Greetings from Amritapuri!

At the very outset, we are extremely glad and humbled to share the tidings that Amrita Vishwa Vidyapeetham has emerged as the fourth best university in India, as per the position of the National Institutional Ranking Framework (NIRF) 2020 for Indian Universities. To sum it up, Amrita has been adjudged as one of the “Top 10 Universities in India” for the fourth consecutive year. Also in Engineering, Amrita Vishwa Vidyapeetham, has been ranked 20th best in India as per the NIRF Rankings 2020. Another recognition came with the United Nations awarding Amrita Vishwa Vidyapeetham its second UNESCO Chair - for Experiential Learning for Sustainable Innovation & Development. With this Amrita joins 700 elite educational institutions globally that share knowledge and expertise to improve and promote educational and research capabilities.

This apart, the year 2020 has been a year of utmost challenge, adversity and extraordinary work routines. The corona pandemic though initially trickled-in, quickly engulfed the nation and the world, throwing normal life into disarray and disillusionment. Suddenly regular education system was not only disrupted, it appeared forlorn. But Amrita prevailed over the trials and tribulations, by quickly switching over to and incorporating the new online system of teaching. Within a month of the lockdown, thanks to state of the art web technology, Amrita successfully adopted to the IoT scheme and made it the new normal.

Not just that, Amrita swiftly plunged into research and innovation to support the struggling front-line fraternity and patients. To cater to the severe shortage of ventilators, a low cost Amrita Ventilator was made and distributed at hospitals. A solar powered automatic non-contact Sanitizer Unit, with a capacity of 3 litres, was designed and deployed. The AI and robotics team sprang into action and came up with a series of innovations for the pandemic viz., PRABHA - the UV sanitisier robot for hospitals and public places; SELF-E 2.0 - self-driving wheelchair without the need for the operator at all; ANNAPOORNA – remotely operated robot that can reach food, water and medicine to patients in isolation wards; BODHI – outdoor surveillance and awareness robot fitted with 360 degrees camera, powerful speaker – useful for Police & Security personnel; and the super safe Tele-Operated Wheelchair with negative pressure isolation hood that is remotely controlled and fully secures the patient from contaminating the surroundings.

Students also chipped in their bite. The students team ‘Health-Heroes’ won a prize for building a Java-based mobile application that aims to completely eliminate the use of physical paperwork in hospitals, pharmacies, and clinics, shifting the process into a digital format to ensure minimal physical contact.

Meanwhile on the academic front, despite the challenges caused by the pandemic, many students were selected by various universities in Europe and the USA for their final semester project or coursework, facilitated by the Center for International Programs. Students traversed to foreign shores like The Technical University of Munich in Germany, Halmstad University in Sweden, Darmstadt University of Applied Sciences in Germany, Aalto University in Finland, Grenoble University in France, Politechnico Di Milano in Italy, University of Twente in Netherlands, University of New Mexico in the USA, and various UPC Schools in Spain such as ETSEIB, ESEIAAT, and EEBE. In the fall semester of July 2020, Amrita students attended Integrated Programs and Dual Degree Programs and travelled to partner universities such as University of California Irvine, the US, Ecole Centrale Nantes, in France, KTH Royal University of Technology, in Sweden, Oakland University in Michigan, USA, University of L’Aquila, in Italy, Vrije University, in Netherlands.

There was no dearth in student's achievements, though most events were online interactions. Students were invited as speakers, contestants, interns, programmers, delegates by foreign universities, research houses, international organisations, forums, conferences and workshops and won many laurels. Meanwhile Students got placed in many blue-chip institutions with the top placement being as good as 30 lakhs per annum. Considerable students were also placed in the above 25 lakhs bracket and many more in the above 10 lakhs slot.

Amrita is committed to strive and explore new frontiers in education and provide sustainable solutions through innovation to help not only academia, but the common man transcends the challenges of these unprecedented times!
Student Achievements

National Events


2. Varun Nair of MCA 2019, a member of team bi0s, won the first place with a score of 6270 points and secured a cash prize of Rupees One lakh and vouchers from TCM Security Academy. The event was held on 31st October from 12 pm to 10 pm. The Competition was live for 10 hours.


8. Sashmita Raghav, [B.Tech, AIE (2019-2023)] successfully delivered a technical session at the event, “conf.kde.in”, held at Maharaja Agrasen Institute of Technology, Delhi, from 19th-21st January 2020, with both travel and stay expenses sponsored by KDE.


17. Meenakshi S L of 2018-2022 CSZE batch, participated with two other members in a two days training workshop, for ‘VeriCrypt’ which was a pre-conference workshop organised as part of the Indocrypt 2020, the 21st International Conference of Cryptology in India.

18. Meenakshi S L of 2018-2022 CSE batch, won a four-week Machine Learning Training for being a Round 1 qualifier. She was placed in top 750 in Round 2 of the Olympiad. The National Engineering Olympiad, is an educational organization popularizing aptitude, competition and assisting the development of competitive spirit among young engineers in India.

19. Harihara Krishnamoorthy of 2017-2021 CSE Batch, participated in “Google Research India AI Summer School 2020”, conducted by Google Research India from 20th to 22nd August 2020.


21. Harsha Deepa of S6 BCA was selected by WiCys (Women in Cybersecurity Global) to do a remote internship as a security engineering intern with Mosse Cybersecurity Institute. This was a remote internship and mostly focused on Penetrating Testing/Red Teaming/Threat Hunting/Secure Coding and using Industry-level frameworks.

23. Meenakshi S L, of 2018-2022 CSE batch, was an invited speaker to the special quarantine edition of 2020 on 3rd October for WinjaTalks, where she talked about the world of cryptography and CTFs under the title, “CTFs, Codes and Ciphers”.

24. Abhishek S of S6 BCA was invited for a Panel discussion on topic “Capture the Flag to Secure Career” conducted by Kerala Police (Cyber Cell) on 16th September 2020.

International Events

1. Abhishek S., S5, BCA was awarded Nullcon Training Scholarship by Crowdfense, Middle east

2. Abhishek S., and Harsha Deepa, S5, BCA received CEH Practical Exam Scholarship by EC Council.

3. Gopa Vasanth [B.Tech, CSE (2017-2021)] was invited for the “Wikimedia Annual Developer Summit 2020” at Tirana, Albania which was fully-funded by organisers held from May 9th - 11th, 2020.
4. Shruti Dixit, Nimisha Dughlaya both of [B.Tech, CSE (2017-2021)], participated in “NullCon Security Conference 19 / WinjaCTF”, and as part of group event, won the 1st place in Winja CTF with SANS Scholarship worth $14,800, held on 06th-07th, March 2020.

5. Vishnu Dev T.J., and Akul Pillai, both of [B.Tech, CSE (2017-2021)] participated in Byte Bandits CTF 2020, and won the 2nd place in it held on 11th April 2020.

6. Shashank Priyadrshi, [B.Tech, AIE (2019-2023)] participated in the online Hachathon organized by Github, Devfolio and Matic, in which he developed an android app for Hospital Authorities to manage their patients during this pandemic of Covid19, during the period 11th to 19th April, 2020.


8. Yash Khare of 2018-2022 CSE Batch, was selected for Major League Hacking Fellowship, Fall 2020 batch, which was completely held online from 21st September 2020, till 14th December 2020.

9. Meenakshi SL, Sandhra Bino and Gopika S were selected for the challenge phase of the summer school “Indian Dutch Cybersecurity Summer School 2020”.

10. Anjali Manoj, Aravind H, Gopika H, Naveen P Nair and Vivek A of 2018-2022 CSE Batch, participated in the event “NASA International Space Apps Challenge” on 4th October 2020 and were selected as Global Nominee, organized by NASA.


13. Swathi Kasikala of 2018-2022 CSE batch completed internship at Mastodon, where she worked with WriteMind, a social media platform, built using ruby, for educational institutions on Mastodon.

14. Sevagan Veerasamy of 2018-2022 CSE batch, completed an internship at Cometchat, a platform that enables developers to add voice, video & text chat to their apps & websites.

15. Abhijit Ramesh, T Vishwaak Chandran, Puneeth Chanda and Yash Khare of 2018-2022 CSE Batch, participated in AI Summer School 2020 that was held by AI Singapore, that began on 8th August 2020.

16. Bhanu Prakash, Gopa Vasanth of 2017-2021 CSE Batch, completed “AI Summer School workshop” which was a fully funded programme, conducted by AI Singapore, from 3rd to 7th August, 2020.

17. Bhanu Prakash of 2017-2021 CSE Batch participated in “Microsoft Learn Student Ambassador” and became the first student Ambassador for the event conducted on 1st August 2020.
18. Meenakshi S L and Sandhra Bino of 2018-2022 CSE Batch participated as speakers in the CTF village track for Diana Initiative, where they introduced the world of CTFs and diversity in the field in their talk titled “Levelling up the Estrogen in the Cyber World”.


20. Ayushi Sharma of 2017-2021 CSE Batch participated in Google Summer of Code 2019 with NetBSD Foundation, from April 2020 to August 2020, as a Student Developer, and was awarded $3000 + Certificate + Swags as a prize.


22. Rishab Mudliar of 2019-2023 AI Batch participated in the event “Lights, Camera, Hacktion” conducted by MLH in October 2020 and secured sponsor prize.


25. Sashmita Raghav was invited as speaker for the event Akademy 2020 conducted by KDE from 9th to 11th September 2020.


28. Harsha Deepa of S6, BCA is a recipient of “Security Training Scholarship” by WiCyS made possible by Google and SANS, on August 16, 2020.

29. Harsha Deepa of S6, BCA was listed in the Microsoft Hall of Fame.

Departmental Activities

1. Department of Computer Science, Amritapuri Campus organised a webinar titled “Data Science Demystified” by Associate Professor Dr Vivek Menon on 26th June as part of a Free Webinar Series. The talk provided a comprehensive overview of data science as well as discussed the
trends, opportunities, and key skills needed in the data science job market.

2. Dr Swaminathan J presented a Webinar titled “Conducting Research: Do’s and Don’ts” to the research scholars of Amrita School of Engineering on Nov 12, 2020. In the talk, Dr Swaminathan shared his experience on various aspects of research such as choosing a research topic, nature of interaction with the thesis advisor, literature survey, importance of writing / note-taking, presenting the research to the audience and more.

3. The Department of Computer Science started a new program BCA – Data Science starting from the academic year 2020 with an intake of 53 students.

Research
A consolidated total of 23 Journal publications authored by Faculty, Research Scholars and PG & UG Students were published in leading journals in the year 2020.

Journal Paper Publication
Research Publications

National / International Journals.
(Students: UG & PG)


Projects approved and grants

1. Name of Project: Roll out of online labs (Olabs) for schools.

Name of PI: Dr Prema, Amrita CREATE and Dept. of Computer Science and Engineering.
Sanctioned Agency: Ministry of Electronics and Information Technology, E Learning division.
Sanctioned Amount: 94.4 lakhs.
Received date: May 11, 2020

Name of PI: Dr Prema and Dr Geetha Amrita CREATE and Dept. of Computer Science and Engineering.
Sanctioned Agency: Ministry of Electronics and Information Technology, E Governance group.
Sanctioned Amount: 154 lakhs.
Received date: June 8, 2020.

Faculty Achievements

Invited as Chair / Resource Person

1. Ms Sandhya Harikumar, Assistant Professor, Dept. of Computer Science, delivered a webinar session titled “Interpretation of Machine Learning”, organised by TESLA (Association of Electrical and Electronics Engineers) MES Institute of Technology & Management Chathanoor on 20th September 2020.

2. Dr Jyothisha J Nair, Associate Professor, Dept. of Computer Science, chaired a Session in “International Conference on Innovations in Science and Technology for Sustainable Development” (ICIST, 2020) held at college of Engineering Perumon, Kollam on 23rd November 2020

3. Dr Jyothisha J Nair, Associate Professor, Dept. of Computer Science, delivered an invited lecture on the topic “Machine learning on Graphs” at LBS Institute of Technology for Women, Thiruvananthapuram on 9th December 2020.

Seminars/Workshops attended

1. Lekshmi S. Nair attended a FDP on Latex on 12th to 19th Aug 2020 organised by Baba Institute of Technology and Science under National Mission of Education, MHRD.

Name of PI: Dr Prema, Amrita CREATE and Dept. of Computer Science and Engineering.
Sanctioned Agency: Ministry of Electronics and Information Technology, E Learning division.
Sanctioned Amount: 94.4 lakhs.
Received date: May 11, 2020

Name of PI: Dr Prema and Dr Geetha Amrita CREATE and Dept. of Computer Science and Engineering.
Sanctioned Agency: Ministry of Electronics and Information Technology, E Governance group.
Sanctioned Amount: 154 lakhs.
Received date: June 8, 2020.

Faculty Achievements

Invited as Chair / Resource Person

1. Ms Sandhya Harikumar, Assistant Professor, Dept. of Computer Science, delivered a webinar session titled “Interpretation of Machine Learning”, organised by TESLA (Association of Electrical and Electronics Engineers) MES Institute of Technology & Management Chathanoor on 20th September 2020.

2. Dr Jyothisha J Nair, Associate Professor, Dept. of Computer Science, chaired a Session in “International Conference on Innovations in Science and Technology for Sustainable Development” (ICIST, 2020) held at college of Engineering Perumon, Kollam on 23rd November 2020

3. Dr Jyothisha J Nair, Associate Professor, Dept. of Computer Science, delivered an invited lecture on the topic “Machine learning on Graphs” at LBS Institute of Technology for Women, Thiruvananthapuram on 9th December 2020.

Seminars/Workshops attended

1. Lekshmi S. Nair attended a FDP on Latex on 12th to 19th Aug 2020 organised by Baba Institute of Technology and Science under National Mission of Education, MHRD.

Name of PI: Dr Prema, Amrita CREATE and Dept. of Computer Science and Engineering.
Sanctioned Agency: Ministry of Electronics and Information Technology, E Learning division.
Sanctioned Amount: 94.4 lakhs.
Received date: May 11, 2020

Name of PI: Dr Prema and Dr Geetha Amrita CREATE and Dept. of Computer Science and Engineering.
Sanctioned Agency: Ministry of Electronics and Information Technology, E Governance group.
Sanctioned Amount: 154 lakhs.
Received date: June 8, 2020.

Faculty Achievements

Invited as Chair / Resource Person

1. Ms Sandhya Harikumar, Assistant Professor, Dept. of Computer Science, delivered a webinar session titled “Interpretation of Machine Learning”, organised by TESLA (Association of Electrical and Electronics Engineers) MES Institute of Technology & Management Chathanoor on 20th September 2020.

2. Dr Jyothisha J Nair, Associate Professor, Dept. of Computer Science, chaired a Session in “International Conference on Innovations in Science and Technology for Sustainable Development” (ICIST, 2020) held at college of Engineering Perumon, Kollam on 23rd November 2020

3. Dr Jyothisha J Nair, Associate Professor, Dept. of Computer Science, delivered an invited lecture on the topic “Machine learning on Graphs” at LBS Institute of Technology for Women, Thiruvananthapuram on 9th December 2020.

Seminars/Workshops attended

1. Lekshmi S. Nair attended a FDP on Latex on 12th to 19th Aug 2020 organised by Baba Institute of Technology and Science under National Mission of Education, MHRD.

Name of PI: Dr Prema, Amrita CREATE and Dept. of Computer Science and Engineering.
Sanctioned Agency: Ministry of Electronics and Information Technology, E Learning division.
Sanctioned Amount: 94.4 lakhs.
Received date: May 11, 2020

Name of PI: Dr Prema and Dr Geetha Amrita CREATE and Dept. of Computer Science and Engineering.
Sanctioned Agency: Ministry of Electronics and Information Technology, E Governance group.
Sanctioned Amount: 154 lakhs.
Received date: June 8, 2020.

Faculty Achievements

Invited as Chair / Resource Person

1. Ms Sandhya Harikumar, Assistant Professor, Dept. of Computer Science, delivered a webinar session titled “Interpretation of Machine Learning”, organised by TESLA (Association of Electrical and Electronics Engineers) MES Institute of Technology & Management Chathanoor on 20th September 2020.

2. Dr Jyothisha J Nair, Associate Professor, Dept. of Computer Science, chaired a Session in “International Conference on Innovations in Science and Technology for Sustainable Development” (ICIST, 2020) held at college of Engineering Perumon, Kollam on 23rd November 2020

3. Dr Jyothisha J Nair, Associate Professor, Dept. of Computer Science, delivered an invited lecture on the topic “Machine learning on Graphs” at LBS Institute of Technology for Women, Thiruvananthapuram on 9th December 2020.

Seminars/Workshops attended

1. Lekshmi S. Nair attended a FDP on Latex on 12th to 19th Aug 2020 organised by Baba Institute of Technology and Science under National Mission of Education, MHRD.


4. Lekshmi S Nair attended AICTE Training and Learning (ATAL) Academy Online FDP on “Internet of Things (IoT)” from 17th to 21st October 2020 at Indian Institute of Technology Palakkad.

Placements

- 55% of MCA 2018 batch students were placed in various IT companies like IBM, Bosch etc.
- 40% of BCA 2017 batch students were placed in various IT companies like Deloitte, TCS, Wipro etc.
- B.Tech CSE 2016-2020 batch students were placed in various companies like, Rippling, Cisco, Amazon etc. The students placed with highest package are as below.

<table>
<thead>
<tr>
<th>Register Number</th>
<th>Name</th>
<th>Company Details</th>
<th>Package Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM.EN.U4CSE16241</td>
<td>Mohit Hooda</td>
<td>Cisco</td>
<td>29.2 Lakhs Per Annum</td>
</tr>
<tr>
<td>AM.EN.U4CSE16506</td>
<td>Machiraju Srivasthhasa Srinivas</td>
<td>Cisco</td>
<td>29 Lakhs Per Annum</td>
</tr>
<tr>
<td>AM.EN.H4CSE16001</td>
<td>Aswin A</td>
<td>Cisco</td>
<td>29 Lakhs Per Annum</td>
</tr>
<tr>
<td>AM.EN.U4CSE16254</td>
<td>Sandesh Ghanta</td>
<td>Amazon</td>
<td>29 Lakhs Per Annum</td>
</tr>
<tr>
<td>AM.EN.U4CSE16151</td>
<td>Rahul Krishnan</td>
<td>SAP Labs</td>
<td>20 Lakhs Per Annum</td>
</tr>
<tr>
<td>AM.EN.U4CSE16136</td>
<td>Kuppili Sai Satwik</td>
<td>VMware</td>
<td>19.5 Lakhs Per Annum</td>
</tr>
<tr>
<td>AM.EN.U4CSE16051</td>
<td>Raghvendra Rao</td>
<td>Sabre</td>
<td>14 Lakhs Per Annum</td>
</tr>
<tr>
<td>AM.EN.U4CSE16501</td>
<td>Manasa D</td>
<td>Amazon</td>
<td>13.5 Lakhs Per Annum</td>
</tr>
<tr>
<td>AM.EN.U4CSE16504</td>
<td>Bedadala Prathima</td>
<td>Providence GIC</td>
<td>13 Lakhs Per Annum</td>
</tr>
<tr>
<td>AM.EN.U4CSE16153</td>
<td>Roshini S Kumar</td>
<td>Providence GIC</td>
<td>13 Lakhs Per Annum</td>
</tr>
<tr>
<td>AM.EN.U4CSE16021</td>
<td>Mokshanvitha Dasari</td>
<td>Providence GIC</td>
<td>13 Lakhs Per Annum</td>
</tr>
<tr>
<td>AM.EN.H4CSE16002</td>
<td>Mayank Pugalia</td>
<td>Rippling</td>
<td>30 Lakhs Per Annum</td>
</tr>
</tbody>
</table>

5. Dr Gopakumar attended a Faculty Development Program on “Data Sciences” from 14th to 18th December 2020 sponsored by ATAL Academy and organized by Central University Kerala.

6. Lekshmi S Nair attended AICTE Training and Learning (ATAL) Academy Online FDP on “Research Methodology” from 1st to 5th December 2020 at Indian Institute of Information Technology, Nagpur.
Students Achievements

Studies abroad.

- Shri Siva Satya Sri Ganesh Seeram (B.Tech Final year) was selected for the dual degree program (3+2 degree) offered by a collaboration of Amrita with KTH University, Sweden. As part of this, he will complete first three years at Amrita and the next two years at KTH. After five years he will be awarded a Bachelor’s degree in Engineering from Amrita and a Master’s degree from KTH.

- Shri Aravind Sadashivan, (B.Tech) was selected for the dual degree program offered by a collaboration of Amrita with KTH University, Sweden for 3+2 degree. As part of this, he will complete first three years at Amrita and the next two years at KTH. After five years he will be awarded a Bachelor’s degree in Engineering from Amrita and a Master’s degree from KTH.

- Anudeep Origanti and Prabhat Gouda both B.Tech (Final Year) have been selected for internship at Northern Illinois University (NIU).

- B.Tech pass-out student Shri Virinchi has got admission to KTH University, Sweden for MS in Nanotechnology.

- IDCSS challenge - In 2020, Saurav Panigrah of B. Tech second year got first prize in the IDCSS (Indian Dutch Cyber Security School) challenge 2020 organised by the Hague Center for Strategic Studies, Netherlands. He also got First Prize in Nullcon Hardware CTF, and third prize in Nullcon SCADA CTF 2020.

- IJCTF and Dark CTF- Hacking Challenge

In 2020, K Sridevi of B. Tech second year received two first positions in the international hacking challenge IJCTF and Dark CTF.
• K. Sridevi and Simran Kathpalia of B.Tech (ECE & EAC - II year resp.) received second prize in the event “Capture The Flag” conducted as a part of DYUKSHA’20, a national level Techno-Cultural fest organized by NSS College of Engineering, Palakkad held on 2020.

• K.Sridevi and Simran Kathpalia of B.Tech (ECE & EAC - II year resp.) got a scholarship amount of $1,095.00 to attend BlackHat USA, an International virtual conference on cyber security, BlackHat USA, held in August 2020.

• Team Abhyuday (comprising third year students G. Preethi, Dilip Vignesh, Goutham Kishore, Sai Krishna, Kavya. G and Vedha Krishna) were adjudged as 2nd Runners-up in Kerala Reboot Hackthon, August 2020. They received a prize money of Rs. 20000.


• A team of 5 final year B. Tech students - Amal Sujith, Pavan Sriram, Kannan JR, Akhila P, Gowri Nandana, qualified upto semifinals in Flipkart Grid Hackathon organized by Flipkart Inc. in July 2020.

• Govind Goel, EAC (II year) was selected as Mentor – Google Summer of Code for the period June 2020 – August 2020. Google Summer of Code is a global program focused on bringing more student developers into open source software development.

• Govind Goel, EAC (II year) was also selected as “Microsoft Learn Student Ambassador” (August 2020 – 2023). It is a global program where Student Ambassadors get access to unique resources to Microsoft Services such as Microsoft Teams and a Microsoft 365 account, and cloud credits so that they can encourage peers to learn, share and grow together in tech.

• Ajay Prabhakar, B.Tech (III year) was a Runner up in IEEE hackathon in the final round in GovTechThon 2020, a virtual hackathon organized by IEEE in collaboration with National Informatics Centre, MeitY, Gol and Oracle from 30th October 2020 to 1st November 2020.

• A team constituting 4 final year B.Tech students - Amal Sujith, Pavan Sriram, Akhila P, Gowri Nandana qualified upto 3rd round for Smart India Hackathon organized by Central Government in August 2020.

• Vedha Krishnan, ECE (III year) has been awarded the title of “Devangers” by Facebook Developers Circle, Hyderabad in Dec 2020 for his active technical contribution to the community.

• Anand S., B.Tech (final year) qualified for the second level (criteria-top 15 percentile) and was placed AIR 55 in the National Engineering Olympiad 3.0 conducted in 2020.

• The project titled, “Tele-operated wheelchair with negative pressure isolation hood” submitted to IEEE Humanitarian Activities Committee (HAC) and Special Interest Group in Humanitarian Technologies (SIGHT) as part of call for COVID-19 proposals, got approved for a funding of USD 4000. This is the first Tele-Operated Wheelchair with Negative Pressure Isolation Hood to carry COVID patients, in India.

The students involved in this work are all 2020 pass out B.Tech students comprising Raviteja Geesala, Ruthvik Chanda, Deepak and Ravi Kiran (S8 ECE)
• **Indy Autonomous Challenge (IAC)** - Team Na-Sarathy comprising a group of 2nd, 3rd and final year B.Tech ECE students, ranked # 2 in world ranking for *Indy Autonomous Challenge (IAC) Social Medial Challenge* in October 2020. Na-Sarathy is one of the two teams only to qualify from India out of 36 teams that qualified worldwide. •

*Medical Robotics for Contagious Diseases Challenge 2020.*

**NEPHO** - A Tele-operated Wheelchair with Negative Isolation Hood, a project by B.Tech ECE students won the runner-up prize at the Medical Robotics For Contagious Diseases Challenge 2020, organized by UKRAS Network, UK Robotics and Autonomous Systems (RAS) Network based in United Kingdom. The project was designed to transport COVID patients safely and to avoid spreading of virus in the environment. The project was funded by IEEE SIGHT. This unique challenge attracted 21 entries from 13 countries – Bangladesh, China, Colombia, Germany, India, Indonesia, Iran, Israel, Mexico, Pakistan, Uganda, UK and USA – and the winners were decided, from a shortlist of 17 exceptional submissions, by a prestigious judging panel, including Prof. Lord Darzi of Denham, Co-Director of IGH, Professor of Surgery at Imperial College London, UK; Simon Di Maio, Director, Research at Intuitive Surgical, California, USA;

• Team Na-Sarathy were also placed 12th in world ranking in the Hackathon 2 of Indy Autonomous Challenge (IAC), organized by Energy Systems Network (ESN) and the Indianapolis Motor Speedway (IMS). A total of 30 teams picked from top universities, all over the world, participated in this Hackathon. Only two teams from India were selected for the event. The hackathon was held for a week from September 12th – 19th, 2020.

**Student Team Members in Na-Sarathy:**

S8 ECE: Nikhil Chowdary, Jahnavi Yannam, Raviteja Geesala, Rohith Raj RV, Manaswini Motheram, Akhil Masetti, Akhil Tammana, Ravi Kiran Pasumarthi

S6 ECE: Santosh Tantravani, Hemanth Tammana, Nagasai Thokala, Sreevatsava Reddy Musani, Rahul Puram, Naveen Samudrala, Hemanth Nidamanuru, Lokesh Gadde, Rohit Inti

S4 ECE: Avinash Hegde Kota, Vijaya Krishna Tejaswi P, Vineeth prithvi Darla, Chaitanya N, Anirudh Dasari, Sriram Chowdary, Muneeesh Puligundla.
Prof. Russell H. Taylor, John C. Malone, Professor at John's Hopkins University, USA; and Dr. Thomas Neff, Manager Software Medical Robotics at KUKA Deutschland.

Prakhar Agrawal B.Tech (II Year) participated in Round 1 of National Engineering Olympiad 3.0 with the NEO foundation held from 24TH to 28th April 2020.

Prakhar Agrawal secured 3rd prize in SCADA CTF - NULLCON competition held at Nullcon International Security Conference, Goa in March 2020, He is an active member of BIOS team at Amrita University, Amritapuri.

Team Abhyudaya comprising third year students G. Preethi, Dilip Vignesh, Gowtham Kishore, Sai Krishna, Kayya.

G and VedhaKrishna finished as 2nd Runner-up in Kerala Re boot Hackthon, August 2020. They were awarded a cash prize money of Rs. 20000.

Three student project entries were selected into the semi-finals of the CISCO Global Problem Solver Challenge 2020. From a pool of more than 500 submissions all over the world, only 49 entries got selected for the semi-finals and three amongst these are from HuT lab, ECE Department. Third year and final year B. Tech students are involved in this project.

1. Amaran: Unmanned Robotic Coconut Tree Climber and Harvester
   Team: Avinash Hegde (S5 ECE) and Vijaya Krishna Tejaswi (S5 ECE)
2. Karachara: Hand Orthotic Device for Stroke Patients
   Team: Sai Muneesh (S5 ECE) and Sri Ram (S5 ECE)
   Team: Samudrala Naveen (S7 ECE) and Sreevatsava Reddy (S7 ECE)

AMS Best Project Award
Every year AMS, Bangalore has been giving Best Project Award to M. Tech students. This time the award was given to Malavika RK and Vishnu K of 2020 pass out batch.

Research
Projects during Covid period
Robotic projects from ECE HuT Labs during Covid period.

ANNAPOORNA: This remotely operated robot using WiFi can reach food, water and medicine to patients in isolated wards. It also has tele-medicine facility and enables patients in isolated wards to interact with doctors/nurses remotely. Will be very useful for front line workers who supply food,
water and medicine to the patients during pandemic/epidemic in hospitals.

**PRABHA:** Fitted with a siren for safety when operated, the mobile robot uses Bluetooth for remote control. The UV lamps can be switched on/off remotely. Can disinfect a room of 12x12 feet in less than an hour. It can be used to disinfect patient rooms, rest rooms, medical equipment etc.

**BODHI:** Police/security personnel can use as outdoor surveillance and awareness robot on the streets, during shutdown/curfew in a situation like COVID or any pandemic or epidemic. Fitted with 360 degrees' camera, and powerful speaker, it can be remotely operated using Wi-Fi. It can be used in containment areas on streets where even police/security personnel can't access. Police/security personnel can play recorded messages or even give live instructions from the control station.

**MARUTI:** The operator/caretaker using a Bluetooth application which can be installed in any smartphone or using a wireless joystick controller can operate the wheelchair at a safe distance of 1m up to 4m. Patients in isolation wards can be transported without the need for the operator to touch the wheelchair or the patients.

**Self-E 2.0:** With the self-driving wheelchair, Self-E 2.0, patients in isolation wards can be transported without the need for the operator. With the help of maps created for each floor of the hospital, the wheelchair can operate in various floors, autonomously.

Both Prabha, the UV disinfectant robot and Self-E, the self-driving wheelchair are successfully deployed at Amrita Institute of Medical Sciences (AIMS), Kochi.

**Patent**
- The project “Method and Apparatus for Wireless Network-Based Control of a Robotic Machine” gained US patent with the patent number US20190069483.
  - Inventor- Dr Rajesh Kannan M

**Project funding**
- Two projects from ECE received recognition and funding of USD 1,300 each from IEEE Standards Education Committee (SEC). The students involved in this work are all B.Tech (S8, ECE) students and are a part of ECE HuT labs.
  1. ROS Package for Mapping with a self-driving wheelchair following the standard for map data

2. Tele-operated control of Search and Rescue (SAR) robot with 802.11 standards using HDL. Team: Raviteja Geesala, Ruthvik Chanda and Ravi Kiran (S8 ECE)

Pic: Students involved in the funded project

- Project Funding (SERB)
  Project, Shape optimization of optical structures received approval and funding for an amount Rs. 28,72,500 by Science & Engineering Research Board (SERB), India. The Principal Investigator is Dr Viswas S Nair and the duration of the project is 2 years.

- The project titled, “Tele-operated wheelchair with negative pressure isolation hood” submitted to IEEE Humanitarian Activities Committee (HAC) and Special Interest Group in Humanitarian Technologies (SIGHT) as part of call for COVID-19 proposals, received recognition and approval for a funding of USD 4000.

The students involved are all B. Tech (S8, ECE) namely Raviteja Geesala, Ruthvik Chanda and Ravi Kiran (S8 ECE)

This is the first Tele-operated Wheelchair with Negative Pressure Isolation Hood to carry COVID patients, in India.

COVID patients can be seated on the wheelchair covered by the negative pressure isolation hood and the operator/caretaker can use the teleoperation control method and operate the wheelchair from a safe distance of up to 4 meters without the need to touch the wheelchair. The negative pressure isolation hood using a HEPA filter was developed and integrated into this powered wheelchair. The negative pressure isolation not only prevents the spread of pathogenic microorganisms but also permits rapid and flexible isolation transport. The air discharged from ventilation is through HEPA filters and is purified to ensure no harmful pathogens are spreading out.

Pic: Tele-operated wheelchair

B.Tech Internships
Name | Company
---|---
Tammana Hemanth | TheMathCompany
Sai Surya Kumar | Resideo
Kavya KS | Zostel
Sridutt Shukla | Multicoreware
Mythresh Panthangi | Aptroid
Sreevatsava Reddy M | Ingersoll Rand (Trane Technologies)
Sradha D Prabhu | Resideo
Kavya KS | Multicoreware
Sradha D Prabhu | Mavericks System
Puram Hari Sudarshan Rahul | Indian Oil Corporation
Varsha Juluri | IQVIA
B Naga Sumanth | Ericsson Global
Shaik Umer Farooq | Dell Technologies
Sangisetty Karthik | Bridgei2i
Sagar Sajeev | Iqvia
Yuvaraja Reddy | Iqvia
A.V.S Suman | ISRO
Basil NJ | ISRO
E Aniruddh | ISRO
Anand S | ISRO
M.Tech Internships

<table>
<thead>
<tr>
<th>Student Name</th>
<th>Company</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anu Thomas</td>
<td>Intel</td>
<td>1 Year</td>
</tr>
<tr>
<td>Gayathri</td>
<td>Infineon</td>
<td>1 Year</td>
</tr>
<tr>
<td>Kiran</td>
<td>Nokia</td>
<td>1 Year</td>
</tr>
<tr>
<td>Sreekanth</td>
<td>Tessolve Semiconductor</td>
<td>1 Year</td>
</tr>
</tbody>
</table>

Pic: M.Tech Internship - Anu, Gayathri, Kiran, Sreenath

Faculty Achievements

IEEE Undergraduate Teaching Award 2020

Dr. Rajesh Kannan Megalingam (Director, Humanitarian Technology (HuT) Labs and Assistant Professor, received the prestigious “IEEE Undergraduate Teaching Award 2020” on October 23, 2020, from the IEEE President 2020, Dr. Toshio Fukuda in a grand event at the flagship conference of IEEE Education Society, Frontiers in Education (FIE 2020), in Sweden, held online from October 21-24, 2020. The award comprises certificate, bronze medal and USD 2000 honorarium. He also delivered a keynote address on “Undergraduate Mentoring and Research at HuT Labs, A Case Study” on the occasion.
I. Department Activities

• The Department organised a “6th Sense Robotic Workshop” as part of Vidyut, during 30th-31st January 2020. The sessions were handled by Mr. Jagmohan Meher, Engineer, SkyLabs. Around 18 B.Tech students from different branches participated in the session. The workshop trained the participants to understand Arduino Architecture, programming, develop and test a sixth sense robot.

Fig 1: 6th Sense Robotic Workshop

• A workshop on “Voice Controlled Home Automation” was organised on 30th January 2020 as part of Vidyut. The sessions were handled by Mr Meher Madhu Dharmana, Assistant Professor of EEE Department. Around 37 B.Tech students from different colleges participated in the session. The workshop trained the participants how to control home appliances from miles away with just a few taps on your mobile.

Fig 2: Voice Controlled Home Automation

• The Department developed Ambu bag based on low cost ventilator named Amrita Ventilator. The ventilator was designed and developed by Shri Akhil M.S., Shri Bharath K.R., Dr. Manacula G. Nair, Shri Unnikrishnan Pillai P., and Shri Sreenivasan M. K. of EEE Department. The Covid 19 pandemic resulted in acute shortage in PPE (Personal Protective Equipment) and emergency equipment including ventilator. To provide a helping hand to the medical fraternity and patients during this emergency, the team designed and developed a cost effective ventilator system which can provide minimum support for emergencies.

Fig 3: Amrita Ventilator

• A webinar on “Challenges in Realizing Self Driving Vehicles and Various Control Applications” was conducted by the Department of Electrical and Electronics Engineering, Amritapuri on 11th July 2020. The session was handled by Dr Gopinath Selvaraj, Senior Technical Architect of Tata Elxsi. The program was organized in virtual mode as Microsoft Teams Live event. The event was coordinated by Assistant Professors Ms Amritha S, and Dr V. Ravikumar Pandi, of EEE. The live program had around 160 participants from all over the country. The session included Autonomous driving and various levels of automation, Artificial Intelligence/Machine Learning applications, implementing challenges in perception, challenges in guidance, navigation and control systems.
and ways forward in realizing AD features of Autonomous Vehicles.

Fig 1: Webinar Poster

• Akhil M S, Laboratory Instructor of Department of Electrical and Electronics Engineering, Amrita Vishwa Vidyapeetham, Amritapuri, Kollam developed a “Solar Powered Automatic Non-Contact Sanitizer Unit”, with a capacity of 3 litres, which can be easy programmable to our needs.

Fig 2: Solar Powered Automatic Non-Contact Sanitizer Machine

• The Department organized the Induction Program of 2020 admission, M.Tech Power and Energy (Smart Grids & Electric Vehicles) and Embedded Control and Automation, on 11th September 2020.

• A three-day Skill Development Workshop was organized on 15th, 21st and 22nd October 2020. On the first day, Dr. V Ravikumar Pandi, Assistant Professor EEE, Amritapuri, conducted a session; “Introduction to Scilab and PSCAD” for M. Tech, Power & Energy, first year students. On the second day, Shri Bharath K R, Assistant Professor, EEE, Amritapuri, handled a session on “Introduction to MPLAB X IDE, Embedded C(xc8), Proteus” for both the M. Tech first year students of both; Power & Energy as well as Embedded Control & Automation. On the third day, Research scholars, Ms. Keerthi, Shri Sreeram, & Ms. Aswathy, together delivered the session, “Familiarization of MATLAB programming and simulation” for both the M. Tech first year students.

• A new consortium named ‘Research Café’, was launched on 11th November 2020, to bring all the ongoing Research and Co-Curricular Activities related to the student clubs (Renewable Energy & Electric Vehicles Club, Robotics Club, IEEE IAS SBC, IEEE PES SBC) and Research Thrust Area Groups (TAGs) functioning under the department, under a single umbrella. Ms. Seema P. N. and Shri Jishnu Sankar VC, Assistant Professor EEE were appointed the coordinators of the Research Café.


• Shri Ajay Krishnan, Power Quality Solutions Specialist, Schneider Electric, Middle East, delivered a talk on the topic, “Power Quality:
Issues, Challenges & Solutions\textsuperscript{a}, on 18th December 2020, as part of Research Café, through Microsoft teams.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{ResearchCafe.png}
\caption{Research cafe}
\end{figure}

II. Faculty Achievements

Collaborative Projects

Dr. Kanakasabapathy, Associate Professor, EEE, Amritapuri and Mr. Narayanan A.M, Senior Energy Consultant, PhD Scholar, EEE, Amritapuri, proposed a collaborative project titled, “Technology Demonstration Project on Future Electrical Distribution System with End-use Energy Efficiency Enhancement and Increasing Grid Interactive Distributed Renewable Energy Generation (REG)”. This project jointly prepared and submitted by Energy Management Centre (EMC) Kerala and Department of EEE, Amritapuri, has been accepted and approved by Bureau of Energy Efficiency (BEE), Ministry of Power, Govt of India vide BEE letter No. 20/42/SDA/AAP/2019-2020/11579 dated 05.02.2020.

III. Research Publications

Journals:

\begin{itemize}
  \item Manitha P.V., Dr. Manjula G Nair | “Fundamental Voltage Peak Detection Controller for Series Active Filters” | Electric Power Systems Research, Elsevier.
  \item VisalRaveendran, Dr.Manjula G Nair | “Power factor corrected level-1 DC public green-charging infrastructure to promote emobility in India” | IET Power Electronics.
  \item Indu V., Vinay P., Rohith N., Puneeth K., Pramod S. | “Design and development of end effector for domestic robots” | Lecture Notes in Networks and Systems.
  \item VisalRaveendran, Alvarez-Bel, Dr. Manjula G Nair, “Assessing the ancillary service potential of electric vehicles to support renewable energy integration in touristic islands: A case study from Balearic island of Menorca”, Renewable Energy.
  \item Manitha P.V, Dr. Manjula G. Nair, Thakur T, “Fundamental voltage peak detection controller for series active filters”, Electric Power Systems Research.
  \item Visal Raveendran, Dr Manjula G Nair,”Power factor corrected level-1 DC public green-charging infrastructure to promote emobility in India”, IET Power Electronics
\end{itemize}

• Manitha, P.V, Dr. Manjula G Nair, “Mitigation of voltage sags and swells in the distribution system using dynamic voltage restorer”, Lecture Notes in Electrical Engineering.


Conference:


• Pillai P.T., Sreelekshmi R.S., Dr.Manjula G Nair, “An electric powered smart velocipede for transport Newsletter 2020 | 21


**Students Achievements**

- K. J. Lokesh, S4 M.Tech (Power & Energy), was selected for internship in CSIR-CSIO, Chennai.

  ![](Fig_5_K_J_Lokesh.png)

- Aishwarya Muralidharan, S4 M.Tech (Power & Energy) was selected for internship in Vestas Technology R&D, Chennai.

  ![](Fig_6_Aishwarya_Muralidharan.png)

- Sonu Varghese, S2M. Tech, Power & Energy (Smart Grids & Electric Vehicles) was selected for internship in Volvo.

  ![](Fig_7_Sonu_Varghese.png)

- Sreehari Surendran, S2 M.Tech, Power & Energy (Smart Grids & Electric Vehicles) was selected for internship in NOKIA.

  ![](Fig_8_Sreehari_Surendran.png)

- V Gokul Pillai, final year B.Tech Student and Ms. Lekshmi R Chandran, Assistant Professor, EEE, have developed a model for diagnosis of COVID-19, based on visual data for using Deep Convolutional Neural Network (DCNN) and Computer Vision. Radio graphical changes in chest Computed Tomography (CT) images of COVID-19 is used for diagnosis using DCNN. The model is able to predict Corona infected with low risk, high risk or
Corona negative with 90.03% accuracy. Human body temperature checking along with CT scan can improve the accuracy of COVID-19 prediction.

- Ritesh Reddy, S4 EEE, won first position in Group Dance Competition at CONSTELLO 4.0, National Level Management Fest of Asia School of Business, Trivandrum on 24th January 2020.

- Team ‘Astra’, from EEE, Amritapuri got selected for the world finals of the European Rover Challenge 2020, which is one of the biggest International Space and Robotics event in the world. Team ‘Astra’ is one among the two teams selected from India.

- Rudra Manoj, Anirudh Unni and Hari Sankar, of S7 EEE (2018-2021) got placed in Robert Bosch.

- Mainak Deb of S3 Electrical and Computer Engineering and team, including the students from Department of Computer Science Engineering and one student from Amrita, Chennai campus, won prize the “Best use of Google Cloud” in the Hackathon which was conducted on 2nd to 4th October 2020. The team, named ‘Health-Heros’ built a Java-based mobile application that aims to completely eliminate the use of physical paperwork in hospitals, pharmacies, and clinics, hence shifting the whole process into a digital format to ensure minimal physical contact for the consumers as well as doctors and staff.

- Mainak Deb of S3 Electrical and Computer Engineering and team, bagged the first prize in a hackathon by developing a system that uses Computer Vision to automatically pause/play videos depending on whether the user is paying attention to the screen or not. Lights, Camera, Hacktion was an online hackathon themed around Film and media, hosted by Major League Hacking. Tech enthusiasts from all over the world participated in this event and were given a timeframe of 24 hours to think of an idea and bring it to life.

- Mainak Deb of S3 Electrical and Computer Engineering and team, won 3rd prize in the Hackathon by creating a face mask detection system using Computer vision.
**Student Internship**


- **Theertha Nair**, M.Tech [Power and Energy (2019-2021)], was selected for internship program in ABB Global Industries and Service Pvt Ltd, Bangalore from 15th July 2020 to 14th May 2021.

- **Pooja Unnikrishnan**, M.Tech [Power and Energy (2019-2021)], was selected for internship in Cummins Electronics from 24th to 28th August 2021.


- **Rudra Manoj**, B.Tech [EEE(2017-2021)], was selected for internship in Decibels Lab, for a period from 3rd Aug to 28th Aug 2020.

**Alumni Achievements**

- WePower Track of IEEE YESIST12 hosted a webinar on the topic, “Grid Integration Issues Associated with Renewable Energy Systems” on 16th May 2020. The session was handled by Shri Aneesh Rajeev, Power System Consultant at RINA Consultant UK and IEEE SIGHT Secretary UK and Ireland section. Topics included renewable energy basics, how the grid behaves when a renewable system is connected and the various career opportunities in this area.

- **Ms. Preethy V Warrier** [Alumni M. Tech PR (2013-2015)], IEEE Senior member, site engineer at Vestas Wind Technology, Chennai, was the speaker in the IEEE IAS SBC UKFCET on their second anniversary, which was conducted from 8th to 10th August 2020, on the topic, “Wind Farm Modelling”. On September 2020, she was selected as the IEEE impact creator. On December 2020, she delivered an expert talk at College of Engineering Chengannur on the topic “Wind power developments Past, Present & Future”.

![Fig 13: Challa Sairam Reddy](image13)
![Fig 14: Theertha Nair](image14)
![Fig 15: Pooja Unnikrishnan](image15)
![Fig 16: Anagha K](image16)
![Fig 17: M. Lakshmi Narasimhan](image17)
![Fig 18: Rudra Manoj](image18)
![Fig 19: Ms. Preethy V Warrier](image19)
Student Achievements

Team Agraganya BAJA, a group of 25 budding mechanical engineering students who are passionate about designing, manufacturing, analysing and marketing of an All-Terrain Vehicle (ATV) participated in SAE BAJA 2020 event at Chitkara University, Punjab. SAE BAJA is a national level intercollegiate engineering design competition organized by SAE INDIA to promote the involvement of student community to the real challenges in the design world. “We got an opportunity to interact with expert from automotive industries and also this event helps us to learn practical knowledge on automobile design” team captain Sheshendra shared about the event.

Team Agraganya successfully cleared the Virtual BAJA event in October 2019, and qualified for the Main event at Punjab. Each team has to design and manufacture an ATV based on the guidelines provided and the vehicle has to qualify various static and dynamic levels which challenge the integrity of the vehicle. Also each team has to present vehicle design report and cost report, which is evaluated by expert team from automotive industry. “Amrita university provides financial and technical support to students to encourage them to be part of such reputed events”. Team Agraganya was guided by Faculty Coordinator Mr. Harikrishna G.

Department Activities

AUTO EXPO 2020 – 5TH STROKE

Department of Mechanical Engineering organized 5th Stroke - Auto Expo 2020 at Amrita Viswa Vidyapeetham, Amritapuri Campus on January 31st and February 1st as part of VIDYUT 2020. The two-day expo witnessed a splendid array of both luxurious and vintage beauties, with a fair number of modified cars and super bikes thrown in to spice things up. To add excitement, the memorable travel exploits of guest riders were shared that would sure inspire young riders to hit the road cross-country. Rallies were conducted on both days to add fun and flavor to the event.

Team Agraganya BAJA participated in SAE BAJA 2020 competition at Chitkara University, Punjab.
The first day of the Expo saw a display of vintage (scooters & cars) and modified vehicles. The second day saw a posse of exotic super cars like Lamborghini, Ford Mustang, Dodge Challenger, Porsche, Nissan, Audi, BMW etc. & hyper bikes like Hayabusa, Ducati, Kawasaki Ninja, Triumph, Aprilia, Yamaha R1, BMW etc. Famed Guests Riders nick named Valmakry, Call Me Venom, Wikky Thug, Gear Up Vichu, Ride With Muzzles, Shiny Rajkumar etc. interacted with students and partook in questionnaires & photo sessions on these days. Students and aspiring riders gained immense knowledge through the various displays, marketing, branding and gained networking opportunity with automobile experts.

Research
Publications
Book Chapter Publication
Student Paper: “Intuitive Manipulation of Delta Robot Using Leap Motion” published as Book chapter in Springer’s NATURE

A research paper titled ‘Intuitive Manipulation of Delta Robot Using Leap Motion’ published by Amrita M.Tech RAU student P Giridharan was recently published as a book chapter in Springer’s NATURE, a publication from one of the leading world publishing company. Giridharan associated with Rageevlochana, student from Amrita Bengaluru campus, developed a hand tracking device to manipulate a delta robot. Delta robots are parallel manipulators used extensively in industries to perform pick-and-place and sorting operations. While the latter is usually integrated with a vision system, the former requires users to teach robot positions and corresponding actions that it has to repeatedly follow, using teach pendants. The kinematics of the robot and the methodology used to integrate leap motion and the manipulator developed by them were presented in this paper. Dr Ganesha Udupa, Professor in the Department of Mechanical Engineering provided expert advice to the students in all phases of the research project.

Journal Papers

Flow past a heated cylinder kept at constant surface temperature is computationally simulated and analysed in the laminar regime at moderate buoyancy. The study, has been restricted to moderate Reynolds numbers to completely eliminate the presence of mode-A and mode-B instabilities. The three dimensional transition due to the mode E instability is captured using a cell-centred finite volume method. The present study reveals the existence of two different kinds of coherent structures - the “surface plumes” and the “mushroom structures”. The role of these mushroom structures in the heat transfer mechanism and the changes that the Prandtl number would bring into this coherent structure are discussed. The mushroom structures observed show high dependency on the changes in Prandtl number whereas the surface plumes are found almost unaffected.

During draining of liquid propellants from propellant tanks of spacecraft rocket engines, air core vortex can be formed and this can result in blockage of drain port. Supply of required amount of fuel (propellant) to the engine may get adversely affected due to this, which can lead to poor engine performance. Hence, vortex suppression is a practical necessity in this space application and this forms the motivation for the current study. This paper deals with numerical studies on vortex air core formation during liquid draining from a cylindrical tank with conical base. Ansys Fluent was used for the numerical simulation. A liquid column contained in a cylindrical tank with conical bottom was rotated and then drained through a centrally located drain port situated at the base of the tank. The angle of the tank base and drain
port diameters were varied over a broad range to attempt vortex suppression. Results indicate that vortex is more suppressed at higher values of base angle. Suppression achieved by employing a conical base is the major and novel contribution of this study. The suppression strategy discussed in the current study has applications in aerospace engineering such as liquid propulsion systems.


The current research work includes analysis of the impact of reinforcements B4C/SiC, on the mechanical properties of Al-6.6Si-0.4Mg alloy. The reinforcement content was varied between 5-wt% and 10-wt% respectively. The mechanical properties—percentage elongation, hardness, tensile and yield strength were observed for varying weight percentage of reinforcement content and compared. The micrographs of the cast specimens were distinguished under an optical microscope and a scanning electron microscope and it was noticed that as the weight percentage of the added reinforcement content increased there was a subsequent transition from learner to finer distribution. Mechanical properties—hardness, tensile and yield strength displayed a similar trend of improvement in corresponding properties with a subsequent increase in the reinforcement wt-%. However, in the case of percentage elongation, there was a decrease in property with a corresponding increase in reinforcement.


OpenFOAM was utilized for analysing bubble behaviour and deformation of free liquid surface due to bubble formation and bursting in a rectangular container. Influence of three system parameters, orifice diameter, number of orifices and spacing between orifices, on various bubble dynamics and deformation of gas-liquid interface is presented. The study also incorporates information on bubble formation, bubbling frequency, and orientation of bubbles. Considering different orifice spacing, bubbling synchronicity is also reported. Details regarding interaction of wakes during bubble coalescence for single, double and triple inlet orifices are presented. The deformation of free liquid surface due to bubble formation and bursting is quantified using a new parameter called deformation index (DL *). The analyses indicate that the frequency of bubble detachment is augmented with increase in orifice diameter and number of orifices. However, bubble detachment frequency is reduced when orifice spacing increased. Orientation of detached bubbles keeps on changing for larger orifice spacing. Results show that variations of these geometric parameters have substantial influence on free liquid surface deformation due to bubble bursting and other bubble behaviour. Using results of these studies, one can develop a bubble-generating device for optimal performance.
A workshop on “Anonymization with Differential Privacy” was organised on March 7th 2020. The Distinguished Speaker was Shri Aljoscha Dietrich from the University of Saarland (Universität des Saarlandes), Germany.

Faculty Achievements
Dr Prabhakaran P., Professor at the School of Engineering, Amrita Vishwa Vidyapeetham, Amritapuri Campus, received the ‘Academy Excellence Award 2018’ from Hon. Raksha Mantri (Defence Minister) Rajnath Singh, who also presented the award certificate and a cash award of ₹2,00,000 during the national Defence Research and Development Organisation - DRDO’s award distribution function held on December 18, 2020. Hon. Union Minister of State for Defence, Yesso Naik, Chief of Defence Staff, General Bipin Rawat, and DRDO’s Chairman, Dr G. Sathish Reddy attended the event and were present at the award ceremony.

The function was presided over by Chief of Army, Chief of Navy and Chief of Air Force staff. Several senior functionaries from Ministry of Defence and Government of India were present at the function.

Academy excellence award from DRDO is given annually to eminent researchers and senior academicians who have made significant contributions to Research and Development. During the ceremony DRDO also confers awards for other categories including Technology Spin-off awards, Individual awards among others.

Paper Presentations:
Dr Sriram Sankaran presented the paper titled “Lightweight and Attack-Resilient PUF for Internet of Things” at the ISES 2020 Conference held at Vellore Institute of Technology, Chennai between 14-16 Dec 2020.

Dr Sriram Sankaran presented the paper titled “Local Clock Glitching Fault Injection with Application to the ASCON Cipher” at the ISES 2020 Conference held at Vellore Institute of Technology, Chennai between 14-16 Dec 2020.

Dr Sriram Sankaran presented the paper titled “A hybrid approach for fast anomaly detection in controller area networks” at the International Symposium on
Advanced Networks and Telecommunication Systems, ANTS, in December, 2020 and was awarded the 2nd Best Paper Award.

Dr Sriram Sankaran presented the paper titled “Identity based security framework for smart cities” at the International Symposium on Advanced Networks and Telecommunication Systems, ANTS, in December, 2020.

Recognitions

Dr Sriram Sankaran served as Session Chair for IEEE International Symposium on Smart Electronic Systems (ISES 2020) held at Vellore Institute of Technology, Chennai between 14-16 Dec 2020.

Shri Vysakh Kani Kolil was a Reviewer of the Journal of Education & Learning (EDuLearn) for the December issue of the journal.

Research

Journal Publications


Conference Publications


Book Chapter Published

**Student Achievements**

Second year students of MTech [Geoinformatics & Earth Observation (2019 batch)] secured internships at these esteemed organizations:

- Ms. Sreya Radhakrishnan – ISRO
- Mr. Akshay Satish – ESRI India
- Ms. Koduganti Sai Sudha Manasa – ISRO
- Ms. Shilpa Sreekumar – ESRI India
- Ms. Swathi Venkatesh - Lawrence Berkely Laboratories

Two first year MTech (Wireless Networks & Applications) students, Mr Tom Toby and Ms. Gopika K V, secured internships at Nokia, India.

**Departmental Activities**

**Tsunami Symposium December 2020**

The Amrita Center for Wireless Networks & Applications, UNESCO Chair on Experiential Learning for Sustainable Innovation & Development, UNESCO Chair in Women’s Empowerment and Gender Equality - Amrita Vishwa Vidyapeetham and ESRI India, global market leader in GIS; jointly hosted a virtual international symposium to critically reflect on the imprints of the December 26, 2004 Indian Ocean Tsunami, its subsequent impact on the global society, and advances in science and technology to build sustainable and resilient communities. This symposium aimed to unveil challenges faced and lessons learnt.
from this unprecedented natural hazard, and analyze the current preparedness in community resilience, governance, and technological solutions to mitigate any future impacts of Tsunamis. This symposium intended to provide a platform to policy makers, technological innovators, the oceanography industry and researchers, to come together and share their knowledge of the imprints left by the devastating Indian Ocean Tsunami of December 26, 2004, as well as to throw light on some of the most assuring technological advancements and strategies that have helped develop resilient communities across the world.

Research

AmritaWNA Developed Low Cost Remote Bed Side Monitor to Fight COVID Pandemic

In order to avoid frequent visits of the medical support staff to the isolation wards to check on patients, the Amrita Center for Wireless Networks and Applications (AmritaWNA) developed a solution - Remote Bed Side Monitoring using Smartphones.

When dealing with COVID-19 infected patients, healthcare workers have to be extremely careful. In such situations, the ideal method of monitoring patience is remotely via protected nursing stations. The use of smartphones and server software can aid in this to minimize the exposure of healthcare personnel to contagious patients. Our use-case employs smartphones (or similar IP-based camera solutions) to periodically capture data from bedside monitors. The data arrives at the server real-time and is processed to provide further alerts.

Faculty Achievements

Dr. Maneesha V Ramesh is cited as one among the world’s top 2% of scientists identified by Stanford University in the field of Networking & Telecommunication.

Stanford University researchers created a publicly available science-wide database of 100,000 top scientists, that provides information on publication citations, h-index, co-authorship adjusted h-index, citations to papers in different authorship positions, and a composite indicator. In this database, the scientists were classified into 22 fields and 176 sub-fields, updated to the end-of-2019.

UNESCO Chair on Experiential Learning for Sustainable Innovation & Development

The United Nations awarded Amrita Vishwa Vidyapeetham its second UNESCO Chair - UNESCO Chair for Experiential Learning for Sustainable Innovation & Development - on June 12, 2020. The Chair will be held by Amrita for the next four years under the guidance of Dr. Maneesha V. Ramesh. As a UNESCO Chair, Amrita becomes part of more than 700 educational institutions that share knowledge and expertise to improve their educational and research capacities.

Dr. Maneesha V Ramesh was invited to the ACU (Association of Commonwealth Universities) organised virtual panel discussion with the British Council at their Going Global 2020 on how universities across the world are integrating the United Nations Sustainable Development Goals into their learning/teaching activities. The event held on 25 June 2020.

Dr. Maneesha V Ramesh selected as the “Member of the Advisory Committee for Landslide-Debris flow"
constituted by the Kerala State Disaster Management Authority, Govt of Kerala.

Dr. Maneesha V Ramesh was invited to deliver an online talk in the International Workshop on “Real Time Monitoring and Early Warning of Landslides: Challenges and Technologies” organised by the Wadia Institute of Himalayan Geology, Dehradun on 28 October 2020.

Dr. Maneesha V Ramesh was invited to deliver a ‘Motivational talk’ to the students of Sree Narayana Institute of Technology, Adoor as part of the Induction program held on November 10, 2020.

Papers published in high end Journals by Amrita Faculty & Research Staff

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Paper Title</th>
<th>Authors</th>
<th>Journal</th>
<th>Impact factor</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Enhancing the reliability of landslide early warning systems by machine learning</td>
<td>T. Hemalatha, Dr. Maneesha Vinodini Ramesh, Dr. Venkat P. Rangan</td>
<td>Landslides Journal, Springer, Jul 2020</td>
<td>5.447</td>
<td>2020</td>
</tr>
</tbody>
</table>

TESTIMONIALS

Akshay, II year, MTech (Geoinformatics & Earth Observation)

“Hi, I am Akshay, MTech Geoinformatics & Earth Observations student from Center for Wireless Networks & Applications, Amrita Vishwa Vidyapeetham. My research is in the area of Coastal change detection. Recently in one of the symposiums organised by the center, I could meet delegates from ESRI India and discuss my research work with them. They were interested in my work and offered me an internship. Now I’m working with ESRI on Geographic Information System and Remote sensing to estimate coastal erosion rate. I am happy that I’m contributing to some of the UN Sustainable Development Goals. I thank my faculty and Staffs at AmritaWNA for supporting me. Thank you.”
Amrita Centre for International Programs

Student Opportunity

A large number of Amrita students from various campuses and departments participated in the Student Exchange program this January 2020. Many students were selected to go to various universities in Europe and the USA for their final semester project or coursework. Students attended The Technical University of Munich in Germany, Halmstad University in Sweden, Darmstadt University of Applied Sciences in Germany, Aalto University in Finland, Grenoble University in France, Politechnico Di Milano in Italy, University of Twente in Netherlands, University of New Mexico in the USA, and various UPC Schools in Spain such as ETSEIB, ESEIAAT, and EEBE. Students from Amrita School of Biotechnology were able to participate in the top notch research lab “Center for Plant Biotechnology and Genomics (CBGP)”, at the Technical University of Madrid, Spain. Moreover, a large group of Amrita students attended a research internship program at Northern Illinois University, Chicago and Pennsylvania State University in Pennsylvania respectively.

Among the 40 plus students who attended the exchange program, a few of them had found careers either in well established companies in the host country or in startups. After their exchange program at host universities, many were able to get into the Master’s program in KTH, Sweden, University of Gothenburg, Sweden, Delft University of Technology (TU Delft) in the Netherlands.

Three candidates have received Amrita scholarships.

1. Vedanth Padigelwar - B.Tech CSE student from Ettimadai campus who went to Aalto University, Finland as part of student exchange program

2. Kartik Moolraj Dattani (left), Shreya. R (middle), Shweta Nayak (right) - B.Sc Biotechnology students from Amritapuri campus who went to UPM (Technical University of Madrid), Spain as part of student exchange program

3. Sai Govind (left) and Sreekanth N (right) - B.Tech, Mechanical Engineering students, Amritapuri campus, who did the internship at Northern Illinois University, USA

4. Akshay Krishna (second from the left), B.Tech Mechanical Engineering student, Amritapuri campus with Dr. Maneesha V Ramesh, Dean of International Programs at Ecole Centrale de Nantes (ECN), France. Akshay had gone to ECN as part of 3+1+2 Integrated Masters Program
Centre's Activities:

**International Virtual Symposium on Smart Community Security & Resilience**

https://www.amrita.edu/event/international-virtual-symposium-smart-community-security-resilience

Amrita Vishwa Vidyapeetham and the University of Missouri (U.S.) jointly organized a two-day International Virtual Symposium on “Smart Community Security & Resilience”. Amrita has signed an MoU with the University of Missouri to establish a Joint Research Centre to promote collaborations, specifically joint projects that focus on the UN Sustainable Development Goals (SDGs) especially SDGs 6, 7, 11, 13, 15, and 17. A major outcome of this symposium will be to identify potential collaborative projects under the New Joint Research Centre.

**Objective**

1. The purpose of this symposium was to create new collaborations between University of Missouri and experts from Amrita on advanced research and education projects.

2. Faculty members from both institutions jointly identified avenues for future collaborative project proposals and publications and also identified and pursued potential funding opportunities.

3. Faculty members identified opportunities for joint mentorship of students and research scholars and for joint course offerings, workshops, webinars, etc.

4. The symposium addressed the Sustainable Development Goals (SDGs):

**Amrita – UTS Joint Workshop on Cyber Security**

Amrita Vishwa Vidyapeetham & University of Technology - Sydney jointly organized a Workshop on Cyber Security on 5th February 2021 from 8:00 am to 1.00 pm IST.

Professor Michael Blumenstein, Dean of Research, University of Technology Sydney (UTS) and Dr Krishnashree Achuthan, Dean Post Graduate Programs, Amrita Vishwa Vidyapeetham gave introductory remarks and welcomed the gathering at this workshop focused on Cyber Security. Ms. Christine Brickenstein spoke about the international engagements of UTS.

The technical sessions started with the very informative talks of Dr Priyadarsi Nanda, Senior Lecturer from UTS and Dr Sethumadhavan, Chair of Amrita Center for Cyber Security at Coimbatore campus. Other key presenters included Dr Manoranjan Mohanty, Dr. Dylan Lu, Dr Jahangir Hossain from UTS and Dr Sriram Sankaran, Dr Prabhakar Krishnan from Center for Cyber Security Systems and Networks at Amritapuri campus. Exacerbated risks from Corona pandemic that caused significant changes to work environments were also highlighted. Emerging trends in broad areas such as Security, Trust and Privacy in Vehicular Ad-hoc Networks (VANET), End-to-End IOT Security, Authenticated Encryption Algorithm, Cryptanalysis, Application of Block Chains in Security were discussed. There was also emphasis on security challenges with respect to SCADA and Power Grid and Electric Vehicle Systems.

Approx 125 participants including students and faculties especially from Cyber Security and Computer Science departments from Sydney, Amritapuri, Bangalore & Coimbatore campuses attended the workshop. Based on the same, UTS & Amrita will decide how both universities can collaborate each other on Joint Centre & Joint Supervision of faculties from both sides, Co-guiding, Joint Paper Writing etc. Also both universities will explore more areas for collaboration like Live in Labs(R) etc., and will explore prospects in organising more workshops in different areas in the coming 6 months.

**International Symposium on Water Sustainability: Challenges, Technologies & Opportunities (IWSS 2021)**

https://www.amrita.edu/event/international-symposium-water-sustainability-challenges-technologies-opportunities-iwss-2021

Amrita Vishwa Vidyapeetham’s UNESCO Chair in Experiential Learning for Sustainable Innovation and Development, the Amrita School for Sustainable Development, and India Water Partnership (IWP) jointly organised and hosted an International Symposium on Water Sustainability: Challenges, Technologies & Opportunities (IWSS 2021) in commemoration with World Water Day.

This symposium explored water sustainability global and local challenges, with the intent of unveiling the technologies adopted and realized opportunities in relation to water sustainability.
International Symposium on Tsunami Risk Reduction & Community Resilience

https://www.amrita.edu/event/one-day-virtual-symposium-tsunami-risk-reduction-community-resilience

The Ministry of Earth Sciences (Government of India), the Indian National Centre for Ocean Information Services (ESSO-INCOIS), the Amrita School for Sustainable Development, the Amrita Center for Wireless Networks & Applications, Amrita Vishwa Vidyapeetham’s UNESCO Chairs, and esri India jointly hosted an International Symposium to critically reflect on the imprints of the December 26, 2004 Indian Ocean Tsunami, its impact on global society, and advances in science and technology to build sustainable and resilient communities.

The symposium strived to unveil challenges faced and lessons learnt from this unparalleled natural disaster and analyse the current preparedness in community resilience, governance, and technological solutions to mitigate any future impacts of Tsunamis.

Schedule

Date:   December 26, 2020
Time:   Starts at 3 p.m. IST (1:30 a.m. PST/10:30 a.m. CET/9:30 a.m. GMT)

Amrita Vishwa Vidyapeetham and esri India signed a strategic Memorandum of Understanding committing themselves towards building sustainable and resilient communities through science and technology at the state, national, regional, and global levels through collaboration with academic and scientific institutions, governments, and corporate entities.

KOLLAM, December 28th, 2020: Amrita Vishwa Vidyapeetham and esri India inked a strategic Memorandum of Understanding (MoU) during the “International Symposium on Disaster Risk Reduction & Community Resilience” held virtually on December 26, 2020. The symposium, jointly hosted by the Ministry of Earth Sciences, the Indian National Centre for Ocean Information Services (ESSO-INCOIS), Government of India; esri India; Amrita's prestigious UNESCO Chair on Experiential Learning for Sustainable Innovation and Development; UNESCO Chair on Gender Equality and Women Empowerment; Amrita School of Sustainable Development; and Amrita Center for Wireless Networks & Applications, critically reflected on the imprints of the December 26, 2004 Indian Ocean Tsunami and took stock of the improved preparedness, early warning systems, and efforts in strengthening community resilience in the past 16 years.

Under the MoU, esri India and Amrita Vishwa Vidyapeetham will collaborate to establish a Center of Geospatial Excellence on Spatial Analysis and Modeling with dedicated facilities for research, development, and testing. The Centre’s mission would be to promote development of specific skills and technical knowhow among academicians, students, and industry around geospatial technologies and latest toolkits like Artificial Intelligence (AI), Machine Learning (ML) and geospatial Big Data Analytics. This includes multiple initiatives such as conducting training programmes, workshops, seminars, policy round tables, symposia events, certificate and diploma courses, and hackathons, in general, with a focus on geospatial technology application areas to strengthen multi-hazard risk reduction and community resilience.

“Enabling and empowering the academic community with necessary tools and technologies needed for future-ready students and capacity building is one of our key priorities. Geospatial infrastructure is the core foundation to disaster risk reduction, sustainability and resilience initiatives world-wide. “Our collaboration with Amrita Vishwa Vidyapeetham will support various research initiatives and flagship programs e.g. Amrita Live-in-Labs® for better sustainability and development”, said Mr. Agendra Kumar, President, esri, India

The symposium commemorated the 16th anniversary of the 2004 India Ocean Tsunami and deliberated on the challenges faced, lessons learnt, and analysed the current preparedness in community resilience, governance, and technological solutions to mitigate any future impacts of Tsunamis. It provided a platform to local, regional, and national government bodies, policymakers, international and national university researchers, NGOs, technological innovators, and scientists to share their knowledge and answer questions that will help develop resilient communities across the world. The symposium strived to revive scientific social responsibility to reduce risk and
vulnerability factors by a) understanding the impact of Tsunamis on coastal communities; b) marking the advances in science and technology in monitoring and modelling of the Tsunami and its impacts; and c) coming up with a strategic framework to further advance our disaster preparedness, adaptation, and mitigation efforts to build sustainable and resilient communities.

Dr. Maneesha Sudheer, Dean of International Programs and UNESCO Chair on Sustainable Development and Innovation, Amrita Vishwa Vidyapeetham, said, “The symposium addressed Sustainable Development Goals of Sustainable Cities and Communities (SDG 11) and Climate Action (SDG 13) and served to provide a platform to integrate the last 16 years of research in science and technology to improve the rehabilitation and resilience of coastal communities. Through this symposium, international research organizations, government organizations, non-governmental organizations and community-led groups have deliberated the needs and gaps in our readiness for the future to handle another Tsunami. This is truly a multi-country, multi-level effort.”

Testimonials:

Vedanth Padigelwar - Aalto University, Finland - Student Exchange (B.Tech CSE, Ettimadai campus)

“My experience at Aalto University was more encouraging about life because of the high work-life balance. Seeing the startup culture in Finland I wanted to continue in a job at a Finland startup but It was really difficult to get a job due to the COVID situation. Then, I explored the Indian startup ecosystem but I felt the pay was low to start a career, later I was able to find a startup of my interest because of some of my friends in Finland with decent pay to give me the experience I needed”.

Kartik Moolraj Dattani, Shreya. R, Shweta Nayak - UPM, Madrid - Student Exchange (B.Sc, Biotechnology)

“We would really like to take this moment to thank everyone in the international office for your consistent support and guidance throughout this entire process. It really was a wonderful and insightful experience. We are hoping to get back to work in the near future to land upon some sort of conclusion to our work. Although it is unfortunate that the situations weren’t on our side but in the end we are grateful it happened. Thank you so much for this opportunity”.

Shreya R:

“I had planned on taking a gap year before my master’s and intern at a lab to get some experience. I was most probably going to intern at a lab in Bangalore. When I came to Madrid, I really liked the culture and the way the labs here work. When I could not come back to India after my project here due to the pandemic, I decided it’s best to apply to labs in Madrid. Since I was already staying here and had a valid visa, it was easier to apply. The recommendations from my previous PI at the lab I was working in, as a part of the exchange program helped seal the deal. Now I’m a student intern at Centro de Biologia Molecular Severo Ochoa, a research institute under the joint leadership of the Autonomous University of Madrid (UAM) and the Spanish National Research Council (CSIC). I am learning a lot through this experience, which would not have been possible without the Student Exchange Program at Amrita University.”

*Shwetha Nayak is currently doing Masters in Cellular and Molecular Biology with a specialisation in Biomolecular science at the University of Turin, Italy

*Shreya R is a student intern at Centro de Biologia Molecular Severo Ochoa, a research institute under the joint leadership of the Autonomous University of Madrid (UAM) and the Spanish National Research Council (CSIC).

Akshay Krishna - Ecole Centrale de Nantes, France - 3+1+2 Integrated Masters Program (B.Tech, Mechanical Engineering)

“I would suggest my juniors join this university, as it gives new exposures, a new way of teachings, new friendships, a new world.”
The Live-in-Labs® sessions for the year 2020 were conducted completely virtual and there were no village visits. During this time, the program saw an increase in the amount of student participation in the Live-in-Labs® academic course. Live-in-Labs® student participation exceeded 420+, with students partaking from the three Amrita University technology campuses of Coimbatore, Amritapuri and Bengaluru.

Concurrently, there were also 19 Live-in-Labs® paper publications in reputed International Conferences and Journals. This comprised 9 International Conference papers published, 8 International Conference papers accepted for publication, 2 International Journal papers accepted for publication.

The papers were successfully presented at the following conferences:
1. 2020 IEEE R10 Humanitarian Technology Conference
2. 2020 HCI4SA
3. 2021 International Conference on ICT for Intelligent Systems
4. 2021 International Conference on Smart Trends in Computing and Communications

Dr. Maneesha V. Ramesh, Dean, Amrita Center of International Programs (ACIP) presented “Live-in-Labs®: A Unique Participatory Approach for Building Sustainable Communities” at the Cycle of Conferences on Sustainability hosted by Research Institute for Sustainability Science and Technology of the Polytechnic University of Catalonia.


Live-in-Labs® Collaborative projects between Amrita & University at Buffalo (USA)

As part of the long-term partnership between Amrita Vishwa Vidyapeetham and State University of New York at Buffalo (USA), 4 students from the UB Department of Management worked alongside MBA students from Amrita’s Bangalore Campus. Together they inaugurated a new format of online Live-in-Labs projects. Students attended several online classes and workshops, before being assigned 2 group projects. Through regular online meetings, the two groups progressed. Amrita students were in charge of collecting data from Indian villages whenever necessary. The two projects were focused on designing sustainable business models tailored to the requirements of rural communities. The first project was about the ‘jivamritam’ water filter initiative. The key challenge in that was to make sure that the deployed filters were backed by a sustainable business model. This was to ensure there was sufficient funds to pay for the maintenance, and thus the long term operation of the filter. Depending on each community’s specifics, a model had to be adapted. The students proposed innovative ideas to ensure communities contribution to the maintenance.

The second project was about Amrita SREE, which is a network of Self-Help Groups who are developing micro-financed initiatives, supported by the MA Math. The face-to-face way of working was disrupted by the Covid-19 situation, and new ways of functioning were required. This was adding up limitations as well as opportunities for improvements that had been identified before. Online meetings were held with key informants. The students proposed several pathways to address those challenges.

The students presented via online their findings, which were transmitted to the relevant persons for being implemented in the respective projects. This pilot on how to conduct Live-in-Labs® in times of pandemic will be replicated whenever possible with other interested international universities.

Student Opportunity

In the fall semester of July 2020 despite the challenges caused by the pandemic, Amrita students who applied from various engineering departments and campuses, attended Integrated Programs and Dual Degree Programs and travelled to partner universities facilitated by the Center for International Programs. Selected students from Amrita are currently attending
these programs at host countries such as University of California Irvine, the US, Ecole Centrale Nantes, in France, KTH Royal University of Technology, in Sweden, Oakland University in Michigan, USA, University of L’Aquila, in Italy, Vrije University, in Nederlands.

For the 2021 Spring semester, many Amrita students have been offered virtual lectures/classes at various host universities as part of the student exchange programs. Host universities include Northern Illinois University, Chicago, in the US, Aalto University, in Finland, Twente University, in Nederlands, Politecnico Di Milano, in Spain, University of Trento, in Italy, and Darmstadt University of Applied Sciences, in Germany and at University of New Mexico, in the US.

For the upcoming Integrated Program session, we will have students attending University of New Mexico, US, University of California, Irvine, US, KTH Royal University of Technology, Sweden, and Oakland University, in Michigan.

Overall though the pandemic had put a brake in the travel plans of students, several partner universities offered virtual classes/internships etc.

Eight engineering students from various campuses of Amrita have been offered virtual summer internships at University of California Santa Cruz (UCSC), in the US.

Two students from Masters in Microbiology Amritapuri campus have been offered a dual degree program for 3 months at The University of Arizona, in the USA

**Students who are currently pursuing dual degree abroad:**

1. Grama Srinivas Shourie - B.Tech Mechanical Engineering students, Bangalore campus who went to Ecole Centrale de Nantes (ECN), France as part of 3+1+2 Integrated Master’s Program

2. Prithvi Bharadwaj Mellacheruvu - B.Tech Mechanical Engineering students, Bangalore campus who went to Ecole Centrale de Nantes (ECN), France as part of 3+1+2 Integrated Master’s Program.