



"If we see the world through the eyes of knowledge and console the suffering with hands of compassion, we can certainly reach the shore of peace and bliss. We should develop the expansiveness of mind to embrace both scientific knowledge and spiritual wisdom. If we can merge science and spirituality all over the world, we will find that we are able to create a mighty river. May that river provide life-giving water to humanity and create beautiful flower gardens of noble culture throughout the world."

- AMMA



EnVision

School of Engineering Newsletter - October 2019



8th

Best
University
in India

nirf National Institutional Ranking Framework
Ministry of Human Resource Development
Government of India
2019

Shri. Ram Nath Kovind, Honorable President of India,
with representatives of the Top 10 universities in India in NIRF 2019 Rankings
including Amrita represented by Dr. Sasangan Ramanathan, Dean, Faculty of Engineering

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Dr. Sasangan Ramanathan
Dean Engineering

Dean's Message...

I am immensely proud to present to you this edition of EnVision.

The edition features substantial achievements by our students - resonating the fact that the next generation is gearing up to tackle future challenges. The students guided by their faculty, have worked together in pursuit of solutions, proving that the University is on the right path of innovative teaching-learning process. The demonstration of such excellence has also paved the way for rewarding careers to many of our students - an immensely proud moment for all of us at Amrita. The consistent effort by the team of faculty and the research collaborations with both National and International partners have instilled the intellectual curiosity in the students. Stay tuned for more exciting and breakthrough technology developments in the coming editions"



Research @Amrita

HEATING AND COOLING WITH MICRO CHANNEL TO DRIVE SYSTEM PERFORMANCE



Funding Agency: Lam Research Incorporated, USA under Unlock Ideas Campaign

FACULTY: Dr. Uday Bhaskar Reddy, Dr. Sasangan Ramanathan, Dr. Sriram Devanathan, from the Department of Chemical Engineering and Materials Science.

Lam Research Inc., has funded a proposal titled "Heating and Cooling with Micro channel to Drive System Performance (Rate and Response)" under Unlock Ideas Campaign initiated by them. There were 78 submissions in collaboration

with 57 universities across 10 countries. Out of 20 projects that were selected globally for funding, Amrita University was one among the two that were shortlisted from India. The grant is to develop a comprehensive Thermal Management System for

Thin film Deposition equipment used in semiconductor device fabrication, where temperature uniformity across large diameter substrate is absolutely critical for achieving excellent process repeatability and reducing equipment complexity.

HIGH PERFORMANCE POLYETHER KETONE – CARBON FIBRE COMPOSITE FOR FUTURE GENERATION AVIATION AND SPACE APPLICATIONS



Funding Agency: Indian Space Research Organization (ISRO) – RESPOND

Faculty: Dr. Meera Balachandran, (Dept. of Chemical Engineering & Materials Science), Dr. K. Jayanarayanan, (Dept. of Chemical Engineering & Materials Science), Dr. Shantanu Bhowmick (Dept. of Aerospace Engineering)

Traditionally fibre reinforced thermoset composites are extensively used in aerospace structures owing to the ease in processing,

good mechanical properties and chemical resistance. However, the performance of the thermoset composites is poor in terms of fracture toughness, ductility and energy absorption characteristics. In this context, the significance of high performance thermoplastic composites in aerospace structural applications is immense due to their outstanding ductility and crack propagation resistance. Poly ether ketones (PEK) are advanced thermoplastic matrix materials which when used in conjunction with carbon fibre reinforcements can

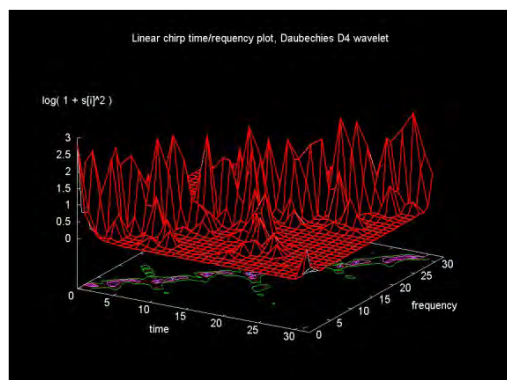
produce laminates which can retain their fracture toughness and other mechanical properties in a wide range of service temperature (- 150°C to 150°C). Additionally PEK exhibits excellent chemical resistance, fire resistance, creep resistance, radiation resistance due to the diphenylene ketone groups they possess. This work is aimed at the development of poly ether ketone – carbon fibre thermoplastic laminates with superior fracture toughness, enhanced mechanical properties and durability in space environment for structural materials in launch vehicles. An autoclave method for the composite laminate production will be developed. Finite element techniques will be utilized for stress distribution analysis in the laminates. The durability of the thermoplastic composite laminates will be studied in space simulated environments and the various properties will be compared with their thermoset counterparts.

EXTENSIONS OF WAVELET PACKET TRANSFORM TO GENERALIZED FUNCTIONS

Funding Agency: Department of Science and Technology (DST) - SERB

Faculty: Dr. Subhashmoorthy R, Dept. of Mathematics

By the introduction of wavelet transform, signals can be localized in both time and frequency. Wavelet packet transform is a further



decomposition for wavelet transform, so that higher resolution in time and frequency domain can be got. In this three year project, the objective is to extend the wavelet packet transform from $2(\mathbb{R})$ to possible larger domains such as the space of tempered distributions, space of square Integrable Bohemians, space of periodic distributions, the space of periodic Bohemians and the space of tempered Bohemians. The first

goal is to construct the domain for the extendable wavelet packet transform which contains $2(\mathbb{R})$ and in the domains, to prove the reconstruction formula, convolution theorems, Parseval's identity for the proposed wavelet packet transform. Further, verification will be done on the extended wavelet packet transform to see if the listed generalized function spaces are having the desired properties such as linearity, continuity etc. So the primary challenge is to construct the suitable domain and codomain for distributional extensions, so that it inherits all properties of classical wavelet packet transform. The study will extend to explore applications of this work in boundary value problems, mathematical physics and in statistics

A BEHAVIORAL STUDY OF RANSOMWARE- TO DEVELOP A GENERIC MITIGATION SYSTEM



Funding Agency: Dept. of Science and Technology (DST)- SERB

Faculty: Dr. Gowtham R, Dept. of Computer Science and Engineering

The ransomware attacks are evolved as a serious cyber threat for the common online users, industries, and governments. On average this attack impacts the online users, governments, and global organizations with 350 percent annual growth rate. These factors clearly indicate the need for developing a robust protection system against this critical malware. Most of the protection systems against the ransomware today are designed based on the passive or

signature-based analysis. The signatures are commonly generated offline based the code patterns present in the known ransomware and stored in the signature repository. The malicious executables are identified as ransomware only when there is an explicit signature match with an entry in the repository. But these techniques fail badly to detect the ransomware that comes with new variants, deployed code obfuscation techniques, and designed for the targeted attack. These shortcomings of the signature-based systems can be addressed by developing a protection system that deploys effective behavior-based analysis. This project aimed to develop a behavior-based model to detect the active ransomware. The system monitors the behavior of active programs towards the user files, retention state, its lateral movement, and system resources. This behavior information is automatically analyzed to detect the presence of the ransomware. To facilitate the behavior-based ransomware detection, this project also involves developing a unique testbed to effectively monitor the behavior of ransomware families.

CYBER SECURITY CENTRE RECEIVES GRANT FROM GOVT. OF INDIA FOR CRYPTANALYSIS LABORATORY



Funding Agency: Government of India.

Faculty: Centre of Excellence, TIFAC-CORE in Cyber Security.

A team of six faculty members headed by Prof. M. Sethumadhavan is working on a Cryptology Project funded by Government of India. As part of the project, a general-purpose high-performance computing lab, with an FPGA Cryptanalyser is being set up at the Centre for Cyber Security. Cryptographic systems needed for the modern IT security are designed to satisfy long term system security goals. With all security guarantees built on such cryptosystems, we are in need of rigorous security proofs for any claim on security. Due to the inherent complexity of the cryptographic structures involved, security proofs can hardly be provided for any practical security system. Therefore we found our confidence in modern cryptosystems by using techniques from cryptanalysis. However, cryptanalysis is solely

based on observations and identified weaknesses of security assumptions. It is the investigation for better and feasible algorithms in terms of optimal input parameters, reduced implementation costs and optimal platform to achieve best results. The nature of the aforementioned issues allows only for empiric solutions. To evaluate such solutions, we require cryptanalytic tools implemented on a range of platforms to practically evaluate and identify the potential of each individual attack. In light of the Cryptanalytic attack options, one usually considers the time taken by an attacker to circumvent the security and resources required in order to have a reasonable chance for success. This cost is typically measured in time and/or money and its sum must be higher than the value of the target asset.

MATHEMATICAL MODELLING OF ROOM ACOUSTICS TO MITIGATE ACOUSTICAL DISTURBANCES



Funding Agency: Vision Group of Science and Technology (VGST), Karnataka

Faculty: Dr. Neetu Srivastava, Dept. of Mathematics.

Noise and acoustic surveys in occupied and unoccupied classrooms, indoor sports halls

and gymnasias have confirmed that the majority of these spaces have, very long Reverberation Times (RT), high occupied noise levels and poor

speech intelligibility. These are likely to be the contributory factors towards voice problems among sports teachers and students hearing in such spaces. The long reverberation times in sports halls could be reduced by the introduction of acoustically absorbent material which would improve listening,

hearing, understanding and speaking conditions in these spaces. Existing literature analyzed the variation of acoustic and noise variations of a wide range of teaching spaces in secondary schools in both unoccupied and occupied conditions. The long RTs result in relatively low values of Speech Transmission Index (STI). In this project, mathematical modeling aims to facilitate good speech intelligibility and speaking conditions in teaching spaces, and to prevent interference by noise with study activities.

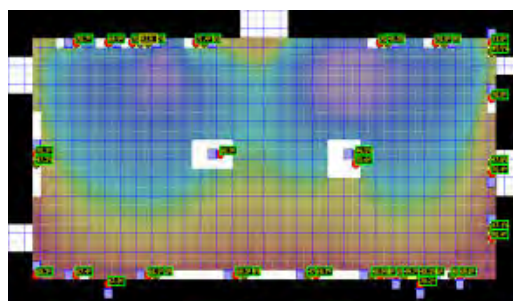
IOT BASED ENVIRONMENT MONITORING AND CONTROLLING SYSTEM FOR PRESERVING CULTURAL HERITAGE

Funding Agency: Vision Group of Science and Technology (VGST)

Faculty: Ms. Jalpa Shah, Dept. of Electronics and Communication Engineering.

Our Indian diverse culture and long-standing heritage are preserved in temples, heritage buildings, scriptures, and museums. However, most of the time artworks and artifacts are kept in the uncontrolled environment and are subjected to tropical high temperatures, humidity, and light intensity. Variations in the environmental parameters affect the life and preservation of the artwork. Accurate manual measurement and monitoring of these parameters is tedious, time-consuming, unreliable and, to some degree, impossible. Therefore, continuous monitoring

and controlling of parameters such as temperature, humidity and light and taking timely preventive and corrective actions is key to preserve our culture and heritage for future generations. Furthermore,



it also helps in reducing energy consumption and remote monitoring and controlling. IoT based wireless environment monitoring and the controlling system will be one of

the ideal solutions for preserving artwork and artifacts. So far these types of monitoring and preserving works are done in the US and Europe but in India, no significant work is done or deployed across relevant places. It is required to design and develop the system for monitoring and controlling the environment for our Indian specific tropical and crowded conditions at our Temples, Ashrams, Talapatra Scriptures, Museums, Art Galleries, and Heritage Buildings. The proposed system can be deployed to monitor and manage huge complexes like National libraries, Museums, Temples under archeological departments and will also help in maintaining and preserving valuable and revered artifacts.

Faculty Recognitions & Engagement



2020 IEEE Undergraduate Teaching Award for

Dr. Rajesh Kannan Megalingam,
Director, HuT Labs

Assistant Professor, Department of Electronics & Communication Engineering, School of Engineering, Amrita Vishwa Vidyapeetham, Amritapuri campus

2020 IEEE UNDERGRADUATE TEACHING AWARD FOR AMRITA FACULTY

Dr. Rajesh Kannan Megalingam, Director, HuT (Humanitarian Technology) Labs and Assistant Professor, Department of Electronics and Communication Engineering, School of Engineering, has been awarded the 2020 IEEE Undergraduate

Teaching Award for his exemplary role in encouraging undergraduate engineering students to take up research for developing innovative solutions for the society by IEEE Board of Directors. Out of 27 awards given since 1992, only two from outside

USA won this award so far. The IEEE Undergraduate Teaching Award was established by the Board of Directors in 1990 to honor teachers of electrical and electronics engineering and the related disciplines. The award consists of a bronze medal, certificate, and honorarium. In the evaluation process, the criteria considered include: excellence in teaching undergraduate students; creative development of the undergraduate curriculum; authorship of course materials for undergraduate students; involvement with undergraduate students through activities such as advising, project supervision, faculty counseling or advising for student organizations; attracting students to engineering and scientific profession and the quality of the nomination.

FACULTY PUBLICATION WINS 2019 CVET MOST CITED ARTICLE AWARD

Paper publication in CVET (Cardiovascular Engineering Technologies) co-authored by Dr. Sabarimala Manikandan from the Department of Electronics and Communication Engineering and Dr. K.P. Soman, from the Department of Computational Engineering and Networks has won the 2019 CVET Most Cited Article Award, jointly awarded by the Biomedical Engineering Society and Springer Nature. The paper



titled An Efficient R-peak Detection Based on New Nonlinear and First-Order Gaussian Differentiator

(December 2011, Volume 2, Issue 4, pp 408–425) was determined to be the most cited article to date from papers published in CVET since its inception in March 2010. This award comes with a \$1,250 cash prize and will be presented at the 2019 BMES Conference in Philadelphia, PA, October 16-19, 2019. BMES journal awards are presented in front of the entire conference assembly, in between plenary lectures.

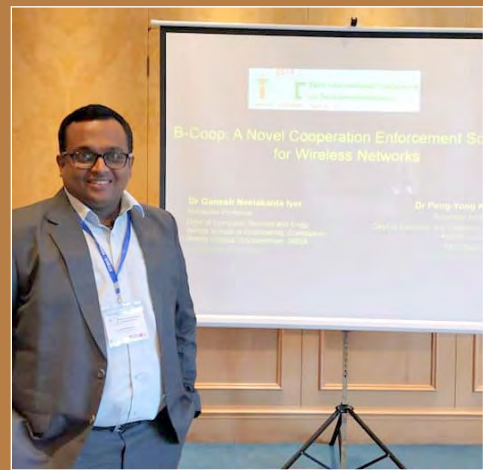
“TOP INNOVATOR AWARD” AT INTEL STUDENT AMBASSADOR AND INNOVATOR SUMMIT – 2019



Dr. Shiram K. Vasudevan, Assistant Professor, Department of Computer Science and Engineering, was awarded “Top Innovator” at Intel Student Ambassador and Innovator Summit – 2019, held at Bangalore from 13th to 15th June, 2019. Dr. Shiram was one of the top performers across Asia to be invited and the only academician among the 12 innovators who were honored in the summit. The honour, was for his contribution to the Tech community, through his projects, webinars and publications.

TUTORIAL ON GAME THEORY AT IEEE ICT 2019 CONFERENCE, VIETNAM

Dr. Ganesh Neelakanta Iyer, Associate Professor, Department of Computer Science & Engineering, delivered an invited talk tutorial on “Game Theory and its Applications in Networks and Distributed Systems” as part of the 26th IEEE International Conference on Telecommunications (ICT 2019) held at Hanoi, Vietnam. The conference saw participation of delegates from more than 40 countries. The conference had invited 5 speakers from all over the globe who were experts in Game Theory and Dr. Ganesh was the only speaker from India. He also served as the session chair for one of the sessions on “Cooperative Communications” and also presented a research paper on the application of non-cooperative games for enforcing cooperation in ad-hoc wireless networks.



AMRITA FACULTY MEMBERS ATTEND IEEE GLOBAL ENGINEERING EDUCATION CONFERENCE 2019, DUBAI



Dr. Anantha Narayanan, Assistant Professor and Dr. Shunmuga Velayutham C, Associate Professor, Department of Computer Science

Engineering, attended the IEEE Global Engineering Education Conference (IEEE EDUCON 2019), organized by American University in Dubai to present their shortlisted papers. The theme of the conference was Engineering Education through Student Engagement. Two shortlisted papers were presented. The first paper “Tinker for Engaging Learning Experience in Computational Thinking and Programming”, presented an indigenously built physical computing toolkit, Tinker, at Amrita University. The toolkit was designed to engage and enable

students from diverse background to focus on the design, problem solving and programming aspects in a fun and creative way. The Second Paper “Introductory programming using non-textual modalities - an empirical study on skill assessment using rainfall problem”, presents an analysis of programming skills of first semester undergraduate Computer Science & Engineering students using Rainfall programming problem. Both papers addressed an important aspect of pedagogical changes absolutely needed in the Indian higher education system.

DR.UDAYA BHASKAR
PRESENTS PAPERS AT,
JTACC CONFERENCE AT
BUDAPEST



Dr. Udaya Bhaskar Reddy Ragula, from Department of Chemical Engineering and Materials Science presented two papers at 50th Anniversary Journal of Thermal Analysis and Calorimetry Conference held at Budapest, Hungary during June 18-21, 2019. Out of 456 oral presentations and 320 poster presentations, only 8 were from India. The paper titled “Catalytic and Non-Catalytic Pyrolysis of Nerium Oleander” was co-authored with Ms. Sindhu Subramanian, Assistant Professor, Department of Chemical Engineering and Materials Science and the other titled “Efficiency Improvement in Solar Cogeneration using Microchannel Heat Exchangers”, was co-authored with Dr. Sriram Devenathan, Professor, Department of Chemical Engineering and Materials Science. The papers offered insight into critical challenges such as new kinetic models for Biomass Pyrolysis and efficiency improvement in compact heat exchanges.

Workshop & CONFERENCES



INDO-FRENCH SUMMER CAMP ON TECHNOLOGY & CULTURE

A two-week Indo-French Summer Camp on Technology & Culture was held at Coimbatore Campus. The camp was organized jointly by the Department of Mechanical Engineering & Computer Science and Engineering as an immersion program intended to understand the deep rooted Indian values besides getting a peek into the Technology developments in India. Eight Students from Grenoble Institute of Engineering, France participated in the program. Students visited a host of Industries which included Robert Bosch Engineering & Business Solutions, Elgi foundry division, and Roots Industries in Coimbatore & Capegemini and Schneider Electric at Bangalore. The Industry visits provided an overview of advanced Research and Field testing facilities that are available in India. In addition students got a glimpse of work culture in India. They also attended a workshop on IoT, where they had the opportunity to work with Arduino modules as teams. The French students along with their Indian counterparts visited various cultural heritage venues, Temples and villages and also participated in Yoga Sessions to get a feel for the cultural wealth and values of India. The workshop is expected to add more such immersion programs and also encourage international students to opt for semester abroad programs at Amrita.

NATIONAL LEVEL FACULTY DEVELOPMENT PROGRAM ON DEEP LEARNING UNFOLDED

The Department of Computer Science and Department of Mathematics, at Amritapuri campus, conducted a five day national level Faculty Development Program on “Deep Learning Unfolded” from May 27-31, 2019. Dr. Deepak Mishra from IIST Thiruvananthapuram was the chief guest for the event. The FDP aimed to train the participants in the field of deep learning. The workshop, through hands-on learning enabled the academicians and research scholars to develop their skills in the cutting edge technology of deep learning and its applications in various fields of science and technology.



WORKSHOP ON IOT AND DRONES FOR BEGINNERS



A workshop on IoT and Drones was conducted by the leadingindia.ai at School of Engineering, Coimbatore campus, from March 16 - 17, 2019. The resource persons for the workshop were Dr. Gaurav Singhal and Mr. Teja Lal from

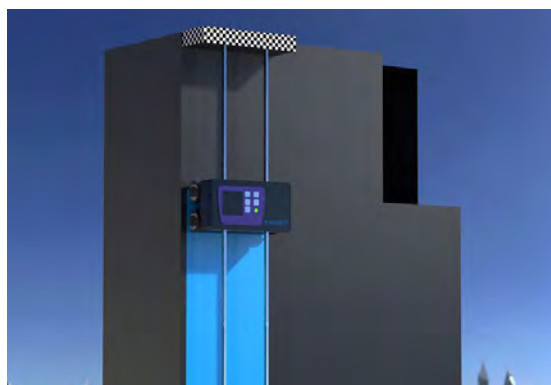
Bennett University. The two day workshop covered the foundations of IoT and encouraged the students to come out with project ideas. Two of the teams among the participants won an appreciation prize for their project idea. The sessions were very

interactive and students could work on Arduino boards. They also had a demonstration of Raspberry Pi and drones capturing aerial photos of the participants.

Student Achievements

STUDENTS DEVELOP A PATENTED WALL PAINTING ROBOT

Student team from School of Engineering, Amritapuri Campus, developed a patented wall painting robot, named “WallpBot”, that ascends tall walls upon which gets mounted independently and paints the surface simultaneously, without compromising the finish. The students, Harikrishnan J., Aravind Sadashiv, Allen Peter John and Arya Sudarsan, were mentored by Dr. Purushothaman, Vice Chairperson, Department of Electronics and Communication Engineering. The



idea was to create the simplest possible solution to paint tall walls and save human counterparts from health hazards and painting

accidents. The Phase 1 prototype was successfully built and tested. The “WallpBot” has also been filed as a patent.



STUDENTS WIN “BEST PAPER RUNNER-UP AWARD” AT 17TH INTERNATIONAL SYMPOSIUM, W2GIS 2019, KYOTO, JAPAN

The students from the Department of Computer Science and Engineering, Coimbatore Campus along with Dr. Vidhya Balasubramanian, Professor, Department of Computer Science and Engineering won “Best Paper Runner-up Award” for their paper titled “A Dynamic Weighted Trilateration Algorithm for Indoor Localization using Dual-band WiFi” at

the 17th International Symposium on Web & Wireless Geographical Information Systems, held at Kyoto, Japan, from May 16-17, 2019. The students, Mathivannan S., Srinath S., Shashank R., Aravindh R, worked on developing a calibration free WiFi based indoor localization algorithm under the mentorship of Dr. Vidhya Balasubramanian. This algorithm makes indoor localization more practical and robust to implement with minimum infrastructure cost and computational overhead. The student team was the only undergraduate team participating in the symposium.



TEAM EMERGED AS 'RUNNER UP' IN NTIRE 2019-CHALLENGE ON IMAGE COLORIZATION

Mr. Jameer Babu, final year B.Tech student from the Department of Computer Science and Engineering and Dr. Athi Narayanana S, Assistant Professor, Department of Computer Science and Engineering from Amritapuri Campus as a team have emerged as 'Runner Up' of NTIRE 2019, (New Trends in Image Restoration and Enhancement workshop) - Challenge on Image Colorization for achieving best perceptual and objective quality. The challenge was held in conjunction with IEEE International

Conference on Computer Vision and Pattern Recognition (CVPR), during June 2019. In this year's CVPR-NITRE competition, the challenge on image colorization was to gauge and push state-of-the-art image colorization and to compare different solutions. The team directly adopted the colorization network to attend the no-guidance track and the IEEE report indicated that the team's work outperformed in perceptual quality the results generated by some other algorithms which have much higher PSNR index.

STUDENT WINS FIRST PRIZE AT MIT ROBOCON 2019



Mr. Ruthvik Chanda of Humanitarian Technology (HuT) Labs of the Department of Electronics and Communication Engineering (ECE), School of Engineering, Amritapuri campus, won first prize at Robocon 2019, a highly recognized international robotic competition, held at Massachusetts Institute of Technology (MIT), Boston, USA, from July 29 to August 9, 2019. This is the 30th edition of

the RoboCon International Design Contest (IDC). The final year student team consisting of Deepak N., Phanindra Kumar A., Raviteja G. and Ruthvik C., from Humanitarian Technology (HuT) Labs, got the opportunity to take part in this global competition. The competition was by invitation only and extended to top universities of 15 countries which included Japan, Singapore, China, South Korea, France, Brazil, Mexico, India, etc. This year, students from 11 countries took part in the competition. Mr. Ruthvik's team won the first prize and Mr. Raviteja's team reached the semi finals.



STUDENTS TO ATTEND FINALS OF HACK HARVARD GLOBAL HACKATHON

B.Tech students J. Anudeep, Kowshik G. from Department of Electronics and Communication Engineering, Coimbatore and Dr. Shriram K. Vasudevan, Assistant Professor of the Department of Computer Science and Engineering, School of Engineering, Coimbatore campus, have been shortlisted for the finals of Hack Harvard Global Hackathon. The Hackathon is a 6-month long contest that challenges students to use technology to identify problems within their local communities and develop potential solutions to these problems. The competition has three tracks and for the final round, the team is invited to present the product at Harvard University on October 18, 2019. The students are extremely excited to be part of the final round at HackHarvard Global Hackathon.



STUDENT TEAMS ACE CISCO THINGQBATOR PROGRAM

Three teams from the School of Engineering, Coimbatore campus made it to the Top 15 in the CISCO ThinQubator program. Cisco ThingQbator is a prestigious IoT makerspace community program for universities to accelerate innovation and entrepreneurship among the student community. This program is supported by NASSCOM foundation, Project DEFY and Li2 Technologies. The teams from Amrita were felicitated by Mr. Vishwanathan Iyer, Vice-President, Cisco, in a colorful ceremony held at Cisco's Bangalore campus on July 2, 2019.

Team SAK developed a prototype smart glove that provides directions which eliminates the need to check the phone GPS while riding a bike. The team from Department of Computer Science and Engineering were Juluru Anudeep, Gudimetla, Kowshik, Chennuru Vineeth and Priyamvada Mahesh and were mentored by Dr. K. V. Shriram, Assistant Professor, Department of Computer Science and Engineering. Team Bend developed a prototype Virtual Reality (VR) game which responds to the motion of the human user in such a way that it becomes an exercise to reduce lower back

pain. The team from Department of Computer Science and Engineering Kishore Ramesh, Nehal Ram Surya B., Mohan Karthik V. and Ragul Pand were mentored by Prof. Prashant R. Nair, Department of Computer Science and Engineering. Team Vindicators were their own mentors and they developed an application to prevent crimes and thefts in ATMs using Artificial Intelligence (AI). The team members were Prashanth Saravanan, Aditya Shanmugham and S. K. Hariesh, from B.Tech. Electronics & Communication Engineering and Sharan Vishnu from B. Tech. Mechanical Engineering.

TEAM BIOS FINISHES AS FIRST RUNNER UP IN ISITDTU CTF, VIETNAM

Team bios of Amrita School of Engineering, Amritapuri Campus, was invited to play the onsite CTF at Duy Tan University, Vietnam, among 6 international CTF teams and 5 Vietnamese teams, after finishing the first worldwide in the qualifying round. The grand finale was scheduled on August 17, 2019, where the team finished as the first runner up. Members of the team were from Pre-final student from the Department of Computer Science and Engineering and comprised of Tarunkant Gupta, Akul Pillai, Mahesh



Hari Sarma, S. Ashwin Shenoi and Jaswanth Bommedi. ISITDTU CTF is an international jeopardy-styled CTF conducted by Duy Tan University, Vietnam. Nearly 300 teams worldwide registered for the CTF, including the most prestigious teams who have been pioneering in the field of Cyber security and research. CTF challenges

simulate real world cyber security threats in the form of challenges so that the players would be well aware of how the world is progressing in the field of Cyber Security. It consists of challenges from various fields such as Reverse Engineering, Binary Exploitation, Cryptography, Web and Forensics.



STUDENTS WIN 5TH PLACE AT THE FORMULA HYBRID COMPETITION, USA

Team "Asta Racing" of School of Engineering, Amritapuri campus won the 5th place at the Formula Hybrid Competition held at New Hampshire Motor Speedway, Loudon, NH, USA, from April 29 to May 2, 2019. The team consisted of students from the Departments of Electrical and Electronics Engineering and Mechanical Engineering. "Asta Racing" is one of the three teams from India participating in the electric only category in the Formula Hybrid competition. Comprising of 35 members, the goal was to

develop the ideal pure electric vehicle. Since the conventional IC engine is one of the main causes of pollution in transportation sector, the team decided to promote and develop environmental-friendly all electric vehicles by participating in the competition with the sustainable designs and manufacturing practices. The Formula Hybrid Competition is an interdisciplinary design and engineering challenge for undergraduate and graduate university students. Students design and manufacture a formula student

racing car and compete in a series of events. This educational competition emphasizes drivetrain innovation and fuel efficiency in a high-performance application. Founded and run by the Thayer School of Engineering at Dartmouth since 2006, Formula Hybrid takes place each spring at the New Hampshire Motor Speedway in Loudon, NH. The competition is part of the Society of Automotive Engineers (SAE) Collegiate Design Series and is regarded as the most complex and dynamic of the series.

Amrita Students Qualify for the **European Mars Rover Challenge**

September 14 -16, 2018
Starachowice, Poland

STUDENT SECURE EMPLOYMENT WITH HIGHEST COMPENSATION



Four Students who attended Summer Internships at **MICROSOFT** for summer internship, got conversion to Full-Time Employment, with an annual compensation of **Rs. 43.33 Lakhs**. This is the highest salary received so far by Amrita students in India.

Seven Students have secured Full-Time Employment with **AMAZON**, with an offer of **Rs.28 Lakhs** per annum.

Eighteen Computer Science students have secured Full-Time Employment with **CISCO** with an annual compensation package of **Rs. 29.18 lakhs**.

STUDENT TEAM SELECTED FOR EUROPEAN ROVER CHALLENGE 2019, POLAND

The team, ASTRA, of School of Engineering, was selected for the final round of the European Rover Challenge Competition 2019, organized by the European Space Foundation, Kielce University of Technology, "Starachowice" Special Economic Zone, Marshal of Swietokrzyskie voivodeship and Mars Society Polska, from September 13-15, 2019, in Kielce, Poland. This is the fourth time Amrita students have been selected to participate in the World Rover Challenge competition. Out of 85 teams from the world, 40 teams were selected for the final round. The team named "ASTRA" had an Interdisciplinary team of B.Tech students comprising, Sreekanth N, Pranav V. K, Kaarthik S. Kumar, Navneeth S, Nitheesh Kumar G, Aravind, Koushik and Rahul from Department of Mechanical Engineering, Virinchi Tirumaladass, Prabhat Gouda, Dinesh Reddy, Indira Basumatary, Mythresh and Yeshwant from the Department of Electronics and Communication Engineering, Abhishek Dinesan, Dheeraj, Sindhuja, Dhanush and Jishnu Ganesh from Department of Computer Science and Engineering and Gokul Pillai from Department of Electrical and Electronics Engineering.

Societal Outreach



AMRITA CENTRE FOR SUSTAINABLE FUTURE AS ENVIS RESOURCE PARTNER

The Ministry of Environment and Forestry and climate change (MOEFCC) has sanctioned an ENVIS (Environmental Information System) Centre to disseminate scientific, technical and semi-technical information on various issues related to biological invasion (Invasive Alien Species) and conduct related research and extension activities. MOEFCC, has recognized Centre for Sustainable future at Amrita Vishwa Vidyapeetham as ENVIS Resource Partner on the theme Invasive alien Species. ENVIS network has been designed as the National Focal Point (NFP) for INFOTERRA, a global environmental information network of the United Nations Environment Programme (UNEP). Amrita is now part of the elite league ENVIS Resource partners of MOEFCC that include most of prestigious institutes.

AMRITA LIVE-IN-LABS® WINS 'INNOVATION BY PRIVATE UNIVERSITY' AWARD AT 14TH WORLD EDUCATION SUMMIT



The Amrita Live-in-Labs® program has won the “Innovation by Private University” award at the 14th World Education Summit, organized by Elets at New Delhi from August 9-10, 2019.

Managed by Amrita Center for International Programs (ACIP), the Amrita Live-in-Labs® program aims to expose youth to problems faced by rural communities in India. Through experiential learning opportunities, participants put theory into practice by generating innovative solutions, thereby facilitating critical and collaborative problem-solving abilities of participants. The Live-in-Labs programs is an optional elective for the Undergraduate program under Faculty of Engineering. The World Education Summit (WES) Awards by Elets aims to identify and acknowledge those individuals, educational institutions, and edu-tech corporate/start-ups that have transformed teaching, learning, and employability outcomes.

Parvathy S.S, Sharma A.K, Anand K.B; Comparitive study on synthesis and properties of geopolymer fine aggregate from fly ashes; Journal of Construction and Building Materials, Volume 198, Pages 359-367, DOI: 10.1016/j.conbuildmat.2018.11.231.

Nandanwar M., Kumar.S; A modelling and simulation study of soluble lead redox flow battery: Effect of presence of free convection on the battery characteristics; Journal of Power Sources; Pages 536-544, DOI: 10.1016/j.jpowsour.2018.11.070.

Rasana N.,Jayanarayanan K, Deeraj B.D.S,Joseph.J; The thermal degradation and dynamic mechanical properties modeling of MWCNT/glass fiber multiscale filler reinforced polypropylene composite; Journal of Composites Science and Technology;Volume 169, Pages 249-259; DOI: 10.1016/j.compscitech.2018.11.027.

Sathyan D.,Anand K.B; Influence of super plasticizer family on the durability characteristics of fly ash incorporated cement concrete, Journal of Construction and Building Materials, Volume 204, Pages 864-874; DOI: 10.1016/j.conbuildmat.2019.01.171.

Hari.R., Mini K.M.; Mechanical and durability properties of sisal-Nylon 6 hybrid fibre reinforced high strength SCC; Journal of Construction and Building Materials; Volume 204, Pages 479-491; DOI: 10.1016/j.conbuildmat.2019.01.217.

Pathak A., Pv S., Stanley J., Satheesh Babu T.G; Multicolor emitting N/S-doped carbon dots as a fluorescent probe for imaging pathogenic bacteria and human buccal epithelial cells; Journal of Microchimica Acta;Volume 186, Issue Article number 157; DOI: 10.1007/s00604-019-3270-7.

Sowmya V., Govind D., Soman K.P.; Significance of processing chrominance information for scene classification; Aritificial Intelligence Review; DOI: 10.1007/s10462-018-09678-0.

Podder A., Koo S., Lee J., Mun S., Khatun S., Kang H.-G., Bhuniya S., Kim J.S; A rhodamine based fluorescent probe validates substrate and cellular hypoxia specific NADH expression; Chemical Communications; Volume 55, Issue 4, Pages 537-540; DOI: 10.1039/c8cc08991d.

Manjusha K., Kumar M.A., Soman K.P.; On developing handwritten character image database for Malayalam language script; Engineering Science and Technology, an International Journal; DOI: 10.1039/c8cc08991d.

Jithin E.V., Dinesh K., Mohammad A., Velamati R.K.; Laminar burning velocity of n-butane/Hydrogen/Air mixtures at elevated temperatures; Energy, Pages 410-417; DOI: 10.1016/j.energy.2019.04.002.

