GECT RESEARCH BULLETIN

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Compiled by Institute Research Advisory Council (IRAC)

Dr. Sheeba V. S.
Principal

..... from Principal's Desk

I am giving this message with great pride and pleasure. This is the first time that ten research scholars of our college are graduated during a period of six months and PhDs are awarded by both Calicut and Kerala Technological Universities. The research culture which has taken root in 2013 is flourishing and can expect more results in the coming years. Four faculty members also have acquired Doctoral degrees from reputed universities during this period. I extend my heartfelt congratulations to all the scholars and their supervisors. Another breakthrough is that we have stepped into the National Institutional Ranking framework with an all India rank of 164 for engineering and technology programmes at national level. Great appreciation to Dr. N Sajikumar, his team, and all those who have contributed to this achievement. Another achievement of our Institution is the Fab Lab and Covid cell activities for COVID -19 management which include the supply of Swab collection booth, Robotic disinfectant spraying machine, pedal operated sanitizer etc to Government Medical College Thrissurand other COVID hospitals. Special congratulations to Prof Ajay James, his team and Covid cell members.I am also glad to see that our Institution is making every effort to promote research and this bulletin serves the functions of sharing relevant news and introducing useful research resources to faculty and research scholars. I look forward to seeing excellence in our future research endevours.

GEC's Proud Moments

Heartfelt Congratulations to Ph.D awardees...

Dr.Divya A.H.

Dr. Renuka T.K.

Dr. Muhammed Iqbal

Dr. Maya U.C.

Dr.Joseph K.D.

Dr. Sudheer P.

Dr. Renukadevi V.

Dr. Jayadevan P.C.

Dr. Ramkumar P.N.

Dr. Arun M.S.

Dr. Pramelakumari K.

Dr. Sunil A.S.

Dr. Lisy E.R.

Dr. Remya George

(for details see page 2)

Sl. No	Name of Ph. D Awardee	Dept.	Name of Supervisor	Title of the Work	Date of Award & University
1	**Divya A H**	ChE	**Dr. Solomon P A**	Assessment and modeling of pollution load in Chalakudy river, Kerala, India	28/01/20, CU
2	**Renuka T K**	EEE	**Dr. Reji P**	Analysis and enhancement of small signal stability of power systems affected by the penetration of renewable energy resources	31/01/20, CU
3	**Muhammad Iqbal**	ME	**Dr. Shalij P R**	Supply chain performance, risk and sustainability: a case of ornamental fish supply chain,	13/02/20, CU
4	**Maya U C**	EEE	**Dr. K Meenakshy**	Fusion based automatic segmentation in brain tumor from MRI images	14/02/20, CU
5	**Prof. Joseph K D**	EEE	**Dr. Asha Elizabeth Daniel, Dr. Unnikrishnan A (CUSAT)**	Design and development of interleaved Cuk converter with boost facility for multiple output voltages	18/02/20 CUSAT
6	**Sudheer P**	CE	**Dr. Sajikumar N, Dr. Sumam K S**	Sustainable water sharing model for inter basin water transfer project	20/02/20, CU
7	**Renukadevi V**	EEE	**Dr. B Jayanand**	A new DC-DC converter based infinite level inverter (ILI) for distribution Statcom	25/02/20, CU
8	**Jaydevan P C**	ME	**Dr. Pradeep M Kamath**	Analysis of fluid flow through microchannels with manufactured roughness level	27/02/20, KTU
9	**Ramkumar P N**	ME	**Dr. Satish K P**	Some investigations of process and productivity improvements in small and medium enterprises through lean six sigma implementation	5/03/20, CU
10	**Prof. Arun M S**	ME	**Prof. Uday Chakkingal (IITM)**	Workability and hot deformation behavior of magnesium alloy AZ31B processed by equal channel angular pressing	16/03/20, IIT Madras
11	**Prof. Pramelakumari K**	EEE	**Dr. V P Jagathy Raj (CUSAT)**	Swarm intelligence based economic operation of hydro-thermal power system with forecasted demand: a case study	21/05/20, CUSAT
12	**Prof. Sunil A S**	ME	**Dr. P S Tide (CUSAT)**	An investigation on flow oscillations due to shear layer instability and vortex dynamics	28/05/20, CUSAT
13	**Prof. Lisy E R**	EEE	**Dr. Nandakumar M, Dr. Anasraj R**	Design and analysis of sliding mode control and sliding surface for MIMO surface	10/06/20, CU
14	**Remya George**	EEE	**Dr. Meenakshy K**	Impact of long-term physical training on cardiac control of autonomous nervous system and stress-recovery characteristics using physiological signals-Focus on women police recruits of Kerala	11/06/20, CU

GECT's Fight against Coronavirus

The current outbreak of coronavirus (COVID-19) is a rapidly changing situation which is being monitored carefully by public health bodies. Our College is committed to supporting the welfare of our society and all those visiting the College or undertaking work on behalf of the College. Our response and planning are firmly based on the official advice and guidelines available for the novel coronavirus from ICMR and WHO. Staff and Students of our College contributed their best to COVID-19 activities. Our Principal **Dr. Sheeba V S** encouraged and appreciated all our attempts to fight against COVID-19.

To support the medical practitioners who treat COVID-19 patients, our students **Aswin Kumar** (ME), **Sourav PS** (PE), **Pranav Balachandran** (PE), **Aswin Kumar** (ME) and **Cherian Francis** (ME) fabricated various medical equipmentsin our **FABLAB** under the guidance **Prof. Ajay James.**These equipments were handed over to the Govt. Medical College, Thrissur and other District/Taluk hospitals (***Details are given in the following Table***).

FAB LAB innovations for COVID-19 management

No.	Medical Equipment	Purpose	Students involved	Supervisor
1	Aerosol box	Safe sample collection from patients	Aswin Kumar (S6, ME)	Prof. Ajay James
2	Covid Cab (WISK)	Safe sample collection from patients	Sourav P S (S8, PE), Pranav Balachandran (S6, PE), Aswin Kumar (S6, ME)	Prof. Ajay James
3	Sanitizer Kunjappan 2.0 (Robot)	Sanitization, delivery of materials	Sourav P S, PranavBalachandran (PE), Aswin Kumar, Cherian Francis (ME)	Prof. Ajay James
4	3D printed Face Shields	For face protection	Sourav P S (PE), Pranav Balachandran (PE), Aswin Kumar (ME)	Prof. Ajay James

5	Ventilator Splitter	For COVID patients	Sourav P S (PE), Pranav Balachandran (PE), Aswin Kumar (ME), Cherian Francis (ME)	Prof. Ajay James
6	Pedal Operated Hand Sanitizer	For safe sanitization	Sourav P S (PE), Pranav Balachandran (PE), Aswin Kumar (ME), Cherian Francis (ME)	Prof. Ajay James
7	Patient Cage for Dentists	For safety	Sourav P S (PE), Pranav Balachandran (PE), Aswin Kumar (ME), Cherian Francis (ME)	Prof. Ajay James





Emigrant Management System Software was developed by the students **Bichu Kuruvila**(CSE), **Ajay S Ram** (CSE), **Krisnan and** (CSE) and **Abhinav** under the supervision of **Prof.Vipin Kumar K S** and **Dr.Thajudhin Ahamed V I** to help the migrants.

A mobile application called **KsheeraDhoothan App** for Indian Veterinary Associationwas created by **Abhinav KM** (CSE) and **Jayakrishnan** (ECE)under the guidance of **Dr.ThajudinAhamed V I** and **Dr.Sinith M** to support the milk farmers during lockdown.

Dept. of Chemistry in association with **NSS** made **hand sanitizers** and **Dept.of Chemical Engineering** made **hand wash** in their laboratories and supplied to all departments and office for use inside the college.

Munawar (Arch) prepared 1000 cloth masks and distributed in his locality.

Trade Instructor **Sri. Rajan V V**, Department of Electronics & Communication Engineering made an innovative and good quality ahutomatic hand sanitizer machine.

IRAC congratulate **Dr. Lal C V** (Nodal officer), COVID-19 cell members and all individuals who actively involved in COVID-19 activities.



Another Milestone for Government Engineering College Thrissur!!!

Dr. N Sajikumar
Professor,
Dept. of Civil Engineering

Government Engineering College Thrissur (GEC Trichur) has marked one more milestone in its history by figuring in the National Institute Ranking Framework (NIRF) ranking. Out of the total 6276 technical institutions offering degree level engineering programmes in India, only 200 institutions figure in the list of Engineering and Technology. The competing institutions for the ranking processes include 16 Indian Institute of Technologies, 31 National Institute of Technologies and 25 Indian Institute of Information Technologies, Indian Institute of Space Research and other national level institutes. Government Engineering College Thrissur was ranked as 164th for engineering and technology programmes at national level. There are only five institutions that figured in this list of engineering and technical institutions from the state of Kerala. They are National Institute of Technology Calicut, Indian Institute of Space Research, College of Engineering Trivandrum, Government Engineering College Thrissur and SOE, CUSAT.

The National Institutional Ranking Framework (NIRF) was instituted in the year 2015 and the ranking of institutions based on the framework has been carried out since 2016. This framework outlines a methodology to rank institutions across the country. NIRF ranking is an Annual Report Card to the Nation and to the stakeholders on what has been done by the institution in the last one year, on the given performance. One must understand the NIRF score as a reflection of where the institution is standing vis-a-vis other institutions in the similar category. The methodology of assessment is based on five broad parameters for ranking various technical institutions. The parameters broadly cover "Teaching, Learning and Resources(30%)," "Research and Professional Practices(30%)," "Graduation Outcomes(20%)," "Outreach and Inclusivity(10%)," and "Perception of people about the institution (10%)".The accreditation by the National Board of Accreditation is meant for assuring a minimum quality level whereas the NIRF ranking gives a relative performance of first 200 institutions. Stakeholders can get information regarding the institution is doing better or worse at the end of each year. Now, the figuring in the NIRF ranking for technical educations has added a feather in crown of GECT.

CONGRATULATIONS
on your well-deserved success

EXCELLENCIA 2020

Our MCA students won the overall prize in the"Excellencia 2020" a 2 day National level Technical fest organized by MES College of Engineering, Kuttipuram, on 12th and 13th February 2020.**Sijomon Benny, Mohammad Fahiz C P, Remshad M, Jayaram G, Safeer Shahul, Sharath Chandran, Amal Babu, Jerrin Joy Pinhero, Siraj M S, Riyas Nizar** and **Jeevan Jos**e participated in the programme.

Best Thesis in Architecture

Fabya Thaila Chandy(2014-2019 Batch B Arch), School of Architecture, Government Engineering College, Thrissur, secured the award for 'BEST THESIS'in National Awards for Excellence in Architectural Thesis, 2019 given by Council of Architecture, India. She received the award for her thesis titled ***'Bhopal Gas Tragedy Memorial Museum'***, on 24th January 2020 at D. Y. Patil College, Navi Mumbai. She has come out with flying colours under the guidance of **Dr. RanjiniBhattathiripad.T**, Professor and Head of School of Architecture. This is the first time a student from Kerala is receiving this award.

Best Paper award to Nithin T Raj

Nithin T Raj of S7 Chemical received best paper award and cash prize in 18th Prof. K V Thomas Endowment National Seminar on New Frontiers in Material and Environmental Sciences, Sacred Heart College, Thevara on 28th and 29th January 2020 for the paper titled "*Synthesis of Microencapsulated Phase change material using copper composites*", co-authored by **Chippy K S, Aswin M R, Arya Kanjily** and **Dr. Praseetha P Nair.**

Best Paper award to Kiran Kumar S

Kiran Kumar S,received the best paper award in theInternational Conference On Emerging Trends In Design, Architecture And Civil Engineering (ICETDACE 2020), SVS School of Architecture, Coimbatore – March 5th and 6th, 2020. Title of his presentation was "*A scrutiny of various frameworks of urban resilience index - in wake of sustainable development goals*". The research work was supervised by **Prof. Bindu C A,** School of Architecture.

Reboot Kerala Hackathon

Reboot Kerala Hackathon, aimed at finding quick and effective solutions for the development of the state in a cost-cutting manner, organizes hackathons in various departments for engineering students. **Riswana T R, Abhay V Ashokan, Shashank Menon, Prabhav Rajeev, Misha Mohan** and **Annarose M B**, under the guidance of **Prof. Ajay James**, won the second position in the hackathon conducted for the health department. The team developed an application "***Healthbook***", that can monitor the vitals, stress and overall health conditions of employees working in offices and provides necessary warnings and suggestions, which includes the stress level, blink rate posture etc.

Team Alpha from our College bagged second price in Agriculture Hackathon conducted at Mala, Thrissur. They developed an android application for farmers which make them aware of various schemes and also notify them about latest schemes available for them. It has features like Malayalam UI, scheme recommendation, user friendly application portal, application tracking. The agriculture department offered support for further development and release of application to public. Team consists of **Krishnanand VP, Shahala O, Fida Nasri, Aswin Kumar, Nandhu PK** under the guidance of **Prof. Ajay James.**

YIP awards

Young Innovators Programme is a specially designed programme under Kerala Development and Innovation Strategic Council (K-DISC) which aims in promoting innovative ideas from students. The team consisting of **Aswin P, Sijomon Benny, Anjith Krishna M, Thamanna Aishin P A** and **Nair Aswathi Unnikrishnan** proposed an idea of a device called Pentaspot that features seamless wireless communication and data transfer between multiple devices with ease. The idea got shortlisted as one among 100 ideas from Kerala for mentorship, funding and guidance from K-DISC team.

Anirudh, Ajay Ram K and **Sooraj Bhaskaran** of S4 Computer Science under the mentorship of **Prof. Ajay James** designed a LASER based measurement marking device Precision-X. This is a detachable smartphone gadget controlled by Bluetooth. Improvisations were made to the existing Augmented Reality technology which utilizes smart phone cameras to 'take' measurements. Precision-X has an ARDUINO based LASER pointer arm which is used to 'mark' preferred measurements. Precision-X bridges the hardware divide which restricted a smart phone from being used as a complete measurement tool.

Ajay Ram K
S4, CSE

Sooraj Bhaskaran
S4, CSE

Anirudh
S4, CSE

Technology conclave prize

JewellAR, a product by Infusory Future Tech Labs Pvt. Ltd bagged first prize in Technology Conclave conducted by District Industries Center, Thrissur at Pooram International Hotel on Jan 24th and 25th. There were 23 projects presented in the competition. Infusory Team consists of **Thomson Tom, Shyam Pradeep** and **Aadhil Khan**. JewellAR is a portable interactive mirror that lets consumers try on even the entire collection of ornaments of a jeweller Through the JewellAR online platform the inventory can be updated seamlessly to all kiosks.

FIBONACCI SERIES IN INDIAN CLASSICAL MUSIC

Dr. Sinith M.S.
Asst. Professor
Dept. of ECE

A typical South Indian Classical Music Concert in which there will be a main artist (a vocalist or an instrumentalist) and other artists (instrumentalist) who will be synchronising with/following the main artist.

Fibonacci Series, as all of us know, is the series obtained by adding any two elements to obtain the next element. In other word any element in a Fibonacci series, *F*n is obtained by adding *F*n-1 and *F*n-2. Hence the elements of the series are 0,1,1,2,3,5,8,13,21,.... Fibonacci series is found in nature in many form. The sunflowers are found to have the number of spirals in their seed pattern showing the Fibonacci series. Most beautiful photographs are also found to be having ratios of adjacent numbers in Fibonacci series (also known as golden ration). The breeding of rabbits in ideal condition also follows Fibonacci series pattern. There are several other form in which Fibonacci series appear in nature.

The presence of Fibonacci series in Music have been studied by many musicologists and ethnomusicologists. Many compositions are found to contain Fibonacci series patterns. For example, Beethoven's Fifth symphony and Mozart's compositions are found to contain Fibonacci series. The presence of Fibonacci series, in any music genres, was not observed / reported in literature. In (1) the authors have found the presence of Fibonacci series in Indian Classical Music notes. They found that the ratio of frequency of notes in Indian Classical Music (Both Hindustani and Carnatic) are found to be ratio of sum of two Fibonacci series numbers. The authors have further used this information for representing pitch in digital format as Fibonacci series based pitch Distribution (FSPD) and used it for efficiently recognising rage using digital devices.

[1] **MS Sinith**, S Tripathi, KVV Murthy, Rage recognition using Fibonacci series based pitch distribution in Indian Classical Music, Journal of Applied Acoustics, Vol. 167, Elsevier, 2020.

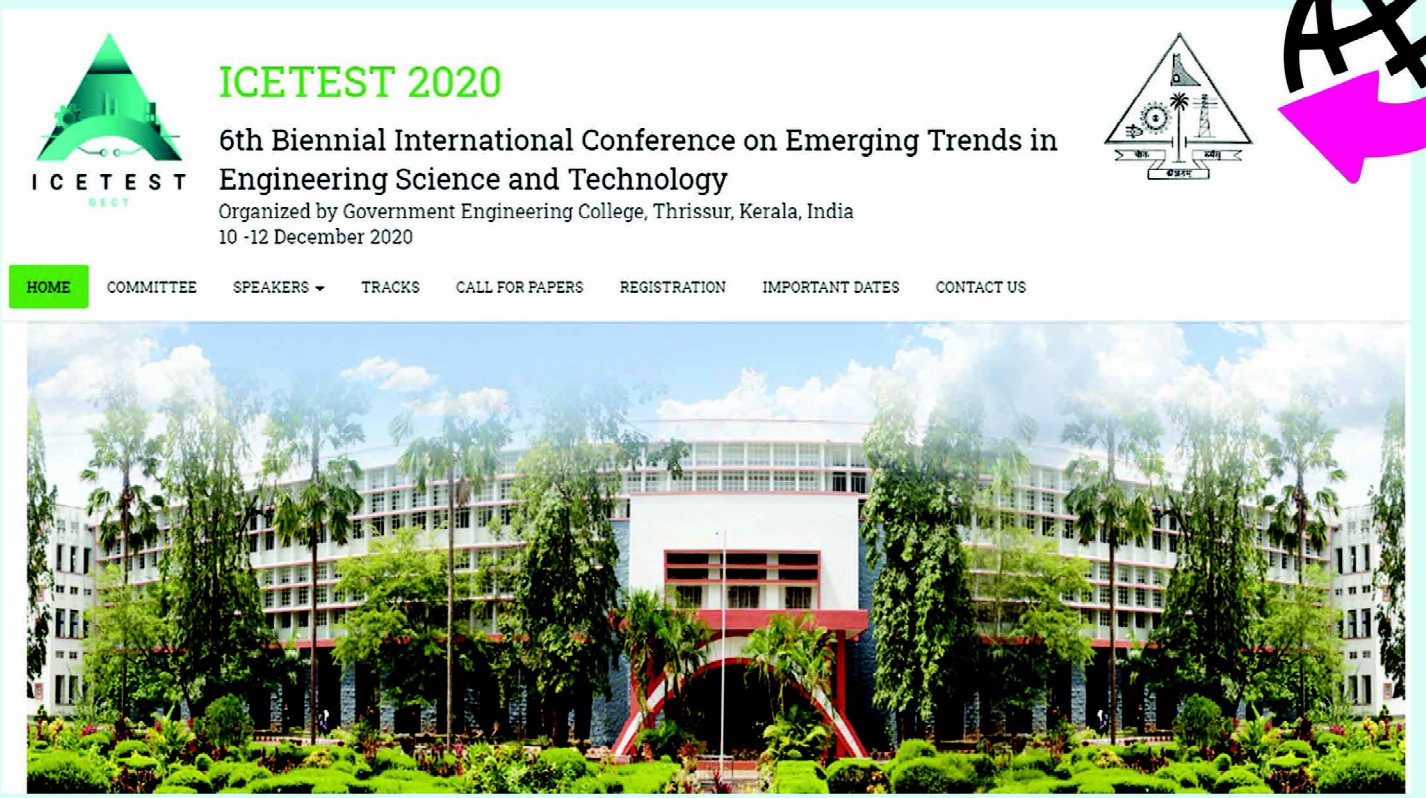
ICETEST 2020

6th BIENNIAL INTERNATIONAL CONFERENCE ON EMERGING TRENDS IN ENGINEERING, SCIENCE & TECHNOLOGY, December 10 – 12, 2020

The prestigious International Conference on Emerging Trends in Engineering, Science & Technology (ICETEST),biennially organized by our college since 2009 is scheduled to be organized this year from 10 – 12 December 2020as an online virtual conference.ICETEST 2020 will have three sub-tracks with Track – 1; organized jointly by the Architecture & Civil Engineering Departments, Track – 2; organized jointly by the Mechanical Engineering, Chemical Engineering & Production Engineering Departments and Track – 3; organized jointly by the Electrical and Electronics Engineering, Electronics and Communication Engineering & Computer Science and Engineering Departments.

The conference will have keynote speeches, invited speeches and contributory oral presentations. Eminent academicians and researchers of international repute from leading institutions will be delivering the keynote speeches. Contemporary and leading researchers will be invited to deliver the invited speeches in thrust areas. The contributory papers accepted for oral presentation will be published in IEEE and other appropriate journal publications.

Conference Convenors: **Dr. HarisNaduthodi & Dr. K.K. Ramachnadran**



Lecture Series @ gectcr (3rd Lecture)

On 30th January 2020 **Dr. Abdul Samad PA**, Associate Professor of Mechanical Engineering delivered a lecture on the topic "***Computational Fluid Dynamics (CFD) for Engineering***". 20 participants including research supervisors, Ph. D scholars and M. Tech students were present in the CAD Lab of Mech. Engg. department for attending the lecture. Professor Samad depicted the various applications and future scope of CFD in the engineering field. There was a hands on training session after the lecture. **Dr. Manju M S**, IRAC convener expressed her gratitude to Dr. Abdul Samad for delivering the lecture.

Lecture by Relecura Inc. USA team members

A lecture and presentation by a team from **RelecuraInc (USA)** regarding proficiency certification for employability enhancement was conducted on 29th of January 2020, for final year students. The main aim of the lecture was to make the final year project more relevant and meaningful from the industrial perspective and to make sure that the student is at home with the concerned technology and the industrial dimensions thereof. The procedure for the same and the accrued benefits there from was elaborated in the session. The team was from the Bangalore research centre and consists of Dr. Ginish George, Mr. Rohit Singh and Dr. Alex Paikada. The program was coordinated by **Dr. ThajudinAhamedV I**, Professor, ECE.

Our Journal Citations during 2016-2018

During 2016-2018 research publications of our staff members bagged a total number of 1047 citations in Scopus indexed journals. As per Web of Science data it is 531. This is a testimony for the active participation of our faculty and staff members in quality research and the extent of exposure of our research outputs to the community. The data was collected by **Dr. Sajikumar N** for applying NIRF ranking. IRAC congratulate **Dr. Sajikumar N** and all researchers of our college for this achievement.

Congrats to TBI, GECTCR

It is very happy to announce that our college has been selected as host institute to set up/establish business incubator under the scheme "***Support for Entrepreneurial and Managerial Development of MSMEs through Incubator***" by Ministry of Micro Small Medium Enterprises **(MSME),** Govt. of India. The college will receive a total funding of Rs. 3 Crores to support entrepreneurial activities. IRAC congratulate the Manager of our TBI, **Prof. Ajay James** and team for this achievement.

IRAC expresses deep gratitude to

Dr. Viyan P for his valuable contribution as **Research Dean** of our College during 2019-2020.

Present Research Dean of our College
Dr. Sajikumar N.
Professor, Civil ENgineering

Moments of Proud - It is KTU's First Doctoral Degree

First Ph.D of APJ Abdul Kalam Technological University was secured by **Jaydevan P C**(ME). IRAC's special congratulation to Jayadevan P C and his research supervisor **Dr. Pradeep M Kamath**, Associate Professor, ME for this achievement.

Ph.D Seminars during Jan-Jun 2020

Seminar	Ph. D Student	Supervisor	Date of presentation	Topic
Ph.D Pre submission seminar	Ajmal K T	Dr. B. Jayanand	21/01/2020	Design, Development and Implementation of a novel infinite level inverter
Ph.D Open Seminar	Prof. Manilal A. M	Dr. Solomon P A	30/01/2020	Removal of oil from produced water/oilfield wastewater.
Ph.D Pre submission seminar	Sam Joshy	Dr. K R Jayadevan	5/2/2020	Influence of in-service microstructural changes in hot forging dies on die failure
Ph.D Pre-submission Seminar	Prof. Miji Cherian	Dr. Sajikumar N, Dr. Sumam K S	17/06/20, CU	Fluid structure interaction in transient cavitating flow in pipes

IRAC congratulate the faculty members for sharing their expertise as distinguished speaker / chairing sessions etc. in conferences and doctoral meetings.

Sl. No.	Programe details	Role	Title of the speech/program	Speaker / Chair
1	FDP on "Renewable Energy Sources: Conversion, Storage and Applications", Jan 6 - 10, 2020 organized by the Dept. of Mech. Engg., Jyothi Engineering College, (sponsored by KTU)	Guest of Honour and inaugural speaker	Hydrogen Fuel Cells	Dr. Ramachandran K K
2	FDP on "Recent Advances in Metal Casting and Joining Techniques" Jan 6 – 10, 2020 organised by the Dept. of Mech Engg., NSS College of Engineering, Palakkad (sponsored by KTU)	Invited Speaker	Developments in Friction Stir Welding	Dr. Ramachandran K K
3	Webinar on 'Friction stir welding for additive manufacturing' 27th May 2020 organized by India Welds and IWS	Webinar presenter	Friction stir welding for additive manufacturing	Dr. Ramachandran K K
4	Webinar on 'Friction Stir Welding of Dissimilar Materials', 8th June 2020, organized by the Dept. of Mech Engg., Sri Ramakrishna Institute of Technology, Coimbatore	Webinar Presenter	Friction Stir Welding of Dissimilar Materials	Dr. Ramachandran K K
5	Chaired session .	Chairing session	24th HYDRO 2019, Dec 18-20, Osmania University, Hyderabad	Dr. Sajikumar N
6	Doctoral committee at Manipal Academy of Higher Education, Dubai	Member	Doctoral committee member, MAHE Dubai	Dr. Sajikumar N

Congratulations to the Contributors of Research Papers to the Journals

Mechanical Engineering

Anand S N, **Ramachandran K K**, Bijulal D, "Microstructural, mechanical and tribological characterization of vacuum stir cast Mg-4Zn/Si3N4 magnesium matrix nanocomposite", Materials Today: Proceedingshttps://doi.org/10.1016/j.matpr.2020.03.053

Abstract: *Stir casting route is a relatively easy, cheap and popular method to produce metal matrix composites. Vacuum stir casting method uses pressure values, which comes intermediate to the gravity and squeeze casting variants of the stir casting process. This article presents the mechanical properties, the microstructural and the wear characteristics of the as-cast nanocomposite of Magnesium. The Magnesium nanocomposite was produced by the vacuum stir casting process with Mg-4Zn alloy as the matrix and Si3N4 nanoparticles as the reinforcement. Microstructural characterization was carried out by optical microscopy and scanning electron microscopy. The results showed that the Mg-4Zn/Si3N4 nanocomposite possesses mechanical and wear properties comparable to other Mg-based materials reported in the literature.*

Abhijith N V, Priyanka C P, Sudeep U, **Ramachandran K K**, "Crystallinity and Wettability Induced Osteogenic Behaviors of Commercially Pure Ti and Ti-6Al-4V Alloy Implant Surfaces Having Multiscale Surface Topography", Materials Today: Proceedings, https://doi.org/10.1016/j.matpr.2020.03.057

Abstract: *The influence of multiscale topography imparted through laser texturing of titanium based bioimplant surfaces on osteogenic behaviours is investigated. The synergistic effects of surface topography, surface physical and chemical behaviours appears to have improved the initial cell adhesion and proliferation. Micro grooves having embedded nano ripples as periodic surface structures were micro-fabricated on two different grades of specimens; commercially pure titanium and Ti-6Al-4V titanium alloy. The surface characteristics, chemical composition and phase constitution of the micro-fabricated surfaces were investigated by confocal microscopy, XPS and XRD analysis. The hydrophilicity of the samples was assessed by measuring the water contact angles and the results have been correlated with the surface chemistry. The response of osteoblasts cells seeded on the laser textured surfaces in standard controlled conditions was investigated using fluorescence microscopy and SEM. The results showed that the presence of multiscale topography enhances cell adhesion and provide a definite orientation for osteoblast cells to grow along the direction of the micro grooves. Surface oxidation states of titanium along with the presence of crystalline phase and improved hydrophilicity appeared to have a major role in the preferential integration of bone tissues on the laser textured specimen surfaces.*

Sunil Jerome, Venkatarathnam G,"Performance of a Linde-Hampson refrigerator operating from –120 °C to –60 °C with optimised R14-hydrocarbon mixtures exhibiting vapour-liquid-liquid equilibria", Heat and Mass Transfer(2020),56, pp1523–1535. https://doi.org/10.1007/s00231-019-02801-z

Abstract: *Single stage Linde-Hampson refrigerators that operate with R14-hydrocarbon mixtures can be used in place of traditional two/ three stage vapour compression cascade refrigerators to provide refrigeration below –60°C. The exergy efficiency of Linde- Hampson refrigerators can be increased by using compositions that exhibit vapour-liquid-liquid-equilibria at low temperatures. The main aim of this work is to present the theoretical performance of a Linde-Hampson refrigerator operating with optimal R14- hydrocarbon mixtures from "120 to "60 °C. The results show that constant temperature refrigeration, however, cannot be provided above "80 °C with these mixtures. The use of nitrogen as an additional component below "100 °C is also investigated.*

Electrical Engineering

Shyam Kamal, **Ramesh Kumar P**, Asif Chalanga , Jitendra Kumar , Bijnan Bandyopadhyay, Fridman L, "A New Class of Uniform Continuous Higher-Order Sliding Mode Controllers", Journal of Dynamic Systems, Measurement, and Control (2020),142(1): 011005 (12 pages), *DOI: 10.1115/1.4044952*

Abstract: *This paper proposes a new class of uniform continuous higher-order sliding mode algorithm (UCHOSMA) for the arbitrary relative degree systems. The proposed methodology is a combination of two controllers where one of the components is a uniform super twisting control which acts as the disturbance compensator and the second part gives the uniform finite time convergence for the disturbance free system. This algorithm provides uniform finite time convergence of the output and its higher derivatives using an absolutely continuous control signal and thus alleviating the chattering phenomenon. The attractive feature of the proposed controller is that irrespective of the different initial conditions, the control is able to bring the states of the system to the equilibrium point uniformly in finite time. The effectiveness of the proposed controller has been demonstrated with both simulation and experimental results.*

Uma syamkumar, Jayanand B, "Real-Time Implementation of Sensorless Indirect Field-Oriented Control of Three-Phase Induction Motor using a Kalman smoothing based Observer", International Transactions on Electrical Energy Systems (2020),https://doi.org/10.1002/2050-7038.12242

Abstract:*This paper proposes an indirect vector control scheme of an induction motor, using a Kalman smoothing based observer to estimate speed. The observer is used to estimate the stator currents, rotor currents, and rotor mechanical speed. Observers based on conventional extended Kalman filters (CEKFs) depend on past output measurements of a system to predict its state variables at the next instant. In a smoothing based observer, some future output measurements are also used to obtain a smoothed estimate of a past instant. The smoothed estimate, thus obtained, is used to predict and correct the states of the next instant. The performance of a CEKF based observer largely depends on the proper determination of its measurement and process error covariance matrices. A trial and error method is usually engaged to arrive at these matrices. Smoothing helps to obtain a better state estimate compared with CEKF, with the same covariance matrices used in CEKF, which is obtained by trial and error. The improvement in estimation is mainly in the transient region. Estimates of low and zero speeds also show good improvement over those of CEKF. This betterment accomplished is without much increase in computational load. Experiments are conducted to compare the performance of a speed sensorless indirect vector control system with the observer, based on CEKF and smoothing for the same values of noise covariance matrices. The experiments conducted used various reference speeds, including low and zero speeds. Results show the superiority of the smoothing based Kalman observer over CEKF based observers.*

Ajmal K T, Muhammedali Shafeeque K, Jayanand B, "A Novel Four Infinite Level Inverter, Journal of circuits", Systems and Computers(2020) https://doi.org/10.1142/S0218126620501935

Abstract:*A novel Four Switch Infinite Level Inverter (FSILI) is proposed in this paper. In conventional multilevel inverters, as the number of levels increases the output voltage becomes more sinusoidal. Unlike conventional multilevel topologies, the output voltage level in the proposed topology depends upon the switching frequency. Since the switching frequency is very high, the output voltage level approaches infinity, thus the name Infinite Level Inverter. Proposed topology requires only one inductor and capacitor reducing the size, weight and thus cost of the overall system. Inherent buck operation is happening in the proposed topology with a sine varying duty ratio PWM control. Steady-state analysis and design of the inverter are carried out. The proposed topology is simulated using Matlab/Simulink to evaluate the theoretical analysis and operation. A hardware prototype is also developed to validate the operation of proposed FSILI.*

Civil Engineering

Miji Cherian R, Sajikumar N, Sumam K S, "Effect of valve closure time on transient cavitating flow through piping systems", ISH Journal of Hydraulic Engineering (2020), DOI:10.1080/09715010.2020.1729875

Abstract: *Hydraulic transient is an unavoidable phenomenon which occurs in any piping system during sudden change in operating conditions, and it sometimes leads to cavitation; subsequently generates very high pressure in the system. The intensity of pressure developed from sudden or gradual closure of the valves at the downstream side primarily depends on the closure time of the valve. This paper is an experimental investigation into the effect of valve closure time on transient flow characteristics in a piping system. The experiments with different flow rates of fluid and valve closure times in the piping system proved that the occurrence of cavitation in a pipe links very much with the closure time of valve and the characteristics of water hammer pressure wave.*

Chemical Engineering

Manilal A M, Soloman P A, "Influence of operating parameters on the fraction of oil oxidized during electrocoagulation of produced water", Water conservation, Science and Engineering (2020) https://doi.org/10.1007/s41101-020-0083-9

Abstract: *Even though electrocoagulation (EC) is a waste treatment process which separates the pollutants from the bulk to a solid phase, it is often reported that a part of the waste is getting mineralized during EC. The present study aims at finding the best combination of operating parameters which can maximize the part of organic matter removed by oxidative mechanism during the EC treatment of produced water. It is found that current density and salt concentration strongly influenced on the fraction of (chemical oxygen demand) COD oxidized. At optimum operating condition (current density- 0.75 A/dm^2, time- 30 min, initial pH-9 and salt concentration - 3 g/L) a maximum of about 77% COD was found oxidised from a stable oil-in-water emulsion of concentration 1250 $\pm$ 50 mg/L. The corresponding total COD removal by EC was observed to be 82%. The proposed methodology is very much appropriate in terms of lower footprint for produced water treatment, especially in offshore basins; due to three reasons such as the operation is fast, lower sludge production and the supporting electrolyte available in-situ. Further, based on the results obtained a second order regression model was proposed to predict the responses viz. COD removal and fraction of COD oxidized. Analysis of variance (ANOVA) studies showed that the model is valid and equipped to predict the responses well, as evident from the high R^2 value of the model.*

Francis John V, Soloman P A, "Optimization of Cellulase Enzyme Production by Co-cultures of Fungi Isolated from Lignocellulosic Waste", International Journal for Modern Trends in Science and Technology (2020), 6(5)http://www.ijmtst.com/vol6issue05.html

Abstract: *Fruit wastes were incubated with the mixture of cellulolytic fungi Penicilliumcitrinum, Aspergillusoryzae, and Trichodermaviride to hydrolyze the cellulosic components and to increase the degree of degradation. The batch experiments are statistically designed and performed using Box-Benhken method of Response Surface Methodology to investigate the influence of major parameters viz., incubation time, temperature, pH, moisture content and substrate concentration on cellulase enzyme production. Maximum cellulase production of 2.03 Units/ml (U/ml) was detected by the RSM method in a mixed culture containing fungi at a ratio of 1: 1: 1 under optimal conditions at an incubation time of 5.27 days, a temperature of 34.09 °C, pH 4.85, moisture content of 63.83% and a substrate concentration of 5.03%.*

Divya A H, Soloman P A, "Prediction of water quality index of an Indian river using arithmetic index method and fuzzy logic", Environmental Engineering and Management Journal (2019),18(9), pp. 2035-2044.

Abstract: *This paper focuses on the effect of some water quality parameters of river water which helps in the calculation of water quality index and culminates in the development of a numerical model for prediction of water quality index of any river system in India by using fuzzy logic in MATLAB. The index was calculated by arithmetic method using eleven various experimentally estimated water quality parameters like Potential Hydrogen, Chlorides, Dissolved Oxygen, Chemical Oxygen Demand , Nitrates, Sulphates, Phosphates, Total Dissolved Solids , Biochemical Oxygen Demand , Electrical Conductivity and Total hardness of the water at eight locations, stretching 60 km of Chalakkudy River, for a period of January 2014 - December 2017. This effective fuzzy logic water quality index model (F-WQIM) enables the prediction of the risk of water consumption and the assessment of load of pollution in Chalakudy River. The performance of the model in predicting the water quality index has been tested by comparing with calculated water quality index values for the following year 2018, and found to be good enough with an Absolute Average Relative Error (AARE) of 4.71 and Root Mean Square Error (RMSE) of 0.317.*

Electronics and Communication Engineering

Sinith M S, Shikha Tripathi, MurthK V V, "Raga recognition using fibonacci series based pitch distribution in Indian Classical Music", Applied Acoustics (2020),167,107381

Abstract: *Fibonacci Series and Music are related in many ways. Even though Indian Classical Music (ICM) is known to be based on Just Intonation rather than equal tempered, not much attention has been given to inflections on the notes, which are integral part of the notes themself. In this work an interesting relation between Fibonacci series and Just Intonation in ICM has been found. Further, discrete version of pitch contours based on a table derived using Fibonacci series is introduced for ICM. These pitch contours can effectively represent the melody and can be a tool for music information retrieval. A pitch distribution based on Fibonacci series is also introduced. Raga recognition is performed using this distribution and a recognition rate of 95.3 percent is obtained for the typical 17 ragas considered for this experiment. The recognition rate is higher compared to reported work in raga recognition.*

Production Engineering

Menon B R, **Shalij P R**, Kiron K R, Sreejith J, Sajeesh P,"Cost value stream mapping as a lean assessment tool in a small-scale industry", International Journal of Productivity and Quality Management (2020), 30(1), pp. 72-91.

Abstract: *Value stream mapping (VSM) is a lean tool which addresses the non-value added activities in the time domain. But, it fails to address it in a cost domain. In this work, a new tool called cost value stream map (CVSM) is proposed, which addresses the problems encountered in conventional VSM and cost-time profile (CTP) and maintains the advantages of both. The determination of work in process inventory and non-value added costs incurred by using CVSM are demonstrated by presenting a case study. An SME in Kerala, India is selected for this. Lean techniques applied on the various non-value added activities in the order of their cost investments 27% reduction in lead time, 27%-32% reduction in WIP inventory and 40%-42% reduction in cost investment while manufacturing the product. The reductions accounted for an annual savings of INR.2,17,728 in the value added cost .*

Samad P A A, **Shalij P R**, "Experimental investigation and CFD simulation of power consumption for mixing in Gyro Shaker", International Journal of Computational Science and Engineering (2020), 21(2), pp.188-201

Abstract: *Better mixing of ingredients is the key for improving the quality of the process in the manufacturing of several products. Gyro Shaker is a dual rotation mixer commonly used for mixing highly viscous fluids. In this work, CFD simulation for the multiphase mixing of Gyro Shaker is carried out for obtaining numerical solutions. Simulations of three different mixing models namely Eulerian granular model, mixture model and volume of fluid (VOF) model are compared with each other. Reynolds number and power number based on characteristic velocity were derived for the Gyro Shaker. Experiments were conducted to validate the mixing power by the simulation using torque method and viscous dissipation method. The viscous dissipation method for mixing power demonstrates a low deviation from the experiment data than torque method. Among the three simulation models, the multiphase mixture model shows the minimum variation of the experimental data. A comparison of the flow fields of the different mixing models is also carried out.*

Physical Education

Shejin K V, "Influence of yogic practices on body composition, vital capacity and flexibility among CBSE school obese children", International Journal of Physical Education, Sports and Health (2020), 7(2), pp. 260-264

Abstract: *The present study aimed at to test the effects of 12 weeks Yogic training progrmme on Body composition, Vital capacity and flexibility of the obese male students. For this purpose thirty (30) boys from S.N. Vidyabhavan, Chenthrapinni, Thrissur, Kerala were selected at random. Their BMI scores were above 30 and their age ranged from 10 -14 years. The thirty subjects were divided in to two groups, experimental group and control group. Each group consists of 15 subjects. A Yogic training program has been implemented on the experimental group for 12weeks (3 days in a week) whereas the control group did not undergo any type of treatment. The pre and post data were collected before and after the yogic training programme. All the data were analyzed using SPSS statistical package to determine the effect of 12 weeks Yogic training programme. Paired t test result shows that the experiment group found significant improvement in body fat (%), vital capacity and flexibility. But there was no significant improvement in the Control group.*

Shejin K V, Kunjikannan R, "Effect of "No Space Exercises" in the Context of Resistance Band Training on BMI of College Students", Studies in Indian Place Names (2020), 40(74), pp. 1722-1726.

Abstract: *Ancient days there were frequent yogic, martial art practices, conference, but during this century these types of regular practices for people are happening once in a blue moon. The researcher wants to spice up the activity for all in a paradigm and provide them fitness with opulent opportunities. For doing regular physical exercise, people required a voracious appetite for fitness and beauty consciousness. Physical fitness is very necessary for healthy and tension free life. Fitness training also includes diet and good sleep. People are always complaining that, there is "no space and time" for exercise; this paper gives a direction to manage these limitations. Here, researcher illustrated the beneficial effects of the resistance activity in our life. Exercise programs in this paper describe the changes of a BMI for college sedentary women. For that, the purpose of the study was to find out the effect of band resistance exercise to know the changes in, the groups. In-order to serve this purpose 25 sedentary female subjects who were selected from college of engineering, Thrissurand they were under gone two month training programme. The age of subjects' ranges from 18 to 22.Paired sample Ttest statistical techniques used. In all these statistical tests, level of significance was fixed 0.05 levels. All statistical analysis was carried out with the help of statistical package SPSS 16.0 for WINDOW. The central value obtained from T-distribution with 59 degrees of freedom at level at level 0.05 is 1.96. experimental group the mean (BMI) the pre test and post test scores are 28.12 and 20.96,its mean difference is 7.16.The calculated T -value is 11.63.Since T greater than the tabulated value, there is a statistically significance from pre to post test mean difference score. Based on the analysis it is concluded that the effect of resistance band exercises, significantly decreased (BMI) variable of sedentary females.*

Conference Publications

1) **Albert Poulose, Ramesh Kumar P**, "*Super-Twisting Algorithm based Load Frequency Control of a Two Area Interconnected Power System, 2019*". 20th International Conference on Intelligent System Application to Power Systems (ISAP).

2) **Thasneem M, Shijna N P**, "*Planning strategies for effective crowd management – a study into the efficiency of crowd management methods*", International Conference On Emerging Trends In Design, Architecture And Civil Engineering (ICETDACE 2020), ICETDACE 2020, SVS School of Architecture, Coimbatore – March 5th and 6th, 2020

3) **Neethu Elizebeth Michael, Suhara E M, B Jayanand**, "*Experimental Verification of Shunt Active Power Filter for Harmonic Elimination*", International Conference on Modeling, Simulation & Intelligent Computing, January 2020

4) **Ajmal K T, Jayanand B**, "*A modified Three Phase Infinite Level Inverter with Improved DC bus Utilization*", International Conference on Communication and Electronics Systems,ICCES, 2020, Coimbatore.

5) **Sandra Rose, Bindu C.A**, "*Effective Land management on conserving Paddy farm sector*" , International conference on Materials Mechanics 2020 (IMMM 2020) on March 6th 2020, Hotel SP Grand Days Trivandrum.

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