



## GEC's Proud Moments



### Heartfelt Congratulations...



**Suresh K Damodaran**

**Suresh K Damodaran**, Associate Professor, Dept. of Electrical and Electronics Engineering has successfully completed his Ph.D in Engineering at NIT Calicut under the supervision of Dr. T K Sunil Kumar, Professor, NIT Calicut. Title of his thesis is *"Heuristic Approach for Economic and Emission Generation Scheduling of Thermal-Hydro-Wind Power Systems"*



**PA Abdul Samad**



University of Calicut awarded doctorate to **PA Abdul Samad**, Associate professor of Mechanical Engineering for his work on *"Investigations on flow characteristics and particulate distributions in Gyro casting of Metal Matrix Composites"*. He did his research work under the supervision of Dr. Shalij P. R, Professor, Department of Production Engineering, Government Engineering College, Trichur.

(See page 4 for abstracts)



## Inculcate Interdisciplinary Research Culture

**- Dr. Sheeba V. S., Principal**

During the executive meeting of Institute Research Advisory Council (IRAC) on 16-10-2019, Principal **Dr. Sheeba V S** emphasized the relevance of interdisciplinary research in Engineering and Technology. She advised IRAC to conduct lecture series by the faculty members of our college every month. According to her, this will be a platform for sharing novel research ideas among the research supervisors, research & PG students and faculty members. She also advised the council to ensure the participation of research and PG students in the lecture series. As the research council proposed, International conference will be held in our college the tentatively in Dec 2020. **Dr. Vijayan P** (Research Dean), **Dr. Manju M S** (IRAC Convener), **Dr. Sajikumar N** and **Dr. Vinod P Raphael** (members) were present in the research council meeting.



**Dr. Vijayan P**  
Dean (Research)  
GEC Trichur

## ..... Message from Research Dean

In the short span of less than a decade, Govt. Engineering College Trichur has witnessed a spurt in research activities in almost all the disciplines of Engineering and science, in which courses are offered at under-graduate and post-graduate levels. The much needed fillip or stimulus for the improved research environment in the institution was largely contributed by the TEQIP Phase II introduced in the year 2010-11, and officially made operational since May 2012. It is exhilarating to note that a tremendous progress in research activities has been accomplished both in the number of faculty undergoing doctoral programmes within and outside the institution, and in the number of scholars admitted under various schemes including the prestigious ones like the National Doctoral Fellowship, the Quality Improvement Programme, etc. Presently, there are 68 research scholars registered under the APJ Abdul Kalam Technological University to which the institution is currently affiliated, and about half a dozen scholars registered under the University of Calicut, the erstwhile affiliating University.

Of the eight engineering disciplines, only four were the approved research centres under the University of Calicut. But with the change of affiliation to APJAKTU, almost all Departments have slowly started undertaking research activities with greater interest and dedication. Though the already achieved improvement in research potential is quite creditable, much more ambitious targets are yet to be realized, such as establishing stand-alone research centres in all the Departments including Basic Science, and bringing out more research output in the form of increase in publications and award of doctoral degrees. This will lay a strong foundation for promoting more multi-disciplinary researches transgressing the boundaries of individual disciplines. It is hoped that all the Departments will diligently work to achieve this goal, and help the institution transform itself into one of the most renowned centres of excellence for research and development of cutting-edge technologies for the changing world. As the institute's research activities prosper, the GECT Research Bulletin, which has started off with a modest beginning, will certainly be able to get elevated to the status of an avant-garde journal of national repute.

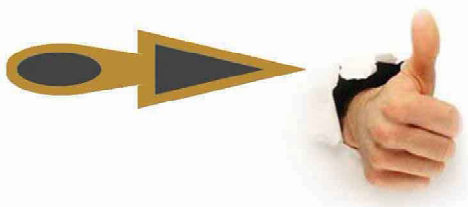


## MSME - Let us share

MSME stands for Micro, Small and Medium Enterprises in manufacturing and service sectors. Government has decided to elicit cooperation between educational institutes and enterprises with the aim to solve the industrial problems and to improve the technical knowledge. Sharing the ideas between resource persons in educational fields and the industrialists facilitates the industrial activities. Those who have technical knowhow (students and staff) can

intervene in the problems of industry and thus offer support. On 11-11-2019, Principal **Dr. Sheeba V S** called a meeting of MSME committee members at Principals Chamber. **Prof. Thajudin Ahamed V I**, MSME coordinator convened the meeting. **Mr. Prakash G S**, Deputy Director of MSME Training Centre was present in the meeting. Committee discussed the plan of action of MSME programs which is to be initiated in our institution. It is decided to arrange a meeting in January 2020 with the personnels from various industries in Thrissur district. Committee identified more than 12 small and medium scale industries in Thrissur. It is planned to create software to interact with the industrialists. Also expertise of faculty/staff will be published by the committee.





## We are Proud of you Atul!



Our student **Mr Atul Nair** (B. Tech CSE 3<sup>rd</sup> year student) has been honoured by the world's leading software companies for identifying faults in safety measures in their websites. Companies like Google, Microsoft, OLX, HackerOne etc have acknowledged his expertise. In the website "Hall of Fame" meant for guarding against flaws in the cyber security measures, he was permitted to write articles. Atul Nair is a cyber volunteer of Kerala Police. He has developed and published various mobile apps. **Whatsaga** is one of the famous apps developed by him for downloading and uploading large sized videos in the Whatsapp. Currently he is busy with developing a mobile application for Kerala Police.

### Idea Fest

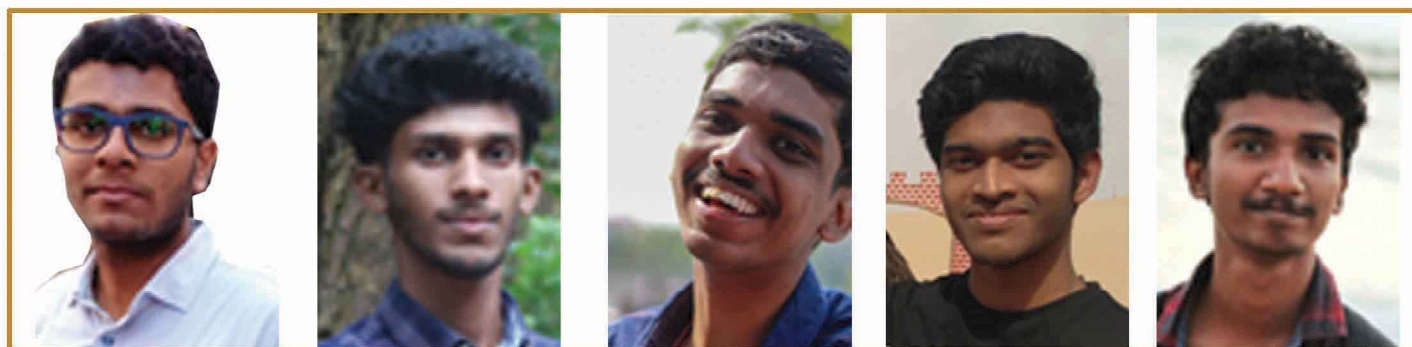
### Awards to Students ....



Four of our students **Mohammed Rishan N K** (Team Leader), **Asshik S**, **Vijay A**, **Jayakrishnan K** and **Jamsheed P** bagged special prize in TEKON 2019 for their project "**Humonoid Teaching Robot**". KTU has been supported this project work financially to the above students and their mentor **Prof. Sindhu N**, Dept. of Electronics & Communication Engineering.



**Mohammed Rishan N K** (under the supervision of **Mr. Jai John K**, Dept. of Electronics & Communication Engineering.) presented the above idea and won the first prize in the exchange program organised by Kerala Start-up mission.



**Cyriac Biju**

**Nimithiyas V**

**Abhay V Ashokan**

**Calvin Wilson**

**Sayooj Surendran**

A team of students consists of **Abhay V Ashokan**, **Calvin Wilson**, **Sayooj Surendran**, **Nimithiyas V** and **Cyriac Biju N** got a special recognition from Kerala Start-up mission for their idea **Smart Helmet**. They worked on this research idea under the supervision of **Prof. Ajay James**, Dept. of Computer Science and Engineering. IRAC expresses heartfelt congratulations to the students and their supervisor.

## Our Students Cross the Hurdles !! (HUDDLE 2019)



Second Edition of HUDDLE, one of the most popular events in Tech Startup Ecosystem in India, was organized on 27<sup>th</sup> & 28<sup>th</sup> September 2019 at the picturesque beaches of The Leela Kovalam, Trivandrum. Huddle 2019 is the focal point for tech start-ups and other relevant stakeholders of the entrepreneurial ecosystem including the government, investors, mentors, industry etc.

It was GEC's prestigious moment that our students **Joseph Jomon, Binish Moulana** and **Sayed Ibrahim** received the special appraisal from the Chief Minister of Kerala in HUDDLE 2019. Their start-up was selected "**Terga**" - a KYC platform on blockchain was selected for addressing the needs of every business. Of the

50 start-ups Terga became one of the top 5 startup that pitched for the industry challenge at HUDDLE Kerala 2019 as the team successfully addressed the challenge of Indusgo (The largest car rental platform in Kerala). A solid platform has been created as a result of multiple MVP's with international fin techs and regulatory services, with each iteration giving a better product for the customers. Also, Terga's collaboration with one of the leading fintechs Finastra provided Terga access to US and European Banking Market.

Our former student (2011) Mr. Sanjay Nediya's Kochi based start-up secured an undisclosed amount of monetary investment from Twitter co-founder Christopher Issac Stone during HUDDLE Kerala.

## NCRAI Publication

### SO-Net : Joint Semantic Segmentation and Obstacle Detection using Deep Fusion of Monocular Camera and Radar

**V. John, M. K. Nithilan, S. Mita, H. Tehrani, R. S. Sudheesh P. P. Lalu**

International Workshop on Deep Learning for Video and Image Analysis in conjunction with PSIVT 2019 Sydney, Australia, 18-22 November 2019.

**Abstract:** Vision-based semantic segmentation and obstacle detection are important perception tasks for autonomous driving. Vision-based semantic segmentation and obstacle detection are performed using separate frameworks resulting in increased computational complexity. Vision-based perception using deep learning reports state-of-the-art accuracy, but the performance is susceptible to variations in the environment. In this paper, we propose a radar and vision-based deep learning perception framework termed as the SO-Net to address the limitations of vision-based perception. The SO-Net also integrates the semantic segmentation and object detection within a single framework. The proposed SO-Net contains two input branches and two output branches. The SO-Net input branches correspond to vision and radar feature extraction branches. The output branches correspond to object detection and semantic segmentation branches. The performance of the proposed framework is validated on the Nuscenes public dataset. The results show that the SO-Net improves the accuracy of the vision-only-based perception tasks. The SO-Net also reports reduced computational complexity compared to separate semantic segmentation and object detection frameworks.



## Lecture Series @ gectcr



As per the guidance of our Principal, Research Advisory Council of our college initiated Lecture Series with a view to share the research ideas between faculty/staff members and research students. It is decided to organize lectures every month. The first lecture of this series was delivered by **Dr. K. K. Ramachandran**, Professor, Dept. of Mechanical Engineering on the topic “*The Art of Scientific Writing and Publishing*”. The lecture was conducted in two phases. 30/10/2019 (at Civil Engg. Dept, 4-5 pm) and 06/11/2019 (Chemical Engg. Dept, 10-12 pm). Dr. Ramachandran K K, beautifully depicted the various aspects of scientific writing. He insisted the faculty, staff and students to publish their valuable research works in high quality peer reviewed International Journals. A total of 45 members including research guides, research and PG students and other staff members attended in both sessions. Dr. Manju M S, convener of IRAC expressed her gratitude to Dr. Ramachandran K K for delivering the lecture.

On 4<sup>th</sup> December **Dr. N. Sajikumar**, Professor of Civil Engineering delivered a lecture on “*Mathematical Modelling*”. He described the various aspects of mathematical modelling which is the art of translating problems from an area to tractable mathematical formulations. According to him a mathematical models can help the research students to understand and explore the meanings of equations and functional relationships which allow one to estimate the quantitative behaviour of the system. IRAC convenor thanked Dr .N. Sajikumar for delivering the second lecture of 2019.



## .....Ph.D Abstracts.....

### Dr. Suresh K Damodaran

The role of optimal generation scheduling of a thermal-renewable power generation system aiming economic and environmental benefits is vital in the current scenario of increasing power demand, escalating the fuel price and high pollution rate. Economic and emission dispatch of power generation systems are broadly studied in this thesis considering various operational obligations. The problem under study is multi-objective with conflicting and non-linear objectives. The thesis investigates capability of selected algorithms representing different heuristic groups for searching for optimal generation scheduling of thermal-hydro-wind system considering economic and emission factors. An improvement is incorporated in conventional PSO algorithm there by leading to a new algorithm, named as modified particle swarm optimization (MPSO). Capability of MPSO algorithm for searching better solution is validated by solving test power system optimization problem and comparing the results to those obtained by other optimization techniques.

### Dr. PA Abdul Samad

The enhanced specific strength of SiC Particulate Metal Matrix Composites (PMMC) has been the major contributing factor for finding applications in the aerospace and automotive industries. The most accepted method for producing such a composite is stir casting in which the homogeneity of particulate reinforcement is a significant challenge. This research work proposes a new method for mixing the particulate reinforcement with the liquid and semi-solid aluminium matrix to ensure a uniform mix of the particulates using a Gyro Shaker. Computational Fluid Dynamics (CFD) simulation model of the mixing device was developed for assessing the mixing performance and flow characteristics while mixing SiC particulates with Glycerol. The results of the simulation were also validated by experimentation. CFD simulation for liquid-solid mixing was conducted by using sand particles and glycerine/water mixture. The distribution of the SiC particulates obtained from simulation was compared with stir casting simulations.

## Ph.D Seminars during Jun - Dec 2019

No	Seminar	Name of the Student	Name of Supervisor	Title of the work	Date
1	Ph.D Open Seminar	Jeeva K.A	Dr. V. S. Sheeba	Secure reversible data hiding in the encrypted domain for privacy protection in cloud environment	25-10-2019
2	Ph.D Open Seminar	Praseeja A V	Dr. N. Sajikumar	Groundwater Contamination due to LNAPL Hydrocarbons and its Control using Natural Fibres	31-10-2019
3	Ph.D (Pre-submission)	Sagar M. Narayanan	Dr. Pradeep M Kamath	Experimental and Numerical Investigations on the Heat Transfer Performance of a Stacked Double Layer Micro channel	
4	Ph. D First Seminar	Sivaranjan K N	Dr. Jasmin E A	Power quality improvement of DG integrated distribution systems using differential inverter bas UPQC-s	30-8-2019
5	Ph. D First Seminar	Nirmal S	Dr. Jasmin E A	Design Control and Synchronisation Techniques for microgrid with renewable energy and storage	30-8-2019
6	Ph. D First Seminar	Viji E P	Dr. Viswanath C Narayanan	Stochastic modeling and Application	30-8-2019
7	Ph. D First Seminar	Suhail T A	Dr. K P Indiradevi Dr. E A Jasmin Dr. Suhara E M	Biosignal Analysis in Younger Generation due to Technological Advancements and Behavioural Patterns	31-08-2019
8	Ph. D First Seminar	Nayana J	Dr. Nandakumar M Dr. Rameshkumar P	Voltage and Power Oscillation Control in transmission Line	30-8-2019
9	Ph. D First Seminar	Anns George	Dr. Nandakumar M Dr. Rameshkumar P	Performance Enhancement in Traction Drive	30-8-2019
10	Open Seminar	Reshma K	Dr. Jayanand B	Development of a new Dynamic Voltage Restorer topology	5-8-2019
11	Research Proposal Seminar	Antony Peter	Dr. Jaison Mathew	LLC resonant converter based soft-switching PWM rectifier with high power factor for EV battery charging and a rotor parameter-free, carrier SVM modulated direct torque control for EV drives	Aug 5, 2019
12	Research Proposal Seminar	Vasuda K V	Dr. Jaison Mathew	Hybrid Flying Capacitor Dual Inverter Topologies for Open End Winding Induction Motor Drives using Single Source	Aug 5, 2019
13	Open Seminar	Anjali P Sasidharan	Dr. Meera V	Removal of phosphate and total coliforms from greywater using nanochitosan and nanosilver impregnated on polyurethane foam	24.08.2019
14	Open Seminar	Maya U.C	Dr K Meenakshy	Fusion Based Automatic Segmentation of Brain Tumour from MRI Images	19-7-2019
15	Open Seminar	Remya George	Dr K Meenakshy	Impact of long-term physical training on cardiac control of autonomic nervous system and stress-recovery characteristics using physiological signals - Focus on women police recruits of Kerala	30-7-2019
16	Pre-submission Seminar	Uma Syamkumar	Dr. Jayanand B	Smoothed Kalman Observer for Sensorless Field Oriented Control of Induction Motor	12-12-2019
17	Synopsis	Jayadevan P C	Pradeep M Kamath	Analysis of fluid flow through microchannels with manufactured roughness level	10.07.2019



## SIBS-THE BEST ALTERNATIVE FOR LIBS

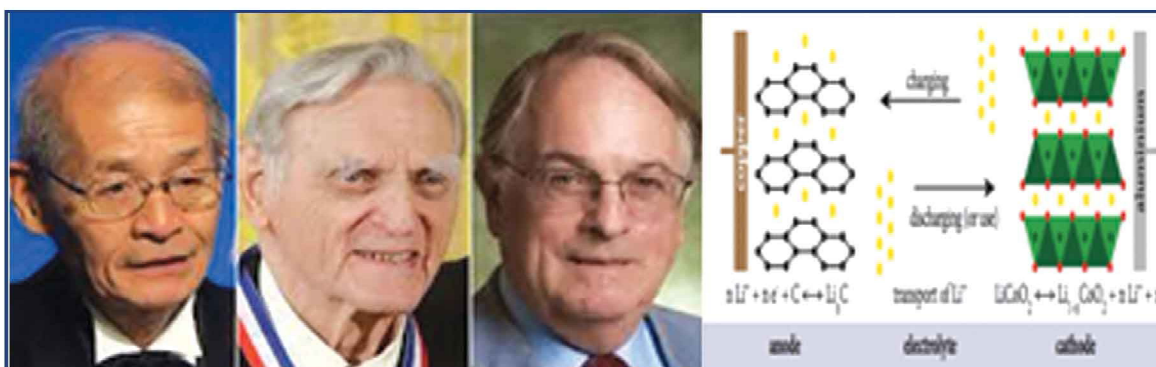
The increasing demand for energy to meet the needs of the growing population has led to a huge global increase in the consumption of fossil fuels. Robust, reliable and economically viable storage systems are necessary to store the off-peak electricity. Out of different storage types, electrochemical storage systems (batteries) are the best candidates for storing energy by virtue of their longevity, low establishment cost and ease of set up. Challenges for batteries are twofold. In the first place the increasing demands for powering systems of portable electronic devices. Among these batteries, **Lithium Ion Batteries (LIBs)** have come to play a pivotal role. In the second place low cost batteries are required for electric Grids. **Sodium Ion Batteries (SIBs/ NIBs)** can be the key for the second because of the huge availability of sodium.

**Dr. Bindu T K**

*HoD & Associate Professor  
Dept. of Chemistry*



On December 10, 2019, **John B. Goodenough**, University of Texas at Austin, U S A., **M. Stanley Whittingham**, State University of New York, USA and **Akira Yoshino**, Professor at Meijo University, Japan shared Nobel Prize in Chemistry for their contributions to the development of the **Lithium Ion Battery (LIBs)**. John Goodenough, **the oldest person who ever Nobel Prize Recipient at the age of 97** is still in active research works. Lithium ion batteries are great examples of how CHEMISTRY can transform lives of people. In fact they created a rechargeable world!!



*A. Yoshino      J B Goodenough      M S Whittingham*

Both electrodes in a lithium-ion cell are made of materials which can intercalate lithium ions. When the battery discharges, the intercalated lithium ions are released from the anode, and then travel through the electrolyte solution to be absorbed in the cathode. As the battery is charged, an oxidation reaction occurs at the cathode.  $\text{Li}^+$  travel over to the anode, where they are intercalated within the graphite. A single lithium-ion cell can produce a voltage of 3.6 volts or higher, depending on the cathode materials. Now a days researchers are working on developing options to use graphene rather than graphite.

Li resources are rare in earth crust and also uneven in geographical availability, **Sodium Ion Battery (SIB)** is one promising alternative to LIB. From 2011 onwards research on SIBs revived. SIBs provide several unique advantages and are increasingly studied as a feasible alternative to LIBS. One of the most important factors is the abundance of Na metal in the earth's crust, making its procurement and processing inexpensive. Also SIBs have good performance in aqueous electrolytic system, unlike LIBS and this brings down the cost and increases safety. All these factors lead to greater potential for SIBs to be applied in systems where large quantities are required (grid scale storage). Despite these advantages SIB systems still have not been able to be commercialized as several hurdles still remain. Large size of the  $\text{Na}^+$  ion makes for considerable sluggish kinetics, resulting in significant constraints for smooth intercalation in the host electrode interstices. The dominant anode material in commercial Lithium ion batteries, graphite cannot be used in SIB as it cannot store the larger sodium ion in appreciable quantities. Instead, a disordered carbon material consisting of a non graphitizable, non crystalline and amorphous carbon structure called "**hard carbon**" is a preferred anode of choice. Many nano materials and a newly synthesized 2D sheet of boron, Borophene are reported to be extraordinary sodium anode materials. Extensive research is going out to improve the efficiency of cathode and electrolyte to create super SIBs.

## BEST PAPER AWARD

**Prof. ManilalAM**, Dept. of Chemical Engineering got the best poster presentation award in the conference “Recent Trends in Clean Technologies for Sustainable Environment” (CTSE 2019), organized by the Dept. of Chemical Engineering, SSN College of Engineering, Chennai during 26-27 September 2019. Title of for his work was “*Investigations on the Influence of Current density, time, pH and salt concentration on the fraction of oil oxidized during electrocoagulation of produced water*”. IRAC congratulate **Prof. Manilal A M** for his achievement

## NCRAI Collaborates with TTI Japan



It is our great triumph that one of the internationally reputed institute TOYOTA TECHNOLOGICAL INSTITUTE (TTI), is collaborating with **Nodal Centre for Robotics & Artificial Intelligence (NCRAI)** of our institute. “Respect the spirit of research and creativity, and always strive to stay ahead of the times” is the motto of TTI. The motto is a heritage of Sakichi Toyoda, who laid the basis of Toyota group about a century ago through the invention and industrial use of the world’s most advanced automatic looms. **Dr. Vijay John**, Assistant Professor of **TTI Japan** delivered a lecture on the topic **Sensor fusion for Self driving vehicles on 06-08-2019**. In the session of the lecture he focussed on the topic “Research possibilities on perception modules and the various challenges in sensor fusion in the field of self driving vehicles”. He also addressed the student group working in optimisation of AI codes for self driving vehicles.

It is great achievement for NCRAI to have a joint publication with TTI in the International Workshop on Deep Learning for Video and Image Analysis in conjunction with PSIVT 2019 Sydney, Australia, 18-22 November 2019. Title of the paper is “SO-Net: Joint Semantic Segmentation and Obstacle Detection using Deep Fusion of Monocular Camera and Radar” (please find the abstract, page No. 7). IRAC expresses immense gratitude to **Dr. Suheesh R S** and **Dr. Lalu P P**, the coordinators of NCRAI for these achievements.

## In house Training Program Conducted under TEQIP

Sl No.	Title of the programme	Department	Coordinator	Date
1	Electric & Hybrid Vehicle : Scope and Challenges	EEE	Dr. Ramesh Kumar P Prof. Biniy B B	09-13 Dec 2019
2	Energy Efficient Technologies and Practices for Sustainable Development	ChE	Dr. Anjana R Prof. Renjana R	22-26 July 2019
3	Advanced Process Control	ChE	Dr. Subin Poulose Prof. Syama S.	22-26 July 2019
4	Simulation and Modeling of Electronic systems	ECE	Prof. Mohamed Salih K.K. Prof. Gopi C	18-22 Dec 2019



## Sharing Expertise

Here goes the contributions of our faculty members in national / international conferences and workshops.

Sl. No.	FACULTY	CONFERENCE / WORKSHOP DETAILS	ROLE	TITLE OF THE SPEECH
1	Dr. K. K. Ramachandran	International Conference on System Energy and Environment (ICSCE 2019), 12 -13 July 2019, Govt. College of Engineering Kannur	Keynote speaker	Advances in Friction Stir welding
2	Dr. K. K. Ramachandran	8 <sup>th</sup> Global Conference of Material Science and Engineering (CMSE 2019), 12 -15 November 2019, Hainan University, Sanya, China	Invited Speaker	Submerged Friction Stir Welding of AISI316L Stainless steel: Mechanical and Microstructural Characterization
3	Dr. K. K. Ramachandran	Innovations in Science – A workshop on Solar Energy and Robotics, 6 <sup>th</sup> July 2019, Vidya Academy of Science and Technology, Thrissur, Kerala	Guest of Honour & Keynote	Solar Power – An Overview
4	Dr. K. K. Ramachandran	Inaugural function of SAE Chapter & Mechanical Engineering Association, Jyothy Engineering College, Cheruthuruthy, Kerala	Speaker Guest of Honour & Keynote speaker	Hydrogen Energy – the Future
5	Dr. K. K. Ramachandran	BRIDGE'19: The Gateway to the Workplace Industry Academia Meet, 27 <sup>th</sup> June 2019, Hotel Pooram International Thrissur, organized by ASAP & Higher Education Department, Kerala	Speaker	Best Practices in Internship – the Global Perspective
6	Dr. K. K. Ramachandran	Energy efficient Technologies and practices for sustainable development, 22 – 26 July 2019, organized by the Department of Chemical engineering, Govt. Engineering College Thrissur	Resource Person	Fuel cell technology – an overview

## Conference Publications

**Sreekanth Unni, Satish K. P** “Effect of Motivational Factors on Organizational Performance in Industries of Manufacturing Sector in Kerala”, *Proceedings of National Conference on emerging trends in manufacturing, FACTURA 2019*, NSS College of Engineering, Palakkad , July 12,13, 2019.

**Jobin Jose, Sajikumar N**, “Assessment of Landslide Susceptibility of Idukki District Using Frequency Ratio Method”, *ISH - HYDRO 2019 International Conference- Osmania University-Dec17-20*, 2019.

**Sajna T J, Sajikumar N**, “Simulation of Flood In Periyar Basin Using Combinations of Hec-Hms, Hec-Ras and Muskingum Routing”, *Ish - Hydro 2019 International Conference- Osmania University-Dec17-20*, 2019.

**Miji Cherian R, Sajikumar N and Sumam K S** “Influence of Material Property of Pipe On Transient Flow Through Piping Systems”, *Ish - Hydro 2019 International Conference- Osmania University-Dec17-20*, 2019.

**Sunil Jerome, Sujatha I**, “Thermodynamic modeling and analysis of newly introduced eco-friendly alternative refrigerants for air-conditioning application”, *International Mechanical Engineering Conference-2019 (IMEC-2019)*, National Institute of Technology, Thiruchirappalli, Nov 29-Dec1, 2019.

**Prasanth P**, “Equipartition Theorem for Periodic to Cathodic Oscillators”, *National Seminar on Recent Advances and Innovations in Physics Teaching and Research at IIIT, Allahabad*, 13-15 Oct-2019.

**Shejin K V, Shibu B**, “Live along with tread mills for a better tomorrow” *The international summit on the Applications of Engineering in Sports*, Mar Baselios College of Engineering and Technology, Thiruvananthapuram, 11,12-oct-2019.

## Book Chapter Contribution

**Viswanath N C**, “On Combining Stochastic and Deterministic Models. In: DudinA, Nazarov A, Moiseev A. (eds) Information Technologies and Mathematical Modelling. Queueing Theory and Applications. ITMM 2019. Communications in Computer and Information Science, vol 1109. Springer, Cham (2019).

## In house Training Program Conducted under FSDTC

Sl No.	Title of the programme	Department	Coordinator	Date
1	RECENT & EMERGING TRENDS IN FLUID MECHANICS RESEARCH.	ChE	Prof. Mercy Anna Philip	02-07 Dec 2019
2	SCHOOL ON ADVANCED CONTROL SYSTEMS	EEE	Dr. ABDUL SALEEM P.K	09-14 Dec 2019
3	ADVANCES IN GREEN ENERGY TECHNOLOGIES	ME	Dr. K.K. RAMACHANDRAN	16-21 Dec 2019
4	FUNDAMENTALS OF FPGA BASED SYSTEM DESIGN	ECE	Smt. ALPHONSA M P	16-21 Dec 2019

## Congratulations to the Contributors of Research Papers to the Journals

### Mechanical Engineering

S. Shashi Kumar, N. Murugan, **K.K. Ramachandran**, “Effect of tool tilt angle on weld joint properties of friction stir welded AISI 316L stainless steel sheets”, *Measurement* (2019) <https://doi.org/10.1016/j.measurement.2019.107083>.

**Abstract:** The effect of tool tilt angle on mechanical and metallographic characteristics of friction stir welded AISI 316L austenitic stainless steel joints was investigated. Three experimental trials were performed between 0° to 3° in steps of 1.5°, while keeping the other primary FSW parameters constant (tool rotational speed of 600/ rpm, welding speed of 45/ mm/min and axial load of 11/ kN). The experimental findings prove that the tool tilt angle has significant effect on dynamic volume of the stir zone, peak temperature and the intensity of the shear band formation in the weld zone. The weld joint made at 1.5° was the best tool tilt axis that exhibited higher strength and superior microstructural features leading to onion ring formation at the weld stir zone. 0° tilt angle resulted in slight shoulder plunge whereas, 3° tilt angle paved the way to the formation of void in the weld zone.



## Electrical and Electronics Engineering

**Lisy E R, M. Nandakumar, Anasraj R,** “Design and Real time Implementation of Nonlinear Sliding Surface with the application of Super-twisting Algorithm in Nonlinear Sliding Mode Control for Twin Rotor MIMO System” Journal of Vibroengineering (2019), 21(8), pp.1392-8716.

**Abstract:** *This paper proposes the design of a nonlinear sliding surface based on the principle of variable damping concept for 2-degree of freedom Twin Rotor Multiple input Multiple output System (2-dof TRMS). The implementation of the designed nonlinear sliding surface in real time is demonstrated. Super-twisting algorithm is applied in nonlinear sliding mode control. The nonlinear sliding surface enables the system trajectory to be highly robust and with the application of super-twisting algorithm in nonlinear sliding mode controller (SMC), the designed controller has minimized the problem of chattering*

*considerably. The system is modeled in such a way that it includes all nonlinearities and coupling effects. A decoupler is designed to nullify the coupling effect. This scheme is capable of reducing both the settling time and peak overshoot simultaneously for 2-dof TRMS. The scheme also reduces the chattering. The proposed method is compared with the design using PID controller. The applicability of the designed nonlinear sliding surface and nonlinear SMC with super-twisting algorithm have been tested both in simulation and in real time. This research paper is mainly dealing with the modeling of Twin rotor MIMO system by including all nonlinearities and coupling effects, the decoupler design for 2-dof TRMS, the design of nonlinear sliding surface for 2-dof TRMS and application of super-twisting algorithm in nonlinear sliding mode control for 2-dof TRMS.*

## Chemical Engineering

**Manilal A M, Soloman P A, Ahmed Basha C** “Removal of Oil and Grease from Produced water using Electrocoagulation” Journal of Hazardous, Toxic, and Radioactive Waste(2020), 24 (1): 04019023

**Abstract:** *A method to remove oil and grease (O&G) from synthetically produced water using electrocoagulation in a batch process with a mild steel anode is proposed. Preliminary studies were conducted to explore the effects of operating parameters on chemical oxygen demand (COD) and O&G removal. Individual and interactive influences of causal variables were investigated using a response surface methodology. The experimental results indicated that electrocoagulation is very effective in pollutant removal and*

*could successfully reduce COD and O&G to 99.7% and 96.43%, respectively, from an influent oil-in-water (O/W) emulsion concentration of 1,250 \_ 50 mg=L under optimal operating conditions. A notable observation was made on the contribution of the electrooxidative mechanism in COD and O&G removal. It was found that removal due to the oxidative mechanism was increased with increases in current density and salt composition. The methodology is very suitable for the treatment of water produced from offshore basins in particular due to the higher rate of operation and smaller amount of sludge compared with conventional biological treatment and to the presence of supporting electrolyte in situ.*

**Francis John V, Soloman P A,** “Bioconversion of coir waste to glucose for bioethanol, International Journal of Engineering and Techniques” (2019), 5(6).

**Abstract:** *Although coir waste is resistant to natural degradation, it can be degraded with the help of important enzyme like cellulase produced by organisms like Aspergillus niger and Pleurotus sajorajju. The process produces glucose, which can be converted to ethanol through sequential saccharification and fermentation with the help of mixed fungal cultures. The present work*

*aims at conversion of the used coir into glucose which can be used for producing bioethanol. The batch experiments are statistically designed and performed using Box-Behnken method of Response Surface Methodology to investigate the influence of major parameters viz. pH, temperature and substrate concentration on glucose production. The maximum glucose production of 1.44mg/ml was achieved under the conditions of substrate concentration 11.46 g/l , pH 5.79 and temperature 32.6 °C.*

## Production Engineering

**Ramkumar P N, Satish K P**, “Study of the Effect of Lean Six Sigma’s Critical Success Factors in Indian SMEs”, International Journal of Mechanical and Production Engineering Research and Development (2019), 9(4), pp. 581-588.<https://doi.org/10.24247/ijmperdaug201957>

**Abstract:** *Small and Medium Enterprises (SME) which support the GDP growth in India, are facing stiff competition in the market place and are to produce quality*

*product with minimum price. Lean Six Sigma (LSS) is a proven quality management approach which improves quality and reduces cost, leading to improved productivity and profitability. This study is aimed at the identification of Critical Success Factors (CSF) of Indian SMEs towards LSS implementation. The study identified 9 CSFs which support the industries in implementing LSS. The study also compared the effect of these factors in industries with various classifications.*

**Ramkumar P N, Satish K P**, “Implementation of Lean Six Sigma Through IRDAIC Model; A Case Study In Indian SME”, International Journal of Mechanical and Production Engineering Research and Development” (2019), 9, Special Issue, pp. 14-20.

**Abstract:** *In the manufacturing industry, the Lean approach is aimed towards waste reduction and Six Sigma is aimed towards reduction of process variation. Lean Six Sigma (LSS) is an integration of both and finds its*

*application in the Small and Medium Enterprises (SMEs) sector. The researchers developed a model “Identify-Rank-Define-Analyse-Improve-Control (IRDAIC)” which helps SMEs to implement LSS in an easier way. This paper presents a case study conducted at an Indian die manufacturing SME, which implemented LSS through IRDAIC model, and the result shows a considerable reduction in the seven wastes/muda and progression in the performance of the industry.*

## Civil Engineering

**Praseeja A V, Sajikumar N**, “A Review on the Study of Immiscible Fluid Flow in Unsaturated Porous Media: Modeling and Remediation” Journal of Porous Media (2019), 22(8), pp. 889–922

**Abstract:** *Groundwater resources have been polluted by many sources. Among them, spillages of oil and similar petroleum products now become a common experience worldwide. This nonaqueous phase liquid (NAPL) can easily migrate downward through the unsaturated (vadose) zone and become widely distributed in the water table. Therefore, it is important to develop a methodology for monitoring and analyzing the movement of these*

*contaminants through the vadose zone for the effective design of remediation schemes. This review discusses the equations involved in the numerical simulation of multiphase flow and the recent development of various multiphase models. In addition, this study emphasizes the advancement of laboratory works using image analysis techniques. Overall, this study reviews the important features and limitations of existing remediation methods and highlights the applicability of natural fibers for the development of a sustainable cleanup technology against oil spill problems.*

Dear Colleagues,

**GECT Research Bulletin** is the official research news bulletin of GEC Thrissur, intended to publish research activities of Students and Teachers. Kindly send the details of your research activities to the e-mail address [gectresearchbulletin@gectcr.ac.in](mailto:gectresearchbulletin@gectcr.ac.in) at the earliest.

**-Editors**

### Editors

**Dr. Vinod P. Raphael** (Dept. of Chemistry) and **Prof. Anish Babu K. K.** (Dept. of Electronics & Communication Engineering).

Contact: Mob: 9287560416, 9288194930

E-mail: [gectresearchbulletin@gectcr.ac.in](mailto:gectresearchbulletin@gectcr.ac.in)

Design & Layout by **Smt. Shincy T P**

(Dept. of Electronics & Communication Engineering).



