NEWSLETTER

AMRITA VISHWA VIDYAPEETHAM | Center for Wireless Networks & Applications

Achievements

New patents granted for AmritaWNA

1. **Wearable Wireless Tongue Controlled Devices** (US9996168)
2. **Mobile Infrastructure for Coastal Region Offshore Communications and Networks** (US10045227)
3. **System and method for Synthesizing and preserving consistent relative neighborhood position in multi-point Tele-Immersive environments.** (US9386271, US9826196, US9852647)

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Contents

India's first IoT systems for Real-Time Landslide Warning

Toiling day and night, researchers, Prof. Balaji Hariharan, Dr. Nirmala Vasudevan, Sangeeth Kumar, Balamukund Singh, Nitin Kumar M, Arun Kumar J, Deepak Brahmanandan, Gosh U.G, Aravind H, Koushik Ramanadan, Dawa Tshering Lepcha and led by Dr. Maneesha V Ramesh, from AmritaWNA deployed an IoT based system for real-time detection and early warning of landslides in Sikkim. Slated as the second implementation of such a kind, Sikkim deployment was done in collaboration with Sikkim State Disaster Management Authority. An array of IoT enabled sensors will monitor a densely populated area spanning 150 acres around Chandmari village in Gangtok district. This heterogeneous IoT system provides the capability for gathering real-time context aware data to understand the dynamic variability in landslide risk. A comprehensive research framework and technological solutions is now in place for landslide hazard mapping which uses remote sensing, low-cost sensing using IoT systems, big data analytics, and decision models for disaster risk reduction. This model can be replicated anywhere along the Himalayan mountain ranges which are susceptible to landslides.

As part of Landslide project, Ms. Hemalatha was at BGS, UK to attend a training programme on Electrical Resistivity Tomography (ERT).

ITRA Evaluation Team in Amritapuri Campus

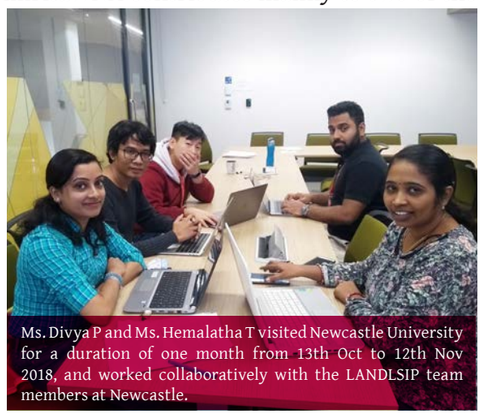
On 6th August, a team comprising of **Prof. Rajat Moona** (Director, IIT, Bhilai - Chairman, Evaluation Committee), **Dr. B.K. Murthy** (Scientist 'G' & Group Coordinator, MeitY - Member, Evaluation Committee), **Mr. Anil Sagar** (Joint Director, MeitY - Meity), **Mr. V.K. Bhatia** (Senior Director - Senior Director, ITRA), **Prof. N. Ahuja** (Director, ITRA - Member, Evaluation Committee), **Mr. Gaurav Sharma** (Principal Research Scientist, ITRA), **Dr. Arun Pande** (Senior Consultant, ITRA (Water), DIC, ITRA), **Prof. Subhasis Chaudhuri** (Professor, IITB, Mumbai- Member, Evaluation Committee), **Mr. George Arakkal** visited Amritapuri campus for evaluation of Micronet project. The event was hosted by Amrita Vishwa Vidyapeetham. OceanNet as it is called was started by researchers from AmritaWNA under Chancellor's guidance. This project will provide extended communication system and affordable Internet services upto a range of 120 km for Fishermen folks when at sea. It has taken the team 118 hrs at sea with 18 boats and 7 sea trials to finalise and freeze the nitty gritty details of the solution. As part of pilot deployment, 10 fishing boats are now integrated with Micronet communication system which has already proved its efficacy to provide extended offshore communication and internet services on these fishing vessels.

LANDSLIP

Partners

8th & 9th March 2018, LANDSLIP consortium partners from Amrita, Newcastle, British Geological Survey (BGS) and King's College London met at Amritapuri campus to undergo project discussions related to workpackage 5.

LANDSLIP is a collaborative project that includes partners from India, UK and Italy, and is funded under the UK Natural Environment Research Council (NERC)/ Department for International Development (DFID) Science for Humanitarian Emergencies & Resilience (SHEAR) programme. The aim of this project is to develop an integrated landslide risk assessment and early warning system (EWS) in a multi-hazard framework, targeting a spatial scale from slope to regional and temporal scale from daily to seasonal. AmritaWNA contributes mainly to two of the work packages of LANDLSIP including WP5 and WP6. In WP5, collaboration is with Newcastle University to develop landslide ontology, and high performance data classification/event-detection algorithms based on social media. In WP6, Amrita is working with King's College London, to understand multi-hazard dynamics in the two pilot study areas by examining multi-hazard scenarios that involve landslides in India. Ms. Divya visited King's college London (KCL) from 19th November 2018 to 7th December 2018 as part of Work package 6, and worked with Dr. Bruce Malamud in collating and analysing the multi-hazard case studies involving landslides in certain regions of North and South India.

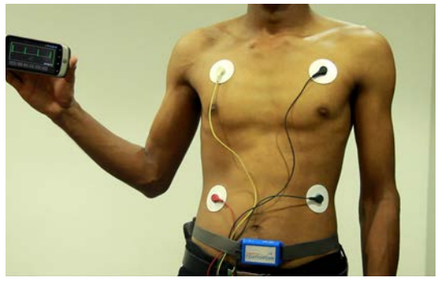


Ms. Divya P and Ms. Hemalatha T visited Newcastle University for a duration of one month from 13th Oct to 12th Nov 2018, and worked collaboratively with the LANDLSIP team members at Newcastle.

Project completed - Wearable ECG

Department of Science & Technology
Ministry of Science & Technology
Government of India

In 2016, AmritaWNA was awarded a 2-year grant by DST, Govt. of India, under the Instrumentation Development Program, to develop and pilot test an affordable body-wearable ECG monitoring device. The researchers at AmritaWNA and physicians at AIMS hospital jointly developed a 3-lead wearable continuous ECG monitoring device called Amrita Spandanam, which has been tested on more than 100 patients and is now ready for technology transfer to our industry partner.



Breast Cancer Detection using Infrared Imaging

Department of Science & Technology
Ministry of Science & Technology
Government of India

Researchers from AmritaWNA have recently started a project titled Advancement of a Computer Aided Diagnostic System which can identify abnormalities in breast at the stage of angiogenesis even ten year before the beginning of the disease.

Technology transfer for OceanNet and Wearable ECG.

OceanNet and wearable ECG monitoring device achieved another big milestone during month of October 2018. A 2 day workshop was held to understand design for manufacture and define design of cellular assembly lines to manufacture the products. Products will be manufactured in an automated plant which has minimum human intervention in the manufacturing and assembly process. The products will be launched in Indian and Global markets .

2018 IoT Workshop in Amritapuri

AmritaWNA, Amrita Vishwa Vidyapeetham conducted a two day national level workshop, "IoT Applications Using Aruduino" from 11 December to 12 December 2018. Dr. Maneesha V Ramesh, Director, AmritaWNA delivered keynote address on the topic “Knowledge Network through Internet of Things (IoT)”. This workshop aimed to impart the knowledge on IoT programming. Researchers from AmritaWNA conducted hands-on-sessions on developing applications using IoT devices such as Aruduino and Waspmote. The participants were exposed to solving different challenges involved in designing real-time IoT applications. Around 44 participants including students, faculty members and researchers attended the workshop. Though the attendees were from multidisciplinary areas such as Computer Science, Electronics and Electrical Engineering backgrounds, the workshop opened up a common platform for them to explore the various concepts of design and development of IoT applications.

Abstract of Patents

Patent No.US9996168

Abstract- A wearable device and a system to provide an input for a computing device are disclosed. The device comprises a sensing unit to deliver infrared signals to the facial region of a user and to receive transmitted or reflected signals therefrom, and a processing unit to determine the position or movement of the tongue of the user based on the received infrared signals. The processing unit is configured to provide an input to a computing device based on the determined position or movement of the tongue. The system further comprises a transmitter for wirelessly transmitting the input from the processing unit to the computing device.

Patent No.US10045227

Abstract- Marine fishermen risk their lives when they go as far as 120 km from the shore on a fishing trip lasting 5-7 days. They are completely cut off from the mainland. Cellular coverage exists only up to 12-15 km from the shore. In emergency situations, the fishermen have no way to call for help. Even under normal conditions, prolonged isolation from their family and friends causes mental depression. The solution enables the fishermen to use the smart phones which they own already to get internet at sea using Wi-Fi. The Access Point (AP) on the boat connects over Ethernet to an onboard gateway to long range Wi-Fi backhaul network. The onshore base station is installed on a tower at a height of 50-60 m. Boats are also used as mobile base stations to extend the range of the network.

Patent No.US9386271

Abstract- E-learning system has a local classroom with an instructor station and a microphone and a local student station with a microphone, a remote classroom with an instructor display and a student station with a microphone, and planar displays and video cameras in each of the classrooms, the remote and local classrooms connected over a network, with a server monitoring feeds and enforcing exclusive states, such that audio and video feeds are managed in a manner that video and audio of the instructor, the local students and the first remote students, as seen and heard either directly or via speakers and displays by each of the instructor, the local students and the remote students presents to each as though all are interacting in the same room.

Patent No.US9826,196

Abstract- An e learning system has a local classroom with an instructor station and a microphone and a local student station with a microphone, a plurality of remote classrooms with an instructor display and a student station with a microphone, and planer display and video cameras in each of the classrooms, the remote and local classrooms connected over a network,with a server monitoring feeds and enforcing exclusive states, with sets of video displays, each set dedicated to a remote classroom, arrayed along a line orthogonal to a line between the instructor station and the local student station,with one display in each set facing towards the instructor station, and one display in each set facing toward the local student station.

Patent No.US9,852,647

Abstract-An e learning system has a local classroom comprising a local student station and an instructor station,such that local students at the local student station and an instructor at the instructor station face each other directly along a first viewing line, a plurality of remote classrooms each having a student station,video cameras in each of the remote classrooms positioned and oriented to capture video images of subjects, video displays in the local classroom arranged along a line orthogonal to the first viewing line and all facing the local student station,in sets of at least two displays, arranged vertically one above another, each first set of at least two displays dedicated to one of the remote classrooms, a second plurality of video displays like the first, but facing the instructor, connection apparatus between classrooms, a server coordinating video feeds with displays.

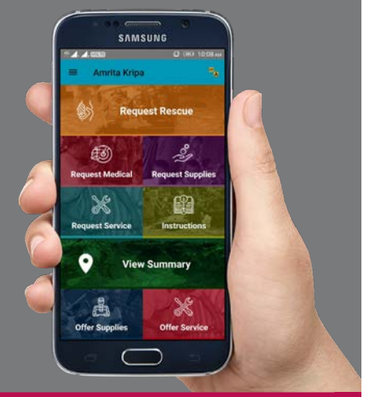
PUBLICATIONS @ 2018

- Rahul Krishnan,Clinically Aware Data Summarization at the Edge for Internet of Medical Things.,"IEEE PerCom (Pervasive Computing and Communications) 2018".
- Rahul Krishnan,Durga P ,Ekanath Rangan,"Deriving High Performance Alerts from Reduced Sensor Data for Timely Intervention in Acute Hypotensive Episodes". IEEE Engineering in Medicine and Biology Society Conference (EMBC 2018).
- Pathinarupothi, Rahul Krishnan, P. Durga, and Ekanath Srihari Rangan. "Data to diagnosis in global health: a 3P approach." BMC medical informatics and decision making 18.1 (2018): 78.
- Rahul Krishnan,Durga P,Ekanath Rangan.,"IoT Based Smart Edge for Global Health: Remote Monitoring with Severity Detection and Alerts Transmission".NA.
- Betsy George, Baby Sreeja.S.D, Sreedevi K Menon.," Energy harvesting using Metamaterial Filters." International Conference on Intelligent Sustainable Systems (ICISS 2017).
- Daniel Col Sol, Aryadevi,Maneesha Vinodini Ramesh.," Design and Implementation of Context Aware Cyber Physical System for Sustainable Smart Building." IEEE ICSGCE 2018.
- Durga P, Rahul Krishnan Pathinarupothi, Ekanath Rangan, Prakash Ishwar.," When less is better: A summarization technique that enhances clinical effectiveness of data." 8th International Conference on Digital Health, DH 2018; Lyon; France; 23 April 2018 through 26 April 2018.
- Jayakrishnan V M,Sethuraman N Rao.,"Effect of Enclosure on Path Loss of Long Range Wifi Signal".ICCIC 2018.
- Rahul Krishnan Pathinarupothi, Amaia Soublet (Shared First authors), EPFL, Ekanath Rangan, Kripesh E V, Durga P, K A Unnikrishna Menon.," Internet-of-Things Based Respiratory Rate Monitoring for Early Detection of Cardiovascular and Pulmonary Diseases." HealthyIoT 2018 - 5th EAI International Conference on IoT Technologies for HealthCare.
- Anjana Luke,K A Unnikrishna Menon.,"Performance Enhancement of a Photoplethysmographic Biosensor Using Efficient Signal Processing Techniques".
- Meenu L, Sreedevi K Menon., "Study on the Effect of Feeding Mechanism in the Frequency Response of OLR." 2018 2nd International Conference on Inventive Systems and Control (ICISC).
- Gayathri B, Sruthi K, K. A. Unnikrishna Menon., "Non-invasive blood glucose monitoring using near infrared spectroscopy". International Conference on Communication & Signal Processing (ICCSP) 2018.
- Pooja P. R., Balaji Hariharan. "An Early Warning System for Traffic and Road Safety Hazards Using Collaborative Crowd Sourcing". International Conference on Communication & Signal Processing (ICCSP) 2018.
- Arjun D, Indukala P.K, K. A. Unnikrishna Menon., "Border surveillance and intruder detection using wireless sensor networks: A brief survey." International Conference on Communication & Signal Processing (ICCSP) 2018.
- Rekha P, Maneesha Vinodini Ramesh,Venkat P Rangan.," Building Optimal Topologies for Real-Time Wireless Sensor Networks." 22 March 2018.
- Rekha P, Emrick Sinitambirivoutin, Florian Passelaigue, Maneesha Vinodini Ramesh.," Design and Development of an IoT Based Smart Irrigation and Fertilization System for Chili Farming." 22 March 2018.
- Prema Nedungadi, Maneesha Vinodini Ramesh, Preeja Pradeep, Raghu Raman.," Pedagogical Support for Collaborative Development of Virtual and Remote Labs: Amrita VLCAP." Cyber-Physical Laboratories in Engineering and Science Education. 26 April 2018
- Shilpa P S, Bhuvana Nair S, Sreedevi K Menon., "Miniaturization of Monopole Antenna with Modified Ground for Wi-Fi Applications". 2018.
- Remya.M, Arvind, Ullas Ramanadhan, Nirmala Vasudevan.," Design of Wireless Solar Power Monitor for Wireless Sensor Network Applications." IACC-2018.
- Athira Gopinath, Rahul Lal P.," Substrate integrated waveguide based circular cavity filter in Ku band." 2018.
- Betsy George, Shabinamol A, Sreedevi K Menon.," Micro strip resonator as microfluidic sensor for blood-glucose monitoring." 2nd International Conference on Communication and Electronics Systems (ICCES). 2018
- Liya M.L, Jayakrishnan V M, Sreedevi K Menon.," International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET), 2018." International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET), 2018.
- Meenu L, Aiswarya S, Sreedevi K Menon.," Experimental investigations on monopole loop antenna with dual band characteristics." International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET), 2018.
- Veluru Sai Anusha, Nithya K.G, Sethuraman N Rao.," A comprehensive survey of electromagnetic propagation models". International Conference on Communication & Signal Processing (ICCSP) 2018.
- Betsy George, Bhuvana Nair S, Sreedevi K Menon.," Investigations on Edge Coupled Metamaterial Filters". International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET), 2018.
- Vallimeena P, Bhavana B.Nair, Sethuraman N.Rao.,"Machine Vision Based Flood Depth Estimation Using Crowdsourced Images of Humans."2018 IEEE International Conference on Computational Intelligence and Computing Research. 2018
- Ramkumar N, Dr P Venkat Rangan, Uma Gopalakrishnan, Balaji H.,"Gaze Alignment Techniques for Multipoint Mobile Telemedicine for Ophthalmological Consultations." 2018
- Dhanesh Raj,Sree Lekshmi S.,"Enabling Technologies to realise SmartMall Concept in 5G era". 2018
- Sai Shibu,Aravind H,Sai Rohith.,"Development of IoT Enabled Smart Energy Meter with Remote Load Management." 2018
- Bithin Alangot,Maneesha Suresh, Arvind S Raj, Rahul Krishnan Pathinaru Pothi, Krishnashree Achuthan.,"Reliable Collective Cosigning to Scale Blockchain with Strong Consistency."Workshop on Decentralized IoT Security and Standards (DISS) 2018.
- Uma Gopalakrishnan,P Venkat Rangan,Ramkumar N,Balaji H.,"Parametric evaluation of progressively immersive multimedia representations for teaching environment in eLearning"

AmritaWNA's contribution towards Kerala Flood Relief

Amrita Kripa App - To Aid Kerala Flood Survivors

In an effort to expedite relief and rescue operations during Kerala Floods 2018, researchers at the AmritaWNA developed Amrita Kripa Mobile App. This high-performance, multilingual, crowd-sourced mobile and web application based App has helped in helped in rescue and provided relief to more than 12000 people. Including a robust and durable suite of applications, Amrita Kripa app coordinates large-scale-distributed operations, directly linking disaster survivors, relief providers, relief-camp coordinators, rescue teams, NGOs, volunteers and administrators to collaboratively achieve optimal response. One of the major feature of the app is the interactive map, which enable relief and rescue operators to analyze ground realities in geographical hierarchies and in terms of the impact and areal extent of the disaster.



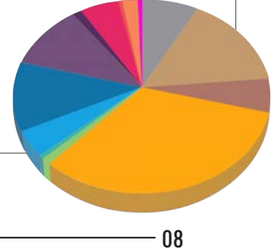
App available on Google Play Store

Jivamritam - Clean Drinking Water Initiative for Rural India

The Jivamritam project, Mata Amritanandamayi Math's ₹100 crore initiative to provide clean drinking water for rural India, aims to install Jivamritam filtration systems for clean drinking water in 5,000 villages throughout the nation. The aim of the project is not only to provide a centralized and easily accessible source for clean drinking water, but also to unify and galvanize members of a given community and educate them on the concept of clean water. Deployment of filtration systems is a 3 stage process. In the first stage, staff and faculty of Live-in-Labs and AmritaWNA visited more than 1000 wards and panchayats to identity areas where the units can be implemented. In the second stage, they have been able to educate the community and grama-panchayat members and after obtaining "no objection certificate" have installed One hundred and ninty two filtration units in the state of Kerala during the 3rd stage, out of which 62 units were deployed during the period March 2018 and Dec 2018. The project also constitutes an active research component which covers areas such as water-wise communities, water quality and monitoring, data science for water management, water and epidemiology, demand-supply models for sustainable water management, storm water management, water-energy nexus, and circular economy of water.

Deployment So far

- Thiruvananthapuram - 14
- Kollam - 29
- Pathanamthitta -10
- Alappuzha -60
- Kottayam -2
- Idukki - 1
- Ernakulam - 9
- Thrissur - 21
- Palakkad - 20
- Malappuram - 2
- Kozhikode - 10
- Wayanad - 1
- Kannur - 4
- Kasargod - 1



CONFERENCES

A one day Workshop on "ICT enabled Distribution Grid" was held at the Amritapuri, Kollam campus on March 22nd, 2018 to demonstrate the culmination of the results of the Indo-European FP7 funded research project "Stabiliz-E". The main highlight being the field visit and demo of the "Scalable, Modular, Self-Healing, ICT Enabled Distribution Grid Test-Bed" setup at our Amritapuri Campus. Sri. Kumaran. P, Director (Distribution & IT-KSEB) was the Chief Guest for the occasion and was also attended by representatives from our project partner organizations, industry experts, faculty/students from Amrita & elsewhere.

Prof. Sethuraman Rao, AmritaWNA visited Honolulu, Hawaii from Apr 14th to April 17th for presenting a paper on Micro Net at the WCNEE 2018 Workshop held at IEEE INFOCOM 2018 and to meet with Mr. Ravi Narayan, faculty at the Department of Information and Computer Science, University of Hawaii at Manoa.

Ms. Indukala P K, Research Associate in AmritaWNA visited Italy, University "Roma Tre" as part of the Indo-Italian Project, titled as "IoT Framework for Modeling, Monitoring and Damage Detection of Natural and Historical Heritage Structures", in June 2018.

Mr. Rahul Krishnan, Project Associate in AmritaWNA presented conference paper "A Summarization Technique that Enhances Clinical Effectiveness of Data", in 8th ACM International Digital Health Conference (DH 2018), Lyon, France, 2018 April.

Dr Maneesha V Ramesh, Director, AmritaWNA was invited to attend International Consortium on Landslides (ICL), International Programme on Landslides (IPL) conference held at Kyoto International Conference Centre & Collaborative Research Hub of the Disaster Prevention Research Institute, Kyoto University, Uji, Kyoto, Japan from Dec 1st to Dec 4th. The conference was organised by the ICL committee members to discuss the action plan for the Fifth World Landslide Forum and the Kyoto 2020 Commitment that is likely to happen at Kyoto, Japan in 2020.

ACADEMICS

(From left to right) Ms. Aryadevi and Ms. Rekha P, receiving their PhD's from Dr. K Sivan (Honorable ISRO Chairman) during Amrita Vishwa Vidyapeetham's 2018 convocation ceremony on 31st August 2018.

PhD graduants with AmritaWNA Faculty

(From left to right) Prof. Sethu Raman Rao, Dr. Rekha Manoj, Dr. Maneesha V Ramesh, Dr. Aryadevi, Prof. Unnikrishna Menon, Prof. Balaji Hariharan

Placement

NOKIA ORACLE aruba NETWORKS
MAXIM Cognizant WABCO
DELL TEJAS NETWORKS ALCATEL
BOSCH TOSHIBA CISCO
ABB ignitarium intel

"HYBRID COMMUNICATION ARCHITECTURES AND ALGORITHMS FOR SMART GRIDS"

Ms. Aryadevi R.D

"CONTEXT AWARE TECHNIQUES FOR ENERGY EFFICIENT DATA ACQUISITION IN WIRELESS IoT FOR DISASTER MONITORING"

Ms. Rekha P

Gold Medals for MTech AmritaWNA Students

Ms. Gayathri Menon (Left) and Mr. Deepu George Koshy (Right) of 2016-2018 batch MTech in Wireless Networks and Applications bagged first rank with Gold medal.

Collaborations

fortiss · King's College London · VU · UC DAVIS University of California · Universitat Politècnica de Catalunya BarcelonaTech · Department of Science & Technology · The University of New Mexico · IIT Bombay · intel · Inno Indigo Policy · Roma Tre Università degli Studi · Technische Universität Kaiserslautern · VTT · Technische Universität München · University at Buffalo The State University of New York · BGS 1835 · irpi · Met Office · Newcastle University

AmritaWNA MTech Students - 2016 - 2018

MESSAGE FROM THE

CHANCELLOR

"Recently, we have witnessed so many natural calamities and alarming changes in the global climate, including rapidly increasing global warming. These are challenging the further survival of this beautiful earth we live in. We should take into consideration how much we have been able to use research to serve the lowest and most vulnerable strata of society. In our approach to sustainable development, we should not forget that it is by strengthening the people at the base of the pyramid that the entire edifice of society becomes healthy and strong."

Sri. Mata Amritanandamayi Devi
Chancellor
Amrita Vishwa Vidyapeetham

BOOKPOST

To:

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