Amrita Vishwa Vidyapeetham
Amritapuri Campus

M.Tech. Programmes

- Computer Science & Engineering
- Control & Instrumentation
- Cyber Security Systems & Networks
- E-Learning
- Power & Energy Engineering
- Robotics
- Thermal & Fluids
- VLSI
- Wireless Networks & Applications
Amritapuri campus of Amrita University is located in Kollam district, between Karunagapally and Kayamkulam cities. Though situated in a village environment, the campus has students from several north Indian states and from foreign students as well. With a strong backbone of IT infrastructure, campus is well connected with internet. More than 95% of the students are residential. Wi-Fi connectivity across the hostels ensures the availability of campus network that enables students to access online educational resources and repositories in the digital library maintained on the campus. Eminent professors and corporate professionals from various foreign universities and industries share their knowledge and experiences with the students and help them apply their theoretical knowledge to real life corporate situations. The campus, though located in a remote village blessed with panoramic backwater expanse, provides all the modern amenities which help the students to make their student-life a memorable one. They are groomed to become leaders with value which is the fundamental need of a developing country like India.

World renowned humanitarian and spiritual leader Satguru Sri Mata Amritanandmayi Devi (Amma) is the Chancellor of the university. Being in close proximity with the international headquarters of Mata Amritanandmayi Math, the campus has the advantage of basking in the effulgence of Amma’s divine presence. Students also get ample opportunities to take part in the service and charitable activities initiated by the Math.
M.Tech. CSE
Department of Computer Science & Engineering

The Department of CSE is one of the largest and well established centers of learning Computer Science in south India offering B.Tech., M.Tech, MCA, programmes. Experienced and highly qualified Faculty support the students to achieve a high level knowledge and skills on recent trends in computing. The Department has close association with reputed institutions in India and abroad (like SUNY Buffalo, VU, UC Davis etc.) to support students in their academic work and final projects as internship. Through this rapport students also get opportunities to learn conventional as well as emerging areas in core Computer Science. Campus has well established Research Centers carrying out real time projects in different areas in Computer Science, funded by the industry and the Government. Research environment at campus is an added advantage for one who seeks career in teaching and research, after the post-graduation. Department also host the prestigious programming contest ACM ICPC – called as the “Olympics of Programming Contests” – every year.
**Faculty**

**M.R. Kaimal, Ph.D,** Professor & Chairperson
- Ph.D from Harish Chandra Institute (Allahabad University)
- Research scientist at Indian Institute of Science (Bangalore) and at National Institutes of Health (Maryland, USA)
- Visiting Scientist at CSIR (S. Africa). UNESCO Scholar in France
- Visiting Professor at University of Chicago
- Faculty at CUSAT, Kochi, University of Kerala; former Dean, Faculty of Applied Sciences at Kerala University
- 39 years of experience in Research & teaching, guided successfully 17 Ph.D dissertations in Computer Science and more than 50 M.Tech. dissertations
- Published papers in a good number of International journals like IEEE, Computer Journal (UK); Book Chapter published by Tyler & Francis

**Bhadrachalam Chitturi, Ph.D**
Assistant Professor
Ph.D from University of Texas, Dallas.
Research Interests: Bio computation/bioinformatics, Algorithm Design and Analysis

**Jyothisha J Nair, Ph.D**
Assistant Professor & Vice Chairperson
Ph.D from NIT Calicut.
Research Interests: Medical Imaging, Image Analysis

**Ms Sandhya Harikumar**
Assistant Professor
M.Tech. from IITD.
Research Interests: Databases, Algorithms, Machine Learning

**Mr Swaminathan J**
Assistant Professor
M.Tech. from Sri Sathya Sai University
Research Interests: Program Analysis and Formal Methods

**Adjunct / Visiting professors**

**Prof. Bharat Jayaraman, Ph.D**
(University at Buffalo, State University)

**Prof. Maarten Steen, Ph.D**
(Vrije University)

**Ms Geetha M**
Assistant Professor
M.Tech. from Amrita Vishwa Vidyapeetham.
Research Interests: Computer Vision, Pattern Recognition, Machine Learning
About the programme

The M. Tech in Computer Science & Engineering is designed as a first level research programme with an objective of preparing the students to take up research and development activities in core and emerging areas in Computer Science with a focus on Machine Learning in conventional/distributed computing environment. The programme includes advanced level courses in Computer Architecture, Networking, Algorithms, Data Bases, Distributed Computing, Computational Intelligence and Machine Learning. This programme will provide a strong basis in Computer Science for those who opt for a serious career in Industry or in an academic or research profession. The diversity of platforms available for implementation and the huge volume of data for analysis, knowledge mining activities in biological systems, medical field, data related to climate changes etc. attract employment opportunities. Along with sister departments like Wireless Networks & Applications and Cyber Security, Computer Science & Engineering provides a variety of opportunities for students to learn about the emerging paradigms and work with experts of international repute.

International Alliances

Students who complete two semesters of MTech. (CSE) successfully have an option to apply for a Dual Master’s programme in VU and can study for a Dual Degree programme with Virje University, Netherlands.

Research / Funded Projects

Science and Engineering Research Board (SERB) project entitled “Video Analytics based Identification and Tracking in Smart Spaces” under the guidance of Dr Vivek Menon, Associate Professor, at a total cost of Rs 14,64,000/-.
The faculty members and research scholars of the Department have been published their works in reputed journals and conferences like “Theoretical Computer Science”, “EEE Internet Computing”, “Defence Science Journal” etc.
About the Center
The mission of this center is promoting partnership between the industry, academia and the government to foster innovative research and education in cybersecurity systems and networks, thus enhancing knowledge, deriving solutions and mitigating risks to benefit society.

With the phenomenal growth of internet, cyber security has become a fast growing global issue and an ever growing market. The advancements on the technological front has made the potential of every device in the daily life to be hooked to the cyber world communicating and passing critical data ranging from personal household activities to critical areas in health care, automotive, banking and finance, defense communication systems, educational and research fields, etc.

What makes Amrita’s Cybersecurity Systems & Networks center unique is the integration of theoretical and practical knowledge from both cyber and physical systems perspective into the two-year curriculum. With adjunct faculty from United States and Europe supporting the program, with the rigorous training to meet industry requirements at Amrita Vishwa Vidyapeetham the quality of education here prepares students to become globally ready to pursue a highly rewarding technical career.
Dr. Krishnashree Achuthan
- MS. and Ph.D. from Clarkson University, US
- Author of over 45 publications in journals, international conferences and patents.
- Worked for Advanced Micro Devices, CA
- Currently the Principal Investigator of several multi-crore projects working with the Govt. of India (Department of Electronics & IT, MHRD, etc.) and private companies
- Research interests: Cyber law, Ethical Hacking and Security Education
Under her leadership the center has grown from a group of 7 to over 40 in the past two years with simultaneous increase in research activities.

Dr. Rafael Fourquet
Research interests include decoding algorithms for Reed-Muller codes, nonlinearity profile and algebraic immunity of Boolean functions, cryptanalysis of block ciphers.

Dr. Shivsubramani Krishnamoorthy

Mr. Snehal Shetty
Research interests include security in the fields of Internet of Things, Routing protocols, MPLS, MPLS-VPN, Multicast, IPTV, Quality of Service, Value-added IP services.

Mr. Hari Kallingal
Research interests include Modelling and Control aspects of Embedded Cyber-physical systems, Realtime Hybrid systems and Embedded Control Systems.

Mr. Prabaharan Poornachandran
17 Years of Experience in Cyber Security including VeriSign, The World Bank etc. published numerous research papers.
PI for various large scale projects. Created Innovative products including Cloud based DDoS mitigation, Wearable personal safety systems etc.

Mr. Shiju Satyadevan –
Research interests include Internet of Things, Security of IoT devices, Big Data Analytics, Sentiment Analysis, Large Volume Image Processing using Hadoop (Processing CCTV images from restricted areas), Social Media Analytics, Security in Cloud environments and innovative E-Governance initiatives.
Ms. Renuka Kumar
M.S in Computer Networks from University of Southern California, 12 years industry experience in silicon valley in IPTV streaming, PCI Express Switching & Bridging, UX/ Web Design, Device Drivers Research Interests: Malware Analysis, Backdoors, Reverse Engineering

Mr. Sudharsan
Research interests Cryptography, Security in Embedded Systems

Mr. Vipin Pavithran
Research interests include Network Security, Cybersecurity Education, Cloud Computing

Mr. Hari N. N.
Research interests include Formal Methods, Operating System Security

Suja Devi

Mr. Kamalanathan
Research Interests include Social Media Security, Sentiment Analysis, Intention/sarcasm detection in Social media

Adjunct / Visiting professors
Dr. Kaladhar Voruganti – Technical Director at NetApp, USA.
Dr. Arun Lakhotia – Professor, University of Louisiana, West Lafayette, Head of Software Research Laboratory.
Dr. Herbert Bos – Professor, VU, Amsterdam
Mr. Srinivas Jaini, Cloud Security Alliance, Silicon Valley Chapter Head, California
Dr. Nirajan Thirumale, EMC/RSA, India
Networking Lab

Networking lab helps students understand the foundations of networking and assists researchers with building complex networks. Emphasis is placed on practical aspects of various network architectures. Packet captures will be extensively used to understand the network protocols. Some of the network technologies that are covered as part of the curriculum include Ethernet, ARP, IP, ICMP, TCP, UDP, RIP, OSPF, BGP, routing redistribution, MPLS, MPLS-VPN etc. using CISCO and Juniper hardware. Students are also exposed to protocol troubleshooting using router debug logs. Labs are also setup to study and model complex routing issues.

IoT Enabling and Security Research Lab

Primary focus of this lab is to build various IoT enablers that are of Low cost, easy to use & interface, and one that can turn a dumb device to an intelligent device. Research is actively underway in order to build an effective, high read range but low cost RFID reader, various low cost sensors, MOTES, IoT Gateway etc. Interoperability of various wireless protocols that are widely used in IoT devices are being seriously looked into. How to enforce/embed device level security (both in-house and third party devices), device authentication (both in-house and third party devices) and light weight encryption algorithms to run on resource constrained devices. Authentication of Mobile IoT devices is yet another area of interest.

BigData Research Labs

Primary focus is into integrate various forms of data handling processes under one umbrella, Effectively Handle Large Volume of data from diverse domains, Generalizing classification and clustering algorithmic models, Building in-memory capability onto Hadoop, Automating conversion of Linear algorithms to MapReduce Algorithms, Crime Analytics, Sentimental Analysis, Handling and Processing Large scale Video Analytics using Hadoop framework, Reducing the fault rates in precisely extracting and accurately identifying objects while in motion, Social Media Analytics, Streaming data processing engines like STORM & SPARK.
Network Security Lab
This lab will provide the student with thorough understanding and exploiting vulnerabilities of various network protocols and how to secure them. Lab also exposes students to ethical hacking commitment and process, process information gathering, enumerating systems and automating attack. Students will have hands on sessions on cryptographic systems, defeating malwares, configuring firewalls and VPNs.

Operating Systems Lab
This course will focus on implementing key OS kernel features in the Nachos kernel / Android. Students will develop programs for multithreading, manipulating kernel objects, thread synchronization, interprocess communication and virtual memory. All the implementations will be based on Linux operating system. Students will gain practical experience with systems programming above and below of system call interface of operating systems.

Cryptographic Lab
The goal of this lab is to help students understand cryptographic primitives.
The cryptographic primitives covered include pseudorandom functions, symmetric encryption (block ciphers), hash functions and random oracles, message authentication code, asymmetric encryption and digital signatures.

International Alliances
Dual degree program between Amrita Vishwa Vidyapeetham and VU, Amsterdam

Research / Funded Projects
Projects funded by Government ministries such as Department of Electronics and Information Technology (DeitY), Department of Science and Technology (DST), Defense Research and Development Organization (DRDO) and other Security focused Private Sector firms.
Research publications


- Padmashani, Devi Deth, Shiju Satyadevan, BSnort IPS (Better Snort), IEEE International Conference on Intelligent Systems Design and Application (ISDA), 2012.


About the programme

According to an estimate by the Govt. of India, the field of cyber security will require 5 Laks additional professionals. This program provides a highly effective full-fledged program on cyber security, designed for the students keeping in mind the niche technical advancements on this field and its practical applications across all the domains in today's world.

The programme provides students with many exciting opportunities in the government, industry and academia. Potential employers include government agencies, IT firms, professional services firms, financial institutions, cybersecurity consulting firms, universities where there are UG and PG programs.

This center also conducts, India's largest 'Capture The Flag’ contest (www.inctf.in) where hundreds of students are trained in cybersecurity fundamentals and compete every year.
While building a solid foundation of the fundamentals, the students are also exposed to emerging trends in the industry and are molded to become quality professionals of the future. The department is also committed towards training of students in research and in the development of cutting edge technologies.

About the programme

The department comprises of 30 faculty members who are actively involved in research. Several faculty have obtained their undergraduate, graduate and post graduate degrees from highly reputed institutes in India and abroad. The team consists of a vibrant mix of experts from the industry, academia and research organizations, who constantly inspire and motivate students to take up research projects leading to international publications. Some of our faculty have also served as visiting professors in Indian and foreign universities, and have also been invited to deliver invited lectures at various seminars.

Many faculty have come with several years of rich industrial experience in reputed companies and research organizations in India and abroad such as Bhabha Atomic Research Centre (India), Maxlinear Inc.(USA), Broadcom Corporation (USA), Synopsys Inc. (USA), Texas Instruments (India, USA), GE Global Research Centre (USA), Cirrus Logic Inc. (USA) etc.
**Faculty**

**Dr. Sundar Gopalan, Professor & Chairperson**

- Bachelor’s degree from IIT-Varanasi (Banaras Hindu University)
- M.S. and Ph.D. degrees from The University of Texas at Austin, USA specializing in the area of Semiconductor Devices and VLSI Fabrication.
- Worked in International Sematech, a semiconductor research consortium located in Austin, Texas, USA, for two years in the Advanced Gate Stack Engineering Group where he was involved in studying and designing new gate stack structures for the next generation CMOS Technology.
- Authored/co-authored more than 42 International publications.

**Dr. Jaychandran Nair (Distinguished Professor):**

- Over 42 years of Research experience in the Department of Atomic Energy, Bhaba Atomic Research Center (BARC) in the field of theoretical, experimental, computational, and strategic seismology.
- Served as the Head of Seismology Division, BARC, Mumbai for several years.
- Spent many years in teaching at Training school BARC, and guiding Ph.D students at IIT Bombay, Mumbai and Bangalore University and Amrita Vishwa Vidyapeetham University.
- He has published over 60 publications in international and Indian journals.
- His current research interests are in the fields of biomedical signal processing and speech signal processing.

**Dr. Bibhudatta Sahoo (Associate Professor):**

- M.S. from the University of Minnesota, Minneapolis, in 2000
- Ph.D degree from the University of California, Los Angeles
- He has over 8 years’ experience in leading VLSI Design companies such as Broadcom Corporation, Irvine, CA (2000-2006), and Maxlinear Inc., California, USA (2008-2010). After serving as an Assistant Professor at IIT Kharagpur in the year 2011, he joined Amrita as an Associate Professor in January, 2012.
- Has several publications in International Journals and Conferences of repute and has two US patents to his credit.

**Dr. M. R. Renu (Sr. Assistant Professor):**

- B.Tech. (Electronics and Communication) from College of Engineering Trivandrum
- M.Sc.(Engg.) from Indian Institute of Science
- Prior to joining Amrita in 2003, she has taught at College of Engineering Trivandrum and Regional Engineering College Tiruchirapally.
- Ph.D. from the Indian Institute of Technology, Bombay
- Research interests include computer vision and image processing.
Dr. Vallath Nandakumar (Adjunct Professor):
- B.Tech from IIT Chennai.
- MS and PhD from University of California in Berkely.
- Expertise in the areas of Digital IC design, Chip verification, computer system hardware validation, team management, and technical leadership.
- Around 20 years of industrial experience as a Design Manager at Tektronix, and as a Section Manager at Advanced Micro Devices.
- Actively involved in teaching and guiding the students at Amrita for the past 4 years.

Dr. Masahiro Fujita (Adjunct Professor):
- Ph.D. from the University of Tokyo
- He is a professor in VLSI Design and Education Center (VDEC) at the University of Tokyo.
- Served as director of CAD for VLSI in Fujitsu Laboratories of America for 6 years.
- He has done innovative works in the areas of digital design verification, synthesis, and testing.
- Authored and co-authored 10 books, and has over 150 publications.
- Current research interests include synthesis and verification in higher level design stages, hardware/software co-designs and also digital/analog co-designs.

Dr. Purushothaman (Assistant Professor):
- B.E. (Electrical and Electronics) from Noorul Islam college of Engineering and Technology Tamilnadu
- Ph.D. from Dhirubhai Ambani Institute of Information and Communication Technology, Gandhinagar, Gujarat (2012).
- He has 10 years of teaching experience.
- Current research interests include Analog Circuit Design, Data Converters and Optimization.

Mr. Sriram Ananthanarayanan (Associate Professor):
- Has a combined experience of over 18 years in the VLSI industry and teaching.
- B.Tech degree from Indian Institute of Technology, Bombay,
- M.S. degree from the University of California at Irvine.
- Worked for over 12 years in leading technology companies such as Synopsys, Inc and Texas Instruments both in USA and India.

Mr. Senthil Murugan (Assistant Professor):
- Bachelor of Engineering in Electronics and Communication Engineering, from Madras University
- Master of Engineering from Anna University, India,
- Has worked for more than 12 years in the VLSI industry, 10 of which have been in the US in companies such as Cirrus Logic Inc. and Onspec Electronics. He has been with Amrita since 2011.

Mr. Ramesh Bhakthavatchalu (Assistant Professor):
- B.E from Vellore Institute of Technology in April, 1994.
- M.E in Applied Electronics from College of Engineering, Anna University,
- Served as Senior Design Application Engineer in Cirrus Logic Inc., USA and Syntest Technologies, USA for 8 years.
- Over 12 years’ experience in teaching, research and guiding students.
The curriculum is organized such that it enables students to get a strong foundation on various aspects of VLSI Design such as state of the art Digital and Analog Design, Semiconductor Device Physics, Digital Signal Processing, Semiconductor Fabrication, and RF Circuit and System Design. The students are also provided with the opportunity to choose electives in their respective areas of interest such as Embedded Systems, Wireless Communication, MEMs Technology, Nanoelectronics, and Image Processing. The curriculum and syllabus are on par with leading international universities and are frequently updated to reflect the latest trends in the field.

Amrita Alumni’s are in many of the famous VLSI design groups of leading companies like SYNOPSYS, Analog Devices, Intel, Broadcom, WIPRO VLSI Division, Open Silicon, HCL, IBM, etc.

**National/International Alliances**

1. The department has extensive collaboration with various industries like
   - Analog Devices (Bangalore)
   - Austria Microsystems (Hyderabad)
   - Broadcom (Bangalore)
   - Hypres Inc. (New York), USA. These companies not only fund research at Amrita but also take selected students for 6 months to 1 year paid internship where they work on state of the art technologies.

2. Collaborations with many Indian and foreign universities like:
   - University of New Mexico
   - KTH Royal Institute of Technology, Sweden,
   - The department also has a tie-up with IIT Mumbai whereby some students are sent to IIT Mumbai every year for a duration of 4-6 months in order to utilize the Center of Excellence in Nanoelectronics facility (as part of INUP – Indian Nanoelectronics Users Program) for Research towards their B.Tech or M.Tech projects.
Infrastructure & Lab

The M. Tech. program in VLSI is equipped with the state-of-art facilities. Each M. Tech. student is provided with his individual computer throughout the duration of M. Tech programme. The lab has sufficient number of FPGA kits to train the students in complete FPGA design. The department has access to the latest tools (Cadence and Mentor Graphics), to design VLSI systems in the latest technology nodes. The department has access to the below listed technology nodes:

- IBM: 32nm SOI process
- TSMC (Taiwan Semiconductor Manufacturing Company): 90nm, 130nm, and 180nm
- United Micro Circuits: 65nm, 130nm, and 180nm
- Global foundries: 55nm

Research / Funded Projects

1. Analog Devices, Bangalore, India is funding research activities at Amrita University, Amritapuri, through which students can design, fabricate, and test a design in the latest technology. The research involves interaction with the Analog Devices team in Toronto, Canada and Boston, USA. Several Amrita students in the past two years have done 3 to 6 months internships in Bangalore where they have worked on next generation of integrated chip-sets.

2. Hypres Inc, New York, USA is actively collaborating with Amrita in developing a superconductor and semiconductor hybrid ADC. The company is open to giving paid 6 to 12 month internship to selected students in New York, USA.

3. ANURAG, DRDO (Advanced Numerical Research & Analysis Group, Defense Research & Development Organization), Hyderabad is funding Amrita Vishwa Vidyapeetham University to pursue research in designing chips for electronic warfare application. They are also open to offering 6 months to 1 year internships to selected M. Tech. students

Recent Research publications

The department places heavy emphasis on research and publication. In the past 2 years there were more than 30 International Publications – both International Conferences and International Journals, and some of the most important ones are listed below:
M.Tech. Power & Energy Engineering
M.Tech. Control & Instrumentation

Department of Electrical and Electronics Engineering

The Department of Electrical and Electronics engineering, Amrita School of Engineering at Amritapuri has the strength of 34 teaching faculty and 11 technical staff with rich range of experience in teaching, research and industry. The department began offering the B.Tech. degree in Electrical and Electronics Engineering from 2005. The present B.Tech student intake is 120. The department also offer M.Tech degree specialized in Power and Energy from 2011 and in control and instrumentation from 2014 onwards, with an intake of 25 each.

Credit based course curricula and continuous evaluation benchmark of international standards in education with a rich industry-academia interaction is followed. The curricula are updated from time to time as per recommendations by the Board of Studies. These periodic improvements ensure that students are up to speed with the latest developments and requirements in the field. The Department prides itself on rapid growth and effectiveness in implementing a healthy learning atmosphere. It actively supports research and development activities and inter-disciplinary projects.
Dr. P. S. Chandramohan Nair, Professor and Chairperson

- M.Sc.(Engg), Ph.D. in Energy Studies from IIT Delhi
- 30 years of academic experience and a few years in research organizations and industries
- Served as Principal in Government Engineering Colleges in Kerala.
- Published more than 65 technical papers out of which 30 are in reputed International Journals and Conference Proceedings of IEEE(U.S.A.), IEE(U.K.), Taylor & Francis (London), Elsevier (U.K.) etc.
- Won four awards from the Government of Kerala.
- Recipient of the premier Award, “Prof. K.M Bahauddin Award for the Best Engineering Teacher of Kerala” presented to him in 2012.
- Served in several senior positions in the state of Kerala.
- Was Director of ANERT (Agency for Non-conventional Energy and Rural Technology).
- Served as Head of Research and Development wing of the Energy Management Center, Govt. of Kerala.
- His numerous talks and scripts on science and technology related topics have been featured on All India Radio and on several television programs.
- Research Interests include: Energy Conservation, Energy Management, Power Systems

Dr. P. Kanakasabapathy
Associate Professor and Vice-Chairperson

Qualification: M.E. (Applied Electronics), Ph. D. (Electrical Engineering, IIT Madras)
Publications: 5 Journals and 15 conference publications
Research Interests: Power Electronics Application to HV/EHV systems, Information Technology Application to Power Systems - Smart Grid, Market Operations in Restructured Power Systems.

Dr. Manjula G. Nair
Professor

Qualification: M.Tech. (Power Systems), Ph. D. Power Electronics (Power Quality)
Publications: 7 Journals and 17 conference publications
Funded research projects: 2
Research Interests: Power Quality, FACTS, Fuzzy & ANN Control, Renewable Energy Sources.
The Department of Electrical & Electronics Engineering is credited with state-of-the-art laboratories. Major laboratories include Electrical Machines, Power Electronics, Power Systems, Electrical Measurements, Control & Instrumentation, Energy Engineering and Robotics. The department has well equipped Electrical & Electronics Workshop and an Equipment Repair Centre. The laboratories are also equipped with most modern software for simulation and research. Internet services with Wi-Fi connectivity and digital library are available to all students and faculty.

Control and Instrumentation Lab provides students with knowledge on various transducers and their applications, PC based control applications etc. This lab is equipped with advanced digital control trainer kits like Microcontroller and MATLAB based servo and stepper motor drive, Microcontroller based control for controller tuning, process control trainer, temperature control trainer, level and flow control trainer. The lab is equipped with dead weight pressure gauge, LVDT, strain gauge, magnetic pickup etc, and softwares like Lab-View, MATLAB, ORCAD etc.

International Alliances
After the successful completion of two semesters, students can avail the option to apply for a dual Master’s programme in VU and study for a Dual degree programme with Vrije University, Netherlands.

Faculty members in the department of electrical and electronics engineering are working in various research projects in their distinguished area of interest. Specific research projects include drainage power recovery from distribution transformers, dc micro grid, smart grid, renewable energy integration to power grid etc. All B.Tech./ M.Tech. students are also encouraged to work with ongoing research projects within the department as well as inter-disciplinary projects outside the department.

Faculty members and students of department of electrical and electronics engineering have published numerous technical papers in reputed transactions, international journals and conferences. Many faculty members are reviewers to reputed international/ national level publications.

The Department has started in 2013 an annual Conference called, Technological Advancements in Power and Energy (TAP Energy) to be held every year. All B.Tech./M.Tech. Students are encouraged to publish their final year dissertation in international journals and conferences.
About Power & Energy Engineering programme
Recent progress in new and renewable energy technologies together with the restructuring and deregulation of electric utilities have paved the way for unprecedented challenges and wide scope for research in power and energy systems and open up new opportunities to young Power Engineers. Conventional Power system is redefined and power electronic components are incorporated along with the existing system. This includes flexible ac transmission and HVDC links embedded in the conventional ac power transmission networks etc.
Further, use of renewable energy such as solar and wind power, coupled with higher efficiency and conservation, will be the key factors to a sustainable world for future generations.

M. Tech. program in Power and Energy Engineering aims to explore the above mentioned challenges and also initiate research activities. This program provides necessary theoretical background with a good blend of applied mathematics along with in-depth coverage in analyses of power and energy systems. The core courses include sustainable, economic, efficient and reliable energy conversion, generation, transmission, distribution, storage and utilization of electric energy, including application of power electronics in power system operation and control.

Completing the course, students will be eligible for the fulfilling the requirement of engineers for design, installation and operation in electric power industries including renewable energy sector. They can also be assets to several scientific and R&D organizations.
About Control & Instrumentation

Control & Instrumentation has wide range of applications starting from day to day life to space exploration. In today's information age, many businesses are placing increasing demands on real time data accessibility in order to improve business planning and decision making, and to access information that can demonstrate their economic and environmental performance. Rapid advancement in technologies also provides challenges as businesses need assurance that their control system investments will deliver efficient operational performance of their plants and economic returns, with minimal risk of technological obsolescence. Hence control & instrumentation systems not only play important roles in plant operation, but also in reducing the cost of production while maintaining and/or enhancing safety. Therefore, it is extremely important that control & instrumentation systems are managed efficiently and economically. With the increasing use of digital technologies, new methods are needed to solve problems associated with various aspects of digital control systems.

Control systems as an interdisciplinary subject, is essential for almost all engineering branches, especially for electrical, mechanical, and chemical streams. So, opportunities are plenty for control engineering students in all these diversified areas. Talented students can grab opportunities in aerospace engineering also. It finds applications in automobile industry, robotics, navigation and chemical process control.

Looking into instrumentation side, it is a very basic and essential background for all the above mentioned application fields. For implementing control techniques in industry, instrumentation systems are essential. Combined with fastly growing embedded technology, control theory can create wonders. There is shortage of qualified personnel in this area compared to the great demand for control & instrumentation engineers.
M.Tech. E-Learning Technologies

Amrita E-Learning Research Lab

The M.Tech in E-Learning Technologies program is offered by Amrita E-Learning Research Lab (AERL) in association with the Department of Computer Science. The program offers core computer science courses along with courses in Advanced Internet Technologies, User Interface, User Psychology, and Educational Technology.

In this unique program, you will learn to create applications such as YouTube, Facebook, Skype, Video Chat, Twitter, Advanced Websites and Multimedia Games with interesting and novel User Interfaces.

Amrita E-Learning Research Lab has huge funded projects from Govt. of India and 150 staff working in advanced areas of E-Learning technologies. The lab offers lots of opportunities for the students to work with in-house experts who have global experience. These invaluable interactions give students the knowledge and self-confidence to become Designers and Architects of large software systems with a human touch.

The E-Learning Lab works on the research and development of online collaboration tools with video conferencing, content, assessment and interaction. The Lab has built an Online Collaboration platform called A-VIEW for online classrooms and meetings. This is a major national project funded by the Govt. of India. The A-VIEW product is having a big impact on society, it is currently used by 450 universities and 3500 colleges all over India, and expected to grow to 20,000 colleges.
Prof. Kamal Bijlani, MS
Associate Professor & Director
- Bachelor of Engineering in Electronics from BITS Pilani
- Masters in Computer Science from Michigan Technological University
- Architect of A-VIEW (Amrita Virtual Interactive E-Learning World)
- Previously, CEO of Advanced Multimedia Software, USA
- Research, Artificial Intelligence Systems, Cambridge, USA (Startup from MIT)
- Scientist Cimflex Texknowledge, USA (Startup from Stanford University)

Shiffon Chatterjee, Ph.D
Assistant Professor
- Ph.D from the Centre for Educational Technology, IIT Kharagpur
- Researcher with the Hole-in-the-Wall Education Limited, New Delhi
- Research interests: Educational Psychology, Pedagogy, Technology-enhanced learning

Sindhumol S., Ph.D
Senior Research Associate, Amrita E-Learning Research Lab
- M.Tech in Computer Science (Digital Image Computing) from the University of Kerala.
- Ph.D in Biomedical Image Analysis from CUSAT
- Worked as Senior Software Engineer (Team Lead)

Adjunct/Visiting Faculty

P. Venkat Rangan, Ph.D
Vice Chancellor, AVVP
- Gold medalist from IIT Madras
- Internationally recognized pioneer of research in Multimedia Systems and Internet E Commerce.
- Has over 75 publications in International (mainly IEEE and ACM) Journals and Conferences, and also holds over 20 US patents.

Bharat Jayaraman, Ph.D
Professor
- Bachelor and Masters degrees from IIT Madras
- Ph.D in Computer Science from University of Utah, USA
- General co-chair, International Conference on Distributed Computing and Network (ICDCN), 2014
- Guest Editor, Computer Journal, published by Oxford University,

Disney’s ‘Frozen’ wins animated feature Oscar

Mr. Rajesh Sharma
Animation Lead,
Technology Manager
Walt Disney Animation Studios
He has been with Disney since 1998
Infrastructure and Lab

Amrita E-Learning Research Lab with 150 staff members has one of the biggest funded projects in India. The major areas of research and development are: online collaboration, video technology, networks, multimedia content and sharing, interactive games, pedagogy, image recognition, knowledge representation. There are teams in Quality Assurance, Support and Deployment.

The Lab has advanced infrastructure for product development: over 200 computers, local and cloud servers, elearning studios, and demonstration areas. Individual computers are provided to all students for their assignments and project work. The staff members of the lab work with the students on various projects, and provide the practical and industry edge in the training of the students.

There is a modern E-Learning Studio that is sound proof with custom lighting. It has a variety of equipments for audio, video, mixers, image recognition, and transmission of high quality classes for distance education. The students can use the studio for their projects and research. This studio allows highly interactive video conferencing between many places all over the world.
Funded projects:
The E-Learning Research Lab has several funded projects. Some of the main projects are A-VIEW, Pedagogy project, and the Online Entrepreneurship project.

**A-VIEW: Used in over 3,500 colleges and 450 universities.**

A-VIEW (Amrita Virtual Interactive E-Learning World) is the main funded project of the lab. A-VIEW is known globally and is widely used by teachers, administrators, and students.

A-VIEW enables students from various locations to interact with teachers in a highly immersive e-learning environment. The software is given free of cost to all higher education institutions in the country. Currently more than 450 universities and 3500 colleges use A-VIEW. It is also used in schools, vocational training and government departments.

A-VIEW can connect large number of users all over the world. The instructor can share documents, whiteboard, animations, videos, quizzes with the learners. The learners can interact with the instructor in a variety of ways like chat, handraise, questions, audio/video, whiteboard, etc.

Prof. Deepak Phatak (Padma Shri) from IIT Bombay has been using A-VIEW to train teachers for several years. Recently, Prof. Phatak started a new national program where 10,000 teachers from all over India are trained simultaneously using the A-VIEW platform. Together, IIT Bombay and IIT Kharagpur have trained over 50,000 teachers.

Prof. Jhunjhunwala (Padma Shri) from IIT Madras has started a new national program for improving the quality of engineering colleges in India. In this program, outstanding professors from various IITs use A-VIEW to teach live online courses to 100 colleges at the same time. Overall, a few thousand students attend the various offered courses simultaneously.

The goal of the National Pedagogy Project lead by IIT Kharagpur is to design and build the curriculum so that it is clear what has to be learned from each module of a course. The intention is to systematically design and develop learner-centric syllabus. This is being done at Amrita for several courses.

The Connect ONE project is aimed at bring together entrepreneurs from all over India under a single platform. A-VIEW is used to hold online seminars and meetings.
About the program

Learn to create applications in Social Collaboration such as Video Chat, Twitter and Facebook, Massive Multimedia Projects such as YouTube, Multimedia Games and Online Open Courses such as Coursera etc. Become a Designer or Architect of large online software systems with a human touch. E-Learning Technologies is part of Computer Science with courses in Learning Sciences such as Pedagogy, Psychology of User Interfaces.

International Alliances

The E-Learning Research Lab has collaborations with various international universities such as MIT, State University of New York Buffalo, Deakin University Australia, Arizona State University and University of Maryland College Park.

Research

E-Learning Research Lab is currently undertaking research in areas such as Smart Classrooms, Image Recognition, Real Time Collaborative Multimedia, Knowledge Representation, Concept Maps and Multimedia, Content Based Indexing, Architecture for Collaborative Environments etc.
M.Tech. Thermal & Fluids Engineering
Department of Mechanical Engineering

About the programme

As the energy and process sector in India is in a boom, the need of the hour is engineers with strong background in thermal and fluid sciences capable of carrying out conceptual design. The program is aimed at providing sufficient theoretical, computational and experimental knowledge in the thermal and fluid sciences. It also encapsulates simulation and experimental skills applied to IC engines, power plant, aerospace and gas turbines research. The program is designed to equip students to perform design related to linear and non-linear steady state/ transient heat transfer, steady and unsteady fluid flow, multi phase flows, fluid structure interactions viz., estimation of thermal and pressure loads and coupled field analysis. The program provides required numerical simulation techniques for design and analysis of equipments like gas turbines and accessories, steam turbines and reactor pipes, heat exchangers, compressors, turbines, pumps, propellers, rotor stator interactions, flow separators, inlet manifolds, volutes, turbo chargers etc. The course also introduces the student to experimental techniques like flow visualization, combustion diagnostics, particle characterization and other recent imaging techniques adopted in the field of thermal research. The department actively collaborates with Indian Space Research Organization (ISRO) and National Aerospace Labs (NAL) and students work in projects at these institutes of National repute for their final M.Tech thesis. Some students have also been selected for international student exchange programs (Polytechnico de Milano, Italy, University of California, Davis etc.) where they do their final M.Tech thesis work. Students will be eligible for the post of design engineers in industries related thermal and fluid sciences and also suitable for R&D organizations.

Major Laboratories in the department

- Fluid Mechanics & Machines Laboratory
- Thermal Engineering Laboratory
- Manufacturing Engineering Laboratory
- Heat & Mass Transfer Laboratory
- Advanced Metrology Laboratory
- Computer Aided Design Laboratory
- Computer Aided Engineering Laboratory
Infrastructure & lab

- **Graduate lab in Fluid mechanics**
  - Wind Tunnel
  - Water Channel
  - Hele-shaw apparatus
  - Computerises Axial Flow
    - Compressor / Blower test rig
  - Computerises Centrifugal
    - Compressor / Blower test rig
  - Gas turbine test rig
  - Forced / Free Vortex Apparatus

- **Graduate lab in Thermal Engineering**
  - Thermal Power Plant consisting of Boiler, Steam turbine, Alternator & surface condenser.
  - Air-condition test rig
  - Boiling heat transfer
  - Heat pipe Apparatus
  - Condensation heat transfer
  - CHF Apparatus

- **CAE/CAD Labs**
  - Ansys® 14.5 Structural Analysis
  - Algore®
  - Solid works®
  - Creo®
  - Cadian®

- **CFD Lab**
  - Ansys® 14.5 Fluent®
  - Ansys® 14.5 CFX®
  - Ansys® 14.0 ICEM-CFD®
  - Thermal Analysis (Conduction, Convection, Radiation & Phase change)
Faculty

Dr. Balakrishnan Sankar
Professor and Chairperson & Associate Dean
Ph. D. (University of Texas at Austin, USA)
Research Interests: Materials Science

Dr. K. Sankaran
Professor & Principal
Ph. D. (IITM)
Research Interests: Thermodynamics, Fluid mechanics.

R. Rajesh
Assistant Professor and Vice Chairperson
B. Tech., M. B. A.
Research Interests: Supply-Chain Management, Manufacturing Engineering

Dr. Vivek Mahadeorao Wasekar
Professor
Ph.D. (University of Cincinnati, USA)
Research interest: Solar Thermal, Thermal Hydraulics

Dr. Ajith Kumar
Professor
Ph. D. (IITM), Post-Doc (KNU, South Korea), Post-Doc. (U.Michigan, Ann Arbor)
Research Interests: Fluid-Structure Interaction, Shear Layer Instability, Vortex Flows, Turbomachinery

Dr. Jayakumar J. S.
Professor
M.Sc. (Engg.) (IISc. Bangalore)
Ph.D. (IITB)

Dr. Jyothi S. N.
Professor
M. Sc. (Engg), Ph. D. (IITM)
Research Interests: Process Control and Environmental Engineering
M.Tech. Robotics
Amrita Multi Modal Applications Using Computer Human Interaction Labs

About the Department / Center

Ammachi labs is a multidisciplinary research center of Amrita University with a focus in technological innovation for social impact in the field of computer-human interaction, haptics, multimedia and virtual reality, with application areas in education, healthcare, defense and disaster preparedness. Even as India's economy booms, and the demand for skilled workers rises, vocational training in India is effectively paralyzed by social stigma, budget constraints and inadequate numbers of trainers and materials. Born out of the demand for accessible, standardized vocational education in India, available at dispersed locations to a diverse population, Ammachi Labs has developed full-package solutions which can address the most crucial areas in the way of meeting India's training goals: multi-media enriched computerized training modules and life enrichment education curriculum, groundbreaking uses of haptic technologies, and a first-of-its-kind solar-powered Mobile Vocational Education (MoVE) unit. Ammachi labs extends Amrita University's unswerving focus on providing effective value-based education to include skill development at all levels and in numerous disciplines.

Short bio / details of the Head / Chairperson

Bhavani B, the Director of AMMACHI Labs, spearheads the pioneering work on technology enhanced learning and computerized vocational education and training delivered through multimedia rich applications and innovative haptic simulations. A Physicist with Masters of Science in Physics from the University of Lagos, Nigeria and a second Masters degree in Radiation Oncology from Wayne State University, USA, she has a deep interest in alternative forms of learning that has been the main theme in much of the work she has guided and produced. She was, in 2012, nominated to be among the top ten young innovators of India.
**Prof Bhavani B**
- **Director**, AMMACHI Labs, Amrita Vishwa Vidyapeetham
- Qualification: Master of Science in Physics, University of Lagos, Nigeria and Masters in Radiation Oncology, Wayne State University, USA
- Research interests: Human computer interaction, learning technologies, disaster risk reduction, vocational education and training

**Dr. Balakrishnan Shankar**
- **Associate dean**, Amrita Vishwa Vidyapeetham and Professor and chairperson, Mechanical engineering
- Qualification: Ph.D., Mechanical Engineering, University of Texas at Austin, USA
- Research interests: Materials science

**Dr. Ganesh Udupa**
- **Professor**, Mechanical engineering
- Qualification: Ph.D., Mechanical Engineering (Precision engineering and metrology), Indian Institute of Technology, Chennai, Post doctoral research fellowship, Nanyang Technological University (NTU), Singapore.
- Research interests: Robotics, precision engineering, optical instrumentation, nanometrology

**Srinivasan Shankar**
- **Senior researcher**, AMMACHI Labs
- Qualification: M.Tech, Mechatronics, National University of Singapore, Singapore
- Research interests: Mechatronics design

**Dr. Ramachandra M. Kaimal**
- **Professor and Chairperson**, Computer Science and Engineering, Amrita School of Engineering Amritapuri
- Qualification : PhD
- Research Interests: AI, Image Processing, Machine Learning Algorithms, Pattern Recognition, Data Compression and Coding Algorithms

**Dr. Latha Parameswaran**
- **Professor and Chairperson**, Computer Science and Engineering, Amrita School of Engineering Coimbatore
- Qualification: MCA, PhD
- Research interests: Image Processing, Image Mining, Image Security
Dr. C. Shanmugha Velayutham
- **Associate Professor**, Computer Science and Engineering, Amrita School of Engineering Coimbatore
- Qualification: PhD
- Research interests: Computer Vision, Evolutionary Computing

Dr. Sreeja V.K.
- **Assistant Professor and Chairperson**, Mathematics department
- Qualification: M. Phil., Ph. D.
- Research Interests: Algebra

Dr. Anand Ramachandran
- **Professor**, Amrita Center for Wireless Network and Applications
- Qualification: Ph.D., Electrical and Computer Engineering, University of Texas at Austin, USA
- Research interests: Low power design, reliable computing embedded systems and applications for the benefit of mankind

Preetha P K
- **Assistant Professor**
- Qualification: M. Tech. (Power Systems)
- Research Interests: Power Systems, Control Systems

Ajith Peter
- **Visiting professor**, Amrita Vishwa Vidyapeetham
- Qualification: M.Tech. Computational Engineering, Center for Excellence in Computational Engineering and Networking, Amrita Vishwa Vidyapeetham
- Research interests:
  - Computational engineering, embedded systems, software defined radios

Gayathri Manikutty
- **Senior researcher**, AMMACHI Labs
- Qualification: Master of Science, Electrical and Computer Engineering, University of Texas at Austin, USA
- Research interests:
  - Embedded system design, and robotics

Unnikrishnan R
- **Research associate**, AMMACHI Labs
- Qualification: MCA, Amrita School of Engineering, Amrita Vishwa Vidyapeetham
- Research interests: Intelligent tutor systems, medical rehabilitation, motor control and learning
Infrastructure & Lab

- Robotics and Control Systems Lab
- Embedded Systems Lab
- Machine vision and machine learning lab
- Automation lab

International Alliances

*Ammachi Labs has international collaboration with universities in US and Europe including*

- Stanford University
- University at Buffalo, The State University of New York
- University of Michigan
- University of New Mexico
- University of Maryland
- Memorial Sloan-Kettering Cancer Center
- Technische Universität München (TUM), Germany
- Ecole Polytechnique Federale De Lausanne (EPFL), Switzerland
- National University of Singapore
Research / Funded Projects.

Computerized Vocational Education Training using Haptics (SAVE):

The goal of the SAVE project is to foster technological innovation in vocational training to help alleviate poverty and to preserve dying skills. SAVE has developed educational applications using multimedia, virtual reality and haptic technologies.

Women Empowerment (WE): a UNDEF funded project for Life Enrichment and Vocational Education Training

AMMACHI Labs has empowered over 3,000 women with the ability to participate in the democratic process through providing vocational and life enrichment education through ICT and CVET (Computerized Vocational Education Training).

Mobile Vocational Education (MoVE):

AMMACHI Labs has developed Mobile Vocational Education – MoVE, which utilizes fully equipped vehicles powered by solar energy to provide vocational education to logistically and geographically diverse areas. The deployment methodology and outreach varies from rural areas to tribal regions.

Selected publications include

About the programme

Robotics, the branch of technology that deals with the design, construction, operation, and application of robots, has become a highly relevant and upcoming discipline. It is being increasingly applied to almost every field of activity including improving the standard of living of humans, handling dangerous and hazardous situations, relieving mankind of repetitive and tiring activities, exploring outer space and performing complex medical procedures. Many industries also use robots in their manufacturing facilities and research. For instance, robots are used in areas like high heat welding and continuous handling of heavy loads. They can function tirelessly even in the most inhospitable working conditions. Owing to this, robots are taking over from man most of the manipulative, hazardous and tedious jobs in factories, mines, atomic plants, space ships, deep-sea vessels, etc. The automation of work through robotics has led to substantial increase in productivity in these areas.

The Amrita University Robotics and Automation M.Tech program is unique in that it provides an academic curriculum that pulls from mechanical engineering, electronics and instrumentation engineering and computer science disciplines, exposing the students to the breadth of and interdependence among the engineering disciplines and offering the students exactly what is required to master the technical knowledge required.

This programme will provide a comprehensive educational environment and enable students to gain expertise in next generation robotics and automation systems. By exposing our students to course work from multiple disciplines and preparing them to think about robotics from a holistic approach, our program will prepare a skilled industry workforce as well as expert researchers who will be able to provide leadership in a world that is increasingly dependent on technology.
About the Center

Amrita Center for Wireless Networks & Applications (AmritaWNA) is a leading edge research center focused on the emerging fields of wireless networks, wireless sensor networks (WSN), wireless technologies including 3G, 4G, and LTE. Guided by the Chancellor of the university, Sri Mata Amritanandamayi, AmritaWNA develops scientific and technological applications for practical humanitarian benefit. AmritaWNA integrates interdisciplinary research areas such as computer science, electronics and communication, electrical engineering, mechanical engineering, information technology, geology, hydrology, environmental engineering etc., to develop cost effective solutions to solve common man’s problems. The Center won the national rural innovation award - ‘NABARD Award for Rural innovations 2012’ from the Honorable Finance Minister Shri. P. Chidambaram for developing and deploying the wireless sensor network system for landslide detection and early warning.

The AmritaWNA Center runs MTech and PhD programmes in Wireless Networks & Applications. The MTech programme is intended to generate trained academic and research personnel in the highly demanding, useful and emerging area of wireless networks. Building on a very successful joint project called WINSOC with about a dozen international partners, this new M-Tech program was introduced with a view to strengthen the academic and research activities in this highly advanced topics: Wireless Networks and Applications. Currently the Center has 19 PhD Scholars. Students are groomed to enter into a broad spectrum of industries such as computers, communication networks, wireless communications, wireless networks, mobile computing, signal processing, earth sciences, environmental sciences, disaster management, health care, e-governance activities, embedded systems, agriculture and chemical industries and strategic planning.

By working in the center on real time projects, they are exposed to research culture in the initial stage itself. This helps them to understand and develop solutions that cater to the societal problems. This has lead to several international publications and patents by M.Tech students. Each student has published at least one publications during their MTech program. The Center has the highest number of publications in the University within a short span of time, a total of 87.

Reputed Professors and Technology Professionals from world over (SUNY, VU, UC Davis, Qualcomm, NEC, Fujitsu etc.) are Adjunct Faculty members at the Center. They are closely involved in the course formulation as well as in teaching the students, thus making this a very privileged and unique department in the University. A number of one of a kind laboratories help the students in excelling in the practical aspects of the subjects as well.

Amrita in Top 5 at UNAOC Challenge: ‘Sanskar’, an interactive Android app, developed by Amrita Center for Wireless Networks and Applications was shortlisted among the top five finalist applications in the 2012 Create UNAOC Challenge, an international competition for app developers that sought to introduce new avenues for intercultural dialogue.

Amrita TBI Innovation awards : Mr. Danesh Raj and Ms. Keerthi, students of MTech WNA, received Amrita TBI innovation awards 2013 for their innovative project proposal. Mr. Dhanesh has received the initial seed funding from the TBI to implement his design.
Dr. Maneesha Vinodini Ramesh, Director
Qualification: Ph.D.
Experience:
- Founding Director of Amrita Centre for Wireless Networks and
- Editor for the Ad-Hoc Networks Journal published by Elsevier and CSI Transaction on ICT published by Springer.
- Secretary, ACM-W India Council, and Vice-Chair of IEEE ComSoc, Kerala Section
- Head of the Computer Science and Engineering department of Amrita University, Amritapuri in 2004-2006. She is in the teaching profession for more than 10 years.
- Her research work was instrumental in deploying the first ever Wireless Sensor Network System capable of issuing landslide warnings that will save human life.
- Has been visiting several international Institutions like University of California, UT Dallas, VU University, Qualcomm, USA., University of Buffalo etc., to deliver distinguished lectures on her research in wireless sensor network area.
- Received the national rural innovation award from NABARD for her pioneering work in developing and deploying a world class wireless sensor network for real-time monitoring, detection, and early warning of landslides in 2012.
- Senior Member of IEEE(2013) and ACM (2013).
- Publications: Dr. Maneesha Ramesh has over 63 publications in International Journals and Conferences.
- Patents: Dr. Maneesha has currently filed two patent applications.

Dr. Venkat Rangan, Vice Chancellor
Qualification: Ph.D.
Areas of Interest: Multimedia, Wireless Sensor Network
Experience: Dr. Rangan founded and directed the Multimedia Laboratory and Wireless Networks Research at the University of California, San Diego, (UCSD) where he served as a Professor of Computer Science and Engineering. He is an internationally recognized pioneer of research in Multimedia Systems and Internet E Commerce. Several startup companies have emerged from Dr. Rangan’s Multimedia Lab: these include: San Diego based Intervu (1995) and InnovaTV (1997), successful pioneers in Internet video streaming. In 1993, Dr. Rangan founded the first International Conference on Multimedia: ACM Multimedia 93, for which he was the Program Chairman. This is now the premier world-wide conference on multimedia. Dr. Rangan also founded the first International Journal on Multimedia: ACM/Springer-Verlag Multimedia Systems, which is now the premier journal on Multimedia.
Awards: Dr. Rangan is also the Fellow of ACM (1998), youngest to achieve this international distinction and he has been awarded with NSF National Young Investigator Award (1993),
The NCR Research Innovation Award (1991), and The President of India Gold Medal (1984). In July 2000, Internet World featured Dr. Rangan on its cover page and named him as one of the top 25 Stars of Internet Technologies. In August 2012, Silicon India ranked Dr. Rangan as one of the “50 Indians Who Redefined Entrepreneurship in the Last 65 Years of Independence”.

Publications: Dr. Rangan has over 85 publications in International (mainly IEEE and ACM) Journals and Conferences.

Patents: 22 US Patents.

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**Dr. Seshaih Ponnekanti, Professor**

**Qualification: PhD**

Areas of Interest: Wi MAX, GPRS, Femtocells, 4G, 3G, LTE, cooperation schemes between Radio Access Networks (RAN), Cross-Layer Radio Access Design,

Experience: Consultant to DUNE-Italy from May 2003 to date, Principal Engineer in Fujitsu, UK April 2000 to May 2003, Engineer/Senior Engineer/Principal Engineer in ERA Technology Ltd, UK since May 1996- March 1999.

Publications: has several publications including 29 international journal publications.

Patents: (1) Communication system (patent granted in the UK: GB0412276.8), (2) Method and Apparatus for Setting an Uplink Transmit Power Level for a Wireless Communication Unit (patent granted in the UK GB 2462063), (3) Location concealment (patent under processing), (4) Resource Management (patent under processing)


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**Dr. Sudhakar Raghavan, Professor**

**Qualification: PhD**

Areas of Interest: MiMO, Digital Signal Processing

Experience: 30 years of long experience in various industries and Universities like Florida Atlantic University, Boca Raton., and Inte corp.

Awards: 2nd Annual Governor’s Award for Outstanding Contributions to Science & Technology by Florida High Tech council, 7 Divisional recognition awards at Intel

Publications: More than 110 publications

Patents: 6 nos

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**Dr. Nirmala Vasudevan, Associate Professor**

**Qualification: Ph.D.**

Areas of Interest: Landslides, Neutrino Phenomenology; Supersymmetry and Grand Unification
Dr. Anand Ramachandran, Professor
Qualification: Ph.D., Electrical and Computer Engineering from UNIVERSITY OF TEXAS AT AUSTIN Austin, TX.
Experience: 15 years of experience in various international companies like National Instruments, Texas., Sun Microsystems, California., Intel Corp., Texas.
Publications: 10 international publications

Dr. Kalyan Sasidhar P. S., Assistant Professor
Qualification:PhD in Computer Science from University of North Texas-Denton, Texas
Areas of Interest:Pervasive computing, Context aware computing
Publications : 10 international publications including 4 International journal.
Experience : Previously working with Nanyang Technological University, Singapore.
Awards and Scholarships :-
Winner of university wide competitive Graduate Students Impact Award 2012.
Research Fellowship on NSF CRI Grant, 2010-2011.
Research Fellowship on MRI Scholarship Grant, 2009-2010
Research Assistant scholarship for academic years 2007-2009
UNT Doctoral Academic Achievement Scholarship 2007.

Prof. K. A. Unnikrishna Menon, Professor
Qualification: PG in Physics with Electronics as special subject.
Experience: Teaching: 7 years at graduate level.
Awards: a) DRDO Award for project PANCHENDRIYA from Scientific Advisor to Raksha Mantri (SA TO RM) –Dr. APJ Abdul Kalam. – “Induction of first indigenous state- of-the art sonar to the service”.
 b) DRDO ‘AGNI’ Award for excellence in self reliance from SA to RM –Dr. M. Natarajan – “Design and development of sonar system for fitment on submarines”.
c) NPOL Golden Jubilee Award for : a) Development of state- of- the-art transducer for a Sonar System, b) Demonstrating Underwater Telephone on Naval platform, c) NPOL Award for Field service
Prof. Balaji Hariharan, Associate Professor
Qualification: M.S. from Temple University, USA
Areas of Interest: Multimedia, Video Codecs, Video Streaming, IPTV, Wireless Networks
His areas of research include video and multimedia applications in Wireless areas. He was previously a Director at Kasenna, a worldwide Leader in Video-on-Demand Systems and Applications. Prior to that he was in various Engineering and Management positions at National Semiconductor Corporation, USA, Cirrus Logic, Inc, USA and Information Gateways Corporation, USA.
Publications: 9 international publications.

Prof. Sethuraman Rao, Associate Professor
Qualification: MTech, Computer Science from IIT Madras
Areas of Research: progressive technical and management experience in high-tech product development involving hardware systems, embedded software systems (C/C++) and applications for Enterprise switching, Carrier Ethernet, IP/MPLS, ATM networking technologies and enterprise Java applications. Over 12 years of first and second level engineering management experience including management of offshore teams and outsourced projects. Solid SDLC experience bringing multiple carrier-class systems and applications to market. Technical experience with distributed embedded systems and Java/J2EE and XML/SOAP based applications. Domain expertise in enterprise switching and system and network management.
Experience: More than 20 years of industrial experience with JUNIPER NETWORKS, Sunnyvale, CA, Campus & Branch BU (CBBU), RIVERSTONE NETWORKS / LUCENT TECHNOLOGIES, Santa Clara, CA.

Dr. Prasant Mohapatra, Professor, Department of Computer Science
Interim Vice-Provost and CIO, University of California, Davis
Qualification: PhD
Areas of Interest: wireless networks, sensor networks, Internet protocol, and quality of service,

Dr. Maarten van Steen, Professor
Department of Informatics, VU University Amsterdam
Qualification: PhD
Areas of Interest: Distributed System, Pervasive Computing, Ubiquitous Computing
Dr. Naga Bhushan, Vice President  
Qualcomm Wireless MIMO Communication Systems  
Qualification: PhD  

Dr. Dilip Krishnaswamy, Senior Researcher  
IBM Research Labs, Bangalore, India  
Qualification: PhD  
Areas of Interest: cognitive systems, smarter planet systems, nanoscale information processing, edge processing systems, distributed data centers, hierarchical distributed analytics, wireless distributed computing, parallel processing, and nano-biological networks

Dr. Balakrishna Prabhakaran, Professor  
School of Engineering and Computer Science, University of Texas at Dallas  
Qualification: PhD  
Areas of Interest: video and health-care data analytics; (ii) streaming of 3D video, animations, and deformable 3D models; (iii) content protection and authentication of multimedia objects; (iv) Quality of Service (QoS) guarantees for streaming multimedia data in wireless adhoc and mesh networks; and (v) collaborative virtual environments.

Dr. Masahiro Fujita, Professor, University of Tokyo  
Qualification: PhD  
Areas of Interest: Computer Aided Design (CAD) for VLSI and Embedded Systems, Formal Verification of Hardware and Software, High performance computing with programmable devices
International Alliances

AmritaWNA has international collaborations with reputed universities and industries. Several research collaborations have been developed with UC Davis, EPFL, UPC, ETH, University of Tokyo, University of Mannheim, TUM, University of Roma, UT Dallas, MIT, Oxford etc. The faculty, researchers, and students get the opportunity to work with the international collaborators and develop their research problems and solve it jointly.

Masters students at AmritaWNA receive the opportunity to join for international dual degree programs. The students who complete two semesters of M.Tech. (WNA) can avail the option to apply for a dual Master's Degree program with the following universities:

- Vrije University, Amsterdam, Netherlands
- Universitat Politecnica de Catalunya (UPC), Barcelona, Spain
- University of New Mexico, USA

The PhD students at AmritaWNA receive the opportunity to do joint PhD with international universities, and be part of collaborative research projects.

The students, researchers also get the opportunity to work for short term periods at industry, collaborate with them in joint projects etc. Some of the industry collaborators are Analog Device, Maxim Integrated Ltd, Qualcomm, IBM, TCS etc.
Student Achievements:
Ms. Uma G (2010-2012) had completed her dual degree with VU and Amrita. Ms. Aryadevi and Ms. Sreedevi, PhD scholars at AmritaWNA received an opportunity to work as interns at Distributed Systems Group at ETH, Zurich.
Mr. Dhanesh, and MS. Keerthi of Mtech 2012-2013 batch became the winner of bright ideas in Amrita TBI Innovation Contest. Along with that Mr. Dhanesh received seed grant from AmritaTBI to implement his research project.
Ms. Aryadevi R D selected for TCS Research Scholarship Cycle-7. She is a Research Associate at AmritaWNA.

Research Projects
AmritaWNA being one of the youngest center at Amrita, has the highest number of collaborative funded projects at the University. The Center has 9 projects including successfully completed 3 projects.
1. Wireless Sensor Network with Self Organization Capabilities for critical and emergency applications (WINSOC), Funding Agency: European Commission
2. Satellite Network for Wireless Sensor Network for Landslide Detection, Funding Agency: ANTRIX (a commercial arm of Indian Space Research Organization, ISRO)
3. Wireless Sensor Network for Real-time Landslide Monitoring, Funding Agency: DIT, India (Department of Information Technology)
4. Indo-Brazil Joint Research Project on Wireless Networks and Techniques with Applications to Societal Needs, Funding Agency: Department of Science and Technology (DST)
5. Monitoring and Detection of Rainfall Induced Landslide using an Integrated Wireless Network System, Funding Agency: Department of Science and Technology (DST)
6. NKN: A Gateway to Global Classroom, Funding Agency: Funding Agency: DeitY, India (Department of Electronics and Information Technology)
9. Indo-European Joint Research Project on Stabiliz-E (Stabiliz-Energy), Funding Agency: Department of Science and Technology (DST) and European Commission
Wearable Wireless Sensor Network - Healthcare Applications

In discussions with Amrita University’s Centre for Wireless Networks & Applications (AmritaWNA), Amrita University’s chancellor, Sri Mata Amritanandamayi Devi (Amma), stressed the need for developing technology to help India’s poor avail of quality medical treatment. Then, in order to help people with cardiac conditions avail of real-time, ECG-monitoring without hospitalization, AmritaWNA has designed a prototype for a low-cost, low-power, wearable ECG-monitoring device called Amrita Spandanam. It was launched by Honourable Chief Minister of Gujarath Shri. Narendra Modi on September, 2013 at the eve of AMMA’s 60th Birthday celebrations. Wireless Sensor Network for Landslide Detection AmritaWNA is one of the pioneers in the research and development of a Wireless Sensor Network for Real-Time Landslide Monitoring. Known for its successful completion of the Indo-European WINSOC project, AmritaWNA is recognized worldwide today for its deployment of the first-ever wireless sensor network for detecting and fore-warning landslides. The system uses wireless sensor network technology to provide advance warning of an impending landslide disaster, facilitating evacuation and disaster management. As part of this research, the Center has developed and deployed world’s first Wireless Sensor Network for Landslide Detection at Anthoniar Colony, Munnar, Kerala.

Remote Triggered Wireless Sensor Network Lab

This is India’s first remotely triggered laboratory in the area Computer Science and Engineering. This lab is an experimental wireless sensor network deployed partly indoor and partly outdoor, envisioned to provide a practical experience for students in designing, deploying and implementing wireless sensor networks in both indoor and outdoor conditions.

Wireless Smart Grid

Amrita wireless smart grid systems are being developed with wireless sensors to monitor energy wastage, line faults, excessive usage of energy, power theft, outlets to recharge renewable batteries, renewable energy generation and transmission etc. The major areas of research focus are in development of communication architecture, distributed algorithms, distributed energy management schemes, cps enabled systems for real-time monitoring and detection, context-aware computing etc., for smart buildings, smart grid, and microgrid.

NKN Project

The Amrita Center for Wireless Networks and Applications is doing research work on a funded project, sponsored by National Knowledge Network, Govt. of India, to enhance the technology innovation in the field of e-learning. This project aims to create virtual environments where students and teachers can interact in a natural, consistent and coherent manner.

Indo-Japan collaborative Project

This project aims at developing the next generation VLSI/SoC by leveraging on Amrita University’s expertise on analog, digital, and embedded system design and VDEC, University of Tokyo’s expertise on algorithms and techniques to build programmable hardware industries.
**Directions to arrive at the campus from the North**

**By Air and Taxi:** Cochin (Kochi) International Airport at Nedumbassery is situated 140 kilometres north of the campus. One can ask for a pre-paid taxi to Amrita University, Amritapuri.

**By Train:** Kayamkulam is the closest train station situated 12 kilometres north of the campus. After disembarking, one can hire an autorickshaw to come to the campus. Buses are also available from Kayamkulam Bus-Stand to Vallickavu Junction, which is about a five-minute walk from the campus.

**By Bus:** From the Ernakulam Transport Bus-Stand, one may board a bus going towards Trivandrum via Alappuzha, and alight at Ochira. From Ochira, an autorickshaw can be taken to bring one directly to Amritapuri, which is 6 km away from Ochira. Or one may board a bus going to Vallickavu Junction, which is about a five-minute walk from the campus.

**Directions to arrive at the campus from the South**

**By Air and Taxi:** The closest airport is Trivandrum (Thiruvananthapuram), located 110 kilometers south of Amritapuri. One can ask for a pre-paid taxi to Amrita University, Amritapuri.

**By Train:** Karunagapally is the closest train station situated 10 kilometres south of the campus. After disembarking, one can hire an autorickshaw to come to the campus. Bus service is also available from Karunagapally.

**By Bus:** From the Trivandrum Transport Bus-Stand, one may board a bus going towards Ernakulam via Kollam and alight at Karunagappally. From Karunagappally, a bus going to Vallickavu Junction can be taken, which is about a five-minute walk from the campus.