones. The structural assignment is based on their spectral data. All the compounds were preliminarily screened for their in inflammatory activities by Docking method. All the tested compounds showed the most potent antibacterial inflammatory . The synthesized compounds were docked with Plasmodium falciparum dihydrofolate reductase-thymidylate synthase (1J3K) using Discovery Studio 4.0 , the best Lib dock score and Binding energy were obtained for Morboline.

PP-11

BINDING INTERACTION OF (1-(4-BROMOBENZYL)-2-(4-BROMOPHENYL)-1H-BENZIMIDAZOLE) WITH ZnO NANOPARTICLE

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Binding interaction studies of the compound (1-(4-bromobenzyl)-2-(4-bromophenyl)-1h-benzimidazole) with ZnO nanocrystals have been carried out by absorption and fluorescence spectral studies. The title compound is adsorbed on the surface of semiconductor nanoparticle through azomethine nitrogen. The conduction band energy position determines the electron transfer from excited state imidazole derivative to the ZnO nanoparticle. Based on photo-induced electron transfer (PET) mechanism, fluorescent enhancement has been explained and apparent binding constant has been calculated. The negative ΔG_{et} value for ZnO nanoparticles reveals that the electron transfer process is thermodynamically favourable.

PP-12

DIHYDROGENPHOSPHATE ANIONIC TEMPLATE ASSISTED SUPRAMOLECULAR FRAMEWORKS IN 2-BENZYLAMINIUM AND 4-ETHOXYANILINIUM DIHYDROGENPHOSPHATE SALTS

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Dihydrogenphosphate, the hybrid salt of orthophosphoric acid has find importance in the field of supramolecular chemistry. The molecular assembly in dihydrogenphosphate salts can explain various physico-chemical properties like ferroelectric, magnetic and nonlinear optical. Dihydrogenphosphate anions ($H_2PO_4^-$) are attractive building blocks in crystal engineering to form hydrogen bonded networks. The $H_2PO_4^-$ anions are linked through O—H···O hydrogen bonds to form a variety of interesting inorganic substructures like linear and zig-zag chains, chain of dimers, strands, sheets and three-dimensional cage. The cations are hydrogen bonded to these anionic networks forming anionic templates. The title compounds 2-benzylaminopyridinium dihydrogenphosphate (I), C_{12} $H_{13}N_2^+.H_2PO_4^-$ and 4-ethoxyaniliniumdihydrogenphosphate (II), $C_8H_{12}N_1O_1^+.H_2PO_4^-$, the $H_2PO_4^-$ anions form one and two-dimensional supramolecular network built through O—H···O hydrogen bonds. The asymmetric unit of the title compound consists of two symmetry independent molecules with a statistical difference in the gemetrical parameters. The 2-benzylaminopyridinium cations in (I) and the 4-ethoxyanilinium cations in (II) are linked to the inorganic anionic network to construct an organic-inorganic framework in the system. The $H_2PO_4^-$ anionic network act as a template for the assembly of cations in (I) and (II). The formation of $H_2PO_4^-$ anionic network in dihydrogenphosphate salts is well directed by the nature of cation and the cationic functionalities.

PP-13

SYNTHESIS, CHARACTERISATION AND OPTICAL PROPERTIES OF Cu –DOPED TiO_2 NANOPARTICLES

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The Cu –doped TiO_2 nanoparticles were prepared by sol-gel method, calcinated at 400 ºC and characterized by powder X-ray diffraction (XRD), high resolution transmission electron microscope (HR-TEM), energy dispersive X-ray analysis (EDX), scanning electron microscopy (SEM), UV–visible diffuse reflectance spectrum (DRS) and photoluminescence spectroscopy (PL).

Keywords: Cu –doped TiO_2; XRD; HR-TEM; DRS; PL; FT-IR; SEM and EDS

PP-14

BIODIESEL AS AN ALTERNATIVE FUEL FROM CHICKEN FAT AND PLASTIC WASTE USING Ti/SBA-15 CATALYST

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The traditional use of fossil fuels particularly petroleum, natural gas and coal has been used for continuously and globally for the past few hundred years. Energy consumption and energy crisis are increasing day by day due to ever-increasing world population and high speed of economic development. As a result, petroleum reserves are being depleted that result into unstable petroleum prices. Moreover, petroleum being a potential source of carbon dioxide in the environment, leads to global warming and climate change. Therefore, it is essentially to search for energy and renewable sources. Biodiesel is a renewable fuel consists of fatty acid methyl esters (FAME) and it can able to control the pollution and the cost effectiveness. It is mostly produced from vegetable oil and non vegetable oil. Homogeneous catalyst was very slow in reaction rate and conversion of the product and also it produce the soap formation when compared with heterogeneous catalyst. In this work, we have utilized chicken fat oil and plastic oil with methanol for the production of biodieseal via transesterification reaction using mesoporous Ti/SBA-15 as catalyst. The catalysts were characterized by using XRD, SEM and TEM. The obtained FAME was analyzed by using FT-IR, ^{1}H-NMR and C^{13}-NMR spectroscopy.

Key words: Mesoporous Materials, Chicken fat oil, Plastic oil, FAME, Ti/SBA-15,

PP-15

SYNTHESIS, SPECTRAL CHARACTERIZATION, NONLINEAR OPTICS AND MOLECULAR DOCKING STUDIES ON DIHYDROPYRIMIDINONE DERIVATIVE

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Organic molecule ethyl-4-(4-chloro-3-nitrophenyl)-6-methyl-2-oxo-1,2,3,4-tetrahydro pyrimidine-5-carboxylate (CNPC) has been synthesized. The molecular structure has been characterized using FT-IR, FT-Raman, ^{1}H and ^{13}C-NMR spectral studies. The structure of the title molecule was theoretically investigated by DFT method using B3LYP/6-31G(d,p) basis set. The firm assignments of vibrational bands are allowed using experimental and computations. The nonlinear optical property of the title molecule has been calculated using first hyperpolarizability components.^{1}H and ^{13}C-NMR spectra were recorded and calculated using the gauge independent atomic orbital (GIAO) method. The intra-molecular charge transfer occurring in the molecule has been analyzed by NBO analysis. The electronic and charge transfer properties have been studied using frontier molecular orbitals. The binding mode of CNPC has been analyzed in the active sites of tyrosyl-tRNAsynthetase from S. aureus and cytochrome p450 14-alpha-sterol demethylase from mycobacterium tuberculosis. Hydrogen bonding interactions between the CNPC molecule and amino acid residues reveal the active binding with the protein structures.

PP-16

DUAL APPLICATIONS OF SPIRULINA-ZnO LOADED TETRA FUNCTIONAL EPOXY MONOMER FOR ANTICORROSION AND ANTIMICROBIAL STUDIES

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Zinc oxide nanoparticles were prepared by sol-gel method and the prepared metal nanoparticles were characterized by various techniques like AFM, SEM, FTIR spectrum and XRD. The development and characterization of nano hybrid coatings using tetraglycidyl 4,4′-diaminodiphenylmethane(TGDDM) and Spirulina functionalized ZnO as nano-reinforcement. The nano hybrid coatings were cured by aromatic and aliphatic curing agents. The effect of the ZnO-Spirulina and curing agents on the corrosion and antimicrobial properties of these coatings was studied by electrochemical impedance and antimicrobial test. It shows the tetraglycidyl epoxy nano-hybrid coatings have better set of coating properties when compared to di-functional epoxy nano-hybrid coatings. The best results were obtained for ZnO-spirulina loadedTGDDM with curing agent Aradur 140. These observations clearly indicate the synergistic effect of curing agent and nano-reinforcing effect of ZnO- Spirulina towards corrosion resistance.

Keywords:Spirulina, Green inhibitors, Zinc Oxide, Impedance, Polarization, antimicrobial.

PP-17

SYNTHESIS AND CHARACTERIZATION OF BARIUM TITANATE NANOCUBES BY HYDROTHERMAL METHOD

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A new barium titanate nanocubes was prepared via., hydrothermal method. The synthesis barium titanate nanocubes morphology was fully characterized by scaning electron microscopy (SEM), powder X-ray diffraction, Raman spectroscopy, Brunauer-Emmett-Teller (BET), Transmission electron microscopy (TEM) and Energy- dispersive X-ray spectroscopy (EDX) analytical techniques, UV-visible spectroscopy and photoluminescence techniques were used to analyzed the prepared Barium tianate Nanocubes.

Keywords: $BaTiO_3$; XRD; SEM; TEM-EDX; BET.

PP-18

ENHANCED PHOTOCATALYTIC DEGRADATION OF ORGANIC DYES IN AQUEOUS SOLUTION UNDER VISIBLE LIGHT IRRADIATION USING MAGNETIC Ru-$NiFe_2O_4$ NANOPARTICLES

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Ruthenium doped nickel ferrite (Ru-$NiFe_2O_4$) nanoparticles were prepared successfully by a combustion technique using citric acid as the fuel. The samples were characterized using X-ray diffraction (XRD) analysis and scanning electron (SEM) microscopy. The XRD analysis confirmed the formation of spinel structure of the synthesized material. The photocatalytic activity of Ru-$NiFe_2O_4$ nanoparticles has been examined for the photocatalytic degradation (PCD) of malachite green and methylene blue dyes under visible light irradiation. It was found from the results that, PCD efficiency of the catalyst increased with co-doping of Ru. The reason for the enhanced photocatalytic activity of Ru-$NiFe_2O_4$ mainly due to increased optical absorption and decreased recombination of electrons–holes. Hence our study also shows that Ru-$NiFe_2O_4$ catalyst can be recovered from the reaction mixture using an external magnet and recycled.

Keywords: Nickel ferrite, photo catalyst, combustion technique, visible light irradiation, X-ray diffraction.

PP-19

CRYSTAL STRUCTURE, BIOLOGICAL EVALUATION AND INSILICO STUDIES OF 3-(1-(4-FLUOROPHENYL)-1H-TETRAZOL-5-YL)PYRIDINE

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The tetrazoles and their derivatives have much attention in drug design.[1] 1,5-disubstituted tetrazoles based drugs were used as an antibiotic (Flomoxef, Cefazolinsodium, and Cefonicid). And also most of the heterocycles are biologically active molecule.[2] Based on this,pyridyltetrazole derivative has been synthesized and characterizedby ^{1}H NMR, ^{13}C NMR, Mass andsingle crystal X-ray crystallography **(Fig 1)**.[3] And also in vitrobiological evaluation such as antimicrobial and anti-inflammatory activities were studied. On thecontinuationof the three-dimensional structure of the ligand, the molecular docking studies were performed against bacterial and inflammatory targets like DNA gyrase inhibition and cyclooxygenase inhibition in Autodock 4.2 software. In addition DFT calculation and ADME (Absorption, Distribution, Metabolism, and Excretion) prediction were performed for additional pharmacological support.

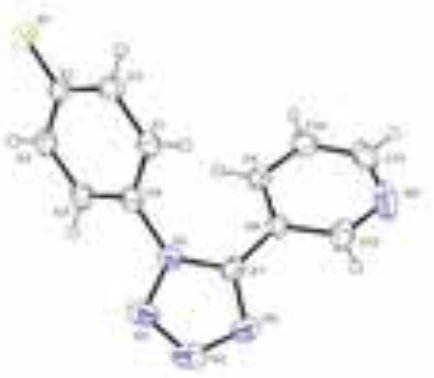


Fig 1: ORTEP diagram of 3-(1-(4-fluorophenyl)-1H-tetrazol-5-yl)pyridine.

Keywords: Crystal structure, Tetrazole, Molecular Docking, DFT calucations.

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2. M. S. Saini, A. Kumar, J. Dwivedi, R. Singh, Int. J. Pharm. Res.2013, 4, 66-77.
3. CCDC No: 996387.

PP-20

SYNTHESIS, CHARACTERIZATION AND BIOLOGICAL STUDIES OF TRINUCLEARSCHIFF BASE METAL COMPLEXES DERIVED FROM 2-AMINOBENZALDEHYDE

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The TrinuclearSchiff base metal complexes were synthesized by the condensation of *o*-phthalaldehyde, *p*-phenylenediamine, and 2-aminobenzaldehyde.The metal complexes have been characterized by elemental analysis, molar conductivity, IR, electronic spectroscopy, EPR and magnetic studies.The molar conductance studies of the metal complexes showed non-electrolyte in nature. The spectroscopic data of metal complexes indicated that the metal complexesexhibit octahedral arrangements. DNA binding studies of metal complexes have been investigated by CV and electronic absorption spectroscopy. Results suggest that the metal complexes bind to DNA via an intercalation binding mode. The DNA cleavage activities of complexes were assayed on pUC18 DNA using gel electrophoresis method. The anti-microbial activities and thermal studies have also been studied. In anti-microbial activity of all complexes showed good anti-microbial activity against gram positive, gram negative bacteria.

Keywords: Trinuclear, DNA cleavage, antimicrobial activity, Schiff base.

PP-21

STRUCTURAL, THERMAL AND POWDER SHG STUDIES ON NEW ORGANIC NONLINEAR OPTICAL CRYSTAL 4-((2,4,5-TRIPHENYL-1H-IMIDAZOL-1-YL)METHYL)PYRIDINE

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Single crystal of 4-((2,4,5-triphenyl-1H-imidazol-1-yl)methyl)pyridine (TIMP) is grown by slow evaporation solution growth technique from ethanol at room temperature. The single crystal-X-ray diffraction study reveals that as-grown crystal belongs to triclinic system and the cell parameters are, a = 10.297 (2) Å, b = 10.439(3) Å, c = 10.716(5) Å, α = 72.897(3)º, β = 72.715(2)º, γ = 78.692(4)º and Z = 2. The optical absorption study was performed to analyze the optical transparency of TIMP and the crystals were transparent in the visible region and have band gap energy of 2.15 eV. TG–DTA thermal analysis shows that the crystal is stable up to 141 ºC and has a good chemical stability. The second harmonic generation efficiency of as-grown material is estimated by Kurtz and Perry technique.

Keywords: imidazole: SXRD; SHG; TG–DTA

PP-22

STRUCTURAL, OPTICAL AND DIELECTRIC STUDIES OF PbS-PVA-PEG NANOCOMPOSITE FILMS

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The nanocomposite film of lead sulphide-polyvinyl alcohol-polyethylene glycol was synthesized by solvent casting technique. The film was characterized using x-diffraction (XRD), scanning electron microscopy (SEM), UV-Visible optical absorption spectrum, photoluminescence and dielectric studies to investigate the structure, morphology, absorption, emission and dielectric properties. XRD pattern reveals that the formation of PbS nanocomposite film with cubic phase. SEM micrograph shows that the PbS nanoparticles are well monodispersed with spherical shape throughout polymer. Optical absorption spectrum results the strong quantum confinement effect due to the presence of small size of nanostructured PbS in polymer composite films. Photoluminescence spectrum exhibits the two emission peaks corresponding to the blue-green and green emissions of PbS. The frequency dependent dielectric studies were analysed at different temperatures.

PP-23

ANTAGONISTIC EFFECT OF CuO AND Fe_2O_3 NANOPARTICLES ON PEANUT LEAVES BY FTIR AND XRF SPECTRAL STUDIES

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Seed germination enhances by several methods, the easy and significant method is presowing seeds with micronutrients. Substantial effects carried out on the effect of seed germination by soaking seeds with nanoparticles. Few research works were focused on the effect of biochemical analysis of plants grown by soaking seeds in nanoparticles. Induced by few research findings, this work focuses on the biochemical analysis of peanut plant leaves presoaked in three different ratios 1:1, 1:2, 2:1 of CuO and Fe_2O_3 nanoparticles. The plant leaves were collected after the minimum full growth period of 30 days after sowing. The leaves samples air and oven dried before analyzing with FTIR and XRF spectral studies. All the sample preparation and characterization was triplicate to reduce error percentage. FTIR spectra of all the samples show considerable variation in biochemical constituents like protein, carbohydrate, lipid etc. However variations in protein secondary structure were analyzed from de-convoluted spectra in the region 1600 to 1700 cm^{-1} using Origin 8.0 software. Statistical analysis like Pearson correlation coefficient and Principle Component Analysis (PCA) were performed by SPSS 16.0 software to support the results obtained from FTIR spectral studies. The XRF results shows significant influence on micronutrients of peanut leaf samples stressed with three different ratios of CuO and Fe_2O_3 nanoparticles. Overall analysis shows the antagonistic effect of of CuO and Fe_2O_3 nanoparticles on peanut plant leaves when peanut seeds are presoaked in 1:2 and 2:1 ratios whereas negligible effect obtained in 1:1 ratio.

Keywords: nanoparticle; carbohydrate; FTIR; presoaking

PP-24

SUPRAMOLECULAR SYNTHONS IN THE COCRYSTALS OF HYALURONIC ACID WITH 2-AMINO-6-CHLOROPYRIDINE

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Hyaluronic acid co-crystal were synthesised by room temperature for few days, the synthesised hyaluronic acid co-crystal were characterised by The X-ray diffraction (XRD) analysis showed the crystalline structure, Functional groups of the sample were identified by using Fourier transmission infrared (FT-IR) spectroscopy. The shape, structure and composition were assessed by Field emission scanning electron microscopy (FE-SEM) and energy dispersive spectroscopy (EDS). The absorption and emission behaviours were also carried out by Hyaluronic acid co-crystal.

Keywords: Hyaluronic acid co-crystal; XRD; FT-IR; FE-SEM and EDS

PP-25

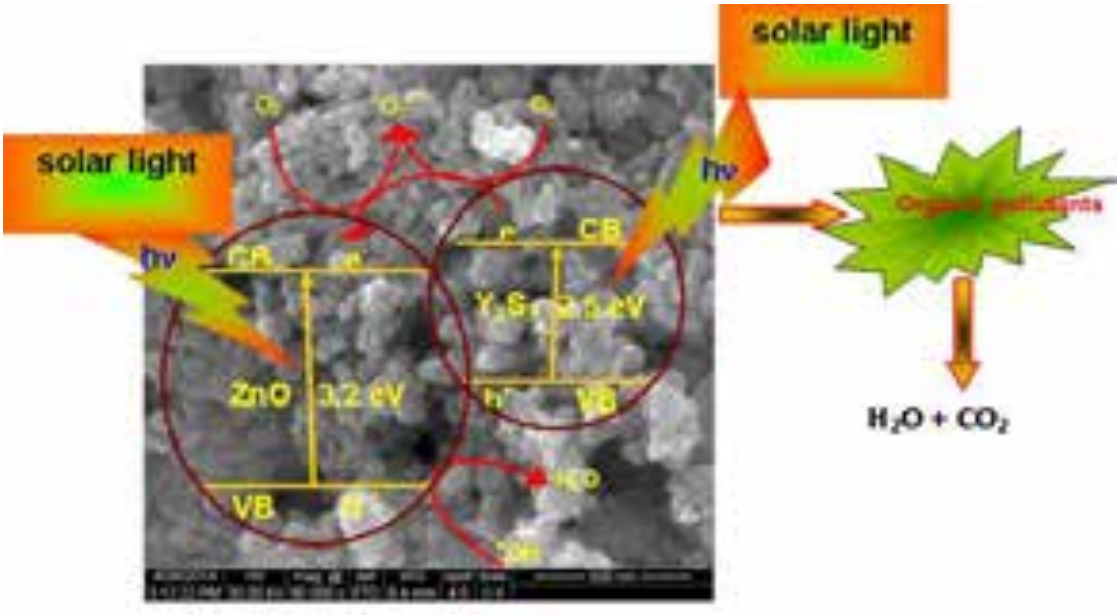
FABRICATION OF Y_2S_3/ZnO NANOCOMPOSITES AND THEIR EFFECTIVE UTILIZATION TOWARD DEGRADATION OF AR18 USING SOLAR

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Y_2S_3-ZnO nanocomposite synthesized by a facile precipitation method combined with a mild ultrasonic technique. The catalyst was characterized by X-ray diffraction (XRD), field emission scanning electron microscope (FE-SEM) images, energy dispersive spectra (EDS), transmission electron microscope (TEM), diffuse reflectance spectra (DRS), Photoluminescence spectra (PL), X-ray photo electron spectroscopic (XPS) and BET surface area measurements. The photocatalytic activity of Y_2S_3-ZnO was investigated for the degradation of Acid Red 18 (AR18) in aqueous solution using solar light. Y_2S_3-ZnO is found to be more efficient than prepared ZnO, commercial ZnO, TiO_2-P25 and Nano TiO_2 (Aldrich) at pH 11 for the mineralization of AR18. The effects of operational parameters such as the amount of photocatalyst, dye concentration, initial pH on photo mineralization of AR 18 have been analyzed. The mineralization of AR 18 has been confirmed by COD measurements. A mechanism has been proposed for the degradation of AR18 by Y_2S_3-ZnO under UV-A light illumination. The catalyst is found to be stable.



PP-26

TABERNAEMONTANA DIVARICATA MEDIATED SYNTHESIS OF ZINC OXIDE NANOPARTICLES AND THEIR ANTIMICROBIAL ACTIVITY AGAINST HUMAN PATHOGENS

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We report a green method for synthesis of high-performance ZnO nanoparticles fabricated by simple biogenic routes using Tabernaemontana divaricata plant leaf extracts. UV–Visible spectrum shows absorbance maximum at 376 nm which corresponds to the energy band gap of 3.26 eV. Morphology and crystalline structure of the prepared Zinc oxide nanoparticles with various shapes and sizes were obtained by TEM and XRD techniques. FT−IR analysis of ZnO nanoparticles might be stabilized through the interactions of terpenoids, steroids, flavonoids, phenyl propanoids, phenolic acids and enzymes present in the extract. ZnO NPs exhibit significant bactericidal activity against Salmonella Paratyphi, Escherichia coli and Staphylococcus aureus using disc diffusion method.

Keywords: T. divaricata, Zinc oxide nanoparticles, Antibacterial activity, Green synthesis.

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PP-27

NANO SILICA CATALYZED SYNTHESIS, SOLVENT EFFECT, NMR SPECTRAL AND DFT STUDIES OF SOME IMIDAZOLE DERIVATIVES

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The solvent dependent fluorescence behavior of heterocyclic molecules is an emerging trend in this era. The designing of simple, well-organized and environmentally benign speculative protocol is a massive challenge to chemists to improve the quality of the environment for present and future generation. A series of novel imidazole derivatives have been designed and synthesized using nano SiO_2 as an efficient catalyst. Synthesized compounds have been characterized by ^{1}H and ^{13}C-NMR spectral studies. The significant features of this nanocatalyst are high product yield, short reaction times and a vast range of substrates usage. Proton and ^{13}C chemical shift of the synthesized compounds were calculated. The absorption and emission properties of imidazole derivatives **1** to **4** have been studied in several solvents. Optimization of 4,5-dimethyl-2-phenyl-1- m-tolyl-1H-imidazole has been performed by DFT at B3LYP/6-31G (d, p) using Gaussian-03.

Keywords: Absorption, Fluorescence, nano SiO_2, DFT, chemical shift.

PP-28

PREPARATION AND CHARACTERIZATION OF TITANIUM DIOXIDE (TiO_2) AND BARIUM TITANATE ($BaTiO_3$) NANOPARTICLES BY SOL-GEL METHOD

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Pure TiO_2 and $BaTiO_3$ nanoparticles were synthesised by sol-gel method. The synthesised TiO_2 and $BaTiO_3$ nanoparticles were characterised by X-ray diffraction (XRD) analysis showed the crystalline structure, the shape, structure and composition were assessed by Field emission scanning electron microscopy (FE-SEM) and energy dispersive spectroscopy (EDS).

Keywords: TiO_2 and $BaTiO_3$; XRD; FE-SEM and EDS

PP-29

KINETIC AND ISOTHERM STUDIES OF METHYLENE BLUE REMOVAL FROM AQUEOUS SOLUTION BY ADSORPTION ON ARACHIS HYPOGEA (GROUNDNUT SHELL)

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The aim of this research work is to prepare powder of arachis hypogea (groundnut shell) available in local agricultural fields. They have exceptional mechanical properties, highly chemical stability and large specific surface area. In this study the powder is used as a adsorbent and offer an attractive option for the removal of organic contaminates such as methylene blue dye from water .The major advantage of this adsorption system are less investment in terms of initial cost , simple design. easy operation, less energy intensiveness, non toxic and superior removal of organic waste constituents as compared with the conventional biological treatment processs..The effect of various experimental parameters such as initial dye concentration ,contact time, adsorbent dose and effect of temperature were evaluated and result shows, when the concentration of adsorbent increases the percentage of dye removal increases , and increases with contact time in the less ph range of 0.3 -1.3.The Freundlich and Langmuir adsorption models were used for the mathematical description of the adsorption equilibrium shows both mono and heterogeneous adsorption taken place .Pseudo first order and Pseudo second order were considered to evaluate the rate parameters and the experimental data fitted the pseudo second order kinetic model.Arachis Hypogea is a low cost alternative to commercial activated carbon in waste water treatment for the removal of colour and dyes.

Key words. Arachis hypogea, methylene blue, adsorption, Langmuir isotherm, rate kinetics.

PP-30

METAL OXIDE REINFORCED EPOXY COMPOSITES FOR AUTOMOBILE INDUSTRY

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This work reports the effect of metal oxide on mechanical properties of Epoxy composites. Epoxy resin formulated with an optimized stoichiometric value of polyaminoamine adduct as a curing agent at ambient temperature, is filled with different loadings of ZnO. The nanoparticles were characterized by UV-vis Spectrophotometer, FTIR, XRD, and SEM. After conformation, Epoxy/ zinc oxide reinforced composites with different proportions of zinc oxide were fabricated by the compressing moulding process. The zinc oxide was well dispersed in epoxy matrices. The Thermal (HDT) and mechanical properties (Tensile and Flexural, Impact strength) have been investigated for the zinc oxide reinforced composites samples. Thermal and Mechanical properties were improved by incorporating 5% zinc oxide into the epoxy matrix further increase in concentration shows decrease in the values could be due to the agglomeration of particles in the polymer matrix.

Keyword: Zno, Fire retardant, Epoxy and bio synthesis

PP-31

SYNTHESIS, SPECTRAL CORRELATION ANALYSIS AND ANTIMICROBIAL ACTIVITIES OF SOME NOVEL 1-SUBSTITUTED BENZYLIDENE-2-PHENYLHYDRAZINE DERIVATIVES

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A series nine number of 1-substituted benzylidene-2-phenylhydrazine derivativeshave been synthesized by condensation of 4-methylphenylhydrazine with substituted benzaldehydes using acetic acid catalyst. The synthesized 1-substituted benzylidene-2-phenylhydrazine derivativeshave been assigned by physical constants, UV, IR and NMR spectral data. This UV, IR and NMR spectral data have been utilized for spectral correlation analyses. From the results of spectral correlation analysis the substituent effect have been studied. The antimicrobial activities of all the 1-substituted benzylidene-2-phenylhydrazine derivativeshave been studied using disc diffusion method.

Keywords: Antimicrobial; Hydrazones; Substituent effect; Hammett constant

PP-32

EFFICIENT SYNTHESIS OF FLUORESCENT TETRA MACROCYCLES APPENDED ZERO GENERATION DENDRIMER AND ITS NICKEL(II) COMPLEX

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Dendrimers are nanosized synthetic macromolecules with a tree-like highly branched 3D structure that provides a high degree of surface functionality and versatility. Over the past few decades, several synthetic strategies were developed to generate multiple dendrimers families with versatile chemical compositions. Dendrimers appended with macrocyclic entities are nowadays prepared and studied for various applications. Here we designed a novel type of Macrocycles appended Dendrimer for a variety of applications in chemistry, biology, and medicine. The synthesis of zero generation dendrimer appended with four compartmental macrocycles is synthesized by stepwise condensation method. The dendrimer ligand is characterized by IR, UV and ^{1}H and ^{13}C NMR spectroscopies. The nickel(II) complex of Dendrimer is prepared by direct complexation method. The metal ion estimation of complex supports the formation of octanuclear metal ion complex. The complex is characterized by IR, UV-Visible spectroscopy. Molar conductance measurement taken in DMSO is reasonably very high which may be due to greater electrolytic nature of the complex. The fluorescent emission of the ligand is observed at 680 nm and the intensity of emission is enhanced on dilution. The fluorescent emission of the nickel(II) complex is also observed at 680 nm. This shows the emission is ligand centered. The enhancement of emission intensity of complex is also greater on dilution. Here the fluorescent property of the complex is ensured based on the increase in emission intensity on dilution.

Keywords: Dendrimer, Macrocycles, nickel(II) complex, Fluorescence, macromolecules.

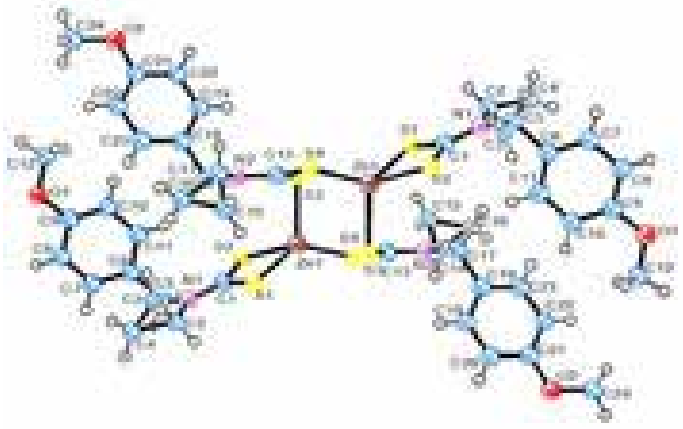
PP-33

Functionalized Zinc(II) dithiocarbamate complexes: Synthesis, spectral and molecular structures of bis(N-cyclopropyl-N-4-methoxybenzyldithiocarbamato-S,S′)Zinc(II) and (2,2′-bipyridine)bis(N-cyclopropyl-N-4-methoxybenzyldithiocarbamato-S,S′)Zinc(II)

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Two new zinc and dithiocarbamate integrated metal complexes such as bis(N-cyclopropyl-N-4-methoxybenzyldithiocarbamato-S,S′)Zinc(II) (**1**) and (2,2′-bipyridine)bis(N-cyclopropyl-N-4-methoxybenzyldithiocarbamato-S,S′)Zinc(II) (**2**) have been synthesized and their spectral investigations viz., FT-IR, ^{1}H and ^{13}C NMR as well as single crystal X-ray diffraction studies have been accomplished. Single crystal X-ray analysis of the complex **1** reveals the presence of distorted trigonal bipyramidal and tetrahedral coordination geometry around the zinc. The dithiocarbamate motif acts as bidentate chelating and bidentate bridging ligands between the zinc ions furnishing centrosymmetric dimeric molecules. In the complex **2**, the zinc is in a distorted octahedral environment with a MS_4N_2 chromophore. The supramolecular frameworks in the complexes **1** and **2** have been sustained by C-H···S, C-H···O and C-H···π ($ZnCS_2$, and chelate) interactions. Computational studies on complexes **1** and **2** have been executed utilizing DFT-B3LYP/ LANL2DZ method. In both the cases, the HOMO–LUMO calculations imply the occurrence of effective charge transfer within the molecule. Further, the MEP analysis of **1** and **2** implies the negative potential sites are sulfur of NCS_2 and oxygen of OCH_3 and the positive potential sites are nitrogen of NCS_2 in both the complexes along with 2,2′-bipyridine for complex **2**. The former sites are susceptible for electrophilic reactions while the latter for nucleophilic reactions.





PP-34

ELECTROCATALYTIC REDUCTION ENHANCEMENT OF FLUORENONE AZINES AT THE SURFACE OF TiO_2 AND SeO_2 DOPED TiO_2 GLASSY CARBON ELECTRODES

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A series of fluorenone azines have been synthesized by sulphated titania solid acid catalyst. The electrochemical behavior of fluorenone azines have been studied using glassy carbon electrode (GCE), Nafion coated titanium dioxide modified GCE (GC-Nf-TiO_2) and Nafion coated selenium dioxide doped titanium dioxide modified GCE (GC-Nf-SeO_2-TiO_2). Electrochemical studies indicated that the surface modified electrodes showed good electrochemical response with respect to azines when compared with the non modified GCE. We also explained, the inductive, resonance and mesomeric effects are how to employ to change in reduction potential of substituted azines.

PP-35

CARBON NANOTUBESDOPED WITH ZINC OXIDE – AS A MATERIAL FOR THE REMOVAL OF OIL FROM WATER

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Oil spills in the sea have caused many serious environmental problems world wide. Carbon nano tubes (CNTs) are potentially very useful for cleaning up oil from the sea water. In this work, a Novel method to prepare CNT doped with Zinc oxide was developed. Initially graphite powder was immersed in a mixed solution of nitric acid and sulphuric acid.Then it was treated with hydrogen peroxide solution. The CNT bundles were obtained by heating this solution mixture upto 70 ^{0}C with constant stirring for 3 hours,. They were separated and then doped with Zinc oxide. Characterization of this new absorbent was done using Scanning electron microscope (SEM) and Transmission electron microscope (TEM).After that,a study was carried out with this new absorbent to absorb oil like petrol, diesel and kerosene in water. Finally it was observed that removal of oil spilling was done successfully by this new material.

Keywords: Carbon nano tubes, hydrogen peroxide, doped with ZnO, Oil spilling.

PP-36

STEAM REFORMING OF METHANE FOR HYDROGEN PRODUCTION OVER NANOPOROUS Ni-Ce-ZrO2 CATALYSTS

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We report about the synthesis and characterisation of two $NiCeZrO_2$ catalysts prepared by one pot-co-precipitation method. The two samples are characterised by similar chemical composition (15 wt% Ni, Ce/Zr = 80/20 atomic ratio) and properties of the $CeZrO_2$ support, which is a cubic phase solid solution with nanometer sized (5–6 nm) crystalline hexagonal/roundish particles. The main differences between the samples are in the NiO particles dispersion and surface area, which were found to be affected by the synthesis of pH. Both samples were characterised about their surface properties by employing FTIR spectroscopy of adsorbed CO probe, and tested about their activity and stability in methane steam reforming (MSR) reaction at relatively low temperature (793 K). The results show a good activity in MSR irrespective of the NiO size and morphology, with negligible CO formation, but a strong dependence of the catalysts stability upon these parameters. Only the catalyst with smaller (5–10 nm) NiO particles was found stable for 250 h in MSR at relatively high steam to carbon ratio (S/C = 2). This performance could be related to a positive effect of the $CeZrO_2$support, allowing fast and easy oxygen transfer to and from the NiO/Ni^0 active phase, most likely thanks to the occurrence of a strong metal–support interaction.

PP-37

PREPARATION AND CHARECTERIZATION OF NANO POLYMER BIO COMPOSITES FOR ELECTRONIC APPLICATION

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This Research work addresses the various issues that occur when the environmental impact of natural fibers is critically evaluated. Nano Sisal fibers (NSF) were prepared from the Sisal fiber by chemical and physical method. They were characterized by the Fourier Transformed Infra-Red Spectroscopy (FTIR), Field Emission Spectroscope (FE-SEM) and High Resolution Transmission Electron Microscopy (HR-TEM). Epoxy polymer based composites reinforced with NSF were prepared by compression moulding. These NSF-composite samples were characterized by mechanical properties, thermal analysis, moisture uptake behaviour, scanning electron microscopy (SEM) and atomic force microscopy (AFM). The 7 wt. % NSF loaded composite sample revealed better properties than other wt. % of NSF.

Key words: Nano Sisal fiber, fracture behaviour, mechanical properties, HDT

PP-38

GREEN ROUTE SYNTHESIS AND HIGH PERFORMANCE OF BIOMASS -DERIVED CARBON MATERIALS FOR SUPERCAPACITOR IN ACTIVATION OF MOLTEN SALT SOLUTION.

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Electrochemical characterization has been carried out for electrodes prepared of several activated carbon fiber samples derived from Biomass -Derived carbon materials. Chemical activation of Carbon fibers with molten salt solution at different carbonization temperatures and impregnation ratios. Surface properties of the activated carbons fibers were significantly influenced by the activation temperature and the impregnation ratio. An increase of either of these parameters produced a high development of the porous structure of the fibers. Their capability as active material for supercapacitors was evaluated by using cyclic voltammetry and impedance spectroscopy. FT-IR analysis in spite of the presence of a variety of functional groups. The XRD analysis reveals that the produced activated carbon has low content of inorganic constituents compared with the precursor. The fabricated supercapacitor presents good characteristics such as lightweight, low cast, portability, high flexibility, and long term cycling stability. We believe that this fact can be attributed to the increase of surface area and porosity with increasing burn-off.

Keywords: biomass, cyclic voltammetry, molten salt, supercapacitors.

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PP-39

EVALUATION OF NUTMEG FOR THE CORROSION INHIBITION OF MILD STEEL IN ACIDIC MEDIA

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The mechanistic aspects of the action of inhibitors have considerable significance due to its practical useful in several industries. The inhibitors used in industrial process to reduce the corrosion rate of the metal and acid consumption are called pickling inhibitors. In the present work, nutmeg is taken and evaluated for their corrosion inhibition performance in both HCl and H_2SO_4 media.

Weight loss, potentiodynamic polarization, impedance and surface coverage studies are to be performed for the methodology of the experimental approach regarding the evaluation of inhibition efficiency. Finally the studies are expected to make one understand the operation of electronic effects in organic molecules leading to adsorption and consequent inhibition.

While assessing the performance of the inhibitor, the effect of the variations in inhibitor concentrations and acids concentrations and temperatures are to be studied. SEM studies are to be made for the confirmation and to picturizes the corroded and protected metal surface.

PP-40

Mn MODIFIED NANOPHOTOCATALYST; CO-PRECIPITATION SYNTHESIS AND VISIBLE LIGHT PHOTOCATALYTIC ACTIVITY

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In the present work visible light active Mn modified nanoZnOphotocatalyst were prepared using co-precipitation method. The prepared photocatalyst were characterized by TG-DTA, XRD, FT-IR, SEM, EDX, TEM, and UV–visible spectroscopy. XRD study reveals that Mn modified nanoZnOphotocatalysthave high crystalline and hexagonal wurtzite structure. As the concentration of Mn changes, morphology of ZnO also changes from spherical like shape to rod shape. It was found that Mndoping improves the photoabsorption capacity of ZnO in visible region. As compared to undoped,the Mn doped nanoZnOphotocatalyst exhibited much higher photocatalytic activity for the degradation of Orange G dye under visible light irradiation. The optimal ratio of Mn is found to be 1% Stability of photocatalyst was investigated up to 3rd cycle and is found to be very stable.

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PP-41

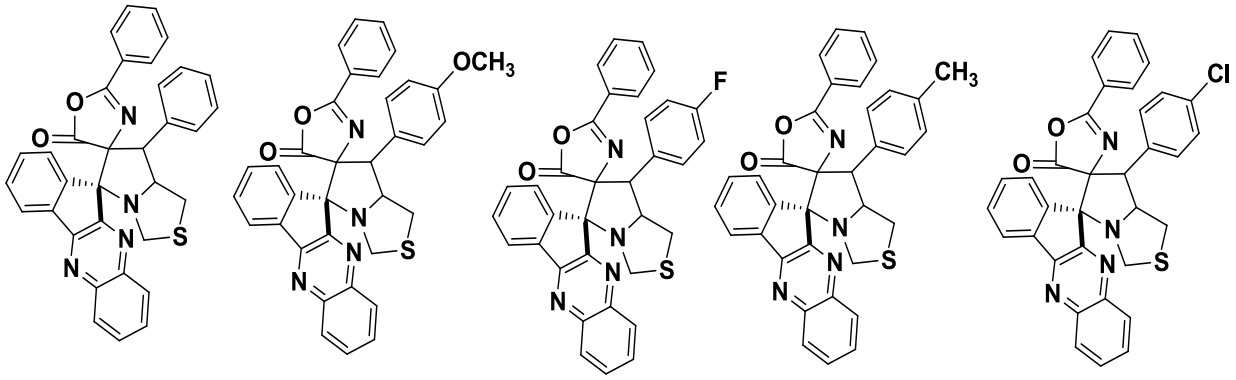
SYNTHESIS OF NOVEL AZLACTONE (2-OXAZOLIN-5-ONES) GRAFTED SPIROPYRROLIDINES VIA MULTICOMPONENT METHODOLOGY

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We have carried out 1,3-dipolar cycloaddition reaction of azomethine ylide generated from o-phenylene diamine, thioproline and ninhydrin with substituted benzylidene oxazolones as dipolarophiles in a one pot multicomponent reaction. When the reaction was carried out in refluxing methanol a series of novel spiro cycloadducts were formed in good yields. The reaction had occurred by the 1,3-dipolar cycloaddition reaction of azomethine ylide generated from ninhydrin , 1,2-phenylenediammine and R-thiazolidine-4-carboxylic acid across the exo cyclic double bond of arylidene oxazolones to give spiro thiazolidine indenoquinoxaline in good yield.

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PP-42

CHARACTERIZATION OF AISI 316 COATING ON MILD STEEL IN FRICTION SURFACING

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Friction surfacing is a progressive process of pronounced impending and an enhanced technology in surface modification. It is a solid state process, which allows deposition welding at temperatures below the melting range. The present study is on the coating of stain-less steel on mildsteeel through the process of friction surfacing. This work explains the perfection obtained through various combination of the parameters used in friction surfacing namely traverse speed, rotational speed and the applied load. Fine bonding has been accomplished between the selected materials out of the process done with variable combination of process parameters. Surface methodology was prepared with a scanning electron microscope for authenticating the results of the coated specimen earlier to and subsequent the salt spray test. Bonding microstructure was characterized using optical microscopy and X-ray diffraction. Corrosion resistance of surfaced coatings was found to be much inferior to that of mechtrode material and greater to that of substrate.

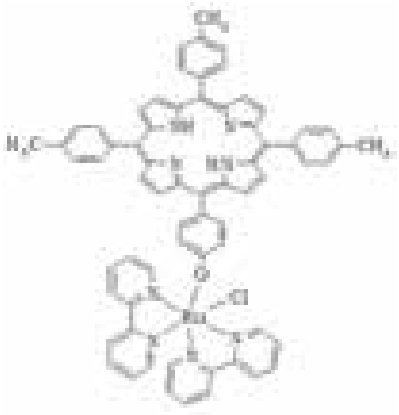
PP-43

SYNTHESIS, PHOTOPHYSICAL AND ELECTROCHEMICAL STUDIES OF MESO-MONO-RUTHENATEDPORPHYRIN

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Meso-monoruthenated have been obtained by the reaction of cis-[$Ru(bipy)_2Cl_2$] with 5-(4-hydroxyphenyl)-10,15,20-tris-(4-methylphenyl)porphyrin. FAB mass analysis and ^1H NMR studies have been measured for the coordination of ruthenium with porphyrin. ^1H NMR indicates possible π-electron interactions between the porphyrin ring and bipyridyl rings. At room temperature the steady state fluorescence gives emission from porphyrin excited state. However, at 77 K, two independent emissions are observed, one from the excited state of the porphyrin moiety, at 650 & 720 nm, and the other from the excited state of the ruthenium moiety at 700 nm. No excited state intramolecular energy transfer reactions have been detected. The fluorescence quantum yields are found to be drastically reduced in ruthenatedporphyrins. The decreased fluorescence quantum yields are explained in terms of heavy atom effect. Fluorescence decay analyses have been found to result in dual lifetime, at 1.5 and 7.7 ns in dichloromethane. No particular solvent polarity dependence on lifetime or quantum yield has been observed. The shorter lifetime is assigned to singlet excited state of ruthenium and longer lifetime to porphyrin singlet excited state. Electrochemical analysis of these species in dichloromethane exhibits three anodic peaks at 0.68, 0.98 and 1.42 V versus SCE, analogous to the $Ru^{3+/2+}$ couple and two successive one electron oxidation processes on the porphyrin ring, respectively. On the other hand, cathodic potentials at –0.965 and –1.53 V versus SCE, corresponding to two successive reduction processes at the porphyrin ring. It is found that the electronic characteristics of both porphyrin ring and ruthenium chromophore are strongly perturbed.

Keywords: Macromolecular, porphyrin, ruthenium, fluorescence, lifetime, electrochemistry.



PP-44

SYNTHESIS, CHARACTERIZATION AND THEORETICAL STUDIES ON VIBRATIONAL AND ELECTRONIC PROPERTIES OF PYRIMIDINE DERIVATIVE: A DFT APPROACH

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An efficient one pot multi component condensation method has been adopted to synthesis 5-(4-hydroxy-3-methoxyphenyl)-7-thioxo-5,6,7,8-tetrahydropyrimido[4,5-d]pyrimidine-2,4 (1H,3H)-dione. The spectral characterization of the synthesized compound has done by FT-IR, FT-Raman and NMR analysis. FT-IR and FT-Raman spectra were recorded in the region 4000–400 and 3500–100 cm^{-1}, respectively. The geometrical structure, vibrational frequencies, infrared intensities and Raman activities of the title molecule were theoretically calculated by DFT/B3LYP methods with 6-31G(d,p) basis set. The calculated HOMO and LUMO energies show that, the charge transfer occurs within the molecule. The solvent effects have been calculated using TDDFT and the results are in good agreement with experimental measurements. The other molecular properties like Mulliken population analysis, and thermodynamic properties of the title compound at the different temperatures have been calculated. The computed hyperpolarizability shows the investigated compound is a good candidate for non linear optics.

Key words: Pyrimidine, NLO, HOMO-LUMO, DFT

PP-45

GRAPHENE OXIDE SUPPORTED MONO AND BIMETALLIC NANO PARTICLES AS CATALYST WITH ANTI BACTERIAL ACTIVITY

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Nanoparticles have unique material characteristics, may find practical applications in a variety of areas, including medicine, engineering, catalysis and environmental remediation due to their ultrafine unit with dimensions measured in nanometres (nm; 1 nm = 10^{-9} metre). Nanoparticles are made by comminution (the pulverization of materials), such as through industrial milling or natural weathering, by pyrolysis (incineration), or by sol-gel synthesis (the generation of inorganic materials from a colloidal suspension). In this study two different types of graphene oxide supported two mono Ru, Pd, and a bimetallic Ru/Pd nanoparticles catalyst were synthesized. The size and shape of the products were characterized by various techniques such as : scanning electron microscopy (SEM), high resolution transmission electron microscopy (HRTEM) field emission scanning electron microscopy with edax (FESEM-EDAX) x-ray diffraction spectroscopy (XRD) Raman analyses followed by kinetic study. Results proved that the newly developed graphene oxide supported bimetallic nanoparticles catalysts can be more efficient to reductive, oxidative and of environmentally important organic pollutant additionally it is also very good biologically active compound.

Keywords: Graphene Oxide(GO), Palladium, Rhodamine, nanoparticle

PP-46

SYNTHETIC STUDIES ON ANODIC ACETOXYLATION OF ADIPIC ACID, ASCORBIC ACID AND SULPHONIC ACID

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The acetoxylated compounds like ascorbic acid, adipic acid and sulphonic acid are chosen as the substrates. The anodic potential of these substrates are identified through the cyclic voltamogram. The oxidation potentials of ascorbic acid, adipic acid and sulphonic acid are 0.62 V, 0.55 V and 0.74 V respectively. The electrochemical acetoxylation of these substrates are carried out of their characteristic anodic potentials by potentiostatic method. The acetoxylated products are analysed by FT-IR. The quenching and enhancing behaviours are confirmed by the formation of acetoxylation process.

Keywords: Acetoxylated compounds; Cyclic voltamogram; FT-IR; UV and PL

PP-47

INFRARED SPECTROSCOPICAL CHARACTERIZATION AND EFFECT OF TEMPERATURE ON MARINE SHELL FROM VELLAR ESTUARY, TAMILNADU, INDIA

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Calcium carbonate ($CaCO_3$) is an extremely important material for fundamental research and several industrial applications. It is the building blocks for the skeletons of many marine organisms, for example the shells of mollusks. It can exist in mainly three phases: aragonite, calcite and vaterite, out of which calcite is the most thermodynamically stable phase. In the present study, Busycotypus Canaliculatus (Class: Gastropoda; Phylum: Mollusca) Shells were collected from one of the known Vellar Estuary, Parangipettai, Tamilnadu. Mineralogical characterization and effect of temperature (300 to 800 °C) of the shells have been analysed by FTIR, XRD and thermal analyses with an aim of achieving calcite for industrial applications. Room temperature FTIR spectra indicate the presence of aragonite as major proportion due to the fundamental vibrations of CO_3^{2-} radical. Room temperature XRD confirmed the presence of aragonite as major proportion. Temperature effect of shells was effectively studied step by step and shows that the strongly recognized calcite is observed at 500 °C and up to 600 °C further growth of calcite is documented. Thermal analysis confirms the obtained results from FTIR and XRD, and shows that the total weight loss of the present shell is comparatively lower (37 %). The present study suggests that the present shells may give best quantity of calcite in the temperature range from 500 to 600 °C.

Key words: Busycotypus Canaliculatus, Calcium Carbonate, Temperature Effect, Calcite

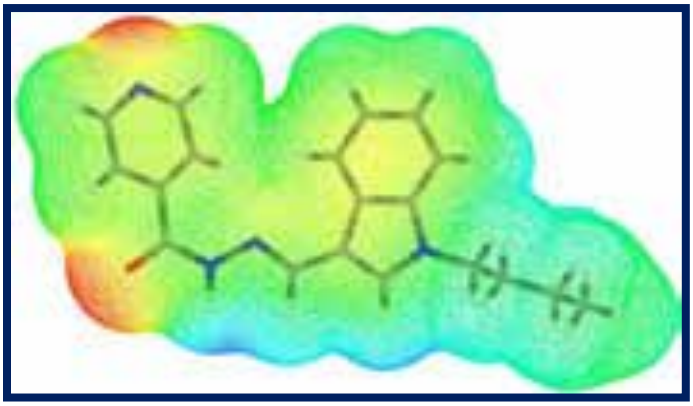
PP-48

INDOLE EMBELLISHED ISONIAZID: SYNTHESIS AND ANTI-OXIDANT ACTIVITY

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A novel heteroatom substituted indole decorated N-butyl, N-hexyl, isoniazid structural scaffold have been successfully developed and employed to investigate the molecules by FT-IR, UV-Vis, NMR, and antioxidant activity, also DFT studies with B3LYP/6-311++G(d,p) method. The optimized structure with their bonding features and vibrational assignments are in good agreement with their experimental ones as well as corresponding reported molecules. Electronic properties, viz. excitation energies, calculated energies, oscillator strengths, frontier orbital energies and band gap energies of the synthesized compounds have been determined both theoretically and experimentally by examination. Antioxidant studies of the synthesized compounds showed the significant activity against DPPH radical.



PP-49

COMPARATIVE STUDY OF Cts/PEG STABILIZED β-Cd CAPPED SILVER NANO COMPOSITES FOR DRUG FORMULATION

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The main objective of the work was to synthesize Cts and PEG stabilized Silver nanocomposites in the presence of β-CD, which acts as surfactants through hydrophobic-hydrophobic interaction with the metal bio nano composite. The characterization of both species of nanoparticles was carried out which strongly suggest that the Cts has more reducing nature than PEG due the presence of amide group. Due to their different ionic nature Cts has been used to formulate cationic surface charged SNCs and PEG as anionic one. The self emulsifying properties, together with the expected biodegradability and biocompatibility, make these Ag@ Cts- β-CD and Ag@ PEG- β-CD NPs very suitable molecules for pharmaceutical applications, such as the solubilisation of therapeutic proteins and drugs. From the present study it has been concluded that different surface charged NPs has its own advantage of attaching to the opposite charged molecule which may be either a drug or bio-molecule like epithelium which helps absorption of the drug at required site.

Keywords : SNCs , Chitosan, PEG and β-CD.

PP-50

Synthesis, Characterization, Antimicrobial Activity and docking Analysis of Schiff base

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The new Schiff base (E)-4-chloro-N'-((2-chloroquinolin-3-yl)methylene)benzohydrazide was synthesized from 4-chlorobenzohydrazide with 1-chloroisoquinoline-3-carbaldehyde using Schiff base synthetic route. The compound was synthesized and characterized by various spectral techniques such as FT-IR, UV-Vis, ^{1}H NMR, ^{13}C NMR and Mass spectral analysis. The biological activities for the synthesized compound was screened in vitro against five bacterial pathogens species: B. Polymyxa, B. Megaterium, V. Cholera, P. Alkalifaciens and F. antarctium and also against two fungal species: C. Albicans and A. fumigates by disc diffusion technique, using agar nutrient as medium, Chloramphenicol and Fucanazole as standard. In vitro molecular docking analysis was carried out for synthesized compound on Mycobacterium tuberculosis (Mtb) strain by discover studio 2.1 version.

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PP-51

PHOTOCATALYTIC DEGRADATION OF ORGANIC POLLUTANTS IN WATER USING NANO TITANIA CPREPARED BY GREEN NOVEL SOLGEL TECHNIQUE

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Heterogeneous photo catalysis one of the importantsteps in Advanced Oxidation Process was found to be promising for the elimination of toxic pollutants from water. Herein we reported the synthesis of mesoporous TiO2 nano particles by Sol-gel method using PVA and Green tea extract (GTE) as templates. The resultant powdered TiO2 samples were calcined at 500°C and the samples were characterized by XRD,FTIR,TGA,and SEM .The decrease in the absorbance of solar radiation is observed for the degradation of Congo red and was tested against commercially available TiO_2(DegussaP-25).The anti microbial activities of the synthesized and characterized samples also under Investigation against certain microbes.The effect of templates on the particle size, surface area. Band gap energy and Degradation of dyes is going to be analyzed and noted.

Keywords: Photodegradation, nanotitania, AOP, sol-gel technique, bitemplates, PVA, GTE, DegussaP-25.

PP-52

SYNTHESIS AND COMPUTATIONAL STUDIES OF 2-NITRO-3-PHENYL-3-(PHENYLTHIO)PROPAN-1-OL AND THEIR DERIVATIVES

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Nitro olefins acts as an excellent Michael acceptors. Owing to the strong electron deficiency of the Nitro group and hetetro atom nucleophiles of sulfur anions acts as nucleophiles. DABCO has been the catalyst of choice great deal of recent interest in the catalytic addition of thiols to nitro Olefin. Hence in this study Michael addition of thiols to nitroolefins was carried out in Lewis base DABCO (1,4-diazabicyclo [2.2.2] octane) with Tetrahydrofuran (THF) at in room temperature. 2-nitro-3-phenyl-3-(phenylthio)propan-1-ol derivatives **(6a-6f)** were obtained at appreciable purity of compounds which ascertained by melting point and thin-layer chromatography and characterized by ^{1}H – ^{13}C NMR. The synthesized compounds were subjected to molecular docking studies through commercial software using Discovery Studio 4.0. Furtherly the pharmacokinetics properties were studied by ADMET. $DMol^{3}$ Properties and B3LYP functions were studied. Among the six derivative compound **6b** showed the higher docking energy of the score -88.1382 and promising molecular interaction against the target protein cytochrome P450 17A1 (steroid 17 alpha – hydroxylase / 17, 20 lyase) which is primarily involved in the steroid biosynthesis pathway. The synthesized compounds of 2-nitro-3-phenyl-3-(phenylthio)propan-1-ol derivatives were explored against the target 3SWZ (CYP17A1). The compound **6b** 3-(4-ethylphenyl) -2-nitro-3-(phenylthio) Propan-1-ol exhibited desirable pharmacokinetic and higher reactivity, hence could be proposed for further invitro anticancer activity.

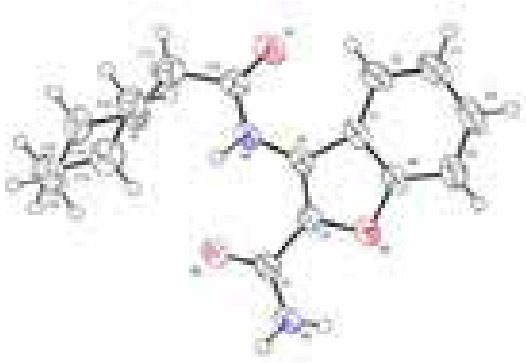
PP-53

CRYSTAL STRUCTURE AND BIOLOGICAL EVALUATION OF 3-(2-(PIPERIDIN-1-YL)ACETAMIDO)BENZOFURAN-2-CARBOXAMIDE

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The benzofuran is one of the most important classes of fused ring heterocyclic compounds. The benzofuran derivatives are naturally occurring and possess many biological applications.[1]Angelicin, psoralen and bergapten are the examples of naturally occurring benzofuran derivatives with biological applications. The isolation of benzofuran derivatives from natural sources is laborious and time-consuming. The syntheses of benzofuran derivatives is very easy than isolation process. The aminoacids are well-known biomolecules. Most of the amino acid derivatives are bioactive units.[2] Based on the above ideas, the research is planned to synthesis combination of benzofuran and aminoacid hybrid. The synthesized compounds are characterized by ^{1}H NMR, ^{13}C NMR, Mass and Single crystal X-ray crystallographic technique**(Fig 1.)**.[3] On continuation, the biological evaluations such as antimicrobial, anti-inflammatory and antioxidant activities were studied for drug development processes.



ORTEP diagram of 3-(2-(piperidin-1-yl)acetamido)benzofuran-2-carboxamide.

Keywords: Crystal structure, Benzofuran, Antimicrobial, Anti-inflammatory.

References:

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3. CCDC No: 1011897.

PP-54

BINDING INTERACTION OF 2-(1-METHOXYNAPHTHALEN-4-YL)-1-(4-METHOXYPHENYL)-4,5-DIPHENYL-1H-IMIDAZOLE WITH PRISTINE ZnO, Cu -DOPED ZnO AND Ag -DOPED ZnO NANOPARTICLES

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A sensitive 2-(1-methoxynaphthalen-4-yl)-1-(4-methoxyphenyl)-4,5-diphenyl-1H-imidazole (MNMPI) fluorescent sensor for nanoparticulates like ZnO, Cu -doped ZnO and Ag -doped ZnO has been designed and synthesized. The nanocrystalline ZnO, Cu -doped ZnO and Ag -doped ZnO have been synthesised by sol-gel method and analysed by powder X-ray diffraction (XRD), scanning electron microscopy (SEM), UV-Visible spectroscopy, UV-Visible diffuse reflectance (DRS) and photoluminescence spectroscopy (PL). The synthesized sensor release is enhanced by nanocrystalline pristine ZnO but is suppressed by Cu -doped ZnO and Ag -doped ZnO nanoparticles. The suppression of fluorescence is additional by copper than by silver doping.

Keywords: MNMPI, ZnO; Cu -doped ZnO; Ag -doped ZnO; XRD; SEM; DRS.

PP-55

STEREOSELECTIVE SYNTHESIS AND SPECTRAL STUDIES OF SOME BENZOTRIAZOLYLACETYL HYDRAZONES OF 3–ALKYL–2,6–DIARYLPIPERIDIN–4–ONES

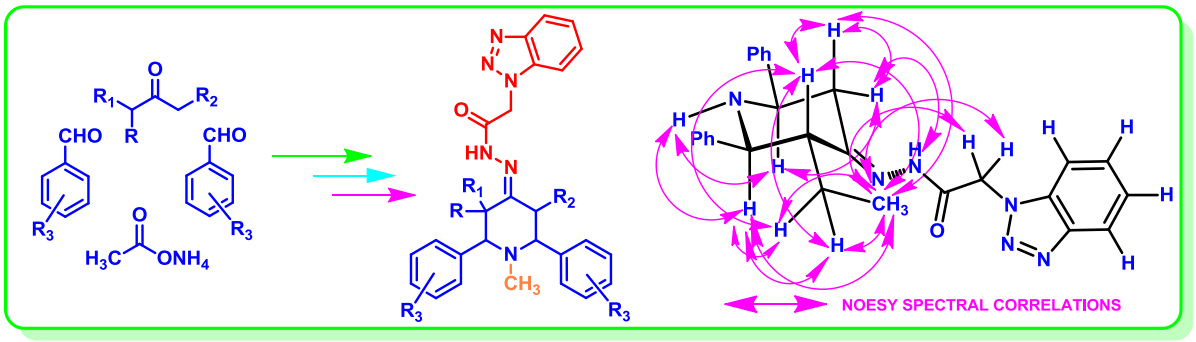
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An effort to include biologically potent benzotriazole nucleus into piperidine ring is achieved through hydrazone formation. The characterization of the synthesized compounds was carried out using FT-IR, ^{1}H &^{13}C NMR, ^{1}H-^{1}H COSY, ^{1}H-^{13}C COSY, NOESY spectral techniques and GC-Mass spectrum. The spectral assignments were done without ambiguity using 2D-NMR techniques. The conformational preference of the piperidine ring deduced from the spectral studies is ‘chair’. The diastereotopic nature of the methylene protons/methyl groups present in the molecules is revealed clearly in their spectral pattern observed.



PP-56

GREEN SYNTHESIS OF SILVER DEPOSITED TiO_2 NANOPARTICLES WITH ENHANCED OPTICAL PROPERTIES

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TiO_2 nanoparticles have been extensively studied in recent years due to low cost, easy availability, non toxic and chemical inertness. They also exhibited interesting physico-chemical, electrical and optical properties and were also widely exploited them for use in various applications. The pure TiO_2 has two main drawbacks such as low quantum yield and high recombination rate. Many strategies have been followed to improve its efficiency such as doping, co-doping, surface modification etc. Noble metal nanoparticles (Au, Pt and Ag) play an important role on TiO_2 to enhance its catalytic activity in visible region by Surface Plasma on Resonance (SPR) effect. Among them silver (Ag) seems to be the best choice because of its biocompatibility, low cost and excellent optical property. In this work silver (Ag) deposited TiO_2 nanoparticle was synthesized by novel green synthesis method. The prepared nanoparticles were characterized by Powder X-ray diffraction spectroscopy (PXRD), Field Emission Scanning electron microscopy (FESEM), Energy Dispersive Analysis of X rays (EDAX), FT–Raman spectroscopy, Fourier Transform Infrared spectroscopy (FT-IR), UV-vis spectroscopy and Photoluminescence spectra (PL).

PP-57

GREEN SYNTHESIS OF ZINC OXIDE NANO PARTICLES USING PLECTORANTHUS AMBOINICUS EXTRACTS: STURUCTURAL AND IN VITRO ANTI BACTRIAL STUDIES

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A series of some new zinc oxide nana particles using plectoranthus amboinicus extracts has been synthesized from their respective compound by precipitation methods. Structural assignment is based on their spectral data were collect and verified . The entire compound was preliminarily Screened a for their in vitro antimicrobial activity against Gram positive and gram negative organism by disc diffusion method synthetic Medicines and are known to play a vital Role in a number of diverse areas such as electronic cosmetics, coating and bio technology.

PP-58

SILOXANE CORE DIANHYDRIDE SKELETAL MULTI-WALLED CARBON NANOTUBE REINFORCED POROUS POLYIMIDE NANOCOMPOSITES

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Multi-walled carbon nanotube(MWCNT)/polyimide (PI) nanocomposite were synthesized from different commercially available aromatic diamine such as p-phenylene diamine (p-PDA) and triamine like Melamine with siloxane-based dianhydride (SDA) in 1-methyl-2-pyrrolidone (NMP) mediumvia thermal imidization.Varying weight percentages (0.5, 1.0 and 1.5 wt %) of MWCNTs were reinforced with polyimide followed by thermal curing to obtain MWCNT/polyimide nanocomposites.The synthesized PIs were characterized and confirmed by NMR, FT-IR, TGA, DSC, dielectrical and SEManalysis. FromTGA, it can be seen that the thermal stability and char yield of the nanocomposites increasesignificantly by incorporating amine functionalized-MWCNTsthan that of neat PI.This indicates that the movement of polymer chains is reduced due to the constraint effect of MWCNTs. The T_g values of the polyimides obtained from their DSC plots were quantified.SEM observations showed an enhanced homogeneous dispersion of MWCNTs with the PI matrix.It is thus believed that the strong interfacialinteraction is responsible for the significantimprovement of dispersion, thus being favorable for increased thermal properties.

Keywords: MWCNT, polyimide, glass transition temperature; thermal stability; nanocomposites; dielectric materials; absorbance and morphology.

PP-59

SYNTHESIS, CHARACTERIZATION AND ANTIMICROBIAL STUDY OF Zn(II) COMPLEX OF A MANNICH BASE DERIVED FROM BENZOHYDRAZIDE

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A Mannich base N^{I}-((2-methoxy phenyl)(morpholino)methyl)benzohydrazide benzoic acid and Zn(II) complex of the above Mannich base as ligand have been synthesized. Both the ligand and complex were characterised through analytical (Elemental analysis, Melting point and TLC) and spectral methods (IR, H-NMR and C-NMR). Further the antimicrobial study was performed on both the ligand and complex using some selected bacterias. The ligand and complex showed antimicrobial activity.

Key words: Mannich base, Metal complexes, Antimicrobial activity.

PP-60

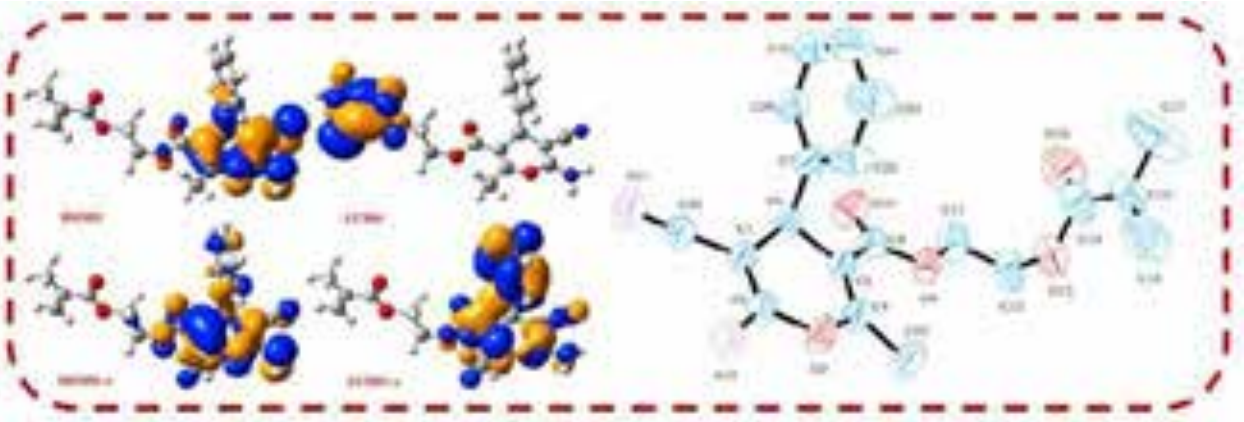
SYNTHESIS, SPECTRAL, STRUCTURAL AND COMPUTATIONAL ANALYSIS OF NOVEL 2-(METHACRYLOYLOXY)ETHYL 6-AMINO-5-CYANO-2-METHYL-4-ARYL-4H-PYRAN-3-CARBOXYLATES

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A one-pot, three-component synthesis of novel 2-(methacryloyloxy)ethyl 6-amino-5-cyano-2-methyl-4-phenyl-4H-pyran-3-carboxylates has been achieved by the reaction of 2-(methacryloyloxy)ethyl 3-oxobutanoate with an aromatic aldehyde and malononitrile using K_2CO_3 as a catalyst in aqueous medium with superior yields. The molecular structure of the resulting compound was investigated by spectral techniques such as FT–IR, NMR and confirmed by single crystal X–ray diffraction study. The geometry and electronic structures were arrived using B3LYP/6-31G++(d,p) calculations. The geometrical parameters, resulted from single crystal XRD, are in accord with the computed ones. FT-IR and NMR spectra of the title molecule have been investigated computationally.



PP-61

GREEN SYNTHESIS: SYNTHESIS AND CHARACTERIZATION OF ZnO NANOPARTICLES USING DRUMSTICK (MORINGA OLEIFERA) LEAF EXTRACT

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Green synthesis: This is the most preferred method of preparation as it makes use of pollution free chemicals and encourages the use of non-toxic solvents such as water and plants extracts. The present study is proposed with an objective to synthesize ZnO nanoparticle by the eco-friendly green synthesis using environmentally benign leaf extract of Moringa Oleifera (Drumstick) where zinc nitrate acts as the precursor. The synthesised ZnO nanoparticles were characterised by X-ray diffraction (XRD), Transmission electron microscopy (TEM), Fourier transmission infrared (FT-IR), Field emission scanning electron microscopy (FE-SEM) and Energy dispersive spectroscopy (EDS).

Keywords: Moringa Oleifera (Drumstick); ZnO; XRD; TEM; FT-IR; FE-SEM and EDS

PP-62

DEVELOPMENT AND STUDIES OF N-SUBSTITUTED ACRYLAMIDE COPOLYMER FOR ANTIMICROBIAL RESISTANCE

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A series of copolymers N-tert-amyl acrylamide (NTA) andmethacryl amido propyl trimethyl ammonium chloride(MPTMACl) were prepared by co- polymerization in 3:1 methanol / water medium at 55–60°C using ACVA as initiator. The copolymers were characterized by ^{13}C &^{1}H-NMR and FTIR spectroscopy. The prepared copolymers were tested for their antimicrobial activity against bacteria and fungi by Well-diffusion method. It was noticed that the activity of polymers against bacteria and fungi were increases with increasing concentrations such as 25 µg/well, 50 µg/well, 75 µg/well and 100 µg/well.

Keyword: Copolymer, NMR, FTIR, Antimicrobial, Well-diffusion.

PP-63

INVESTIGATION ON THE ELECTRICAL PROPERTIES OF EPOXY NANOCOMPOSITES FOR HIGH VOLTAGE APPLICATIONS

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Silicon oxide nanoparticles (SiO_2) were prepared by sol-gel method and the prepared nanoparticles were characterized by various techniques like AFM, SEM, FTIR spectrum and XRD. The prepared nanoparticles are used to improve the electrical insulationof epoxy polymers (DGEBA). The nanocomposite was prepared by epoxy polymer in the presence of different concentration of prepared surface modified SiO_2 nanoparticles (SiO_2-APTES). The formation of the SiO_2-APTES-DGEBAnanocomposites was characterized by UV-Vis Spectroscopy, TGA, DSC, SEM and AFM. The electrical properties were investigated using impedance techniques and the conductivity value of the SiO_2-APTES-DGEBAnanocomposite was in the range of 10^6 – 10^7 Hz. The real part of permittivity, dielectric loss and ac conductivity shows significant changes with filler concentration, temperature and frequency, especially it is more pronounced in 1% SiO_2-APTES-DGEBA and 7% SiO_2-APTES-DGEBA samples. The overall analyses suggest that loading epoxy resins with SiO_2-APTES improve the thermal and electrical properties of epoxy resin.

Keywords:Nanodielectrics,Permittivity, dielectric loss, AC conductivity, Silicon dioxide.

PP-64

GROWTH AND CHARACTERIZATION OF IMIDAZOLIUM HYDROGEN OXALATE SINGLE CRYSTAL

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A new organic nonlinear optical single crystal of Imidazolium hydrogen oxalate (IO) was successfully grown by solution growth using the slow evaporation technique. The structure of the grown crystal and crystalinity has been determined by single crystal X-ray diffraction, Powder X-ray diffraction analysis respectively. The presence of functional groups in IO crystal has been identified by FTIR and FT-Raman spectra. The optical transparency range has been studied through UV–Vis–NIR spectroscopy. The thermal stability of the compound has been determined by TG-DTA analysis. The mechanical properties like Vicker's microhardness number (H_v), yield strength (σ_v) and stiffness constant (C_{11}) of the grown crystal have been evaluated. The dielectric behavior of the grown crystal has been characterized. The second harmonic generation efficiency of the grown IO crystal has been obtained by the Kurtz–Perry powder technique.

PP-65

THERMODYNAMIC POSSIBLE PHOTOELECTRON TRANSFER FROM IMIDAZOLE TO ZnO NANOCRYSTAL

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The 2-(1-(naphthalene-1-yl)-4,5-diphenyl-1H-imidazol-2-yl)phenol was synthesised and characterized by spectral techniques. Absorption, emission and cyclic voltammetric studies have been made to probe the binding interaction between imidazole and ZnO nanocrystals. The nanocrystalline ZnO enhances the absorbance and emission intensity of imidazole and the binding constant for the formation of imidazole -ZnO composite has been obtained. TEM, SEM and EDX spectra confirmed the binding of imidazole with nanocrystalline ZnO.

Keywords: Imidazole; ZnO; UV-Vis; PL; Cyclic Voltammetry; TEM; SEM and EDS

PP-66

FACILE SYNTHESIS OF MODIFIED SEMICONDUCTOR OXIDEDAYLIGHT ACTIVE PHOTOCATALYST WITH ANTIPHOTOCORROSIVE PROPERTY FOR DETOXIFICATION AZO DYE

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Utilization of solar energy is an energy efficient process for dye wastewater treatment. Photocatalytic degradation of toxic dyes was carried out using modified semiconductors under direct sun light. Concerning this, the different weight percentages of Cadmium sulphide loaded silver semiconductor oxide catalysts were prepared by the simple sol-gel cum precipitation – thermal decomposition method and used for degradation studies. Cadmium sulfide is a kind of semiconductor with fine band gap of 2.4 eV, and its valence electron can be effortlessly evoked to conduction band under sun or visible light illuminations. Among the different CdS prepared catalysts, highly efficient 2 wt % of CdS-Ag-ZnO was characterized by different characterization techniques. Presence of metal sulphide increases the absorbance of ZnO into the entire visible region. XPS reveals that the silver present as a metalic state in the catalyst. The efficiency of the catalyst was compared with single metal doped, undoped, and other commercial catalysts, especially Degussa P25, a standard bench mark photocatalyst. The photomineralization of AB 1 (Acid Black 1) dye have been analyzed in details. Mineralization of these dyes has been confirmed by chemical oxygen demand (COD) measurements. Mechanism has been proposed for the higher efficiency of CdS-Ag-ZnO at pH 9 under solar light. Antiphotocorrsive study recorded using AAS technique; itreveals that bare ZnO suffers more dissolution or suspension by photocorrosion than our prepared photocatalyst CdS-Ag-ZnO. This catalyst is found to be more stable and reusable.

Key words: Antiphotocorrosive; sun light; Demineralization; Acid Black (AB 1).

PP-67

SYNTHESIS CHARACTERIZATION AND ANTIMICROBIAL SCREENING SOME NOVEL 2, 6-BIS (4-CHLOROBENZOYL) - 3, 5-BI (SUBSTITUTED ARYL) TETRAHYDRO-1,4- THIAZINE 1,1-DIOXIDE DERIVATIVES

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A series of some new 2,6-bis, (4-chlorobenzoyl)- 3,5-bi(substituted aryl) tetra hydro-1,4-thiazine -1,1- dioxide has been synthesized from their respective compound. The structural assignment is based on their spectral data. The entire compound was preliminarily Screened a for their in vitro antimicrobial activity against Gram positive and gram negative organism by disc diffusion method synthetic Medicines and are known to play a vital role in a number of chemical and biochemical processes. We know that Thiazines are six membered cyclic compounds containing sulfur and nitrogen atoms at 1,2; 1,3 & 1,4 positions and also posses two pharmacophores i.e., -NH- and –SO2. A survey of synthesis of thiazines Revealed the moiety have attracted a great deal of interest of medicinal chemists.

PP-68

CORROSION INHIBITION OF MILD STEEL IN 1 N HCl ACID SOLUTION BY LEAF EXTRACT OF PONGAMIA PINNATA - A GREEN APPROACH TO CORROSION MITIGATION

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The Plant extracts can be called as good corrosion inhibitors, since the use of plant extract is not only inexpensive but also effective and eco – friendly; also, they are the renewable sources and readily available. In addition, plant extracts contain many active functional groups as well as hetero-atoms such as S, N, O, and P. These active functional groups as well as the lone pair electrons of the hetero – atoms plays a major role in corrosion protection of materials. The aim of the present work is to use the leaf extract of Pongamia pinnata (P.pinnata) as corrosion inhibitor for mild steel. P.pinnata is a tree belongs to leguminosae family and the extract of P.pinnata possesses high medicinal values, it is used in curing diarrhea, whooping cough, ulcer, bronchitis and rheumatic joints. In the present study, the effect of the leaf extract of P.pinnata on the corrosion of mild steel in 1N HCl was studied using weight loss technique, potentiodynamic polarization, and electrochemical impedance spectroscopy. The inhibition efficiency increased with increase in concentration of the inhibitor and decreased with increase in temperature. From the electrochemical studies it is concluded that P.pinnata acts as a mixed type inhibitor for mild steel in 1 N HCl and the corrosion or dissolution reaction is retarded by adsorption process. Adsorption of leaf extract molecules on the mild steel surface obeys Langmuir, Temkin and Frendlich adsorption isotherm. From the results it is concluded that the P.pinnata can be a good corrosion inhibitor for mild steel in 1 N HCl medium.

Keywords: Corrosion, Mild steel, Potentiodynamic Polarization, Electrochemical Impedance Spectroscopy, Pongamia Pinnata.

PP-69

GC-MS ANALYSIS AND PHYTOCHEMICAL SCREENING ANALYSIS OF TRIDAX PROCUMBENS

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Plants are playing vital role in medicine and clinical research. Which are available in plenty in nature. It is important that the plants phytochemicals analysis should be done. To know the phytochemical components present in it. Then the economic importance species should be marked and prevented from the destruction. Phytochemical analysis predicts us how important the plants are in research. With this intuition, Tridax procumbens (vettukkai thalai) is selected for this study. The methanol leaf extract of Tridax procumbens are rich in alkaloids, glycosides, flavonoids, saponins, terpenoids and steroids. Tridax procumbens were the best possessing rich source of phytochemical and justify their traditional uses.

Keywords: Tridax procumbens, Asteraceae, Leaves, methanolic, GC-MS, phytochemical analysis.

PP-70

THE EFFECT OF TRIAZOLES AND SURFACTANTS ON THE CORROSION INHIBITION OF CARBON STEEL IN ACID SOLUTION

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The inhibitive action of triazoles and surfactants on the corrosion of carbon steel has been studied using the weight loss method and electrochemical studies. Results obtained show that these organic compounds are very good inhibitors. Potentiodynamic polarisation studies clearly reveal the type of inhibitor. The corrosion parameters such as corrosion current (i_{corr}), corrosion potential (E_{corr}), inhibition efficiency (IE), corrosion rate, and activation energy (E_a) were calculated at different temperatures ranging from 303 to 333 K. The adsorption of triazole compounds on carbon steel surface obeyed Langmuir's adsorption isotherm.

Triazole-type organic compounds are good corrosion inhibitors for many metals and alloys in various aggressive media. Better IE is exhibited by TTA compared to BTA. This can be attributed to the increased p-electron density and the presence of methyl group in the TTA molecule. The adsorption of triazoles on a carbon steel surface obeys Langmuir's adsorption isotherms. Of the combinations studied, TTA + "Triton X-100", BTA + "Triton X-100" functioned as mixed inhibitors, but acted predominantly as cathodic inhibitors. Chemical analysis of the dissolved species in the acid solution confirmed, that the inhibitors employed in the present investigation were able to minimise the dissolution of iron.

Key words: Steel, Corrosion inhibitors, Surfactants, Adsorption

PP-71

PHOTOCATALYTIC ACTIVITY OF MAGNETICALLY SEPARABLE Fe_3O_4-ZnO NANOCOMPOSITES IN VISIBLE REGION

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Fe_3O_4-ZnO nanocomposites were synthesized by sol-gel method and characterized with X-ray diffraction analysis (XRD) for structural confirmation, HR-SEM images and EDAX spectrum for surface morphology and presence of iron oxide nanoparticles in ZnO matrix. The mean crystallite size of Fe_3O_4-ZnO nanocomposites was 34 nm as calculated by Debye Scherrer's formula which confirmed with HR-TEM image. The SAED pattern shows the presence of (100), (101), (102) and (202) of ZnO phase and (400) of Fe_3O_4 phase, confirming the crystalline nature of Fe_3O_4-ZnO nanocomposites. The vibrating sample magnetometer (VSM) result shows that Fe_3O_4-ZnO nanocomposites possess super paramagnetic nature and the composite nanospheres are magnetically separable. The diffuse reflectance spectroscopy (DRS) studies shows that the implantation of Fe_3O_4 nanoparticles into ZnO matrix modifies the UV absorption edge slightly to visible region. The photocatalytic activity of Fe_3O_4-ZnO nanocomposites studied against Rhodamine B dye in visible region, is found higher than that of pristine ZnO nanospheres which shows that Fe_3O_4-ZnO nanocomposites is a promising photocatalyst. The better photocatalytic activity in visible region and magnetically separable nature of Fe_3O_4-ZnO nanocomposites is the main highlight of this work.

Keywords: Fe_3O_4-doped ZnO; sol-gel; paramagnetic; Photocatalyst.

PP-72

STUDY ON THE EFFECT OF 1- [PHENYL (PIPERIDIN-1-YL) METHYL] THIOUREA AS CORROSION INHIBITOR FOR MILD STEEL IN 1.0 M HCL MEDIUM

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The influence of 1- [PHENYL (PIPERIDIN-1-YL) METHYL] THIOUREA (PPMT) on corrosion inhibition of mild steel in 1.0 M HCL was studied by weight loss, effect of temperature, potentiodynamic polarization, electrochemical impedance, FT-IR, UV-Visible and Scanning electron microscope. The experimental results showed that the inhibition efficiency increases with increase in PPMTconcentration but decrease with rise in temperature. The adsorption of PPMT on the mild steel surface obeyed the Temkin's adsorption isotherm. Potentiodynamic polarization curves showed that PPMT acted as a mixed type inhibition in Hydrochloric acid. This was supported by the impedance measurements which showed a change in the charge transfer resistance and double layer capacitance indicating adsorption of PPMT on the mild steel surface. Protective film formation against the acid attack is confirmed by FT-IR, UV-Visible and SEM.

Keywords: Mild steel, Potentiodynamic polarization, Sulphuric acid, Temkin's adsorption isotherm and electrochemical impedance spectroscopy

PP-73

BIOSENSING BEHAVIOUR OF CIPROFLOXACIN AND SPARFLOXACIN WITH BIOMOLECULES BY SPECTRAL, ELECTROCHEMICAL AND MOLECULAR DOCKING METHODS

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Biosensing property of ciprofloxacin and sparfloxacin with different biomolecules (DNA, RNA and BSA) are investigated by UV–Visible spectroscopy, fluorescence spectroscopy cyclic voltammetry and molecular docking methods. Upon increasing the concentration of the biomolecules, the absorption maxima of ciprofloxacin and sparfloxacin are red shifted in aqueous solutions whereas red or blue shift noticed in the fluorescence spectra. The negative free energy changes suggest that the interaction processes are spontaneous. Cyclic voltammetry results suggested that when the drug concentration is increased, the anodic electrode potential increased. Molecular docking results showed that hydrophobic forces, electrostatic interactions, and hydrogen bonds played vital roles in the drugs with biomolecules. The molecular docking calculation clarify the binding mode and the binding sites are in good accordance with the experiment results.

PP-74

ENHANCED ELECTROCHEMICAL PERFORMANCE OF $LiFePO_4$ BY RHODIUM DOPING

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An attempt was made to synthesis Rhodium (Rh) doped LiFePO4 for Li Ion battery application as cathode candidate, $LiRh_X\ Fe_{1-x}\ PO_4$ (X=0.01-0.03). The cathode material is prepared by mixture of 75% active material , 20% acetylene block and 5% polyvinylidene Fluoride (PVDF) as binder made syrup with few drops of N-Methylene -2-Pyrolidine.The best electrochemical performance was identified where X=0.02($LiRh_{0.02}\ Fe_{0.98}\ PO_4$ with specific capacity of 159.8 mAhg-1 .and the capacity fade is only 0.5% after 50 cycle.

Keywords: Li- Ion Battery, $LiFePO_4$, Rhodium, capacity fade and electrochemical study.

PP-75

SYNTHESIS, STUDY OF STRUCTURE ACTIVITY RELATIONSHIP AND EVALUATION OF BIOLOGICAL ACTIVITIES OF SUBSTITUTED (E)-2-BENZYLIDENE-N-METHYLHYRAZINECARBOTHIOAMIDES

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A series of ten substituted (E)-2-benzylidene-N-methylhydrazinecarbothioamideswere synthesized from 4-methyl-3-thiosemicarbazide with substituted benzaldehydes. All the synthesized compounds were in good agreement with elemental and spectral data (UV, FT-IR, ^{1}H NMR and ^{13}C NMR). The assigned UV λ_{max} (nm), IR νC=N (cm^{-1}), NMR δ^{1}H (ppm) CH=N and δ^{13}C (ppm) C=N spectral data of (E)-2-benzylidene-N-methylhydrazinecarbothioamidescorrelated with Hammett constants using single and multi-regression analysis. From the results of correlation analysis substituent effects on the spectral data have been discussed. The antibacterial activity of (E)-2-benzylidene-N-methylhydrazinecarbothioamides have been studied with three Gram-positive pathogenic bacterial strains namely (B. subtilis, S. aureus and S. pyogens) and two Gram-negative strains (E. coli and P. aeruginosa). The antifungal activity of (E)-2-benzylidene-N-methyl hydrazones studied with three fungal species (A. flavus, A. niger, T. viride)using disk diffusion method.

Keywords: hydrazones, biological activity, substituent effect, spectral correlation

PP-76

EPOXY/GRAPHENE OXIDE NANOCOMPOSITE COATINGS –PROCESSING, PROPERTIES AND APPLICATIONS

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The ban on harmful substances in antifouling paints requires the development of new antifouling strategies. Alternatives should be as effective as conventional paints but of lower toxicity. In the present study, a commercially available epoxy resin modified with amine functionalized nano graphene oxide and was examined in order to get information on its antifouling and anti-corrosive properties. So, an epoxy nanocomposite was synthesized using nano graphene oxide (in the amount of 1%, 3%, 5% and 7 wt%) and diglycidyl ether of bisphenol A (DGEBA) type of epoxy resin. The structural conformation of these materials was ascertained from FTIR spectral study. The epoxy coating materials were characterized by chemical resistance, impact resistance, flexibility, contact angle and antifouling tests. The anti-corrosive properties of the nanocomposite were investigated using salt spray and electrical impedance spectroscopy methods. The surface morphology images were taken by SEM analysis. The results showed improved antifouling and anticorrosive properties of epoxy based nanocomposite coating compared to that of neat epoxy coating.

Keywords: Epoxy resin, Coating, Antifouling, Anticorrosion, Biocide, Barnacle, SEM

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PP-77

SURFACE MODIFIED TiO2 PHOTOCATALYTIC STUDY ON METHYL ORANGE DEGRADATION AT UV/VISIBLE LIGHT

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The photocatalytic waste water treatment is one of the most promising tasks in heterogeneous community. For this water pollution reduction, many photosensitive semiconductors such as CdS, ZnO and SiC surface modified with metal and non metal, organic and inorganic sensitive materials were reported[1], however, Titania (TiO2) doped semiconductor shows excellent photosensitive property because of the large band gap 3.2 eV extension at anatase TiO2 is to enhance it recombination of electrons hole. Through this conceptual idea, we tested TiO2 narrow band gap modification via CdS nano crystal incorporation liability on photocatalytic degradation of methyl orange (MO) under studied. The CdS coupled TiO2 photocatalysts were prepared under solvothermal method reported by Wu et al. [1]. Three different catalysts were prepared with Cd/TiO2 mole (1- 6%) to check photocatalytic performances. The materials were further characterized by BET isotherm for surface adsorption, X-ray diffraction for crystal dimension, TEM for crystal morphology and orientation, UV-Visible for band gap study. The analysis of TEM spectra show that the crystals lattice deformation assumes the CdS crystals dispersion uniformity over TiO2 anatase phase enhanced conduction band due to its high surface area. The X-Ray diffraction gives additional patterns at 43.9° and 52.1° to their corresponding 220 and 111 planes in CdS/Ti O2 (4.7 %) clearly shows the dispersion of CdS ions over titania. The choice of solvothermal method adopted for photo catalysts preparation at room temperature in order to prevent most of oxygen defects at edges of Ti4+ crystal surface. Thus, the reactivity anticipating more facile at 101 facet of anatase titania thereby couple through high conduction of CdS substitution. The CdS-TiO2 photocatalytic activity on water polluted MO degradation was studied under Uv-Visible region. The life time of photo induced hole in TiO2 examine the property of MO degradation and it was determined from the basic knowledge of water splitting by referred material [2]. The conduction band of CdS has slightly higher than TiO2. Hence it creating more holes in valence bond of titanite, which is increased the rate of oxidation in MO degradation even at visible light irradiation. The rate of degradation of organic pollutant was followed pseudo first order reaction. Through this kinetic study, photo-catalytic degradation of MO compared between TiO2 and CdS/TiO2 catalysts exposes the rate of electron transfer from MO singlet excited state to the conduction band of CdS/ TiO2 much faster than that of TiO_2 conduction band alone. Therefore, TiO2 surface modified through CdS catalyst is far better to the life of electron recombination in photocatalytic degradation of MO.

PP-78

HYBRID ORGANIC-INORGANIC LIGHT EMITTING DIODES: EFFECT OF Cu-DOPED ZnO

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The synthesized pristine ZnO and Cu-doped ZnO nanomaterials have been characterized using scanning and transmission electron microcopies, energy dispersive X-ray spectroscopy, X-ray diffractometry, X-ray photoelectron spectroscopy, lifetime and Fourier-transform infrared spectroscopies, electronic spectral studies and cyclic voltammetry. HyLEDs have been fabricated using pristine ZnO and Cu-doped ZnO as electron injection layer and 2-(1-methoxynaphthalen-4-yl)-1-(4-methoxyphenyl)-4,5-diphenyl-1H-imidazole as emitting layer which emits green colour. The pristine ZnO and Cu-doped ZnO layer is inserted at the interface between ITO cathode and organic emitting layer. The device with nano Cu -doped ZnO layer facilitates the electron injection more efficiently than the one with nano ZnO layer. The current density and luminance of the device increased significantly by Cu -doped ZnO device compared to the ZnO device. The device with Cu -doped ZnO nanomaterials show luminance of driving voltage and luminance was obtained from the ZnO device.

Keywords: HyLEDs, Pristine ZnO, Cu-doped ZnO, electron injection layer, high efficiencies, low turn-on voltCue.

PP-79

STUDIES ON POLYMER COMPOSITE FROM TANNERY SOLID WASTE

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Leather manufacturing involves discharge of large quantities of solid and liquid wastes. Raw trimmings and wet blue trimming solid wastes generated in the leather industry and it makes pollution problem. Land filling in an easy option for the disposal of solid wastes like chrome shavings and trimmings, but is subjected to stringent environmental regulation because of the presence of chromium in these materials. An efficient ways of utilization of these waste materials may be to combine them in a suitable form with epoxy resin with different proposition with room temperature and pressure and it give composite materials. Such application based on the fibrous nature of the chrome shavings and trimmings would avoid the environmental problem as well as evolve value added products based on these waste materials.

Keyword: Leather waste, mechanical properties, Chromium extract.

PP-80

POLY [N-(2-HYDROXYPROPYL)METHACRYLAMIDE]/ SODIUM ALGINATE COMPOSITE FOR BIOMEDICAL APPLICATIONS

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The use of natural polymer for drug carrier is of high importance nowadays due to its biocompatibility and inert nature. Poly [N-(2-hydroxypropyl) methacrylamide] p(HPMA) and sodium alginate (SA) were blended and cast into thin film and analyzed for their physical and mechanical properties. pHPMA is a neutral, highly biocompatible and widely used for delivery of drug. Its synthetic flexibility has been proved useful for various anticancer drug combination and structural functionalization. Hydrogel forming property of alginate enhances wide usage of its matrix material. Composite film of p(HPMA) and SA was made by mixing 10 w/v% of sodium alginate and 10:10 w/v% of Poly [N-(2-Hydroxypropyl) methacrylamide] and casted into petri dish and dried at 60°C. Functional groups present in the composite p(HPMA)/SA film were analysed using Fourier transform infrared spectroscopy (FT-IR). FTIR showed no interaction between pHPMA and SA in the p(HPMA)/SA composite film. Thermo Gravimetric analysis (TGA) and Differential Scanning Calorimetry (DSC) were used to analyse thermal behaviour and thermal stability of composite. TGA showed composite film p(HPMA)/SA was stable upto 240°C. XRD analysis indicated change of crystalline nature of pHPMA to amorphous in pHPMA/SA composite film. Surface morphology was studied using Scanning electron microscope (SEM). Composite films were checked for biocompatibility by MTT assay with VERO cell lines. Composite film p(HPMA)/SA showed good biocompatibility of 74 % with VERO cell lines. The characterisation analysis proved that the SA/pHPMA composite films are good matrix material for drug delivery.

PP-81

SPECTROSCOPIC STUDIES OF RECENTLY EXCAVATED ANICENT POTTERIES FROM POOMPUHAR TAMILNADU, INDIA

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The systematic and scientific study of artifacts reflects technological development and civilizations during the past. The importance of pottery artifacts as indicators of the artistic and technological advances reached by the ancient culture is investigated by a number of techniques. Spectroscopic studies have been performed on recently excavated archaeological pottery samples from Poompuhar Tamilnadu, India. The clay mineral type and its structural deformation due to firing have been studied from their fourier transform infrared (FT-IR) spectra. The maximum firing temperature attained during baring, firing conditions (open/reduced atmosphere) and iron mineral phase changes is well established. Micro- raman spectroscopic technique is used to identify minerals in the potsherds. Further scanning electron microscope (SEM) studies on potsherds pave the way to micro structural analysis and trace the subsequent development of virtification stages, thereby firing temperature is being confirmed. The results obtained from the different techniques provide the information for understanding the technological conditions implemented for the production of pottery and are found to give useful information about the analytical composition of potteries.

Keywords: Ancient Pottery, FT-IR, Micro-raman and SEM-EDX

PP-82

EFFECT OF EDTA DOPING ON URACIL CRYSTALS

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Ethylenediamine teraacetic acid (EDTA) doped Uracil were grown by slow evaporation method at room temperature with double distilled water as solvent. The grown crystals have been subjected to spectroscopic and structural properties. FTIR analysis has been carried out to characterize the grown crystals. The range and percentage of optical transmission as well as absorption are determined by recording UV-Vis spectrum. From the UV data, Band gap determination is also carried out. Fluorescence spectra has also been carried out to characterize the grown crystals to study the absorption and emission spectra. The powder X-ray diffraction methods are used for identifying the structural parameters of grown crystals. The effect of the influence of dopant on the surface morphology of Uracil-EDTA crystal faces are analyzed by SEM Elemental composition were also confirmed by EDAX method.

Keywords: Band gap; EDAX; FTIR; SEM

PP-83

SUPERFICIAL SONICATION SYNTHESIS OF A HIGHLY SUNSHINE ACTIVE Sr LOADED Ag/ZnO PHOTOCATALYST AND ITS APPLICATIONS

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Hexagonal and spherical-like Sr/Ag/ZnO nanostructures have been prepared successfully by a simple by sonication method. The structure and composition of the samples were characterized by XRD, FE-SEM, EDX, TEM, DRS, PL, XPS and BET surface area measurements. In the present work, the photocatalytic degradation of Trypan blue dye with prepared heterogeneous photocatalyst for Sr/Ag/ZnO under the sunshine. The effects of operational parameters such as primary analysis, pH, catalyst dosage, dye concentration and stability of the catalyst on photo mineralization of TB dye have been analyzed. The mineralization of TB has been confirmed by COD measurements.

PP-84

INVESTIGATION ON STRUCTURAL, QUANTUM CHEMICAL, VIBRATIONAL, OPTICAL, THERMAL, AND MECHANICAL PROPERTIES OF THIRD ORDER NONLINEAR OPTICAL SINGLE CRYSTAL: 4-METHOXYANILINIUM PERCHLORATE

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4-Methoxyanilinium Perchlorate, a new nonlinear optical single crystal has been grown by slow evaporation solution growth technique at room temperature. Single crystal X-ray diffraction analysis reveal the newness of the crystal structure belonging to the monoclinic with lattice parameters a = 10.816 (2) Å, b = 27.242 (9) Å, c = 9.944 (2) Å and β= 98.6 (1)° . The crystal packing is stabilized by three dimensional hydrogen bonding network between cation and anion like N–H···O hydrogen bonds leading to two ring motifs, viz., $R_3^5(9)$ and $R_2^3(6)$. The functional groups in the complex were identified using FT-IR and FT- Raman analyses. The mechanical strength of the crystals has been measured by Vickers micro hardness. The thermal stability and decomposition details were studied through TG/DTA thermograms. The optical behaviours, including transmission spectrum and third harmonic generation (THG) were investigated to study its linear and nonlinear optical properties. Optical nonlinearities were analyzed and discussed involved with its crystal structure. Frontier molecular orbital, Mulliken charge, molecular electrostatic potential and hyperpolarizability analyses were also performed by quantum chemical study with basis set of 6–311++G(d, p).

Keywords: Crystal structure, FT-IR/FT- Raman, TG/DTA, Quantum chemical analysis and Nonlinear optics.

PP-85

LASER SURFACE HARDENING OF LOW CARBON ALLOY STEEL AND INVESTIGATION OF MICROSTRUCTURE AND HARDNESS USING HIGHPOWER LASER DIODE

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In this work surface hardening using high power laser diode (HPLD) of easily available low carbon alloy steel (LCAS) which are widely used in automobile industries were studied. Surface hardening of a material which improves mechanical properties like hardness, ductility, strength, toughness and also relieves the internal stress. After laser hardening, surface of the sample being investigated under SEM. Improvement in the hardness is measured by Vicker's hardness tester, different phases being changed after surface treatment which are identified by XRD analysis, experimental results shows phase change of ferrite to martensite, hardness values gradually increases.

Keywords : HPDL, Vickers Hardeness, Microstructure, Low carbon alloy steel.

PP-86

ASSEMENT OF MICROBES PRESENT IN GROUNDWATER OF CUDDALORE DISTRICT, TAMIL NADU

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The purpose of this study is to evaluate the presence of microbes on groundwater of Cuddalore District. Groundwater is slowly contaminated by sewages, agricultural and urban runoff. Domestic wastewaters are widely discharged to water bodies, particularly rivers. Pathogens related with these discharges consequently become distributed through the water body presenting a risk to downstream water users. Usually municipal raw sewage can contain 10 to 100 million coliform bacteria 100/ml, and 1 to 50 million Escherichia coli or faecal streptococci 100/ml. Different levels of wastewater treatment may reduce this by a factor concentrations are reduced further after dilution by the receiving waters. Microbes such as coliforms, streptococci, presence on groundwater were analyzedby using most probable number (MPN),and compared with water quality standard of World Health Organization (WHO).

Keywords: Domestic waste waters, Sewages, Groundwater, Water body and Microbes,Atomic Absorption Spectrophotometer.

PP-87

A FACILE ULTRASONIC ASSISTED SYNTHESIS OF SUBSTITUTED HYDROXYAPATITE FOR BIOMEDICAL APPLICATIONS

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Hydroxyapatite ($Ca_{10}(PO_4)_6(OH)_2$), (HAP) is the main inorganic component of bone material and it is widely used in biomedical applications due to its excellent bioactivity and biocompatibility particularly in bone repair and tissue engineering. Substitution of trace elements, such as Sr, Zn and Mg ions, into the structure of calcium phosphate is the subject of examination, because of their future role in the biological process. The present work, deal with the synthesis of multisubstituted nanohydroxyapatite by novel ultrasonic assisted amino acid directed method. The effect of ultrasonic irradiation time on the crystallinity and size of the HAP nanoparticles in presence of template were investigated. The in vitro bioactivity of the as synthesized multisubstituted nanohydroxyapatite was determined by soaking it in SBF for various days. The synthesized multisubstituted nanohydroxyapatite was characterized by Fourier transform infra-red spectroscopy (FT-IR) and X-ray diffraction (XRD) techniques. The morphology of the powders was examined by scanning electron microscope (SEM) and Transmission electron microscopic (TEM) techniques. The in vitro study results showed that a dense multisubstituted hydroxyapatite (HAp) layer was formed within 14 days of soaking in SBF. It is experimental that the synthesis of multisubstituted nanohydroxyapatite not only supports the growth of apatite layer on its surface but also accelerate the growth which is evident from the in vitro studies. Therefore, multisubstituted nanohydroxyapatite may be a potential candidate in tissue engineering and biomedical applications.

Keywords: Hydroxyapatite, SEM, TEM, In vitro, biomedical application

PP-88

GREEN SYNTHESIS OF ZINC OXIDE NANOPARTICLES USING AZADIRACHTA INDICA (NEEM) LEAF EXTRACT AND ITS APPLICATIONS

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Green synthesis of metal oxide nanoparticle is gaining considerable interest due to the use of environmentally friendly reactants and room temperature synthesis. This is the most preferred method of preparation as it makes use of pollution free chemicals and encourages the use of non-toxic solvents such as water and plants extracts. The present study is proposed with an objective to synthesize ZnO nanoparticle by the eco-friendly green synthesis using environmentally benign leaf extract of Azadirachta indica (Neem) where zinc nitrate acts as the precursor. The X-ray diffraction (XRD) analysis showed the crystalline structure, Transmission electron microscopy (TEM), Functional groups of the sample were identified by using Fourier transmission infrared (FT-IR) spectroscopy. The shape, structure and composition were assessed by Field emission scanning electron microscopy (FE-SEM) and energy dispersive spectroscopy (EDS). The optical properties were also carried out by zinc oxide nanoparticles.

Keywords: Azadirachta indica (Neem); ZnO; TEM; XRD; FT-IR; SEM and EDS

PP-89

GROWTH AND CHARACTERIZATIONS OF AMINO ACID SINGLE CRYSTALS USING ORGANIC ACID AS ADDITIVE

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Amino acid single crystals has been grown using organic acid as additive by slow evaporation solution growth technique. The unit cell parameters of grown crystals are determined from single crystal X-ray diffraction analysis. Grown crystal crystallizes in the orthorhombic system with space group of $P2_12_12_1$. The crystallanity of grown crystals are confirmed by powder X-ray diffraction analysis. The functional groups of grown crystals are confirmed from FTIR, FT-Raman and NMR spectroscopic analyses. Thermal stability of material is determined using TGA and DTA thermal analyses. Further the kinetic parameters such as activation energy (E), entropy (ΔS), enthalpy (ΔH) and Gibbs free energy (ΔG), are calculated using Coats-Redfern method. The variation of dielectric properties of the grown crystals as a function of frequency has been investigated at different temperatures. The optical parameters, such as optical band gap energy, transparency, reflectance, refractive index are calculated using UV-Visible transmittance data in the spectral range 200-800 nm. The third order nonlinear optical parameters are determined using Z-scan technique.

Keywords: Optical parameters; Functional groups; Organic acid

PP-90

ACOUSTICAL STUDIES ON MOLECULAR INTERACTION OF 3-NITRO BENZILIC AICD WITH VARIOUS SOLVENTS AT DIFFERENT CONCENTRATIONS USING ULTRASONIC TECHNIQUE

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Benzilic acid (systematically known as Hydroxy((diphenyl)acetic acid) is an organic compound with the formula $(C_6H_5)_2C(OH)COOH$. It is white crystalline aromatic acid soluble in many primary alcohols. This is a standard building block in organic synthesis. It is used in the preparation of quite a few pharmaceuticals such as anodyne, cosmetic drugs, spasmolytics and anti-inflammatory drugs [4] and is chiefly known as the acid used in the esterification to make benzilate – the incapacitating hallucinogen. Ultrasonic waves are generated by piezoelectric transducer, which converts electrical signals into mechanical ultrasound waves. The same transducer can also be used as detector for converting mechanical signal into electrical signal. Thus, transducers are used as both transmitter and receivers. The study of molecular interaction plays a vital role in the development of molecular science. Molecular interactions and structural behavior of molecules and their mixtures can be identified using ultrasonic studies.

The acoustical parameters like velocity (u), density (ρ) and viscosity (η) have been measured in binary liquid mixtures of 3-nitro benzilic acid with polar and non-polar solvents at 298K. The experimental data have been used to calculate acoustical parameters namely, adiabatic compressibility (β), apparent molar volume (Ø), acoustic impedance (Z), intermolecular free length (L_f), and relative association (R_A). The excess values of these parameters are also evaluated over the different concentration range .The result is interpreted in terms of molecular interaction such as dipole-dipole interaction through hydrogen bonding between components of mixtures. The dependence of excess properties of mixtures on compositions were compared and discussed in terms of the intermolecular free length and other factors affecting the solvation and self association effect. The excess values of these indicate the complexity of dipole-induced interaction in the binary liquid mixture.

PP-91

SYNTHESIS, SPECTRAL CHARACTERISATION AND ANTIMICROBIAL ACTIVITIES OF ZnO AND Ag -DOPED ZnO NANOPARTICLES

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Pristine ZnO and Ag -doped ZnO nanoparticles have been synthesised by sol-gel method and characterized by powder X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), UV-visible and photoluminescence spectroscopies. All the synthesized nanoparticles display violet emission due to charge carrier recombination. The emission spectrum of synthesized nanoparticles like ZnO and Ag -doped ZnO enhancement were observed. The enhancement behaviour of Ag -doped ZnO lightly suppressed compared to ZnO nanoparticle. The suppressed enhancement was confirmed by the formation of Ag -doped ZnO. Antimicrobial studies were carried out against the bacterial strains viz., Escherichia coli, Salmonella typhi, Staphylococcus aureus, Pseudomonas aeruginosa and fungal strains viz., Candida albicans, Aspergillus niger, Mucor, Rhizopus sp.

Keywords: ZnO and Ag -doped ZnO; XRD; SEM; EDS; UV-Vis; PL and Antimicrobial studies

PP-92

ECO-FRIENDLY BIOSORPTION OF CADMIUM AND LEAD ONTO DRIED CACTUS (OPUNTIA FICUS INDICA) CLADODES

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Cadmium is known toxic for living organism present in low levels which is associated with zinc and copper minerals. The ultimate purpose of this study is to prevent the prevailing health hazards by removing the cadmium(II) and Lead(II) ions. The biosorption of cadmium (II) and lead (II) ions onto a natural, low-cost adsorbent developed from cactus cladodes was investigated. Experiments were carried as a function of adsorbent particle size, pH, adsorbent mass, contact time, initial metal concentration and temperature. The results indicate that the percentage of adsorption increases with an increase adsorbent dosage and decrease of particle size. The equilibrium uptake was increased with an increase in initial metal concentration in solution. The maximum biosorption occurred at pH of 5.8 and 3.5, respectively for cadmium (II) and lead (II) ions. Parameters of the pseudo-first-order and pseudo-second-order models were estimated with the aid of the non-linear regression

Keywords: pH, absorbent mass, pseudo first order, non linear regression.

PP-93

CADMIUM QUANTUM DOTS FOR OPTOELECTRONIC APPLICATIONS

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The study of nanotechnology is a fast growing area generating many inspiring new high-performance materials with new properties. Nanoparticles have unique photoelectric, thermoelectric and photo catalytic properties which are promising materials for diverse applications. Nanoparticles often possess unexpected optical properties as they are small enough to confine their electrons and produce quantum effects. Quantum dots have been investigated as building blocks for tuneable optical devices such as light emitting devices and lasers.Cadmium oxide, Cadmium sulphide, Cadmium-selenium and Cadmium-tellurium are important visible-light sensitive semiconductors which are widely used in solar cells, light emitting diodes, photocatalysts, transparent electrodes, sensors, lasers, biological imaging and labeling applications. Cadmium sulphide has a good capability to be used as a photo catalyst for H_2 evolution under visible light. Cadmium telluride-titanium dioxide nanocomposite was prepared by hydrothermal reaction of sol-gel derived titanium dioxide and organically modified cadmium telluride. The crystallinity of titanium dioxide in the nanocomposite was higher than that of pure titanium dioxide obtained by the reaction under the same temperature and pressure conditions, showing that cadmium telluride induced the crystallization of titanium dioxide. Cadmium nanocomposite'soptical properties are size-tunable, it makes Cadmium nanocomposites best suited for optical applications.

Keywords: Nanocomposite; Quantum Dots; Photocatalysts; Optical properties.

PP-94

STRUCTURAL AND THERMAL ANALYSIS OF DISC BRAKE WITH AND WITHOUT CROSSDRILLED ROTAR OF RACE CAR

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The disc brake is a device for slowing or stopping the rotation of a wheel. Friction causes the disc and attached wheel to slow or stop. Brakes convert friction to heat, but if the brakes get too hot, they will cease to work because they cannot dissipate enough heat. This condition of failure is known as brake fade. Disc brakes are exposed to large thermal stresses during routine braking and extraordinary thermal stresses during hard braking. This paper studies about the model of a disc brake used in Honda Civic. Coupled field analysis (Structural+Thermal) is done on the disc brake. The materials used are Cast Iron. Analysis is also done by changing the design of disc brake. Actual disc brake has no holes; design is changed by giving holes in the disc brake for more heat dissipation. Modeling is done in Catia and Analysis is done in ANSYS13.

PP-95

SPECTROSCOPIC METHODS IN THE ANALYSIS OF NORMAL AND BLOOD PRESSURE HIGH BLOOD SAMPLES

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Spectroscopy is an excellent tool to study the various types of problems in pharmaceuticals and biological science. In this work FTIR and UV-Visible Spectroscopy techniques are employed to study the spectral differences between a normal and diseased blood. Blood undergo a change in chemical and biochemical, when a person is affected by diseases.It has been observed thatthe general appearance of the normal blood and blood pressure (BP) samples are same in terms of the position of the vibrational bands. But there is generally increase in the absorption level of the peaks in the blood pressure samples compared to that of normal blood.

PP-96

PERFORMANCE OF CORROSION INHIBITION OF MANNICH BASES ON MILD STEEL IN 1M SULPHURIC ACID

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Two novel Mannich bases have been prepared and evaluated their corrosion inhibition performance by various techniques like mass loss, electrochemical studies and synergism studies. Adsorption isotherm was also performed for these compounds. For correlating the experimental results, Quantum chemical calculations were performed. The mass loss studies showed that the given compoundswere temperature dependent and increasing their corrosion inhibition performance with increasing concentration. Electrochemical studies showed that the Mannich baseswere mixed type. The experimental results obtained for these compounds were well correlated with the theoretical values.

Keywords: Mannich base, adsorption, mild steel, electrochemical studies, quantum chemical.

PP-97

ELECTROCHEMICAL SENSING OF CdSe QDS – GO NANOCOMPOSITE MODIFIED ELECTRODE FOR THE DETECTION OF PARACETAMOL

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Nanostructured materials are attracting a great deal of attention because of their potential for achieving specific processes and selectivity. The unique physical and chemical properties of quantum dots (QDs) make them extremely suitable for designing new and improved sensing devices. In this work, we report the synthesis of CdSe QDs – GO nanocomposites for the fabrication of modified electrode. The prepared nanocomposite was characterized by microscopic and spectroscopic techniques. The electrochemical performance of the modified electrode was studied using cyclic voltammetry. The electrocatalytic behavior of CdSe QDs – GO nanocomposite modified electrode towards the oxidation of paracetamol was investigated by cyclic voltammetry and chronoamperometry. The modified electrode showed comparatively good sensitivity and increased current response for the determination of paracetamol.

PP-98

SINGLE-POT SYNTHESIS AND CHARACTERIZATION OF CERIUM : NICKEL MOLYBDATE MIXED METAL OXIDE NANOCOMPOSITES BY SIMPLE COMBUSTION METHOD

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The synthesis of cerium rare earth (RE) metal doped nickel molybdate nanocomposite was described by combustion method and was explored to study the electrical, optical and analytical applications. Cerium RE metal doped nickel molybdate nanocomposites were synthesized by rapid single-pot microwave combustion method using urea as fuel. The formation of nano crystalline structure of $NiMoO_4$:Ce was confirmed by Powder X-ray diffraction (XRD) and the functional group was characterized by Fourier transform infrared (FT-IR). The optical and electronic properties were analyzed using Ultraviolet-visible (UV-Vis.) and Photoluminescence (PL) spectroscopy. The morphology of the nanoparticles was investigated using scanning electron microscope (SEM) analysis which demonstrates uniform nanoparticles with spherical shape homogenously distributed all over the sample.

Keywords: Nickel molybdate: Cerium, Microwave combustion method; Optical properties.

PP-99

ANALYSIS OF THE PHYTOCHEMICAL CONTENT AND ANTI-MICROBIAL ACTIVITY OF LORANTHUSELASTICUS OF LORANTHACEAE

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The importance of plant is well known. Life and its growth cannot be imagined without plants. They not only produce food for survival but also create healthy environment and eco-friendly atmosphere to live. Loranthauselasticus is a parasitic plant of Loranthanceae family and grown in plants. They have been identified and their phytochemical and biological activities were studied. For this study the plant grown in the Azadirchtaindica is chosen. The results revealed the presence of various phytochemical constituents. The results are discussed.

PP-100

2,5-HEXANEDIOL BASED LIQUID CRYSTALLINE RANDOM COPOLYESTER, SYNTHESIS AND CHARACTERISATION

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A copolyester was synthesized using 2,5-hexanediol as one of the diols with isophthaloyl chloride as Diacid chloride. 1,4-dihydroxy napthalene, was used as another diols for the synthesis of random copolymer. A formation of copolyester was confirmed using Ultraviolet (UV), Fourier Transform Spectroscopy Infrared (FTIR), Nuclear Magnetic Resonance (NMR) spectral techniques. Thermal studies were carried out using Differential Scanning Calorimetry (DSC) and Thermo Gravimetric Analysis (TGA). Elemental analysis further confirms the formations for the copolymer. Morphology of the copolyesters was also characterized using Scanning Electron Microscope (SEM). Results of the investigation confirm a relatively new entry copolymer in the family of liquid crystalline copolymers.

Keywords: Copolyester, ultravioletspectroscopy, infrared spectroscopy, nuclearmagnetic resonance, scanning electron microscope, characterization.

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PP-101

FLUORESCENCE QUENCHING OF RHODAMINE B DYE IN PLURONIC F127 BY QUENCHERS AND THEIR EMISSIVE AND NON EMISSIVE PROPERTIES

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In this study we have explored the interaction of a cationic dye, Rhodamine B with pluronic block copolymer (F127), in the presence and absence of the anionic quenchers, which forms mixed micelles with F127. The aggregation behavior and solubilization studies on nonionic copolymer micellar assemblies together with the fluorescent dye Rhodamine B and the presence of added some quenching salts (NaCl, NaI, NaOAc, NaOH) was monitored by using UV–vis spectroscopy and fluorescence spectroscopy. The fluorescence spectrum depends on the presence of quenchers by the presence of emitting species. The quenching depends on the ability of the fluorophore to transfer energy to the quencher. The method is presented for the sensing of ions by determining the concentration of quenching salts in aqueous based on FRET process. . We have applied both emissive and nonemissive properties in time-resolved spectroscopic techniques to demonstrate the binding of the probe Rhodamine B to the pluronic and F127 mixed micelles in the presence of quenchers. The sensing process characterised by Fluorescence lifetime measurements was used, due to its high sensitivity. We rerport the interaction of pluronic F127 in Rhodamine B dye and effect of quenchers and their emissive nonemissive properties and its helps to serve as an excellent drug delivery vehicle in this system.

Keywords: Rhodamine B, Pluronic F127, Quenchers, UV & Fluorescence spectroscopy.

PP-102

SYNTHESIS AND CHARACTERIZATION OF TITANIUM OXIDE NANOPARTICLES USING FUSARIUM SOLANI

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Titanium oxide (TiO_2) nanoparticles have been successfully synthesized by biosynthesis using phytopathogenic fungus Fusarium solani. Thermogravimetric/Differential thermal analysis (TGA/DTA) was employed to study the thermal property of the as-synthesized TiO_2 nanopowder. XRD analysis confirmed the presence of anatase phase TiO_2 with polycrystalline nature. The role of different functional group vibrations of F. solani fungal supernatant for the synthesis of TiO_2 nanodendrites was studied by Fourier transform infrared (FT-IR) spectroscopy. Field emission scanning electron microscopy (FESEM) equipped with energy dispersive X-ray spectroscopy (EDS) ascertained the formation of TiO_2 nanodendrites with the densely composed branches having a diameter about 11 to 15 nm. The observed of Raman active modes are corresponding to the anatase phase of TiO_2.

Keywords: Biosynthesis, TiO_2, TGA/DTA, XRD, FESEM.

PP-103

PHOTOREDUCTION OF $Co^{III}(pn)_2Cl(L)^{2+}$ ON AQUEOUS TiO_2 SUSPENSIONS UNDER VISIBLE-LIGHT ILLUMINATION IN BINARY SOLVENT MIXTURES

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Interfacial electron transfer at nanomaterial (nm) TiO_2/ $Co^{III}(pn)_2Cl(L)^{2+}$ interface by employing binary solvent mixtures has been probed by designed solution and chemical reactions in H_2O/methanol (or isopropanol). The distinct photoreduction of Co^{III} at λ = 254 nm excitation leads to possible reduction route on the surface due to solvent influence is presented for cobalt(III) complexes $Co^{III}(pn)_2Cl(L)^{2+}$ (where L = $RC_6H_4NH_2$, R = H, m-CH_3, and p-CH_3) by nm-TiO_2 particles; $Co^{III} + TiO_2 + h\nu \rightarrow TiO_2$ (h,e^-) + $Co^{III} \rightarrow TiO_2$ (h) + Co^{II}. In this the strategy of adsorption/accumulation of $Co^{III}(pn)_2Cl(L)^{2+}$ at the active surface is achievable by the addition of organic cosolvent and the interfacial charge transfer is efficient at nm- TiO_2/Co^{III} were generated by photoreduction probed by HRTEM-SAED, SEM-EDAX and X-ray mapping analyses. Accompanying the adsorption and subsequent photoreduction the deposition/dissolution balance of $Co^{III}(pn)_2Cl(L)^{2+}$ ion and Co^{II}_{aq} provided the possibility of cyclic process in solvent modified medium. An intricacy on binary solvent modified $\Phi_{Co(II)}$ in terms of correlation analyses using solvent empirical parameters ε_r, Y, E_T^N, DN^N, α, β and π^* provides a model to understand solvent medium participation. Surface morphologies prove the effective scavenging by nm-TiO_2 particles in the photoreduction of $Co^{III} \rightarrow Co^{II}$ in binary solvent medium. The unique change in quantum yield and the influence of TiO_2 as a photocatalyst are discussed.

PP-104

REMOVAL OF HEAVY METAL ION FROM AQUEOUS SOLUTION BY ACTIVATED CARBON PREPARED FROM PUVARASU LEAVES

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The activated carbon were prepared from the agricultural solid waste like Puvarasu leaves used to eliminate the heavy metals and dyes from aqueous solution. Adsorption of all dyes and metal ions required a very short time and gave quantitative removal the process is pH – sensitive and selective removal of desired heavy metal ion may be achieved by various pH and other condition like the effect of contact time , initial metal ion concentration and temperature on metal ion has been studied. The Langmuir adsorption isotherm and Freundlich isotherm techniques were studied carefully respective constant were determined. Carbon does required for maximum percentage of adsorption was found in the case of Cr(VI) ion respectively per gram of the carbon, The Puvarasu carbon is more efficient .

Keywords: Activated carbon,heavy metal chromogenic groups, Puvarasu leaves, Langmuir adsorption isotherm, Freundlich isotherm.

PP-105

SOURCES OF TOXIC HEAVY METALS AND THEIR EFFECTS IN LIIVING ORGANISAM

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Cadmium, Chromium, Copper, Iron, Zinc, Nickel and Mercury metals were listed as toxic heavy metals which are exist in the various industrial waste water. Sources are for Cadmium launderettes, electroplating workshop, plastic manufacturing, pigments, enamels, paints. For Chromium Alloys, preservatives, dyeing and tanning activities, metal coatings. For Copper Electronics, plating, electrical wires, paper, textiles, rubber, printing, plastic. For Iron Galvanizing, electroplating, polishing. For lead Fuel additive, batteries, pigments, roofing, fishing weights. For Zinc Domestic wastes, galvanizing, batteries, paints, fungicides, textiles, cosmetics, pulp, paper mills, and pharmaceutics. For Nickel Alloys, electroplating, nickel-cadmium batteries, launderettes, paints and for Mercury Dental practices, clinical thermometers, glass mirrors. This toxic metals causes serious health hazards. Cd causes Kidney damage, skeletal damage, itai-itai (ouch-ouch) diseases, and cancer. Zn causes Its deficiency can lead to poor wound healing, reduced work capacity of respiratory muscles, immune dysfunction, anorexia, diarrhea, hair loss, dermatitis and anemia. Pb causes headache, irritability, abdominal pain, nerve damages, kidney damage, blood pressure, lung and stomach cancer and glimas, for children, behavioral disturbance, memory deterioration, reduces ability to under-stand and anemia. These heavy metals in the industrial waste water can be minimized by the following techniques adsorption, biosorption, precipitation reverse osmosis, electrolytic recovery techniques, and liquid–liquid extraction etc. Hence It is very essential to minimize the toxic metal level in the industrial waste water before discharge into the near water bodies.

Key words: Heavy meats, health hazards, adsorption and biosorption.

PP-106

SYNTHESIS, CHARACTERIZATION AND ANTIBACTERIAL ACTIVITY OF SILVER NANORODS USING SILVER ACETATE AS PRECURSOR

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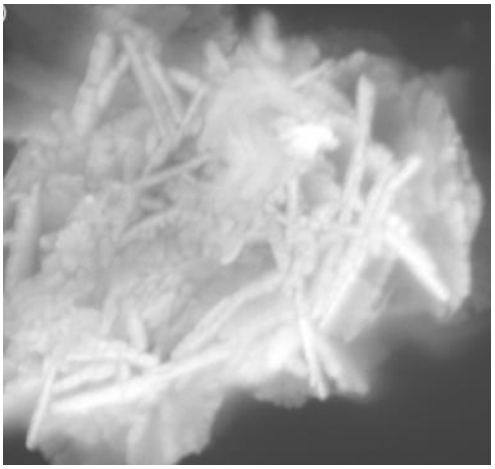
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Silver nanorods (Ag NRs) were produced by a simple microwave irradiation method using silver acetate as precursor. UV-Visible diffuse reflectance spectroscopy and X-ray diffraction were used to confirm the synthesized sample. The emission spectrum of silver nanorods was also observed by using spectrofluorimeter. FT IR spectrum was carried out to know the changes in the functional group. High-resolution transmission electron microscopy (HR-TEM) and high-resolution scanning electron microscopy (HR-SEM) were assisted to investigate the morphology and size of the synthesized sample. These morphologies show that the synthesized sample had rod-like morphology. The elemental composition of the silver nanorods was determined by energy dispersive X-ray analysis (EDX). Antibacterial activity experiments were carried out for the synthesized silver nanorods.

Key words: Silver nanorods, Silver acetate, Electron microscopy, Thermal decomposition.



PP-107

ELECTROCHEMICAL SENSING OF DOPAMINE AND HYDROGEN PEROXIDE BASED ON THIONINE/NICKEL HEXACYANOFERRATE BIMEDIATOR SENSOR

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A sensitive platform for the electrochemical determination of dopamine (DA) and hydrogen peroxide (H_2O_2) has been developed by fabricating a bimediator sensor using thionine (TH) and nickel hexacyanoferrate (NiHCF). The surface morphology and the composition of the TH/NiHCF bimediator modified electrode were characterized by field emission scanning electron microscopy (FESEM) and energy-dispersive spectroscopy (EDS) techniques. The redox characteristic of the resulting TH/NiHCF modified electrode was studied by cyclic voltammetry, differential pulse voltammetry, hydrodynamic voltammetry and chronoamperometry. The modified electrode showed an excellent electrocatalytic behaviour toward the oxidation and reduction of dopamine and hydrogen peroxide with a linear response over the concentration range from 6.66×10^{-6} to 1.11×10^{-3} (dopamine) and 1.67×10^{-6} to 1.11×10^{-3} (hydrogen peroxide) respectively. The real time electrocatalytic analysis of the resulting sensor towards the determination of dopamine in urine samples and hydrogen peroxide in milk samples were studied in detail. The fast amperometric response, low detection limit, wide linear range, good selectivity and long-term stability for the electrochemical detection of DA and H_2O_2 imply a good performance of the TH/NiHCF sensor.

PP-108

AN INVESTIGATION OF BIOLOGICAL EFFICIENCY OF CHIRAL LESS HYDROPHOBIC LIGANDS, WITH ANIMAL CARCINOMA AND SARCOMA PROTEIN RECEPTORS THROUGH DOCKING SUDIES

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The biologically active homo-dichiral vicinal diamine [(R,R)- and (S,S)-1-o-chlorophenylpropane-1,2-diamines (o-CPDAs)] ligands were synthesized through modified literature procedure. The model chemistry for the synthesized candidates were docked with animal carcinoma and sarcoma bio-receptor models. The best docking pose energies obtained for rigid and flexible docking interactions of (R,R)- and (S,S)-o-CPDA with sarcoma and carcinoma receptors were observed. The interacting residue representations using cartoon, dot and mesh views were visualized using PyMOL program. The Ramachandran's plots for the docked-interacting residues were viewed using Discovery studio 2016 visualization - program. The docking score for the selected receptors models with the enantiomeric ligands reveals the docking efficiency order as; (R,R)-o-CPDA >>> (S,S)-o-CPDA & Carcinoma >>> Sarcoma (for flexible dockings).

Keywords: chiral vicinal diamines, rigid docking, flexible docking, Ramachandran plots.

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