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### SUMMARY OF PUBLICATIONS IN SCOPUS INDEXED JOURNALS - 2019

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Department of Civil Engineering
The National Institute of Engineering, Mysuru

Performance of Hybrid Fibres on Mechanical Properties of Self-Compacting Concrete at Elevated Temperature

N Suresh¹, B P Sachin²

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ABSTRACT

Purpose – The present experimental investigation attempts to study the behaviour of hybrid fibre-reinforced self-compacting concrete (HFSCC) subjected to elevated temperature. The purpose of this study is to find out the performance of hybrid fibres of 0.5 per cent by volume of concrete (out of which 75 per cent are steel fibres and 25 per cent, polypropylene fibres). Reinforced beams were casted and tested for the flexural load-carrying capacity, and comparisons were made with the load-carrying capacity of reinforced beams without the inclusion of fibres. Design/methodology/approach – The study includes 60 concrete cubes of 150 mm and 60 beams of 150 _ 150 _ 1,100 mm reinforced with minimum tension reinforcement according to IS 456-2000. The specimens were subjected to elevated temperature from 100°C to 500°C with an interval of 100°C for 2 h. The residual compressive strength and the load-carrying capacity of beams for 5-mm deflection were measured. Parameters such as load at first crack, width and length of cracks developed on the beam during the application of load were also studied. Findings – The result shows that for self-compacting concrete without fibres (SCCWOF), there is a gain in compressive strength between 200°C and 300°C, beyond which the strength decreases. For HFSCC, the gain in strength is between 300°C and 400°C, and thereafter the strength gets reduced. The load-carrying capacity of beams reduces with an increase in temperature. An increase in load-carrying capacity (up to 40.7 per cent) for HFSCC beams is observed when compared to SCCWOF beams at 500°C.

*Full paper: Journal of Structural Fire Engineering, Vol.10, Issue 2, 2019*
Experimental Investigation on Geopolymer Concrete Subjected to Elevated Temperature

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ABSTRACT

Geopolymer concrete can be expressed as "concrete without cement". Geopolymer concrete is environmentally friendly and an inventive way to replace the conservative concrete which contributes 7-8% of total CO2 production in the world - “The concrete which entails the source materials and the alkaline solution”. The source material can be from agricultural wastes such as Bagasse ash, Rice husk ash, Palm fuel ash, etc and the industrial by-products such as Fly ash, Ground Granulated Blast Furnace Slag, Copper Slag, etc. The alkaline solutions can be either sodium hydroxide and sodium silicate or potassium hydroxide and potassium silicate. In the present study, an effort has been made to check the likelihood of reuse of bagasse ash in Geopolymer Concrete by probing mechanical properties of M30 grade concrete for 0, 25, 50, 75 and 100 percent replacement by bagasse ash. The behavior of 100% GGBS replaced concrete under elevated temperature by weight loss, residual strength, cracking pattern and spalling pattern.

Feasibility of Greywater Treatment with River Sand and Polypropylene Pall Rings as Filter Media

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ABSTRACT

There is an increase in scarcity of water with rapid population increase in urban areas giving reason for concern and the need for appropriate water management practices. Greywater recycling is emerging as a new trend in water management practices. Initiatives by the Urban Local Bodies (ULBs) have resulted in attempting the greywater recycling in urban areas, flats and apartments and also in individual houses. A rational design is not available for greywater recycling unlike domestic wastewater. Hence, a study was taken in National Institute of Engineering (NIE), Mysuru campus to evaluate the feasibility of treating greywater using river sand and PPPR. The methodology involved designing, fabricating and installing a greywater treatment model in NIE campus. Greywater treatment system installed in NIE campus consisted of anaerobic and aerobic treatment units. The system was monitored over a period of time to check the performance. The sampling of greywater was done weekly and the samples were analyzed for different water quality parameters like pH, TDS, TSS, BOD, COD, turbidity and nutrients. The greywater treatment system with river sand and PPPR as anaerobic and aerobic filter media was effective in removing the turbidity, TSS, COD, BOD and nutrients from the greywater samples to significant extent. It has shown moderate efficiency in removing TDS compared to other parameters.

*Full paper: International Journal of Recent Technology and Engineering (IJRTE), Vol. 8, Issue-2, 2019*
Incorporation of Long Term Climate Changes in Hydrological Modelling

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\textsuperscript{2}Department of Civil Engineering, The National Institute of Engineering, Mysore

ABSTRACT

One of climate change's most important concerns at the moment is its impact on hydrology as it has direct links with agriculture, vegetation, and livelihood. This study tries to analyze potential future climate change in the Kumaradhara river basin. This study involved three steps: (1) acquiring and using general circulation model (GCM) to project future global climate scenarios; (2) establishing statistical relationships between GCM data and observed data using Statistical Downscaling Model (SDSM); (3) downscaling the second generation Canadian Earth system Model (CanESM2)GCM output based on the established statistical relationship. The statistical downscaling is carried out for three scenarios used in the fifth evaluation report of the recent Intergovernmental Panel on Climate Change (IPCC) viz., Representative Concentration Pathways (RCPs) 2.6, 4.5 and 8.5. The statistical downscaling Model (SDSM) results showed that the mean annual daily precipitation is altered in the basin under all the scenarios but it will be different in different time periods depending on scenarios and the basin will experience the reduced precipitation levels in summer. Also the precipitation will marginally rise in all the time slices with reference to baseline data. We can conclude from the results that this region's climate will affect future farming as the availability of water is bound to change. This study should, however, be followed up by a larger study incorporating multiple CMIP5 models such that changes in hydrological-regimes can be examined appropriately. Keywords: climate change impacts; general circulation model; CanESM2; RCPs; Statistical downscaling; SDSM

Micro-Behavioral Study of Bagasse Ash Based Geopolymer Concrete

T M Savitha¹, Y M Manjunath², Dilip Srinivas³

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²Department of Civil Engineering, The National Institute of Engineering, Mysore
³Assistant Manager in L & T CTEA, Mysore

ABSTRACT

Cement manufacturing industries which emits about 7% of CO2 to the environment causing pollution. So, in order to avoid pollution problems there is a need to find an alternative binding material. Wastes like agricultural or industrial in the form of ash can be utilized as a substitute for cement. In this research work, Ground Granulated Blast-furnace Slag(GGBS) and Sugarcane Bagasse ash(SCBA) is used as a complete replacement to cement so as to form Geopolymer concrete(GPC). Two different SCBA sources which has high amount of silica content is considered for the partial replacement of GGBS in varying percentages like 5%, 10%, 15%, 20%, 25%, 30% to determine mechanical and microstructure properties. A 5M alkaline solutions of Sodium hydroxide and Sodium silicate is used. In this work, mechanical properties of GGBS-SCBA based GPC which includes compressive strength, split tensile strength, flexural strength and microstructure properties of SCBA samples by X-ray Fluorescence (XRF), Energy Dispersive spectroscopy (EDS), X-ray Diffractometer (XRD), Scanning Electronic Microscope(SEM) techniques are determined and analyzed on different GPC mix proportions.
Implementation of Techniques and its Management on Constructional Activities

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¹,²,³,⁴ Department of Civil Engineering, The National Institute of Engineering, Mysore

ABSTRACT

Precast construction is a time effective technique which consumes less time than cast-in-situ technique for execution. Savings of time in construction would compensate the overall profit for the owner. Precast technology achieves better concrete quality control with less wastage of materials. In this paper, G+3 commercial multi-storied building is planned and compared with the precast construction and cast-in-situ construction for cost analysis using Payback Period Method and Net Present Value Method. Scheduling is done using Primavera. Primavera (P6) turns out to be competent tool in monitoring, scheduling, controlling and updating the project at any stage of construction process. Through payback period it is able to deduce that, the initial investment can be recovered approximately one month before the cast-in-situ method when we are employing precast approach. Also, considering investment criteria i.e. Net present value method shows that, a higher profit is obtained towards the investment in precast than in cast-in-situ method. Hence, precast construction method proves to be profitable when compared to conventional method of construction.

A Study on Influence of LDPE on Properties of Bitumen Pavement Under Submergence Condition

Hema H1, Veena K2

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ABSTRACT

Now a days, the bituminous pavements are expected perform better since there is steady increment in high traffic intensity and there is significant change in daily and seasonal temperature. In addition, the performance of bituminous pavements is found to be very poor in moisture induced situations. Over the years, the presence of moisture has been major cause for pavement failure. Moisture damage leads to stripping which is the disintegration of binder from the aggregates. Research has indicated that the addition of polymers to asphalt binders helps to increase in the bond between the aggregate and the binder which can enhance many properties of the asphalt pavements to help meet the above mentioned demands. Plastics are used extensively in day to day life and there are tonnes of wastes are generated. The safe disposal of these plastic wastes poses a major problem to society by considering the surrounding environment. It is because plastic is a non-biodegradable product and hence using this as an additive is considered to be beneficial. In the present study, an attempt has been made to study the influence of partial replacement of Low density polyethylene (LDPE) wastes in bituminous pavement when submerged in water between 1 to 4 days. Various percentage of LDPE i.e. 2%, 3%, 4%, 5%, 6% were mixed with bitumen and subjected to Marshall test. And various engineering properties were studied and compared between with and without LDPE content. Mainly this study focused on the effect of LDPE waste on the Marshall stability and loss in stability by using retained Marshall Stability theory. The results revealed that 5% addition of LDPE gave the best results on all soaking days. Hence LDPE is therefore can be recommended as a good hydro-carbon additive for the reduction in loss of stability.

*Full paper: International Journal of Engineering Research & Technology (IJERT), Vol. 8 Issue 06, 2019
ABSTRACT

Water resources are stressed because of the country's increasing population and increased water requirements. Even though a good understanding of both surface and groundwater hydrological systems make it possible to manage these resources properly. To study the main characteristics of formation of clusters of groundwater levels, statistical analysis has been used. Geostatistics is a class of statistics used to analyze and predict the values associated with spatial or spatiotemporal phenomena. It incorporates the spatial (and in some cases temporal) coordinates of the data within the analyses. The Statistical analysis is applied to monthly groundwater levels fluctuation data over a period of 2004-2017 in Mysuru, Mandya, Chamarajanagara and Hassan districts of Southern Karnataka in India. The groundwater levels data is collected from 197 Observation Wells from the districts. The Statistical methods like K-Means Clustering and Agglomerative Hierarchical Cluster Analysis is used to perform the datasets. Grouping is made using AHC method, during this process results are obtained by graph called Dendrogram. The obtained results are compared with the LULC maps of all 4 districts. Different grouping (cluster) is made for groundwater level fluctuations for proper conclusion to arrive.

*Full paper: International Journal of Engineering and Advanced Technology (IJEAT), Vol. 9, Issue-1, 2019*
Feasibility of Flyash based Geopolymer for Soil Stabilization

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¹,²Department of Civil Engineering, The National Institute of Engineering, Mysuru

ABSTRACT

Soil stabilization is the process of enhancing the soil properties and making it fit for engineered purposes. The common stabilizing techniques are becoming expensive day by day due to the rise in cost of stabilizing agents which forces to find an alternative economical stabilizing agent. Thus this study aims to improve the properties of the soil by adding the waste materials like flyash and geopolymers as stabilizing agents. The soil compressive strength and water absorption for different alkaline solution to solid ratio were studied by casting stabilized soil blocks. The solid here is represented by the mixture of red soil and flyash. It was evident from the Unconfined Compressive Strength (UCS) tests that as the alkaline solution to solid ratio increases, the compressive strength also increases. Optimum ratio of 0.2 was selected based on the workability conditions. It was observed that soil blocks show a decrease in 13 per cent strength than the UCS test samples prepared from the same ratio. It is evident to conclude that allowing a tolerance of 1 per cent variation, the strength of the soil blocks will remain in constrain of 12 to 15 per cent of the UCS sample test value.

Modeling Lateral Placement and Movement of Vehicles on Urban Undivided Roads in Mixed Traffic: A Case Study of India

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¹Department of Civil Engineering, The National Institute of Engineering, Mysuru
²Department of Civil Engineering, National Institute of Technology, Mangalore
³Department of Civil and Environmental Engineering, Indian Institute of Technology Tirupati

ABSTRACT

In India, the majority of urban roads are undivided where the behavior of flows in a particular direction is predominantly influenced by the opposing traffic. Due to lack of lane segregation, the vehicles in ongoing direction occupy the opposing lane, which increases the lateral interactions between vehicles. These lateral interactions are influenced by various parameters such as vehicle types, driver behavior and vehicular speeds. Study of such complex interactions plays an important role in evaluating various management measures using microscopic simulation models. The lateral characteristics of vehicles, such as placement, separation and movement, act as necessary input for simulation models. The present study aims to analyze and model the lateral characteristics of vehicles on two-lane urban undivided roads. To achieve this, traffic flow data were collected from an urban undivided mid-block section in Bangalore City, India, using video graphic technique. Multiple linear regression model was developed for predicting the lateral placement of subject vehicle and it was found that lateral placement of subject vehicle is influenced by types and speeds of subject and opposing vehicles. Lateral separation for different types of ongoing (subject) and opposing pairs was also analyzed. The results show that both the ongoing and opposing vehicles have less freedom to move laterally when their sizes increase and hence, lateral separation decreases. The choice of path of vehicles' lateral shifts (left, current and right) on urban undivided roads was modeled using multinomial logistic regression. Lateral shift of a vehicle is influenced by speeds of subject vehicle and leader vehicle in current path, speed of leader vehicle in target path, and lateral gap between leader vehicles in current path and target path.

*Full paper: International Journal of Traffic and Transportation Engineering, 2019*
Studies on the Structural Characteristics of Laterite Blocks and Masonry in Puttur Area of Karnataka, India

Ganesha Mogaveera¹, G Sarangapani²

¹Professor and Head, Department of Civil Engineering, Mangalore Institute of Technology & Engineering Moodbidri
²Department of Civil Engineering, The National Institute of Engineering, Mysuru

ABSTRACT

From water transport studies it has been found that laterite blocks requires at least 20 to 25 minutes immersion in water at the time of construction. The compressive and shear bond strength varies from 0.29 MPa to 0.83MPa Laterite blocks are widely used for load bearing masonry. Laterite blocks are usually found in heavy rain fall areas all over the world. The characteristics of laterite blocks vary from place to place. There is a wide variation in the property and appearance of laterite blocks. They are used in natural form without any manufacturing process. Several investigators have evaluated the characteristics of laterite blocks and laterite blocks masonry. However the information available on the characteristics of locally available laterite blocks of are scanty. As such a detailed experimental investigation has been made to know the characteristics of laterite blocks masonry constructed using locally available laterite blocks and cement mortars. Three different proportions of cement mortars have been tried. The water transport phenomenon, masonry compressive strength and shear bond strength has been obtained for each case. Compressive strength has been obtained through stack bonded masonry prisms of five block height, whereas the shear bond has been determined through masonry triplets.

*Full paper: Journal of Geotechnics and Engineering Structures (JGES) Vol. 6, Issue – 1, 2019*
A Comparative Study on RCC Structures  
(Frame, Infill, Bracings, Wire Frame and Shear Wall)

S D Sneha¹, H Hema², R Abishek³
¹²Department of Civil Engineering, The National Institute of Engineering, Mysuru  
³Yasha’s Consultants, Mysuru

ABSTRACT

The RCC structure is popular in the modern era because of the various benefits it has got to offer. There is a need to study the behaviour of RCC structures. In the present study, multi-storey building of G+9 structure situated in a high seismic area is analysed for gravity and lateral loads. The following six models are analysed. Model-1: Frame structure, Model-2: Infill, Model-3: X-Bracings, Model-4: Diagonal Bracings, Model-5: Introducing Shear wall at corners, Model-6: Wire Frame. A typical G+9 structure is analysed and designed (only columns) as per IS codes. The structure is analysed for gravity and earthquake load. Earthquake load is carried out by equivalent static analysis and response spectrum method (RSM). Models are analysed using ETABS 16:2:1. The analytical model of the structures includes all the important components that influence mass, strength, stiffness and deformation of the structure. After the analysis, the design of columns is carried out for all the models to check the steel quantity requirement for the structural member. The results obtained from analysis are plotted to compare the behaviour of RCC structures for the models that are analysed in the present study. The aim is to study the behaviour of structure like base shear, displacement, storey drift, natural time period and frequency and mode shapes. The design is done for columns, for every storey, the steel requirement is calculated for all the six models for comparative study. The cost comparison is made from the economy point of view.

*Full paper: Sustainable Construction and Building Materials, pp 99-114, 2019*
Reinforced Concrete Jacketed Column and its Formwork

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¹Student, Department of Civil Engineering, The National Institute of Engineering, Mysuru
²Department of Civil Engineering, The National Institute of Engineering, Mysuru

ABSTRACT

This study focuses on the planning and designing of a multistory building. Further, understanding the structural system of the designed building and its performance with respect to structural design forms an integral part of the study. While designing the building, certain material characteristics have been assumed and characteristics of the materials assumed in the design is verified for the suitability in the design. Assuming failure in one of the columns, retrofitting scheme have been suggested for the same, and also related tests are performed regarding the process of retrofitting by RC jacketing of short columns. A prototype of formwork system for jacking has also been prepared for the same as an extension of this study.

An Experimental Investigation on Flexural Behaviour of Reinforced Self-Compacting Concrete Beams at Elevated Temperatures

N Suresh¹, B P Sachin²

¹,²Department of Civil Engineering, The National Institute of Engineering, Mysuru

ABSTRACT

This paper deals with the effect on mechanical properties of Self-Compacting Concrete (SCC) subjected to sustained elevated temperature. Experimental investigations were carried to find the behavior of Self Compacting Concrete for compressive strength, split tensile strength and flexural behavior. The experimental program was carried on cubes, cylinders and reinforced beams to study the effect of sustained elevated temperature on SCC. The specimens were subjected to elevated temperature between a range of 100 °C to 600°C at an interval of 100 °C for a period of 2 hours. The observations show that there is an increase in compressive strength up to 300°C and found to decrease beyond this temperature. It is also been observed that tensile strength and load carrying capacity of the beam is inversely proportional to the temperature.

The Worthiness of Using Information on Land-Use–Land-Cover in Watershed Models for Western Ghats: A Case Study

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²BGS Institute of Technology, Bellur, Mandya

ABSTRACT

The variable source area (VSA) theory of runoff generation mechanisms has been proved to hold good in many wet mountainous areas, decades ago. According to this theory, infiltration-excess overland flow is limited to very small areas in mountainous and forested catchments. But, the perception that the land surface characteristics, including land-use–land-cover (LULC), form the major factors influencing the response of the catchment to rainfall has dominated the thought in hydrology to such an extent that models based on the overland flow theory continue to be used even in such areas. The present study was taken up in order to understand the worthiness of using parameters, including the curve number (CN), that are based on the physiographic characteristics of the catchment in a watershed model designed to estimate runoff in the wet mountainous areas of the Western Ghats in southern India, where the VSA theory has been proved to hold good. The study has been accomplished by applying the NITK model developed for estimating runoff using daily rainfall data. This model is believed to estimate reliably the streamflow in the region using parameter values that can be computed from catchment characteristics. In the present study, it is applied on three gauged streams in the region of Western Ghats in Karnataka. Initially, the performance of the model has been studied with the parameters fixed using the catchment characteristics. Later, the model has been used as a tool to test hypotheses concerning the catchment response, by varying the parameter values, adopting a trial and error procedure. Initial results showed that the model performance is poor as the coefficients of efficiency vary between -66.9 and 82%. The sensitivity analysis carried out subsequently showed that the model parameters are required to be altered greatly for good performance and that the model simulations are not sensitive to the parameter CN. Further, the performance of this model was compared with that of a VSA model, known to suit the region well. This showed that even after all the changes in the model parameters, the model results are not highly reliable. Hence, in order to understand the reasons for the poor performance of the model, a technique was developed to compute the CN values that would be actually necessary to simulate daily direct runoff (DRO) reliably in this method, the daily values of CN are computed by applying backwards the expression for runoff on the DRO estimated by the VSA model. The variations in the values of CN computed using this method are then studied. It is found that the variations in daily CN are high and highly random too, whereas the NITK model uses only three fixed values of CN. It is thus concluded that factors other than those on which the CN is popularly believed to depend control the runoff generation in the region and that influence of LULC on runoff is not discernible at all from the kind of data that is commonly available.

*Full paper: Journal of Earth System Science, Vol. 128, Issue 1, 2019*
Dynamic thermal performance of conventional and alternative building wall envelopes

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2Centre for Sustainable Technologies, Indian Institute of Science, Bangalore
3Department of Civil Engineering, Indian Institute of Science, Bangalore

ABSTRACT

The current study investigates the thermal performance parameters of the building wall envelopes. The two wall systems, homogenous and composite wall envelope configurations were considered in this study by adopting conventional and alternative building materials. The study is based on theoretical investigation in evaluating the thermal performance parameters of the building envelope by adopting admittance method and finite difference methods. The effects of various wall configurations on time lag and decrement factor, interior surface instantaneous thermal load and the influence of exterior surface heat transfer coefficient on the time lag and decrement factors have been studied. Even dynamic thermal performance parameters such as thermal admittance, decrement factor, surface factor and its time leads and heat capacitance, effect of thermal conductivity and optimum thickness for maximum energy storage also studied. The study results reveal the impact of various building material thermal properties and its configurations as envelope on the thermal performance parameters. Â© 2018 Elsevier Ltd

*Full paper: Journal of Building Engineering, Vol.21, pp.373-395, 2019
Effect of Exclusive Bus Lane on Travel Time for Urban Mid-Blocks

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¹Department of Civil Engineering, The national Institute of Engineering, Mysuru
²,³,⁴Under Graduate Student, Department of Civil Engineering, The national Institute of Engineering, Mysuru

ABSTRACT

In most of the developing nations such as India, traffic flow is heterogeneous in nature with mix up of different vehicles having varying static and dynamic characteristics and vehicle in such stream follow no-lane discipline. According to Annual Report by Ministry of Road Transport and Highways, number of registered vehicles in India is increasing at a rate of 12 % per year. This is mainly due to rapid urbanisation which in turn leads to various traffic problems such as peak hour congestion, delay, pollution, and accidents further reducing the capacity of existing road system. In most of the cases existing road capacity cannot be improved by constructing additional lanes due to lack of resource and right of way. In such cases traffic control and management measures play crucial role to improve the capacity of existing system. One such traffic management measure is provision of exclusive bus lane by allocating a reserved lane on urban arterials to exempt buses from other private vehicles. The effect of these Exclusive bus lanes (XBL) on travel time under mixed traffic flow can be analysed through microscopic traffic simulation packages such as VISSIM. Previous studies show that, provision of XBL cuts down the journey time and travel time gets reduced which motivate the people to become more reliable on mass transportation system (Yang and Wang, 2009; Vedagiri and Jain, 2012; Raj et al., 2013; Syed et al., 2016; Abdilfatah and Wahid, 2017).

*Full paper: International Conference on Innovative Trends in Civil Engineering for Sustainable Development (ITCSD), 2019
Characterization of Compacted Fine-grained Soils

H S Prasanna¹, Basavaraju², A R Chaitra³

¹,²,³ Department of Civil Engineering, The National Institute of Engineering, Mysuru

ABSTRACT

Compaction control is the most significant factor affecting the behaviour of earth work projects constructed with compacted fine-grained soils. The durability and stability of a structure are related to the achievement of proper soil compaction. Correlating engineering properties with index properties have assumed greater significance in the field of geotechnical engineering. In the present experimental study, an attempt has been made to establish the correlations between index properties of soils with the compaction characteristics of soils having different clay mineralogy altogether for varying energy levels. The compaction characteristics can't be explained only by liquid limit and plasticity index of the soils but more effectively by plastic limit of soils. It can be concluded that these correlations can be used for predicting the compaction characteristics of soils in field compaction works.

*Full paper: IGC-2019 Indian Geotechnical Conference, Indian Institute of Science Bengaluru, 2019*
Comparative Study on Influence of Lead Rubber Bearing on RC Structures with Flat Slab and Conventional Slab System under Seismic Loading

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ABSTRACT

The main objective of isolation system is to elongate the structural time period, thereby shifting the natural period of the structure from the predominant periods of earthquake. Isolator mainly does three roles: energy dissipation, rigidity, and horizontal flexibility against lateral loads. The aim of my project is to study the responses of the structure for flat slab and beam slab system of RC structure by response spectrum analysis. The modeling and analysis of the structure are carried out using ETABS 2016 software. The dynamic properties of the structure such as base shear, storey drift, time period, and storey displacement are found, and the comparison is made between them.

Department
of
Mechanical Engineering
Influence of Water Ageing on Mechanical Properties of CaCO3 Filler Filled Epoxy Resin and Sansevieria/Carbon Fiber Reinforced Composites

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ABSTRACT

The present paper studies water absorption behavior and its consequence on mechanical properties of untreated and chemically treated Sansevieria/carbon fiber reinforced hybrid epoxy (Sria/CF-Ep) composite with calcium carbonate (CaCO3) nanoparticles. Sansevieria/carbon fiber (30/5 wt%) reinforced hybrid epoxy composite with 1.5, 3 and 4.5 wt% of CaCO3 have been developed by hand lay-up method followed by heat press. The water absorption characteristics of the Sria fibers were obtained by immersing the composite samples in sea water at room temperature, until reaching their water content saturation level. The dry and water-immersed hybrid composite samples were subjected to hardness, interlaminar shear, tensile, flexural, and impact tests. The water absorption development of hybrid composites was found to follow Fickian diffusion behavior. Diffusion coefficients and maximum water uptake results were evaluated; the outcome showed that both increased with an increase in filler loading to study the consequence of water penetration in the fiber/matrix interface. The study shows that the mechanical and water-resistant properties of the Sria were improved through chemical treatment and hybridization. Nevertheless, as a result of water penetrating the fiber/matrix interface, longer water-immersion times reduced the tensile and flexural strength of the composites. Keywords Epoxy, Sria, Nano CaCO3, Sea Water, Mechanical Properties

*Full paper: Open Journal of Composite Materials, 2019*
Role of Nano-CaCO$_3$ on Mechanical and Thermal Characteristics of Pineapple Fibre Reinforced Epoxy Composite

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ABSTRACT

In current research work, influence of nano-calcium carbonate (N-CaCO$_3$) with different filler loading (1, 3 and 5 wt%) on the mechanical behavior and thermal stability of pineapple fibre reinforced epoxy (PF/Ep) composites were considered. Hand lay-up method and ultrasonication method were used for the fabrication of agglomeration-free composite slabs. Test results showed that upon incorporation of N-CaCO$_3$ up-to 3 wt% enhanced the tensile, flexural properties and fracture toughness. Impact test results also showed an improvement in impact strength of N-CaCO$_3$ filled PF/Ep composites at 1 wt%. Thermal stability of PF/Ep composites was analyzed using thermo gravimetric analysis (TGA), and the data showed that the thermal stability of N-CaCO$_3$ filled PF/Ep composite was better when compared to unfilled PF/Ep composites.

*Full paper: Material today proceedings, 2019
Metallic nanofillers effect in assessing the abrasive wear performance of carbon fabric reinforced epoxy composites

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ABSTRACT

The potential of metallic nanofiller reinforcement in the carbon fabric reinforced thermoset polymers for bettering the abrasive put on resistance has no longer been explored so far. Hence a sequence of 5 composites of epoxy (Ep) matrix bolstered with high strength carbon fabric (CF/Ep) and aluminium (Al) and zinc (Zn) nanoparticles (0.5 and 1 wt. %) used to be fabricated by hand layup method and three-body abrasive put on overall performance of these composites alongside with the mono-composite (CF/Ep) was once evaluated. A composite slab used to be abraded against free silica sand particles under unique loads/distances. It used to be determined that both Al and Zn nanofillers revealed extensive potential to improve abrasion resistance of mono-composites. The hardness of the composites, however, should no longer be correlated with the abrasive wear performance. Worn surface evaluation by scanning electron microscope on the other hand, helped to correlate the abrasive wear performance of the composites with the worn surface topography, failure of fibers, resin and their interface. Difference in the failure-mode of the fibers/fillers used to be notion to be broadly speaking accountable for controlling the abrasive put on performance of the epoxy composites.

*Full paper: AIP Conference Proceedings, Vol. 2057, Issue 1, 2019*
Tribological Characterization of Recycled Basalt-Aramid Fiber Reinforced Hybrid Friction Composites using Grey-Based Taguchi Approach

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ABSTRACT

Fibers play an imperative role in determining the tribological behavior of reinforced friction composites. The objective of the present study is to develop recycled basalt and recycled aramid fiber reinforced hybrid friction composites with the addition of various fillers and optimizes the tribological behaviors of the composites. The pin-on-disc test rig was used to conduct dry sliding wear following Taguchi’s L₂⁷ orthogonal array with process parameters of the applied load, sliding speed and the weight percentage of fiber content. Grey relational analysis was adopted for tribological parameters optimization, satisfying multiple performance characteristics. Analysis of variance was used to find the contribution of individual factors that affect tribological behavior. Optimal parameter combination for multi-response characteristics of the friction composite under investigation was applied a load of 15 N, sliding speed of 1 m s⁻¹ and composite with 25 weight percent of fiber content. The results showed that addition of fiber content significantly increased wear resistance of the friction composites. Further, from the scanning electron microscopy images of friction and wear tested friction composites, plateau formation, fiber-matrix debonding, fiber pull out, cracks and damage on the matrix and various wear mechanism were identified.

*Full Paper: Materials Research Express, Vol. 6, Issue 6, 2019*
Role of Nano-Fillers on Tribological Behaviour of Ultra High Molecular Weight Polyethylene Composites

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ABSTRACT

An investigation has been made of the dry slithering wear and two-body abrasive wear (2-BAW) performance of ultra high molecular weight polyethylene (UHMWPE) loaded up with carbon nanotubes (CNTs) and copper nanoparticles (n-Cu). Tribological tests were carried out utilizing a pin-on-disc test rig employing EN32 steel and SiC emery paper as counterparts against UHMWPE composite glued to a circular pin, under different test circumstances. Scanning electron microscopy (SEM) was expended to dissect the morphologies of chosen worn surfaces. The configurations of friction coefficient (µ), weight reduction and explicit wear rate (Ks) were assessed in adhesive wear-mode and the Ks in the event of multi-pass 2-BAW mode under various dissociate/masses. It has been demonstrated that inclusion of exceptionally little extents (0.1 and 0.5 wt%) of nano-fillers has resulted in significant improvement in the slithering wear performance. Moreover, 1-D filler (CNTs) diminished the contact surface, advanced the exchange of UHMWPE and diminished the interlocking and furrowing of the composite from the steel partner, which added to the reduction of both Ks and µ. UHMWPE loaded up with 0.5 wt% CNTs has outpaced the material system in the study group in tribological properties. Abrasive wear assessment revealed that the UHMWPE composites demonstrated diminished Ks with expanding abrading distance and coarseness of SiC emery paper. Further, UHMWPE/CNTs demonstrated good resistance to abrasion wear in contrast with unfilled UHMWPE and n-Cu filled UHMWPE composites.

*Full paper: Material today proceedings, 2019*
The Effect of Boron Carbide on the Mechanical Properties of Bidirectional Carbon Fiber/Epoxy Composites

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ABSTRACT

This research work based on carbon fiber epoxy (CF/Ep) composites shows the effect of Boron carbide B₄C filler on mechanical properties using a hand layup procedure followed by the vacuum bagging process method. The boron carbide fillers were uniformly dispersed in epoxy resin and used as matrix material. The weight percentage of (B₄C) filler material in the composite was varied and mechanical properties were obtained with microfiller. The T800CF/Ep composites with 1%wt., 3%wt. and 5%wt. B₄C fillers were taken for evaluating the mechanical properties. All composites were fabricated with an equal weight percentage of carbon fiber and a similar consolidation process. The mechanical properties like tensile properties, flexural properties, interlaminar shear strength, impact strength and hardness are studied to know how the mechanical response of composite structures varies with filler addition. Testing followed the trend of 1%wt. > 3%wt. > 5%wt. of B₄C in all mechanical properties of B₄C filled CF/Ep composites. Tensile strength of 1%wt. B₄C filled composites was better than basic CF/Ep composites whereas 3%wt. & 5%wt. B₄C filled composite values were lower. The tensile modulus of all the B₄C filled composites was better than basic CF/Ep composites whereas 3%wt. & 5%wt. B₄C filled composite values were lower. Flexural properties of 1%wt. and 3%wt. B₄C filled composites were better than basic CF/Ep composites whereas 5%wt. B₄C filled composite values were lower. Interlaminar shear strength (ILSS) of 1%wt. B₄C composites gave better results whereas 3%wt. and 5%wt. B₄C filled composites gave lower results. The impact energy of all composites gave lower values than basic CF/Ep composites. Hardness values of all B₄C filled composites were better than basic CF/Ep composites. The most important developments in the mechanical properties of composites are further supported by scanning electron microscopy.

*Full paper: Material today proceedings, 2019*
Utilizing Vacuum Bagging Process to Prepare Carbon Fiber/Epoxy Composites with Improved Mechanical Properties

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ABSTRACT

This research paper based on bidirectional carbon fiber/epoxy composites (CF/Ep) shows the effect of fiber architecture on mechanical properties using a hand layup procedure followed by the vacuum bagging process method. The three different fiber architectures T800CF/Ep, T700CF/Ep and T300CF/Ep were chosen for studying the mechanical properties. All composites were fabricated with an equal weight percentage of carbon fiber and a similar consolidation process. The tensile properties, flexural properties, interlaminar shear strength, impact strength and hardness are studied to know how the mechanical response of composite varies with fiber architecture. Testing results showed that the effect of fiber weave architecture is more obvious in CF/Ep composites than in neat epoxy with regard to mechanical properties. Both tensile and flexural properties showed that T800CF/Ep composites have a very good strengthening effect on both tensile load response and bending load response of CF/Ep composites. The fiber architecture has less effect on the density and serious effect on the strength and deformation of CF/Ep composites. Inherent properties and weaves structure of carbon fiber (CF) dictated the performance of composites. Compared to Hand layup method, the Vacuum bagging method showed (2–6)%,(11–15)%,(5–6)%,(15–20)% and (1–3)% improvement in tensile strength, tensile/flexural modulus, ILSS, impact strength and hardness respectively whereas the flexural strength values were almost near to the former values Grunenfelder et al. (2017). The most important developments in the mechanical properties are further assisted by scanning electron microscopy.

*Full paper: Materials Today Proceedings, 2019
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Optimization of Wear Behaviour of Boron Nitride Filled Polyaryletherketone Composites by Taguchi Approach

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ABSTRACT

This research article intends to portray the act of boron nitride (BN) filler (0–30 wt %), functional load, sliding speed and sliding distance on the tribological wear conduct of polyaryletherketone (PAEK). The main purpose is to investigate the impact of the above mentioned factors on the specific wear rate ($K_s$). These composites are manufactured by methods for extrusion pursued by injection moulding procedure. Friction and wear failure information are gathered utilizing Pin-on-Disk wear test rig. At all tribo-test conditions, the friction coefficient ($\mu$) and $K_s$ diminishes up to 10 wt% of BN and after which it augments. Optimization of the tribological performance was directed by Taguchi plan of trials to investigate the $K_s$. The $K_s$ of unfilled PAEK is in the order of $4.48 \times 10^{-6}$ mm$^3$ Nm$^{-1}$, while the $K_s$ of 10 and 30 wt% BN filled PAEK is $1.21 \times 10^{-6}$ and $0.22 \times 10^{-6}$ mm$^3$ Nm$^{-1}$ correspondingly. The best outcomes are seen at a BN stacking with 10 wt%. Sliding distance was found as the most persuasive factor influencing the wear conduct of PAEK-BN composites, other variables like load, filler wt% and sliding speed likewise had a segment to play in achieving the least $K_s$. Worn surface morphology was contemplated utilizing scanning electron microscopy.

*Full paper: Materials Research Express, Vol. 6, Issue 8, 2019*
The Effect of Hexagonal Boron Nitride on Wear Resistance under Two and Three-Body Abrasion Modes of Polyetherketone Composites

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ABSTRACT

This investigation was performed to study the effect of hexagonal boron nitride (hBN) on abrasion wear behaviour of polyetherketone (PEK) composites. PEK composite were examined for two-body abrasive wear (2-BAW) with silicon carbide abrasive paper and three-body abrasive wear (3-BAW) test with silica sand according to ASTM standards. The Taguchi L9 design of experiment was employed to optimize the wear operating parameters. The optimized conditions with 10 N loads, 320 grit size and 10 wt% of hBN resulted minimum specific wear rate (Ks). Unfilled PEK portrayed better impact strength, hardness, lower density and lower Ks under 3-BAW. However, 10 wt% of hBN was beneficial under 2-BAW condition. The SEM micrographs were analyzed to probe the wear mechanism involved in the abrasion process. Surface roughness (Ra) value measured was compared with Atomic Force Microscopy (AFM) and it was found that both the values are in good agreement. Multi-objective optimization by ratio analysis (MOORA) was implemented to rank the overall performance of PEK composites under study.

Mechanical and Abrasive Wear Behaviour of Waste Silk Fiber Reinforced Epoxy Biocomposites Using Taguchi Method

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ABSTRACT

The aim of this research article is to study the static mechanical properties and abrasive wear behavior of epoxy biocomposites reinforced with different weight percentage of waste silk fibers. The effect of parameters such as velocity (A), load (B), fiber loading (C) and abrading distance (D) on abrasive wear has been considered using Taguchi's L₂⁵ orthogonal array. The objective is to examine parameters which significantly affect the abrasive wear of biocomposites. The addition of silk fiber has resulted in improved flexural properties of the epoxy matrix. The results of ANOVA indicated that the parameter which played a significant role was abrading distance followed by fiber loading, load and sliding velocity.
Mechanical and abrasive wear behavior of cenosphere filled carbon reinforced epoxy composites using Taguchi-Grey relational analysis

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ABSTRACT

Carbon fabric reinforced Epoxy (C-E) composites filled with different weight percentage of silane treated flyash cenosphere (CSP) particles were synthesized using hand layup process followed by compression moulding method. The fabricated samples were subjected to mechanical tests and two body multipass abrasive wear test (2BMAW) in accordance with American society for testing and materials (ASTM). Mechanical results showed addition of CSP particles in C-E composites tends to improve property such as density, hardness, flexural and impact strength. Meanwhile Taguchi method with Grey relational analysis (GRA) was implemented for 2BMAW test to optimize the wear process parameters with multi-response characteristics. Filler wt% (Filler content), Grit size of abrasive (emery paper), sliding distance (m) and Load (N) were selected as wear process parameters for which responses were coefficient of friction (COF), specific wear rate (SWR) and hardness (BH) of the composites. Analysis of variance (ANOVA) result based on grey relational grade (GRG) revealed that filler wt% (filler content) and sliding distance were found as most significant process parameter influencing the wear performance of the composites by 55% and 19% respectively followed by Grit size of emery paper and applied load. Finally microstructure analysis of the fractured and worn sample has been studied using scanning electron microscope to understand the mode of failure mechanism.

*Full paper: Materials Research Express, Vol. 6, 2019*
Static and Dynamic Mechanical Performance of Carbon Fiber Reinforced Polyethersulfone Composites

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ABSTRACT

This study has been carried out to demonstrate the effect of short carbon fiber (SCF) loading on static and dynamic mechanical performance of polyethersulfone (PES) composites. Different combinations of SCF/PES composites were prepared by extrusion followed by injection molding. The static mechanical properties such as hardness, tensile and flexural properties of PES based composites were analyzed following ISO standards. As engineering materials, the polymer composites with high modulus as well as excellent damping properties are of great interest in aerospace and automotive industries for severe dynamic environment. Furthermore, in addition to static properties of composites, dynamic mechanical behaviour of PES based composites was evaluated. Mechanical test results showed that increasing the SCF wt. % in the composites increases the hardness, tensile and flexural properties. Furthermore, the optimal SCF loading was found to be 30 wt. % for significantly improving the overall composite mechanical performance. Upon the reinforcing of SCFs, an improvement in the storage modulus was found. Based on the fractographic analysis, orientation and aligned structure of carbon fibers, good bonding of fibers within the matrix and better fiber-matrix interaction were the primary reasons leading to the improvement of mechanical properties. The optimized composite (PES with 30 wt. % of SCF) could be used in automotive components like frames, flap covers and gears of printing machinery.

Dry Sliding Wear Performance of Thermoplastic Copolyester Elastomer Composites

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ABSTRACT

This research work uncovers the wear performance of short glass fiber (SGF) fortified thermoplastic copolyester elastomer (TCE) hybrid composites loaded up with both micro (short carbon fibers, PTFE, SiC, Al2O3 and MoS2) and nano (Al2O3 and PFPE) sized particulate fillers. The readied hybrid composites are tested for tribological performance using pin-on-disc test rig. Test outcomes uncovered that TCE hybrid composite strengthened with SGF and loaded up with PTFE, SiC, Al2O3 and MoS2 displayed better wear resistance, however TCE hybrid composite loaded up with nano lubricating filler i.e. PFPE displayed slightest friction coefficient (µ) in the investigation. This study additionally archives the impact of tribological control factors such as sliding distance, sliding speed and filler content on tribological conduct of TCE composites in terms of specific wear rate (Ks) and µ.

Microstructure and Abrasive Wear Behaviour of Nickel Based Hardfacing Stainless Steel Deposited by Gas Metal Arc Welding

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ABSTRACT

Wear is one of the foremost issues faced in manufacturing industries that reduces the lifestyles of machine elements and will increase the running costs. Therefore, hardfacing is extensively employed by industry professionals to minimise the wear of moving components. In this research work, a nickel based alloy recognized as Hastelloy C-276 was strengthened on stainless steel (316L) substrate via the usage of Gas Metal Arc Welding (GMAW) technique. The coating thickness used to be assorted was from 1 to 3 mm on the substrate. The optical microstructure of the interface revealed the defect-free fusion between hardface and substrate metals. Microhardness (Hv) and three-body abrasive put on test have proven that the hardfaced alloy metal posses higher hardness and effective wear resistance. The worn surface morphologies have been found using SEM in order to perceive the involved wear mechanisms.

Role of Zirconia Filler on Mechanical Properties of HDPE/UHMWPE Blend Composites

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ABSTRACT

Hybrid composites based on high-density polyethylene-grafted maleic anhydride / ultra-high density polyethylene loaded with short glass fiber (SGF) and zirconia (ZrO₂) micron sized particles were fabricated by melt-mixing process and their physical and mechanical properties were determined. Physio-mechanical properties such as density, hardness, flexural properties and impact strength of these composites were studied. The presence of SGF and ZrO₂ in the grafted HDPE/UHMWPE blend increased the hardness, bending strength and modulus. However, impact strength decreased with increase in ZrO₂ loading. Further, it was found that the HDPE/UHMWPE blend with 25 wt. % SGF and 2.5 wt. %ZrO₂ showed optimum mechanical properties due to improved fiber/matrix adhesion. Scanning electron microscope was used to identify the fractographic features of the selected fractured coupons.

Role of Zirconia Filler on Mechanical Properties and Dry Sliding Wear Behavior of Glass/Basalt Hybrid Fabric Reinforced Epoxy Composites

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ABSTRACT

This paper presents the effect of zirconia filler on mechanical properties and dry sliding wear of bidirectional hybrid (glass and basalt fiber) fabric reinforced epoxy (G-B/E) composites. Fabrication was done by hand layup method followed by compression molding. The effect of zirconia filler loading on mechanical characteristics like hardness, tensile and flexure of fabricated G-B/E composites were determined according to ASTM standards. Also, wear behavior under dry sliding condition was performed using pin-on-disc machine for different applied normal loads/sliding distance. Experimental results reveal that incorporation of zirconia filler improves the mechanical properties. Further, the wear test results indicated addition of zirconia into G-B/E hybrid fiber composites plays important role on specific wear rate under the tribo-conditions selected for the study. Further, inclusion of zirconia into G-B/E composites shows improved wear resistance and addition of 6 wt. % of zirconia exhibits least specific wear rate compared to other hybrid G-B/E composites. In addition, Scanning electron microscope images of selected mechanical test fractured coupons also have been discussed.

Role of Fillers on Physico-Mechanical Properties of POM Based Hybrid Composites

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ABSTRACT

Silicone (SC) and polytetrafluoroethylene (PTFE) reinforced polyoxymethylene (POM) composites have been fabricated by melt mixing followed by injection moulding. Physical and mechanical properties of SC and SC+PTFE/POM composites have been investigated as per ASTM standards. The dispersion of fillers in POM was studied by using scanning electron microscopy (SEM). The effects indicated that the hardness of the POM matrix decreases with increasing the SC content and slight increase in hardness was found in SC+PTFE/POM. The mechanical performance of the composites are investigated by means of a well known universal testing machine and notched Charpy impact tester. The POM with 10 wt. % of SC binary composite reveals good mechanical properties. The tensile and flexural properties of SC+PTFE/POM hybrid composites are higher than that of 20 and 30 wt. % SC reinforced POM binary composites. Further, these mechanical strength and impact toughness are established on the kind as nicely as filler loading over the full range of the study. The uniform dispersion of the filler in the POM matrix is obtained from SEM micrographs. Furthermore, SEM was used to identify the fractographic points of the tensile fractured POM based composites.

Tribological Behaviour of Pongamia Oil as Lubricant with and without Halloysite Nanotubes using Four-Ball Tester

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ABSTRACT

This investigation is conducted to obtain the wear and friction behavior of halloysite nanotubes (HNTs) as an antiwear additive to bio-based pongamia oil. The tribological tests were carried out using a four-ball tester (ASTM D-4172). The variation of viscosity of bio-based pongamia, madhuca indica and neem oils is also evaluated in conformity with IP70/62. The test results were compared with synthetic petroleum-based lubricant (SAE20W40). The experimental test data showed that pongamia oil containing HNTs (1.5 wt.%) has superior tribological characteristics and smoother wear scar diameter compared to other combinations of pongamia oil without additives and other bio-based oils.

*Full paper: AIP Conference Proceedings, Vol. 2128, Issue 1, 2019*
The current experimental toil is embraced to investigate the thermal conduct of short glass fiber (SGF) fortified thermoplastic copolyester elastomer (TCE) hybrid composites loaded up with both micro (short carbon fibers, PTFE, SiC, Al₂O₃ and MoS₂) and nano (Al₂O₃ and PFPE) sized ceramic particulate fillers. The composite test coupons are produced by compounding in twin screw extruder followed by injection molding. The readied hybrid composites are evaluated for thermal conduct in thermal gravimetric analysis (TGA). The outcomes uncovered that the TCE and their composites displayed the degradation in three phases. The degradation temperature of the composite expanded with the expansion in fiber and filler content. Notwithstanding, softening temperature of the TCE composites did not modified impressively within the sight of fiber and fillers.
Effect of Nano Filler Reinforcement on Mechanical Properties of Epoxy Composites

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ABSTRACT

Nano-sized functional fillers, such as Nano-clay (N-C) and Nano-calcium carbonate (N-CC), have attracted a great deal of awareness due to their unexpected intrinsic properties. Extensive research has been done on clay material for epoxy nanocomposites but only a few have ventured into a comparison with other Nanofillers. In this paper, a study has been made of the mechanical properties of epoxy containing N-C and N-CC fillers. These composites were studied for their mechanical properties such as hardness, tensile, flexural and impact strength as per ASTM standards. Fraction of void cohort in the samples was quantified following the rule of mixture. Experimental results demonstrated that incorporation of N-C fillers expanded the hardness, impact strength and module of epoxy nanocomposites. However, the tensile and flexural properties have shown declining trend for N-C/N-CC nanocomposites. The morphological and fractographic features were examined utilizing scanning electron microscopy.

Analytical Modeling of Railway Suspension System using MATLAB Simulink

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ABSTRACT

In this paper the performance of quarter railway suspension system is investigated using MATLAB Simulink under step input condition of the track. Integral Coach Factory (ICF) Bogie is considered for the Analytical Modeling. A linear dynamic system model of quarter ICF Bogie is made and according to the model the mathematical equations are written. The equivalent Simulink model corresponding to the equations are made in MATLAB Simulink. The system is simulated under step input condition of the track to get the performance characteristics such as displacement, velocity and acceleration. The result shows that for the given step input, the major vibrations occurring to the bogie frame and the coach. These vibrations of the ICF Bogie affect the ride comfort of the passenger. The addition of proper controlling element like hydraulic actuator controlled by PID controller to the suspension system of ICF Bogie is suggested in order minimize the vibrations and to achieve the ride comfort for the passenger.

*Full paper: International Journal of Recent Technology and Engineering (IJRTE), Vol. 8 Issue 1S2, 2019*
Numerical and Experimental Investigation of Vibration Isolation of Three-storied Building Structure using Tuned Mass Damper

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ABSTRACT

A tuned mass damper (TMD) is a passive energy dissipating device which is comprised of a mass, spring and a damper. The idea behind this type of dampers is that if a smaller mass is attached to the multiple degrees of freedom system and its parameters are tuned precisely, then the oscillation of the whole system can be reduced by this smaller mass. In this work, different dampers of different frequencies were designed and integrated with the three-storied building frame model to minimize its first mode of vibration along x-axis at a frequency of 3Hz. The best suitable damper was determined through the numerical analysis was then fabricated and tested for the validation of the result. It was found that for the TMD of 3Hz the reduction in the response of the structure was found to be around 83.72%.

*Full paper: International Journal of Recent Technology and Engineering (IJRTE), Vol. 8 Issue 1S2, pp: 141-149, 2019
Surgical robotics has evolved over the years and is now drawing a lot of attention. With the advancements in technology, innovation and the Information technology revolution, extensive use of robots in surgery shall be a reality in the years to come. Artificial Intelligence is now being extensively explored in the area of medicine and personalized healthcare, leading to extensive research and development in these areas. This paper attempts to dwell in brief of the available literature on the use of robots in surgery, its development and evolution and the challenges to improve surgical outcome. The paper concludes by presenting a framework to integrate the variables and its effect on the robot assisted surgery.
Implementation of Lane Centering Algorithm using Model Predictive Controller

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ABSTRACT

This paper insists a controller is foremost advisable for lane centering algorithm. Its main objective is to minimize the lateral offset and heading error which are the inputs to the controller, while steering angle be the output. The ciphering of the Controller has been done by choosing Model Predictive Controller for lane centering. The error in the steer angle is been reduced to keep the optimal control of the dynamic vehicle through compilations of Matlab/Simulink and Carsim at different vehicle velocities. The results from simulations proves that MPC is most acceptable in reducing the error and make the system more efficient by minimizing the computational gist and better lane centering interpretation.

Automated NetAct Integration Process using Robot Framework

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ABSTRACT

This Process automation refers to the use of digital technology to perform a process or processes in order to accomplish a workflow or function. Here the process of NetAct integration is being automated to reduce the human efforts. NetAct is an EMS (Element Management System) which is used to supervise Network Elements by checking Dynamic adaptation, alarms (Fault Management - FM), configuration (Configuration Management - CM) and the performance (Performance Management - PM) of a Bare-metal and VNF. The Process of NetAct integration consists of seven phases which need to be carried out one after the other successfully with validation.

Design & Development of a Prototype of an Agri-bot for Multiple Farming Applications & n,p, k Sensing (Nitrate, Phosphorus, Potassium)

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ABSTRACT

The purpose of the project is to execute the design of a multi purpose agricultural robot that will be utilized for assessing and smartly monitoring soil nutrient quality. Same should be capable of traversing on uneven, irregular terrains, of lightweight, but powerful design. The vehicle so designed can also be adapted in future to perform weeding, fertilizer spraying, seeding operations. Since it is an autonomous vehicle, a GPS mechanism can be augmented to monitor its movement and tracking of various field and site conditions, as a futuristic development.

ABSTRACT

This paper describes smart containers, a system for automatically maintaining inventory status of any items for the purpose of updating the users. Containers were instrumented with embedded system with level sensor to determine the height of dry/liquid goods commonly stored in it. The containers periodically “wake-up” and communicate to a base station regarding their inventory status, the fill status is automatically updated using the same sensor. The volume is displayed by graphical user interface using geometrical parameters of the container based on user requirements.
Design and Development Automated Food Maker

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ABSTRACT

Today our lives are hurried and busy. We want to experience more and achieve more. This pursuit of fitting more into each day leaves little time for the most important factor which affects our quality of life- the food we eat. Many great innovations have come which help us to monitor our health, sleep, steps, pulse to live better. But the problem of eating fresh & healthy without any hassle is yet to be addressed. Unfortunately, mornings are hectic for most people, especially families with children. In the current day situation it is very difficult to cope up with hunger pangs. Most people usually rush through the meal, gobble down whatever’s handy in the kitchen, or grab a quick, on-the-go bite. That’s where the Automated food Maker comes to the rescue. It’s all about making a fresh food that one can grab and go. All it needs is to add the necessary ingredients and then selecting the preset menu of various dishes. In a very quick time, a perfectly cooked food is ready to eat. The user can customize their food with a practically endless variety of fresh ingredients. It lets the user enjoy a homemade food, made their way, in the comfort of their own kitchen in a completely automated way. Cleanup is easy because all removable parts go in the dishwasher.

Influence of S0 Type of Addendum Modification on Sliding Performance of Spur Gears

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ABSTRACT

The effect of S0 type of addendum modification on sliding velocity of the involute spur gear has been studied. For the analysis four critical points such as Beginning of Engagement, Low Point of Single Tooth Contact, High Point of Single Tooth Contact and Disengagement point corresponding to pinion are considered. Length of approach and length of recess for modified gears are evaluated. Effects of addendum modification on contact fatigue life and wear prediction are discussed. Product of contact stress and sliding velocity at critical points for varied addendum modification factor X are evaluated, and its effect on sliding velocity has been analysed. Effect of change in value at critical points of contact for modified gear pair on Hertzian fatigue is discussed.

*Full paper: IOP Conf. Series: Materials Science and Engineering, 2019*
Evaluation of critical speed for aluminum boron carbide metal matrix composite shaft

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ABSTRACT

This work deals with finding an alternative lightweight material over conventional materials for manufacturing drive shafts. Drive shafts are a key component for transmitting power from one end to the other. However, the conventional materials used for producing drive shafts pose several disadvantages especially concerning with their weight. Conventional drive shafts are susceptible to large vibration during high-speed traversing because of truncated strength-to-weight ratio. The work aims at improving the critical speed of the specimen by proposing a new composite material made of aluminum matrix reinforced with boron carbide (B₄C) particles. Specimens with weight percentage 0, 3, 6, 9, 12% of reinforcement were manufactured through stir casting technique. The work has established a new lightweight material with enhanced critical speed which can be used for various high-speed applications. Other important mechanical properties like hardness and tensile strength were also analyzed. Modal analysis was carried on the specimens using ANSYS 15 Workbench. © Springer Nature Singapore Pte Ltd. 2019.

*Full paper: Lecture Notes in Mechanical Engineering, pp. 527-534, 2019*
Areca Short Fiber Reinforced Polylactic Acid (PLA) Composites: Influence of Physical Treatment on Properties

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ABSTRACT

There is growing need to develop new biodegradable composite material which are eco-friendly and at the same time cater to the product application requirements. The research emphasis on study the properties of composites prepared by arbitrarily distributed UV treated areca fibers with Polylactic acid. Ultraviolet – a physical surface treatment has been carried out to treat areca short fibers which have been extracted from areca husk. Surface treatment significantly improves the bond between the fiber- matrix interface. The preparation of test samples has been performed using plain Polylactic acid, Polylactic acid - untreated areca short fiber (PLA-UnASF) and Polylactic acid - UV treated areca short fiber (PLA-TrASF) as per ASTM standards by means of injection moulding method. Varying fiber loading viz., 10%, 20%, 30% and 40% by weight have been utilized to develop test specimens. Developed composites have portrayed for properties like density, moisture absorption, mechanical - tensile strength and modulus, flexural strength and modulus, izod impact strength, hardness, electrical - dielectric strength, thermal – TGA and DSC and soil degradation. The results indicate an improvement in strengths of composite with increase in fiber loading and physically treatment. This new material can be utilized for house hold appliances, automobiles and industrial applications.

Investigation and Simulation of Mechanical Properties of W & Al2O3 Thin Films Co-Sputtered on SS304 Substrates

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ABSTRACT

Tungsten (W) and Alumina (Al2O3) thin films developed on SS304 substrates have been made under various deposition conditions of magnetron co-sputtering. Deposition Conditions have been defined using the DOE approach. Measured thicknesses of films have been ranges from 130.5 nm to 445nm. Thin films have assessed by means of mechanical properties viz., Young's modulus (E) and hardness (H). Assessment has been done by using the nanoindentation experiment and the numerical simulations. Nanoindentation experiment has been conducted for five different thickness’s values. These results were processed to simulate for remaining deposition conditions in order to achieve more information. Experimental results and simulated values have been summarized as a final opinion. Based on these results, best E and H mechanical properties have been selected to present optimum condition. Optimum condition has been found for thin film thickness 419 nm.

*Full paper: International Journal of Recent Technology and Engineering (IJRTE) Vol. 8 Issue-1S2, pp 150-153, 2019*
Fabrication and Performance of Areca Short Fiber Polypropylene Composite at Varying Fiber Loading

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ABSTRACT

The primary focus of this research is to study the density, impact strength, hardness and dielectric properties polypropylene areca fiber composite reinforced with randomly distributed and varying areca fiber loading. The test samples of plain polypropylene, polypropylene areca fibers composites have been prepared as per ASTM standards using injection moulding technique. Different fiber weight loading fractions (10%, 30%, 50%, & 70%) have been used to prepare test samples. The developed polypropylene areca fiber composites have been characterized for density, izod impact strength, hardness and dielectric strength test. Result showed that improvement in the properties of polypropylene areca fibers composites increase with fiber loading compare to plain polypropylene.

*Full paper: International Journal of Recent Technology and Engineering (IJRTE) Vol. 8, Issue 1S2, pp: 183-186, 2019
Influence of physical modification on Indian originated areca fiber based polypropylene composites: Mechanical and dielectric properties characterization

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ABSTRACT

Natural fiber based composite is one of the emerging materials which is being evolved in the recent past for the general applications. This is because of the abundant availability of natural fibers which are less expensive. The main advantage of natural fibers is low density, low cost, biodegradability, acceptable specific properties, less wear during extraction and during the preparation of composites. This research primarily focuses on the study of interfacial bonding between fiber and polypropylene, characterization of mechanical properties (tensile, compression, hardness) and dielectric properties of composites by reinforcing polypropylene with randomly distributed areca fibers. The extracted areca fibers were Ultraviolet treated to get better interfacial bonding between fiber and matrix. The test samples have been prepared as per ASTM standards for plain polypropylene, polypropylene-areca fiber (untreated) and polypropylene-areca fiber (UV Treated) composites using injection moulding technique. Different fiber weight loading fractions (10%, 20%, 30%, & 40%) have been used to prepare test samples. The test samples have then been characterized for mechanical properties-tensile strength, compression strength, flexural strength, impact strength, tensile modulus and flexural modulus, as well as for hardness and dielectric strength. The mechanical properties and dielectric strength were compared between the polypropylene reinforced with untreated areca fiber composites and polypropylene reinforced with UV treated areca fiber composites for different percentage of fiber loading.

*Full paper: AIP Conference Proceedings, Vol. 2057, Issue 1, 2019*
Comprehensive Investigation of Acrylonitrile-Butadiene-Styrene (ABS) Polymer for Weathering with the Combination of Different Blends of UV Stabilizers, HALS and Antioxidant

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ABSTRACT

The use of polymers in automobiles is increasing constantly and this trend is expected to continue. This clearly indicates that polymer are choice of materials in all the application sectors including in Automobile sector. The main properties in selecting the plastics materials as compared to other materials applied in automobiles are the aesthetic of automotive vehicles, their functionality and cost effective solution, as well as fuel efficiency. These materials are offer remarkable range of appealing properties, the effect of climatic conditions on the degradation and performance of these materials is not fully understood. It is necessary to know the variation of the mechanical properties of any polymer component in automobile after exposed to different atmospheric conditions before particular application. Generally when these components are subjected to weathering effects, they are prone to underperform. Therefore to improve their properties over time, different kinds of UV stabilizers, Hindered amine light stabilizer (HALS) and Antioxidant are used. However there is a need to study which UV stabilizers is to be used for the automobile applications polymers and what are its percentages? In this context, it is proposed to carry out a comprehensive investigation on degradation due to weathering of ABS polymer with the combination of different percentages of UV stabilizers, HALS and antioxidant. This paper briefly explains the effects of the weathering on the behavioral change of ABS polymer mechanical properties which is most commonly used by in automobile manufacturer. It also briefly discusses the methodology of accelerated weathering methods to help in evaluating the permanence of polymers components is also briefly discussed. The results after weathering and mechanical tests were discussed and optimized the percentage of blends as per the application.

*Full paper: SAE Technical Papers, Symposium on International Automotive Technology, 2019*
PLC Programming of an Inline Transfer Machine for the Production of the Core Bush of the Automobile Tyre Valve

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ABSTRACT

The Valve Stem is a pneumatic valve that admits pressurised air into the automobile tyre or tube and then closes to prevent leakage of the admitted air, thus keeping the tyre inflated. The Valve stem contains a spring assisted poppet valve called the valve core to perform this function. The bush forms the body of the core and provides complete sealing inside the tem in addition to providing a proper seating to the core inside the valve stem. The bush is produced on an inline transfer machine comprising several workstations that have individual functions. The raw material is progressively machined as it moves from one station to the next on a transfer mechanism, so as to get the finished product i.e. the bush, at the ejection station. The process of manufacturing the bush is carried out by PLC programming. An attempt has been made in this work to control the operations performed by this automated production line for the machining of the bush. The PLC programming is carried out in order to achieve control over every function of the machine, the workstations, poka yoke system and to enable easy fault traceability through the Human Machine Interface (HMI). Safety of the machine and the operator is realised through programming. The replacement of relay based hardwiring by PLC programming makes the control panel much more compact and troubleshooting significantly easier.

Architectural Framework for Industry 4.0 Compliance Supply Chain System for Automotive Industry

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ABSTRACT

The vision of Industry 4.0 impacts the mechanism as well as its benefits to the supply chain system. The biggest challenge to achieve a robust, stable and efficient eco-system for Supply chain system is to have an architecture that initiates the framework for both the eco-system and predictive analysis. This paper proposes an architecture that can be realized on the cloud infrastructure considering a 360° view of the requirements. The three-core component of the architecture includes cloud, analytics and Internet of Things. The synchronization of these core components aims to achieve reliability in optimal latency. The proposed novel architecture of SCM exploits the potential of the cyber-physical system, big-data and predictive methods to minimize the demand -supply gap irrespective of uncertainty and unpredictable events. The model validation is done by Delphi method of validation and case studies of automotive sector. It was found to be acceptable and useful for adopting the architecture for synchronized supply chain system to Industry 4.0 as well as provisions many disruptive innovations, which is quite useful for both social and economic view point.

X-Ray Diffraction – A Simplistic Approach Forperovskite based Solar Cells
Degradation Studies

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ABSTRACT

The efficiency of Perovskite Solar Cells increased from 3.8% to 22.1%, showing promising renewable energy resource to compete with conventional solar cells. However, low stability issue of perovskite is serious drawbacks which restrict outdoor applications. The degradation should rectify urgently to achieve long life. The degradation of perovskite films observed by lab based XRD and collects the sample status in terms of film stability. UV-Vis spectroscopy also utilized to understand optical properties, such initial study paves important way to understand the initial degradation of material and ways to solve them.

*Full paper: Materials Today Proceeding, In press, available online, 2019
Acquisition of Technological Capability by Firms in the Aerospace Cluster of Bengaluru

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ABSTRACT

Technological capability is believed to be the ability of a firm to make innovations in its products and manufacturing processes. It is especially important for SMEs to make informed choices of technology to meet global quality standards and adopt the best practices to ensure productivity. The acquisition of technological capability takes place through deliberate efforts by firms, which is characterised as technological learning mechanisms in the literature. This paper provides an assessment of the influence of technological learning mechanisms on the acquisition of technological capability of SMEs in the Bengaluru aerospace cluster in southern India. Firstly, a measure is developed to quantify technological capability at the firm level. Seventeen variables, which form the building blocks, have been factored into four factors in order to develop the measure called Technology Index (TI). Secondly, learning variables, which significantly influence technological capability, have been identified through regression analysis. Learning variables include education of CEO, years of operation in the aerospace industry and vertical collaboration. This analysis leads to important lessons for entrepreneurs and policy makers.

Reduction of Hexavalent Chromium (Cr6+) in Welding Fumes during Stellite Hardfacing with GTAW Process

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ABSTRACT

A novel technique to reduce emission during satellite hardfacing was developed with a single compound activating flux. The strategy of coating the precursor of nano alumina to the base material brought a noticeable reduction in Cr6+ concentration. The optimum combination of process parameters which favoured the maximum reduction in Cr6+ concentration in the welding fumes at the source was arrived using Taguchi methodology of experimental design. The maximum reduction of Cr6+ up to 34% was achieved from this novel technique.

* Full Paper: Materials Today: Proceedings, 2019
Corrosion Behaviour of ZrO2-TiO2 Nano Composite Coating on Stainless Steel under Simulated Marine Environment

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ABSTRACT

Nano structured ZrO2-TiO2 film coating was realized on AISI304 stainless steel using the sol-gel dip coating technique. The effect of coating on the corrosion resistance of steel was investigated in simulated marine water using potentiodynamic polarization measurement. The effect of coating process parameters on the corrosion rate was systematically investigated using the Taguchi methodology of DoE. The results reveal an appreciable enhancement of as much as 88.21% in corrosion resistance of stainless steel with the additional coating. The morphology, thickness and micro hardness of the coating were found to influence the corrosion resistance.

* Full paper: Materials Today: Proceedings, 2019
Analytical Study of Roughness on Tilted Pad Thrust Slider Bearing Improved by the Boundary Slippage

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ABSTRACT

Influence of roughness on conventional hydrodynamic lubrication of tilted pad thrust slider bearing is studied. Roughness effect is studied using Christensen stochastic process. To study the effect of roughness, bearing characteristics like load carrying capacity is analyzed.

Experimental Investigations on Free Vibration of Plates

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ABSTRACT

In this article, the natural frequencies, damping ratios, and damping constants of plates in different materials such as Steel, Aluminum, and Copper, with different boundary conditions like clamped-clamped-clamped-clamped (CCCC), clamped-clamped-clamped-free (CCCF), clamped-clamped-free-free (CCFF), clamped-free-free-free (CFFF) and free-free-free-free (FFFF), have been experimentally investigated. Natural frequencies obtained experimentally are compared to the natural frequencies obtained from numerical analysis using finite element analysis package ANSYS. The effects of different parameters like density, boundary conditions, and fixed edge length on free vibration characteristics of the plates are discussed. The damping ratios are determined experimentally, and the effect of boundary conditions on the damping ratio is also discussed.

Offset Policy and its Impact on Aerospace Industry in India

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ABSTRACT

Offset policy has been one of the policy instruments adopted by the Government of India (GoI) in order to promote local manufacture. Offset policy is believed to promote indigenous manufacture of high-end products and to facilitate creation of jobs. This paper probes the impact of offset policy on the Indian aerospace industry in the backdrop of extant literature. It draws parallels with similar policies in many other countries and provides useful perspectives about the efficacy and future scope of the policy.

*Full Paper: International Conference on Technology, Innovation, Entrepreneurship and Education, 2019*
Dry Sliding and Abrasive Wear Behaviour of Al-7075 Reinforced with Alumina and Boron Nitride Particulates

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ABSTRACT

Present research examination focuses on the surface morphology; mechanical properties and wear conduct of Al-7075 metal matrix composites reinforced with alumina and hexagonal boron nitride fillers. Particulate reinforced Al-7075 metal matrix composites were manufactured following the two step stir casting method with differing the weight percentage (2.5 and 5) of reinforcement. Uniform dispersion of alumina and hexagonal boron nitride in pure alloy was verified by optical microstructure. The fabricated samples were subjected to abrasion using dry sand rubber wheel abrasive wear test rig by varying the abrading distance and the applied normal load. Silica sand of particle size 350–400 µm was used as abrasive medium. Mechanical and dry sliding wear test results indicated that both alumina and hexagonal boron nitride fillers show improved mechanical properties and wear resistance. From the abrasive wear test results, it was recognized that the wear resistance of composites is increased by increasing the weight percentage of reinforcements and the reinforced composite gave better resistance against abrasion than the control sample (Al-7075). Further, it was adjudicated that 5 wt% micro hexagonal boron nitride reinforced Al-7075 composite prompts predominant abrasion resistance. Finally, it was presumed that hexagonal boron nitride and alumina fillers gracefully and successfully improved morphological, mechanical, and also the wear properties of Al-7075 alloy for various engineered load-bearing applications.

Effect of Nano Filler Reinforcement on Mechanical Properties of Epoxy Composites

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ABSTRACT

Nano-sized functional fillers, such as Nano-clay(N-C) and Nano-calcium carbonate (N-CC), have attracted a great deal of awareness due to their unexpected intrinsic properties. Extensive research has been done on clay material for epoxy nanocomposites but only a few have ventured into a comparison with other Nanofillers. In this paper, a study has been made of the mechanical properties of epoxy containing N-C and N-CC fillers. These composites were studied for their mechanical properties such as hardness, tensile, flexural and impact strength as per ASTM standards. Fraction of void cohort in the samples was quantified following the rule of mixture. Experimental results demonstrated that incorporation of N-C/N-CC fillers expanded the hardness and impact strength of epoxy nanocomposites. However, the tensile and flexural properties have shown declining trend. The morphological and fractographic features were examined utilizing scanning electron microscopy.

*Full paper: International Conference on Materials Engineering & Characterization (ICMECH), Adhi College of Engineering & Technology, Chennai, 2019
Role of HNTs on Mechanical and Thermal characteristics of Pineapple Fibre Reinforced Epoxy Composite

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ABSTRACT

In present work, outcome of Halloysite nano tubes (HNTs) with different filler loading (1, 3 and 5 wt. %) on the mechanical behaviour and thermal stability of pineapple fibre reinforced epoxy (PF/Ep) composites were considered. For the fabrication of composite slabs hand lay-up method associated with ultra-sonication process were employed to eliminate agglomeration. Experimental results showed that upon addition of HNTs up-to 3 wt. % boosted the tensile and fracture toughness. Flexural properties was found to increase with increase in HNTs loading upto 5 wt. %. Impact test results also showed an improvement in impact strength of HNTs filled PF/Ep composites at 1 wt. %. Thermo gravimetric analysis (TGA) was employed to understand the thermal stability of PF/Ep composites, and the result showed that the thermal stability of HNTs filled PF/Ep composite was superior when compared to unfilled PF/Ep composites.

*Full paper: International Conference on Materials Engineering & Characterization (ICMECH), Adhi College of Engineering & Technology, Chennai, 2019
Mechanical and Tribological Properties of Carbon Fabric Reinforced Epoxy Composites with and without Boron Nitride Filler

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ABSTRACT

Present research examination focuses on the surface morphology: static mechanical properties as well as friction and wear conduct of carbon fabric reinforced epoxy (CF/Ep) composites with different size boron nitride (BN) filler. BN added carbon fiber strengthened epoxy (BN-CF/Ep) composites were portrayed regarding surface morphology, tensile, flexural as well friction and wear properties. Mechanical test outcomes revealed that 1.5% nano-BN filled CF/Ep composites indicate increase in tensile strength and bending strength respectively; with relative to micron BN filled CF/Ep composites. CF along with BN improves enormously the wear resistance of Ep despite the fact there is marginal increment in friction coefficient. Further, it was exhibited that 7.5 wt% micro-BN into CF/Ep prompts predominant wear resistance. Generally speaking, it was presumed that BN filled CF/Ep gracefully and successfully improved morphological, mechanical, as well as friction and wear properties of Ep for various engineered load-bearing

*Full paper: International Conference on Emerging Trends in Mechanical Engineering (ICETME), Held at ST. Joseph Engineering College, Mangaluru, 2019*
ABSTRACT

The present research work involves the processing, mechanical and dry sliding wear behaviour of reinforcing silicon carbide (SiC) particles with magnesium (Mg) matrix fabricated by powder metallurgy route. The amount of SiC reinforcement was varied from 0-20 vol. %. The hot pressing method was adopted for sintering of composites with the application of low applied pressure and temperature. The density of composites was varied from 1.74 to 1.98 g/cm$^3$ as the SiC content varied from 0 to 20 vol. %. Microhardness and compressive strength of the composites were also increased as the SiC content increases. Dry sliding wear test carried out at different load, sliding distance and sliding velocity illustrates that composites are better performer than monolithic Mg.
Morphology and Physico-Mechanical Properties of Basalt Fiber Reinforced Epoxy Composites

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ABSTRACT

This paper presents the surface morphology and physico-mechanical properties of 25, 30, 35, and 40 wt. % of short basalt fiber (sBF) fortified epoxy composites. Density, hardness, tensile and flexural tests were performed to measure the physico-mechanical properties of each silane treated sBF/Ep composite. In general up to a certain threshold value, the tensile and flexural properties of the composites increased as the wt. % increased, following which, there was a decrease in strength and modulus. Mechanical test outcomes revealed that 35 wt. % silane treated sBF/Ep composites indicated 31% and 40 % increase in tensile strength and flexural strength respectively. Inspection of tensile and three-point bend fractured surfaces of sBF/Ep composites showed better interfacial adhesion between the fiber and matrix. Finally, from the generated the tests data, it was presumed that 35 wt. % silane treated sBF/Ep composites gracefully and successfully improved the mechanical properties. These developed composites can be effectively utilized for various load-bearing components especially in automotive applications.

*Full paper: International Conference on Advanced Trends in Mechanical & Aerospace Engineering(ATMA), Held at Dayananda Sagar University, Bangalore, 2019
Role of Calcium Carbonate on Hardness and Fracture Toughness of Carbon Fabric Reinforced Epoxy Composites

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ABSTRACT

Present study seeks the role of nano-calcium carbonate (n-CC) on physical properties and fracture toughness of unidirectional carbon fiber/epoxy (UDCF/Ep) composites. The loading of n-CC are 1.5 wt. %, 3 wt. % and 5 wt. % in UDCF/Ep composite. Unfilled and n-CC filled UDCF/Ep composites were probed for the density, hardness and single edge notched bending (SENB) test in accordance with governing ASTM standards. The measured density and hardness of the composites escalated with n-CC loading. However, N-cc was found to enhance the fracture toughness till 3 wt. % filler. Post-test, specimens were visioned under scanning electron microscope to analyze the involved fracture features. The SENB specimen was modelled and analyzed in the ANSYS for the peak load condition which affirmed the region of maximum stress intensity.

*Full paper: International Conference on Advanced Trends in Mechanical & Aerospace Engineering (ATMA), Held at DayanandaSagar University, Bangalore, 2019*
Effect of Halloysite Nanotubes on Morphology and Mechanical Properties of Alkali Treated Pineapple Fiber Reinforced Epoxy Composites

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ABSTRACT

Present study deals the surface morphology and mechanical properties of alkali treated pineapple fiber reinforced epoxy (PF/Ep) composite with and without halloysite nanotubes (HNTs). The loading of HNTs are 1, 3 and 5 wt % in PF/Ep composite. PF/Ep and HNTs filled PF/Ep composites were characterized in terms of measured density, morphology, tensile and flexural properties. Mechanical test results revealed that incorporation of the HNTs augmented the tensile and flexural properties. Alkali treated PF/Ep composite with 3 wt % HNTs showed 16 % and 22 % increase in tensile strength and Young’s modulus respectively and 23.01 % and 29.96 % in flexural strength and flexural modulus relative to unfilled alkali treated PF/Ep composites. Overall we concluded that alkali treated PF with 3 wt % HNTs effectively improved the morphological and the mechanical properties of epoxy for various engineered and futuristic applications.

*Full paper: International Conference on Advanced Trends in Mechanical & Aerospace Engineering (ATMA), Held at DayanandaSagar University, Bangalore, 2019
Impact of Nano-Silicon Dioxide on Mechanical Properties of Carbon Fabric Reinforced Epoxy Composites

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ABSTRACT

Nanoparticles could improve the mechanical properties of polymer based composites due to synergy of higher filler-matrix interaction and better load transfer from matrix to the fillers. Epoxy resin has high strength and modulus, and good adhesion strength, which makes it attractive for several industrial applications. To improve interfacial bonding between epoxy and silicon dioxide (SiO₂), surface treatment of SiO₂ is done using acetone and silane coupling agents. To improve SiO₂ dispersion in epoxy matrix, the epoxy matrix is modified by mixing with amine containing liquid rubber. Ultrasonication process has been used for uniform mixing of SiO₂ in the modified epoxy resin. Carbon fabric reinforced epoxy (CF/Ep) composite with surface treated nano-SiO₂ are fabricated using vacuum bagging technique followed by hot press. The effect of silane treated nano-SiO₂ with varying filler loadings from 0.5 to 3 wt. % on the static mechanical properties such as hardness, tensile, and flexural properties are characterized following ASTM standards. The experimental results show that the inclusion of silane coupling agent increased the interfacial bonding between nano-SiO₂ particles and the epoxy resin so that the surface hardness, tensile and flexural properties are improved.

*Full paper: International Conference on Advanced Trends in Mechanical & Aerospace Engineering (ATMA), Held at Dayananda Sagar University, Bangalore, 2019*
Role of Graphene Nanoplatelets on Tribological Behaviour of Madhuca Indica Oil

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ABSTRACT

This research article outlines the friction and wear behavior of madhuca indica oil (mahua oil) blended with 0.25-1% by weight of graphene nanoplatelets (GNPs) using four-ball tester in accordance with ASTM D-4172 standard. The micro-morphology and wear scar diameter of the rubbed steel ball surfaces were characterized by optical microscopy. The test results were compared with base mahua oil lubricant. The addition of GNPs in the base oil acted as a superior lubricant additive which reduced both the friction coefficient and wear loss in terms of wear scar diameter of steel balls. The loading of very small quantity of GNPs (0.25wt. %) in mahua oil could be used as effective bio-based lubricant in automotive engines for better mechanical as well as thermal efficiency.

*Full paper: International Conference on Design Materials and Manufacture, Held at National Institute of Technology, Surathkal, 2019
Vibration Analysis of Railway Wagon Suspension System for Improved Ride Quality using Matlab Simulink

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ABSTRACT

In this paper the dynamic response of Indian railway wagon suspension system is investigated using MATLAB Simulink under step input condition of the track. In the beginning a linear dynamic suspension model of the Indian Railway Wagon is made and according to the quarter model the mathematical equations are formed and the equivalent Simulink model corresponding to the equations are made in MATLAB Simulink. The system is simulated under step input condition of the track to get the dynamic response such as displacement, velocity and acceleration of the coach, bogie frame and the wheel. The result shows that for the given step input, the major vibrations are occurring to the coach and the bogie frame. These vibrations will affect the passenger ride comfort. In the next step the full suspension model of the whole Indian Railway wagon is made and it is again simulated using MATLAB Simulink under step input condition of the track, considered at the four wheels of the Indian Railway wagon with a different time interval. The result shows that the vibration occurs for all the step condition at the different time intervals. Thus always Indian Railway wagon system undergoes vibration due to the track irregularities and to minimize these vibrations the system has to be redesigned or reconstructed with a proper technical knowledge.

*Full paper: 6th International Conference on Production and Industrial Engineering (CPIE-2019), Held at Dr. B R Ambedkar National Institute of Technology, Jalandhar, 2019
Fatigue Behaviour of Polymer Nano Composites – A Review

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ABSTRACT

Most of the house hold articles and devices which we use in everyday life is made of Natural polymers and synthetic polymers. Existing research also reports that polymer nano-composites show far better performance versus micro-fillers. Premature failure, of the machine components, occurs well within the endurance limit of the material. This failure due to fatigue is a common phenomenon on many of the applications across industries and hence the prediction and prevention of fatigue failures is critical for safe and economic operation of machines. This work reviews various methods of fatigue characterization of polymer composites. Stress – life and strain – life approaches have been applied by many researchers in this domain. The fatigue characterization leads to the development of life estimation curves by both these methods. There are also work done on other methods to arrive at Stress – life curves. This paper addresses these different methods of characterization and compares them. The analysis of these data for evaluation of various fatigue parameters are also covered in this work.

*Full paper: 3rd International Conference and Exhibition on Fatigue, Durability and Fracture Mechanics and symposium on condition Assessment/Residual Life Assessment & Extension, at VTU Belagavi, 2019
Experimental Investigation on Free Vibration Analysis of Composite Plates

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ABSTRACT

Composite materials constitute a considerable portion of today’s airplanes, missiles, submarines, and sport equipment due to high strength and stiffness to weight ratios, high durability and fatigue life, and high corrosion resistance. The performance of a composite material is generally based on the mechanical and dynamic characteristics such as tensile, compression, flexural, impact, and free vibration properties. It is therefore essential to establish the material performance under various configurations. In this study, the influence of filler material in eight layered fibre reinforced polymer composite laminate plates with various filler material was examined. Composite plates made of glass fibre and epoxy resin with varying filler material percentage such as silicon dioxide and aluminium oxide are considered. Free vibration characteristics, namely natural frequency and damping factors of the composite plates were experimentally determined by carrying out experimental modal analysis. The accelerometer is mounted on the specimen to find the displacements of plates and by using the DAQ system the signals is acquired and the results are plotted. The results which are obtained from frequency domain and time domain graphs, by using time domain graph damping ratio is calculated using logarithmic decrement method and by using frequency domain graph natural frequencies are obtained. Numerical analysis is done in ANSYS software with different boundary conditions. Free vibration test results obtained from experiments and numerical studies are compared. Effects of boundary condition and filler material percentage on natural frequencies and damping ratios were studied. The effect of natural frequency and damping ratios on composite plate specimens are found that they are in the decreasing order of CCCC>FCCF>CCFF>CFFF. The effect of filler material percentage in the composite plates on the natural frequency and damping ratios are found that they are increasing with the amount of filler material.

*Full paper: International Conference on Advances in Mechanical Engineering & Management (ICAMEM – 2019), at Vidyavardhaka College of Engineering, Mysuru, 2019*
Artificial Neural Network-based Prediction of Cutting Parameters from Tool Vibration and Forces

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ABSTRACT

Automation in the machining process becomes crucial in successfully maintaining high quality and low-cost production. In the automated machining process, the tool condition and the cutting parameters affect the quality of the product. So it is required to monitor cutting parameters without interruption of machining operation. This can be done by monitoring the tool vibration continuously and predicting the cutting parameters using Artificial Neural Network (ANN). This work aims at monitoring the vibration of the tool and feeding it as input to ANN for predicting the cutting parameters. This will help in reducing the production time by not interrupting the operation. Experiments were conducted to monitor tool vibration in a conventional lathe for machining mild steel using an HSS tool based on the design of experiments. A tri-axial accelerometer was mounted on the tool to acquire vibration data using National Instruments Data Acquisition systems (NI DAQ). The force data is measured using a dynamometer attached to the lathe. The experimental values were used for developing a feed-forward back-propagation ANN model. The cutting parameters were predicted using the trained network, compared and found to be very close with the experimental values. It is concluded that the proposed ANN model is able to predict the cutting parameters which help in monitoring the tool condition for good product quality.

*Full paper: International Conference on Advances Emerging Trends on Smart Grid Automation and Industry 4.0 (ICETSGAI 4.0 2019), at Birla Institute of Technology, Mesra, Ranchi, 2019
ABSTRACT

Every part and structure is subjected to vibration at least at a certain point in time. Each component is having its own natural frequencies and when any of these natural frequencies match with loading frequency the resonance occurs. For some components, vibrations are often intentionally designed and have a functional purpose, for example, vibratory feeder, sieves, surface finishers, and compactors. But in most components resonance lead to catastrophic failure. Hence it is necessary to describe the structure in terms of dynamic properties namely mode shapes and its modal frequencies. Mode shape is a specific pattern of vibration at specific frequencies utilized for structural health monitoring. And the change in mode shape is used as an indicator to determine the damage. This motivated us to go for experimental investigation of the mode shapes of common structure like beam. In this work, an attempt is made to find the mode shapes of a beam by experimental roving impact test without using an FFT analyzer. Experimental roving impact test was performed by acquiring the data using the National Instruments data acquisition system (NIDAQ) and LabVIEW. Then MATLAB was used for post-processing the data to get mode shapes. The finite element analysis was carried out using ANSYS. Then results obtained from finite element analysis are compared with the experimental analysis and found to be in good agreement.

*Full paper: International Mechanical Engineering Congress (IMEC – 2019) at NIT, Trichy, India, 2019*
ABSTRACT

Mechanical properties of ultrafine grained 5052 Al alloy processed through multi-directional forging were investigated in the present work. The as-received 5052 Al alloy was solution-treated (ST) at temperature 540 °C for two hours and subjected to multi-axial forging at room temperature as well as liquid N2 temperature to a cumulative true strain of 4.2. The cryo-forged samples have exhibited a significant improvement in strength (380 MPa) and hardness (130 Hv) with 7.1% ductility, as compared to other conditions. Similarly, the high-cycle fatigue behaviour of the cryo-forged samples is found to be 80 MPa, which is better than other conditions. It was due to the formation of ultrafine grained microstructure with an average grain size of 230 nm in the cryo-forged samples. The formation of nano-shear bands in the cryo-forged samples, which accommodates the applied strain during cyclic loading, is also responsible for dislocation accumulation along with broken/deformed impurity phase particles. The microstructure of the samples was characterized by optical microscopy, X-ray diffraction, and TEM to substantiate the mechanisms of grain refinement and its influence on the mechanical properties. Fractography of the tensile, as well as fatigue, tested samples were carried out using a Scanning Electron Microscope (SEM) to reveal the type of fracture.

Highly Flexible and Conducting Polymer Nanocomposite Films for Selective Gas Sensing Applications

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ABSTRACT

Fabrications of gas sensor with real time and capable analysis at room temperature have gained immense attentions of the scientific community. Hazardous caused by gases and considering the human health, gas sensor is designed by combining organic and inorganic biocompatible materials. Here we report metal-organic thick films which were fabricated by solution intercalation method, for better molecular interaction and homogeneous dispersion of filler, After the intercalation of AlFeO₃ (50-60 nm) in to polymer Poly (vinyl alcohol) PVA), drastic changes in structural and morphology of the film were conducted by using Scanning electron microscope (SEM). After effective doping with metal oxide, PVA is ended with superior conducting property and it was examined by Keithley 2400. However, conductance of the PVA/AlFeO₃ is examined in the presence of the carbon dioxide (CO₂) and liquid petroleum gas (LPG). Further in order to stabilize the sensing ability of PVA/AlFeO₃ the concentration of the gas molecules is maintained from minimum to maximum (50 ppm to 1000 ppm). The recorded response plots and high sensitivity towards CO₂ and LPG detection confirms that designed flexible PVA/AlFeO₃ is very potential and it can be used as environmental monitor.

Ergonomic and Technical Aspect in Redesign of Material Handling System

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\textbf{ABSTRACT}

This paper presents an overview on Improvement activities of the axle industry in half line assembly which include Material handling system, Productivity improvement and Setup time reduction.

Increasing Productivity of Inter Axle Drive Head (Iad) Workstation in Drive Head Assembly

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ABSTRACT

Productivity Improvement is one of the most important factors for an organization to survive in this growing competition. Globalization has given rise to new standards for products and the demands of the customers are met keeping the appropriate standards for quality. A literature review is carried on productivity improvement and reducing customer complaint by adapting Automation (Image Capturing Device) for a drive head assembly process of axle in an automotive industry. Automation reduces human intervention with machines which reduces defects and increases productivity. The aim of the study to eliminate errors by reducing workers effort and should eliminate waste.

Evaluating Machining Performance of AISI 1014 Steel Using Gingelly Oil as Cutting Fluid

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ABSTRACT

Cutting fluids are generally used for lubrication and cooling the machined surface during the turning operation. The petroleum-based oil, when used for the machining process, has raised many health and environmental issues. The use of bio oils during machining process results in environmental issues. The use of bio oils during machining process results in environmental-friendly working atmosphere, with minimal health hazardous among workers. Many researchers have worked on the effect of process parameters, surface characteristics of the machined surface by using bio oils as lubricants. The metallurgical transformation takes place on the machined surface during the machined surface. But the studies on suing the bio oils on improving the machined surface, chip formation and generation of cutting force needs to be studied in details with comparison with other process methods. The change in the microstructure, during the machined process also needs to be studied thoroughly, where mere literatures are available. With this direction, the experimental studies were conducted to study the machining parameters during the turning process by using gingelly oil as cutting fluids. The studies showed that there was a gradual decrease in cutting force and improved surface finish on the machined part. The improvement in the machinability during the cutting process with respect to chip length, pitch and surface roughness was discussed for all the process. Finally, the changes in the microstructure on the metal surface for the different cutting forces were studied..

*Full paper: Australian Journal of Mechanical Engineering, 2019*
Poly (Vinyl Alcohol) Stablized Light Emitting Phosphors Introduced Fiber Reinforced Composites for Decorative Applications

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ABSTRACT

Polymer based composite hybrids presenting combinatorial materials in a solitary matrix are of significant interest for various engineering decorative applications. In particular, high load bearing polymer-based materials that absorb day light and emit the same in the dark are of considerable interest for decorative applications. Herein, an attempt is made to fabricate one such glass fiber (GF) reinforced poly (vinyl alcohol) (PVA) composite hybrid doped with optimum measure of light emitting phosphors (caesium zincate (Cs₂ZnO₂). The as developed composite hybrids were characterized for their structural, optical and mechanical functionalities, with special emphasis on decorative applications. The toughtful introduction of Cs₂ZnO₂ nanoparticles (NOs) induce light emitting properties, while PVA matrix act to guard the luminescence centres of otherwise vulnerable Cs₂ZnO₂ NPs. Besides, the GF reinforcements enable the ease of load transfer, thereby aiding improved mechanical strength.

*Full paper: International Conference on frontiers in Materials from Basic Science to real time Applications, at CNMS-JAIN University, 2019
Visibly Transparent and Mechanically Flexible PMMA/Al$_{0.4}$Zn$_{0.4}$O Nanocomposite Based UV Filters

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ABSTRACT

The thoughtful combination of optically transparent Poly (methyl methacrylate) (PMMA) and UV absorbing Al$_{0.4}$Zn$_{0.4}$O nanoparticles (NPs) with minimized Rayleigh scattering yields design flexible nanocomposites (NCs) with appreciable UV filtering abilities. Herein, we report the successful development and performance evaluation of one such UV filtering polymer nanocomposite (PNC) thick film. While, optical characterizations of PMMA/ Al$_{0.4}$Zn$_{0.4}$O NCs were achieved using electronic spectral studies. The photo-stabilization behaviours were quantified using light-emitting diode (LED) lifetime tests. The spectral characterizations together with photo-stabilization behaviours supported excellent UV filtering abilities of PMMA doped with 4 wt% Al$_{0.4}$Zn$_{0.4}$O NPs. Moreover, in contrast to UV LED lamps encapsulated with virgin PMMA, the lifetime of those UV LEDs encapsulated with PMMA/ 4 wt% Al$_{0.4}$Zn$_{0.4}$O NCs improved by 74%. The obtained results support the increased potential of organic/inorganic PNC hybrids for UV filtering applications.

*Full paper: International Conference on frontiers in Materials from Basic Science to real time Applications, at CNMS-JAIN University, 2019*
Department of Electrical & Electronics Engineering
Optimal Allocation of DG Units in Distribution System Considering Variation in Active Power Load

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ABSTRACT

High distribution system power-losses are predominantly due to lack of investments in R&D for improving the efficiency of the system and improper planning during installation. Outcomes of this are un-designed extensions of the distributing power lines, the burden on the system components like transformers and overhead (OH) lines/conductors and deficient reactive power supply leading to drop in a system voltage. Distributed generation affects the line power flow and voltage levels on the system equipment. These impacts of distributed generation (DG) may be to improve system efficiency or reduce it depending on the operating environment/conditions of the distribution system and allocation of capacitors. For this purpose, allocating of distributed generation optimally for a given radial distribution system can be useful for the system outlining and improve efficiency. In this paper, a new method is used for optimally allocating the DG units in the radial distribution system to curtail distribution system losses and improve voltage profile. Also, the variation in active power load in the system is considered for effective utilization of DG units. To evidence the effectiveness of the proposed algorithm, computer simulations are carried out in MATLAB software on the IEEE-33 bus system and Vastare practical 116 bus system.

Optimal Siting and Sizing of DG Employing Multi-objective Particle Swarm Optimization for Network Loss Reduction and Voltage Profile Improvement

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ABSTRACT

Day by day employing Distributed Generation (DG) is increasing and it is becoming an indispensable small capacity generation in the distribution system. It is cost effective, eco-friendly and it can enhance the reliability of the distribution network. This paper proposes a technique for optimal sizing and siting of DG, using modified Particle Swarm Optimization technique. It is proposed for optimal placement and sizing of DG. Since the objective is both reduction of losses and voltage profile improvement the multi objective function is chosen and by choosing appropriately desired level of emphasis is given to both the objectives. Also, by using an index Multi Objective Ranking Index (MORI) the best combination of loss reduction and voltage profile improvement is obtained. The effectiveness of the methodology is tested on standard IEEE-33 bus system and results are presented. © 2019, Springer Nature Singapore Pte Ltd.

*Full paper: Lecture Notes in Electrical Engineering, Vol.545, pp.1469-1478, 2019
The Impact of Location and Size of the Wind Technology on Power Quality in a Distribution System with Different Loads

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ABSTRACT

The impact of wind technology on power quality for a distribution system is emphasized in this paper. The Power Quality of a Distribution system depends on voltage and Frequency quality. The pros of integrating the wind turbine to the system are loss reduction and voltage profile improvement but the cons of adding renewable energy to the distribution system are represented in this paper. such as voltage unbalance, flicker, power factor, and the impact of voltage and current harmonics are measured. The performed analysis results indicated the importance of the integration of DG based on Power quality Parameters.

Placement of Fixed Size Diesel Generators in IEEE 12 Bus Radial Distribution System to Improve Voltage Stability

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ABSTRACT

Distributed Generation (DG) is small capacity generating units directly associated to the distributed system. With the penetration of distributed generators nearby the consumer load center support to the distribution system will be enhanced. The Distributed Generation involves both Renewable & sustainable sources of energy to engender power in order to appease the ever increasing energy requirement. Suitable location and capacity of DG units will benefit the achievement of active power system network. The voltage profile and Real power line loss and Reactive power line loss reduction can also be improved with suitable location and allocation of DG. This work proposes a new Simulation method for the placement of fixed Size Diesel Generator in IEEE 12 bus radial distribution system stationed on Voltage stability index and Transmission line losses. This index is progressed by acknowledging steady state node voltages cited in Per Unit.

Progressive crude oil distillation: An energy-efficient alternative to conventional distillation process

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ABSTRACT

Distillation, the major process in crude oil refineries as of now. In this work we focused the attention to energy saving with respect to an industrial crude oil distillation unit. An alternative to the conventional crude oil distillation model present in the Bharat Petroleum Corporation, Kochi Refinery is proposed and simulated. The theoretical predictions as well as the simulated results indicate that the Progressive crude oil distillation reduces the utility burden as well as increase the extraction of more valuable light components. The simulation was carried out using Aspen HYSYS V8.8.2. Different crudes are taken into account and their properties and amount of distillate are analyzed. The optimization is done in an easy manner rather than the conventional mathematical method, together with the advanced process control tools; make it profitable in the operation in real time.

Study on the Effective Removal of Chromium VI via Polysulfone/TiO$_2$ Nanocomposite Membranes and its Antifouling Property

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**ABSTRACT**

By thermal induced phase inversion technique, polysulfone /TiO$_2$ (psf/TiO$_2$) nanocomposite membranes are prepared with N-methyl pyrrolidone (NMP) as solvent and polyvinylpyrrolidone (PVP) as the porogen. The prepared membranes are then undergone physical, morphological, thermal characterization studies using a universal testing machine, scanning electron microscope, thermogravimetric analyzer, and X-ray diffractometer. Membrane properties such as porosity, equilibrium moisture content, contact angle, flux rate, % rejection, and its antifouling property are also determined. Polysulfone nanocomposite membranes with 1% TiO$_2$ is found to have a higher porosity, percentage of water uptake, mechanical properties, and a lower contact angle. Polysulfone with 1% TiO$_2$ is found to have a higher performance with the flux rate of 75.714 l/m$^2$ h along with the 94.045% Cr(VI) ion rejection and a better antifouling property.

*Full paper: Global Challenges in Energy and Environment, pp: 157-166, 2019*
Study of Different Modelling Techniques of SMA Actuator and Their Validation Through Simulation

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ABSTRACT

With the increased emphasis on both reliability and functionality, shape memory alloys (SMAs) are fast becoming an enabling technology capturing the attention of engineers and scientists worldwide. The thermal-electrical-mechanical dynamics of SMA are nonlinear and hysteretic in nature, possessing a problem for the researchers to model the actuator. The increased range of applications and better realisation of SMA actuators have led to the research on modelling of SMA’s thermo-mechanical response. The paper discusses various SMA actuator modelling approaches such as Preisach model, Fermi–Dirac statistics, Duhem hysteresis model and Brinson model and attempts to elucidate their advantages and limitations through Simulink-based models and simulation results. © 2019, Springer Nature Singapore Pte Ltd.

*Full paper: Lecture Notes in Electrical Engineering, Vol. 545, pp. 1211-1228, 2019*
ABSTRACT

This study suggests a controller for grid connected hybrid renewable system with shunt active filter functionality. The controller consists of a modified pq theory based inner loop and an adaptive fuzzy logic based outer loop. Positive sequence sinusoidal signal regulator and self tuning filter are employed for making the controller work satisfactorily under unbalanced and distorted grid voltage conditions. In order to verify the effectiveness of controller under different system conditions, numerical simulations are carried out for different cases. A laboratory prototype is developed and tested under steady state condition, and the results are found to be satisfactory.
Aircraft Engine Fuel Flow Parameter Prediction and Health Monitoring System

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ABSTRACT

In Aircraft engines, condition monitoring based strategies are used to lessen upkeep costs, ensure aircraft wellbeing and to reduce the fuel utilization. Currently the performance deterioration of aircraft engines is determined using parameters such as fuel flow, engine fan speed, vibration, oil weight, oil temperature and Exhaust Gas Temperature (EGT) etc. In this paper, a model has been proposed to obtain the performance deterioration of Turboprop engine. In this paper, Multiple Regression Analysis (MRA) with Artificial Neural Network (ANN) and Data clustering with fuzzy logic approach is performed for the prediction of Fuel Flow (FF) parameter and compared for accuracy of their prediction with minimum performance error. Using this model, any performance deterioration that may happen in the aircraft turboprop engine can be effectively recognized and this could also be a marker for the pilots in case of the occurrence of fault in the fuel flow parameter sensor.

*Full paper: 4th International Conference on Recent Trends on Electronics, Information, Communication & Technology (RTEICT), 2019
Voltage Stability Enhancement in Radial Distribution System by Shunt Capacitor and STATCOM

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ABSTRACT

Voltage stability has a major concern in power system operation. It is the ability of the power system to maintain acceptable voltages at all buses in the system under normal conditions and after being subjected to a disturbance. Voltage instability may result in voltage collapse of the system. Hence, assessment of voltage stability is important. Implementation of new equipment including high-power electronics-based technologies such as flexible AC transmission systems (FACTS) has become essential for improvement of operation and control of power systems. The project work aims at the enhancement of voltage stability in the radial distribution system by using shunt capacitor and FACTS controller. A stability index named line stability indicator (LSI) is formulated for voltage stability analysis. This indicator is tested on a standard IEEE 33 bus radial distribution system. The indicator is used to find the weak lines in the system. Placement of shunt capacitor and FACTS controller at the receiving end side of the weak bus results in improvement of voltage profile of the system. Cuckoo search (CS) algorithm is applied for optimal sizing of shunt capacitor and FACTS controller. Program is coded in MATLAB for the enhancement of voltage stability in the radial distribution system.

*Full paper: Lecture Notes in Electrical Engineering, 2019 (Book Chapter)
Department of Electronics & Communication Engineering
The Effect of Dielectric Surface Modification and Heat-Treatment on the Performance of Rubrene Based Organic Field-Effect Transistor

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ABSTRACT

In this work, bottom gate top contact structured organic field-effect transistors (OFETs) were fabricated using Rubrene as active material and SiO₂ as the dielectric on n-type silicon wafer by thermal evaporation method. The effect of dielectric surface modification and abrupt heat treatment on the crystallinity of Rubrene thin film and its influence on the performance of OFETs are investigated. The surface morphologies and the crystal structure of Rubrene films are characterized using differential scanning calorimetry, X-ray diffraction and atomic force microscopy. It is observed that the dielectric surface affects the crystalline structure of Rubrene thin film as well as the electrical performance of the OFETs. Thermal transition of Rubrene from amorphous state to highly crystalline state is observed after abrupt heat treatment. It is observed that highly crystalline Rubrene thin films can be obtained by carefully deploying the rapid heat treatment method followed by surface treatment. The electrical properties of the OFETs such as field effect mobility, threshold voltage and current on/off ratio are evaluated using the V-I characteristics and the results are compared with the published data. Improvements in the performance of OFET are evident due to the improved crystallization and highly ordered structure of Rubrene molecules.

Performance Analysis of Learning Algorithms for Automated Detection of Glaucoma

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ABSTRACT

Human Eye is one of the major sensory organs in the body. Eye can be affected by different types of diseases like Glaucoma, Diabetic Retinopathy, age related macular etc. Glaucoma is an eye disease which steals vision slowly starting from peripheral vision and progresses toward the central vision at a later stage. This disease damages the optic nerve and leads to irreversible vision loss. Fundus photography has been found to be a very useful modality for the detection of eye related abnormalities. Various types of feature extraction from fundus images, that can be used for the detection of Glaucoma has been suggested by different authors. The main objective of this work is to extract different types of features from fundus images in order to come out with best suitable set of features that can help in automated detection of Glaucoma and evaluate it using learning algorithm. Different combinations of these features have been given to Support Vector Machine (SVM) and KNN to classify the images as normal and glaucomatous. A tenfold cross validation is performed using the extracted features and a comparative study has been carried out in terms of Accuracy, Sensitivity, Specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) Performance evaluation has been done with and without applying feature reduction techniques. Best accuracy of 97.5% has been achieved when Wavelet features are used.

*Full paper: International Research Journal of Engineering and Technology (IRJET), Vol. 06, Issue: 06, 2019*
Design of Memristor Based Multiplier

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ABSTRACT

Memristor is a novel technology, the fourth fundamental passive element to overcome the limitations faced by the CMOS technology. Memristor has the capacity of memory but cannot store energy [9]. Multiplier is one of the basic circuits in the field of digital signal processing and is used in various applications such as FFT. In this paper, a 4 bit multiplier is realised and implemented using the memristorcmos hybrid technology and the results are analysed in the LTspice tool.

*Full paper: International Research Journal of Engineering and Technology (IRJET), Vol. 06, Issue 05, 2019
MAC Improvements for Very High Throughput Wlans

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ABSTRACT

Here we present the first amendments of high throughput networks identified as IEEE 802.11n originated in 2009 to achieve 150 Mbps speed for typical wireless systems to provide better wireless technology. At the same time, to further improve the medium access control (MAC) throughput, a pair of new amendments for WLAN standard are developed which are IEEE 802.11ac and IEEE 802.11ad. The 802.11ac is designed to achieve 1.3 Gbps speed due to its larger frame sizes, improved queuing and enhance the quality of service (QoS) features with the help of multi-user MIMO. The 802.11ad is designed to allow around 7 Gbps while using the possibility of transmitting in the 60 GHz band that can offer the chance to get the high gain and fewer interference features of directional antennas. Lastly, simulation results show the study of QoS requirements for interactive multimedia transport flow is readily achievable in 802.11ac/ad when compared to 802.11n and other legacy standards

*Full paper: International Journal of Communication Networks and Distributed Systems, Vol. 22, Issue 1, 2019*
Synthesis of Reversible Logic Gates and Adder Circuits Using Quantum Gates

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ABSTRACT

Reversible logic circuits due to their low power consumption in comparison with classical circuits using bits as the information units have become an keen area of research. A reversible circuit with equal parity of inputs and outputs is called parity preserving circuits. Proposed method consists of reversible quantum gates to achieve reversible computation which lead to less energy loss, thereby reducing the power. Quantum circuits consists of sequence of quantum gates which use qubits as information units. This paper focuses the realization and implementation of basic logic gates, half adder, full adder and their reversibility check using quantum gates.

Medical Image Compression Scheme Using Number Theoretic Transform

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ABSTRACT

In this paper, a new methodology is proposed for the medical image compression using number theoretic transforms or NTTs. NTTs are the discrete Fourier transforms carried over finite fields and rings. All the arithmetic operations are carried over a modulo number M. From the review of NTTs and their variants, it is found that NTTs involve only real integers, and the transform is reversible and hence no round-off errors in NTT-based algorithms. Another attractive feature is that NTTs of regular structures are also regular. These factors lay the foundation for the proposed lossless compression scheme of medical images. The variant of NTT known as Fermat number transform (FNT) is used for the proposed compression scheme as it involves less or no multiplications. The results obtained are favorable in terms of compression ratio and reduced number of computations. Further study and research is in progress to optimize the algorithm in terms of computations and hardware implementation of NTTs for real medical images. It is forecasted that with the use of dedicated hardware and optimization of these digital transforms, much higher compression ratio at faster speed may be achieved.

*Full paper: Computer Vision and Machine Intelligence in Medical Image Analysis, pp 43-53, 2019
Finite Field Discrete Cosine Transform for Image Processing Applications

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ABSTRACT

Discrete transforms such as DCT are found useful in several image processing applications. There exist discrete transforms for finite fields which use integer arithmetic. Discrete cosine transform over finite field (FFCT) is one such transform which uses k-cosine trigonometry. As all the arithmetic is carried out on integers the image processing algorithms based on FFCT do not suffer from round off errors as in DCT based algorithms. In this paper we investigate properties of FFCT and discuss parameters used for two dimensional FFCT pair. The transformation kernel over GF (p) where p is prime is calculated and FFCT of 8x8 regular test images are obtained. From the study of FFCT of the test images we suggest the application of this transform to detect one bit error that occurs in photo mask image of integrated circuits. An image compression algorithm is also implemented to show that FFCT based compression algorithms are lossless and yield higher compression ratio.

*Full paper: International Journal of Engineering and Advanced Technology (IJEAT), Vol. 8, Issue-5, 2019*
Observation of poloidal asymmetry in measured neutral temperatures in the Aditya-U tokamak plasma

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ABSTRACT

The neutral particle temperature in the edge region of the Aditya-U tokamak has been measured by recording the hydrogen Balmer alpha emission spectra at 656.28 nm from different lines of sight in both the high and low field sides. The spatial profile of the Hα emission has been recorded using a 1 m multi-track spectrometer. The neutral temperature is estimated from the Doppler broadening of the measured Hα spectrum by appropriately removing the contribution from the Zeeman splitting of the spectral lines. A computer simulation code was developed to estimate the neutral temperature by including the broadening mechanisms such as Doppler broadening and the Zeeman effect to simulate the Hα emission spectrum along with the proper convolution of the instrumental width of the diagnostic system. It has been observed that the high field side neutral temperature (~4–6 eV) during plasma flat top is almost twice that of the low field side (~2–3 eV) suggesting poloidal asymmetry in the neutral temperature.

*Full paper: Nuclear Fusion, Vol. 59, Issue 10, 2019*
Overview of operation and experiments in the ADITYA-U tokamak

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ABSTRACT

The first Indian tokamak, ADITYA, operated for over two decades with a circular poloidal limiter, has been upgraded to a tokamak named ADITYA Upgrade (ADITYA-U) to attain shaped-plasma operations with an open divertor in single and double-null configurations. Experimental research using ADITYA-U has made significant progress since the last FEC in 2016. After installation of a plasma facing component and standard tokamak diagnostics in ADITYA-U, the Phase-I plasma operations were initiated in December 2016 with a graphite toroidal belt limiter. Ohmically heated circular plasmas supported by filament pre-ionization with plasma parameters \( I_p \sim 80-95 \text{ kA} \), duration \( \sim 80-180 \text{ ms} \), with a maximum toroidal field \( \sim 1 \text{ T} \) and chord averaged electron density \( \sim 2.5 \times 10^{19} \text{ m}^{-3} \), have been obtained. The runaway electron (RE) generation, transport and mitigation experiments, along with magneto hydrodynamic (MHD) activities and density enhancement with H₂ gas puffing experiments were carried out in Phase-I, which was completed in March 2017. Preparation for the Phase-II operation in ADITYA-U includes calibration of magnetic diagnostics followed by commissioning of major diagnostics and installation of a baking system. After repeated cycles of baking the vacuum vessel up to \( \sim 135 \text{ °C} \), the Phase-II operations resumed in February 2018 and are continuing to achieve plasma parameters close to the design parameters of circular limiter plasmas, using real-time plasma position control. The plasma current has been raised to \( \sim 135 \text{ kA} \) in Phase-II, with a maximum chord averaged electron density of \( \sim 4 \times 10^{19} \text{ m}^{-3} \). Hydrogen gas breakdown has been observed in more than 2000 discharges, including Phase-I and Phase-II operations, without a single failure. Several experiments have been carried out, including the control of REs with the fuelling of supersonic molecular beam injection as well as sonic H₂ gas puffing during current flat-top, MHD mode studies using multiple periodic gas puffs, and radiative improved modes using neon gas puffs. The experimental results from Phase-I and Phase-II operations of the ADITYA-U tokamak are discussed in this paper.

*Full paper: Nuclear Fusion, Vol. 59, Issue 11, 2019*
Modeling of the HÎ± Emission from ADITYA Tokamak Plasmas

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ABSTRACT

The spatial profile of HÎ± spectrum is regularly measured using a high-resolution multi-track spectrometer in ADITYA tokamak to study the neutral particle behavior. The Monte Carlo neutral particle transport code DEGAS2 is used to model the experimental HÎ± spectral emissions. Through the modeling of the spectral line profile of HÎ±, it is found that the neutral hydrogen, which is produced from molecular hydrogen and molecular hydrogen ion dissociation processes contributes 56% to the total HÎ± emission, and the atoms which are produced from charge-exchange process have 30% contribution. Furthermore, the experimentally measured spatial profile of chord integrated brightness was modeled for the two plasma discharges having relatively high and low density to understand the neutral particle penetration. The presence of neutrals inside the core region of the ADITYA tokamak is mainly due to the charge-exchange process. Furthermore, it is observed that neutral particle penetration is lower in higher density discharge.

*Full paper: Atoms, Vol. 07, Issue 04, 2019*
Evaluation of an oxygen transport coefficient in the aditya tokamak using the radial profile of O4+ emissivity and the importance of atomic data used therein

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ABSTRACT

Oxygen impurity transport in the typical discharges of the Aditya tokamak was investigated using emissivity radial profile of emissivity of the spectral line (2p3p 3D3-2p3d 3F4) at 650.024 nm from the Be-like oxygen ion. This O4+ spectral line was recorded using a 1.0 m multi-track spectrometer capable of simultaneous measurements from eight lines of sight passing through the plasma. The oxygen transport coefficients were determined by reproducing the experimentally measured emissivity profiles of O4+, using a one-dimensional impurity transport code, STRAHL, and photon emissivity coefficient (PEC) belonging to that transition. The PEC values were obtained from both ADAS and NIFS atomic databases. Using both the databases, much higher values of diffusion coefficients compared to the neo-classical values were observed in both high and low magnetic field edge regions of typical Aditya tokamak Ohmic plasma. Although, almost similar profiles of diffusion coefficients were obtained using PEC values from both databases, the magnitude differs considerably. The maximum values of diffusion coefficients in the plasma edge at low field side of tokamak were ~45 and ~25 m²s⁻¹ when modeling was done using the ADAS and NIFS databases, respectively. Further analysis on the atomic data used in the calculation indicates that the difference in diffusion coefficients is mainly related to the variation in the values of atomic data of the two databases.

*Full paper: Atoms, Vol. 07, Issue No.03, pp. 1-12, 2019
High-Efficiency WLANS for Dense Deployment Scenarios

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ABSTRACT

In this article, we review the latest technical attributes such as orthogonal frequency division multiple access (OFDMA), multi-user MIMO (MU-MIMO) and enhanced clear channel assessment (CCA) for better spatial reuse used in the 802.11ax amendment to the 802.11 standard that leads to PHY and MAC enhancements for high-density scenarios of access points (APs). IEEE 802.11ax, also referred to as high-efficiency wireless local area network (WLAN) (HEW), provides mechanisms to thoroughly utilize the unlicensed spectrum bands (2.4 and 5 GHz) and strengthen the user experience. The functional requirements of HEW are stressed on interactive video transmission latency and access efficiency to meet quality of service (QoS) requirements. Finally, we investigate three configurations—MU-MIMO, OFDMA and combination of both or mixed mode—for 4-user AP transmission schemes in 802.11ax. The performance of the MU schemes varies with packet size and operating SNR. OFDMA is more efficient than MU-MIMO at low SNRs for all packet sizes, which means 5th percentile stations (STAs) can get desired throughput.

*Full paper: Sadhana, vol. 44, Issue 33, 2019*
A Comparison of Regression Models for Prediction of Graduate Admissions

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ABSTRACT

Prospective graduate students always face a dilemma deciding universities of their choice while applying to master’s programs. While there are a good number of predictors and consultancies that guide a student, they aren’t always reliable since decision is made on the basis of select past admissions. In this paper, we present a Machine Learning based method where we compare different regression algorithms, such as Linear Regression, Support Vector Regression, Decision Trees and Random Forest, given the profile of the student. We then compute error functions for the different models and compare their performance to select the best performing model. Results then indicate if the University of Choice is an ambitious or a safe one.

*Full paper: Second International Conference on Computational Intelligence in Data Science (ICCIDS), 2019
Intrusion Detection System using Naive Bayes Algorithm

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ABSTRACT

The growth of internet usage increased the need of security in network which is monitored by Intrusion Detection System (IDS). Using machine learning algorithms is common for implementing any IDS to detect network traffic whether it is normal or attack. Naive Bayes algorithm is one of the popular supervised classification algorithm for categorical dataset which is built on conditional independence of feature assumption. Our experimental research focused on comparison of traditional Naive Bayes algorithm and PCA based implementation using with (sklearn) and without built-in python library. Experimental results using PCA based NSL-KDD intrusion detection system indicate better accuracy compared to traditional Naive Bayes in both with and without built-in sklearn python library.

Full Paper: 5th IEEE International WIE Conference on Electrical and Computer Engineering (WIECON-ECE) 2019
KNN Classification using Multi-core Architecture for Intrusion Detection System

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ABSTRACT

Network security is an important aspect in today’s world, as the number of internet users is increasing rapidly. Security for these devices could be provided by software tool Intrusion Detection System (IDS) which monitors and analyzes the network traffic. There are different machine learning approaches to design IDS which vary with accuracy, execution time, and false alarm rate. This paper presents multi-core architecture on K-Nearest Neighbor (KNN) algorithms using python language. The experiments of the IDS are performed with KDD99 dataset. Evaluation results show that computational time decreased with exploitation of multicore architecture. So, this approach can be implemented for resource-constrained devices like Internet of Things and Wireless Sensors Networks.

ABSTRACT

Now a day’s indoor mapping and navigation is an important issue and day by day its necessity is increasing. In recent times the concept of indoor mapping has gained great popularity. In this project, we present an indoor mapping and navigation system. The proposed indoor mapping and navigation system consists of a circuit made up of arduino UNO and tweeters as transmitters and our mobile phones as receivers. The different arduino UNO circuits will generate different frequencies corresponding to different rooms and because the mobile phone is so ubiquitous these days, it is the perfect receiver and users can use our application to recognize the ‘required’ room/shop. The android application has three basic modules which form the basis for receiving the frequency and displaying it. Towards the end, the project discusses the working of the prototype of the system that proves the correctness of the proposed method.

*Full paper: National Conference on Computer Science and Management Applications, 2019*
Automated Paid-Parking Assistance System

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ABSTRACT

Vehicle parking in dense cities can become a chore. Vehicle parking is an important issue in recent times, which needs to be managed. To do this, manual systems may not be always viable. Low cost affordable automated systems are required to maximize the productivity and ease the urban infrastructure. Increasing number of vehicles, traffic congestion, limited parking facilities, road safety and vehicle safety are but a few aspects which need attention of the researchers. This paper discusses the implementation of a simple, cost effective automated system in paid-parking lots. This system makes use of a control unit, ultrasonic and infrared sensors, RFID readers, Servo motors and display units. A working model was built and tested successfully.

*Full paper: National Conference on Computer Science and Management Applications, at VTU, Mysuru, 2019*
Microcontroller Based Implementation of A Cryptographic Hill-Cipher Module

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ABSTRACT

Cryptography is a technique of enciphering and deciphering the data for its secured transmission. In cryptographic data transmission, the readable message will be converted into illegible form which can only be deciphered by the intended user using a specific key. Encryption is done at the transmission side and decryption is done at the receiver side. Since, only the sender and the receiver know the shared secret key, data confidentiality is maintained. The Hill cipher algorithm uses a total of twenty nine characters for this implementation. The algorithm is programmed in C++ using CodeBlocks IDE. Implementation is carried out by using the microcontrollers in Arduino Uno circuit board, an HT 12 E/D (Encoder/Decoder) and an RF (Radio Frequency) transmitter/receiver.

*Full paper: National Conference on Computer Science and Management Applications, at VTU, Mysuru, 2019*
A Review Paper on Brain Tumor Segmentation and Detection

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ABSTRACT

According to official statistics, cancer is considered as the second leading cause of human fatalities. Among different types of cancer, brain tumor is seen as one of the deadliest forms due to its aggressive nature, heterogeneous characteristics, and low relative survival rate. Determining the type of brain tumor has significant impact on the treatment choice and patient’s survival. Human-centered diagnosis is typically error-prone and unreliable resulting in a recent surge of interest to automatize this process using machine learning approaches. This paper is focused on review of those papers which include segmentation, detection and classification of brain tumors. The common procedure for an algorithm which aims to classify brain tumors on MRI scans is: Preprocessing the image for example by removing noise, then segmenting the image, which yields the region which might be a brain tumor, and finally classifying features such as intensity, shape and texture of this region. Many machine learning approaches towards brain tumor detection have already been made. However, these approaches, even though yielding good results, are not used yet. Therefore this research topic remains important and still requires attention.

Reversible Data Hiding in Medical Images Using Histogram Modification

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ABSTRACT

Secrecy of information is very important which leads a way for data hiding through images. The special case of lossless recovery of data as well as cover media is known to be reversible data hiding. In this paper, we will present a method to hide data in medical images, with images being the cover media. It is implemented in the spatial domain utilizing histogram modification technique. The proposed method first employs creation of modified histogram based on adjacent pixel differences and then histogram modification algorithm is applied. Data embedding varies the pixel values based on neighbouring pixel values and also on the correlation between adjacent pixels. Data extraction is performed as opposite to the embedding. We chose some common medical images like CT, MRI, Ultrasound, etc. We performed our proposed technique and obtained result and calculated using various statistical parameters like Mean, Median, SSIM, PSNR, BPP, etc. We have implemented our technique using Matlab Graphical User Interface (GUI), thereby representing it as an application of telemedicine.

*Full paper: National Conference on Communication, Signal Processing, IoT, Networking and Embedded Applications (NCCOSINE), at National Institute of Engineering, Mysuru, 2019*
Study of Fiber - Wireless (Wi-Fi) Access Network

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ABSTRACT

Fiber-Wireless (FiWi) broadband access network is a promising “last mile” access technology, because it integrates wireless and optical access technologies in terms of their respective merits, such as high capacity and stable transmission from optical access technology, and easy deployment and flexibility from wireless access technology. Since FiWi is expected to carry a large amount of traffic, numerous traffic flows may be interrupted by the failure of network components. Thus, survivability in FiWi is a key issue aiming at reliable and robust service. Survivability is defined as the ability to provide services to users if any failure occurs in the network. Mainly survivability is related to backend since it has tree topology. If an (Optical Network Unit) ONU has low traffic then it transfers its traffic to other ONUs and goes into sleeping mode and if traffic increases then ONU comes into awakening mode. By adding such criterion in ONU we can save energy in FiWi network. The Fi-Wi network is a combination of optical backend and wireless front end. One of the key issues in FiWi network is ONU placement since it is related to network deployment cost. A Fi-Wi network consists of a wireless sub network as the front end and an optical sub network as the back end. Passive Optical Network (PON) sub network in Fi-Wi network can provide up to 1.25 GBPS EPON (Ethernet PON) and GPON (Gigabit PON) supporting 2.488 GBPS rate in the downstream and 1.244 GBPS rate in the upstream. The Dense Wavelength Division Multiplexing (DWDM) is a technology which multiplexes multiple optical carrier signals on single optical fiber by using different wavelengths of laser light to carry different signals. In modern era of telecommunications, there is a sharp increase in the growth of internet and broadband services. To fulfill these demands, DWDM-PON is one of the most promising approaches. Currently DWDM technique is being used for achieving higher data rates. DWDM is a technology which multiplexes multiple optical carrier signals on single optical fiber by using different wavelengths of laser light to carry different signals. The DWDM puts together multiple signals and sends them at the same time along a fiber with a transmission taking place at different wavelengths. In DWDM-PON, the different wavelengths chosen, each for a specific user, are multiplexed by the optical multiplexer on transmitting side and transmitted over fiber. On the receiving end, an optical splitter splits the received power in equal amount to each ONU maintaining the same bit error rate (BER). However, in situations like a large disaster or in difficult deployment places where the installation cost is more, the alternative solution may be wireless link such as FiWi, which provides flexibility and quick deployment of the system. Hence, the convergence of optical and wireless technologies gives rise to hybrid (DWDM-PON/ Wi) network.

Full paper: National Conference on Communication, Signal Processing, IoT, Networking and Embedded Applications (NCCOSINE), at National Institute of Engineering, Mysuru, 2019
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ABSTRACT

This study aims to give organizations insight into how to successfully implement RPA and what factors to beware of to avoid failure. The main literature that is supporting this research is previous research of RPA along with a comparison to IT development via Business Process Management. Experts in the field that have experience of implementing RPA were interviewed for this research. The results are present as a dynamic Oracle ERP for RPA implementation with a description of what risk factors it is necessary to beware of to avoid failure. The results indicate that the value is not only in the robot. When a number of automated processes increases then RPA gets more complicated. Organizations need to be able to understand RPA and therefore build a structure for RPA with appropriate RPA team. Including change management right from the beginning is fundamental; when the changes are applied, employees have to be prepared for them. Companies need to continuously work on the process assessment and therefore identify, optimize and prioritize processes for the RPA lifecycle. Companies that have RPA team with lack of knowledge could experience that some part of the RPA lifecycle is not carried out successfully, which can have an adverse effect later on in RPA lifecycle and result as project failure. RPA project evaluation depends mainly on the objectives of the project and therefore the type of processes that are automated.

*Full paper: International Research Journal of Engineering and Management Studies (IRJEMS), Vol. 03 Issue 05, 2019
Adaptive LCD Windshield Glare Elimination System

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ABSTRACT

Driving the vehicles for long durations strain our eyes, be it during a sunny morning or pitch dark night with oncoming traffic. Drivers make 90% of decisions based on what they see in front of them, if they fail to see anything, it can turn out to be a major risk of accident. Adaptive LCD windshield glare eliminator and variable tint adjustment mechanism is made use to Aid the safety and comfort of the driver. This is achieved using a transparent LCD on top of windshield and a camera setup to switch on and off pixels actively thereby stabilizing light entering inside a car thru windshield.

Secure Android Application Development and Security Assessment

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ABSTRACT

Now a days mobile has taken a main part in everyday life of an individual, all important information are stored in mobile database and accessible by mobile applications. Even online transactions are through mobile applications; hence, mobile security requires the main priority. Android applications undergo static and dynamic analysis during security testing. This analysis requires tools like apktool, adb, BurpSuite, Drozer, dex2jar, JDGui and jadX. This paper consists of step-wise procedure for an android application security assessment through which vulnerabilities can be found and solutions to overcome vulnerabilities.
Deep Learning Driven Networking Applications

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ABSTRACT

Deep learning architectures are inspired from the architecture of human brains since brains also have a deep architecture. With the progress and advancement of the Internet, networking research has become one of the most important fields. Since the networking deals with difficult problems that require effectual results, deep learning algorithms work very well in network domain by leveraging their capabilities for advanced network performance. Though, many researchers have exploited deep learning in networking but have been found to be dispersed in the literature. The present research has been focused on to contribute to the limited literature on applications of deep learning in computer networking. This research has focused on deep learning researches in the network related areas such as network traffic classification, WSN and social networks, network flow prediction and mobility prediction. The present research will facilitate the readers to find some motivating and stimulating research areas to pursue in the significant field of deep learning in networking domain and move ahead in the forward direction.

Wireless Sensor Network (WSN) is a self-configuring network of small sensor nodes communicating among themselves using radio signals and deployed in quantity to sense, monitor and understand the physical condition. In this paper, much of interest is shown towards the design of WSNs by using cross layer Adaptive Dynamic Retransmission technique. The objective of the work is to compare the performance of the DSR (Dynamic Source Routing) and PSR (Proactive Source Routing) protocol with the proposed work. The DSR and PSR protocols consumes more energy, hence it is required to design an energy efficient routing protocol for WSN. The performance of above mentioned techniques is compared on basis of parameters such as Throughput, Packet Delivery Ratio, Packet Loss Ratio and End to End Delay. Mechanism of the proposed work is adapted to transmit power between two nodes and to utilize the transmitted energy efficiently by making use of adaptive Dynamic Retransmission technique.

Protection of Personal Data on Distributed Cloud Using Biometrics

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ABSTRACT

The proposed system aims at providing a secure and efficient solution to end users to access their own personal files in the cloud servers using biometric authentication. Biometric fingerprint scanner is used for the processing of fingerprint based authentication. The user’s own personal files are stored in the free public multiple cloud storages namely AWS and Google drive using two techniques called splitting and merging techniques. Rijndael algorithm will improve the security in cloud environment. Files or details are stored in multiple clouds using cryptographic techniques. Data gets split into fragments and gets stored in various distinct cloud servers with encrypted key. At once the authorized token for the specific is requested by the user, the cloud server performs a keyword based on the search's encrypted data and combines the fragments, this is sent to the verifier for the verification.

*Full paper: International Research Journal of Engineering and Technology (IRJET), Vol. 06, Issue 04, 2019*
Attendance Management System Using Real Time Face Recognition

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ABSTRACT

This paper introduces a new method in attendance management systems using computer vision algorithms. We propose the system using real time face detection algorithms using dlib library and cognitive face, which automatically detects and takes students attending on a lecture. The system represents a tool for instructors, combining algorithms used in machine learning with adaptive methods used to track facial expressions during a longer period of time. This new system aims to more efficient than traditional methods, at the same time being nonintrusive and not interferes with the regular teaching process. This approach promises to offer accurate results and a more detailed attendance reporting system which shows student activity and attendance in a classroom.

Medical Documentation of Clinical Data and Disease Prediction

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ABSTRACT

Fruitful organization of Electronic Health Record improves persistent wellbeing and nature of consideration, yet it has the essential of interoperability between Health Information Exchange at various clinics. The Clinical Document Architecture (CDA) created by HL7 is a center record standard to guarantee such interoperability and spread of this archive group is basic for interoperability. Shockingly, medical clinics are hesitant to embrace interoperable HIS because of its sending cost aside from in a bunch nation. An issue emerges notwithstanding when more clinics begin utilizing the CDA archive group on the grounds that the information dissipated in various reports are difficult to oversee. In this paper, we portray our CDA record age and combination Open API administration dependent on distributed computing through which clinics are empowered to advantageously produce CDA reports without buying exclusive programming. Our CDA archive joining framework coordinates numerous CDA records per quiet into a solitary CDA report and doctors and patients can peruse the clinical information in sequential request. Our arrangement of CDA archive age and coordination depends on distributed computing and the administration is offered in Open API. Engineers utilizing diverse stages hence can utilize our framework to upgrade interoperability. In this situation, two completely dispersed security protecting profile coordinating conventions have been characterized without depending on neither a customer server relationship nor any focal server. Homomorphic properties of Shamir mystery sharing are misused to process the crossing point between client profiles secretly, and because of the littler computational space of mystery sharing, the conventions can accomplish higher execution and lower vitality utilization for down to earth parameter settings of a web apparatus.

ABSTRACT

Recent advances in technology have indicated that the Internet of Things (IoT) is going to play a major role as technology enabler in computer sensing and automation. For IoT devices it is becoming imperative to have learning capabilities through machine learning. For the purpose of experimentation, the investigators have used Raspberry Pi as the hardware device. Here the investigators have applied statistical based feature selection techniques to reduce the number of features in the dataset. Furthermore, the investigators have analyzed and removed the possible outliers to normalize the health care data used for experimentation and have applied two machine learning algorithms such as Logistic Regression and K Nearest Neighbor (KNN) for the purpose of classification. The perceived results indicate more than 90% accuracy with KNN; thereby, outperforming Logistic Regression by 4.08%.
Performance Analysis of Internet of Things using Visible Light Communication

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ABSTRACT

Internet of Things enables seamless interaction between connected devices. The growing popularity of IoT will increase the number of sensors and devices to be connected with Internet enormously, resulting in generation of Trillions of GBs of data. Most of the IoT devices have very less storage capacity and hence data generated are to be transmitted to IoT node head which takes care of processing. Data generated from ECG devices, Video surveillance systems are very large requiring a physical medium with high bandwidth for the connection between device and IoT node head. Further the objects plugged into Internet are most of the times powered by batteries requiring low power communication. Visible Light Communication (VLC) is one such technology that provides wide bandwidth up to 10Gbps with energy efficiency and thus it can be a potential solution for the above problem. In this paper we propose NS3 based IoT Implementation using existing IoT protocol stack with Visible Light Communication as the physical medium considering error model. We achieve a throughput of 416 Mbps which is a significant improvement over Wireless Fidelity based IoT implementation which has a throughput of 91.2 Mbps under the same condition.

Priority Based Algorithmic Design of Flow Control Protocol for IoT using LiFi

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ABSTRACT

Internet of Things which is a network of physical objects can be used to ease the life style of people with better facilities such as smart cities, homes, hospitals that give a better service than the traditional one. Many such applications generate large volume of data that may not lead the network stable. The attention should be paid towards controlling such data flow. The flow control algorithms that are used in computer networks cannot be used efficiently here as they are independent of applications and the flow control developed for one application need not be applicable to other. Here we design a protocol that controls data flow based on priority of the data sent in various applications that use IoT. Also we give feasibility analysis of the protocol designed at different levels.

Forest Fire Detection Using Wireless Sensor Network

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ABSTRACT

Development of real time fire detection system is the main target of this research using unmanned aerial vehicle. Sensors, Raspberry Pi and Camera are used for capturing and processing the images of the fire in the forest. This system uses two sensors, namely flame sensor and smoke sensor. Flame sensor is used to detect the fire using infrared light, whereas a smoke sensor is sensitive to gases and smoke. Data collected by the sensors and camera is processed by Raspberry Pi which is the micro controller. The result of the data that is processed is sent to the cloud and can be accessible in ThingSpeak. A prediction algorithm is used to detect fire based on the comparison of pixels. All this hardware is integrated together and mounted on the drone.

SC-MANET: Threats, risk and solution strategies for security concerns in mobile ad-hoc network

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ABSTRACT

A MANET is a form of the wireless network among the mobile, wireless nodes. The presence of various significant attributes in MANET like end to end communications, dynamic topology and simple setup, leads to difficulties like routing, security, and clustering. Network security is an important aspect for both wired and wireless communication. This paper, provide a detail review on different security attacks over the MANETs. Further discussion is carried out by providing of prior solutions to overcome the security attacks and gives a bench mark for future study. An extensive survey of existing researches towards security in MANET is addressed. Later on, a research gap in current state of art in MANET security is discussed. Especially, this survey study mainly focus on security problems, challenges and solution strategies for security concerns in mobile ad-hoc networks.

*Full paper: Advances in Intelligent Systems and Computing, Vol.765, pp. 300-310, 2019
Security for Localization of IOT Devices

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ABSTRACT

The Sensor nodes are important components and Authentication of nodes is a major concern because such nodes are more susceptible to various attacks. The main goal of this paper is to verify whether data coming from sensor is authenticated or not. The two different techniques namely an On Spot Verification and In-Region Verification are discussed. In the On spot verification, the location of the sensor nodes is verified with that of the registered value of that node. In the In-Region verification, the current location of the sensor nodes with respect to its neighbouring nodes is verified with the registered value of the node. If no change in the value has been taken place, then the data coming from that particular sensor is authenticated.

*Full paper: International Journal of Science and computing, (IJESC), Vol. 9, Issue 04, 2019*
A Novel Approach for the Run-time Reconfiguration of Heterogeneous Applications in a Smart Home Monitoring System

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ABSTRACT

The Run-time Reconfiguration is implemented in many of the applications like Home Automation, Structural Health Monitoring Systems, Intrusion Detection Systems, Fire Detection Systems etc. It is required to dynamically reconfigure the applications based on the changing needs. Since all these applications runs on different networks, there is a demand to run the heterogeneous applications on the same network. The objective of this paper is to develop an adaptive model for run-time reconfigurations of Heterogeneous applications in a Smart Home Monitoring System using Wireless Sensor Networks and Internet Of Things. The intelligent mechanism would dynamically reconfigure itself and run only the required application. The proposed system saves the power and memory consumption.

*Full paper: International Conference on Inventive Computation Technologies, 2019*
Breast Cancer Prognosis using Machine Learning Models

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ABSTRACT

Breast Cancer has been a common cause of death among women worldwide. Timely diagnosis of the disease is very essential for proper treatment and decision making. Human limitations affect the rate of correct diagnosis. Machine learning models are very effective in classifying the data. The classification algorithms also help experts minimize possible errors. In this study, we have used Wisconsin diagnostic breast cancer (WDBC) dataset to classify tumors as benign and malignant. Performance analysis of the six classification algorithms – KNN, Naïve Bayes, Random Forest, Logistic Regression, SVM and Decision tree is done in terms of effectiveness and efficiency of the model. Keywords—Machine learning, Classification, Breast Cancer Classification, kNN, Decision Tree, Naïve Bayes, SVM, Random Forest, Logistic Regression.

House Price Prediction System using a Hybrid Regression Technique

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ABSTRACT

People looking to buy a new house tend to be more conservative with their budgets and market strategies. Generally house prices are calculated without the necessary prediction about future market trends and price increases. In this paper we proposed the prediction of efficient house pricing for real estate customers with respect to their budgets and priorities. By analysing previous market trends and price ranges, and also upcoming developments future prices will be predicted. The proposed approach will help customers to invest in an estate with approaching an agent. It also decreases the risk involved in the transaction.

ABSTRACT

Microsoft Azure is a distributed computing administration made by Microsoft for structure, testing, conveying, and overseeing applications and administrations through a worldwide system of Microsoft-oversaw server farms. It facilitates SaaS, PaaS and IaaS. SaaS stands for software as a service. PaaS stands for platform as a service. IaaS stands for infrastructure as a service. It supports a huge number of programming languages, frameworks and tools. PaaS is a stage that is given to customers to create and convey programming. The customers can concentrate on the application advancement as opposed to stressing over equipment and framework. It likewise deals with the greater part of the working frameworks, servers and systems administration issues. IaaS is a managed service that gives unlimited oversight of the working frameworks and the application stage stack to the application designers. It gives the client to get to, a chance to manage and screen the server farms without anyone else. Modern approach to the traditional on-premises datacenter is provided by the cloud computing. Cloud environments will help you to experience the online portal, which in turn encourages the users for managing, computing, storing and networking. The best example is the Azure portal. Here users will create a virtual machine which is configured by specifying the VM size, the operating system, any pre deployed software, configuration related to network, and the VM location. Azure dashboard is a web application that provides insight about VM infrastructure in Azure, which includes the information related to the backup and recovery, High Availability and Disaster Recovery.

Blockchain Enabled E-Voting System

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ABSTRACT

The Blockchain-Enabled E-Voting uses a digital-currency analogy where in eligible voters can cast a ballot anonymously using a computing environment. BEV employs an encrypted key, smart biometrics and tamperproof real-time personal ID verification. Blockchain enable the creation of tamper-proof audit trails for voting. The idea of adapting digital voting systems to make the public electoral process cheaper, faster and easier, is a compelling one in modern society which normalizes it in the eyes of the voters, removes a certain power barrier between the voter and the elected candidate, thus making it an effective way for casting vote in this generation of technology.

ABSTRACT

This paper aims to provide a solution that uses a multimodal approach to analyze large intake of audio and video data and use it to understand the emotions of a subject and to describe the current surroundings to the subject in question. The model is trained on the egocentric data, which contains audio and video signals. The model contains emotion recognition and a speech recognition which extract features of their own allowing to perform a classification on the emotions. The large inflow of data from up and coming technologies like Google Lens and onset of Internet of things are key application points for this solution.
Analysis of Smart Applications using Internet of Things

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ABSTRACT

Internet of Things which is a network of physical objects plays a vital role in the near future. The idea behind Internet of Things is that Things instead of humans can make use of Internet to communicate. IoT can be used to ease the life style of people with better facilities such as smart cities, homes, hospitals that give a better service than the traditional one. Analysis of applications that use IoT is very much needed to improve the quality of life style of people.

An Adaptive Computational Model for Threshold Based VM Migration and Job Scheduling in Cloud

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ABSTRACT

Cloud computing is considered as a most promising technique for offering the strong significant resources for computation for huge data by taking the advantage of virtual machine configurations where multiple operating systems are configured where multiple application applications are deployed to perform the several tasks. However, during peak time, huge number of requests are processed through the virtual machines where overloading phase of virtual machine may occur which may delay the task completion process resulting in degraded performance of cloud computing system. In order to deal with these issue, virtual machine migration strategy is introduced where overloaded virtual machines are migrated to perform the task in optimal time duration which can help to finish the task on the pre-assigned time duration and can save the energy consumption. During last decade, significant amount of work has been carried out in this field of virtual migration but achieving desired performance is still challenging. In order to deal with this issue, here we present a novel approach where we considered resource availability related information for VM allocation. In the next phase, threshold-based migration scheme is implemented based on the computing resources. Finally, an experimental study is presented for VM migration using proposed technique and a comparative study is also presented which shows that proposed approach achieves better performance when compared with the state-of-art techniques of VM migration.

A Comparative Analysis of Diverse Price Prediction Models in Context of Cloud Computing

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ABSTRACT

Cloud computing technology has gained huge attraction from research community due to its characteristics of offering the services over internet. These services are known as: software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS) and these services are offered based on the customer demand. These service are beneficial for the industries which allows industries to start the desired computation task without investing in hardware and software and when the demand is more, then resources can be increased to accomplish the task. Despite of several promising advantages of cloud computing, this paradigm faces several challenging issue which can affect the cloud computing performance such as load balancing, energy consumption, QoS and cost for resource utilization. Several approaches have been developed to address the load balancing, energy consumption and QoS related issues but cloud service utilization cost is still considered as a challenging task for cloud users where prices are fixed for utilization of cloud service unit but dynamic traffic may cause underutilization or overutilization of resources resulting in resource wastage and extra cost, respectively. In order to deal with this issue, price prediction models are developed which are based on the time-series analysis of the given data. These techniques are developed using machine learning, artificial intelligence methods and other ensemble learning. In this work, we consider different type of price prediction model and presented a comparative analysis and the obtained performance of each model is compared with different types of data traffic.

Workload and SLA Violation Prediction in Cloud Computing

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ABSTRACT

Recently, cloud computing has come up as an evolving technology in various real-time computing field and widely adopted in several real-time computing systems. Due to its advantages of pay-as-you go services where users need not consider other factors such as hardware and platforms. Due to increasing demand of these applications, providing efficient resource and managing these resources is a crucial task because wastages of resources can lead towards the economic loss to the users and service providers. In order to deal with these issues, we focus on the workload prediction and SLA violation prediction approach for improving the overall performance. According to the proposed model, we develop a workload prediction model using clustering approach where similar workload patterns are grouped together to reduce the overhead and later SLA violation scheme is applied which is used for reducing the violations using Naïve Bayes classification approach. Finally, comparative experimental study is carried out which shows that the proposed approach archives better performance when compared with the state-of-art techniques.

*Full paper: International Conference on Inventive Systems and Control (ICISC), pp. 582-587, 2019*
ABSTRACT

Today digital transformation is playing a key role in many intelligent enterprises. Due to this there is a tremendous data exchange between internet of things which results in higher demand of bandwidth over communication network. Hence there is a need to utilize the bandwidth effectively which aids in reducing the greenhouse gas emissions in internet of things. Reducing the data size is one aspect that can be considered, to wisely utilize the network bandwidth. In this paper, a novel GWOICT (Grey Wolf Optimizer for Information and Communication Technology) algorithm is developed using jpeg baseline compression algorithm and grey wolf optimizer to reduce the size of images that enables to reduce the CO2 emissions while transferring data over a network of objects. The proposed technique has shown better results in terms of compressing the images and reducing CO2 emissions over the network for driving towards green internet of things in an enterprise.
Detection and Analysis of Drowsiness in Human Beings Using Multimodal Signals: Business Algorithms, Cloud Computing and Data Engineering

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ABSTRACT

The state of drowsiness can be characterised as an intermediate state of mind which occurs between the alert state and the sleep state. The alertness of the mind is reflected immediately through the sense organs and other body parts. Automatic detection and analysis of drowsy state of mind is essential in applications where the human’s mental status is important. One such scenario is monitoring driver’s alertness while he is driving. A multi-modal approach is analysed for detecting the drowsy state in humans. Two modalities are considered here, video information and bio signals, for analysis. Visual information conveys a lot about the human alertness. The precise indicators from the video information need to be identified and captured for analysis and detection. The bio signal that indicates human brain alertness is EEG signal. The physical and mental alertness are analysed for detecting drowsiness state of a human being. A framework is proposed for drowsiness detection of humans in real-time.

*Full paper: Lecture Notes on Data Engineering and Communications Technologies, Vol.21, pp. 157-174, 2019
A survey on local market analysis for a successful restaurant yield

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ABSTRACT

Establishment of a new restaurant requires a paramount investment in it. Thus, a thorough analysis of different factors is important to the determination of the probable rate of success of the restaurant. Among the different factors, location plays a vital role in the determination of the success of the restaurant unit. The demographics of the location, existing cluster of restaurants established in the location, and the growth rate of the location need to be studied prior to selection of the optimal location. However, it is a cumbersome job to find the correct location, by analyzing each of these different aspects of the location. This paper studies the different aspects of a location which makes it a determining factor in the prediction of success of a restaurant. The proposed work aims at the creation of a web application that determines the locations suitable for the establishment of a new restaurant by using techniques of machine learning and data mining. © Springer Nature Singapore Pte Ltd. 2019.

*Full paper: Advances in Intelligent Systems and Computing, Vol. 813, pp. 249-257, 2019*
A novel deterministic framework for non-probabilistic recommender systems

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ABSTRACT

Recommendation is a technique which helps and suggests a user, any relevant item from a large information space. Current techniques for this purpose include non-probabilistic methods like content-based filtering and collaborative filtering (CF) and probabilistic methods like Bayesian inference and Case-based reasoning methods. CF algorithms use similarity measures for calculating similarity between users. In this paper, we propose a novel framework which deterministically switches between the CF algorithms based on sparsity to improve accuracy of recommendation. © Springer Nature Singapore Pte Ltd. 2019.

*Full paper: Advances in Intelligent Systems and Computing, Vol. 813, pp. 85-97, 2019*
CURE IT- The Medical Assistant Application

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ABSTRACT

Serving a population of over 1.3 billion, India’s healthcare sector is a far cry from such a colossal task. We can cite many reasons for this drawback, amongst those, the most remediable is the inefficiency of the existing medical records handling system. Manual storing and fetching of the medical records will lead to unavoidable time delay and also not dependable at times of emergencies. Reconstructing the whole system digitally is the only way forward. Medical records that are in digital format provide a more reliable and faster access to the Data. The Application provides two different types of accounts, one for the ‘Patients’ and the other for the ‘Doctors’. Through our Application a ‘Patient’ can upload the images of his medical records into the Firebase database. The Firebase authentication ensures a very strict data privacy. ‘Doctors’ have permissions to access patients’ data but only after being validated by the User. ‘Doctors’ also has the provision to add his professional comments regarding a medical consultation. The Application also provides an automated medicine ordering system. Once the ‘Patient’ uploads a valid prescription we analyse it with the help of Google Vision API. We extract the medicines’ name and dosage, place an order through one of the online pharmacy merchants. The application also reminds the User with timely notifications to consume medicine as prescribed. It also keeps a track of the Users’ personal stock of medicine and notifies the user to replenish his medical cabinet accordingly. It provides a list of hospitals and clinics nearby the Users’ location. By providing all these facilities through the Application we are moving a step closer towards a constructive healthcare.

*Full paper: International Research Journal of Engineering and Technology (IRJET), Vol. 06, Issue 04, 2019*
Detecting Suspicious Accounts in Money Laundering

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ABSTRACT

Money laundering could be a criminal activity to disguise black money as white money. It is a method by that outlawed funds and assets square measure born-again into legitimate funds and assets. Money Laundering happens in 3 stages: Placement, Layering, and Integration. It results in numerous criminal activities like Political corruption, smuggling, monetary frauds, etc. In Republic of India there's no sure-fire opposed concealment techniques that square measure accessible. The Federal Reserve Bank of Republic of India (RBI), has issued tips to spot the suspicious transactions and send it to monetary Intelligence Unit (FIU). FIU verifies if the dealing(transaction) is truly suspicious or not. This method is time intense and not appropriate to spot the outlawed transactions that happens within the system. To overcome this drawback we have a tendency to propose associate economical opposed concealment technique which might ready to determine the traversal path of the Laundered cash victimization Hash based mostly Association approach and sure-fire in distinctive agent and measuring instrument within the layering stage of cash wash by Graph theoretical Approach. Key Words: Data mining, Anti Money Laundering, FIU, Hash Based Mining, and Traversal Path.

Crop yield is directly dependent on climatic and weather conditions. A lot of research has been done studying the dependency of weather on crop yield. Crop prediction models have proven to be successful in increasing the crop yield. Soil parameters and atmospheric parameters are used by the models to predict the suitable crop. Parameters such as type of soil, pH, phosphate, potassium, organic carbon, sulphur, manganese, copper, iron, depth, temperature, rainfall, humidity have shown to influence the yield of crop. In this paper, we review the research conducted by several researchers in this direction with a logical conclusion. © Springer Nature Singapore Pte Ltd. 2019.
A Case Study for Comparing the Difference Between Logistic Regression and K-Nearest Neighbour Using Raspberry Pi for the Purpose of Machine Learning

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ABSTRACT

Recent advances in technology have indicated that the Internet of Things (IoT) is going to play a major role as a technology enabler in computer sensing and automation. For IoT devices it is becoming imperative to have learning capabilities through machine learning. For the purpose of experimentation, the investigators have used Raspberry Pi as the hardware device. Here the investigators have applied statistical based feature selection techniques to reduce the number of features in the dataset. Furthermore, the investigators have analyzed and removed the possible outliers to normalize the health care data used for experimentation and have applied two machine learning algorithms such as Logistic Regression and K Nearest Neighbor (KNN) for the purpose of classification. The perceived results indicate more than 90% accuracy with KNN; thereby, outperforming Logistic Regression by 4.08%.

A Review on Trust Models of Social Internet of Things

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ABSTRACT

The realization of IoT boom has motivated scientific community to enhance IoT into a more acceptable modeling of real world. Social Internet of Things (SIoT) is a step in this direction. The concept of SIoT presents social relationship aspect to network of IoT devices. It also represents real-world activities in the form of concrete model. Hence, SIoT may be termed as IoT network with social relationship affiliation. The nature of relationship among various SIoT members determines the interactions that will take place among them. Work done by researchers presents various models upon which social relationship interactions can be based. Among them the concept of trust which is the most appropriate way to quantify the reliability of interactions among members of the SIoT is found. In this paper, different trust management models for SIoT are reviewed. Trust model based on multiplicative attribute graph (MAG) model is considered as the basic concept of this survey. The different trust models are also compared using different metrics.

*Full Paper: Springer Lecture Notes in Electrical Engineering (Book series LNEE), Vol. 545, pp 203-209, 2019

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ABSTRACT

With the development of cloud environment which is serving user requests, storing data etc., energy consumption has become a big issue. Increased energy data consumption of data centers emit a large amount of CO2 and also has made the IT industry to worry about when we think of green computing. As more tasks are running in the datacenter, minimizing the energy consumption becomes a challenge. Technologies like virtualization, migration, and DVFS (Dynamic Voltage and Frequency Scaling) and workload consolidation are the appreciating solutions and hence used in our work to reduce energy consumption and power without affecting the progress rate of jobs. Virtualization is a technology in which physical machines are partitioned into multiple virtual machines (VMs). Techniques like Fuzzy logic and Linear Regression are also used for the host discovery and allocation of VM identified for migration. We have also compared our proposed mechanism with existing systems in various dimensions. To understand this, a prior knowledge of cloud’s energy consumption is required.

*Full paper: Advanced Informatics for Computing Research, pp.288-299, 2019 (Book Chapter)
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The exponential rise in the demands for Quality of Service (QoS) centric wireless transmission systems has revitalized academia-industries to develop more efficient routing solutions to serve reliable communication. However, classical wireless communication protocols are confined due to static and resource constrained network scenarios. Up-surging mobile-communication demands require more scalable, reliable, QoS-centric routing even under dynamic topology conditions. For a large scale wireless network, zone based routing approaches that embody both reactive as well as proactive network management strategies have been found significant; however traditional routing decisions confines its efficacy for dynamic topology based networking solutions such as Mobile Adhoc Networks (MANETs). MANET that often undergoes exceedingly high topological and network conditions changes requires optimal routing model with augmented network-awareness, multi-parameter assisted route decision etc to achieve QoS provision. With this motivation, in this paper a robust Cross-Layer Architecture Based Geographical Network Condition Aware Zone Routing Protocol (GC-ZRP) has been developed for QoS assurance over MANETs. Unlike classical ZRPs, GC-ZRP applies cross-layer architecture with, Network layer, Medium Access Control (MAC) layer and Physical layer to perform enhanced Service Differentiation and Fair Resource Scheduling (SDFRS), Proactive Network Management (PNM), Dynamic Link Quality Estimation, packet velocity estimation and congestion detection models, which are performed at the different layers of the standard IEEE 802.11a protocol stack. The multiple network parameters based best forwarding path formation enables GC-ZRP to exhibit optimal packet delivery ratio, minimum packet loss and deadline miss ratio for real-time data traffic while ensuring maximum possible performance for non-real time data traffic.

Sports Navigator – A Framework for all Sports Intelligence using Machine Learning
(Game Census)

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ABSTRACT

There are significant advances in the field of Machine Learning and Data analytics over the past few years and its use-cases has spread across various application areas starting from Transportation to Medical. Sports industry has been recently reaping the benefit of Machine Learning. People are looking to improve their games from all avenues. There is also a significant increase in the Interest in games among parents and kids. However, there is no one platform which creates a digital footprint of each player so a player can be tracked from his early participation in games till he starts playing professional games. We propose a platform which will collect data from all the videos played by players and create a digital footprint of each of the players and games. This paper particularly covers a game census with comparison between attacking team and opponent team.

A Survey on Service Oriented Scheduling for Big Data Cloud

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ABSTRACT

Big Data is an emerging data intensive computing technology to extract intrinsic information from large scale variety forms of rapidly growing data. Big Data Analytics is a data science paradigm, which employs several statistical and machine learning tools for effective and quick decision making. As Cloud computing technologies are coming into reality, several Cloud providers are offering large scale computing and storage facilities as services based on pay and consumption models to the end users. Due to their service oriented delivery of Clouds, these are turning as back end infrastructure to address several big data mining problems in Big Data computing. As the convergence of Clouds and Big Data is turning into new area aka “Big Data Clouds”, there is a need to address several under pinning technical elements of Big Data computing in Clouds. In this paper, we discuss Service oriented scheduling mechanisms to serve Big Data Analytics in Clouds infrastructure as services. Our main focus is on scheduling aspects, which bring out the several issues, thus meeting the constraints, and Quality of Service (QoS) parameters. We initially, bring about several challenges in scheduling the Big Data problems over Clouds infrastructure, followed by offering the service oriented analytics deliver over Clouds based SLAs and the Quality of Service while considering the dead line, budget constraints.

ABSTRACT

Data warehouse store historical records on which analysis queries are executed. Data warehouse are populated from the transaction database through a process called as Extract Transform and Load (ETL). Extract is to identify the transaction database records to be moved to the data warehouse. Transform is to make the records normalized to suit the data warehouse environment. Load is to actually store the records in the data warehouse. Today business wants to perform real time analysis of data. Availability of updated records in the data warehouse is necessary for real time analysis. This could be achieved through the process of near real time (ETL), i.e., to improve existing ETL process. Improvement to existing ETL could be achieved in many ways such as to increase the frequency of loads, to identify relevant changes that are required for analysis and move only those changes. Only through increasing the frequency of load would not be useful in many cases. Hence we should identify the changes and then move if they are useful for analysis making it smart ETL. In this paper we study three such techniques. First one is to create a replica of dimension table in data warehouse and move the changes to the replica this reduces the query response time. Second is to load the data in parallel so that loading time could be reduced. Third is to identify changes and trigger the loading process. We have used the first approach to create replica and loaded the data in parallel and observed that by loading in parallel not only does the loading time reduces but also the query response time. Then in the first approach is the query response time reduces to a certain limit methods suggest to move the data from replica dimensions to the original dimensions. Here we bring in right time trigger to move instead of just the query response time. We found that when we have a combined approach to query response time and right time trigger the number of moves are reduced.

*Full paper: Lecture Notes in Networks and Systems, Vol. 43, pp. 387-402, 2019
Comparative Study on Influence of Lead Rubber Bearing on RC Structures with Flat Slab and Conventional Slab System Under Seismic Loading

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ABSTRACT

The main objective of isolation system is to elongate the structural time period, thereby shifting the natural period of the structure from the predominant periods of earthquake. Isolator mainly does three roles: energy dissipation, rigidity, and horizontal flexibility against lateral loads. The aim of my project is to study the responses of the structure for flat slab and beam slab system of RC structure by response spectrum analysis. The modeling and analysis of the structure are carried out using ETABS 2016 software. The dynamic properties of the structure such as base shear, storey drift, time period, and storey displacement are found, and the comparison is made between them.
A Novel Approach to Handle Huge Data for Refreshment Anomalies in Near Real Time ETL Applications

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ABSTRACT

Real time analysis of data is the new trend to get useful insights in very less time spend for data preprocessing. Analysis of data requires the movement of data from various heterogeneous/homogenous sources to a common place known as the data warehouse. Data source for data warehouse are the transaction processing systems. Movement of data from the transactional data-base to the data warehouse is done using the process of Extract Transform and Load (ETL). ETL previously was done during of peak hours like a night load or on weekends. The requirement of real time analysis demands the ETL to be fast and not wait for off peak hours. This lead to the concept of near real time ETL, here techniques are employed to identify the potential changed data at the transaction database and move it to the analysis data base with a very minimal delay. This movement of data in real time from multiple sources in an incremental form could lead to anomalies in the data warehouse. This work discusses the various causes of anomalies and solutions to overcome them. Our main contribution is the application of loading data into temporary tables for reducing query execution time in case of overcoming refreshment anomalies.

Evolutions in Zone Routing Protocol based on QoS-Centric Approaches

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ABSTRACT

The rise in the demands for Quality of Service (QoS) centric wireless transmission systems has forced to develop more efficient and robust routing algorithms to help trusted and error-free communication. Traditional communication protocols are confined due to unavailability of resources and other various restricted environments. Communication stresses more on requiring additional scalability and QoS-centric routing. In this case, the ad hoc grids integrate numerous communication procedures which are castoff to principally oblige communication from a node to additional in the identical or diverse grid. The routing conventions under Ad Hoc Grids are characterized as Reactive and Proactive Routing Etiquettes. Considering the advantages of Reactive and Proactive routing protocol, the Hybrid Routing Protocol has been projected. In the Hybrid Routing Procedure, Zone Routing is one such routing procedure. This paper largely emphases on evolutions finished on the Zone Routing Procedure and estimated against limited QoS-based restrictions. Individually, development is cautiously considered and analysed for the QoS parameters and related to the traditional Zone Routing Procedure.

*Full paper: 2nd National Conference on Advanced Computing Technologies and Applications, at REVA University, Bangalore, 2019*
Design and Implementation of School Children’s Vehicle Tracking and Monitoring System

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ABSTRACT

This paper is based on school childrens’ vehicle tracking and monitoring system based on biometric and android terminals. This project focuses on implementing children tracking system for every child attending school. This system is being developed using GSM which helps in facilitating the needful information about the child travelling in the school bus by sending SMS. Android application is implemented to track school vehicle. Biosensor based smart tag system has been implemented for monitoring children and driver in vehicle (entry/out). Before vehicle reaching parent home location message alert system has been implemented. This application works well in all transportation systems and ensures safety.

*Full paper: National Conference on Communication and Data Science (NCCDS) at GSSS, Mysuru, 2019*
Conflation of the Cloud Side and the Data Owner Side Access Control for Secure and Encrypted Cloud Storage.

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**ABSTRACT**

The cloud provides numerous benefits which attracts many customers. However, the lack of user-to-cloud controllability raises concern amongst the data users. The cloud providers cannot be fully trusted and hence the data owners are left perturbed whether to host the privacy-sensitive data to the cloud or not. To meet the issue of confidentiality, the data owners have adopted the method of encryption wherein the plaintexts are converted to encrypted texts when being uploaded to the cloud. The Cipher-text Policy Attribute Based Encryption (CP-ABE) is used to provide the owner centric access control but it doesn’t provide rich security against several other attacks. In the existing system, the cloud provider doesn’t have the permission to verify whether a downloader can decrypt a file or not. Hence, the files can be accessible to everyone accessible to the cloud storage. This exposes the system to a type of attack called Economic Denial of Sustainability (EDoS) attack. Here the malicious attacker tries to exhaust the cloud resources by trying to download thousands of files. The payer of the cloud service would then have to bear the expense. Besides, the cloud provider serves both as the accountant and the payee of resource consumption fee, lacking the transparency to data owners.

*Full paper: National Conference on Communication and Data Science (NCCDS), GSSS, Mysuru, 2019.*
ABSTRACT

WSN applications primarily focus on data accumulation from the various sensor nodes spread across the environment. Many existing data gathering protocols work on the principle of using Cluster Head (CH) which is the designated node in a cluster for collecting data and Mobile Element (ME) which collects data from various CH’s and deposits the data in the Base Station (BS). The proposed work on creation of an efficient data gathering technique in WSN, is the result of intense survey of existing technique in related framework and immense understating of the short coming of these existing protocols. The things that predominantly stand out from the survey performed are overflow of buffers at sensor nodes, visiting schedule of MEs, data fusion aspect and Idle listing concept, have not been well addressed. These limitations pave way for inception of novel data gathering technique for WSN. In this paper Energy Efficient Data Gathering Technique using Multiple Mobile Elements (EEDGMME) is introduced. Better efficiency in data gathering technique is achieved by data fusion at Cache Point (CP) which intends to reduce the instances of transmissions, visiting schedule for MEs to reduce buffer overflow and resultant data loss at various nodes of the network, Sleep-Awake duty cycling which prevents the instances of Idle listing and hence conserve the nodes energy. Practical simulation results prove the theoretical perspective of improved performance gains in comparison to the existing protocol Mobile Element based Energy-Efficient Data Gathering with Tour Length-Constrained in WSN (EEDG). Proposed technique EEDGMME provides better packet delivery ratio, lesser delay, reduced overhead, optimum energy consumption with decreased packet drop and hence enhances the network usability span.

*Full paper: Lecture Notes on Data Engineering and Communications Technologies, Vol.21, pp. 263-285, 2019 (Book Chapter)
WSN-Based Electronic Livestock of Dairy Cattle and Physical Parameters Monitoring

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ABSTRACT

A numerous advantages of wireless sensor networks have led to discover various applications incurred in the field of health systems, home, industrial, commercial, military, and environment etc. The biggest privilege of using WSN is due to its low cost, maintenance, and other desirable features. One major application involved in WSN is animal health monitoring. By incorporating this, health status of the cattle can be observed and maintained based on variety of parameters using distinct sensors. The description about unique sensors that are associated in wireless sensor network in order to monitor the health status of cattle to erupt the ill health is presented in this paper. The disadvantages incurred in the existing system are overcome by the proposed system containing android application where all the cattle’s health-related data will be stored in a database.

*Full paper: Lecture Notes in Electrical Engineering, Vol. 545, pp. 37-45, 2019 (Book Chapter)
Department of P. G. Studies (MCA)
Classification of Tumors in Brain MRI Images with Hybrid of Global and Local DWT Features using Decision Tree

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ABSTRACT

Automated brain tumor identification and classification is still an open problem for research in the medical image processing domain. Brain tumor is a bunch of unwanted cells that develop in the brain. This growth of a tumor takes up space within skull and affects the normal functioning of brain. Automated segmentation and detection of brain tumors are important in MRI scan analysis as it provides information about neural architecture of brain and also about abnormal tissues that are extremely necessary to identify appropriate surgical plan. Automating this process is a challenging task as tumor tissues show high diversity in appearance with different patients and also in many cases they tend to appear very similar to the normal tissues. Effective extraction of features that represent the tumor in brain image is the key for better classification. In this paper, we propose a hybrid feature extraction process. In this process, we combine the local and global features of the brain MRI using first by Discrete Wavelet Transformation and then using texture based statistical features by computing Gray Level Co-occurrence Matrix. The extracted combined features are used to construct decision tree for classification of brain tumors in to benign or malignant class

*Full paper: International Journal of Recent Technology and Engineering (IJRTE), Vol. 8, Issue-12, 2019
IoT Based Gas Leakage Detection

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ABSTRACT

Spots like ventures, inns, bottles, research centers, and so forth utilize different sorts of combustible gases for instance, LPG, carbon dioxide, smelling salts, and so on. The utilization of these gases puts every one of the spots referenced above in danger prompting a risk to harm of life and property because of any sort of spillage of these gases. Security is the fate of most extreme significance. This factor prompts a need of a gas identification framework to be introduced at such clumsy areas for ceaseless checking of any sort of spillage which can't be distinguished by the human detects. The proposed framework will persistently screen the surroundings for any spillage. In the event of any spillage discovery, it will alarm the client by means of a bell and by utilizing the Ethernet shield module and an Android application; it will caution the client about the natural conditions like the gas level and temperature of that area of establishment utilizing web based life locales like Twitter or through an email notice.

IoT Based Anti-theft Vehicle Tracking and Regaining System

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ABSTRACT

Conceptual Structuring Anti-Theft vehicle Tracking and Regaining System which track the vehicle and offers to stop the vehicle in a base time allotment when it is lost. Hostile to Theft Vehicle following and recapturing System has a GPS (Global Positioning System) and a GSM (Global System for versatile communication).GPS is used to find the zone of the vehicle GSM for sending SMS to the owner of the Vehicle. Vehicle Tracking and Regaining structure is planned for both bicycle and four Wheeler Vehicles. Owner can send a SMS at whatever point to the contraption which is in the vehicle. This System in like manner consolidates the accident ready Feature. Subsequent to tolerating a message, then the owner may rise significant exercises to getting back the vehicle. The whole system is constrained by a fueled battery and connector.

Classification of Assembly (W-Section) using Artificial Intelligence

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ABSTRACT

Artificial Intelligence (AI) has become increasingly important in modern world and it is that which makes machine work smart. Machine Learning is an application of AI. ML is the ability to learn without being explicitly programmed. Deep Learning (DL) is the part of ML methods based on Learning. They can be supervised, semi-supervised and unsupervised. In this paper we are using a Convolutional Neural Network (CNN) to classify the Assembly by using one of the classification model i.e., inception V3 model. This project classifies the images of the W-sections based on the training data and provides us the classified folders of the images as Three-Bolts, Two-Bolts, Four-Bolts and etc. And also determines whether it is correct or wrong assembly by giving the image through the Web client.

*Full paper: International Research Journal of Engineering and Technology (IRJET), Vol. 06, Issue 05, 2019*
ABSTRACT

The number of traffic accidents is rapidly increasing which leads to increase in deaths and injuries. Road safety becomes an important key factor to be concentrated to reduce all of these accidents. In this paper, we have concentrated on the study of the factors that are influencing the road accidents and the accident patterns that are frequently occurring. The main aim here is to identify those hidden rules. The hidden rules in the frequently occurring accident item set uncover the association between the factors that are influencing the accidents. The occurrence of accidents can be reduced by breaking these hidden rules. Identifying these patterns helps in taking precautionary measures towards road safety. Data Mining is an emerging technology that can be used to mine the frequent item set and patterns based on the association rules like support count and confidence. Association rule mining technique called “Eclat algorithm” used in this paper to find the frequent itemset and determine the accident patterns that are frequently occurring. This algorithm is effective and faster than “Apriori algorithm” because the dataset will be fetched only once and the process is carried out by referring to the previous tables. By developing the system and obtaining the patterns it was seen that this technique is effectively working with good results. Thus, a smart automated modeling using eclat algorithm for traffic accident prediction was successfully developed that helps the traffic department to concentrate on road safety by avoiding frequently occurring accident patterns.
Blood Cross Portal: Blood Deferral Donor using Machine Learning

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ABSTRACT

People giving blood might be deliberate non-compensated blood benefactors or substitution contributors as vital by an individual from their very own family or network. WHO prescribes willful non-compensated blood givers over substitution givers because of the level of blood safety from the two gatherings? In spite of the fact that an individual can deliberately choose to give blood, they might be precluded from giving blood because of reasons relating to the benefactors' safety and additionally beneficiary security, which is essentially alluded to as contributor deferral. Deferral might be worldly delay or changeless rejection from giving blood due to being associated or affirmed with having an irresistible sickness, hematological ailment, or whatever other ailment that will either impact the well being of blood or influence contributors' own well being. In this venture, everything about the of blood giver, regardless of whether they are benefactor deferral or not with complete subtleties.

*Full paper: International Research Journal of Engineering and Technology (IRJET), Vol. 06, Issue 05, 2019
Classification of Tumors in Brain MRI Images With Hybrid of Global and Local DWT Features using SVM

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ABSTRACT

Automated brain tumor identification and classification is still an open problem for research in the medical image processing domain. Brain tumor is a bunch of unwanted cells that develop in the brain. This growth of a tumor takes up space within skull and affects the normal functioning of brain. Automated segmentation and detection of brain tumors are important in MRI scan analysis as it provides information about neural architecture of brain and also about abnormal tissues that are extremely necessary to identify appropriate surgical plan. Automating this process is a challenging task as tumor tissues show high diversity in appearance with different patients and also in many cases they tend to appear very similar to the normal tissues. Effective extraction of features that represent the tumor in brain image is the key for better classification. In this paper, we propose a hybrid feature extraction process. In this process, we combine the local and global features of the brain MRI using first by Discrete Wavelet Transformation and then using texture based statistical features by computing Gray Level Co-occurrence Matrix. The extracted combined features are modelled by Support Vector Machine with different kernel functions like Linear, quadratic and RBF for classification of brain tumors in to benign or malignant class.

*Full paper: 4th IEEE International conference on Communication and Electronic Systems (ICCES), at PSG Institute of Technology, Coimbatore, 2019
A Novel Approach of Predicting the Music Genre through Classification for The FMA Dataset

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ABSTRACT

Music seems to be an integral part of our lives. We listen to music when we are happy, sad, lonely and even when being moody. Music is a big money market too. In countries like India and also many Asian and east Asian countries, every film produces a minimum of three to four musical compositions. Music producers and singers of these compositions are paid heavy amounts of money for their induced talent. Likewise, through prediction and music genre classification people can be gauged about their likes and dislikes, the various moods of people can be analyzed, the next song in their playlist can also be predicted. Overall, music information retrieval and music analysis are interesting topics of research. With the late advent of the old school machine learning, also called machine intelligence, researchers are able to bring out intriguing results from different data streams and sources. For our work, we propose a system that can predict and analyze different music genre through machine intelligence-based classification techniques. We use the FMA dataset as the base data.

* Full Paper: 3rd Asia Conference on Machine Learning and Computing, at Hong Kong University, Hong Kong Proceedings with IJMLC, 2019
A Novel Approach for Music Recommendation System using Matrix Factorization Technique

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ABSTRACT

A recommender system provides personalized content to its users to handle the ever expanding information overload, thus improving customer relationship management. Music is a subject used widely across the world in different aspects of life. Music recommender systems help users to listen to the right choice of music. With the advent of mobile devices and internet, access to different music resources is easily available. In this paper we provide music recommendations to the Million song dataset using the Turi Create’s core ML library and with focus on two methods of collaborative filtering techniques: user-based and item-based recommendations. Results are deduced exploring numerous metrics to measure the similarity of users and items such as cosine metric, Pearson correlation, latent matrix factorization and others. A comparison of different evaluation metrics is carried out to check for the effectiveness of the recommender system.

Department of Basic Sciences
Synthesis, Characterization Crystal and Molecular Structure Studies of 5-(3-Methylbenzoyl)-4-Methyl-1, 3, 4, 5-Tetrahydro-2H-1,5-Benzodiazepin-2-One: Hirshfeld Surface Analysis and DFT Calculations

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ABSTRACT

Benzodiazepines derivatives have been reported for their broad spectrum of biological applications. These derivatives are also being investigated for their supporting activity against human cancers. The title compound 5-(3-Methylbenzoyl)-4-methyl-1,3,4,5-tetrahydro-2H-1,5-benzodiazepin-2-one has been synthesized, characterized using ¹H NMR, ¹³C NMR, IR techniques and finally the structure was confirmed by single crystal X-ray diffraction studies. The single crystals of the compound were obtained using ethanol as crystallization solvent. The compound C₁₈H₁₈N₂O₂ crystallizes in the orthorhombic crystal system with P2₁2₁2₁ space group. The crystal structure of the title compound is stabilized by N—H···O intermolecular hydrogen bond and π···π interactions. The structure also exhibits one dimensional chain stacking along a-axis through intermolecular interactions. These molecular interactions were then quantified using Hirshfeld surface analysis to understand their nature of involvement in interaction with other molecules. The analysis of the fingerprint plots revealed that the H···H (58.7%) interactions has the major contribution to the total molecular surface. Further, the electronic properties of the title compound were studied by computing the frontier molecular orbital energies using density functional theory calculations with B3LYP/6-311 + G (d, p) level basis set. Finally, the molecular electrostatic potential map was generated and the chemical reactive sites were identified to understand the molecular surface properties.

*Full Paper: Chemical Data Collection, Vol. 24, 2019

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ABSTRACT

Synthesis of ONO tridentate imine based molecule N’-[(E)-(5-bromothiophen-2-yI)methylidene]-3-hydroxynaphthalene-2-carbohydrazide (HTp) is gained quick attention because of its operational simplicity carried by both conventional and microwave methods and structurally it was elucidated by analytical, spectral, X-ray crystallography and Hirshfeld surface techniques. Analysis from the X-ray study provided the details of molecular structure, packing and hydrogen bonding properties in the solid state. The molecule is crystallized in monoclinic P21/c space group. The apparent binding affinity for the coupling of human serum albumin (HSA) with HTp drug molecule was examined through in vitro spectroscopic methods and molecular docking studies. HTp strongly quenched the intrinsic fluorescence intensity of HSA in terms of a static mode. The thermal based binding parameters were quantified from the fluorescence quenching experimental data. The energy transfer efficiency determined according to Förster’s theory. Besides, the experimental results were in line with the molecular docking results.

Molecular Docking and Vibrational Spectroscopy Studies of (E)-N'-Hydroxy-1, 3-Diphenyl-4,5-Dihydro-1H-pyrazole-5-Carboximidamide

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ABSTRACT

The experimental (FT-IR and Laser-Raman spectra) and theoretical (DFT studies) vibrational modes of (E)-N'-Hydroxy-1,3-diphenyl-4,5-dihydro-1H-pyrazole-5-carboximidamide were studied in detail. FT-IR and Laser-Raman data were collected in the range 4000-400 cm⁻¹ and 4000-100 cm⁻¹, respectively in solid phase. Optimized structural parameters and frequency values were theoretically calculated using DFT/B3LYP and DFT/M06-2X chemical methods with 6–311++G (d,p) basis set by Gaussian 09W software. Theoretical frequency assignments and potential energy distributions (PED) analysis were performed by VEDA 4 program. With the optimized structures, the highest occupied molecular orbital (HOMO) and the lowest unoccupied molecular orbital (LUMO) energies and clouds were obtained and evaluated. Additionally, molecular docking studies for potent pyruvate kinase activators (PDB codes: 4RPP, 4FXJ, 4QG6, 4WJ8) and previously used targets (PDB codes: 2QU5, 2W1G and 2VTO-three different cancers related proteins) were employed for docking by AutoDock Vina program considering Swiss-Target reports and related literature knowledge.

Ultrasound-Assisted Synthesis of Auxiliary Pyrazoline Integrated Thiazole, Thiazolone Derivative and Their Biological Evaluation

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ABSTRACT

In this paper, we describe a simple catalyst-free protocol for the synthesis of thiazole, thiazolone integrated pyrazole derivatives, under ultra-sonication technique. Thiazolone derivatives (5a, 5e, 5i, 5d, 5h, 5l) were derived from [3+2] cyclocondensation reaction between carbothioamide pyrazoline (4a-c) as S-N bi-nucleophile with DMAD/DEAD. The target molecules (5b, 5f, 5j, 5c, 5g, 5k) were synthesized by the reaction of (4a-c) with the substituted bromoethanone. Formation of the products was confirmed by FT-IR, 1H-NMR, 13C-NMR, LCMS analysis. Docking studies were carried out against the antimicrobial target (Acinetobacter baumannii penicillin) to know the interaction of the molecules (ligands) with the docked target. Among the docked compounds thiazolone derivative (5d) showed the minimum binding energy of -9.08 kJ/mol with ligand efficiency of -0.23. All the synthesized compounds were examined primarily for their in-vitro antibacterial and antioxidant activity (IC50). Compound (5g) (18±0.0) and (5d) (19.5±0.5) showed significant bacterial inhibition against E.coli and S.aureus. Compound (5k) (16.57) showed substantially DPPH free radical inhibition activity as compared to the reference drug Ascorbic acid.

Ex Vivo and Silico Molecular Docking Studies of Aldose Reductase Inhibitory Activity of Apigenin from Morus Indica

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ABSTRACT

An investigation on Aldose Reductase Enzyme (ALR) inhibitory activity of apigenin (API) isolated from Morus indica L. was evaluated by ex vivo and molecular docking studies. Materials and Methods: The inhibitory efficacy of API from M. indica was evaluated against ALR in lens tissue of mice by ex vivo and their binding mechanism through molecular docking was carried out by AutoDock. Results: The API (10-50 µg mL⁻¹) concentration exhibited significant inhibition (p ≤ 0.05) of ALR enzyme in a dose dependent manner with IC50 value of 39.23 µg mL⁻¹. The positive control aminoguanidine (AG) at 10 mM inhibited 42.96% of ALR. The molecular docking studies revealed that API showed better binding energy (-9.15 kJ mol⁻¹) when compared to AG (-3.78 kJ mol⁻¹). Molecular interaction analysis showed that API interrupts the proton donation mechanism which is necessary for the catalytic activity of ALR by forming H-bond with Trp20 (proton donor). Conclusion: The ALR inhibition potential offered by API was further confirmed through molecular docking studies. The present findings support the pharmacological application of API for the treatment of diabetes cataract.

The Crystal Structure of RS-7-Chloro-2-(2,5-Dimethoxyphenyl)-2,3 Dihydroquinazolin-4(1H)-One: Two Hydrogen Bonds Generate an Elegant Three-Dimensional Framework Structure

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ABSTRACT

In the title compound, C₆₁H₁₅ClN₂O₃, the heterocyclic ring adopts an envelope conformation, folded across the N...N line, with the 2,5-dimethoxyphenyl unit occupying a quasi-axial site. There are two N—H...O hydrogen bonds in the structure: one hydrogen bond links molecules related by a 41 screw axis to form a C(6) chain, and the other links inversion-related pairs of molecules to form an R₂²(8) ring. The ring motif links all of the chains into a continuous threedimensional framework structure. Comparisons are made with the structures of some related compounds.

Mycofabrication of bioactive silver nanoparticle: Photo catalysed synthesis and characterization to attest its augmented bio-efficacy

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ABSTRACT

Photocatalysed mycosynthesis of nanoparticles can be used as alternative for chemical and physical method of nanoparticle synthesis. We report synthesis of silver nanoparticles (SNPs) from two fungal species wherein the reduction in the silver ions might have occurred by nitrate-dependent reductase enzyme/proteins. Reduction in silver ions was an extracellular and made the process rapid coupled with photoreduction; it made us to the develop combination of an easy process for biosynthesis of the SNPs within 20 min. The formation of SNPs was confirmed from the surface plasmon resonance peak in the visible region of the spectrum (410–440 nm). The optimized production process shows Czapek Dox broth in alkaline pH at 60 °C of post culture temperature was found to be finest for maximum yield in both the fungal species. The particles were then characterized by UV-Visible Spectrophotometry, SEM, DLS and XRD analyses which confirm the particles are in nanoscale. The extracellular mycosynthesized SNPs were shown to have antioxidant, anti-arthritic, antiangiogenic and antimicrobial activities. The study confirms SNPs form soft corona with the human serum protein by protein corona studies. Potential of fungal-mediated biosynthesis of SNPs is important for development of effective imaging or therapeutic agents applicable for drug targeting.

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Tuning the Electrical and Thermal Functionalities of Mechanically Flexible Poly (Vinyl Alcohol) Nanocomposites: Effect of Cerium Zirconate Nanofiller Content

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ABSTRACT

Herein, we report the considerate doping of particle stabilizing poly(vinyl alcohol) (PVOH) matrix using cerium zirconate (Ce0.5Zr0.5O2) nanoparticles (NPs) with varying amounts viz., 0.5, 1, 2 and 4 wt% of Ce0.5Zr0.5O2 NPs and their electrical, mechanical and thermal performance appraisal. The developed polymer nanocomposite (PNC) thick films have been also studied for their surface wettabilities via static water contact angle measurements, so as establish their self-cleansing abilities. Further, the electrical functionalities of developed PNCs were valued using LCR (inductance (L), capacitance (C), resistance (R)) meter. While, thermal behaviors were established via thermo gravimetric analyzer (TGA) and differential scanning calorimeter (DSC) studies.

Highly Flexible and Conducting Polymer Nanocomposite Films for Selective Gas Sensing Applications

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ABSTRACT

Fabrications of gas sensor with real time and capable analysis at room temperature have gained immense attentions of the scientific community. Hazardous caused by gases and considering the human health, gas sensor is designed by combining organic and inorganic biocompatible materials. Here we report metal-organic thick films which were fabricated by solution intercalation method, for better molecular interaction and homogeneous dispersion of filler. After the intercalation of AlFeO₃ (∼50 - 60 nm) in to polymer Poly (vinyl alcohol) (PVA), drastic changes in structural and morphology of the film were conducted by using Scanning electron microscope (SEM). After effective doping with metal oxide, PVA is ended with superior conducting property and it was examined by Keithley 2400. However, conductance of the PVA/AlFeO₃ is examined in the presence of the carbon dioxide (CO₂) and liquid petroleum gas (LPG). Further in order to stabilize the sensing ability of PVA/AlFeO₃ the concentration of the gas molecules is maintained from minimum to maximum (50 ppm to 1000 ppm). The recorded Response plots and high sensitivity towards CO₂ and LPG detection confirms that designed flexible PVA/AlFeO₃ is very potential and it can be used as environmental monitor.

Nanostructured Al_{0.2}Y_{1.8}O_3 Semiconductor Assisted Enhancement in PVOH Fortitude to Withstand High Energy UV Photons: An Opto-Mechanical Study

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ABSTRACT

An appreciable enhancement in UV endurance of poly(vinyl alcohol) (PVOH) thick films was affected using nanostructured Al_{0.2}Y_{1.8}O_3 semiconductors. The effect of shorter wavelength UV radiations on physico-mechanical and opto-electronic behaviors were established via morphological, optical and mechanical characterizations. The enhancement in photo-stabilities of PVOH/Al_{0.2}Y_{1.8}O_3 nanocomposite (NC) films were accessed via optical and mechanical performance evaluation. The optical transmittance, fluorescence emission, tensile strength and surface wettability of PVOH/Al_{0.2}Y_{1.8}O_3 thick films remained almost unaltered (upon UV irradiation), while there occurred detrimental changes in physico-mechanical and optical behaviors of pristine PVOH. The anti UV-ageing property of Al_{0.2}Y_{1.8}O_3 reinforced PVOH NCs were achieved via considerate deactivation of UV induced photo-oxidative deterioration, using Al_{0.2}Y_{1.8}O_3 nanofiller assisted energy drain.

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Orange-Red Fluorescent Polymer Nanocomposite Films with Large Stokes Shift: An Opto-Electronic Exercise

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ABSTRACT

Herein, we report the successful fabrication of orange-red fluorescent polymer nanocomposite (PNC) hybrids, that envisage efficient photon management and appreciable UVA-protection, besides high design flexibilities and ease of self-cleaning. The visibly transparent PNC thick films were developed via aqueous solution casting of -OH backboned poly (vinyl alcohol) (PVA) with nanostructured sodium zincate ($\text{Na}_2\text{ZnO}_2$). The as developed PNC films offer appreciable photonic down-conversion of high energy UVA-radiations to relatively lower energy Orange-red light via fluorescent emission. The optical band gap studies reveal a direct band gap relationship with valence band maxima and conduction band minima occurring at same wave vectors. While, static contact angle measurements support nanofiller induced wettability transitions (hydrophilic to near hydrophilic). The fluorescence spectral (excitation and emission) studies of PVA/$\text{Na}_2\text{ZnO}_2$ NC films validate a promisingly large Stokes shift (~245 nm), which visualises a fair separation between the photonic absorption and emission bands, that may further aid an exponential minimization of optical losses due to re-absorption. The thermogravimetric studies support their excellent thermal stabilities. The relatively large Stokes shift, appreciable thermal stability and excellent UV harvesting ability of PVA/$\text{Na}_2\text{ZnO}_2$NC films construct them as competent luminescent down-shifting (LDS) materials for possible solar cell applications.

A dramatic increase in UV endurance of polycarbonate (PC) films were achieved via thoughtful intercalation of cesium zincate (Cs$_2$ZnO$_2$) nanoparticles (NPs). The augmented UV endurance of PC/Cs$_2$ZnO$_2$ nanocomposite (NC) films were analyzed via yellowing index quantification and Fourier Transform Infrared (FTIR) measurements at 1713 cm$^{-1}$. The foundation for improved UV stability was owed to Cs$_2$ZnO$_2$ NPs induced lessening of undesirable photo-degradation reactions. Moreover, the introduced NPs act to dissipate the high energy UV photons via polymer-nano metal oxide induced synergistic spectral down-conversion. The novel spectral down-conversion abilities and patina-green light emitting properties of PC/Cs$_2$ZnO$_2$ NC films were valued with UVA-transilluminator coupled fluorescence microscopic studies. Eventually, the synergistic combination of Cs$_2$ZnO$_2$ NPs with PC host, wherein the metal oxide offers protection against undesirable photo-degradation reactions, while the polymeric host guards the luminescence centers of nanostructured metal oxides are highly desirable for various photonic and opto-electronic applications.

Facile Microwave Assisted Green Synthesis of Zno Nanoparticles: Application to Photodegradation, Antibacterial and Antioxidant

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ABSTRACT

The present study reports the effective synthesis of zinc oxide nanoparticles (ZnO Nps) by microwave irradiation method using Indian bael (Aegle marmelos) juice as fuel. The synthesized nanostructures were characterized by X-ray diffraction, FT-IR, scanning electron microscope, transmission electron microscope, Raman Spectroscopy, photoluminescence and ultraviolet (UV)–visible studies. At room temperature, photoluminescence spectrum showed the excitation wavelength at 370 nm and emission peaks at 388 and 468 nm corresponding to Zn vacancies and O vacancies, respectively. Further, the effectiveness of the synthesized zinc oxide nanoparticles was tested for methylene blue dye degradation under UV irradiation. The dye removal efficiency of nanoparticles was 96% after 35 min of UV (λ = 617 nm) irradiation. The ZnO nanoparticles were subjected to antimicrobial activity against different strains. The current synthetic work pledges to provide some new visions into the design of nanomaterials for multifunctional long-term applications for cleanup and biomedical applications.

*Full Paper: Journal of Materials Science: Materials in Electronics, 2019
The unique size-dependent material property engineering, together with parallel technological advancements, that facilitates effective handling and management, have all set the tempo for escalating research on nanostructured materials. In particular, semiconductor metal oxide nanoparticles (NPs) have attracted significant scientific interest, owing to their versatile end applications ranging from antimicrobial to drug delivery, sensors to energy stores and many more. Zinc oxide (ZnO) is one such primary wide band gap semiconductor with large exciton binding energies, direct band gap absorption and intrinsic structural defects induced exciton emission. Besides, ZnO NPs are also known to exhibit particle size and morphology dependent confinements, which may often induce entirely new material properties. Herein, an attempt is made to present a detailed review of the synthetic condition dependent material property tuning and hence, related applications of ZnO NPs. Besides, the article also sheds light on characterization tools adopted towards the successful structural elucidation metal oxide NPs.
Synthesis of Coumarin Analogs Appended With Quinoline and Thiazole Moiety and Their Apoptogenic Role Against Murine Ascitic Carcinoma

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ABSTRACT

The synthesis and antiproliferative effect of a series of quinoline and thiazole containing coumarin analogs 12a-d and 13a-f respectively, on mice leukemic cells was performed. The chemical structures of newly synthesized compounds were confirmed by IR, 1H NMR, 13C NMR and mass spectral analysis. The result indicates that, 7-methoxy-2-oxo-2H-chromene-3-carboxylic acid [4-(4-methoxy-phenyl)-thiazol-2-yl]-amide (13f) showed potent activity against EAC and DLA cells in MTT (15.3 μM), tryphan blue (15.6 μM) and LDH (14.2 μM) leak assay with 5-fluorouracil as a standard. Further, the anti-neoplastic effect of the compound 13f was verified against Ehrlich ascites tumour by BrdU incorporation, TUNEL, FACS and DNA fragmentation assays. Experimental data showed that compound 13f induces the apoptotic cell death by activating apoptotic factors such as caspase-8 &-3, CAD, Cleaved PARP, γ-H2AX and by degrading genomic DNA of cancer cells and thereby decreasing the ascitic tumour development in mice. Besides, compound 13f was also subjected for docking studies to approve the in vitro and in vivo studies. The data revealed that the compound 13f has very good interaction with caspase 3 protein by binding with amino acid Arg 207 through hydrogen bond.

Crystal Structure Study, Hirshfeld Surface Analysis and In Vitro Antibacterial Activity of P-Tolyl 4-Fluorobenzoate

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ABSTRACT

The title compound C₁₄H₁₁FO₂ crystallizes in orthorhombic crystal system with space group P2₁2₁2₁. The compound exhibits inter-molecular interaction of the types C–H…O, and C–H…π; intramolecular interaction of the type and C–H…O. The inter-contacts are also studied using Hirshfeld surface analysis. The compound was screened for antibacterial activity which revealed medium to low activity against certain bacteria.

Partition Laplacian Energy of a Graph

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ABSTRACT

Let $G = (V, E)$ be a graph and $P_k = \{V_1, V_2, ..., V_k\}$ be a partition of $V$. Recently we have introduced the partition energy of a graph $E_{P_k}(G)$ and computed partition energy of some families of graphs with respect to a given partition. In this paper, we introduce the concept of partition Laplacian energy $LE_{P_k}(G)$ which depends on the underlying graph $G$ and the partition of the vertex set $V$ of $G$. We obtain an upper bound and few lower bounds for partition Laplacian energy, also obtain partition Laplacian energy of some families of graphs, their internal-complements and show that $k$-partition Laplacian energy of a $r$-regular graph $G$ is equal to its $k$-partition energy with respect to any partition $P_k$ of $V$.

Analytical approach to Ramanujan type and Ramanujan’s modular equations of degree 7

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ABSTRACT

In this paper, we deduce certain modular equations of degree 77 analogous to Ramanujan’s modular equations of degree 77. Also, we prove six modular equations recorded by Ramanujan in his second notebook.

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