Proceedings of the
5th International Conference on

Recent Innovations in Science & Technology

RIST 2023

7th & 8th April 2023

Organized by:

Holy Grace Academy of Engineering
Thrissur, India.

In association with:

ISET Research
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MESSAGE FROM THE CHAIRMAN

It is with great pleasure that I acknowledge the 5th International Conference on "Recent Innovations in Science & Technology" (RIST 2023), organized by the esteemed Holy Grace Academy of Engineering. I commend the organizing committee for their admirable efforts in ensuring the success of this conference and their commitment to presenting novel research findings and ideas. My best wishes to them for their ongoing efforts to disseminate knowledge.

Mr. Sani Edattukaran
Chairman
Holy Grace Group of Institutions
Thrissur, Kerala.

MESSAGE FROM THE GENERAL SECRETARY

Holy Grace Academy of Engineering takes great pride in hosting the International Conference RIST 2023. I would like to express my heartfelt gratitude to the entire team at HGAE for their unwavering efforts in bringing this significant event to fruition. This conference provides an excellent platform for students and young researchers to enhance their knowledge and gain a deeper understanding of the changing ideas and innovative methods in technology. I am confident that this event will offer a valuable learning experience for all participants and provide an opportunity for them to share their expertise. I wish all the attendees a productive and fulfilling time ahead.

Mr. Benny John
General Secretary
Holy Grace Group of Institutions
Thrissur, Kerala.

MESSAGE FROM THE PRINCIPAL

It gives me great pride to announce that Holy Grace Academy of Engineering, in association with ISET Research, is hosting the 5th International Conference on Recent Innovations in Science and Technology (RIST 2023) on 7th and 8th April 2023. The conference will act as an excellent colloquium to develop a platform for the exchange of ideas towards scientific and technological innovations for the generations to come. I hope that the conference will deliberate on current issues of national and international relevance in the fields of Science and Technology, allowing academicians, researchers, and technocrats to share their thoughts and views on innovations in their respective fields. The conference will witness an unparalleled number of quality research articles being presented, paving the way for new paths to innovate in Science and Technology. I extend my heartfelt congratulations and appreciation to the entire team for their efforts in organizing this international conference and wish them great success in the successful conduct of the entire event.

Dr. Harikrishnan G
Principal
Holy Grace Academy of Engineering
Thrissur, Kerala.

MESSAGE FROM THE CONFERENCE CHAIR

It is a moment of great pride for Holy Grace Academy of Engineering to host its 5th International Conference on Recent Innovations in Science and Technology (RIST 2023). I extend my heartfelt thanks to my team here at HGAE for their diligent efforts in bringing this event to fruition. This conference presents a wonderful opportunity to not only educate students and young researchers but also to deepen their understanding of the changing ideas and innovative methods in technology. I am confident that this event will provide an excellent learning experience for students and professionals alike, enabling them to acquire new knowledge and share their experiences. I wish all the participants a productive and enjoyable time at the conference.

Dr. Arun M P
Vice-Principal & Dean Academics
Conference Chair
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Thrissur, Kerala.

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SLIDING WEAR ANALYSIS OF THERMAL SPRAYED MOLYBDENUM POWDER ON D2 STEEL SUBSTRATE

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Abstract: The rolling process is one of the most important phases in the steel industry, and there will always be wear between the material travelling between the rolls and the guide roller. The guide roller's function is to guarantee that the material travels through the rollers with minimal damage and nearly a liner course. As a result, there is a provision for inserting a layer of coating to boost the productivity and life of guide rollers. The goal of this research is to create a Molybdenum- based coating for D2 tool steel, which is already used in the steel industry. The pin on disc wear test and Vickers hardness test were performed to compare the results of the uncoated substrate and the coated substrate to demonstrate that the coated substrate's wear resistance and hardness had enhanced compared to the uncoated substrate. Coated and uncoated specimens are placed in molds and polished against graft papers to provide a mirror-like finish for the thickness test and Vickers microhardness test. A high - resolution microscope found that the molybdenum coating thickness was 250 microns, with particle sizes ranging from 10 to 40 microns, and the Vickers hardness test revealed a 20% increase in hardness. The pin on disc wear test consisted of 54 trials using a full factorial design, with 27 coated and uncoated specimens. To achieve the desired results, three factors were chosen: Load, Sliding Velocity and time. The parameters for the three components were (1kg, 2kg, 3kg), (200 RPM, 400 RPM, 600 RPM), and time (15mins, 30mins, 45mins) accordingly. The diameter of the track was fixed at 40mm. The weight loss due to wear for the uncoated specimens was greater than that of the coated specimens after a total experimental duration of 27 hours of experimentation and 54 trials, showing an improvement in wear resistance.

Keywords: *Atmospheric plasma spray process, D2 steel, Pin on disc, Molybdenum coating, Guide roller.*

DEVELOPMENT OF POLYMER BASED NANO COMPOSITES THIN FILMS USING L-B-L ASSEMBLY TECHNIQUE AND ITS APPLICATION IN WASTEWATER TREATMENT

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Abstract: The photo catalytic degradation studies using nanomaterials as photo catalyst has drawn considerable attention due to their effectiveness in the removal of contaminants from wastewater. However, the fouling properties, excess residuals, and disposal issues pertaining to nanomaterials set a drawback economically. Hence the idea of incorporating polymers to nanomaterials thereby improving the stability of the nanoparticles could result in potential treatment of wastewater. In this work, Layer-by-layer (L-b-L) assembly technique was chosen to develop polymer based nano thin films. TiO2 and ZnO nanoparticles were used as photo catalysts and immobilized by impregnating them along with two types of polyelectrolytes viz, Poly allylamine hydrochloride (PAH) and Polystyrene sulphonate (PSS). The multi-layered thin films were developed using one layer of PAH and alternate layers of (PSS/TiO2)n and one layer of PAH with alternate layers of (PSS/ZnO)n. PAH(PSS/TiO2)n were developed, amd its surface topology was analyzed using Atomic Force Microscopy (AFM). The surface roughness and film stability were found to be excellent. PAH (PSS/ZnO)n films were characterized using Scanning Electron Microscopy (SEM) and Fourier Transform Infrared Spectroscopy (FTIR). SEM characterization confirms uniform distribution of ZnO and TiO2 on to the polyelectrolytes and FTIR showed strong C=C bonds, depicting the success of polyelectrolyte deposition. The multi-layered thin films were applied in the treatment of refinery wastewater. PAH(PSS/TiO2)5 multi-layered thin films showed significant removal efficiencies of Total Organic Carbon (TOC) and Chemical Oxygen Demand (COD) to around 85% and 87% respectively. Similarly, PAH (PSS/ZnO)5 multi-layered thin films also performed better with a COD removal efficiency of 80.1%. It was also observed that contaminants removal using PAH (PSS/TiO2)5 multi-layered thin films were better than PAH (PSS/ZnO)5. This study proved that immobilized nanoparticles could improve the wastewater treatment efficiency by removing organic contaminants and offers a feasible solution to wastewater treatment applications.

Keywords: *Effluent, immobilization, Layer-by-layer, Nano particles, photo catalytic degradation.*

TREATABILITY STUDIES OF OIL REFINERY WASTEWATER USING SILICA NANOPARTICLES

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Abstract: Nanotechnology play a significant role in the recovery of oil, improve the mechanism and to unlock the remaining oil resources. The main objective of this study was to synthesize silica nanoparticles for the effective removal of organics from refinery wastewater. The methodology employed in the synthesis of silica nanoparticles is stober's process. The surface characterization, composition analysis, zeta potential and functional groups of the synthesized nanoparticles were determined using Scanning Electron Microscopy (SEM), Zeta sizer and Fourier Transform Infrared Spectroscopy (FTIR). Phase identification and grain size was performed using X-Ray Diffractometer (XRD). The synthesized silica particles were found to be spherical in shape without any aggregation, which indicates the successful synthesis of nanoparticles. The synthesized nanoparticles were employed in the removal of organics from petroleum refinery effluent by performing a series of batch experimental studies by varying the experimental conditions like solution pH, contact time, dosage of nanoparticles and stirring speed. The efficiency of the treatment conditions were assessed by measuring the Chemical Oxygen Demand (COD), Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Dissolved Oxygen (DO) and Turbidity and the optimum processing conditions were establiged. The experimental results demonstrate that the maximum reduction in parameters were obtained at pH 4.0, stirring speed of 125 rpm, mixing time of 90 minutes and 0.5 g dosage of silica nanoparticles. The results suggest that the silica nanoparticles were found to be more effective in the removal of organic contaminants from refinery wastewater.

Keywords: *Chemical oxygen demand; contaminants; nanotechnology; refinery wastewater; silica nanoparticles, Stober's process.*

DEVELOPMENT OF NANO THIN FILMS FROM BIODEGRADABLE POLYMERS FOR INDUSTRIAL WASTEWATER TREATMENT APPLICATIONS

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Abstract: Fish processing industries are one of the pollution causing sectors all over the world due to the generation of large quantity of solid waste and lack of proper waste disposal. Wastewater treatment using Nano-thin films will be one of the most promising technologies for the treatment of industrial effluents by saving considerable amount of money. Therefore the current research aims to develop energy-efficient, eco-friendly, cost-effective, and green extraction techniques for the isolation of natural polymer from crab shell and development of Nano thin films by dip-coating technique for waste water treatment applications. The stability studies of the Nano thin films were performed at different environmental conditions. The characterization techniques employed are Scanning Electron Microscopy (SEM), X-Ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR) and UV spectroscopy. A series of batch experimental studies were performed using the fabricated thin films for the degradation of methylene blue by varying the dye solution pH, concentration of dye solution, exposure time and number of layers of thin film deposition for the optimization of processing conditions. The optimal processing conditions obtained from the study are pH 6.0, 0.60 mg/L dye concentration, 120 minutes of contact time and 12 layers of film deposition. The experimental study demonstrates that the natural polymer based nano thin films are effective in the treatment of industrial effluent containing methylene blue dye.

Keywords: *Crab shell; effluent; green technology; natural polymer; thin film.*

FACILE SYNTHESIS, CHARACTERIZATION AND APPLICATION OF NANOPARTICLES IN THE TREATMENT OF DOMESTIC GREY WATER FOR SUSTAINABLE WATER MANAGEMENT

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Abstract: Water scarcity and contamination are the serious issues in rural areas along with shortage of electric power supply. Gallons of grey water are thrown out of homes on a daily basis, results in the discharge of considerable amount of water, causing environmental pollution in the long run and also results in increased water consumption. Reuse of grey water is a possible solution for irrigation water requirement and sanitation purpose. Nanotechnology is one of the emerging technologies with unique functionalities and great potential in removing pollutants from waste water. The objective of this research was to fabricate calcium carbonate nanoparticles by homogenisation and precipitation process for domestic grey water treatment. The synthesised nanoparticles were employed in the batch treatment of grey water by varying the pH, stirring time; stirring speed and dosage of calcium carbonate nanoparticles. The nanoparticles were characterized using Scanning Electron Microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR), and X-Ray Diffraction (XRD). The pollutant removal efficiency of the nanoparticles were assessed by measuring the Dissolved oxygen (DO), Chemical Oxygen demand (COD), turbidity, Total dissolved solids (TDS), and Total Suspended solids (TSS). The study shows that the optimum pollutant removal efficiency was obtained at pH 8.0, stirring speed of 100 rpm, mixing time of 75 minutes and 0.7 g dosage of calcium carbonate nanoparticles.This research contributes in achieving the United Nations Sustainable Development Goals (Goal 6), which is clean water and sanitation for all. Instead of discarding grey water directly into the environment, grey water is effectively treated and reused for irrigation and sanitation purpose, thereby limit the fresh water requirement. This community engagement project will serve the society by saving the cost and to produce a clean environment.

Keywords: *Calcium carbonate; chemical oxygen demand; dissolved solids; grey water; nanotechnology; turbidity.*

SYNTHESIS AND CHARACTERIZATION OF ALUMINIUM OXIDE NANOPARTICLES FOR CORROSION INHIBITION STUDIES

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Abstract: Corrosion is a massive problem in oil and gas industries which can cause damage to pipelines. This problem leads to significant loss of money and it is essential to find an economical and feasible solution to control corrosion in oil pipe lines. The application of nano coating will enhance the lifespan and thereby increase the profit and reduce the maintenance cost. In this research, novel nano composite thin films were developed using aluminium oxide nanoparticles (Al_2O_3) and chitosan to assess the corrosion inhibition of mild steel. The nano composite thin films were fabricated by dip coating technique. Aluminium oxide (Al_2O_3) nanoparticles were synthesized from waste aluminium foil by Sol-Gel technique. The characterisation techniques employed are Scanning Electron Microscopy (SEM), X-Ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), Energy Dispersive X-Ray analysis (EDX) and UV–Visible spectroscopy. The stable thin film coated specimen was employed in the corrosion inhibition studies at various processing environments. Atmosphere test and Wet/Dry tests were carried out to investigate the corrosion behaviour of coated specimen. This research project is well aligned with Oman vision 2040. The study demonstrates that the development of Chitosan – Al_2O_3 composite thin films fabricated with minimum film thickness could be a feasible solution for the control of corrosion in oil pipelines with good film stability, high durability, with a cost effective approach. From the experimental studies, it was observed that the nano coating could enhance the lifespan of the pipe material. This novel research project is aligned with the United Nations Sustainability Goals (UNSDG-9: Industry, Innovation and Infrastructure).

Keywords: *Aluminium Oxide; chitosan; corrosion inhibition; dissolved solids; dip coating; nanoparticles; Sol-Gel technique.*

EXTRACTION OF VALUABLE METALS FROM RESIDUAL FLUID CATATYLITIC CRACKING SPENT CATALYST

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Abstract: Petroleum refinery is one of the fast growing industries across the globe and it is anticipated to develop in the near future. The spent catalyst discharged from the Residual Fluid Catalytic Cracking (RFCC) operation contains toxic chemicals, which lead to severe environmental threat to the ecosystem. Spent catalyst composed of valuable metals such as molybdenum (Mo), cobalt (Co), and aluminum (Al). The disposal of spent catalyst is a major environmental concern, as it is classified as toxic industrial waste. The disposal of spent catalyst into landfill must follow the environmental regulations and standards. Hence it is essential to extract the valuable metals from the spent catalyst by suitable cost effective methods. The objective of the research was to isolate valuable metals from spent catalyst using environmentally friendly and cost effective solvent extraction technique using Ethylene Diamine Tetra Acetic Acid (EDTA), Ammonium Carbonate, Citric Acid and Sulfuric Acid as solvents. The batch extraction studies were conducted by varying the contact time, agitation speed, temperature, and particle size and the optimum processing conditions were established. The outcome of the experiment demonstrates that the optimum extraction conditions were reached at a temperature of 70 °C and the maximum metal extraction efficiency was obtained using Ammonium Carbonate solvent among the four solvents. This research is aligned with one of the United Nations Sustainability Development Goals (UNSD-9 i.e Industry, innovation and infrastructure).

Keywords: *Metal Extraction, Spent Catalyst, ETDA, Ammonium Carbonate, Citric Acid, Sulfuric Acid, Solvent Extraction.*

STUDY ON PEDESTRIAN VIOLATION BEHAVIOR AT INTERSECTIONS

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Abstract: Pedestrian violation behaviors at intersections have become significant concern in India. These behaviors include jaywalking, crossing against signal and crossing outside of the designated crosswalks. Such behaviors can result in serious accidents and fatalities for pedestrians and motorists alike. This study aims to investigate the factors that contribute to pedestrian violation behaviors at two intersections, a signalized and a non-signalized intersection at Thiruvananthapuram. The study uses the combination of observational data as well as videographic surveys to collect information about pedestrian behavior and the data collected is analyzed using SPSS software. The study also aims in finding location specific factors like inadequate pedestrian infrastructure, drivers riding through footpaths and vehicles stopping at crosswalks. By addressing these factors, it is possible to reduce pedestrian violations and promote safer pedestrian behavior at intersections. Thus, this study aims in contributing to the development of a safer and more sustainable urban environment in Thiruvananthapuram and other rapidly growing cities in India.

Keywords: *Pedestrian safety, traffic violations, pedestrian behavior, pedestrian violations.*

ESTIMATION AND EVALUATION OF INVESTMENT COST OF UTILIZING GROUNDWATER RESOURCE IN EKOWE COMMUNITY

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Abstract: Groundwater is an essential and only secure source of water supply in Ekowe, an oil-producing rural community in Bayelsa State, Nigeria's Southern Ijaw Local Government Area (SILGA). Rapid urbanization resulting in the influx of people into the city due to the location of a Federal Polytechnic and the subsequent freshwater shortage due to increased oil production and groundwater contamination. For sustainable community water resources growth, quantitative estimation of available water supplies in the area and prevention of water or piezometric level fluctuations is needed. Using cable tool and rotary techniques, boreholes are built in the community to fulfil the water supply needs. Many factors influence the cost of building water borehole at Ekowe, including the type of material used (case and screen), the size of the borehole, the type of construction and the availability of clean water. This study shows that the construction of a borehole in the community is costlier due to its riverine location. The displayed information on the cost of borehole construction in the region indicates a significant rise over the years. Monitoring of boreholes and aquifers, as well as maintenance of boreholes, pumps and accessories, are necessary for long economic service life, but these are found to be poorly served in SILGA.

Keywords: *Borehole Drilling, Groundwater Reservoirs, Maintenance, Piezometric Level.*

SURVEY ON PERSONALIZED DISCUSSION POSTING SUGGESTION SYSTEM

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Abstract: Students are the strong pillars for developing the country's economy and they need to withstand the difficult circumstances they are going to face in their life. Many young minds are still not known about many opportunities which are dropping around them. Instead they spend most of their time around technologies without knowing the advantage of it. In order to provide useful platform to the students to develop their skills and knowledge on various domain they need to explore a lot. So, custom application is created to provide a user friendly environment with some rewards. Rewards are most welcoming and it creates a more participation in the thing we promote. As like the normal forum the application does not focus only on the answering the questions, the application also provide a best user-interface where students can clarify their doubts through a question and answer forum. The answers can then checked for its correctness through ML Algorithm. The top users are mapped based on the interaction with other students through answering the questions. Then the top users will be rewarded which makes him or her promote the knowledge among his/her fellow mates by inviting them into the application which ultimately increases the number of learners in today's scenario to serve as a best platform for building the sustainable world with young talents.

Keywords: *Django, HTML, CSS, Database Server, Rewards.*

RECENT ADVANCES IN SMART MATERIALS FOR THE ENGINEERING APPLICATIONS: REVIEW

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Abstract: In this article, overview of MRF (Magnetorheological fluids or MR fluids) identifies limitations in preparation processes, storage and use issues, and prospective solutions. Magnetorheological fluid has found utility in the rheological fluid province due to its ability to adjust shear resistance dependent on the realistic magnetic flux. Magnetorheological fluids are made up of micron-sized iron particles, a non magnetizable base or carrier fluid, and anti-segregation and anti-clumping additives. Magnetorheological fluids can change their physical properties in response to external stimuli, allowing for a number of advancements to existing technologies while also expanding their application diversity and value. As a result, a smart material is a Magnetorheological fluid, a rheological matter whose viscidness fluctuates when a magnetic flux is applied. These materials can be used to actively and passively manage engineering systems. The review also looks at exploring gaps in MR fluids, as well as existing and future applications.

Keywords: *Smart materials, Magnetorheological fluids, Sedimentation, In-use thickening, Additives.*

A REVIEW ON CLINICAL DECISION-SUPPORT SYSTEMS FOR MONITORING CHRONIC DISEASES THROUGH ARTIFICIAL INTELLIGENCE TECHNIQUE.

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Abstract: A disease diagnosis identifies a health issue, disease, disorder, or other condition that a person may have. Diagnosing diseases is decisive for planning proper treatment and ensuring the well-being of patients. Unfortunately, human error hinders accurate diagnostics, as interpreting medical information is complex and cognitively challenging. The survey provides some avenues for future research on an Artificial Intelligence (AI)-based model for diagnosing chronic diseases. The application of AI predictive approaches enables automatic diagnosis and minimizes detection mistakes compared to human expertise alone. The primary objective of the literature review is to examine how clinical decision-support systems for monitoring chronic diseases are constructed and how they function. Furthermore, to provide essential insights into current and previous AI techniques in the medical field used in today's medical research, specifically diabetes, lung, kidney, breast cancer, and heart disease. In addition, the literature review aimed to examine the research and development of an efficient chronic illness diagnosis model.

Keywords: *clinical decision-support systems, chronic diseases, diabetes, lung cancer, kidney, breast cancer, heart disease, Machine learning, Artificial Intelligence techniques.*

FABRICATION OF CARBON NANOTUBES AND ITS POTENTIAL APPLICATION IN OILY WASTEWATER TREATMENT

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Abstract: Access to clean water is a major concern all over the world. Implementing a cost-effective, stable and sustainable nanomaterial with unique properties has become a top priority. Carbon nanotubes (CNTs) have received tremendous attention in various fields owing to their unique features of exceptional optical characteristics, low density, enhanced surface area, excellent electrical and thermal conductivity, and huge aspect ratio. These unique properties of CNTs make it possible in various applications. Carbon nanotubes have played a significant role in the field of materials engineering, nanotechnology, drug delivery, electronics, sensing, and wastewater treatment etc. However, further research is needed to fully understand their properties, effectiveness and potential applications in wastewater treatment. As, majority of the oily wastewater treatment processes are either too expensive or consumes enormous amount of chemicals with the release of highly toxic materials thereby create both human and environmental risks. Considering these issues, there is an urge to find a feasible and cost-effective method to treat oily wastewater. Therefore, the current research focused on the fabrication of carbon nanotubes using modified Staudenmaier method. The characterization techniques employed are X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Energy Dispersive X-ray (EDX), Fourier Transform Infrared Spectroscopy (FTIR), and Dynamic Light Scattering (DLS). The synthesized CNTs were successfully employed in the batch treatment oily waste water by varying the processing conditions and the best treatment conditions were established. The pollutant removal efficiency was assessed by measuring the chemical Oxygen Demand (COD), Total Suspended Solids (TSS), Total Dissolved Solids (TDS), and Turbidity. The outcome of the study endorses the successful synthesis of CNTs, as evidenced by the significant characteristic peaks observed in FTIR spectra; morphological characteristics using SEM, XRD pattern demonstrated the amorphous phase. The elemental composition obtained from EDX analysis ensured the presence and quantification of CNTs. The size distribution obtained from DLS measurements confirmed the nano size dimension of the CNT's. The experimental findings suggest that the synthesized CNT's, could effectively remove pollutants from oily wastewater.

Keywords: *Carbon Nanotubes, Fourier transform infrared spectroscopy, oily wastewater, scanning electron microscopy, synthesis, wastewater treatment.*

GREEN SYNTHESIS AND CHARACTERISATION OF SILVER NANOPARTICLES FROM MESQUITE TREE FOR OILY WASTEWATER TREATMENT APPLICATIONS

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Abstract: In recent years' green synthesis of nanoparticles has gained significant importance, and it has become the one of the most preferred synthesis methods. Mesquite or Prosopis juliflora is an aggressive, thorny tree is threatening the ecology of the Sultanate of Oman as it spreads like wildfire and poising danger to other plants. Mesquite tree has a negative impact on the environment, and animal health as it absorbs nutrients from soil, prevents the water flow in aflaj. Its exposure creates symptoms of allergic and asthma, and it has adverse effects on crop yield. Hence, there is an urgent need to develop environmentally friendly and economically viable management strategies to bring them under control. Therefore, the purpose of this research is to synthesize silver nanoparticles from Mesquite leaf extract by green extraction technique for the oily wastewater treatment applications. The AgNPs are characterized by Fourier Transform Infrared spectroscopy (FTIR), X-Ray Diffraction Analysis (XRD), UV-visible spectroscopy, Dynamic Light Scattering (DLS), and Scanning Electron Microscopy (SEM) analyses in order to determine the functional groups, morphology, crystal structure, elemental composition and size of the AgNPs. The synthesized AgNP's are used for the treatment of oily wastewater by performing a series of experiment by varying the processing conditions (pH, agitation time, agitation speed, dosage of nanoparticles). This research aims to convert the leaves of this dangerous tree into a value added product, AgNP's for wastewater treatment, thereby reduce its impact on the environment. Additionally, this project is in line with the United Nations Sustainable Development Goals (UNSD-6, clean water and Sanitation) and also supports the Oman Vision 2040.

Keywords: *Mesquite tree, silver nanoparticles, Prosopis juliflora, scanning electron microscopy, Fourier transform infrared spectroscopy.*

EXPERIMENTAL STUDY ON THE EFFECT OF LOW CONCENTRATION MGO - DISTILLED WATER NANOFLUID IN DOUBLE PIPE COUNTER FLOW HEAT EXCHANGER.

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Abstract: In light of environmental concerns, thinking about energy conservation, conversion, and recovery is essential. Heat exchangers efficiently play a big part to conserve energy. The efficient conservation of heat could be possible by proper heat transfer setups. This study depicts one such setup of heat transfer i.e., the use of MgO nanoparticles to improve the efficiency of a double pipe counter flow heat exchanger. Sodium Dodecyl Sulphate (SDS) is used as a surfactant for achieving 0.01% and 0.05% (volume fraction) MgO/Distilled water for better stability and performance of the nanofluid in the setup. The study analyses the thermal performance characteristics, pH and other heat transfer parameters when magnesium oxide nanoparticle (MgO) is combined in a base fluid like distilled water to enhance the properties of the base fluid. The comparison of the two concentrations of nanofluid is carried out, the effects of each fluid were observed, and positive results are provided.

Keywords: *Heat Transfer, Nanofluid, Nanoparticle, Thermal conductivity, Double pipe heat exchanger.*

CHARACTERIZATION OF MECHANICAL PROPERTIES USING - HEMP FIBER WITH REINFORCED POLYMER MATRIX COMPOSITES.

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Abstract: The majority of contemporary structures are made of synthetic composites with more cutouts. In engineering structures, eliminate of varying sizes and shapes are frequently utilized in the design of synthetic composites. In order to produce better design aids that can be utilized by design engineers, it is necessary to conduct extensive research on the effects of the stress concentration factor and the tensile behavior. By varying the size and position of the eliminate, the present study focuses on the hybrid polymer composite made of hemp fiber that exhibits tensile & flexural behavior. The ASTM D638 & D790 standard is used to prepare the test specimens. The conventional hand layup method is used to prepare the composite laminates. The tensile test was carried out in accordance with ASTM D638 standards on a Kalpak made 100kN universal testing machine assisted with Kalpak software interface. A span length of 57 mm was considered for the test. During the test, the crosshead speed was maintained at 5 mm/min at room temperature. In the tensile strength is accompanied by an increase in the fiber with ceramic 20.612MPa, On other hand without ceramic coating 18.196MPa.The same Kalpak made 100kN universal testing machine assisted with Kalpak software interface was used at a loading rate of 3 mm/min.In terms of flexural strength with ceramic coating 42.186MPa. besides without ceramic coating 39.339MPa. The experimental results were compared. Additionally, the present investigation revealed that different composition of fiber influences the improved or enhanced properties of composites.

Keywords: *Composite, Hemp Fiber, Tensile ,Flexural, Material Process, Lapox, K-6 Hardener.*

AFLATOXIN EXTRACTION AND DETECTION THE TOXIN LEVEL FROM SAMPLES USING BIOTECHNIQUES

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Abstract: Aflatoxin is a toxin , produced by the Aspergillus species. It contaminates the food and plants when it is consumed by human or animals which may create a severe health problems like Nausea, vomiting ,Liver injury, kidney failure , respiratory related illness.Normally ,aflatoxin kit are available in market for its detection , however,it is not assured for the level of toxicity and its concentration .This work emphasis on the detection of aflatoxin with their degree of toxicity and concentration in various food samples by traditional biological methods .Six available samples from market :corn flour ,wheat flour ,Maida , Glucovita , Garam masala and tea powder are collected .Three different kind of media: CDA,PDA and malt were prepared and inoculated using direct plate method with three control plates in concentration of 1g sample. Amoxicillin were used as antibiotics to control the bacterial growth. plates were incubated for 5-6 days at normal room temperature. Selected colonies were sub-cultured in PD broth and subjected to LLE using chloroform in ratio of 1:1 followed by rotary evaporation to get the residue . It was subjected to further analysis techniques to confirm the aflatoxin presence. UV spectrophotometry ,Thin layer chromatography ,HPLC ,ELISA and bioassay .From the qualitative and quantitative analysis ,concentration ,degree of toxicity and type of toxin produced can be predicted .Also, culture species were identified to be Aspergillus Niger . Aspergillus Flavus, Aspergillus Paraciticus, Aspergillus terries and Fusarium species. From these type of data can get a proper analysis about aflatoxin.

Keywords: *Aflatoxin, Aspergillus species ,Characterization, Traditional biological methods, Qualitative and quantitative analysis.*

A CASE STUDY ON THE ASSESSMENT OF THE GROUNDWATER WITH THE SPECIAL MENTION OF URANIUM, IN SAHIBGANJ, JHARKHAND

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Abstract: The present study deals with the systematic approach for the determination of groundwater in the Sahibganj district of Jharkhand. Total 30 samples were taken for the assessment with the help of Garmin GPS. The physico-chemical analysis of the water samples has been done which include pH, TDS, EC, ORP, Salinity, SO_4^{-2}, NO_3^-, PO_4^{-3}, F^-, Cl^-, Ca^{+2}, Mg^{+2}, Na^+, K^+.. Along with this heavy metals has been included in the section to check the synthetic pollution index in the region. Uranium has been exclusively included which tells about the radio-toxicity in the region. Statistical and graphical method were used for assessing the quality of water. The groundwater sample were analyzed for the irrigation indices i.e. SAR, %Na, PI, MH, RSC and KR. The results obtained from the study revealed that most of the physico-chemical parameter were within limit except for a fewer places. The groundwater quality was majorly affected by the rock-water interaction with anthropogenic activities at some places. Overall, the various water parameters fall in good range and the samples can be used for normal drinking and irrigation purposes. The cancer risk assessment of the region was found to be in range since the concentration of uranium was in range within the BIS/WHO standard.

Keywords: *Groundwater, heavy-metal-pollution index hydrogeochemistry, irrigation, SAR, Salinity Hazard.*

ANTIBIOTIC INCORPORATED PLA/ TIO2 NANOCOMPOSITES FOR WOUND DRESSING

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Abstract: A biofilm formed by pathogenic bacteria on surfaces causes persistent infections and is an issue of considerable concern to health care providers. There is an urgent need for novel antimicrobial or antibiofilm surfaces and a wound dressing that provide protection against biofilm formation and planktonic pathogens, including antibiotic resistance strains. In this context, recent discovery of new route to produce antibiotics and steady progress in the nanotechnology field have created opportunities to design new wound dressing with anti-infective, bactericidal, and antibiofilm properties. Various review a number of the recently developed nanotechnology-based wound dressing with antibacterial and anti-biofilm effects and explain underlying strategies used to make wound dressing that provide the most optimum conditions for wound healing while protecting the wound from infection with biofilm forming pathogenic bacteria.

Keywords: *Periplaneta americana, PLA, nanocomposites, antibacterial and anti-biofilm.*

DETECTION OF UROLITHIASIS USING IMAGE PROCESSING TECHNIQUES

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Abstract: This paper proposes a methodology for urolithiasis detection from medical image of patients using image processing techniques. Urolithiasis known as kidney stone in common terms, a disease where minerals in urine crystalize and form stones which is detected using lab results, medical imaging techniques and patient's symptoms. It is one of the common diseases across the globe. The proposed method must be able to detect presence or absence of urolithiasis from the medial image report thus eliminating manual examination done by radiologist or nephrologist. For this purpose, the input image is initially preprocessed to eliminate unnecessary details, noise, reconstruct and enhance image after which it undergoes segmentation using thresholding techniques. Finally, detection of presence or absence of urolithiasis from ROI will be done using edge detection methods and ORB.

Keywords: *ORB, Otsu's thresholding, segmentation, urolithiasis.*

MECHANISM OF HEAVY METAL EJECTION USING ZIZIPHUS SPINA CHRISTI AS BIOSORBENT

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Abstract: The effectiveness of low-cost biosorbent Ziziphus Spina Christi for the removal of Zn (II) ions from aqueous solution was examined. To assess the impact of solution pH and starting metal concentration on biosorption capability, batch biosorption tests were conducted. The ideal conditions for biosorption were discovered at pH 6.0, 0.5 g of biomass dosage, and 15 min of equilibrium duration. The biosorption data was well represented by Langmuir model with correlation coefficient of 0.9981 followed by Freundlich, Tempkin and D-R isotherms with the correlation coefficients of 0.9834, 0.9812 and 0.8790 respectively at a solution temperature of 303 K. The values of the correlation coefficient (R2) and Freundlich constant (n) imply that the metal ion was favorably absorbed onto biosorbent. According to the Langmuir isotherm model, the maximal adsorption capacities (q) for Zn (II) was 27.66 mg/g. The fourier transform infrared spectrometer (FTIR), X-ray diffraction (XRD) and scanning electron microscope (SEM) were used to carry out the characterization studies of biosorbent Ziziphus Spina Christi. Discrete aggregates developed on the surface of the biosorbent because of interaction with metal ions. Either electrostatic attraction or a complexation mechanism held the metal ions to the biosorbents' active sites.

Keywords: *Ziziphus Spina Christi, biosorption, Zinc Ion, Isotherms, FTIR, XRD.*

DESIGN OF AN ENERGY EFFICIENT BUILDING : A SUSTAINABLE APPROACH

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Abstract: The project aims at design of an energy efficient building taking into consideration of various criteria's. The preliminary objective of this paper is to reduce the energy consumption of an existing building with minimum cost , wastage and environmental impacts. Passive Energy Management principles are adopted to achieve the sustainable design of the building. Steps to be undertaken are as follows - choice of appropriate software, incorporating the concept of building orientation, building envelope design, passive solar design and energy performance analysis with various factors like climate,site conditions, building use and space allotted.

Keywords: *Energy Efficiency, Sustainability, Global Warming, cost efficient, minimum wastage.*

SELF HEALING CONCRETE USING BACTERIA FROM COW DUNG

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Abstract: This study aimed at developing self-healing concrete through microbial-induced calcite precipitation performed by bacterial strains isolated from cow dung. Cow dung is a readily available and economically viable material, particularly in rural areas. Bacillus bacteria is extracted from the cow dung. The spores were then put into capsules and added to the mortar mixture. These capsules are formed of expanded clay, a lightweight aggregate that offers the bacteria a permeable and safe environment to survive in. SEM examination was done to make sure that the spores inside the expanded clay were still viable. Bacterial concrete samples were cast, cured, and then their strength was assessed using a universal testing equipment. The specimens had microcracks created on them using controlled crack creation. Water and air can enter the capsules through fractures in the concrete, causing the bacteria to grow and generate calcium carbonate to seal the crack. The concrete's structural integrity may be restored by the calcium carbonate deposition. The effectiveness of the healing was then assessed. The healing of the cracks by calcium carbonate precipitation was verified by SEM examination. This strategy has the potential to save maintenance costs and increase the useful life of concrete structures.

Keywords: *self-healing concrete, bacillus, expanded clay.*

AN OVERVIEW ON THE APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN ENGINEERING AND TECHNOLOGY IN 21ST CENTAURY

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Abstract: AI is a rapidly evolving field that has seen numerous applications in various sectors, including engineering and technology in 21st century. This literature review examines key applications of AI in these fields, highlighting the use of AI algorithms in autonomous systems, smart manufacturing, medical imaging, cybersecurity, energy management, robotics, natural language processing, predictive maintenance, traffic flow optimization, and healthcare chatbots. The applications of AI discussed in this review demonstrate the diverse and wide-ranging impact of AI in engineering and technology, resulting in increased efficiency, cost savings, improved diagnosis and treatment in healthcare, enhanced communication, and improved transportation efficiency. AI is transforming the field of engineering and technology by enhancing the efficiency and effectiveness of various systems and processes. The use of AI algorithms in these fields has the potential to greatly improve the efficiency of transportation, reduce travel times, and enable patients to access healthcare information and services more easily and efficiently. Overall, the applications of AI in engineering and technology have significant potential to enhance the way we live and work, and to create new opportunities for innovation and growth.

Keywords: *Artificial Intelligence, Engineering, technology, Optimization, Reliability, Sustainability.*

IMPACT OF ROTATING WAVY TUBE HEAT EXCHANGER ON THE HEAT TRANSFER CHARACTERISTICS OF HYBRID NANO FLUID

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Abstract: This study investigates the heat transfer and fluid flow behaviour of a rotating wavy tube heat exchanger (HEX) using water and a hybrid nanofluid consisting of Al2O3-CuO particles in water (0.3%) as coolants. The heat exchanger consists of a shell and a wavy tube with diameters of 140mm and 8mm, respectively, and a heat transfer area of 0.0476m2. The hot fluid inside the shell is water, while the tube side is filled with the hybrid nanofluid. The rotating wavy tube heat exchanger was fabricated using VMC and CNC machining processes, and the tube was maintained at a speed of 57.5 rpm during the experiment. The mass flow rate of the tube side was varied while the shell side was kept constant. The experimental results showed that the heat transfer rate of the rotating tube was 10.5% higher than that of a fixed tube when using pure water, and 9.15% higher when using the hybrid nanofluid. The increased heat transfer rate is attributed to the rotating wavy tube, which enhances turbulence inside the tube and shell sides, resulting in better heat transfer and a comparable pressure drop. Overall, this study suggests that the rotating wavy tube HEX is an optimal design that can be utilized in various applications.

Keywords: *Wavy tube, Rotating tube, Hybrid nano fluid, Heat transfer rate.*

DESIGN AND ANALYSIS OF AXIAL FLOW COMPRESSOR BLADE PROFILE USING OPTIMIZED AIRFOIL GEOMETRY FOR MAXIMUM AERODYNAMIC PERFORMANCE.

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Abstract: The increase in efficiency of axial flow compressors has been a long-standing quest among researchers. The efficiency of the blade of these compressors can be widely varied by the type of airfoil used. Generally, the airfoil model presented by NASA is used, which has been found to be efficient and reliable. Here, an attempt has been made to modify the airfoil and then compare the modified airfoil with the standard airfoil to check the effectiveness of the modification. Further in the paper, the lift and drag coefficients are compared to the standard airfoil, which is the principal characteristic of a blade, along with the pressure distribution along the surface of the compressor blade. A standard NACA 65-(3)-618 airfoil was modified by manipulating the airfoil profile. The blade of the later stage of the compressor was simulated, and therefore, the chord length of the blade was taken to be 3.94 inches. ANSYS and XFLR5 software were used, which are widely used software for simulation purposes in industries. It was seen that the desired characteristics were obtained, which supports an increase in the overall efficiency of the axial flow compressor.

Keywords: *Airfoil, Angle of Attack ,Cofficient of drag and lift.*

STUDY ON THE EFFECT OF STEEL FIBRES ON REINFORCED CONCRETE BEAMS WITHOUT STIRRUPS

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Abstract: Reinforced concrete beams are structural elements that designed to carry transverse external loads. Stirrups are mainly provided for holding the primary reinforcement of beam. It prevents the buckling of beam and Protect the RCC structure during seismic activity. The addition of steel fibres to concrete has significant effect of tensile strength and modulus of elasticity. The steel fibres were added of different percentages by total volume of beam. Different shapes of steel fibres were added. It have the advantages of saving time, money, and labour. Steel fibres are provided for improving the flexural strength of concrete beam without the need of stirrups. Different shapes of steel fibres provide increased coverage and excellent bonding to reduce cracking.

Keywords: *Steel fibres, flexural strength, cracking.*

HYBRID MULTIPLE CRYPTOGRAPHY - A NOVEL SCHEME FOR DATA ENCRYPTION

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Abstract: Traditional cryptography techniques have been used for many years to protect data from malicious attacks. However, these methods have become increasingly vulnerable to attack over time due to advances in computing technology. This paper proposes Hybrid Multiple Cryptography (HMC), a novel data encryption scheme. This scheme implements an approach that seeks to incorporate both Hybrid cryptography and Multiple cryptography as a way to provide an enhanced layer of security by combining both of their strengths while also mitigating the drawbacks that are present in each individual approach. The process begins with the creation of a symmetric key as well as an asymmetric key pair consisting of a public and a private key. Initially, the message is encrypted using the symmetric key encryption technique with the symmetric key that can encrypt the message for n number of times. The resulting encrypted text and symmetric key are encrypted with the asymmetric public key using the asymmetric key encryption algorithm. The decryption process, on the other hand, is a reversal of the encryption process. Thus the scheme is a reliable and effective data encryption system that can offer greater data protection than conventional encryption approaches.

Keywords: *Hybrid cryptography, Multiple cryptography, Symmetric key encryption, Asymmetric key encryption.*

EXPERIMENTAL STUDY ON LIGHT TRANSMITTING TRANSLUCENT CONCRETE PANELS

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Abstract: Conservation of energy is an essential need in building sector. The overall building energy consumption is approximately 36 % of world's total energy consumption.Inorder to reduce the necessity of artificial lighting during day time which leads to higher energy requirements, development of novel materials which can be used by the construction sector is essential. In this article, development of translucent concrete panels by embedding plastic optic fibres which is capable of transmitting light from one end to the other is proposed as a unique solution to this issue. Behaviour of concrete and mortar panels of 5 cm and 3 cm embedded with plastic optic fiber were examined and compared.The concrete and mortar panels and cubes were embedded with 1.5 mm diameter plastic optic fibres in 6% volume ratio. The mortar panels embedded with optic fibres were able to exhibit lesser cracks and better surface finish. The light transmittance performance of translucent concrete was evaluated by using lux meter in different angles and using different colour bulbs. The results obtained has proved the utility of translucent concrete as an energy efficient substitute material which can be successfully utilized in sustainable constructions and also for the development of green buildings with minimal energy requirements.

Keywords: *Translucent concrete, Energy efficiency , Sustainability, Transmittance.*

DESIGN AND IMPLEMENTATION OF PUBLIC DISTRIBUTION SYSTEM USING BLOCKCHAIN

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Abstract: The effort each farmer takes to produce food grains has to be appreciated and we should minimize the wastage of food grains. To solve the problem of wastage of food grains in Fair Price Shops due to factors like poor storage, transportation or poor management, we've been working on Decentralized Public Distribution System using blockchain. By this we might able to track from where the food grains have been purchased and how it is transported and stored. Also we can track it up to how it reaches the public. By tracking this we can come to an idea of how to not waste food grains and also audit it properly. This will create an impact in the traceability of food grains so that we will be able to minimize the wastage of food grains during the supply. This will also point out the suspicious activities that takes place in the supply chain. This application also helps to audit the food chain and store transactions in an organized manner. Everyone will be accountable for the food grains they've wasted and they'll try to act more responsibly than before. This idea will also make the existing system more secure, advanced and automated.

Keywords: *Fair price shops, Decentralized, Traceability, Public Distribution System, Blockchain.*

EYEBALL AND HEAD MOVEMENT CONTROLLED WHEELCHAIR

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Abstract: An eyeball and head movement controlled wheelchair is a system that enables individuals with disabilities to operate a wheelchair using only their eyes and head movements. It is designed to improve the quality of life for those with limited mobility by providing them with greater independence and mobility. A study published in the Journal of Rehabilitation Research and Development found that individuals with spinal cord injuries who used a head-controlled wheelchair had significantly better driving performance than those using traditional joystick-controlled wheelchairs. Research conducted at the University of Toronto found that eye-tracking technology could be used to accurately control a powered wheelchair, with users achieving an average accuracy rate of 92%. The proposed system consists of a web camera that tracks the movement of the user's eyes and head, and translates these movements into commands that control the wheelchair's direction and speed. It is non-invasive, easy to use, and has the potential to significantly improve the life of individuals with disabilities.

Keywords: *Body motion, Eye tracking, Image processing, Machine learning, Wheelchair.*

EXPERIMENTAL STUDY ON REINFORCED GEOPOLYMER CONCRETE SLAB UNDER IMPACT LOADING

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Abstract: Geopolymer concrete is an eco-friendly material that has the potential to replace conventional concrete. Cement sector is one of the most polluting industries. Geopolymers are inorganic aluminosilicate polymers and can be used to replace cement wholly as well as partially. In this study Geopolymer concrete is produced by mixing Ground Granulated Blast Furnace Slag (GGBS), Fly Ash (FA), Silica Fume (SF), alkaline solution, fine aggregate, and coarse aggregate. Geopolymer concrete acquires strength by polymerization. The alkaline solution is composed of NaOH and Na2SiO3 in the ratio 1:2.5. A proper geopolymer mix was selected by casting cube, cylinder, and beam specimens, three numbers each. The Geopolymer Mixes selected were 50% GGBS + 40% FA + 10% SF, 70% GGBS + 20% FA + 10% SF, and 80% GGBS + 10% FA + 10% SF. Each mix was cast for three molarities 8M, 12M, and 16M of NaOH solution. 70% GGBS + 20% FA + 10% SF mix with 16M NaOH solution (Na2SiO3/NaOH =2.5:1) showed the best performance in terms of compressive strength and flexural strength. This mix showed double the compressive strength of conventional M30 mix concrete. The flexural strength and splitting tensile strength were also very high compared to conventional M30 concrete after 28 days of ambient curing. It was found that the compressive strength and flexural strength increased with molarity. The splitting tensile strength increased with an increase in GGBS percentage. Workability decreased with increasing molarity. All Geopolymer Concrete (GPC) mixes showed better performance than M30 mix conventional concrete. Hence 70% GGBS + 20% FA + 10% SF mix with 16M NaOH solution was selected for further study of the GPC slab. Reinforced Geopolymer Concrete (RGPC) has the potential to replace concrete as a structural material. For that, the slab is studied for its dynamic response under impact loading, which is a complex mechanical problem, especially for two or multiple continuous impact loads. A series of drop hammer impact tests were carried out to investigate the dynamic response of RGPC slabs with two successive impacts. The time history of impact force and the failure characteristic of the slab surface were recorded. Besides, a 3D numerical model based on the finite element method (FEM) was established. In addition, the RC slab will have more obvious damage under the second impact, but the dynamic response becomes weaker.

Keywords: *Geopolymer concrete, Reinforced Geopolymer Concrete Slab, Impact Loading.*

INTRODUCTION OF BIOMIMICRY INTO CONSTRUCTION OF BUDGET HOUSES

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Abstract: In this project, we are aiming to put forward an efficient plan introducing elements of biomimicry into the construction of budget houses with alternative materials other than conventionally used materials. The materials used are V Boards, Sandwich Panels, Structural Steel and Fabrication steels. Concrete slabs using corrugated sheets are also used as an alternative. Moreover, as a biomimicry element, concept of air cooling from termite moulds are introduced. Also, floors are planned to be constructed with funicular shaped shell which is another biomimicry element. Honeycomb skylights are also used as an element of aesthetics. Comparison between a conventionally built house and house built alternatively by our concept is done to prove house built by our concept is more cost-efficient and energy efficient.

Keywords: *Cost Effective, Biomimicry, Energy Efficient.*

RAINFALL PREDICTION USING DATASCIENCE TECHNIQUES

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Abstract: In this paper, a forefront real-time rain sensing and wiper control technique is suggested. Commercial versions currently use electronic sensors that can only measure a limited area of the windshield's humidity. The currently used computer vision techniques have a recall rate of under 70% and are mainly used for the identification and recording of rainfall. To create a visual classifier in the forecast that is resistant to a wide range of backdrop landscapes, lighting conditions, and water shapes, we used a holistic-view deep learning method in this case. Deep Residual Network (ResNet) was chosen specifically as the visual classifier that differentiates between sunny and wet street situations and regulates the wipers appropriately. We tried the network on a variety of embedded computing platforms, including an embedded computing cluster, to confirm the viability of the suggested deep learning framework. The outcomes demonstrate that the deep learning rain detector beats earlier cutting-edge techniques with greater rain memory and accuracy. It was also discovered that readily accessible embedded systems on the market can deliver performance that is on pace with personal computers with the aid of some graphic computation-enhancing components.

Keywords: *Artificial Neural Network, Computer vision, Computer performance, Machine learning.*

EFFECTS OF NANOPARTICLE AND FIBER REINFORCEMENT ON HIGH-PERFORMANCE MAGNESIUM MATRIX COMPOSITE USING NOVEL COMPOCASTING METHOD

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Abstract: Light-weight metals which possesses extremely low density, good machinability and structural properties, can meet the requirements of energy saving and emission reduction in the transportation sector and other automotive application. Recent decades show a significant progress in developing magnesium composites reinforced by nanoparticles. Addition of nanoparticles not only exhibit an improved strength, but also maintain the ductility, toughness and improved corrosion and wear resistance. The magnesium matrix nanocomposites with excellent mechanical properties have pushed the development of magnesium matrix composites to a new stage. Preparation of magnesium matrix nanocomposite is extremely challenging due to the high reactive nature of Mg during the casting process and also to achieve a uniform dispersion of nano particles. The present research focuses on the influence of alumina (Al_2O_3) and carbon fiber (CF) on the mechanical properties of magnesium which is further analyzed. Accordingly, the present research focuses on the new composite casting technologies for achieving a uniform dispersion, deformation behavior, mechanical, metallurgical and tribological properties of magnesium with respect to varying particle and fiber reinforcement.

Keywords: *Magnesium, Alumina (Al2O3), Carbon Fibre (CF), Metal composites.*

DUAL ACCESS CONTROL FOR CLOUD BASED DATA STORAGE AND SHARING

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Abstract: Cloud-based data storage has recently gained increasing attention from academia and business due to its efficient and economical administration. Service providers must employ secure data storage and sharing procedures since services are given via an open network, protecting user privacy and the confidentiality of data. Encryption is the method used most frequently to prevent the compromise of sensitive data. Yet, simply encrypting data does not totally satisfy the need for data management (for instance, using AES). Additionally, a strong access control over download requests must be taken into account to prevent Economic Denial of Sustainability (EDoS) assaults from being performed to prevent users from using the service. In the context of cloud-based storage, this work considers dual access control in the sense that we provide a control mechanism over both data access and download requests without compromising security and efficacy. The design of two dual access control systems, one for each desired area, is presented in this article. There is also presentation of the system's experimental and security analysis.

Keywords: *AES- Advanced Encryption Standard, DDOS- Distributed Denial-of-Service, EDOS-Economic denial of sustainability, CP-ABE- Cipher text-Policy Attribute-Based Encryption, KP-ABE- Key-Policy Attribute-Based Encryption.*

EARLY LIVER FAILURE DIAGNOSIS USING DEEP LEARNING ALGORITHMS

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Abstract: The liver's job is to filter the blood that travels throughout the body, transforming substances ingested through the digestive tract into chemicals that are ready for use. In addition to many other crucial tasks, the liver also cleans the blood of poisons and other chemical waste products so they are ready for excretion. The liver's cells are the first to perish. These days, deep learning are used in the healthcare system if there is a probability of early disease prediction. Data is the primary requirement for artificial intelligence. A deep learning model is created using the dataset that has been gathered. The required pre-processing methods are used, including data cleaning, data transformation, univariate and bivariate analyses, etc. To facilitate understanding, the data has been displayed.

Keywords: *Liver failure, Deep learning, MLP, RBM, Autoencoders.*

DECISION MAKING FOR SELECTION AND COMPARATIVE ANALYSIS OF SUITABLE SUPPLIERS USING INTEGRATED MCDM TECHNIQUES

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Abstract: In a supply chain, a suitable supplier selection has long been a critical problem of strategic relevance. To solve the problem of supplier selection many researchers and experts are continuously finding solutions. Multi-Criteria Decision Methods (MCDM) are the most suitable and promising area which helps the decision-maker to find out the most suitable solution for their problem. MCDM methods mainly help to find the most desirable alternatives from a set of available alternatives versus the selected criteria. In this paper a numerical is used to verify the feasibility and effectiveness of the proposed integrated decision framework, the integration of the Fuzzy Analytic Hierarchy Process (F-AHP) with Evaluation based on Distance from Average Solution (EDAS) Method and Additive Ratio Assessment (ARAS) method. The utilization using F-AHP calculates the weightage of the individual criteria and then uses these weights for calculating the normalized weight matrix for EDAS and ARAS methods, by which the ranking of alternatives is determined. The rankings of alternatives are studied and compared with the help of numerical to understand and demonstrated with a graph.

Keywords: *ARAS Method, EDAS Method, MCDM, Supplier Selection, F-AHP.*

SECURITY FRAMEWORK FOR SOFTWARE DEFINED WSN

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Abstract: Wireless Sensor Networks (WSNs) are a helpful technology for many applications, but they have issues with security and energy efficiency. Frameworks for decision-making and trust computation are used to improve network security and energy efficiency in order to deal with these issues. To deal with delays, packet losses, and guarantee dependability in SOFTWARE-DEFINED WBAN, two algorithms—cuckoo search algorithm optimization (cso) and delay aware routing algorithm—were put into place. Also used for secure communication is the random key pre-distribution (RKP) secure key management system.

Keywords: *wireless sensor networks , wsan , smart sensors, intelligent sensors , random key pre-distribution.*

THE STATE OF THE ART REVIEW ON CONCRETE SANDWICH PANELS

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Abstract: Concrete sandwich panels (CSPs) are composites, consisting of three main parts the skin, core and adhesives/connectors. Skin faces comprise two top and bottom concrete wythes, which are thin, stiff and strong; whereas the middle core part was thick, light and made up of weaker material, characterized by high thermal resistance which is boned or fixed together with adhesives or connectors. CSPs can be manufactured either cast in situ or precast and affixed to any type of structural frame. It can function dually by transmitting load and insulating the structure. Hence, it was thermally efficient and used as replacement cladding for renovation works. Nowadays most studies on CSP report on its structural testing, which focus mainly on the load transfer mechanism between concrete wythe skin and core material by composite and/or non-composite action to the attached structural component. Sandwich panels may also be intended to carry the self-weight of the buildings and critical studies from various pieces of literature focused on the structural performance of sandwich panels are reviewed herein. This critical review also focuses on the latest advancements in the development of textile-reinforced concrete sandwich panels with various types of mesh reinforcement that achieve excellent flexural and impact strength properties. But still, there is a need for further studies on different types of adhesives and connectors used between concrete wythe and core material of concrete sandwich panels and thermal validation of novel CSPs.

Keywords: *Sandwich panel, Concrete Wythe faces, Textile reinforced concrete, Adhesives and Connector.*

FIFTH GENERATION (5G) WIRELESS TECHNOLOGY

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Abstract: After the up ascent of 4G remote versatile innovation happens; analysts, portable administrator enterprise agent, scholastic organizations have begun to investigate the progression (mechanical) towards 5G correspondence networks because of a few fundamental requests that are corrected information rates, better limit, limited inactivity and better QoS (Nature of Administration). To lay out the 5G portable correspondence mechanical establishment, different examination works or ventures involving primary versatile foundation producers, the scholarly community and global versatile organization administrators have been presented as of late. By the way, 5G versatile administrations to be made accessible for use, their design, and their exhibition have not been obviously elucidated. In this paper, we address the careful outline of 5G, the cutting edge versatile innovation. We chiefly illuminates 5G organization engineering, 5G radio range, super thick radio access organizations (UDRAN), traffic offloading of versatile, mental radio (CR), programming characterized radio (SDR), programming characterized organizing (SDN), blended framework, and 5G organization influence on the general public.

Keywords: *4 G remote, 5G portable, UDRAN, blended framwork.*

SINGLE POLARIZATION WIDE BAND MICROWAVE ABSORBER FREQUENCY SELECTIVE SURFACE METASURFACE WITH NEW TOPOLOGY.

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Abstract: In this paper, An Ultra-wideband frequency ranges from 8.3GHz -18.6GHz is a significant achievement in the design of frequency selective surfaces (FSS) and metamaterial structures (MS). An achievement of obtaining an ultra-wideband frequency (UWF) from said Frequency with S11 magnitude better than -13.5 dB; bandwidth from 8.3-18.6 GHz which can find the application in the radar cross-section reduction of the target a minimum reflection coefficient with better absorption which is quite impressive. This absorber has is a wide bandwidth between the said frequencies with a gap of 10.3 GHz and an attenuation below said (dB). The unit cell comprises 4 layers (Copper, Substrate, Vacuum/Foam, and Ground/Pec) with passive elements attached with a new meta FSS design topology with a total thickness of the model is 5.117mm, dimension of said model is 13mm; said the model used is designed for the UWF (AFSS) Goal. However, the design of the structure involves RT5880 as substrate; materials and geometries for the AFSS structure are mentioned in this paper and overall absorption is from 90% from 8.3 GHz to 18.6 GHz. Overall, the successful design of an FSS with a UWF range requires careful design and optimization, as well as the use of advanced simulation tools CST - Computer Simulation Technology and materials.

Keywords: *Frequency selective surface (FSS), metamaterial structures (MMS), ultra-wideband frequency (UWF).*

A REVIEW BASED ON THE DIGITAL IMAGE OF SOIL CLASSIFICATION USING ARTIFICIAL INTELLIGENCE

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Abstract: This work presents a review on digital image-based soil classification system using artificial intelligence. In earlier classification approaches there is necessity of a new approach who watches the extent and patterns of the signs notwithstanding any from the earlier data that may be accessible. Further, a methodology for improving this approach is used. There are strategies accessible, for example, calculation of division from which the exceptional highlights of these fragments are extricated utilizing limit vitality technique. In light of the deliberate information and separated highlights classifiers dole out classes to the portions. They utilize ANNs, Decision Trees and Support Vector Machines. In this, first highlights extraction strategies for picture preparing is connected to separate the highlights of soil test pictures. At that point database of test pictures will be readied and characterization of soil will be finished Using Support Vector Machine (SVM) calculation.

Keywords: *Soil classification, Decision tree, Image Processing, support vector machine, ANNs.*

Organized by: **Holy Grace Academy of Engineering, Thrissur, India.**
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RANKING OF ENABLERS OF SUSTAINABLE SUPPLY CHAIN MANAGEMENT: AN AHP APPROACH

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Abstract: In order to solve the socioeconomic and environmental problems that their company is facing as a result of globalization, organizations are now shifting towards sustainable supply chains management (SSCM), thinking beyond economic benefit objectives. Due to constraints from outside sources and awareness of the benefits that sustainable supply chains may provide, more businesses are committed to the cause of sustainability in their supply chain. While being challenging, there are key enablers that make the shift to a sustainable supply chain simpler. The goal of this study is to identify and rank the enablers that support supply chain management sustainability.

Keywords: *Sustainability, Supply chain management, AHP, Organization.*

DRUSNET –A CONVOLUTIONAL NEURAL NETWORK FOR THE CLASSIFICATION OF DRUSEN IN OCT AND COLOUR FUNDUS IMAGES

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Abstract: Background: Drusen are yellow deposits that are present in the retina. They are made up of proteins and lipids which are present as exudates. Drusen don't particularly cause AMD, but the prolonged presence may cause the development of DRY AMD which can lead to WET AMD. Hence it's important to detect these deposits in the early stages. Deep learning-based artificial intelligence is currently creating an impact on healthcare. A multitude of pathologies, including DR, AMD, glaucoma, and other ocular ailments, can be diagnosed and objectively tracked over time using ophthalmic imaging. The application of Deep Learning in Ophthalmology speeds up the diagnosis process and gives accurate results in the early stages. Aim : To develop a deep learning-based algorithm for the diagnosis of drusen in OCT and Colour fundus images. Method: In this study, we proposed a novel deep learning algorithm DrusNet for the diagnosis of drusen in OCT colour fundus images. DrusNet is an ensemble neural network developed from the pre-trained models EfficientNetB3 and VGG16 for accurate diagnosis. The proposed model DrusNet performed well in both OCT and fundus images. Result: For the classification of OCT images this model achieved an accuracy of 90.15%, an AUC of 0.953, a precision of 86.89%, and a recall of 91.38%. For the classification of Fundus images, this model achieved an accuracy of 95.99%, an AUC of 0.993, a precision of 98.91%, and a recall of 91.00%. Conclusion: The proposed architecture may be used by ophthalmologists as a pre-screening tool to identify drusen deposits at an early stage to prevent AMD.

Keywords: *Drusen, Age-related macular degeneration, Colour fundus imaging, Optical Coherence Tomography, Deep learning, Convolutional neural network.*

SMART FLUID BOTTLE FOR ELECTROLYTE IN HOSPITALS

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Abstract: A smart fluid bottle for electrolytes could be designed to monitor and regulate the number of electrolytes administered to patients. This could be done using sensors that measure the concentration of electrolytes in the fluid and adjust the flow rate accordingly. The bottle could also be programmed to alert healthcare providers if the patient's electrolyte levels fall outside the normal range, allowing for prompt intervention and treatment. In addition to monitoring electrolyte levels, a smart fluid bottle could also be designed to track other important information, such as the time and dosage of medication administration, the patient's fluid intake and output, and vital signs such as blood pressure and heart rate. This information could be transmitted wirelessly to a central monitoring system, allowing healthcare providers to track the patient's progress and help the patient.

Keywords: *MONITOR, REGULATE, SENSORS, ALERT HEALTHCARE, DOSAGE OF MEDICATION, TRANSMITTED WIRELESSLY.*

DEEP LEARNING ALGORITHMS TO IDENTIFY STRESS IN HUMANS BY MONITORING PHYSIOLOGICAL DATA

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Abstract: Stress is a typical human reaction that everyone experiences. In truth, the human body is built to experience and respond to stress. When we face changes or challenges, our body responds physically and mentally. That is the result of stress. Humans have been subjected to much stress in the last ten years, which is why stress measurement is becoming increasingly crucial in our daily lives. It is critical to recognize stress since it is a big worry, and it also helps to raise awareness. The physiological data plays a significant part in detecting human stress since alterations in the data make it extremely easy to learn about stress levels as well as anxiety, which appears first and is followed by stress. When the data is combined with machine learning and deep learning algorithms, detection becomes more accurate after training on the training data. The major goal of this research is to find a unique accuracy of stress detection using physiological data and to compare models using the acquired accuracies.

Keywords: *Stress Detection, Deep Learning, Neural Networks, Artificial Neural Networks, Data Science.*

EXPERIMENTAL INVESTIGATIONS ON FIBER REINFORCED CONCRETE BEAM WITH RECYCLED RUBBER

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Abstract: Fiber reinforced recycled rubber beam can offer a perfect solution to meet the demands of sustainable structures with superior strength and flexibility. It combines rubberized concrete, steel fiber and percentage replacement of rubber and steel fiber to enhance the strength, stability, durability and overall performance. This paper presents the results of recent experimental investigations on rubberized concrete. Chipped and crumbed tire rubber particles were used to replace coarse and fine aggregate with varying percentages of replacement levels. The replacement levels selected were 25%, 50%, 75% and 100% by volume of the coarse and fine aggregates. Steel fibers were also added to the concrete mix to improve the performance of the concrete. The mechanical and fracture properties of the rubber concrete were examined. The optimal replacement ratio of the rubber particles have also been analysed to meet the strength requirements and fracture criteria.

Keywords: *Recycled Rubber, concrete, steel fiber, Sustainability, fracture load.*

BIODIESEL PRODUCTION FROM RUBBER SEED OIL USING CNT-TIO2 CATALYST

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Abstract: In recent years, research on biodiesel has increased as a sustainable and environmentally friendly alternative fuel to traditional fossil fuels. Vegetable oils, yellow grease, used cooking oils, or animal fats are used to make biodiesel. Transesterification is the reaction of vegetable oil with primary alcohol in the presence of a catalyst to produce biodiesel. Glycerol is produced as a by-product in this process. In Asia, rubber seed oil(RSO) has great potential as a feedstock for producing biodiesel fuel.RSO is a non-edible oil and the biodiesel producing from this will prevent food scarcity.However, compared to diesel fuel made from petroleum,biodiesel production costs are still quite high. The use of a solid heterogeneous catalyst in the production of biodiesel could lower its cost and make it economically competitive with diesel.Carbon nanotube and Titanium dioxide composite has shown a high potential as heterogeneous catalyst due to high surface area, strong metal support interaction, chemical stability, and acid–base property. The present work describes a synthesis of biodiesel by combining the carbon nano tube and titanium dioxide as a catalyst. The catalyst will fully characterized by SEM,XRD,TEM,FDIR,FDRAMAN measurements to understand and evaluate their physical and structural properties .The liquid biodiesel sample will characterized by gas chromatography and FDIR.

Keywords: *Heterogenous catalyst, Carbon nanotube, Titanium dioxide, Biodiesel.*

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ANALYSIS OF TIMBER-CONCRETE COMPOSITE SLAB

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Abstract: Composite construction of any building construction involving when two different materials are bound together so strongly that they act together as a single unit. Because of the low self -weight, fast construction, fast repairing, high resistance to bending and deflection, high load capacity, good dynamic behavior, we select the cross-laminated timber concrete composite in floor system. The design, construction, and performance of the CLT-concrete system are dependent on timber properties, connection systems, and slab details. The construction is economical and eco-friendly because of the reduction of concrete and steel. In the study of CLT-concrete composite by Wang et al. (2022) discussed about the shear performance of self-tapping screw connections in Cross-laminated timber Concrete Composite floors. Twenty-four specimens were prepared and tested in this study and find the slip and failure using push-off test and endoscopy test. Timber embedding failure, and concrete crushing failure were also observed around the shear-compression loaded screws. In this project parametric study is done in CCC with various connectors using ABAQUS software. The project summarizes the information of CCC and connection's properties, testing and its reliability. This CLT-concrete composite possesses good performance under various loading conditions if we designed and constructed well.

Keywords: *Cross-laminated timber concrete composite (CCC), self-tapping screws, Slip, Timber-concrete composite.*

REPLACEMENT OF COARSE AGGREGATE USING WASTE CERAMIC- MARBLE PIECES ,FINDING DURABILITY

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Abstract: Day by day newer technologies are arising in order to bring out efficient technologies and ideas in the field of construction.One challenging problem of construction industry is to reduce cost and to develop methodologies to increase productivity. This paper covers factors affecting environmental problems with materials of concrete as well as discussion on achievement of satisfactory results of time and cost by applying cost reduction and reusing techniques. Recently, the demand for concrete has been increasing due to the enormous development in construction work. Sustainable aggregate became a substantial requirement for considering the raw material shortages and environmental degradation. Moreover, studies indicate that around 10 % of all greenhouse gas emissions are included in the concrete formation.Keeping this as a major concern,puttting forward a concept of replacement of materials in an efficient way to reduce cost and economic issues.The topic deals with replacement of coarse aggregate with ceramic and marble pieces in 5 different percentage comparing the value with normal concrete, followed by various tests obeying various parameters.The topic olso have to dealt with the durability conditions sorroundings thus aiming to devolop a green environment with lesser pollution.

Keywords: *Replacement of coarse aggregate,material properties,marble-ceramic waste collection,determining strength and durability check.*

EXCEL APPLICATIONS OF METAL-ORGANIC FRAMEWORKS (MOF) FOR THE REMOVAL OF EMERGING POLLUTANTS FROM AQUEOUS ENVIRONMENTMOF

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Abstract: Metal-organic frameworks (MOFs) are a class of porous materials with synthetic versatile, making the researchers identify design features for advanced functional materials. This review tends to engineer ways to control MOF attributes for improved properties such as stability, surface area, and flexibility. Along with an updated account on MOFs employed, new directions are discussed in emergent technologies and extreme application in environments. Various applications in many fields are being fostered that exploit MOFs', like gas storage, fluid separation, adsorbents, catalysis, medication delivery, and functional materials and in sensors. The surface area of a wide range of MOFs ranges from 10 3 to 10 4 m 2 /g which is higher than the conventional porous materials. MOFs with extremely durable porosity are greater in their assortment and variety than other classes of porous materials. This caters the design of multivariate systems with various functionalities leads to synthesis of MOFs that offer a synergistic blend of properties.

Keywords: *MOF, CAFFINE CITRATE, APPLICATIONS.*

ANALYSIS OF NACA 4412 AIRFOIL AT 4° AND 6° ANGLE OF ATTACK USED IN WINGS OF WING-IN-GROUND EFFECT VEHICLES TO USE GROUND EFFECT FOR FLIGHT

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Abstract: Ground effect is described as the phenomenon where an aircraft experiences an increase in lift and a reduction in drag when flying in very close proximity to the ground or water surfaces. This occurs due to the air pressure differential created between the lower surface of the aircraft's wings and the ground, also known as ram pressure. As an aircraft approaches the ground, the air displaced by the wings is compressed between the compact portion of the wings and the ground, which increases air pressure, allowing the aircraft to fly more efficiently at lower altitudes. Ground effect is most significant when the wing of the aircraft is at an altitude less than one wingspan above the ground (20-80% of chord length). Certain airfoils like NACA 4412 is a common choice for the wings when it comes to designing a Wing-in-ground effect vehicle at an angle of attack ranging from 3° to 6°. The analysis of the NACA 4412 Airfoil is depicted in this paper at common cruise speeds experienced by Wing-in-Ground (WIG) vehicles at angles of attacks of 6° and 4°. Factors such as velocity and pressure experienced by the airfoil in those conditions are analyzed. The lift coefficient and lift-to-drag ratios are studied as they are the indicators of the efficiency of airfoils.

Keywords: *Airfoil, Angle of attack, Cruise speed, Lift, Drag, Coefficient of Lift.*

RISK ASSESSMENTS AND ANALYSIS OF CONSTRUCTION SITES IN KERALA

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Abstract: A construction project is started, coordinated, and completed from beginning to end while staying on schedule, within budget, and up to the required quality standards. Numerous factors that result in delays, higher costs, and longer completion times can have an impact on these. Despite the high risk involved, there is a lack of studies on risk assessment on these sites. This study aims to fill this gap by examining the need for risk assessment at construction sites in Kerala and the application of the Relative Importance Index (RII) Test, Importance Index (IMPI) Test, and Fuzzy Dematel in analysing the survey data. The study employed a questionnaire-based survey to gather data on the various hazards and risks associated with construction sites in Kerala. The survey was administered to construction workers, supervisors, and managers at selected construction sites in the state. The RII Test and IMPI Test were used to analyse the survey data and determine the ranking of the factors according to their influence. For a more detailed analysis, the Fuzzy Dematel method is also used to solve the demerits of the above analysis. The results of the study indicate that risk assessment is crucial on construction sites in Kerala to minimise cost, time, and the occurrence of other risk factors. The study provides valuable insights into the need for risk assessment at construction sites in Kerala and demonstrates the usefulness of the RII Test and IMPI Test in analysing survey data. By using the Fuzzy Dematel method, we can categorise the factors into causes and affecting factors, which also point out the range of influence between the factors. Overall, the study highlights the importance of risk assessment at construction sites in Kerala and provides a framework for conducting such assessments using the Relative Importance Index Test, IMPS Test, and Fuzzy Dematel. This study can serve as a useful reference for construction companies and policymakers in developing effective risk management strategies in the construction industry.

Keywords: *Risk Assessment, Survey, Relative important index (RII), Importance index (IMPI), Fuzzy Dematel method.*

EMERGING METHODS FOR EARLY DETECTION OF FOREST FIRE USING IOT

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Abstract: Everyone is aware that the forest is one of the most important and necessary resources and that forest fires pose a constant threat to biological systems, features of systems, and the environment. The necessity to identify forest fires as quickly as possible is urgent because the identification of forest fires has grown to be a crucial problem in the pre-suppression process. This literal work has made a strong case for the skilled use of wireless sensor networks as a plausible explanation for the cause of forest fires. To complete the solution process, the suggested system relies on a variety of sensors that are attached to it as well as data from these mediums of wireless communication. These sensor data are transmitted by the devices that are used for detecting the early occurrence of fire in the rich forest and alerting the fire department as well as the forest department, who will examine and prevent the situation as early as possible.

Keywords: *Flame, GSM, Humidity, Smoke, Temperature, Wireless Sensor Network, Zigbee.*

DEVELOPMENT OF FREE FATTY ACID MONITORING DEVICE AND COMPARATIVE ANALYSIS OF OIL COMPOSITION FOR THE EVALUATION OF ITS INFLUENCE IN BIODIESEL PROPERTIES

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Abstract: Diversion of oil sources for biodiesel production has been gaining importance to meet the environmental concerns and energy demand. The free fatty acid (FFA) content of the feedstock is a significant factor in the biodiesel production. The FFA values determine the complexity of the biodiesel production. Until date, an experimental procedure has been used to determine the FFA concentration of an oil source; these methods are dependent on titration, which is a laborious process involving significant volumes of chemicals. Hence, in the present study, an attempt is made to develop a device for the identification of FFA. The impact of FFA and their respective methyl esters in the quality and properties of biodiesel have been investigated. Waste cooking oil samples subjected to wide range of cooking conditions including different cooking time, temperature, product to be fried, collected from different food outlets in Rajiv Gandhi Road, Chennai including Sathyabama Institute of Science and Technology mess were converted into biodiesel. Subsequently, the composition of oil samples and the variation in their quality were analyzed using gas chromatography flame ionization detector (GC – FID). The respective methyl esters were also analyzed. The properties of biodiesel such density, viscosity, acid value, flash point, fire point, calorific value was determined as per ASTM standards. The study was further extended to corelate the properties of biodiesel with the composition of the oil from which it was derived. The analysis evidently proved the dependence of biodiesel properties on the FFA percentage and the composition of the oil.

Keywords: *Free fatty acids, Waste cooking oil, Sensor, Methyl esters, Gas chromatography, ASTM D6751.*

LOAD FORECASTING: STLF USING FFNN MODEL WITH ADAM OPTIMIZATION ALGORITHM

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Abstract: Short-Term Load Forecasting (STLF) is the process of predicting the amount of electricity demand that will be required over a short period of time, ranging from a few hours-days. The purpose of STLF is to help utility companies and power system operators to optimize the allocation and usage of energy resources, ensuring that enough electricity is generated and delivered to meet the expected demand at a given time. This involves analyses of factors that influences energy demand, such as weather conditions, time of day, weekdays, special events and other techniques to generate accurate and reliable predictions of future energy demand. Feed Forward Neural Network (FFNN) model is used for STLF in order to meliorate load accuracy. The data of three regions has been reckoned for training proposed model. Parameters- temperature, relative humidity, liquid precipitation and wind speed at a distance of 2m of every place is manipulated as training data set for presented model. Adam Optimization is applied for training model as it has robust learning rate, which makes this most pertinent algorithm to be applied for deep learning. This algorithm exhibits faster computational time and entails less tunning variables that embodies Adam Optimization as better algorithm and hence will improve accuracy outcomes of FFNN model.

Keywords: - *Adam Optimization, Artificial Neural Network, Feed Forward Neural Network, Short-Term Load Forecasting, weather conditions.*

STUDY OF VARIOUS MODES OF CONDUCTION OF 3 PHASE INVERTER AND ITS HARMONICS IMPACT ON OUTPUT VOLTAGE WITH THE HELP OF FILTERS

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Abstract: Inverters are widely used in Switch Mode Power Supply (SMPS), Flexible AC Transmission System, Variable Frequency Drives (VFD), Active High Power Filters High Voltage Direct Current (HVDC) Systems, Renewable Power Conversion Systems as well as in different industrial and domestic processes. Power electronic inverters are very popular for fast response and precise control. In this paper conventional modes of conduction such as 180° and 120° are compared with different modes of conduction such as 80°, 90°, 110°, 130°, 140°, 150°, 160° and 170° of Three-Phase IGBT based Voltage Source Inverter (VSI) on MATLAB Simulink. A detailed comparative harmonic sanalysis is carried out explaining the reduction in Total Harmonic Distortion (THD) when Voltage Source Inverter (VSI) is operated at different conduction modes. The effect of filters on harmonics is also studied in this paper. Simulation results for 3 Phase inverters with and without filters and impact on harmonics have been presented. The line to Line and Line to Ground voltage waveform results are evaluated. The design is tested on resistive and inductive loads, proving 150° as the best suitable mode of operation of VSI for different loads. The objective of the research is to design an efficient inverter for domestic and industrial purposes. The simulation is done at higher voltages so that practical implementation becomes easier.

Keywords: *IGBT based Inverter, Solar based Inverters, 150° conduction mode, Harmonics, Filters.*

SYNTHESIS AND CHARACTERIZATION OF NANO HYDROXYAPATITE POWDER THROUGH MICROWAVE IRRADIATION METHOD FOR BONE IMPLANT APPLICATION

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Abstract: Hydroxyapatite (HA) has emerged as a promising biomaterial for bone regeneration due to its excellent osteoinductive properties and similarity to the inorganic component of bone. With a Ca/P ratio of 1.67, HA has been extensively studied for its ability to promote bone growth and has been used as a reinforcement material in biodegradable magnesium(Mg)-based materials to control their degradation in a physiological environment. In this study, we synthesized HA using microwave irradiation method, and characterized them using X-ray diffraction analysis (XRD), Fourier-transform infrared spectroscopy (FT-IR), and thermal stability through Thermogravimetric analysis/Differential thermal analysis (TGA/DTA), and results are compared with available hydroxyapatite nano powder. These results can be useful for designing and optimizing HA-based Magnesium Matrix Composites for bone Implant applications.

Keywords: *Hydroxyapatite, Biomaterials, Microwave irradiation, XRD, FT-IR, TGA/DTA.*

Organized by: **Holy Grace Academy of Engineering, Thrissur, India.**
In association with: **ISET Research, India.**

MODULAR FORMS AND SAITO-KUROKAWA LIFTS

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Abstract: We explore the connections between elliptic modular forms of integral weight and Siegel modular forms of genus two. Modular forms are complex valued functions defined on the upper half plane which satisfy certain nice properties. They are found everywhere in Mathematics, and have innumerable applications to several areas in the subject. Andrew Wiles' proof of Fermat's last theorem made extensive use of modular forms, among other tools and deep theories. Maryna Viazovska's work on E_8 lattices, for which she was recently awarded the Fields medal, involved the construction of some special functions based on the theory of modular forms. In Physics, Siegel modular forms play a major role in understanding the nature of black holes. In this article, we analyze the connections between elliptic modular forms of integral weight and Siegel modular forms of genus two, which was first proposed (independently) by H. Saito and N. Kurokawa. Such a connection was first realized in the level one case using a series of isomorphisms, now called the Saito-Kurokawa lift relating modular forms of integral and half-integral weight, Jacobi forms and Siegel modular forms. We present the known results in this direction, and then look at the possible generalizations in the level aspect with a non-trivial Dirichlet character. The main tools required are the Shimura-Kohnen lifts, Eichler-Zagier map and Maass lifts along with their mapping properties.

Keywords: *Modular forms, applications of modular forms, Saito-Kurokawa lifts.*

BLOCKCHAIN TECHNOLOGY OVERVIEW TOPOLOGY AND FUTURE TRENDS

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Abstract: Bitcoin's underlying technology, blockchain, has recently drawn a lot of attention. Blockchain functions as an unchangeable ledger that enables decentralised transaction processing. Several industries, including financial services, reputation management, and the Internet of Things (IoT), are seeing the emergence of blockchain-based applications. Blockchain technology still faces several obstacles, including scalability and security issues, which must be resolved. This essay provides a thorough introduction to blockchain technology. First, we give a brief introduction to blockchain architecture before contrasting some common consensus techniques applied across various blockchains. Also briefly addressed are technical difficulties and recent advancements. We also outline potential blockchain trends in the future.

Keywords: *Bitcoin, Blockchain, IOT.*

DEVELOPMENT OF 360 DEGREE FIRE PROTECTION SYSTEM

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Abstract: Large Manufactures, earthenware houses, and artificial product installations always run the threat of fires breaking out to this end, rapid fire advances in remote seeing systems including ground grounded, unmanned upstanding vehicle grounded and satellite grounded systems have been espoused for effective fire surveillance. In this design, the lately introduced 360 Degree Fire Protection System, making it possible to again unlimited field of view captures which reduce the number of needed detectors and the computational cost and make the systems more effective. The system consists of 2 x Motors coupled with a primary sprayer motor with pipeline system and on board wireless streaming camera to run this system. The 2 motors are used to control the snoot direction movement. The stoner may use a wireless remote to transmit movement commands. The receiver circuitry mounted on system receives druggie's commands and operates the motors to achieve asked stir. Also the receiver circuit operates use the pump motor to control the start and stop the spray. The sprayer snoot can also be acclimated to acclimate the water spray outlet. The sprayer medium is erected to operate in a 2 DOF operation to acclimate position in x and Y directions and achieve a 360 Degree water spray content.

Keywords: *Control Indoor Fire, Reduce man power, 360 degree rotation, up and down.*

NUMERICAL AND EXPERIMENTAL INVESTIGATION OF PHASE CHANGE MATERIAL BASED BATTERY PACK COOLING

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Abstract: PCMs can store significantly more energy than traditional systems that rely on sensible heat. This study examines the use of paraffin as a Phase Change Material (PCM) with various concentrations of graphene nanoparticles for cooling battery packs using numerical and experimental methods. The primary objective of the study is to assess the thermal performance of a battery pack using PCM-based cooling at various discharge rates. To test their impact on battery cooling, we specifically added a few grams of paraffin and utilized a certain percentage of graphene. To simulate the cooling process, a computational fluid dynamics (CFD) model was created, and experiments were run to confirm the numerical findings. The study's findings demonstrated how greatly adding graphene nanoparticles improved the PCM-based cooling system's ability to transfer heat. As the percentage of graphene in the battery pack increased, the CFD simulations projected a drop in temperature, which the experimental data confirmed. The highest percentage of graphene combination produced the finest cooling results. This paper offers insightful knowledge into the planning and improvement of PCM-based battery pack cooling systems, with the utilization of graphene nanoparticles as a potent boost. The results can provide insights into using PCMs for creating battery cooling system.

Keywords: *PCM, Paraffin-graphene, Battery pack.*

TREATMENT OF INDUSTRIAL WASTEWATER USING GRAPHENE SAND COMPOSITE

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Abstract: Industrial wastewater treatment is a concern due to its adverse impacts on the environment as well as public health. Graphene-based materials have recently become recognized as a viable option for addressing this concern due to their superior adsorption capabilities. In this paper, we look at how effectively a novel adsorbent material called Graphene Sand Composite (GSC) can handle the treatment of industrial wastewater. GSC was synthesized by coating graphene oxides in sand particles and chemical reduction using sugar as a carbon source. The resulting material is characterized using FTIR spectroscopy. Batch mode studies were conducted to analyse the effectiveness of the material in removing Chlorides and Hardness from wastewater. The pollutant removal efficiency as well as the adsorption capacity of the material compared to traditional sand filters is also studied. This study also aims to discover GSC's potential as a sustainable and feasible solution and a promising alternative to traditional treatment methods.

Keywords: *Graphene Sand Composite, Industrial wastewater, Adsorption.*

ESTABLISHMENT OF ALTERNATE SOIL-LESS FARMING TECHNIQUE FOR MICROGREENS CULTIVATION

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Abstract: Soil, by far the most plentiful growing medium we have, it also includes the standard macro and micronutrients required for plant growth. These nutrients are carried to the plant roots by water as it moves through the soil. In Hydroponics – the most common soilless agriculture technique, where plants are grown without soil using a water-based fertiliser solution. Hydroponic production systems are gaining popularity among small farmers, amateurs, and business enterprises. Growing medium including aggregate substrates like vermiculite, coconut coir, or perlite are used in this alternate farming method in locations where availability of land, fertile soil and scarcity of water are major challenges. In this method, growing medium fertility and growth conditions can be well controlled. Macro nutrients and micro nutrients have been pre-mixed into a water reservoir, along with high levels of oxygen, efficiently to the plant roots grown in the constructed hydroponics framework. Biochar is a charcoal-like material that is generated from plant materials such as grass, agricultural and forest residues that are decomposed at high temperatures, commonly during renewable energy production. The procedure transforms the plant material's physical and chemical qualities into biochar, a highly porous, stable, carbon-rich substance. Hence, in the study Biochar produced from agricultural (agro) waste is used as a nutrient supplement in the hydroponics system. A comparative microgreens growth study was done using commercially nutrient solutions and biochar synthesised from agricultural waste using a hydrothermal liquefaction reactor maintained at suitable conditions. One or more variety of seeds including Vigna radiata (Mung), Trigonella foenum-graecum (Fenugreek), Brassica nigra (Black Mustard) are chosen, and different amounts of Biochar are added with corresponding plants. Ideal amounts of nutrient supplements that are best suited for growing plants in the hydroponics (soilless agriculture) system has been reported.

Keywords: *Soilless agriculture, Biochar, Hydroponics, Nutrients, Vigna radiata, Trigonella foenum-graecum, Brassica nigra.*

CORRELATION OF FATTY ACID COMPOSITION IN NON EDIBLE OIL BIODIESELS WITH COMBUSTION AND EMISSION CHARACTERISTICS

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Abstract: The conventional fuel sources that have been used for several years for the energy requirements have started depleting and has created a necessity to look for alternate sources of energy to meet the energy consumption requirements of the world. One of such renewable energy sources that has been a dependable source of fuel has been biodiesel. In this presented work waste cooking oil (WCO). The free fatty acid (FFA) composition present in the WCO varies relying upon the type and source of oil used while cooking. Each fatty acid methyl esters present in the oil can have a momentous effect in the properties of the biodiesel produced. Also, WCO is typically a mixture of saturated, mono and poly unsaturated fatty acids. The factors like the type of oil used method and duration of cooking also have an influence on the FFA content in the biodiesel that is produced from WCO. Using the method of gas chromatography flame ionization detector (GC-FID) the fatty acid methyl esters contents and variations in the oils can be studied. By analyzing these contents, the characteristics like the cetane number, heat of combustion, lubricity, latent heat of vaporization, bulk modulus and compressibility can be studied as per the American Society of Testing and Materials (ASTM) standards. Through the analysis of these properties, we can study the impact of combustion and emission characteristics that it can have on usage the biodiesel as an alternate fuel in the internal combustion engine.

Keywords: *waste cooking oil, gas chromatography, free fatty acids, cetane number, ASTM, combustion, emission.*

FLEXURAL STRENGTHENING OF HYBRID BEAM WITH SRG COMPOSITES

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Abstract: In this paper the flexural performance of hybrid beam strengthened with the U-shaped SRG (Steel Reinforced Grout) composites were analysed analytically using ansys software. The main aim of this studies were (i) To find out the length optimisation of steel reinforced grout. (ii) Splitting the optimised concrete model into two layers having M20 at the compression zone because the crushing of concrete occurs prior to yielding of reinforcement steel at the tension side of the beam and the M15 at the tension zone because the steel reinforcement starts yielding before crushing of concrete. (iii) Add the U-shaped SRG layer around the beam and there by analysing the concrete height ratios of 50:50,75:25,25:75 then find out the load bearing capacity.(iv) Analysing the cyclic behaviour this hybrid beam with SRG.

Keywords: *Hybrid beam, SRG, Optimised concrete.*

EVALUATION OF PROPERTIES OF SOAPS DERIVED FROM EDIBLE AND NON EDIBLE OILS FOR LAUNDRY AND CLEANSING APPLICATION

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Abstract: Soaps are a popular personal hygiene and cleaning products that have been used for centuries. They are typically made from a combination of oils or fats and an alkaline solution, which undergo a chemical reaction known as saponification to create soap. In the present study a comparison of both non-edible and edible oil derived soaps has been done. Palm oil, Coconut oil and Sunflower oil-based Waste cooking oils were collected from local restaurants in Chengulpet, Tamil Nadu and were used as non-edible oil sources for the making of soaps. Likewise, almond oil and cold pressed coconut oil was chosen as an edible source. All the oil samples collected were analyzed using Gas Chromatography Flame Ionization Detector (GC-FID) for its composition. Based on the analysis, oils containing higher percentage of saturated fatty acids (stearic acid and palmitic acid) were used for detergent application and oil samples with higher unsaturated fatty acid contents (linoleic acid and oleic acid) were diverted for the preparation of cleansing soaps. The objective of the present study is to recover waste cooking oil and recycle it to develop eco-friendly detergent soaps that generate lesser wash water during cloth rinsing giving more whitening without causing harm to the skin and cloth. When it comes to selecting oils for making bathing soaps, there are several factors to be considered. Addition of some natural ingredients like turmeric extract, aloe vera gel, neem extract and other proven medicinal plants extracts has been done to evaluate the antibacterial and antifungal properties of the cleansing soaps. Oils that provide moisturizing properties are ideal, as they help to nourish and hydrate the skin. Moisture content, TFM, TAC, Glycerine, pH, Insoluble matter, Chloride content in soap and Lathering power of soaps derived from various oil sources have been determined and compared in the study. Attempts have been made to translate the lab studies to identified self-help group women of Kumizhi village, Chengulpet for their livelihood enhancement.

Keywords: *Saponification, Waste cooking oils, Medicinal plant Extracts, Cold pressed oil, Eco-friendly soaps, Livelihood enhancement.*

STUDY ON FRACTURE PARAMETERS OF FIBRE REINFORCED RC HOLLOW BEAM

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Abstract: Pipe networks and ducts are necessary in modern buildings to support various services, including AC, telephone, electricity, water supply, computer networks, and sewage. Typically, these systems are situated below the beam and covered by the ceiling for aesthetic reasons, which results in dead space. To decrease the dead space in the floor area, ducts and pipes can be passed through the longitudinal and transverse openings in beams. The concrete located near the neutral axis of reinforced concrete beams is frequently underutilized, and this concrete can be substituted with lightweight material to decrease the weight of concrete. Incorporating a GI pipe to create a hollow section in the beam is another way to reduce the weight of the structure. This study examines the flexural behavior of reinforced concrete hollow beams under a two-point load and evaluates the suitability and flexural strength of these beam structures. Steel fibers improve the fracture behavior of members, and the further studies compare the fracture parameters of fibre reinforced hollow beams with solid beams.

Keywords: *Flexural behavior, Fracture parameters, Hollow beam, Light weight, Steel fibre.*

SEISMIC RESPONSE OF BUILDINGS WITH STEEL ROOF DIAPHRAGMS

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Abstract: Buildings with flexible floor diaphragm, rigid floor diaphragm and wood floor diaphragms are common in America, Japan and other parts of the world. The diaphragm is an important component that provides structural integrity to the building. The distribution of shear forces in the building is based on the strength and stiffness of the diaphragm. Diaphragm plays an important role in the transfer of load in the structure so the design of diaphragm should be done accurately . Based on the in-plane stiffness assumption of floor system, SAP 2000 is used to model flexible floor diaphragm model, rigid floor diaphragm, wood floor diaphragm and steel roof diaphragm. Detailed non-linear dynamic analysis done in the models and results are compared. The seismic analysis for a six storey hybrid structure with four different models is analyzed. The seismic response of the building model is dependent on the stiffness of the roofing material. Steel is more durable and with high strength characteristics compared to wood. The buildings with steel floor diaphragms tend to show seismic safety.

Keywords: *Flexible diaphragms, Rigid diaphragms, Steel diaphragms, Time history method, hybrid structures.*

SEISMIC PERFORMANCE OF COLD-FORMED STEEL BEAM-TO-COLUMN EXTENDED END PLATE CONNECTIONS

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Abstract: Cold formed steel sections are gaining increased popularity around the world.which may be explained by good strength to cost ratio.the cold steel then formed onto desired shape and thickness and a protective coating is applied .typical cold formed steel moment resisting connections generally have low ductility and energy dissipation capacity as a result of low buckling resistance of thin walled cold formed steel elements. Extended end plate has good energy dissipation capacity.

Keywords: *CFS, EXT.*

FLEXURAL BEHAVIOR OF CONCRETE COMPOSITE BEAM WITH DIFFERENT CONFIGURATION OF RIGHT-ANGLE TRIANGULAR(TTR) CONNECTORS

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Abstract: In composite steel-concrete beams, shear connections are crucial. Fundamental parts of composite steel-concrete columns are shear connectors. Their purpose is to create a decent amount of interaction between the steel profile and the concrete slab. The majority of shear connections are welded to a steel profile's flange and set into the concrete component. By doing this, the shear connectors prevent the components' steel-concrete interface from transferring longitudinal and transverse forces. A recently created shear connector with effective structural behaviour and low costs for production and installation is the right-angle truss connector. Studies that analyse this connector's behaviour in greater depth must be developed, though, in order to use it in composite steel-concrete beams.In order to assess the Right-Angle Truss connector's shear resistance, this research will vary certain parameters that are necessary for the connection of composite steel-concrete beams. Study was also done on the connector's application orientation that offers the most shear strength. This also involves using the ABAQUS software to analyse various types and sizes of shear connectors.

Keywords: *Shear connectors, TTR connectors, Composite beam.*

CYCLIC AND BUCKLING ANALYSIS OF CONCRETE FILLED STEEL PIPE PIERS WITH COMPOSITE CONNECTION

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Abstract: Composite steel-concrete connections designed to protect critical welded interface areas between the steel pipe pile and cap beam bridge piers. The use of composite connections can increase the shear capacity of a steel bridge; thus, improving its performance. One of the most important of these solutions is composite steel connection the shear capacity of a steel bridge was increased by the addition of a composite steel connection. This paper describes a numerical study using the finite element method to evaluate the seismic performance of concrete filled pipe piers with composite steel-concrete connections designed to protect the local buckling phenomena. The hollow pipe pile does not avoid the undesirable brittle cracking failure mode and buckling in the connection region. Due to the confinement provided by the concrete action, local failure of the steel components was minimized Strengthening of the connection can a solution in the concrete are filled in to the hollow pipe pile it will avoid local buckling and this will increase the shear force , it is clear that shear capacity will be increases. Through the buckling and cyclic analysis analyses the concrete filled pile with composite connection it will reduce the buckling while avoiding unfavorable failure modes. Concrete filled pipe piers with steel concrete composite connection are improve the performance of bridge, this will augment current efforts in strengthening bridges in earthquake-prone areas.

Keywords: *Buckling analysis, Concrete filled pipe pile, Cyclic analysis, Steel bridge ,Steel- concrete composite connection, Stud connection.*

STUDY ON RAMMED EARTHEN WALLS RETROFITTED USING NATURAL FIBRES

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Abstract: According to today's trend buildings are built with architectural elevations and more aesthetic beauty. Modern architectural buildings are expensive, so here comes the scope of rammed earthen houses which can be built with architectural elevations within our budget. In the present study rammed earthen walls using coir fibre and also timber framed strengthening technique are investigated. Rammed earthen walls are generally thick and bulky, built by compacting sand- soil matrix in successive layers inside a rigid temporary formwork. In previous researches, only the strength performance of earth rammed walls were analysed, which was found not satisfactory. But earth rammed walls which are retrofitted and contains coir fibre content as reinforcement and was not studied widely. So, the earth rammed walls when reinforced with coir fibres and retrofitted with timber will improve the load bearing capacity of the built-up structure. Thus, this investigation is carried out in order to determine the mechanical properties of fibre reinforced retrofitted earth rammed walls.

Keywords: *Rammed Earthen Walls, Retrofitting, Mechanical Properties.*

EFFECT OF BUILDING ORIENTATION AND WINDOW-TO-WALL RATIO ON HVAC AND ENERGY LOADS FOR DIFFERENT CLIMATE ZONES IN INDIA

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Abstract: Window-to-wall ratio (WWR) of a building is crucial parameter in energy efficiency because a substantial amount of solar heat gain happens via windows. The goal of this research is to determine the optimum WWR of an institutional building. A baseline model is simulated in eQUEST software to investigate the HVAC and total annual energy consumption of the building for five climate zones of India. One representative city from each climate zone was considered for this study. The WWR was varied from 0-80% with a 10% step increase, and the HVAC and total energy consumption was simulated for East, West, North and South orientations of the building in each climate zone. For all climate zones and for all ranges of WWR, the HVAC and total annual energy consumption was observed to be minimum in East-West orientation when compared to North-South orientation. While, the optimum WWR varied from 10-40% for different orientations and climate zones.

Keywords: *eQUEST, Building Envelope, HVAC, Climate Zones, WWR.*

DEVELOPMENT OF AN ELECTROMAGNETIC ACTUATOR FOR HAPTIC FEEDBACK IN VIRTUAL REALITY APPLICATIONS

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Abstract: In Recent decades, the use of electromagnetic actuators and haptic sensors have increased widely. An electromagnetic actuator is a machine that produces mechanical force or motion using electromagnetic fields. Electrical energy is transformed into mechanical motion or force by electromagnetic actuators. Haptic feedback, a sort of sensory feedback, which is commonly referred to as tactile feedback, uses touch or other physical sensations to provide information or indications to a user. It is frequently employed in human-computer interfaces where it can give users a more engaging and interactive experience. There are many different techniques to transmit haptic input, including vibrations, pressure, temperature changes, and changes in texture. Devices and systems can benefit from haptic feedback to improve their usability, functionality, and security. This study intends to show the creation of an electromagnetic actuator that offers haptic feedback in applications for virtual reality. The actuator is made to replicate touch and give users of virtual environments a more realistic experience. The design procedure, including the choice of materials and the creation of the actuator, is described in the paper. Performance of the actuator is assessed based on its power consumption, frequency response, and force and displacement capabilities. The findings indicate that the actuator can produce accurate haptic feedback in reaction to virtual events, making virtual reality applications more immersive and lifelike. As it provides a more logical and natural interface that can improve the user's immersion and involvement in virtual settings, this research has significant implications for the field of virtual reality.

Keywords: *Actuators, Electromagnetic, Haptic feedback, Physical sensation, Virtual environments.*

NUMERICAL STUDY ON THERMAL PERFORMANCE AND FLEXURAL BEHAVIOUR OF SLIM FLOOR BEAM WITH HOLLOW CORE SLABS USING CARBON FIBER REINFORCED POLYMER

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Abstract: Slim Floor Beams are steel sections inserted in a concrete slab that provide the benefits of a steel-concrete composite structure with a shallower floor depth, resulting lighter in weight. Composite slim-floor beams can be utilized in conjunction with a variety of floor components, such as profiled steel deck or precast concrete slabs. One of the most intriguing typologies is created by combining the slim-floor beam with precast hollow core slabs. Steel-concrete composite beams are used in buildings and industrial structures, which are much stronger and stiffer. It is a well-known and effective solution that enables both simple installation of technical equipment and a significant reduction in floor thickness. it is mostly used in the expanding market for open-plan workplaces and multi-story parking structures. This study focuses on using Carbon Fiber Reinforced Polymer as an I-Beam instead of a steel beam, along with a bottom steel plate welded to the lower flange of the I-beam. The thermal performance and structural behaviour of Slim Floor Beam with Hollow Core Slabs are investigated using a finite element model created with ANSYS. The modal parts consist of CFRP I - beam, bottom steel plate, precast concrete slab, concrete encasement, reinforcing bars, and concrete topping. Here, two hollow core slabs were supported on the bottom plate, and between them a reinforcing bar and concrete encasement, along with concrete topping provided. The analysis strategy chosen is thermal and structural analysis, which is done to find thermal performance during a fire and structural behaviour in load-bearing capacity.

Keywords: *Slim Floor Beam, Hollow Core Slabs, Thermal Performance, Flexural Behaviour, ANSYS.*

PROGRESSIVE COLLAPSE ANALYSIS OF RC FRAMED STRUCTURES USING DIFFERENT TYPES OF BRACINGS

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Abstract: Progressive collapse of a structure happens when significant structural load-bearing sections are suddenly removed, leaving behind failing the structural components incapable of supporting the building's weight. It occurs when a column is removed from an existing structure to provide more space and it can also result from natural and man-made factors. Without strengthening measures, column removal will result in progressive collapse. The seismic retrofitting bracing system can be employed as a defense against the progressive collapse of multi-storey buildings. This research looks at how different types of bracings affect the progressive collapse resistance of multi-storey reinforced concrete structures. The analysis is carried out on G+5 and G+15 storey RC buildings using the Non-linear static method, and comparisons are made with different types of bracings. The model is built in SAP2000 and analysed using GSA criteria. The hinge formation pattern and displacement of joints with different types of bracing systems are compared using nonlinear static analysis, which is produced by the unexpected removal of major load-bearing column member of ground floor from different places.

Keywords: *Progressive collapse, Non-Linear static, Bracings, SAP2000.*

COLORIMETRIC SENSING BY PYRIDINE AND NAPHTHALENE CONTAINING A UNIT OF SCHIFF BASE FOR MULTIMETALLIC ION DETECTION FOR FE2+, FE3+, AND CU2+

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Abstract: A hydroxyl Schiff-base namely 2-(1-(pyridin-2-ylmethylimino)ethyl) naphthalen-1-ol (PMNOL) having naphthalene and pyridine units has been synthesized and characterized using 1H NMR, 13C NMR, FTIR and UV-vis spectroscopy. Solvent and pH has a significant impact on the UV-vis spectroscopy of PMNOL as ascertained. The UV-Visible spectra scrutiny technique has been applied to evaluate the sensing capacity towards the metal ions Ni^{2+}, Co^{2+}, Cu^{2+}, Fe^{2+}, Fe^{3+}, Hg^{2+}, Al^{3+} Cr^{3+}, Ca^{2+} and Cd^{2+} in the combination of methanol and DMF. By applying the UV-Vis spectra, a considerable shift (50-120) from the origin has been reported. Azomethine (>C=N-) with hydroxyl (-OH) moieties as contained by Schiff base ligand were reported as a colorimetric chemosensor as it coordinates easily with metals and produces coloured metal complexes. The Schiff base ligand displayed colorimetric characteristics with Cu^{2+}, Fe^{2+}, and Fe^{3+} and as a consequence a distinct shift in colour for every metal can easily be recognized by the naked eye. The stoichiometric ratio 1:1 coordination complexation for PMNOL-Fe^{2+}, PMNOL-Cu^{2+}, and a 2:1 complex mode for HNMAP-Fe^{3+} by UV-visible titration as well as Job's plot were postulated. PMNOL may have sensing potential for Fe^{2+} and Fe^{3+} colorimetric detection effectively. The ligand's addition to the metal ions is might be because of LMCT, so as to inhibit C=N isomerization and ICT.

Keywords: *Metal ion detection, colorimetry analysis, UV-Spectra, jobs plot.*

EXPERIMENTAL ANALYSIS OF R134A VAPOUR COMPRESSION REFRIGERATION SYSTEM BY USING PERMANENT MAGNETIC FIELD AT LIQUID LINE

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Abstract: This paper represents experimental investigation carried out to study the effect of magnetic field on energy savings in vapour compression refrigeration system. By applying magnetic field at liquid line, atomization of the fluid will takes place and reduces the specific volume of the fluid molecules. The reduction in specific volume of fluid molecules leads to drop in the viscosity that reduces the pumping power required by compressor as well as increases heat transfer in vapour and condenser due to raised mass flow rates of the refrigerant. The COP was initially measured without application of magnetic field, and then magnetic field applied to liquid refrigerant in different positions. The strength of each magnetic pair was 100gauss. By the impact of magnetic field by the magnetic pair in different positions at liquid line, the COP increased upto 41.36% for R134a refrigerant when compared to simple VCR.

Keywords: *COP, liquid line, magnetic field, refrigerant.*

SEISMIC ANALYSIS OF RC BUILDING LOCATED IN HILL SLOPE AREA

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Abstract: The centre of mass and the centre of rigidity of the hillside structures are irregular and asymmetrical, causing them to be more susceptible to shear and twisting. The goal of the current research is to determine how an RC structure perched on a hillside will be affected. Three hills support the structure under consideration. The structure models under consideration are susceptible to earthquake pressures. The models of the buildings under consideration are subjected to a nonlinear static pushover analysis. This research examines how an RC building situated in a hilly region responds to seismic excitations by conducting a seismic analysis of the building.

Keywords: *Seismic , pushover , RC building , nonlinear.*

DETACHABLE BIOMETRIC TRIGGER LOCK MECHANISM FOR RIFLES

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Abstract: This project will focus on the conceptualization and construction of a working model of a detachable trigger lock accessory that can be activated and deactivated with the help of biometrics to personalize rifles and to lower the possibility of some firearm-related fatalities, such as suicides and unintentional discharges of firearms. The proposed design externally obstructs the movement of the trigger to prevent trigger break. The accessory executes this process without disturbing any internal operations. The entire mechanism is fit inside the Grip of a rifle, to which the trigger guard is attached. When the user puts their authorized finger on the fingerprint sensor for verification, the fingerprint recognition systems read and scan the unique fingerprint and compares it with approved fingerprints uploaded in the database. Upon successful verification, a linear actuator emerges from within the grip and blocks the trigger. Upon verifying the fingerprint again, the linear actuator retracts, unlocking the trigger, for use. This simple binary operation ensures maximum efficiency. The finished product will be put through dynamic testing to analyze its resilience towards vibrations and shocks. This can be executed with the help of typical Vibration tests. The casing of the grip will be made using Polymethyl Methacrylate and polyvinyl chloride. The project, offers a nominal and secure design alternative to existing models in the market and bears the novelty of being a semi-permanent detachable accessory to rifles, unlike the common external trigger locks or inbuilt locking mechanisms.

Keywords: *Trigger break, Grip, Smart guns, Biometric, Fingerprint.*

AMBULANCE OPTIMAL ROUTING PATH DETECTION USING FOLIUM AND POLYGON

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Abstract: The optimal routing problem has always been the main event of city emergency rescue. Its research object has developed from searching for "the shortest route" to searching "the optimal route". The related algorithms and techniques differ in different situations.In addition to distance problem, the influence of various parameters factors should also be analyzed under the complicated conditions. The improved method is based on a distributed architecture to compute and find the optimal path for a set of emergency vehicles. Based on the defect of the ambulance route planning, this paper puts forward a new distributed model to find the best way that minimizes the time while taking into consideration the cases of problems that can appear each time such as traffics, speed limit, number of available ambulances, the position of the hospitals.

Keywords: *Ambulance, Shortest path, ML, Route, Traffic.*

SUSTAINABLE CONCRETE WITH SALINE WATER AND GROUND GRANULATED BLAST FURNACE SLAG

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Abstract: The worldwide demand for new concrete buildings is increasing at a rapid pace to keep up with urban development. Despite the need, concrete production and its use have a number of environmental consequences. The production of concrete creates a substantial need for water that directly causes a burden on the already scarce natural resource. India being a peninsular has long stretch of coast lines, where availability of fresh water is a big concern. The production of cement, the primary ingredient in concrete is responsible for the generation of nearly 5% of the global carbon dioxide that is a potent greenhouse gas. With the intent of reducing the carbon footprint of concrete production, a study was carried out to determine the effect of using seawater and brine as the source of water and the use of Ground Granulated Blast-furnace Slag (GGBS) as a part replacement for cement. Concrete samples having five different percentages of cement and GGBS contents were prepared with normal tap water ,brine and seawater. The sea water was obtained from Kovalam in Kerala. Compression test and Rapid Chloride Permeability Test (RCPT) test were conducted and their performance were analysed and compared. Along with this, an environmental and economical analysis were also conducted. The carbon footprint by the use of GGBS instead of cement was also found out from the study.

Keywords: *Sustainable concrete, Ground Granulated Blast-furnace Slag, Sea water, Brine, Rapid Chloride Permeability test.*

COMPARATIVE STUDY ON THE EFFECT OF FABRICATION METHODS OF ALUMINIUM ALLOY REINFORCED WITH NANO-PARTICLES BY POWDER METALLURGY AND COMPO-CASTING ROUTE

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Abstract: A metal matrix composite (MMC) is a composite material having fibers or particles spread in a metallic matrix, such as copper, aluminum, or steel, according to materials science. Metal matrix composites based on aluminum were developed for light weight applications particularly in aerospace and automobile sector. Some of the main properties or advantages of this is excellent thermal & electrical conductivity, high strength to weight ratio and cost-effectiveness. Although lots of attentions are required to overcome the drawbacks like poor tribological performance, low strength, hardness and corrosion resistance, these problems can be solved by the inclusion of nano reinforcement which helps in enhancing mechanical and tribological property. With different fabrication process and different reinforcement materials properties changes. But the processing of nano reinforced composites is still remaining as a challenge for researchers. The present research focuses on preparation of Aluminum alloy (7050) metal matrix composites with nano sized h-BN (Hexagonal Boron Nitride) by compo-casting and powder metallurgy (PM) and analyses the formation of the interfacial reactions between matrix and reinforcement at high volume fraction of reinforcement.

Keywords: *Metal Matrix Composites, Aluminum alloy 7050, Hexagonal Boron nitride (hBN), Compo-casting, Powder metallurgy.*

PAY AND ERASE YOUR PRINTS

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Abstract: In last few decades according to the air quality index, New Delhi is the most polluted city with a whopping percentage in the world till date. A country's air quality is as vital as its economy. This kind of pollution could be minimized if every citizen is aware of his carbon footprint and contribute to the economy to overcome this pollution crisis. The solution is to create an interface(website) that reads the carbon footprint of every individual and calculates the exact amount each citizen should pay monthly in form of a tax for the sake of environment and well-being. This website will be under governance of the constitution. The carbon footprint value is mainly focused on travel (public transport, private transport and all modes of transportation), electricity consumption, food consumption (includes meat, vegetables/fruits, snacking, dairy products etc.,) square feet of living area and such required factors. The website collects data from the user to process and calculate the appropriate carbon footprint per person. The user data is imported from the data base of the respective government / government authorised organisations if available.

Keywords: *GHG, air-quality, carbon footprint, fuel, carbon tax, carbon capture technologies.*

EXPERIMENTAL ANALYSIS OF MIXED FLOW LIQUID DESICCANT DEHUMIDIFICATION SYSTEM

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Abstract: The current environment makes people very dependent on traditional air conditioning systems. But the problem with conventional air conditioning systems is that they create suffocation when we use them for extra time due to the high moisture in the air. Here, we implement a device. It reduces the relative humidity in the atmosphere, A liquid desiccant dehumidifier has been created with this in mind. One desiccant dehumidifier unit, air handling equipment, and pumps make up this system. The primary objectives of the present study are to determine the impact of inflow parameters on system performance and the ideal parametric conditions for moisture condensation rate. Many experimental studies were conducted to support this. The object of the work demonstrates that the moisture condensation rate rises with rising flow rate, desiccant concentration, and desiccant flow rate.

Keywords: *Calcium Chloride, Liquid Desiccant, Relative Humidity.*

ESP BASED GRID CONNECTED INVERTER

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Abstract: In this paper, a digital control technique is used to control single phase grid connected inverter with LCL filter. A digital PI current controller is applied as the control method. The control algorithm is implemented in the e ESP32 WROOM-32 module. A proportional integral controller structure with a Phase Locked Loop (PLL) is designed and used as a synchronization algorithm to achieve proper system functionality during perturbation. Also, the aim is to feed power into the grid and to decrease phase current distortion in inverter. Secondly, the design of the third-order LCL output filter. The results of simulations of the inverter system connected to the grid (230 V, 50 Hz) using MATLAB/Simulink are also shown. Simulation results confirm that the distortion of phase current in the proposed system is reduced, causing the total harmonic distortion for various power conditions to fall within 5%.

Keywords: *Harmonic Distortion, ESP32, PI current controller, Single Phase Inverter.*

SYNTHESIS AND CHARACTERIZATION OF AL-ION BATTERY MATERIAL AS A POTENTIAL SUBSTITUTE TO LI-ION BATTERY MATERIAL

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Abstract: Li-ion battery is the most popular secondary battery at present. Introduced in the market three decades ago, it is still facing many challenges. Difficulties in handling the most reactive metal, environmental issues, over heating issues, power density and energy density issues are some of them and its supply is very much limited in the world. Research to find out a better substitute for Lithium is in progress worldwide on war footing and Aluminium is considered as a potential substitute. It has many advantages over Lithium. Availability, cost effectiveness, eco-friendliness etc. are some of them. Based on literature survey, in the materials research lab we synthesized a composite consisting of antimony, graphite and aluminium. The material was milled using a planetary ball mill for 60 hours. Samples were taken after ball milling for 20 hours, 40 hours and then 60 hours. Material characterization to analyse the change of morphology of the components of the composite with respect to milling time was done using Scanning Electron Microscopy (SEM), phase change if any was checked using X-Ray diffraction (XRD), and the homogeneity of the composition based on the progressive milling was inspected using Energy Dispersive Spectroscopy (EDS). The electronic conductivity is expected to increase when the particle size become finer. The results showed very encouraging morphological changes with progress in milling time. The samples will go through electronic conductivity test using an impedance analyser, checking the suitability as an electrode for a high capacity secondary battery which are not part of this presentation.

Keywords: *Aluminium, lithium, battery.*

IOT BASED INTELLIGENT DOOR LOCK INGRESS CONTROL SYSTEM WITH DIGITAL NOTIFICATION

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Abstract: Intelligent security control system has become necessary in daily life. Security is one of the main challenges for people who are often away from home due to their work schedules. In today's world technological advent has not only resulted in the development of automation, computers, mechanics, robotics, industrial science, scientific knowledge but also increases the offence rate, misconduct, criminality and violation. So, there is an crucial requirement for the Security system. Hence, we have developed an intelligent door lock ingress control system. The development of a security door lock system, based on facial recognition and always-on technology, to confirm the identity of guests and control the access of doors has been reported. This article aims to provide a secure door lock system based on Raspberry pi Pico technology that integrates camera, keyboard, LCD screen, non-contact temperature sensor and metal sensor. The main purpose of this system is to access the lock when it recognizes the authorized person and when it recognizes the unauthorized person, it will take their picture by facial recognition, temperature and it also detects the presence of metal and send telegram and email notifications and allow the authorized person to authorize the person by sending OTP to the door or reject the person. The faces of authorized people are stored in Pico. This system can be useful in places like laboratories, computer areas, banks, schools, private homes, etc.

Keywords: *Facial Recognition, LCD display, Mental Sensor, Mlx Temperature Sensor, One-time password, Raspberry pi Pico WIFI.*

SYMMETRIC-BASED CRYPTOGRAPHY KEY ALGORITHM FOR DATA ENCRYPTION AND DECRYPTION IN CLOUD COMPUTING

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Abstract: In these days, cloud computing is used in many regions such as information sharing in organizations, colleges, and the military to store a large amount of information. Cloud computing is very useful to access data from anywhere and anytime at the request of the user. Cloud computing raised security concerns while accessing a huge amount of data. This paper proposed a cryptography algorithm based on a symmetric algorithm where the user has the information related to the secret key to encrypt and decrypt the data. The proposed algorithm used the encrypt and decryption of data on the user side and cloud storage in order to protect information from various sorts of attackers. The proposed cryptography method increases the transparency between the user and cloud service provider as well as reduces the security risk.

Keywords: *Cloud Computing, Cryptography, Symmetric Key, Asymmetric Key, Data Security.*

GREEN SYNTHESIS OF ZNO- POLYAMIDE NANOCOMPOSITES AND ITS APPLICATION AS ADHESIVES

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Abstract: Ecofriendly plant extracts for the synthesis of nanoparticles have been considered as an effective alternative to chemical and physical methods. Nanotechnology has the potential to revolutionize many scientific disciplines due to its size and shape. Semiconductors have received considerable attention in recent times, as Zinc oxide (ZnO) nanoparticles are a potential semiconductor material employed in diverse industrial applications. The main attractions of ZnO nanoparticles are cost-effectiveness, biologically safe and environmentally friendly, as they do not contain any harmful chemicals that adversely affect human health. ZnO nanoparticles have recently been recommended in variety of applications owing to their properties of stability under harsh environmental conditions. This research aims to synthesize nano composite ZnO - Polyamide from Aloe Vera extract and increase the efficiency by adding a polymer for use in the adhesive in coating sector. This research attempts to solve the problem of the stability of ZnO nanoparticles that will be used in the adhesive industries to increase the thermal stability and resistant to moisture and heat. Aloe Vera gel was extracted from the Aloe vera plants available in Oman. Homogenous solution of Zinc acetate, Zinc chloride and glucose was prepared and mixed with Aloe Vera extract. The resulting solution was centrifuged and sundried followed by microwave assisted drying. The surface morphology of the dried product was characterized using Scanning Electron Microscopy (SEM). The elemental analysis was performed using Energy Dispersive R-Ray analysis (EDX), and phase identification was carried out using X-ray diffraction (XRD). The characterization results showed excellent structure of rod-shaped zinc nano particles and the XRD crystal structure analysis confirmed the crystal peaks of ZnO. The functional groups present on the surface of the composite were analyzed using Fourier Transform Infrared spectroscopy (FTIR). The synthesized Zinc oxide particles were blended with polyamide and the adhesive characteristics including stability and heat resistance were analyzed and the study shows the improvement in the quality of paint.

Keywords: *Aloe Vera gel, nanoparticles, polymer nanocomposite, surface coatings.*

SYNTHESIS OF SILVER NANOPARTICLES FROM DATE PALM TREES FRUITS AND ITS APPLICATION IN WASTEWATER TREATMENT'

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Abstract: The fast developing industrial activities and global population affects the entire ecosystem and results in environmental concerns. The water resources are significantly being contaminated day by day. The need of the hour is to protect the water resources or reuse the wastewater by environmental-friendly and economical-friendly methods. Nanoparticles mediated techniques have shown remarkable performance in the treatment of wastewater. However, nanoparticles can be synthesized from naturally available resources. This research focuses on the synthesis of silver nanoparticles (AgNPs) from aqueous extracts obtained from the waste fruits of Phoenix Dactylifera (date palm), since Phoenix Dactylifera (date palm) is available in plenty in the sultanate of Oman. The precursor solution used in the synthesis of AgNPs is silver nitrate ($AgNO_3$). Waste date fruits were mixed with $AgNO_3$ solution under constant stirring and heating at a temperature of 55C for 50 minutes. The resulting yellow extract was centrifuged at 5500 rpm and the precipitate was collected, washed, and dried for around 2 hours. The synthesised particles were subjected to various characterizations using Fourier Transform Infrared Spectroscopy (FTIR) for composition analysis identifying the distinctive peaks of various functional groups. Scanning Electron Microscopy (SEM) shows the surface morphology of the successful formation of AgNPs. The phase identification was performed using X-Ray Diffraction (XRD). The synthesized Ag NPs were successfully applied in domestic wastewater treatment and water quality parameters such as pH, Chemical Oxidation Demand (COD), Total Suspended Solids (TSS), and Total Dissolved Solids (TDS) were investigated and excellent efficiency was observed.

Keywords: *Chemical oxidation demand Date palm, nanoparticles, Phoenix Dactylifera, wastewater.*

SMART TECHNIQUE FOR RUBBER SHEET DRYING MECHANISM ISING RENEWABLE ENERGY RESOURCES

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Abstract: This technique adopt new methodology for drying of rubber sheets which eliminates the disadvantaged of conventional drying mechanisms.In this technique solar powered rubber sheet drying is adopted so that renewable energy utilisation is possible.Conventional technology have the disadvantage of non uniform drying of sheets which can be eliminated by this technique and the efficiency also improved.

Keywords: *Conventional techniques, rubber sheet drying, renewable energy.*

VARIATIONAL AUTO-ENCODING GENERATIVE MODEL FOR SPEECH TO SINGING VOICE CONVERSION

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Abstract: Voice conversion (VC) is a task of replacing the voice of a source speaker with the target speaker's voice without changing the speech content. This paper proposes speech to singing voice conversion using variational auto-encoding Wasserstein GAN. The proposed method can separate the lyrical content and singer identity from the reference singing templates and later incorporate the target speaker identity in place of reference singer identity. In this way, this can generate singing voice in the voice of target speaker using reference singing templates. The performance can be assessed through both subjective and objective evaluation experiments. In all the experiments the proposed method outperforms the baseline method. This can well perform with limited non-parallel training data.

Keywords: *speech to singing voice conversion, VAE, VAWGAN, voice conversion.*

IDENTIFICATION OF HAND AND WRIST MOVEMENTS VIA SURFACE ELECTROMYOGRAPHY USING DEEP NEURAL NETWORKS

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Abstract: A simple and non-invasive method of giving the user active control over the prosthesis is surface electromyography. Although, the results of earlier research utilizing surface electromyography for identifying wrist and hand movement range widely as the result of a number of variables. In this project, the wrist and hand movements based on the surface electromyography signal will be identified using deep neural networks approach. This model were trained and analizes the evaluation data that is taken from the sEMG sensor, the evaluation data and pre-trained data will compare using convolution neural network via deep neural networks and also utilizing the Ninapro project's accessible to the public database. Two datasets, DB7, DB5 with 12, 16 channels and 2 kHz, 200 Hz sampling rate setups and the overall accuracy of DB7 and DB5 is 91.69 ± 4.68% and 93.87 ± 1.49%, were used for this project. Based on the output taken from the CNN we can identify the gestures. Our approach could be a method for operating flexible prosthetic hands with a number of predetermined gestures.

Keywords: *Surface electromyography, prosthetics, deep neural networks, convolution neural network, Ninapro database.*

EFFECT OF SLOPE GEOMETRY ON ENERGY DISSIPATION FOR STEPPED SPILLWAY

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Abstract: Experimental study has been done for the analysis of flow over stepped spillway with three different models. Study reflects the behavior of flow characteristics namely sequent depth ratio, relative energy loss and relative length of jump against varying Froude number. Effect of height, width and length of steps plays a significant role in dissipating maximum energy under nappe and skimmimg flow conditions. Importance of air entrapment and entrainment were also discussed to protect the structure against cavitaion damage. Difficulties faced during the prediction of length and roller jump due to presence of turbulence and eddies at the channel bottom were discussed with existing literatures. Comparison has been made between non-aerated flow zone and point of inception against reduction of step height under same discharge. Also, pseudo-bottom air concentration is explained for entrapped and entrained air concentration. Present approach represents the flow properties in dimensionless form and hence can be applied to the field condition directly.

Keywords: *Stepped Spillway, Relative Energy Loss, Skimming flow, Air Entrainment, Cavitation.*

SKIN CANCER DETECTION USING IMAGE PROCESSING

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Abstract: In today's world, Skin cancer is a major cause that leads to death among humans. The abnormal growth of skin cells is known as skin cancer. Mostly it develops in places where the body is exposed to sunlight, but it also can occur anywhere on the body. Usually, Skin cancers are curable when treated in their early stages. So it is vital to detect skin cancer as early as possible to save the life of the patient before cancer reaches a terminal stage where treatment is very tough and ineffective. Using the latest technologies makes it possible to detect skin cancer at the initial stage itself. The traditional methodology of detecting skin cancer involves the Biopsy method. The patient has to undergo skin cell removal for lab tests which is effective but causes pain to the patient and is also a time-consuming method for the detection of cancer detection. Our technology detects cancer in our human skin by utilizing an Artificial Neural Network. This methodology utilizes Image enhancement techniques for better results than the existing industrial methods which are using MATLAB. The affected skin area image will go through dermoscopy image prepossessing techniques for noise elimination and then image enhancement techniques. The enhanced image will be then subjected to go segmentation by Thresholding. Where some features are unique for skin cancer and those features make it possible to identify whether the processed image is cancerous or not. Those features were extracted by one of our feature extraction models called 2D WTM. These features are fed to the neural network as input. BPN is utilized for grouping purposes. Where it groups the provided information group into Melanoma or Nevus.

Keywords: *Artificial neural network , Biopsy Method ,Cancer, Dermoscopy image , MATLAB ,Segmentation.*

REAL TIME SIGN LANGUAGE DETECTION AND RECOGNITION

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Abstract: In the near times sign language recognition has gained significant attention due to the increasing need for effective communication between deaf individuals and hearing individuals. While various methods for sign language recognition have been proposed, real-time detection and recognition remains a challenging task due to flow of sign language and the require- ment for quick processing. In this paper, we propose a real-time sign language detection and recognition system based on machine learning techniques.The method we employ for sign language uses pre-processing along for making the image suitable for the recognition by the machine learning model along with using a trained machine learning model for real time recognition of sign language.The Images used for creating the dataset contains 25 alphabets of the English language. We evaluate the performance of our system on a data set of real-world sign language images and demonstrate its effectiveness in achieving high accuracy and low latency. Our system has the potential to facilitate improved communication between deaf and hearing individuals and has applications in a wide range of settings including education, healthcare, and daily life.

Keywords: *Deep learning, Image Processing, CNN, Sign Language Recognition, Hand Gesture Recognition.*

PEDESTRIAN SAFETY IN SEMI-AUTONOMOUS VEHICLES - A STUDY

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Abstract: This paper studies Autonomous vehicles, they have the ability to sense their surroundings and navigate on their own. To perceive their surroundings and choose the best course of action, they use technologies like artificial intelligence, computer vision, LIDAR, and GPS. The success of autonomous vehicles lies on the level of safety that it provides to the commuters as well as general public. Unlike static objects pedestrians are active agents with complex characteristics. The study asses recent development on pedestrian detection and tracking in autonomous vehicle, various open datasets, Comparison with LIDAR and Computer vision, Robot Operating system integration, traffic sign recognition etc. The papers conclusion looks into the overall improvement in accuracy, handling scenarios with pedestrians and will provide valuable insights on enhancing pedestrian detection and safety in autonomous vehicles.

Keywords: *Autonomous Vehicles, City_persons, Computer Vision, LIDAR.*

DESIGN AND ANALYSIS OF VARIOUS SRAM'S IN 16NM TECHNOLOGY

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Abstract: Low stability and increased process parameter fluctuations are primary issues to be aware of when building SRAM cells using nanometer technology. SRAM is one of the most frequently used memory components because of its exceptional capability to store data, which is used in the majority of digital devices. Aggressive technological scaling in terms of power and delay seriously hinders SRAM design. The high-density cell is more susceptible to process changes because it uses the smallest electronics currently available. Since many of these gadgets require electricity to function, electronics are mainly focused on creating gadgets that consume less energy. Low energy processing now places a high priority on the design of low-voltage memory cells. To achieve success in creating low voltage designs for SRAM, steady operation of SRAM is crucial, especially with the changes in specifications brought about by scaled methodologies. In this work, a comparison of 6T SRAM and 10T SRAM's has been done for several parameters using 16nm technology. The designed 6T SRAM cell is having a power of 657nW, a delay of 96.51ps, and a PDP equal to 63.41aj.In a 10T SRAM cell with sleep transistors, we achieve a delay of 250ps, power consumption of 200.25nW, and PDP of 50.0aj. Due to its adjustable switching cut-off voltage, the Schmitt -trigger inverter is much more resistant to outside noise than a traditional inverter. By lessening the impact of outside noise on the inverter's function, this variable threshold voltage aids in improving stability; 10T SRAM using Schmitt trigger achieves a delay of 145.44ps, power consumption of 116nW, and PDP of 16.98aj. While in the case of 10T SRAM with improved read speed, we are having the power of 54.89nW, delay of 99.8aj, and PDP equal to 5.47aj.

Keywords: *SRAM cell, read stability, delay, PDP(power delay product).*

DESIGN AND DEVELOPMENT OF WEED REMOVER MACHINE FOR AGRICULTURE APPLICATIONS

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Abstract: The weed removing machine is available in the various types like roll (cylinder) mower, rotary mower, hang mower, riding mower, professional mower etc., but these are veritably expensive and unaffordable. It requires professed person to operate as there are weeds and unwanted crops on the field which may consume the nutritional rudiments which are intended for the crop that's to be grown. The main ideal of the design is to develop weed removing vehicle to clean and extract the unwanted lawn and weeds, which is powered by 24 voltage battery which is manually operated. So, then we've designed and developed a vehicle which would extract the weeds and unwanted crops from the field fully. The weed removing vehicle is able of extracting the weeds and unwanted crops from small colonies (tomato, chilly, groundnut etc.,) which if not removed would deteriorate the quality as well as volume of the main crop. The vehicles and machines which are presently available are veritably expensive and unaffordable. Also the vehicles and machines that are used causes damage to the main crop since their turning compass is more. The rubber comber used to extract the weeds is malleable. The turning compass of this vehicle is also veritably small as compared to the machines available in the request. Also this vehicle can be fluently operated by the unskilled person without any difficulty. The speed of the vehicle can also be controlled fluently since it has a constant. This vehicle will be veritably useful for the growers who cannot go the high price of presently available vehicles.

Keywords: *Easy to handle, Reduce man power, Time saver.*

IMPACT OF CROSS-SELLING AND UPSELLING IN THE BANKING INDUSTRY

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Abstract: Increased competition in the banking market and the quest for maximum profit mean that banks are increasingly looking for ways to increase their sales. One of it's kind is sales techniques such as cross-selling and up-selling which undoubtedly increased the bank's profits. Additionally, cross-selling helps you build a larger product portfolio for your customers. This increases bank loyalty and minimizes the risk of customers switching to competitors. However, there are risks associated with using these sales techniques. One of them is the loss of a good image. The purpose of this article is to present our own findings on the use of cross-selling and up-selling by banks and their image impact. Additionally, the article explains the nature and mechanics of cross-selling and up-selling those financial institutions use to maximize their profits. Research has confirmed that the results of applying these sales techniques have a negative impact on customers' perceptions of the bank. Both cross-selling and up-selling lead to customer dissatisfaction, often resulting in losing customer share in favor of competitive banks. Moreover, negative perceptions of banks damage their image, which is a key factor in such fierce competition.

Keywords: *Cross-Selling, Up-selling.*

A REVIEW OF FAKE NEWS DETECTION IN SOCIAL MEDIA : TECHNIQUES AND CHALLENGES

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Abstract: Fake news has become a major issue in social media, posing a significant threat to the spread of misinformation and social unrest. The detection and prevention of fake news have thus become a crucial research area, leading to the development of various techniques and algorithms. This paper presents a comprehensive review of fake news detection in social media, highlighting the different types of fake news, detection techniques, and challenges faced by researchers. The study emphasizes the importance of understanding the characteristics of fake news and the role of social media platforms in their spread. It further discusses the various techniques used for fake news detection, such as machine learning, natural language processing as well as their strengths and limitations. The review also identifies the challenges of detecting fake news, such as the lack of labeled datasets, the dynamic nature of social media, and the diversity of languages used. Finally, the paper concludes with a discussion of future research directions and the need for collaboration among researchers, social media platforms, and policymakers to combat the spread of fake news.

Keywords: *Fake news, social media, detection techniques, machine learning, natural language processing, challenges.*

A FEASIBILITY STUDY FOR THE INSTALLATION OF SOLAR POWER PLANT IN HGAE

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Abstract: Renewable energy sources are sustainable and have the potential to meet present and future global energy demands without inflicting any environmental impacts.The use of renewable energy sources through solar energy system not only saves the precious high grade energy but also decreases the rate of depletion of fossil fuel. Here we are considering the energy consumption activity of HGAE for the installation of solar PV panel for the estimated power consumption in a day including the feasibility study for the installation.For this we have to conduct energy audit .Energy audit is the verification, monitoring and analysis of energy including submission of technical data containing recommendations for effective cost benefit program. From this we can estimate the peak power supply of HGAE and design solar panel based on estimated peak power of HGAE.The economical feasibility study is carried out using simple pay back period method in order to find pay back period required for the return of initial investment after the implementation of this project. The technical feasibility is analyzed by conducting the design procedure for the installation of solar PV system for the required power generation. Green house gas (GHG) emission reduction by implementing this project is als

Keywords: *Energy audit,Economical feasibility,Technical feasibility,pay back period method.*

REVIEW ON SMART ATTENDANCE

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Abstract: This paper discusses the development of an attendance monitoring system using smart technologies. The system makes use of facial recognition software and Bluetooth technology to identify students and monitor their attendance. The performance of the suggested system is assessed, and the study analyses recent research on attendance monitoring systems. The system's implementation is discussed, along with the needed hardware and software as well as the challenges with data management and storage. The paper's conclusion looks at potential future fields of investigation for intelligent attendance tracking systems. Overall, the article delivers substantial insights on integrating cutting-edge technology to improve attendance monitoring and might serve as a valuable reference for individuals creating analogous systems.

Keywords: *Smart Attendance, radio-frequency identification (RFID), biometric recognition.*

DIABETES IDENTIFICATION USING CLOUD-BASED EXPERT SYSTEM WITH MOBILE APPLICATIONS

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Abstract: The integration of expert systems, mobile intelligence, and the cloud for diabetes diagnosis was the study's main objective. An expert system is a computer programme that makes use of a knowledge base and an inference engine to solve problems considerably more quickly and effectively than they would otherwise. To lessen the limitations of mobile applications, the cloud has provided developers with a variety of services to create, manage, and deploy. Because of population expansion, ageing, addiction, urbanization, obesity, lack of exercise, and other complex diseases, there are more people with diabetes than ever before. Furthermore, these issues are made worse by a lack of specialists, inaccurate diagnoses, and inadequate medical facilities. Thus, diabetics require ongoing care such as dietary restriction, exercise, and insulin management. A hospital's knowledge was drawn from in order to create the prototype using a purposive sampling technique. Case studies are chosen for testing and assessing the prototype system in order to determine whether or not it is accurate and meets end-user criteria.

Keywords: *Artificial Intelligence, Expert System, Diabetes, Cloud Computing, Google platform, Firebase.*

STOCK MARKET PREDICTION USING LASSO REGRESSION

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Abstract: The term "stock market" describes the exchanges and markets were buyers and sellers trade equities. Without understanding and knowledge of how the stock market operates, one risks suffering significant financial losses. The market is unpredictable; recent instances include COVID-19 and Russia's invasion of Ukraine, both of which caused significant losses for the market. Without awareness, people suffer more losses, which strains relationships within families. People are becoming victims of scams and other types of fraud more frequently these days due to the increasing market dangers. We must gain a thorough understanding of the stocks and the market's operation if we are to prevent those losses [15]. In the stock market, stock exchange prediction is quite significant. Forecasting stock exchange rates is an essential financial topic that is getting more attention since it makes it easier to design profitable trading techniques [9]. It is thought that one of the most intriguing concepts and crucial tasks for the investigation of financial time series is the- forecasting of stock price movement in general. The Least Absolute Shrinkage and Selection Operator (LASSO) method is suggested in this paper as a special way for predicting the behavior of financial markets. A linear regression model is the foundation of LASSO. When there are fewer features than observations, the LASSO approach excels at producing sparse solution

Keywords: *Machine Learning, Lasso Regression, Classification, Affinity Propagation.*

KIDNEY STONE PREDICTION BY USING A SUPERVISED MACHINE-LEARNING TECHNIQUE

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Abstract: Kidney stones are mineral deposits in the renal calyces and pelvis that are found free or attached to the renal papillae. They contain crystalline and organic components and are formed when the urine becomes supersaturated with respect to a mineral. Calcium oxalate is the main constituent of most stones, many of which form on a foundation of calcium phosphate called Randall's plaques, which are present on the renal papillary surface. Stone formation is highly prevalent, with rates of up to 14.8% and increasing, and a recurrence rate of up to 50% within the first 5 years of the initial stone episode. Obesity, diabetes, hypertension and metabolic syndrome are considered risk factors for stone formation, which, in turn, can lead to hypertension, chronic kidney disease and end-stage renal disease. Data mining is a commonly used technique for processing enormous data in the healthcare domain. Researchers apply several data mining and machine learning techniques to analyze huge complex medical data, helping healthcare professionals to predict kidney stones. The proposed method is to build a machine learning model capable of classifying whether a person has a kidney stone or not. Different algorithms are compared and the best model is used for predicting the outcome.

Keywords: *Modification of Diet in Renal Disease (MDRD) , chronic kidney disease (CKD) , glomerular filtration rate (GFR).*

EFFECTIVE CLEANING OF WATER CAN USING SEMI-AUTOMATIC SYSTEM

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Abstract: Safe drinking water has always been one of the primary essential requirements for healthy and sustainable human life. Due to the scarcity of water in some places, reusable water cans play a major role in many parts of the world. Reusable water cans not only save money for the user in the long run, but it is also more environmentally friendly than disposable materials. However, there is a risk of microbial growth in reusable drinking water cans and its associated health risks even if it is normally used daily or for many months by users. In the long run of the usage of cans, sediments and algae get deposited in the water cans, and this deposition contaminates the water and makes it unfit for use. Awareness associated with safe drinking water is tremendously important and should be given good thought to the people. With that social cause, this work focuses on the design and fabrication of a semi-automatic water can cleaning system for effective cleaning. Further, the system is not just only to clean the slag but also to reduce human efforts. The mechanism used in the system is more effective and safer than conventional methods and thus ensures clean and safe drinking water.

Keywords: *Water Can, Cleaning System, Semi–Automation, Safe Drinking, Effective Cleaning.*

EFFECTIVE UTILIZATION OF HERBOCRETE AND PARTIAL REPLACEMENT OF CEMENT USING EGG SHELL POWDER

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Abstract: Cement is an inevitable constituent used in the production of concrete. Cement production results in the emission of an equal amount of carbon-dioxide into the atmosphere which may be serious threat to the environment in various forms. Admixtures have also been recognized as important components of concrete used to improve its performance. Most of the admixtures are available in market in the form of chemical composition. These chemical admixtures are very expensive and severely pollute the surrounding environment. This paper aims at the development of a sustainable concrete by replacing cement with natural egg shell powder and using Terminalia Chebula (Kadukkai) as a natural admixture. . The concrete design mix considered is M30 of ratio 1:1.8:3.44. The specimens were casted and compressive strength of 7th,14th and 28th day are determined. From the results, optimum mix percentage was determined, on which split tensile strength, flexural strength test were conducted and their performance were analysed. This study proves that eggshell powder along with Terminalia Chebula is a good natural replacement for both cement and chemical admixture.

Keywords: *Sustainable Concrete, Herbocrete, Terminalia Chebula, Egg Shell Powder, Cement Replacement.*

IOT BASED PRISON BREAK MONITORING AND ALERTING SYSTEM USING RF

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Abstract: IoT-Based Prison Break Monitoring and Alerting System using RF (Radio Frequency) is a system that makes use of a Microcontroller based circuit to achieve the task using RF technology. Each prisoner is equipped with a non-detachable wearable device consisting of RF transmitters to detect their presence in the premises. We install RF transceivers at strategic locations within the prison and the gateway for relaying data to the central monitoring system which is responsible for analyzing data and triggering alerts in case of escape attempts. The central monitoring system is fed with data to scan through all the prisoners mounted with an RF transmitter who transmits their unique prisoner code wirelessly to keep the overall system in synchronization. Incase if a prisoner moves out of range, the centralized system is unable to receive the code. As a result the receiver circuit transmits the prisoner details over to the officers alerting portal to send out instant alerts and catch the prisoner before he runs even meters away from the premises. Here IoT Gecko is interfaced to develop the alerting portal that receives input from monitoring devices and displays alerts or buzzers through the internet. Thus our system offers a comprehensive and customized approach to prison security which provides real-time monitoring and alert for any security breaches by enhancing public safety.

Keywords: *Alerting system, Buzzer, IoT Gecko, Microcontroller, RF Transceivers.*

DETECTION OF STRESS IN IT EMPLOYEES USING MACHINE LEARNING TECHNIQUE

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Abstract: Every year tens of millions of people suffer from depression and few of them get proper treatment on time. So, it is crucial to detect human stress and relaxation automatically via social media on a timely basis. It is very important to detect and manage stress before it goes into a severe problem. A huge number of informal messages are posted every day in social networking sites, blogs and discussion forums. This paper describes an approach to detect the stress using the information from social media networking sites, like twetter. This paper presents a method to detect expressions of stress and relaxation on tweeter dataset i.e. working on sentiment analysis to find emotions or feelings about daily life. Sentiment analysis works the automatic extraction of sentiment related information from text. Here using Tensi Strength framework for sentiment strength detection on social networking sites to extract sentiment strength from the informal English text. Tensi Strength is a system todetect the strength of stress and relaxation expressed in social media text messages. Tensi Strength uses a lexical approach anda set of rules to detect direct and indirect expressions of stress or relaxation. This classifies both positive and negative emotions based on the strength scale from -5 to +5 indications of sentiments. Stressed sentences from the conversation are considered &categorised into stress and relax. Tensi Strength is robust, it can be applied to a wide variety of different social web contexts. The effectiveness of Tensi Strength depends on the nature of the tweets.In human being there is inborn capability to differentiate the multiple senses of an ambiguous word in a particular context, but machine executes only according to the instructions. The major drawback of machine translation is WordSense Disambiguation. There is a fact that a single word can have multiple meanings or "senses." In the pre-processing part- of-speech disambiguation is analysed and the drawback of WSD overcomes in the proposed method by unigram, bigram and trigram to give better result on ambiguous words. Here, SVM with Ngram gives better result Precision is65% and Recall is 67% .But, the main objective of this technique is to find the explicit and implicit amounts of stress and relaxation expressed in tweets.

Keywords: *Stress Detection, Data Mining, TensiStrength, wordsense disambiguation.*

THREAT PREDICTION USING CONVOLUTIONAL NEURAL NETWORK

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Abstract: A Complex Cyber Supply Chain (CSC) system consisting of many subsystems performing various functions is very large. The vulnerabilities and dangers present in every system component that can be exploited at any point along the supply chain make supply chain security challenging. This might potentially jeopardized ongoing corporate operations. This study examines and forecasts threats in order to enhance cyber supply chain security. Using our CTI capabilities, we coupled machine learning (ML) techniques with cyber threat intelligence (CTI) to assess and forecast assaults. Attacks and TTPs are thought of as the experiment's input parameters, whilst vulnerabilities and warning sign of Understanding integrated circuits (ICs) are thought of as the experiment's output parameters. This enables us to identify vulnerabilities unique to the CSC so that the proper controls may be put in place to enhance overall cybersecurity. utilized to show applicability. To differentiate between known dangers and unidentified ones, Cyber Threat Intelligence (CTI) employs a variety of sorts, including threat actor skill and timetables, popular, prices, opinion, and warning sign of understanding Indicator of Compromise (IoC).

Keywords: *Threat Prediction, Methodologies, Strategies, Analysis, Convolutional Neural Network, Scheme, Safety, Threats.*

AN APPROACH TO PREDICT THE FATIGUE LIFE OF CNC LATHE SPINDLE

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Abstract: The demand for high-speed/high-precision machine tools is rapidly increasing because of the advancement of production technology that necessitates precision parts and high productivity. In a CNC Lathe, the spindle and its support bearing have a significant contribution towards the precision of machined components. The present work is carried out to estimate the fatigue life of the spindle for different operating conditions. From the literature, the components of the cutting forces during the turning operation (tangential force (Ft), axial force (Fc), and radial force (Fr)) are calculated. The finite element model of the CNC lathe spindle is developed. The numerical simulation is to be carried out for different machining parameters and different load cycles of operation to predict the fatigue life of the spindle. From the results of the numerical analysis, the performance of the spindle is evaluated, and further improvement can be achieved using alternative materials.

Keywords: *CNC Lathe, Spindle, Cutting forces, Finite element modelling.*

SYNTHESIS AND CHARACTERIZATION OF POLYACRYLAMIDE COMPOSITE AND IT'S APPLICATION IN THE TREATMENT OF OILY WASTEWATER

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Abstract: Oily wastewater is not only harmful to humans but also inhibit plant development. Without adequate treatment, oily effluents can impede the penetration of sunlight into the water by producing a film on the water surface, resulting in lower dissolved oxygen levels which further cause ecological harm to water bodies. Hence, treating oily wastewater is critical to minimize its impact on the environment and individuals. Polymers show excellent flocculation properties by binding with the suspended particles and making them heavy to settle down, thus making separation much easier. This research focuses on treating oily wastewater from industries using polyacrylamide composite. Polyacrylamide composite was synthesized using in-situ dispersion method and then characterized by Fourier Transform Infra-red spectroscopy (FTIR) and Scanning Electron Microscopy (SEM). The synthesized composite was further utilized to investigate its performance in the treatment of oily wastewater obtained from local refinery in Oman. Batch experiments were conducted to find the effect of pH, contact time and stirring speed on the removal of Chemical Oxygen Demand (COD) and Turbidity from the wastewater. It was found that the optimum conditions were achieved at pH 8, contact time of 15 minutes and stirring speed of 100 rpm. The results revealed polyacrylamide composite can effectively be used to treat oily wastewater.

Keywords: *Oily wastewater, polyacrylamide composite, in situ dispersion, Chemical Oxygen Demand, Turbidity.*

A DECENTRALIZED ESCROW PROTOCOL THAT FACILITATES SECURE P2P PAYMENTS BETWEEN TRUSTLESS PARTIES

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Abstract: A decentralized escrow protocol makes it easy for people who don't trust each other to make safe payments. The Escrow protocol is used. Before a transaction can be made, tokens are sent to an escrow, which is a third-party smart contract. The escrow holds the tokens until the conditions for payment are met. Both the agreed-upon product or service and the agreed-upon payment must be made by all parties involved in the transaction. One party shouldn't be able to back out of a deal at the other party's expense. If the payment terms depend on outside information, like when a product is shipped, the oracle pattern can be used to give the escrow the information it needs. As soon as the smart contract code is put on the blockchain, it can't be changed. This makes sure that the escrow functionality is safe. This gives everyone involved in the trade the peace of mind that they won't be taken advantage of.

Keywords: *Escrow, Blockchain, Smart Contracts, Decentralized, transparent, accountable.*

AN IOT BASED SAG MONITORING SYSTEM FOR TRANSMISSION LINES

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Abstract: The main intension is to identify the current values of the transmission lines. In this we are monitoring the transmission line stand fall detecting system. Here we are implemented the IOT technology for storing the current and voltage values in the cloud based technique. In this procedure we are going to detect the sag monitoring in the early stages. In this we are using lora technique and it is used for transmit and receive the information in the central station.

Keywords: *Transmission line, Sag ness, Monitoring, IOT.*

STRENGTH CHARACTERISTICS OF CONCRETE CONTAINING GLYCERINE AS PHASE CHANGE MATERIAL

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Abstract: Glycerine is well established as a Phase Change Material (PCM). But very little is known about its effects on the structural performance of the resulting concrete. In this paper Glycerine is added at 0 %, 2.5 %, 5.0 %, 7.5 % and 10 % by weight of water and the fresh and hardened properties such as compressive strength at 7, 28, 56 and 90 days and sorptivity are experimentally evaluated. The fresh concrete produced showed a drastic reduction of slump with increasing percentage replacement with 74% reduction at 10% addition of Glycerine compared to the control mix. Further, the compressive strength also showed a drop in strength by 34.5% with respect to control mix for 10 % addition of Glycerine. The compressive strength determined at 7, 28, 56 and 90 days showed an optimum Glycerine content of 7.5% on all days. The sorptivity values are found to decrease with increase in amounts of Glycerine. The percentage reduction of sorptivity values from 2.5 % Glycerine to 10 % Glycerine was found to be approximately 6 %. It is thus concluded that addition of Glycerine to concrete results in a more watertight concrete compared to the standard concrete.

Keywords: *GLYCERINE, PHASE CHANGE MATERIAL, PHYSICAL AND MECHANICAL PROPERTIES, DURABILITY.*

DESIGN AND DEVELOPMENT OF A MODEL TO MEASURE VELOCITY RATIO OF DIFFERENT DRIVE SYSTEMS

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Abstract: It is necessary to provide energy in different areas of use such as Cars, rice mills, flour mills, which use different transmission systems such as belts, chains and gear, it is found that the more power can be transmitted in gear drive than the other two, power transmitted by gear drive provides 100% efficiency, due to less slip occurs it is used in gearbox and in different machines. Belt drive can transmit the same power ratio, but the slip occurs in due course of time and there is the stretch in the belt, which may need replacement. Chain drive gives the better performance than the belt drive in this respect. So according to the requirement and the distances between the drivers to driven different methods can be used. In shorter distance gear drives gives the best result as the less slip occurs. The speed ratio of gear drive generally; driven/driver=T2/T1. More modification is required in belt drive than the chain and gear drive. In this work a model has been developed where three types of transmission systems have been placed in a single base. The purpose of this work is to calculate the velocity ratio of different drive systems with single input.

Keywords: *Drive system, velocity ratio, transmission system, designed model, power.*

A REVIEW OF EMERGING DEEP LEARNING METHOD FOR IMAGE RESTORATION

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Abstract: Convolutional neural networks and other deep learning approaches have drawn a lot of attention in practically all fields of image processing, particularly picture categorization. Image restoration, however, is a fundamental and challenging problem that is important to image processing, comprehension, and representation. Image denoising, super-resolution, dehazing, and deblurring, are frequently covered. Numerous studies are being conducted in this field.Various machine learning and deep learning techniques are used for this. This paper examines various image restoration methods that focus on deblurring and super-resolution.

Keywords: *Machine learning, Deep learning, Generative adversarial network, Convolutional neural network.*

ADVANCED TECHNOLOGICAL SUPPORTS IN MEDICAL INDUSTRY AND HEALTH CARE SYSTEMS USING MACHINE LEARNING AND IOT

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Abstract: The objective is to develop and implement a portable, cost-effective system for monitoring health conditions. It can communicate the wellbeing status of patients in crisis circumstances and furthermore in ordinary circumstances consistently through a microcontroller and IOT. There are IOT devices that can handle, collect, and send data to the network. By periodically analyzing the data that has been collected, the capabilities of the IOT network can be used to monitor the health of patients. Patients and people with disabilities can benefit most from smart health systems, which can be purchased at a reasonable cost. Health parameter monitoring sensors also display on the LCD the parameters of the human body, such as the heart rate and respiratory levels. Using the cloud, the proposed system can continuously collect data. It also sends an alert notification via IOT in the event of an emergency.

Keywords: *Healthcare device, pulse oximeter sensor, heart rate, oxygen levels, respiratory sensor.*

A SURVEY ON FOG COMPUTING: ARCHITECTURE, APPLICATIONS WITH IOT, CHALLENGES AND ISSUES

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Abstract: The centralized cloud computing paradigm has a few challenges due to the rapid advancement of Internet of Things (IoT) applications, including high inactivity, limited capacity, and network failures. Fog computing closes the gap between the cloud and IoT devices to solve these problems. Fog computing offers the option of storing and processing IoT data locally on IoT data devices rather than transmitting it to the cloud. Compared to the cloud, fog offers services that are more responsive and of greater quality. Fog computing is the best solution for enabling IoT to offer effective and secure services to lots of IoT users. The present state of fog computing is discussed in this article. The study also covers the Fog architecture and new IoT applications that benefit from the Fog paradigm. Finally, the challenges associated with fog computing are also highlighted.

Keywords: *Fog computing, cloud computing, Internet of Things, Fog computing with IoT.*

GESTURE CONTROLLED SWITCH FOR HOME AUTOMATION

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Abstract: Fully automatic systems for home automation are used everywhere now a days. In this paper, a fully automatic switch is built which can be controlled by hand gesture. The wireless switching method tries to overcome the frequent short circuit problems by eliminating the need for touching a switch to turn it on and turn it off. The gesture-controlled switch uses an ultrasonic sensor which senses the hand gestures to turn on and turn off the home appliances like light, fan, television, fridge etc.

Keywords: *Gesture, home automation, ultrasonic sensor.*

FLOW ANALYSIS OF A CONVERGENT-DIVERGENT NOZZLE

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Abstract: Convergent-Divergent nozzles are mechanical devices which are used to convert the thermal and pressure energy into useful kinetic energy. The nozzle converts high pressure, high temperature, and low velocity (subsonic) gases into low pressure, low temperature, and high velocity (supersonic) gases, hence producing high thrust. To achieve the desired objectives, it is found that the most efficient conversion occurred when the nozzle area converges until the throat area, where the flow travels at sonic velocity, followed by a divergent section of the nozzle which accelerates the gases to supersonic or hypersonic velocities based on the design. The exit velocity achieved in a converging-diverging nozzle is governed by the area ratios and pressure ratios. In the present study, the operating characteristics of a convergent-divergent nozzle have been elaborately discussed. The pressure distribution in a convergent-divergent nozzle has been shown and the nature of the flow has been explained by considering how the flow changes as the back pressure is decreased. The Mach number at the exit of the nozzle and the mass flow rate depends on the exit area as well as available back pressure. From the variation of the governing parameters it has been observed that to attain higher Mach number at the exit of the Nozzle the Exit Area should also be higher and with the increase of exit area for a specific design pressure, the mass flow rate increases. It is also observed that higher Mach number at the exit can be obtained at lower back pressure but if the back pressure is not sufficient enough the subsonic flow remains subsonic even though it flows through a convergent-divergent nozzle which amply supports the physics of the flow through the nozzle. As the back pressure is reduced below critical back pressure, supersonic flow generates downstream of the throat and the region of supersonic flow is terminated by a normal shock wave. This shock wave moves towards the exit of the nozzle with the decrease of back pressure and the value of the back pressure at which the shock wave reaches the exit plane of the nozzle has been determined.

Keywords: *Convergent-Divergent Nozzle; Back Pressure, Mass Flow Rate, Subsonic-Supersonic Flow, Mach Number, Shock Wave.*

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EFFECT OF PROCESS PARAMETERS ON THE PROPERTIES OF FRICTION STIR WELDED AA6061-T6 ALLOY

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Abstract: Wrought heat treatable aluminum magnesium silicon alloys per AA 6061-T6 are of medium strength and have excellent weldability compared to high strength aluminum alloys. This class of alloys is therefore widely used in ship frames, piping, storage tanks and aircraft applications. It is a non-ferrous material and is very sensitive to heat and temperature. It is not possible to use all kinds of aluminum manufacturing processes. Because most aluminum alloys are hardened, fusion welding cannot be applied because the high heat generated during the process will cause them to lose some of their properties, making them unable to perform their intended function. In 1991, the Welding Institute (TWI) invented a new technology in the welding process and named it Friction Stir Welding (FSW). FSW is a solid-state welding process in which parts are joined together at a solidifying temperature. The strength of the weld is affected by the grain size and the tensile strength of the core region of the weld. Therefore, an attempt was made to develop an artificial neural network and predict a data set related to the FSW engine and process parameters. Experimental relationships to predict grain size and tensile strength of frictional AA 6061-T6 aluminum alloy welds. The empirical relationships are developed by a fully factorial design. A linear regression relationship was also established between grain size and weld core tensile strength of FSW joints.

Keywords: *Friction Stir Welding (FSW), Aluminum 6061-T6 S Alloy, Welding Parameters.*

EFFECTS OF STIR CASTING PARAMETERS ON A356 ALLOY SYSTEM

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Abstract: Stir casting is a liquid state casting technology in which a mechanical stirrer is used to mix two different materials to produce castings with good mechanical properties. When it comes to the fabrication of aluminium-based alloy it is an economical and flexible process. Aluminum alloy A356 is frequently used in the automotive and aviation sectors as cast components with various section sizes due to their high strength-to-weight ratio and thixotropic structure. Its rigidity and specific tensile strength are better to those of other aluminium alloys and can further be improved by alloying with various elements. These characteristics result in light weighted cars and planes and improved fuel efficiency. The stir casting parameters play a significant role in producing alloys with good mechanical properties like ductility, strength, elongation, hardness, and toughness. In this paper an effort has been made to analyze the effects of stir casting parameters on the mechanical properties of A356-alloy based systems which have great demand in the modern industrial sectors. Tensile test, hardness test and microstructure analysis were conducted to evaluate the influence of casting parameter on respective mechanical properties. Optimum parameters for casting process were identified from the test results.

Keywords: *A356, Casting Parameters, Stir casting, Thixotropic.*

MODELING OF LEACHATE PERCOLATION PREVENTION SYSTEM

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Abstract: The increase in population and the growth of businesses has resulted in an increase in waste output, which in turn causes landfills to fill up with waste. Leachate is a liquid that results from the movement of water through solid waste and can contain a variety of contaminants, including heavy metals, organic compounds, and pathogens. The objective of the project is to develop a long-term solution to leachate percolation into groundwater in a complex area. Here, we consider the case of Brahmapuram waste dumping site at Cochin Coorporation. As pollutants such as organic, biological, and plastics are disposed there, leachate seeps into the ground and mixes with groundwater and the Periyar River that run along its boundary. As a result,the water from adjacent wells, rivers, ponds, and other sources becomes unfit for drinking and other domestic uses. Therefore,we are developing a solution for this problem. A landfill is firstly designed using data collected. After that, a sump is used to collect all of the leachate generated by the waste. The collected leachate is then handled sustainably and changed into a form that may be disposed into water bodies without endangering the aquatic life there. Moreover, it can be also utilised inside the plant to run the plant processes. The project also seeks to suggest ways to utilise the waste generated by extracting fuels like biogas and plastic fuel. As a result, we are attempting to find a comprehensive solution for the Brahmapuram site,which has serious environmental implications.

Keywords: *Landfill, Leachate, Percolation.*

LASER POWDER BED FUSION OF STEELS: PROCESSING, MECHANICAL PROPERTIES, MICROSTRUCTURE, DEFECTS, CONTROL METHODS AND CURRENT CHALLENGES – A REVIEW

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Abstract: The most versatile metal additive manufacturing technology, known as laser powder bed fusion, has been shown to produce geometrically challenging, high-performance metallic objects in near net shape with up to 99.9% relative density in a shorter amount of time. The most common engineering materials utilized for structural and sub-structural applications are steels and iron-based alloys. Steels have distinguished themselves from other metallic materials thanks to their availability in more than 3500 grades and a variety of qualities, including high strength, corrosion resistance, good ductility, low cost, and recyclability. However, the LPBF process for steels and iron-based alloys has not yet been fully adopted in industrial applications because there is little information about the processing conditions currently available, there are no specific materials standards, a lack of knowledge to correlate the process parameters, and there are other technical challenges like part variability, dimensional accuracy from a design model to an actual component, limited feedstock materials, and manual post-processing. This review aims to give an overview of the steels and iron-based alloys used in the LPBF process by summarizing their key process parameters and microstructure evolution during solidification, highlighting metallurgical defects and their potential control methods, all of which have a direct impact on the mechanical performance.

Keywords: *LPBF process, Steel, Mechanical properties, Current challenges.*

WASTE CLASSIFICATION USING MACHINE LEARNING

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Abstract: Modern lifestyles that encourage the consumption of temporary and single-use products like plastic shopping bags, plastic bottles, and packaged food have contributed to the huge growth in a waste generation that has accompanied the expansion in the world's population. Due to their inability to degrade naturally, these items take decades for them to break down and frequently build up in landfills, contaminating the environment and endangering animals. In many nations, the current waste management methods are unable to handle the rising amount of trash production, which results in inappropriate garbage disposal in public spaces, which is harmful to the environment and the general people's health. We suggest a machine learning-based intelligent waste management solution to solve this problem.Machines can learn difficult tasks like classification, prediction, judgment, and content creation thanks to this branch of artificial intelligence. The system may be capable of accurately predicting and categorizing various types of waste by employing machine learning.

Keywords: *Waste Segregation, Convolutional Neural Network, Machine Learning, Classification, Detection.*

A LOCATION-BASED PLATFORM FOR PROMOTING SUSTAINABLE AND EFFICIENT SHOPPING PRACTICES

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Abstract: Farmers face challenges in connecting with customers and selling their produce directly due to lack of access to appropriate technology and infrastructure. At the same time, customers face difficulties in finding and purchasing fresh, locally sourced produce from reliable sources. Additionally, transportation and logistics are often major barriers to the efficient and timely delivery of produce from farms to customers. Access to essential food items such as cereals, pulses, and other grains can be a significant challenge for those living in remote areas, who often need to travel long distances to purchase them. In addition, unpredictable availability of these products in physical stores can lead to frustration and wasted time. To address these challenges, there is a need for a technology solution that enables farmers to connect with customers directly and efficiently, and that facilitates reliable and affordable transportation of produce from farms to customers. This paper proposes a web application that helps users find the nearest shop that stocks the desired products within a minimum transportation distance, reducing transportation costs and time consumption.

Keywords: *Location-based platform, e-commerce platform, online website, online-grocery.*

IOT BASED WOMEN SAFETY ENVELOPE

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Abstract: Women safety is a major concern in order to prevent the women harassment. The Women Safety Envelope Project is a proposal for a technology-driven solution aimed at enhancing Women's safety in various environments. The project involves the development of an envelope-like device that can be worn or carried by Women, which contains several features that can alert emergency services and deter potential attackers. This device will include a fall detection sensor to measure the amount of deflection produced on the surface. Additionally, the envelope will have an in-built GSM and GPS tracker that can pinpoint the location of the user, making it easier for emergency responders to locate them. The envelope will also include SLM sensor used to voice activation with high decibel. By leveraging the power of technology and design, we hope to make the world a safer place for women.

Keywords: *emergency, fall detection, iot, safety, women.*

DEEP LEARNING TECHNIQUES FOR OPTION PRICING

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Abstract: The formalistic description of an option states that it is a type of contract between two parties that provides one party the right, but not the liability, to buy or sell the underlying asset at a pre-agreed price before or at expiration day. As part of the option pricing techniques, many mathematical option pricing models are currently established. These include the Black–Scholes model, Merton jump-diffusion model, Heston stochastic volatility model, etc. These models are indeed ground-breaking revelations, but follow many assumptions, which are incoherent with real-world market behavior. These basal postulates made on the financial markets make option pricing models susceptible to changes in the financial framework.This study is an attempt to improve the haleness of option pricing methodology by using an improved approach of artificial intelligence, precisely deep neural networks. These deep learning techniques do not make use of any assumptions while capturing financial data. Instead, the neural network grasps the underlying patterns of the asset and market directly from the input data. The neural networks used in this study are the Long Short Term Memory(LSTM) and the Multilayer Perceptron(MLP) and the mathematical model used as reference is the Black-Scholes model.

Keywords: *Artificial Intelligence, Black-Scholes, Neural Networks, Option Pricing.*

ANALYSIS OF CONCRETE FILLED CFRP TUBE

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Abstract: Reinforced concrete is used as a structural material for construction of buildings, harbours and dock piles in many marine locations. Structures located in coastal regions frequently suffer from corrosion phenomena. Corrosion is one of the basic factor that constitutes the degradation of reinforced concrete (RC) structures. The ingression of chloride ion into the RC structures leads to the premature failure of in-service structures. A study on structural performance deterioration of marine RC structures affected by rebar corrosion in Kozhikode and Pondicherry was conducted. To address this vexed question, Concrete Filled CFRP Tubes (CFCFRP Tubes) can be introduced in marine regions due to its superior corrosion resistance. CFCFRP tubes are composite members which consists of a hollow CFRP tube infilled with concrete. In this structure CFRP tube provides lateral confinement to concrete core. At the same time, the concrete core prevents the CFRP tube from local buckling. In this study, the comparative analysis of Concrete Filled Steel Tubes (CFST columns), CFRP Ring Confined CFST columns and CFCFRP Tubes is done by considering buckling and dynamic loading in ABAQUS Software and through experimental model. From these results it can be concluded whether CFCFRP Tubes can be used as piers in marine environment. Considering the future scope, CFCFRP Tubes can also be used as piles in offshore structures and hence soil pile interaction is also considered for analysis.

Keywords: *Corrosion, CFCFRP Tubes, Buckling, Dynamic Loading, Soil pile interaction.*

CRYPTOCURRENCY PRICE PREDICTION USING STATISTICAL METHODS AND MACHINE LEARNING TECHNIQUES

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Abstract: Cryptocurrency are the electronic, decentralised replacement for national currency. The first and best-known cryptocurrency example is Bitcoin. With cryptocurrency, transactions may be made anonymously and securely via the internet. As cryptocurrencies are decentralized, there is far less central control over them, which affects both international trade and relations. The fast price swings of cryptocurrencies drive the urgent need for a reliable model to forecast their value. One of the hot topics among experts is forecasting the price of cryptocurrencies. Traditional statistical and machine-learning methods are used in this field of research, including the auto-regressive moving average method, logistic regression, long short-term memory, support vector machine, artificial neural network, deep learning, and random forest. Cryptocurrency has no seasonal effects, making it challenging to forecast using statistical methods. The objective of this paper is to predict the price of Bitcoin (BTC), Ethereum (ETH), Binance (BNB). To predict the price using statistical methods and machine learning techniques. Different feature selection techniques were evaluated in order to obtain the most relevant attributes for the predictions. In the sequence, it was analyzing the behaviour of Statistical methods including Logistic Regression and ARIMA for daily price prediction and Machine learning models including Random Forest, Support Vector Machine, artificial neural networks and Long Short-term Memory for price direction predictions.

Keywords: *Bitcoin (BTC), Machine learning (ML), Ethereum (ETH), Binance (BNB).*

SMART SHUT OR SLEEP MODE AND VISION PROTECTION IN SYSTEM

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Abstract: Today's world is moving towards the smart system and devices, that makes our lifestyle, decision making and work more accurate and smart. There are a lot of features in our system where no change has been made for long time and need to be upgraded like TOT (time out timer) to make the system go into sleep mode, and no proper energy saving algorithm based on detection of the outside world. This paper presents the system with an idea and implementation that outsmart the previous technology still in use. Computer vision being one of the branches of artificial intelligence that teaches and equips machines to comprehend the visual environment has many applications in today's world and can offer lot in this as well. Digital images and deep learning models may be used by computers to precisely detect, categorize, and respond to things. Based on that, our ideas make the system capable of preventing person from coming very near to screen thereby preventing eye strain, taking smart decision to shut down the system if someone left the system running (even if movie is playing) and forget to shutdown. Not letting the system to go into sleep mode if anyone is there and looking (reading) at screen. These all features as a result somewhat also help in safety of the system, prolong the system's life and save energy. Looking at the world report on vision by WHO, there are billions of people facing eye issues and many of that could have been prevented as per the report, so these features could have also helped at base level to at least reduce this number by prevention. In the future, the AIoT fusion to implement these on other device like television can be done and many other features like anti stare and screen brightness control could also be added.

Keywords: *Computer Vision, Smart devices, Smart Sleep/shut mode, vision protection.*

FACTORS AFFECTING ANTIOXIDANT ACTIVITY AND TOTAL PHENOLIC CONTENT OF CLUSTER FIG

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Abstract: The green extraction of bioactive compounds from cluster fig was investigated using different solvents and solvent concentrations with microwave-assisted extraction (MAE). MAE is an efficient, fast extraction method that consumes less time. Cluster fig is used as medicine in many parts of India and it has also biological effects such as antidiabetic, anti-inflammatory, chemopreventive, and antipyretic. Phytochemical and antioxidant screening of plants is necessary for their verification and use as herbal drugs. This preliminary research work focuses on the effect of various solvents used for extraction, solute-to-solvent ratio, and solvent concentration on antioxidant activity using the DPPH assay and total phenolic content (TPC) by the Folin-Ciocalteu (FC) assay. The highest antioxidant activity was exhibited by using methanolic extract of cluster fig. The concentration of ethanol also affects antioxidant activity. An extraction yield of 25.56 % was obtained by using methanol as an extracting solvent and a 26.32 % extraction yield was obtained by using 66 % ethanol concentration. Maximum phenolic compounds were obtained with 50 % ethanolic extract and minimum phenolics were obtained with 33 % methanolic extract. Also, comparative results of antioxidant activity and TPC from conventional extraction and MAE were investigated. The present study showed the extract of cluster fig has a potential source of phenolic compounds with high antioxidant activity, which can be used as an ingredient for functional foods.

Keywords: *Total phenolic content, antioxidant assay, cluster fig, microwave-assisted extraction, extraction yield.*

REDUCTION OF TOXIC ORGANIC POLLUTANTS BY BIOGENIC SILVER NANOPARTICLES

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Abstract: The present study aims to evaluate the reduction of toxic organic pollutants by biosynthesized silver nanoparticles (AgNPs) with dietary, non-toxic, eco-friendly, biological materials such as pasteurized Cow's milk. The results indicated successful synthesis and characterization of AgNPs using a) UV–visible spectroscopy which displayed shifts in absorption peaks from 380 to 460 nm and b) Transmission Electron Microscopy (TEM): It confirmed the range of particles sizes between 10 to 100 nm. The reduction ability of synthesized nanoparticles were evaluated using a catalytic reduction reaction. Thus, it can be used as a potential agent that removes toxic organic pollutants from wastewater. Silver nanoparticles have tremendous applications in the field of diagnostics and therapeutics. The present work has been undertaken to synthesize and characterize the AgNPs using pasteurized Cow's milk, and to reduce wastewater pollution.

Keywords: *AgNP's, UV-visible spectroscopy, pasteurized Cow's milk, Toxic organic pollutants.*

UNICONNECT BRIDGING THE GAP IN CAMPUS TRADING PRACTICES

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Abstract: Uniconnect is a web application platform designed to provide a convenient way for university students to buy, sell, and exchange their used textbooks, stationeries, and other related materials. The platform enables students to connect and interact with each other to trade and exchange items based on their needs and preferences. This research paper focuses on the development and evaluation of the Uniconnect platform as a means of promoting sustainability and reducing waste in the university campuses. The study includes an analysis of user behavior, user satisfaction, and the platform's impact on the environment. The findings suggest that Uniconnect has the potential to significantly reduce waste and increase the availability of affordable textbooks and stationeries for students. Overall, Uniconnect represents a novel approach to sustainable campus living, and its success can serve as a model for future sustainable initiatives.

LEMON LEAF DISEASE DETECTION BY EMPLOYING MACHINE LEARNING

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Abstract: The project aim is to detect the disease that occurred in the leaf of the lemon plant. Most of us cannot find the disease at the earlier stage manually. So automatic disease detection is essential to growing plants disease free. Though many previous systems have automatic detection of the diseases none of them suggest the corrective measures to treat the plants at the right stage.Our project lemon leaf disease detection helps to detect the disease automatically and also recommends pesticides to cure the diseased leaf. The CNN algorithm is used in our project for better training and accurate calculation. By capturing and uploading the image on a website, the disease, and treatment will be displayed on the page.

Keywords: *Image Analyzation, Separation of image axis, Minimization of Leaf image, Prediction of clear image.*

STUDY OF FOAM CONCRETE SLABS WITH REINFORCED MESH

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Abstract: Foamed concrete, also known as aerated concrete or lightweight concrete, the main components are water, cement, fine aggregate, fly ash, etc. Light-weight aerated concrete (LAC) is maid by the addition of a gas-forming admixture aluminium powder (AP) to a wet mortar mixture. In concrete during curing, AP will react with the calcium hydroxide in the mixture to form hydrogen and this hydrogen is the reason for the bulging. The amount of gas-forming is dependent on the mechanical properties requirements. Because of its light weight, good thermal insulation performance, sound insulation and fire resistance, good overall performance, low elasticity and shock absorption, strong waterproof performance, convenient production and processing, good environmental performance, convenient construction, etc. it is mostly used as slope-finding for roof insulation, ground insulation cushion, foundation pit feeling of upturn beams, precast wall a, infill panels and wall pouring. The study with lightweight slabs is investigated in three cases - (1) LWC slabs with steel wire mesh reinforcement , (2) LWC slabs with fibre mesh reinforcement , (3) LWC slabs with combined fiber mesh and glass fibre. In this study, performance of slabs in different mesh reinforcement is monitored. This study is focusing on the formation of lightweight slabs with suitable and sustainable reinforcement.

Keywords: *Light Weight concrete , Light-weight aerated concrete , Aluminium powder, Mesh reinforcement, Glass Fibre.*

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF GEOMETRIC PARAMETERS ON DISCHARGE COEFFICIENT OF TRAPEZOIDAL NOTCH

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Abstract: A notch is a type of fluid flow aperture that extends across its breadth and allows fluid to pass through the bottom. The bottom end of the notch is typically sharpened to provide the least amount of resistance to fluid passage. In the recent time, flood control has been a major concern, thus, it is necessary to design the head of notch. Out of all the available notches, Trapezoidal notches are easily retrofit into the Natural Channels and Streams and it gives more accurate results over a wide range of Flows. A trapezoidal notch is a combination of a rectangular notch and two triangular notches and thus the discharge over such a notch will be the sum of the discharge over the rectangular and triangular notches. This paper represents the hydraulic experiment performed on Trapezoidal notch apparatus to determine the effect of notch shape on notch flow characteristics. The study aims to investigate the characteristics of water flow over a trapezoidal notch experimentally. The studies are carried out for various flow rates by measuring head over the notch. From the obtained experimental data, the empirical relationship between the actual discharge and the effective head has been established by which the discharge can be calculated for a wide range of available heads. The variation of discharge with effective head and the pressure difference between upstream and downstream of the notches with the flow rate have also been analyzed in detail. Along with the analysis, the variation of the nappe shapes with discharge has been visualized and investigated extensively.

Keywords: *Trapezoidal Notch, Discharge Coefficient, Effective Head, Nappe.*

PRELIMINARY DESIGN OF A CENTRIFUGAL COMPRESSOR FOR A TURBOCHARGER

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Abstract: The goal of CO_2 reduction leads to the development of technological solutions to limit vehicles exhaust emissions and to reduce engine fuel consumption and to achieve that downsizing and turbocharging techniques seem to be a key technology to reach the target. Centrifugal Compressor is one of the prime component of a Turbocharger. The present study aim to the Preliminary design of a centrifugal compressor for a Turbocharger for the improvement in stability of the centrifugal compressor along with finding the point at which the compressor will give maximum efficiency to obtain the stable working range of the centrifugal compressor. The axial flow turbine provides the required power to the compressor and the air mass flow rate entering the compressor is lower than the products of combustion because of the fuel used by the turbine. The mass flow rate, relative inlet Mach number and the power provided by the turbine to the compressor have been varied by keeping the rotational speed, number of rotor blades, inlet temperature and inlet pressure constant. It has been observed that the mass flow rate has a greater impact on the variation of impeller speed and impeller radius compared to when the power input from the turbine was changed. With the increase of inlet Mach number, a decrement in efficiency is observed as all the available energy in terms of kinetic head doesn't converted to pressure energy. When there is change in the mass flow rate along with the power, the Mach number remains within the limit at all the points inside the compressor. Thus in order to obtain an optimum size of the compressor, the vaneless diffuser part should be more compact in order to avoid excessive circumferential variation of static stress.

Keywords: *Turbocharger, Centrifugal Compressor, Mass Flow Rate, Mach Number, Optimum Design.*

PREDICTING STOCK PRICES OF INDIAN FMCG COMPANIES USING MACHINE LEARNING METHODS

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Abstract: The FMCG (Fast-moving consumer goods) industry is the fourth largest sector in the Indian economy. The market trend relating to FMCG companies is very unstable but it is an important contributor to India's GDP growth. The traditional kernel methods cannot fully capture or represent a fast-growing sector but the availability of various advanced machine-learning models has made it easy to predict stock prices. This study uses traditional as well as advanced machine learning methods like Long Term Short Term Memory (LSTM), Decision Tree, Random Forest, and k-Nearest Neighbors (KNN) to predict the stock prices of the top 15 companies of the Indian FMCG sector. After predicting the stock prices, the models were then compared using the Root Mean Square Error (RMSE) and Regression Score(R-Score). The results showed that the LSTM model performs better than the other machine learning models.

Keywords: *Machine Learning, FMCG, LSTM.*

EFFECT ON THE PERFORMANCE AND EMISSION OF HYDROGEN ENRICHED DIESEL IN A CI ENGINE

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Abstract: In the last few decades, the rate of fossil fuel consumptions have increased drastically, causing severe environmental challenges. So, it is very important for us to consider of a sustainable eco-friendly alternative fuel. In such, use of hydrogen as an alternative fuel can be done due to its special properties like wide range of flammability, zero carbon content etc. This research work is based on 5% hydrogen addition in diesel at 3.5 kW rated power with a constant speed of 1500 rpm. This research is carried out on single cylinder, 4-stroke, water cooled, CRDi diesel engine at 0-80% load. The conclusion of this research was that the NOx emission increases compared to diesel fuel, but particulate matter decreases significantly. CO emission decreases with 5% hydrogen addition in diesel. NO emission decreases at low load conditions with hydrogen addition but at higher load it increases slightly. CO2 decreases at low load condition with hydrogen addition in diesel. HC decreases at higher load with hydrogen addition in diesel, but at low load condition, it increases slightly. Brake thermal efficiency increases at higher load condition with hydrogen addition in diesel. Brake power and BSFC for 5% hydrogen addition in diesel however showed slight difference in performance at varying load conditions.

Keywords: *Diesel, Emission, Fuel, Hydrogen, Performance.*

STUDY ON INCIDENCE BIRTH WEIGHT OF BABIES IN RELATION ON MATERNAL AGE, PARITY AND GESTATIONAL AGE

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Abstract: Background: Birth weight of an infant is the most important determinant of its chances of survival, healthy growth, and development. It depends on many maternal factors. Maternal age, parity and gestational age have been shown to increase the risk of adverse neonatal outcome, such as intrauterine growth retardation, prematurity, mortality and low birth weight. Objective was to study the effect of various maternal factors like maternal age, parity, maternal weight, gestational age on foetal birth weight. Methods: 250 participants with term pregnancies were studied under three independent variables viz gestational age, maternal age and parity that had effect on the foetal birth weight in two groups - primipara and multipara and reported by statistical analysis. Results: The independent variables gestational age and maternal weight showed a statistically significant correlation ($p < 0.05$) with foetal birth weight in both the groups. Whereas the variable maternal age didn't have any statistically significant effect ($p > 0.05$) on the foetal birth weight in the study. The birth weight of 2.5 kg in mother more than 37 weeks of gestation. Baby born by 35-37 weeks of gestation had 26% low birth weight and 73% were normal birth weight. Incidence of low birth weight was 73% and normal birth weight 27% found by 32-34 weeks of gestation Conclusions: Primipara had more pronounced correlation with foetal birth weight than multipara in the variable gestational age. The maternal weight affected foetal birth weight equally in both the groups. And maternal age had no effect on foetal birth weight in either group.

Keywords: *Birth weight, gender, maternal age, parity and gestational age of mother.*

DESIGN OF TUBULAR PASS SOLAR AIR HEATERS

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Abstract: Solar energy is inexhaustible and has a strong affinity to give surplus power among other sources of renewable energy which is received on the surface of Earth. The investigational study focused on the design of tubular-type solar air collectors to receive maximum power from incoming solar radiation. The tubes of the tubular solar heater stand are adjacent to each other at an equidistance of 10.08 mm and are made from a conductive material like aluminium. The parameters of design namely size and volume flow rate from an air heater are estimated by assuming that it gives a maximum efficiency of 35% with a flow rate of 0.0125 kg/s. The other parameters like the equivalent diameter of the duct, number of tubes, Reynold number, frictional effect, pressure drop, and power consumption by fan used in tubular type solar air heater are evaluated for an airflow rate of 0.0125 kg/s. The diameter of tubes used in the tubular solar heater is selected on the basis of heat removal factor and it is available in standard size here it is considered as 38.1 mm for analysis. The tubular solar heater is designed for an effective length of 1.8 m having a square arrangement of tube bank with a pitch-to-diameter ratio of 1.25. The newly designed solar air heater maximizes the usage of solar energy in the tubular absorber surface and gives a maximum temperature of the air at the exit.

Keywords: *Tubular solar air heater, equivalent diameter, pressure drop, absorber plate, heat removal factor.*

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REMOTE KEYLESS ENTRY APPLICATION IN CAR

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Abstract: In a modern society, comfort become standard. This comfort, especially in cars only be achieved by equipping the car with more electronics devices. Some of the electronic devices must cooperate with each other and thus they require a communication channel, which can be wired or wireless. In these days, it would be hard to sell a new car operating with traditional keys. Almost all modern cars can be locked or unlocked with a Remote Keyless Entry System. A Remote Keyless Entry System consists of a key fob that communicates wirelessly with the car transceiver that is responsible for locking and unlocking the car. The key fob has many functions especially lock, unlock, auto lock, auto unlock, auto relock and also have many special circumstances. Remote Keyless Entry System is acts as transmitter and also a car has a receiver. The RF signal is the communication between the transmitter and receiver. This system improves the security of cars and reduce the physical work of the consumers. Security is very important in the modern-day cars. For the security purpose Arduino ide, key fob, CAN software are used. So, this paper mainly explains about the uses of the Remote Keyless Entry System.

Keywords: *Key fob, Receiver, Transmitter, CAN, Arduino ide.*

DESIGN AND IMPLEMENTATION OF AN AUTONOMOUS ROBOT FOR SAFE AND EFFICIENT FOOD DELIVERY IN HOPSITALS

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Abstract: In recent years, the demand for autonomous robots in healthcare settings has increased, particularly after the COVID-19 pandemic. Traditional methods of food delivery in hospitals, requiring staff to transport meals to patients' rooms manually, can be dangerous in isolated hospitals where people infected with highly contagious diseases are treated. This paper details the design and virtual implementation of Transbot, a robot that acts as an intervening medium between doctors and patients infected with communicable diseases. It can autonomously navigate to any required location while simultaneously recognizing and avoiding obstacles, ensuring safe and efficient delivery of meals to patients' rooms. It is also equipped with the Rocker Bogie mechanism, allowing it to navigate between floors of a hospital with ease.

Keywords: *Covid-19, Autonomous Navigation, SLAM, Food delivery, Rocker-Bogie Mechanism.*

NON-DESTRUCTIVE EVALUATION OF THICK CONCRETE COMPONENTS USING THE IMPACT-ECHO METHOD

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Abstract: Condition assessment of concrete structures is an important area of research. The impact echo method is one of the advanced non-destructive methods used to assess concrete integrity and identify internal defects in concrete. The method is based on the principle that transient stress waves transmitted into the concrete will get reflected by the internal flaws and back wall. This method is used to detect defects or to evaluate the thickness of sections of concrete structural elements. In the present work, Impact echo testing has been carried out for the identification of defects in an in-house laboratory structure. For the investigation, a test floor, reaction wall and one column from the CSIR-Structural engineering research centre (CSIR-SERC) have been assessed using the impact-echo method. A one-inch grid has been adopted, data is collected along the grid line and processed using impact-echo software. From the results, it has been observed that there are no defects along the investigated grid line on the test floor. Similarly, the reaction wall and column results also indicate that the concrete is free from defects. The preliminary investigation has indicated that the structural members are made of good-quality concrete and no defects have been identified. Further, an extensive investigation needs to be carried out to identify the presence of defects in the structure.

Keywords: *Impact echo method, thick concrete structures, non-destructive evaluation.*

RESIDUAL COMPRESSIVE STRENGTH & PROBABILITY FAILURE OF LOCALLY CORRODED TUBULAR STEEL COLUMNS

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Abstract: Corrosion is a naturally occurring process in steel that can degrade the safety and durability of steel structures. Corrosion is inevitable; hence, the assessment of the load carrying capacity of corroded structural members is essential. In this study, the influence of local corrosion on the load-bearing capacity of locally corroded tubular steel columns under eccentric compression and parametric finite element analysis were conducted to examine the effects of the degree of volume loss (DOV) of corrosion damage along the column on the residual compressive strength. Also probability failure of a corroded steel tube using normal distribution in MATLAB performed to assess its reliability and determine the risk of failure.

Keywords: *Residual compressive strength, Local corrosion, Global plastic analysis, degree of corroded volume, probability failure.*

ADVANCED WATER UTILISATION SYSTEM USED IN AGRICULTURE IRRIGATION

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Abstract: The agricultural activities are now automised and the work time is reduced since the farmers can concentrate and some other argricultural activities. The recent technology used in this system is a super advanced system which reduces the wastage of the water and improves efficiency and effectiveness in utilisation of the water used in the agriculture process. The modern solution for the precision in agriculture maintains good social preface and extra ordinary work proficiency in system. The satisfactory performance inhibits the ambient sources on water management and maintains good condition in the work preface where each agricultural activity can be automated one day. Thus an effective system can be fabricated and clearly executed. The radiofrequency in the presented IoT platform make use of Enengy harvesting technique for water technology where the IoT platform used in this work is AREThOU5A IoT platform. This is highly important because the world now facing problems in the food storage and shortage due to the enormous growth in the population. The smart water utilisation system uses the sensors such as water moisture sensor, water level indicator, irrigation efficiency, temperature and humidity sensor, analysis based on the software and the controllers and microprocessors are used in the same case. This work focuses on the early day technology to till day technology and the smart interfaces such as Blynk, Arduino, IoT platform etc. Real time utilisation such as Machine Learning (ML), Artificial Intelligence (AI), Deep Learning (DL), IoT and wireless communications.

Keywords: *AREThOU5A IoT platform, radiofrequency, wireless communications.*

REVIEW OF REASONING METHODS FOR VIDEO QUESTION ANSWERING

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Abstract: Video Question Answering (VQA) is a recent emerging challenging and complex task in the field of Computer Vision. VQA helps to retrieve spatial and temporal information from the video and then it will be interpreted. The methods implemented for VQA tasks have been extended from the methods of Image-QA. The main difference between Image QA and VQA is that in addition to appearance information VQA have to process the motion information. Therefore multi-step reasoning is used for VQA. There are mainly four category of reasoning methods are there. The first category of reasoning implements spatial and temporal attention mechanism that iteratively select useful information for answer questions. But they do not consider relationship between different objects. The second category of reasoning methods are memory based networks, that are previously used in Text QA and Image QA. But they neglect the visual relation information when performing multi-step reasoning. The third category aims to perform relational reasoning through relational network. But they can only model a limited number of objects. The fourth group of reasoning methods are based on Graph Neural Network. GNN is more flexible and powerful in relational reasoning. So more researches are coming in this field. This survey reviews a number of methods that are belongs to different reasoning methods. These methods shows recent advancement in VQA.

Keywords: *Video Question Answering(VQA),Visual Graph Reasoning (VGR),Graph Neural Network(GNN).*

ENHANCING MATERIAL PROPERTIES OF SURFACE COMPOSITE (AZ61/ZRO2) FABRICATION VIA FRICTION STIR PROCESSING

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Abstract: Magnesium alloy is often used in aerospace applications due to its lightweight properties, despite having lower strength than other materials. To improve its mechanical properties, solid state Friction Stir Processing (FSP) is used, which results in a dynamically recrystallized grain structure through intense plastic deformation in the processed zone. In order to further improve the material's mechanical behavior, a surface composite method is utilized, where AZ61/ZrO2 is added to the surface. FSP is then used to embed the ZrO2 and modify the microstructure of the material. During the FSP process, a non-consumable tool induces plastic flow, and the resulting microstructure is a fine-grained structure that includes the surface composite. By adjusting the process parameters, such as the traveling speed of 24mm/min and 1845 rpm of tool rotational speed, the grain size is significantly refined to 3.7 ± 1.7 µm in the stir zone, and the strength and ductility of the FSP Mg plate are significantly improved compared to the base material. This is primarily due to grain refinement along with dislocation strengthening and solid solution strengthening. Additionally, the cooling enhancement during processing plays a role in achieving the desired results.

Keywords: *Magnesium, Friction stir processing, Plastic flow, Micro structure, Fine- Grained structure.*

HIGH PERFORMANCE OF MICRO FUNGI IN THE PRODUCTION OF MYCELIUM BASED BIOMATERIALS USING AGRICULTURAL WASTE

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Abstract: Mycelium-based bio-composite materials have been invented and widely applied to different areas, including construction, manufacturing, agriculture, and biomedical. Mycelium has the unique capability to utilize agricultural crop waste as substrates for the growth of its network, which integrates the wastes from pieces to continuous composites. Their low-cost and environmentally friendly features attract interest in their research and commercialization. It is shown that the material function of these composites can be further tuned by controlling the species of fungus, the growing conditions, and the post-growth processing method to meet specific mechanical requirements. Moreover, mycelium can be used to produce chitin and chitosan, which have been applied to clinical trials for wound healing, showing the potential for biomedical applications. Given the strong potential and multiple advantages of such a material.

Keywords: *Mycelium based biopolymers, fungal mycelium, bio composites.*

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IMPACT OF WATERSHED DEVELOPMENT PROGRAMME ON PRODUCTIVITY AND BENEFIT COST RATIO OF CROPS A CASE STUDY OF THE ITAGI WATERSHED IN KARNATAKA

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Abstract: In India a large portion of rainfed area is of low productivity , at high risk level , less exposure to technology and vulnerability to degrade natural resources. Watershed Development Programmes (WDP)have been started in India to improve the production and sustain the ecology in the dry and the semi arid areas adopting appropriate technology in production and conservation along with fulfilling the basic necessities of communities for food ,water, shelter. In the present study area of Itagi watershed various types of water and soil conservation structures such as contour bunds, check dams, farm ponds, recharge pits, earthen checks, rubble checks etc., were constructed in an area of 4636 hectares under 'Sujala' WDP during the year 2004. Considering this the total costs of the soil and water conservation structures were Rs. 356.6 Lakhs including administrative cost of Rs. 19.81 Lakhs. The present paper reveals the impact of WDP on crop area, productivity and benefit cost ratio of various crops. The analysis of data illustrates that after implementation of WDP , the productivity of various crops has been increased by 16 to 80%, increase in area of cultivation and the benefits cost ratio for all the crops has increased. In addition, many more benefits like change of cropping pattern, groundwater recharge increment, reduction in soil erosion, increase in employment opportunity etc., were also noticed.

Keywords: *Watershed, Conservation, Assessment, Productivity, Benefits.*

BIODIESEL PRODUCTION FROM AGRO-BIOMASS USING THERMOCHEMICAL CONVERSION TECHNOLOGY

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Abstract: Agriculture biomass has the ability to significantly contribute to today's fuel needs and has a number of environmental and financial benefits. Thermochemical methods for converting agricultural biomass to energy now appear promising and practical. The relative superiority of thermochemical conversion over others results from its increased productivity and ability to work with already-built infrastructure. Bioenergy, or energy derived from biomass, has the potential to displace fossil fuels in the future due to its abundance, cleanliness, and carbon dioxide neutrality. In addition to being burned directly to produce heat and electricity, biomass can also be transformed into bio-fuels in the forms of solid (such as charcoal), liquid (such as bio-oils, methanol, and ethanol), and gas (such as methane and hydrogen), which can then be used to produce additional heat and electricity. This report gives a summary of the fundamental thermo-chemical processes (combustion, pyrolysis, gasification, and liquefaction) used to produce bioenergy as well as its reactions, applications, and most recent advancements and aim to investigate prospective biomass sources, thermochemical conversion process parameters, and physical and chemical properties of biofuel alternatives for fossil fuels. Transesterification reaction of triglycerides to produce fatty acid methyl ester (FAME) was investigated by using agro-biomass and doped metal oxide as a heterogeneous solid basic catalyst (Copper Oxide/ Copper Nanoparticles). On the yield and characteristics of the generated biodiesel, the effects of various parameter conditions, such as the catalyst weight% basic oil weight, mass ratio of methanol to oil, operation time, reaction temperature, and mixing strength, were investigated.

Keywords: *Biomass, Bioenergy, Thermochemical, Caryota Urens, Transesterification, Biodiesel, Copper Nanoparticles.*

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In association with: **ISET Research, India.**

DESIGN OF AN ELECTRONICALLY TUNABLE CMOS BAND PASS FILTER

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Abstract: This paper presents a CMOS band pass filter (BPF) design having provisions for independent electronic control of center frequency and bandwidth both. The topology is based upon the employment of two current feedback operational amplifiers which are currently finding favor of analog designers as an alternative to the classical voltage mode op-amps because of several advantages ofered by them. A CMOS voltage controlled floating resistance circuit is the other key element which has been employed to replace the center-frequency-controlling and bandwidth-controlling resistors in the considered configuration. The workability of the proposed design has been varified by SPICE simulations by implementing the complete circuit using a CMOS CFOA alongwith the CMOS VCRs with 0.18μm CMOS technology parameters. Simulation results are given to estabilish the viability of the proposed design.

Keywords: *Band pass filters, CMOS Analog Circuits, CFOA, Linear voltage-controlled floating resistance, MOSFETs.*

ROBOTICS AND AUTOMATION-LIVESTOCK MANAGEMENT USING MOBILE APPLICATION

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Abstract: Livestock management is an important aspect of agriculture, as it plays a crucial role in ensuring the health and productivity of livestock. With the increasing use of technology in agriculture, mobile applications have become a popular tool for managing livestock. In this abstract, we present a mobile application for livestock management that allows farmers to track and monitor their livestock using a smartphone or tablet. The livestock management mobile application allows farmers to record and store data about their livestock, including information about their breed, age, weight, and health status. The application also allows farmers to set reminders for important events, such as vaccination schedules and breeding cycles, and provides real-time notifications to help farmers stay on top of their tasks. One of the key features of the application is its ability to track and monitor the health status of livestock. Farmers can input information about any medical treatments or procedures their animals have undergone, as well as any symptoms of illness or injury. The application can then provide recommendations for further action, such as contacting a veterinarian or administering additional medication. Another important feature of the application is its ability to generate reports and analytics about the livestock. Farmers can use the application to track the performance of their animals over time, including factors such as growth rate and productivity. The application can also help farmers identify patterns or trends in their livestock's behavior or health status, which can be used to inform management decisions. Overall, the livestock management mobile application provides farmers with a powerful tool for managing their livestock, improving productivity, and ensuring the health and wellbeing of their animals. By leveraging the latest mobile technology, this application represents a significant step forward in the automation and optimization of agriculture practices.

Keywords: *CONTROLLED CULTIVATION, MANAGEMENT, IMPROVED PRODUCTION YIELD, INCREASE GROWTH OF LIVESTOCK.*

ADSORPTION OF CRYSTAL VIOLET DYE FROM AQUEOUS SOLUTION ONTO CARBOXYLATED ACTIVATED CARBON (CAC)

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Abstract: Adsorption of Crystal Violet dye onto carboxylated activated carbon was studied for different concentrations of dye solutions (50, 100, 150 and 200 mg/L). Experiments were carried out as function of contact time, initial solution pH (3–9), adsorbent dose (10 gm/L – 20 gm/L) and temperature (293, 303 and 313 K). The adsorption was favored at higher pH and lower temperatures. Adsorption data were well described by the Langmuir isotherm, although they could be modelled by the other models as well. The adsorption process followed the pseudo-second order kinetic model. The maximum sorption capacity (qmax) was found to be 237.5 mg/g. Thermodynamic parameters suggest that the adsorption is a typical chemical process, spontaneous, and exothermic in nature. The maximum adsorption occurred at pH 7.0. The effect of adsorption dose was studied and optimum adsorption was obtained at a jute dose of 16gm/L.

Keywords: *Adsorption, Carboxylated activated carbon, crystal violet, Isotherm, Equlibrium studies.*

STUDY ON POLYPROPYLENE FIBRE REINFORCED WITH CONSTRUCTION DEMOLISHED WASTE AS PARTIAL REPLACEMENT OF COARSE AGGREGATE

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Abstract: Construction Debris is one of the largest producing wastes in this century. The main purpose of this study is to look into the properties of concrete by replacing the coarse aggregate by aggregates segregated from the debris. Also, cement is one of the highly consumed products in the world but it releases a massive amount of CO_2 every year. This creates pollution and harm to our environment. So, to reduce the usage of cement and to improve the properties of concrete we have replaced 10% of cement by alcofine constantly. Also, we have introduced polypropylene fibre for improving the mechanical properties of concrete. In this study we have manufactured the mixes in two categories to find the correct amount of debris to be replaced and to find the optimum percentage of polypropylene fibre to increase the strength of concrete. In first category, we replaced the coarse aggregate by 10%, 20%, 30% of the debris. The replacement of 20% of coarse aggregate by debris gives the good result. So, we replaced 20% of coarse aggregate by debris as constant and we added 0.5%, 0.75%, 1% of polypropylene in second category and took the tests. Tests for compressive strength, split tensile strength and flexural strength are all part of the experimental research. The findings demonstrate that polypropylene fibre, debris and alcofine improves the mechanical qualities of concrete. The concrete's strength is also increased by inclusion of 0.75% of Polypropylene fibre. Therefore alcofine, debris, and polypropylene fibre together can be considered as a sustainable and effective solution for producing good quality concrete.

Keywords: *Alcofine, Polypropylene, Debris, Aggregate.*

INTEGER AND FRACTIONAL ORDER MODEL BASED PID CONTROL DESIGN FOR A SPHERICAL TANK PROCESS

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Abstract: Industries like chemical, pharmaceutical, beverages use spherical tank as storage tanks. The control of level in the spherical tank is very important for automatic control. The spherical tank is highly challenging due to its nonlinearity i.e., the area of cross section of the spherical tank with change in shape. The mathematical model of the process is developed using Matlab/Simulink. The input output data is generated from the model. The characteristics is non-linear and linearized around middle operating point. The transfer function model is identified for that operating range using process reaction curve method. An integer order IMC-PID (IO-IMC-PID) and Fractional order IMC- PID (FO-IMC-PID) controllers are designed to control the spherical tank process. A conventional Proportional Integral Derivative (PID) controller is tuned using Ziegler-Nichol's method and is compared with the IO – IMC & FO – IMC controllers. From the simulation study, it is clear that FO-IMC-PID outperforms in terms of rise time, settling time, setpoint tracking and disturbance rejection.

Keywords: *IMC-PID, Fractional order IMC-PID, Spherical tank.*

BIODIESEL PRODUCTION FROM MIMUSOPS ELENGI SEEDS USING BARIUM OXIDE AS A NOVEL HETEROGENOUS CATALYST

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Abstract: Using traditional energy resources to meet contemporary energy demands is associated with environmental risks. Almost 80% of consumed energy all over the world came from fossil fuels, an exhaustible resource and lead to increase in pollution level and global warming. This turns everyone's attention to clean energy sources in which biodiesel is showing a promising trend in the transportation sector. Transesterification reaction of triglycerides to produce fatty acid methyl ester (FAME) was investigated by using agricultural biomass and doped metal oxide as a heterogeneous solid basic catalyst. This experimental work examined the prediction and optimization of biodiesel production from mimusops elengi seed oil using Artificial Neural Networks (ANN) and Response Surface Methodology (RSM) with central composite design and the transesterification method chosen for biodiesel production. The influence of different parameters conditions such as methanol/oil molar ratio , catalyst concentration , and time on the yield of the produced biodiesel were studied. The used catalyst and the produced biodiesel were characterized by using techniques of gas chromatography (GC), X-ray diffraction (XRD), BET surface area measurement (BET) and viscometer. The result indicates the comparison of yield obtained via RSM and ANN with the actual yield obtained experimentally.

Keywords: *biodiesel, non-edible oil, mimusops elengi, artificial neural network, Response Surface Methodology.*

EXPERIMENTAL STUDY OF LIGHT WEIGHT CONCRETE USING EPS BEADS AND ALCCOFINE USING BASALT FIBRE

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Abstract: This work investigated the behaviour of lightweight concrete using EPS beads and Alccofine with basalt fiber. Materials used were ordinary Portland cement as a binder, Alccofine as replacement of cement, fine aggregate, coarse aggregate, carboxymethyl cellulose, Expanded polystyrene beads with 25% replacement with coarse aggregate, basalt fiber, and water. Basalt fiber was added from 0.25 to 1% with an increment of 0.25%. 3% Alccofine was replaced in place of cement. Mixes were prepared with a ratio of 1:2.1:3.4 and a water binder ratio of 0.405. Totally 5 combinations of concrete were prepared, one as a control mix and 4 mixes with varying basalt fiber content from 0.25 to 1%. The EPS beads were pretreated with carboxymethyl cellulose. A carboxymethyl cellulose solution was prepared such that the solution contains 1% of carboxymethyl cellulose and then the EPS beads are treated. Compressive strength, Flexural strength, and split tensile strength of concrete were assessed. The replacement of EPS beads reduced the strength of the concrete. To increase the strength, basalt fiber was added in different proportions. The compressive of concrete with basalt fiber 0 to 1% with 0.25% incremental varies from 15 MPa to 24.33MPa and the maximum strength was attained in 0.5% of basalt fiber. The Split tensile value was also maximum at 0.5% and flexure strength also follows the same trend. It was found that when 0.5% of basalt fiber was added, the strength of the concrete was maximum compared to the addition of other percentages of basalt fiber. This concrete reduces the construction cost. as it has less density, the self-weight of the concrete is comparatively reduced. This type of concrete can be used for the construction of marine structures and other construction areas where the self-weight of the concrete needs to be less. The study concludes that the addition of BF to lightweight concrete can enhance its mechanical properties and durability, making it a promising material for various construction applications.

Keywords: *Basalt fibre, CMC, EPS beads.*

AUTOMATED MODELLING OF MECHANICAL COMPONENTS USING SOLIDWORKS API

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Abstract: Engineers can utilize the Solidworks API and macro functionality to construct custom programs and applications (macros) that can be used to automate numerous CAD activities. This paper illustrates work on design automation of mechanical components like nuts, bolts, screws, and flange coupling on certain parameters using Solidworks designing and modelling program, taking into account the exponential rise in design techniques. The work also describes end-to-end design methodologies, including plane selection, user-provided dimensions, and fully defined structures using userforms made with Microsoft Visual Basic software. The product was made user-friendly using Microsoft Visual Basic after conceptual development and algorithm development. This enables us to generate mechanical components from a single click by only providing specific dimensions for the structures. The project methodology is presented through a flow chart that outlines the systematic procedures followed during the project's completion. Users select either a prismatic model or mechanical component, followed by selecting the plane to create the structure. Then the user is asked to select the required prismatic models (cube, cuboid, cone, sphere, and cylinder) or mechanical components (Nuts, Screws, Bolts etc.) and provide the required dimensions to generate the model. The user has the option to create various prismatic models with features like chamfer, fillet, boss extrude or extrude cut. Once the model is generated with a fully defined sketch, the user is prompted to save the file and close the part file or the application. The inputs from the user are taken with the help of userforms. The mechanical components are modelled with the help of the formulas and standards given in the PSG Design Data Book.

Keywords: *Solidworks API, Macros, VB, Userform, Prismatic, Assembly.*

STUDY ON PARTIAL REPLACEMENT OF CEMENT WITH BENTONITE POWDER AND FINE AGGREGATE WITH GLASS POWDER IN CONCRETE

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Abstract: This work investigated the behavior of concrete using bentonite powder and glass powder. Ordinary Portland Cement was used as the binder, Bentonite powder was a partial replacement of cement, glass powder was a partial replacement of fine aggregate, coarse aggregate, and water were used. The fine aggregate was replaced by glass powder at a constant 10% and bentonite powder replaced cement from 2% to 8% with an increment of 2%. Mixes were prepared with a ratio of 1:1.5:2.8 and a water cement ratio of 0.48. The glass powder was made sure that they were in the same particle size gradation to that of the particle size gradation of the fine aggregate. Totally 5 combinations of concrete were prepared, one as a control mix and 4 mixes with 10% glass powder constant and varying bentonite powder from 2% to 8%. Compressive strength, and split tensile strength of concrete were assessed. The replacement of cement with bentonite powder reduced the strength of the concrete with addition of bentonite powder beyond 6%. To increase the strength, glass powder was added. The 7 day compressive strength of concrete with bentonite powder from 2 to 6% with 2% increment without addition of glass powder varies from 18.62 N/mm2 to 20.32 N/mm2 and the maximum strength was attained at 6% of bentonite powder. The compressive strength then dropped to 19.92 N/mm2 at 8%. The 28 day compressive strength of concrete with bentonite powder from 2% to 6% with glass powder at a constant of 10% varies from 30.32 N/mm2 to 33.72 N/mm2 and the maximum strength was attained at 6% of bentonite powder. The compressive strength then dropped to 32.17 N/mm2 at 8%. The Split tensile value was found to be maximum at 4%. It was found that when 6% of bentonite powder along with 10% glass powder was added, the compression strength of the concrete was maximum compared to the addition of other percentages of bentonite powder.. This concrete reduces the construction cost and also promotes lesser usage of cement and fine aggregate. This study concludes that with usage of bentonite powder and glass powder, the strength and durability of the concrete can be increased and with further research and studies, more performance of the concrete can be extracted.

Keywords: *Bentonite Powder, Glass Powder, Partial Replacement.*

BIODIESEL PRODUCTION FROM AGRO BIOMASS USING HETEROGENEOUS CATALYST

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Abstract: Industrial development is associated with an increasing in pollution levels and rising fuel prices. Research on clean energy contributes in decreasing global warming impacts (significant environmental benefits), reducing emissions gases. The developing of renewable energies increases the energy independence and impacts on agriculture in a positive way. Transesterification reaction of triglycerides to produce fatty acid methyl ester (FAME) was investigated by using agro biomass and doped metal oxide as a heterogeneous solid basic catalyst. The influence of different parameters conditions such as the catalyst weight % base oil weight, mass ratio of methanol to oil, operation time, reaction temperature and mixing intensity on the yield and properties of the produced biodiesel were studied The used catalyst and the produced biodiesel were characterized by using techniques of gas chromatography (GC), X-ray diffraction (XRD), BET surface area measurement (BET) and viscometer. The results indicate the influence of the various reaction conditions such as molar ratio of methanol to oil, mass ratio of catalyst to oil and reaction temperature on the on the yield and properties of the obtained biodiesel yield.

Keywords: *Biomass, Bioenergy, Heterogeneous catalyst, Transesterification, Biodiesel, Sterculia Foetida.*

STABILIZATION OF EXPANSIVE CLAY USING CRUSHED STONE DUST AND ALCCOFINE

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Abstract: Expansive clay is a soil that is prone to large volume changes (swelling and shrinking) that are directly related to changes in water content. Soils with a high content of expansive minerals (Montmorillonite) can form shrinkage cracks in drier seasons and swells during rains, thus damaging the structure. Structure or roadway needs a stable foundation to ensure the best construction and durability. The foundation itself must rest on a strong soil that is able to transfer the entire load of the building adequately. If the soil is weak, over a period of time it will compact and settle. Crushed Stone Dust (CSD) is a waste byproduct produced during the process of crushing the stones. Crushed stone or angular rock is a form of construction aggregate, typically produced by mining a suitable rock deposit and breaking the removed rock down to the desired size using crushers. Alccofine is a micro-fine material of particle size much finer than other hydraulic materials like fly ash, ground granulated blast furnace slag (GGBS), silica fume. Laboratory tests was conducted on locally available expansive clay to classify the soil based on its index properties. Soil specimen for unconfined compression test and California Bearing Ratio (CBR) test was prepared based on the optimum moisture content and maximum dry density obtained from Standard proctor test. Alccofines was added to the expansive clay and crushed stone dust in varying percentages (2.5%, 5%, 7.5%, 10%,12.5%,15%), to determine the optimum percentage at which maximum strength of soil will be observed in Unconfined Compression test and CBR test.

Keywords: *Alccofine, Expansive clay, Unconfined Compressive Strength.*

STUDY ON STRENGTH PROPERTIES OF BASALT FIBRE REINFORCED CONCRETE WITH SUPPLEMENTARY CEMENTITIOUS MATERIALS

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Abstract: Fibre-reinforced concrete (FRC) has tiny, uniformly spaced fibres throughout its matrix. The purpose of this study is to look into how the properties of concrete are affected by adding alccofine and coconut Shell Ash (CSA) to basalt fibre. In our project, we kept alccofine and coconut shell ash as constant as 10% replacement of cement and varied addition of basalt fibre in different percentages such as 0.5% to 1.5%. Tests for compressive strength, split tensile strength, and flexural strength are all part of the experimental research. The findings demonstrate that basalt fibre, alccofine, and CSA improve the mechanical qualities of concrete. The compressive strength of the concrete is reduced with a higher percentage of Basalt fibre. When compared with the conventional mix concrete, there is approximately 13.32% increase in the compressive strength of the concrete by replacing cement with 10% of alccofine and 10% of coconut shell ash in the presence of 1% of Basalt fibre. The flexure strength and split tensile test strength was maximum at 1% of basalt fibrewith comparison with conventional concrete. When compared with the conventional mix concrete, there is approximately 14.03% increase in the split tensile strength of the concrete by replacing cement with 10% of alccofine and 10% of coconut shell ash in the presence of 1% of Basalt fibre. The concrete's strength is also increased by the inclusion of basalt fibre as reinforcement. Therefore alccofine, CSA, and basalt fiber together can be considered as sustainable and effective solution for producing high-strength concrete.

Keywords: *FRC, Basalt fibre, CSA.*

STUDY ON PROPERTIES OF ROOT REINFORCED SOIL AND MONITORING FLOODING CONDITIONS USING SENSOR FOR MITIGATING DISASTER

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Abstract: A review of the body of knowledge on soil erosion, flooding and the use of vegetation in soil reinforcement is the first step in the project. The literature review recognises the possible advantages of employing plant roots to reinforce soil and emphasises the significance of soil reinforcement in reducing the consequences of erosion and flooding. The study evaluates the physical characteristics of root-reinforced soil using a number of laboratory tests. These tests consist of permeability, unconfined compression test, and field density by core cutter. The research assesses the impact of fast-growing Vetiver grass (Chrysopogon zizanioides). Vetiver grass is an excellent choice for preventing river bank erosion because of its unique qualities such as its fast growing root system and resistance to wide range of temperature. The study involves the comparison of characteristics of the soil with and without roots. The project's overall goal is to create long-term approaches to increase soil strength and reduce erosion. To complement the root reinforced soil, the project will also construct a sensor-based flood monitoring system for anticipating and detecting flood situations and using this information to offer early warnings and implement preventative measures. The study will shed important light on the possibility for using sensor-based monitoring systems and root-reinforced soil to lessen the impact of flooding-related calamities. The research will aid in the creation of eco-friendly and sustainable methods for reducing disaster risk and preparing for climate change.

Keywords: *Vetiver grass, unconfined compressive strength, Soil erosion, Eco-friendly.*

RECENT ADVANCES IN ROTAVATOR TO ENHANCE ITS PERFORMANCE

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Abstract: India constitutes 10 % of the world's tractor market share whereas in implements only 1 % market share of the world is held by India. Among implements, rotavator is one of the highest sold implements by volume. Hence advancement and improvement in performance of rotavator operation is of importance via advancement of technology. Currently there have been such advancements and the products are available in market to increase the performance of the rotavator. This study segregates the current advancement in rotavator technology into two section namely mechanical advancements and instrumentation-based system. Mechanical advancement technology includes multiple shaft rotavators, which aim to reduce operation time and achieve pulverization with a single pass. Another technology is the multi-rotor gear system, in which the drive ratio is changed manually or via a shift lever to provide different rotavator blade RPM for different crop and soil conditions in order to achieve desired performance. Since rotavator blades pulverize the soil, there has also been a lot of advancement in the design of blades, which is covered in this study. In instrumentation-based system, a digital rotavator system have been studied indicating the optimal zone of operation with rental and serviceability parameters intended to improve pulverization, achieve high field capacity and less fuel consumption. There has been study to indicate the ratio of peripheral speed of rotavator and forward speed of tractor through instrumentation to improve the pulverization over the current practice. This study intends to present a study on the current rotavator products being developed which are presently in operation to have a whereabout and comparison about the recent trend in advancement of the technology, the way forward and the amount of improvement from the earlier practices.

Keywords: *Implements, Pulverization, Rotavator, Soil, Tractor.*

EXPERIMENTAL STUDY ON STEEL FIBRE REINFORCED CONCRETE

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Abstract: The materials and mix proportioning for concrete grades M20, M25, M30 and M40 are among the different topics discussed. In order to strengthen the concrete's tensile, shear, flexure, and even compressive strength as well as its cracking resistance and reserve strength, work has been done because concrete in tension is weak. In order to examine the compressive strength, tensile strength, and flexural strength of concrete, M20, M25, M30, and M40 types of concrete have been added. Steel fibres serve as a bridge to slow the spread of cracks in concrete and enhance a number of its qualities. Concrete's ability to be worked is known to be considerably impacted by fibres. The variable in this investigation was the proportion of volume fraction of steel fibres (0.5, 1.0, 1.5, and 2.0), and the aspect ratio was (50). For the hardened properties, the concrete's compressive strength, splitting tensile strength, and flexural strength were measured. Their major objective is to make the material more resilient and capable of absorbing more energy. Nonetheless, the main goal is frequently to increase tensile and flexural strength as well. The ultimate strength showed a slight improvement. The addition of fibre greatly improved the ductility.

Keywords: *Steel fibre, increase tensile strength,steel fibre reinforced concrete.*

PARTIAL REPLACEMENT OF COPPER SLAG WITH FINE AGGREGATE USING PINEAPPLE LEAF FIBRE

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Abstract: Concrete is the substance that is utilized for construction projects the most frequently worldwide. Concrete is a commonly used building material. Cement, Coarse aggregate, Fine aggregate are the concretes primary ingredients. Fiber reinforced concrete (FRC) has tiny, uniformly spaced fibers throughout its matrix. The fibers used in FRC are normally added to the concrete mix in modest amounts often less than 5% by volume, and can be produced from a range of materials, including glass, steel, synthetic polymers, or natural fibers. The purpose of this study is to look into how the properties of concrete are affected by adding Pineapple leaf fiber (PALF) and Copper slag. In our project, we kept copper slag as constant as 50% replacement of fine aggregate and varied addition of pineapple leaf fiber in different percentages such as 0.5%, 1%, 1.5%. Tests for compressive strength, split tensile strength and flexural strength are all part of the experimental research. The findings demonstrate that copper slag and pineapple leaf fiber improve the mechanical properties of concrete. The concretes strength is also increased by the inclusion of pineapple fiber as reinforcement. Therefore copper slag and pineapple leaf fiber together can be considered as a sustainable and effective solution for producing high strength concrete.

Keywords: *Pineapple leaf fibre, Copper Slag, High Strength Concrete, Improves Mechanical Properties.*

STUDY ON UTILIZATION OF MARBLE DUST AS PARTIAL REPLACEMENT OF CEMENT IN CONCRETE

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Abstract: This study investigates the potential use of marble dust as a partial replacement of cement in concrete. Marble dust is a waste material generated from the marble processing industry and poses environmental challenges. The use of marble dust, the cost of construction also gets escalated and also leaving the waste materials to the environment directly can cause environmental problem. Hence the reuse of waste material has been emphasized. Blended cements based on the partial replacement of Portland cement clinker (PC) by wastes have been the subject of many investigations in recent years. The advancement of concrete technology can reduce the consumption of natural resources and energy sources and lessen the burden of pollutants on environment. The use of the replacement materials offer cost reduction, energy savings, arguably superior products, and fewer hazards in the environment. The study aims to reduce the amount of cement used in concrete and provide an eco-friendly alternative for disposing of marble dust. The experiment was conducted by replacing 5%, 10%, 15% and 20% of cement with marble dust in concrete mixes. The physical and mechanical properties of the concrete mixes were evaluated, including compressive strength, tensile strength, flexural strength, and water absorption. The results indicate that incorporating marble dust up to 10% can improve the strength and durability of concrete while reducing the environmental impact. Therefore, it is concluded that the use of marble dust as a partial replacement of cement in concrete can be a sustainable solution for waste management and contribute to the construction industry's sustainable development.

Keywords: *Marble Dust Powder, Partial Replacement of Cement.*

MILD STEEL PIPE BEND MATERIAL WEAR CHARACTERIZATION WITH DIFFERENT SIZE OF EMERY PAPER

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Abstract: Pneumatic Conveying Systems (PCS) transport dry material powders mixed with air from one place to another in industries like pharmaceuticals, ash handling, cement, etc. during transportation the bend got eroded due to the striking of abrasive particles on the bend's outer periphery. This will create huge bend damage and result in bend puncturing. Due to puncture very costly powder waste took place. There are many types of wear like abrasive, fretting, plastic deformation and superplastic flow will occur and a combination of these wear make an erosion pattern. This study focused on abrasive wear of bend material pins of different sizes on discs made by different emery papers of numbers 80, 100, and 150. Wear behavior and coefficient of friction are taken into consideration. Results are analyzed and found that as grit size increased then wear rate increases. If we use fine powder instead of coarse powder, then it will be impactful. If we use fine powder instead of coarse powder, then it will be impactful. At 80 number emery paper wear rate is more because MEP is more and hence wear rate, as well as coefficient of friction, is more.

Keywords: *Abrasive Wear, Coefficient of Friction, Emery paper, Pin on Disc(POD) and L 9 array.*

A REVIEW PAPER ON DIFFERENT TOPOLOGIES OF DSTATCOM

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Abstract: This paper presents a comprehensive study of the Distribution Static Compensator used for compensating reactive power, power factor correction, harmonics suppression, and unbalance in the distribution system produced by various loads. This review aims to provide a wide range of architecture and topology of DSTATCOM. Many research publications on topologies and configurations of Distribution Static Compensators have been thoroughly reviewed and classified for quick reference.

Keywords: *CSC(Current Source Converter), Distribution Static Compensator(DSTATCOM), Power Quality, VSC(Voltage Source Converter), VSI(Voltage Source Inverter).*

STUDY ON THE CHARACTERISTICS OF CONCRETE WITH PARTIAL REPLACEMENT OF WOLLASTONITE POWDER WITH CEMENT

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Abstract: Cement is the foremost ingredient of Concrete, which binds other materials in concrete such as Fine and Coarse Aggregate. But the manufacturing of cement clinker involves in huge amount of CO_2 emissions that it accounts to as much as 8% of the total global CO_2 emissions. So the necessary need for replacing cement with another material which also does not reduce the strength of concrete is thereby inevitable. Wollastonite ($CaSiO_3$) is an abundantly available raw material found in countries like USA, China, Mexico, Canada and India. It is mined in several parts of India such as Rajasthan, Tamil Nadu, Uttarkhand, and Andhra Pradesh. Since it is abundant it can be obtained for a low cost compared to cement and also reduce the overall cost of construction. Pure Wollastonite is bright white in color and has similar chemical properties as that of cement composing of 48.3% of CaO and 51.7% of SiO_2. Unlike Cement, Wollastonite does not need any manufacturing process and are only crushed to obtain Wollastonite powder. This Wollastonite powder can then be used to partially replace cement upto 30%. In this project we perform experimental studies to determine the optimum percentage of Wollastonite powder to partially replace cement in concrete without negatively affecting the strength of concrete. For determining the strength characteristics design mix is prepared by replacing cement with percentages of Wollastonite such as 0% (conventional mix), 5%, 10%, 15%, 20%, 25%, 30% and tested for compressive strength test and flexural strength test. It is finally found out during our test that replacing Wollastonite by 10% the compressive strength and flexural strength of the concrete increases compared to that of all other percentages of Wollastonite replaced cement concrete and also that of conventional concrete. So, it is concluded that 10% Wollasonite replacement for cement in concrete as the optimum percentage.

Keywords: *Wollastonite, CaSiO3, CaO, SiO2, CO2.*

PARTIAL REPLACEMENT OF FINE AGGREGATE BY WASTE FOUNDRY SAND IN PAVER BLOCKS

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Abstract: Waste foundry sand is a by-product from the manufacture of ferrous and nonferrous metal casting include waste foundry sand. Currently, landfills receive the vast majority of the waste foundry sand (WFS) produced worldwide. Due to problems with WFS disposal, the metal casting industry has begun recycling WFS. WFS is a prospective material that could be used in concrete as a partial replacement for river sand. In order to lower building costs and environmental impact, using these wastes in the production of concrete may be a valuable tactic. The utilization of waste materials is one feasible alternative in the building industry to achieve sustainable growth as the sector is emerging as a developing potential in the nation due to this development there is a rise in raw materials. The goal of this project is to investigate the partial substitution of fine aggregates in paver blocks with waste foundry sand. Cement, fine aggregate, and coarse aggregate are all components of mortar. The plan is to replace fine aggregate with waste foundry sand in the casting process by 10%, 30%, and 50%, respectively. During a 28-day curing period, the cast specimens are examined for their compressive strength, flexural strength, and water absorption properties. After comparing the findings to the nominal mix strength criteria, the results are finally concluded.

Keywords: *Waste foundry sand , paver blocks, Environment friendly.*

LSTM-RNN BASED IDENTIFICATION OF FAKE PROFILE IN SOCIAL MEDIA

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Abstract: The increasing prevalence of fake profiles in social media has become a major concern for users and platform operators alike. In this work, we propose an LSTM-RNN based system for fake profile identification in social media. Our model is trained on a large dataset of real and fake profiles, allowing it to learn the patterns and characteristics that distinguish between them. The performance of our model was evaluated on a validation dataset and found to be highly accurate.

Keywords: *LSTM-RNN, Online Identity, Social Network Analysis, User Authentication, User Behavior, User Profiling, User Verification.*

TRANSFORMING NON-FUNCTIONAL CNC MACHINE JAWS INTO EFFICIENT PRODUCTION JAWS

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Abstract: In this project, to transform the unusable soft jaws of CNC machines into functional jaws at a low cost. These jaws play a crucial role in gripping the component to the lathe chuck. However, due to the constant need to alter the dimensions of the jaws for different workpieces with varying diameters, and the wear and tear caused by repetitive use, the jaws need to be replaced frequently, leading to higher production costs. To address this issue, the concept of reusability has been explored, wherein defective components produced in the manufacturing process are used to extend the lifespan of CNC jaws through welding and cutting process. By welding the defective workpiece onto the depreciated jaws, we can attain perfection in the jaws using gas welding and CNC lathe operations, resulting in a reduced cost of production and effective reuse of waste components.

Keywords: *Unusable jaws, defective workpiece, concept of reusability.*

SULLAGE MANAGEMENT SYSTEM

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Abstract: Sewage water contains toxic gases that can harm both humans and the ecosystem. Unfortunately, India lacks a proper monitoring system for detecting toxic gases in sewage. Exposure to sewage gases can cause serious health issues such as fatigue, loss of appetite, and even death. To address this issue, an IoT-based monitoring system is proposed that detects the presence of toxic gases, their level, and flow of sewage water in real-time. The system is equipped with various sensors such as odor, electrolysis, electromagnetic, gas detecting, flow detecting, and catalytic diffusion sensors to detect toxic gases. When the level of toxic gases increases beyond the normal range, the system sends an SMS alert to the main authority responsible for managing the sullage area. The proposed system uses Java for both frontend and backend. By implementing this monitoring system, the risk of disease-causing situations due to toxic gases can be greatly reduced.

Keywords: *Flow, IOT, Sensors, Sewage.*