13TH IEEE INTERNATIONAL CONFERENCE ON ADVANCED NETWORKS AND TELECOMMUNICATION SYSTEMS

December 16 – 19, 2019 **BITS Pilani K K Birla Goa Campus Goa, India**

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13th IEEE International Conference on Advanced Networks and Telecommunication Systems 2019

IEEE ANTS is a premier IEEE forum on advanced networking and telecommunications topics. IEEE ANTS is financially and technically supported by IEEE Communications Society. The distinguishing characteristic of IEEE ANTS is the promotion of an intense dialogue between academia and industry to bridge the gap between academic research, industry initiatives, and governmental policies. This is fostered through panel discussions, keynotes, invited talks, and industry exhibits, where academia is exposed to state-ot-the-practice and results from trials and interoperability experiments. The industry, in turn, benefits from exposure to leading-edge research in networking as well as the opportunity to communicate with academic researchers regarding practical problems that require further research.

The theme this year is "**Bridge to Connect Everything**". Technological advances in wireless sensor networks, internet of things or cyber physical systems are generating more possibilities to combine devices, networks and systems with the physical world. In future, a technological bridge is necessary to connect "everything" of the digital world with "everything" in the physical world to create an interactive and smarter environment for the user. Futuristic technology would be on ubiquitous communication and networking encompassing multiple platforms, systems and services with awareness of user's requirement and network's quality of service. The theme of this conference will foster an environment for deliberating on different research aspects on the said topic.

About Birla Institute of Technology & Science, Pilani

BITS Pilani
Pilani | Dubai | Goa | Hyderabad

The Birla Institute of Technology & Science, Pilani is an all-India Institute for higher education. The university consists of fifteen academic departments with a focus on education in Engineering and Sciences. The institute was established, in its present form, in 1964 as part of the vision to realize nation-building with an emphasis on "Science, Technology and Modernization". During this period, the institute's transformation from a regional engineering college to a national university was backed by the Ford foundation and Dr. G. D. Birla. The Massachusetts Institute of Technology, USA provided technical assistance required for this transformation.

The institute has developed and administers the All-India computerized entrance test BITSAT (BITS Admission Test), which is the first of its kind in India. Acceptance rate in BITS is very low, less than 2.08% in 2007 making it one of the most selective universities in India.

The institute has strong linkages with industry, as can be seen by its off-campus Work Integrated Learning Program (WILP) which enrolled 20,000 students from corporate enterprises in 2009. Practical experience of the industry is in the curriculum as a Practice School Program (Internship), where students work with companies located across India and abroad.

BITS Pilani also has campuses in Dubai, Goa, and Hyderabad. Although these campuses are autonomous for most part, the right to grant degrees rests with the main campus, BITS – Pilani thus has the distinction of being the first Indian institution to set up a campus outside India

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About BITS Pilani, K. K. Birla Goa Campus

BITS Pilani
K K Birla Goa Campus

Goa, well-know tourist hotspot, with its lust green meadows, hills and Valleys, the sea and attractive beaches sets the right ambience for BITS Pilani K K Birla Goa Campus, an institute of excellence in technology and science. Commissioned in August 2004 and spread over an area of 180 acres, the campus is unique in respect of scenic beauty and panoramic view of picturesque surrounding encompassing Zuari river, hillocks, waterways, forests and landscape. In the midst of idyllic, sylvan beauty, the campus houses the main building, having academic and administrative offices, guest house, hostels for boys and girls, student activity center, faculty and staff quarters, medical center, playground and shopping complex.

The campus, in keeping with the tradition of innovation and creativity, has given a state-of-the-art touch to the infrastructure of the entire institute without diminishing the natural beauty of Goa. The institute constituting of ten departments spanning the gamut of pure science, applied science, humanities and management. Spacious labs, state-of-art classrooms with soundproof acoustics, modern furniture, computer labs with internet facility and library define the infrastructural counters of the institution.

Being fully residential, separate hostels are provided for both boys and girls with single room accommodation furnished with a bed, a wardrobe, a computer cum study table, a mirror and black granite shelf. Internet connection is provided in each room as a part of Project BITS Connect! A shopping complex with departmental store, cafeteria, bank and all other utility shops provide needful support to the campus inmates. The campus also has a medical center with two doctors, pharmacist and other support staff to provide round the clock medical coverage to all the residents of the institute.

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About Dept. of EEE, BITS Pilani K K Birla Goa Campus

BITS Pilani
K K Birla Goa Campus
Department of Electrical & Electronics Engineering

The Department of Electrical and Electronics Engineering at the K K Birla Goa Campus caters to the largest student strength on-campus.

The department offers three first degree programs viz B.E. Electrical and Electronics Engineering (EEE), B.E. Electronics and Instrumentation Engineering (EIE) and B.E. Electronics and Communication Engineering (ECE), two higher degree programs viz M.E. Embedded Systems and M.E. Microelectronics and Ph.D. programs (both full time and part time).

The faculty of the department consists of young and experienced highly qualified members with versatile interests in teaching and research. Faculty members are encouraged to engage with industry and research institutions for developing research projects for possible sponsorship from national and international agencies.

The department provided modern facilities for practicing modern techniques of pedagogy and research. The facilities include telepresence class rooms, massive open online courses (MOOC), learning management systems, remote engineering labs, etc., to the advantage of the students. There are ten different laboratories which are equipped with modern hardware/software design tools for facilitating practical training for first degree as well as higher degree students. The facilities are also extended to students for developing demonstration projects for exhibition, conferences, publication in journals, etc.

Further, we look forward to the completion of construction of the 'New Academic Building', in near future so as to enable continued growth.







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SCHEDULE

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Network Science: An Introduction</td><td>Tutorial 02
Amateur Radio Communication Systems and Networks as a Bridge to Connect Everything</td><td>Workshop 01
Impact of Emerging Standards, 5G and Beyond, and Machine Learning on Connected Vehicles</td></tr>
<tr><td colspan="3">11:00 – 11:30 : Tea Break</td></tr>
<tr><td colspan="3">11:30 – 13:00 : Morning Tutorial / Workshop Session Continues</td></tr>
<tr><td colspan="3">13:00 – 14:00 : Lunch Break</td></tr>
<tr><td colspan="3">14:00 – 14:30 : Inaugural ceremony (Venue: Auditorium)</td></tr>
<tr><td colspan="3">14:30 – 15:00 : Keynote Talk 01 – Prof. Matti Latva-aho</td></tr>
<tr><td colspan="3">15:00 – 15:30 : Keynote Talk 02 – Mr. Rajesh Challa</td></tr>
<tr><td colspan="3">15:30 – 16:00 : Tea Break</td></tr>
<tr><td colspan="3">16:00 – 17:30 : Technical Session 01</td></tr>
<tr><td>WL 01</td><td>NAT 01</td><td>EMT 01</td></tr>
<tr><td colspan="3">17:30 – 18:30 : Panel Discussion 01
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Towards a LiFi based IoT Architecture: Applications and Challenges</td><td>Workshop 02
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Fast Packet Processing using Data Plane Development Kit (DPDK)</td></tr>
<tr><td colspan="4">11:00 – 11:30 : Tea Break</td></tr>
<tr><td colspan="4">11:30 – 13:00 : Morning Tutorial / Workshop Session Continues</td></tr>
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<tr><td colspan="4">14:00 – 14:30 : Keynote Talk 04 – Ms. Sellamal Shekar</td></tr>
<tr><td colspan="4">14:30 – 15:00 : Keynote Talk 05 – Ms. Swati Meherishi</td></tr>
<tr><td colspan="4">15:00 – 15:30 : Tea Break</td></tr>
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<tr><td>WL 02</td><td>NAT 02</td><td>EMT 02</td><td>Workshop 04
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<tr><td colspan="4">17:00 – 18:00 : Technical Session 03</td></tr>
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<tr><td colspan="5">11:00 – 11:30 : Tea Break</td></tr>
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<tr><td colspan="5">13:00 – 14:00 : Lunch Break</td></tr>
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<tr><td colspan="5">16:30 – 17:00 : Tea Break</td></tr>
<tr><td colspan="5">17:00 – 18:30 : Technical Session 07</td></tr>
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4th international workshop on 5G and future wireless technologies</td><td>Workshop 07
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<tr><td colspan="5">11:00 – 11:30 : Tea Break</td></tr>
<tr><td colspan="5">11:30 – 13:00 : Technical Session 09</td></tr>
<tr><td>WL 09</td><td>NAT 08</td><td>SP 02</td><td>Workshop 06 continue</td><td>Workshop 07 continue</td></tr>
<tr><td colspan="5">13:00 – 13:30 : Keynote Talk 07 – Dr. Konstantin Kebkal</td></tr>
<tr><td colspan="5">13:30 – 14:15 : Lunch Break</td></tr>
<tr><td colspan="5">14:15 – 15:45 : Technical Session 10</td></tr>
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<tr><td colspan="5">15:45 – 16:15 : Tea Break</td></tr>
<tr><td colspan="5">17:00 – 17:30 : Valedictory Ceremony (Venue: DLT – 7)</td></tr>
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13th IEEE International Conference on Advanced Networks and Telecommunication Systems 2019

13th IEEE International Conference on **Advanced Networks and Telecommunication Systems (ANTS)** took place on December 16-19, 2019 in Goa, India

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Message from General Chair

We, at BITS Pilani, K. K. Birla Goa Campus, take great pleasure in hosting the IEEE International Conference on Advanced Networks and Telecommunication Systems (IEEE ANTS – 2019) during 16 – 19th December 2019. BITS Pilani gives emphasis to University – Industry linkages as part of its curriculum, and also works with industries to collaborate on research in advanced topics in Communication and Networks.

This conference will bring together academicians and industry representatives to deliberate on advanced topics in Telecommunications and Networks area. The theme 'Bridge to connect everything' is apt for present times and I am sure this conference will provide a platform for intense discussions and deliberations among the delegates.

My colleagues at EEE department have put in lot of effort to make the experience of delegates a memorable one. I extend a warm welcome to all participants to the conference and wish them a fruitful stay at Goa for the three days of the conference.

- Prof. G. Raghurama, Director and Senior Professor,
BITS Pilani, K. K. Birla Campus, Goa

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December 16 – 19, 2019 | Goa, India

Message from Technical Program Committee Chair

On behalf of the Technical Program Committee, it is our privilege to welcome you to the 13th IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS 2019) at BITS, Pilani K K Birla Goa Campus. This year the theme is "Bridge to Connect Everything (BCET)". The distinguishing characteristic of IEEE ANTS has always been the promotion of an intense dialogue between academia and industry to bridge the gap between academic research, industry initiatives, and governmental policies. This is fostered through panel discussions, keynotes, invited talks, and industry exhibits, where academia is exposed to state-of-the-practice and results from trials and inter-operability experiments.

Over the years, IEEE ANTS has evolved into one of the premier conferences in the area of Communication and Networking. This year we received 413 paper submissions from over 22 countries, out of which 178 papers were accepted after a rigorous double-blind review process. This corresponds to an acceptance rate of 43.1%. Among these 178 accepted papers, there are 135 regular papers, 21 short papers, 22 WiE track papers.

The technical program of IEEE ANTS 2019 consists of 29 sessions including both Regular and Short Paper tracks and 4 sessions in the Women in Engineering track. The conference also features several keynote speakers and invited talks, 5 tutorials, 7 workshops and 2 panel discussions with equal participation from both industry and academia. This year's edition also features a lightning talk session.

We would like to take this opportunity to express our heartfelt gratitude to the General Chair, the Tutorial, Workshop, PhD Forum, Publicity, WiE and Publication Chairs. We also thank all the members of the Technical Program Committee and external reviewers for their dedication, efforts and timely reviews. Without their help, this conference would not have been feasible. We also thank all the authors for submitting their work to IEEE ANTS 2019.

We are looking forward to seeing you in BITS, Pilani K K Birla Goa Campus!

Prof. Anupama Karuppiah
BITS-Pilani, K K Birla Goa Campus, Goa

Dr. Sudeep Baudha
BITS Pilani, K K Birla Goa Campus, Gao

Keynote 01

Title: Key drivers and research challenges for 6G

Session: December 16, 2019 | 14:30 – 15:00

Venue: Auditorium

Speaker: Prof. Matti Latva-aho

Abstract of the Talk:
As 5G research is maturing towards a global standard, the research community must focus on the development of beyond-5G solutions and 2030 era, i.e. 6G. It is not clear yet what 6G will entail. It will include relevant technologies considered too immature for 5G or which are outside the defined scope of 5G. More specifically, the way in which data are collected, processed, transmitted and consumed within the wireless network will be a key driver for 6G. It is also envisioned that we need new KPI drivers towards 6G besides the current 5G technical superiority KPIs: societal megatrends, UN sustainability goals, emerging new technical enablers as well as ever increasing productivity demands are emerging critical drivers towards 2030 solutions. To summarize, 6G is not only about moving bits: it will become a framework of services, including communication service where all user specific computation and intelligence may move to edge cloud. Integration of sensing, imaging and highly accurate positioning capabilities with mobility opens a myriad of new applications in 6G era.

Biography of the Speaker:
Matti Latva-aho received the M.Sc., Lic.Tech. and Dr. Tech (Hons.) degrees in Electrical Engineering from the University of Oulu, Finland in 1992, 1996 and 1998, respectively. From 1992 to 1993, he was a Research Engineer at Nokia Mobile Phones, Oulu, Finland after which he joined Centre for Wireless Communications (CWC) at the University of Oulu. Prof. Latva-aho was Director of CWC during the years 1998-2006 and Head of Department for Communication Engineering until August 2014. Currently he serves as Academy of Finland Professor in 2017 – 2022 and is Director for National 6G Flagship Programme for 2018 – 2026. His research interests are related to mobile broadband communication systems and currently his group focuses on beyond 5G systems research. Prof. Latva-aho has published close to 500 conference or journal papers in the field of wireless communications. He received Nokia Foundation Award in 2015 for his achievements in mobile communications research.

Keynote 02

Session: December 16, 2019 | 15:00 – 15:30

Venue: Auditorium

Speaker: Mr. Akhil Panchabhai

Biography of the Speaker:

Akhil Panchabhai is a General Manager in the Mobile Communications Team at Samsung R&D India Bangalore. He holds a B.E. (Hons.) degree in Electrical & Electronics from BITS, Pilani Rajasthan (1999), & an M.S. in Electrical Engineering from Clemson University, SC, USA (2004). At Samsung, he has been supervising cross-functional teams for commercialization of 3G, 4G & now 5G technologies in Samsung's flagship Galaxy S & Galaxy Note smartphones. In his career spanning close to two decades, Akhil has developed strong hands-on experience on 3GPP standards, contributed to in-house protocol stack development, commercialized several World-First Launches, is a co-inventor in several patents & is spearheading IP creations & innovations in his team. Akhil's area of Expertise is in 3GPP Access Technologies.

Keynote 03

Session: December 17, 2019 | 09:00 – 09:30

Venue: DLT - 5

Speaker: Dr. Rajesh Challa

Biography of the Speaker:

Dr. Rajesh Challa ia an Associate Architect in Networks R&D division at Samsung R&D Institute India, Bangalore (SRIB) and received his Ph.D. degree in Computer Engineering from Sungkyunkwan University, South Korea, in 2019. He has been working with SRIB since 2003 on mobile commercialization activities and conducting research in next-generation mobile systems. His areas of expertise include IP multimedia subsystem (IMS), Android Radio Interface Layer (RIL), Linux device driver development, Data plane and NAS layer of LTE, and proprietary Samsung Handset Platform (SHP) solution. He is CORD Ambassador in Open Networking Foundation (ONF) Ambassadors' Program, and has been a contributor in ONOS/CORD projects. He is currently representing Samsung Electronics at CNCF TUG group, and focusing on 5G cloud-native network design and orchestration at SRIB. His research includes 5G network slicing & orchestration, Service Chaining (SFC), and Software-Defined Networking (SDN). His area of expertise are: IP Multimedia Subsystem (IMS) Data plane and NAS layer signaling of LTE Android Radio Interface Layer (RIL) Linux device driver development.

Keynote 04

Session: December 17, 2019 | 14:00 – 14:30

Venue: DLT - 5

Speaker: Ms. Sellamal Shekar

Biography of the Speaker:

(Mrs)Sellammal Shekhar, Sc'G', Associate Director, DRDO Headquarters

Educational Qualifications: Obtained Bachelor's degree in Electronics & Communication Engineering from University of Jodhpur, MTech from IIT Delhi and M S in Cyber Law & Cyber Security from National Law University, Jodhpur.

Work Experience: After a small tenure in ISRO, Space Applications Centre, Ahmedabad, she joined DRDO in Nov' 86. Worked at different DRDO Laboratories

1. Defence Electronics Research Laboratory, Hyderabad
2. Analytical Studies Group, Delhi
3. Scientific Analysis Group, Delhi
4. Weapons and Electronics Systems Engineering Establishment, New Delhi

At present, posted as Associate Director in the Directorate of Extramural Research & Intellectual Property Rights, DRDO Headquarters, N Delhi.

Keynote 05

Session: December 17, 2019 | 14:30 – 15:00

Venue: DLT - 5

Speaker: Ms. Swati Meherishi

Biography of the Speaker:

Swati Meherishi is Executive Editor of Applied Sciences and Engineering at Springer. She has an extensive experience publishing engineering content across two continents. She holds degrees in Physics and Philosophy from the prestigious St. Stephen's College in Delhi. Prior to Springer, Swati has managed key engineering textbook portfolios in both India and the United States. At Springer, Swati manages a growing portfolio of journals, including both Springer-owned and key academic society journals, such as Journal of the Indian Institute of Science, INAE Letters, Transportation in Developing Economies, Indian Geotechnical Journal, Transactions of the Indian Institute of Metals, and the Institution of Engineers (India) journals. She has successfully negotiated and launched new journal partnerships with several institutions of repute, including the Indian National Academy of Engineering, the Indian Institute of Science, and the Indian Institute of Packaging. Swati also publishes books across all domains of engineering and applied science. She has successfully launched several new book series, including prestigious partnership series with the Infosys Science Foundation, Indian Institute of Metals, and IIT Kanpur. Her primary aims at Springer are to grow Springer's Engineering and Applied Sciences Portfolio in key interdisciplinary areas and to generate institutional and corporate partnerships. While her authors and editors hail from top institutes and corporate centers all around the globe, Swati's focus remains to garner quality content from top engineering schools and corporate R&D groups across India in form of both books and journals. Swati is a member of the Materials Research Society (MRS), Institute of Electrical and Electronics Engineers (IEEE), and the American Institute of Chemical Engineers (AIChE). In her free time she teaches technical communications courses to graduate students at IIT

WEBPAGE: http://www.springer.com/engineering/engineering+contacts?SGWID=0-40513-19-1435347-0

Keynote 06

Title: Agent-based network stack architectures and underwater networks

Session: December 19, 2019 | 09:00 – 09:30

Venue: DLT - 7

Speaker: Dr. Mandar Chitre

Abstract of the Talk:

Traditional layered networks offer very good separation of concern but compartmentalize information. This eases protocol development, but often leads to inefficient usage of network resources such as bandwidth. In severely resource constrained networks such as underwater networks, cross layer optimization is critical to efficiently use scarce resources. Agent based network stacks provide a good separation of concern, while allowing easy information flow between protocols at different levels of abstraction in the stack. In this talk, we explore such architectures, and see how they can be applied to real life networking problems.

Biography of the Speaker:

Mandar Chitre is currently the Head of the Acoustic Research Laboratory (ARL) at the Tropical Marine Science Institute (TMSI) in Singapore. He is also an Associate Professor and Associate Head of Department (Undergraduate Programs) at the Department of Electrical & Computer Engineering (ECE) of the National University of Singapore (NUS). He also serves as the Editor-in-Chief for the IEEE Journal of Oceanic Engineering. Mandar's research interests include underwater acoustic communications & networking, ambient noise imaging (ANI), collaborative underwater robotics, and acoustic signal processing.

Keynote 07

Title: Hydro-acoustic communications and networking based on modems incorporating EviNS Framework

Session: December 19, 2019 | 13:00 – 13:30

Venue: DLT - 7

Speaker: Dr. Konstantin Kebkal

Abstract of the Talk:
Paper presents results of an easy-to-achieve implementation of an underwater acoustic sensor network capable of operating in different modes for underwater acoustic data exchange among mobile and/or stationary network nodes. A key novelty of this implementation consists of the use of underwater acoustic (UWA) modems incorporating a dedicated Networking Software Framework (called the EviNS Framework). The latter is a compact open-source, open-architecture software that is undemanding in terms of computer resources and can be installed directly on the UWA modem platform as part of its standard software. The practical usefulness and advantage of this solution stems from the fact that it significantly reduces the costs involved in setting up an UWA network while retaining small dimensions, small weight, and high energy efficiency of each hydro-acoustic network node (e.g. modem performing the functions of network communication devices). A case study with a network based on the UWA modems incorporating the EviNS Framework (with pre-installed but freely changeable media-access and routing protocols) is presented. Apart from providing details on the application of the EviNS Framework, the paper offers an analysis of the performance of an ad-hoc underwater sensor network operating in shallow water area (the environment of large practical interest). Experimental results aimed at assessing the performance of the UWA network are presented in relation to the combination of a simple medium-access control protocol (for uncoordinated access) and wide-spread floodingbased routing protocols (based on sequence number control).

Biography of the Speaker:
Dr. Konstantin Kebkal was born in Kiev, Ukraine, in 1966. He received his engineering degree from the Technical University Sevastopol (Ukraine) in 1995 and his PhD in Electronic Engineering from the Technical University Berlin (Germany) in 2000. Extensive experience in underwater acoustics, signal processing, applied mathematics and electrical engineering. His studies of the physics of dolphin communication laid the groundwork for EvoLogics' Sweep Spread Carrier (S2C) technology for underwater data transmissions: based on results of these studies he has developed a patented ultra-broadband communication system providing high reliability needed for applications in the oceanographic and offshore applications. In 2000 he co-founded R&D company EvoLogics GmbH aimed at developing flexible and reliable solutions for the maritime industry, especially underwater communication, navigation and positioning systems and networks for increasing the flexibility of operations whilst reducing risks and costs. More than 100 scientific publications, 2 international patents.

Invited Speakers

Speaker 01: Mr. Nikhil Mitaliya

Title: 6 Key Challenges of the Internet of Things

Biography: Nikhil Mitaliya is a Field Application Engineer in Tektronix India Pvt. Ltd. He is with Tektronix for the last 7 Years. Nikhil is having experience of a total of 10 Years in the Test & Measurement Industry. He has been closely working with ISRO, Defense Organization, and Semicon Industries very closely and has assisted them for the testing of in various Projects in communication and RADARs.

Speaker 02: Mr. Munir Mohammed

Title: IEEE Standards for 5G and IoT

Biography: Munir Mohammed as a Senior Program Manager at IEEE leads the standards initiative on Emerging Applications. Munir has been with IEEE for more than 12 years and prior to that he has worked in various firms such as LexisNexis, Level 3, Satyam etc

Tutorial 01

Title: Network Science: An Introduction

Session: December 16, 2019 | 09:30 – 13:00

Venue: DLT - 5

Speaker: Dr. Pramode Verma

Abstract of the Talk:

This a half-day short course will offer an introduction to the emerging discipline of Network Science that has applications in computer networks and social networks, among others. Networks are characterized from a graph theoretic perspective which highlights their structural properties. The emphasis in the course is on quantifying the relationship between network topology and the expected performance of the network under a variety of conditions. Contemporary networks appear to form somewhat randomly. This is especially the case for social networks, citation networks, the World Wide Web, and the Internet which provides the base structure for information networks. With increasing mobility, the nodes and transmission facilities are no longer static but continuously evolve in a fashion that appears random. How we can characterize such networks in a way that can lead to their protection or destruction (e.g., in the case of a biological network through which a communicable disease spreads) is an important objective of the tutorial. The tutorial will define some of the most important parameters of such networks such as their nodal degree distribution, Betweenness and Closeness associated with a node, and the entropy of a network graph. Using these and other parameters, the properties of Random, Small-world, and Scale-free networks are analyzed. Emphasis is placed on the scale-free networks which characterize a vast number of evolving networks, including the Internet.

Biography of the Speaker:

Pramode Verma is Professor Emeritus of Electrical and Computer Engineering at the Gallogly College of Engineering of the University of Oklahoma, and an independent practitioner in telecommunications as the Principal at PK Verma, LLC, registered in the State of Florida. Prior to this, he was Professor, Williams Chair in Telecommunications Networking, and Director of the Telecommunications Engineering Program at the University of Oklahoma (1999-2017). Before joining the University of Oklahoma, over a period of twenty-five years, Pramode held a variety of professional, managerial and leadership positions in the telecommunications industry, most notably at AT&T Bell Laboratories and Lucent Technologies. He is the co-inventor of ten patents in the telecommunications space with one patent pending. He regularly serves on National Science Foundation panels, especially those on Small Business Innovation Research. Pramode's business experiences encompass mergers and acquisitions while he was a member of the leadership team at Lucent Technologies during 1996-1999. During this period, he helped Lucent acquire significant equity positions in several technology startups in the telecommunications space. As CTO of Customer Sales and Service Solutions division at Lucent Technologies, he created a new

stream to the tune of $50M by acquiring software resell, or exclusive, rights to package software developed by third parties into Lucent Technologies' flagship products. During his tenure at Lucent Technologies he championed the concept of multivendor interoperability as an imperative for serving customers while offering them complete flexibility to best meet their business needs from a range of suppliers. He has been on the Board of Directors of several start up corporations in telecommunications, most notably, Infinitec Networks Inc., a corporation in the telecommunication access space, located in Tulsa, Oklahoma, from 2000-2005 and, concurrently, on the Board of Directors at Panoak Communications. He was also on the Board of 3DIcon, a start up in Tulsa, OK, in 3D imaging. His academic credentials include a doctorate in electrical engineering from Concordia University in Montreal, and an MBA from the Wharton School of the University of Pennsylvania. He is the author/co-author of over 150 journal articles and conference papers, and several books in telecommunications engineering. He is a Senior Member of the IEEE and a Senior Fellow of The Information and Telecommunication Education and Research Association. He is registered as a Professional Engineer in the Province of Ontario, Canada.

Tutorial 02

Title: Amateur Radio Communication Systems and Networks as a 'Bridge to Connect Everything'

Session: December 16, 2019 | 09:30 – 13:00

Venue: DLT - 6

Speaker(s): Mr. Miroslav Skoric; Mr. S. Ram Mohan; Mr. Sandeep Baruah

Abstract of the Talk:
In this survey the audience will learn how to establish wireless computer communications with correspondents in local neighborhoods, other cities, countries & continents – without commercial and governmental infrastructures; How to take advantage of amateur radio satellites (topic: Hybrid Satellite-Terrestrial Networks; How to exchange urgent e-mails without Internet or telephone connections; How to use amateur radio in a school to save human lives and properties; How to create a local AMUNET (AMateur radio University NETwork) and expand visibility of an academic institution; How to contribute to weather observation (amateur radio meteorology, topic: Sensor Networks; ballooning, topic: High Altitude Networks) and tourism (amateur radio positioning & reporting systems; topic: Routing in Wireless and Mobile Systems); How to choose most proper hardware and software for all the above (topic: Spectrum Issues & Requirements Energy).

Biography of the Speaker(s):
Speaker 01: **Miroslav Skoric**, a Senior Member of IEEE Austria Section, is a retired engineer. He had almost three decades of experience in computer network administration and system maintenance (Diploma in Business Computing) and in the amateur radio (licensed amateur since 1989, amateur radio call sign YT7MPB). He has been maintaining various types of amateur radio bulletin board systems (MS DOS, Windows and Linux platforms) at VHF/HF radio frequencies and Internet inputs/outputs in his local amateur radio union and clubs-societies. The instructor voluntarily served as the union's secretary and information manager during the nineties – when he was compiling technical and scientific information for broadcasting via local amateur radio frequencies and repeaters. Teaching experience includes several classes in a local high-school amateur radio club; technical paper presentations in domestic and international events; tutorials & workshops on the amateur radio in engineering education, one round-table session, several magazine/journal articles, five book chapters (the sixth one is under review), and a web page featuring popular amateur radio software. Social activities include the membership in IEEE Computer Society, IEEE Communications Society, IEEE Education Society, ACM, NIAR, and IAENG. At the end of 2018, Miroslav was appointed for the secretary post in SRV (Amateur radio union of Vojvodina province in Serbia – YU7 & YT7 prefixes).

Speaker 02: As a licensed ham with Radio Amateur Grade-I since 1988, **S. Ram Mohan**, VU2MYH, conducted number of experiments on HF and VHF communication equipments and carried out propagation tests, organized training programs, 'DXpeditions', workshops, General Amateur Radio activities including public service Communication. Mr. Ram actively serves as Executive Vice Chairman & Director of National Institute of Amateur Radio (NIAR) in Hyderabad, India. His

qualifications includes B.E, ASOL Grade-I. As Chief Investigator for DIT funded Pilot Projects, he has successfully implemented the programs on Digital connectivity to Urban/Rural/Remote areas through amateur radio, Study on Propagation Conditions in Coastal Areas earlier and currently working towards a program for implementing Advanced Digital Amateur Radio Communication Network. He was the leading team member for many emergency communications operations in the country, such as Uttarakand Floods-2013, West Bengal 'Aila' Cyclone relief communications-2009, Indian Ocean Tsunami-2004, Orissa Super Cyclone Amateur Radio Relief network, Gujarat earthquake. Amateur Radio relief network won him several appreciations in India and abroad. The National Institute of Amateur Radio (www.niar.org) has well qualified and highly motivated members to develop latest state-of-the-art communication technologies in amateur radio digital communication. Related to that, Mr. Ram is currently working on programs for creating 1 lakh hams in the country, as well as working on advanced communication techniques using satellite, ballooning and other latest digital technologies.

Speaker 03: **Sandeep Baruah**, VU2MUE [Previously VU2MSY], Scientist-EVIGYAN PRASAR, Department of Science & Technology, Govt. of India, who mentors engineering students at different parts of India. Profile:
https://www.qsl.net/vu2msy/A_Pictorial_Compendium_of_Ham_Radio_Outreaching_SandeepBaruahVU2MUE.html

Tutorial 03

Title: Towards a LiFi based IoT Architecture: Applications and Challenges

Session: December 17, 2019 | 09:30 – 13:00

Venue: DLT - 5

Speaker: Dr. Anand Srivastava

Abstract of the Talk:

Current wireless communication technologies, such as wireless-fidelity (Wi-Fi) and Bluetooth, use radio waves as the basic medium in transferring information. Even though these technologies are widely spread, the need of exploring alternatives to transmit data wirelessly and more efficiently is a must. The reason behind that relies on the current limitations of the radio frequency (RF) band, which include overcrowding and interference with other RF applications. To explore alternatives, much research has been conducted to prove the possibility of using visible light as a wireless medium for transferring data. As a result, a new technology was presented by a German physicist Harald Haas, called light-fidelity (Li-Fi), which is a wireless technology that utilizes visible light as a communication medium instead of using the basic radio wave. Recently, Li-Fi technology has attracted the research community. Various studies have been conducted to improve the technology. However, there is still a noticeable need to support the research field due to the modernity of the technology. Hence, this tutorial presents an extensive survey of the previous studies and projects conducted on the technology, besides multiple leading companies working on the manufacture of Li-Fi-compatible products. In addition, a Li-Fi-based IoT architecture will be proposed, which relies on the collection of data from multiple environments, where Li-Fi is installed. Li-Fi-generated data is analyzed and processed to make intelligent decisions to enhance services in many sectors. The tutorial will present a general architecture design for LiFi for IoT, and provide the design and feasibility analysis of different types of LiFi for IoT models that cover the application space for indoor IoT. Finally, I will discuss research challenges that need to be solved to enable the vision of LiFi for IoT, and provide preliminary results for solutions targeting several of these challenges.

Biography of the Speaker:

During his stint with CDOT for nearly two decades, **Dr. Anand Srivastava** was responsible for development of national level projects for Indian Telecom in the areas of Telecom Security Systems, Network Management System, Intelligent Networks, Operations Support Systems, Access Networks (GPON) and Optical Technology based products. Majority of these projects were completed successfully and commercially deployed in the public network. He has also carried out significant research work in the Photonics Research Lab, Nice, France, under the Indo-French Science & Technology Cooperation Program on "Special optical fibers and fiber-based components for optical communications" during the project duration (2007-2010). He was also closely involved with ITU T, Geneva in Study Group 15 and represented India for various optical networking standards meetings.

- General Manager, Alcatel-Lucent India (2009 – 2011)
- Adjunct Professor, IIT Delhi (Part-time 2003 – present)
- Dean and Professor, IIT Mandi (2012 – 2014)
- Dean and Professor, IIIT Delhi (2014 – present)

Tutorial 04

Title: Participatory Sensing and IoT-cloud based Smart City Applications: Opportunities, Challenges and Case Studies

Session: December 18, 2019 | 09:30 – 13:00

Venue: DLT - 6

Speaker: Dr. Sarbani Roy

Abstract of the Talk:

Participatory sensing is an interesting approach for several societal applications like air pollution monitoring, noise pollution monitoring, road condition monitoring, driving pattern monitoring, health monitoring etc. With the widespread availability of smart-phones among the citizens, participatory sensing has become an effective way of sensing urban dynamics. The combination of citizens as sensors along with smart-phone or IoT as sensors are favored to build a powerful sensing layer for these societal applications. By integrating data from multiple sources it is possible to produce more consistent, accurate, and useful information about the physical world. This sensing layer has the potential to generate big data. But the smart-phone and IoT devices are usually not powerful enough to store and analyze that data. Cloud environment provides efficient storage and computing facility to handle that data. The process of developing a smart city involves the interaction of different stakeholders like city authorities, public and private sectors, as well as the citizens. In reality, smart city is an overall scenario, not any single application rather a pool of applications, which is impossible without citizens. For better urban governance, the need to plan and implement smart applications for citizens is becoming evident. In this context, integration of participatory sensing, IoT and Cloud can efficiently bridge the gap and connect citizens (participants), sensors, data and analysis to provide real-time services to the stakeholders. This tutorial will address the opportunities and challenges of participatory sensing in IoT based applications. This is an effort to understand the importance of integration of participatory sensing, IoT and Cloud for leveraging them effectively and conscientiously. The current state of the research, architectures, platforms and technologies will be discussed. Further, societal applications like air and noise pollution monitoring which are unleashing the power of participatory sensing, IoT and Cloud will be emphasized.

Biography of the Speaker:

Dr. Sarbani Roy is Professor in the Department of Computer Science and Engineering, Jadavpur University. She obtained her M.Tech in Computer Science and Engineering from University of Calcutta, India in 2002. She received Ph.D. degree in Engineering from Jadavpur University, Kolkata, India in 2008. She was awarded Fulbright-Nehru Senior Research fellowship in 2013-2014 and joined the research program at University of North Carolina, Charlotte, USA. She has to her credit more than 100 technical papers, which include 4 book chapters, 19 peer reviewed scientific journal publications and more than 85 conference publications. She coauthored one book, Building Wireless Sensor Networks: Theoretical and Practical Perspectives (CRC Press, 2015). Her research interests include Wireless Sensor Networks, IoT, Cloud, Social Network Analysis and Societal Applications. She has been involved in technical program committees, organizing committees for many international conferences and also acted as a reviewer for many international conferences and journals. She is a senior member of IEEE and member of ACM.

Tutorial 05

Title: Automotive Joint Radar Communications: When Hertz met Shannon in a Benz

Session: December 18, 2019 | 15:00 – 18:30

Venue: DLT - 6

Speaker(s): Dr. M. R. Bhavani Shankar; Kumar Vijay Mishra

Abstract of the Talk:
Combining spectral and hardware resources of various sensors, such as communications and radar, is heralding a new era of efficient spectrum utilization in emerging technologies such as intelligent transportation systems. Such a joint radar-communications (JRC) model has advantages of low-cost, compact size, transportation safety due to enhanced mutual information sharing and performance optimization, spectrum sharing, and better management of inter-vehicular interference. With the advent of autonomous vehicles, all weather sensing of the traffic environment is necessary; a high-resolution radar operating at millimeter-wave (mm-Wave) band and employing a multiple-input multiple-output (MIMO) paradigm enables this. The mm-Wave provides radar transmission bandwidth that is several GHz wide (~4GHz in the 77-81 GHz band) resulting in very high radar range resolution. The MIMO configuration leads to fine spatial (angular) resolution with fewer antenna elements. Concurrent with this development, today mm-Wave MIMO system has emerged as the preferred technology for short-range communications including in-room gaming, intra-large-vehicle communications, inter-vehicular communications, indoor positioning systems, and IoT-enabled wearable technologies. There is, therefore, significant interest in developing mm-Wave JRC systems. Several signal processing and digital communication techniques are critical in implementation of mm-Wave JRC. Major challenges are joint waveform design and performance criteria that would optimally trade-off between communications and radar functionalities. Novel MIMO signal processing techniques are required since the mm-Wave JRC systems employ large antenna arrays to generate high-gain beams for countering severe propagation losses. Constraints on the low-power consumption and implementation friendly designs are sought, while robust radar and communication receive processing to perform respective tasks need to be implemented. There are opportunities to exploit recent advances in cognition, compressed sensing, and machine learning to reduce required resources and dynamically allocate them with low overheads. While several seminal works have been published, the research field of JRC is vast with several interesting avenues to be explored. Exposure to radar processing, communication system design and a clear understanding of the existing JRC landscape are essential to pursue impactful research in this emerging area. In this context, the tutorial introduces the SPCOM perspective of mm-Wave JRC systems reviewing the state-of-the-art, highlighting the key technical challenges and solutions offered in prior-art, detailing the architectures, system design methodologies and optimization tools as well as providing a vision for the system evolution.

Biography of the Speaker(s):

Speaker 01: **M. R. Bhavani Shankar** (SM'15) received Masters and Ph. D in Electrical Communication Engineering from Indian Institute of Science, Bangalore in 2000 and 2007 respectively. He was a Post Doc at the ACCESS Linnaeus Centre, Signal Processing Lab, Royal Institute of Technology (KTH), Sweden from 2007 to September 2009. He joined SnT in October 2009 as a Research Associate and is currently a Research Scientist at SnT. He was with Beceem Communications, Bangalore from 2006 to 2007 as a Staff Design Engineer working on Physical Layer algorithms for WiMAX compliant chipsets. He was a visiting student at the Communication Theory Group, ETH Zurich, headed by Prof. Helmut Bölcskei during 2004. Prior to joining Ph. D, he worked on Audio Coding algorithms in Sasken Communications, Bangalore as a Design Engineer from 2000 to 2001. His research interests include Design and Optimization of MIMO Communication Systems, Radar and Array Processing, polynomial signal processing, Satellite communication systems, Resource Allocation, Game Theory and Fast Algorithms for Structured Matrices. He is currently on the Executive Committee of the IEEE Benelux joint chapter on communications and vehicular technology, member of the EURASIP Special Area Team (SAT) on Theoretical and Methodological Trends in Signal Processing and serves as handling editor for Elsevier Signal Processing. He was a co-recipient of the 2014 Distinguished Contributions to Satellite Communications Award, from the Satellite and Space Communications Technical Committee of the IEEE Communications Society. He has co-organized special sessions in CAMSAP (2019), ICASSP ('17, 18), SPAWC ('15, 16) and EUSIPCO ('15, 16).

Speaker 02: **Kumar Vijay Mishra** (S'08-M'15-SM'18) obtained Ph.D. in electrical engineering and M.S. in mathematics from The University of Iowa in 2015, and M.S. in electrical engineering from Colorado State University in 2012, while working on NASA's Global Precipitation Mission Ground Validation (GPM-GV) weather radars. He received his B.Tech. summa cum laude (Gold Medal, Honors) in electronics and communication engineering from the National Institute of Technology, Hamirpur, India in 2003. During 2003-2007, he worked on military surveillance radars as a research scientist at the Electronics and Radar Development Establishment (LRDE), Defence Research and Development Organization (DRDO) in Bengaluru. He is currently National Academies of Sciences, Engineering and Medicine (NASEM) Harry Diamond Distinguished Postdoctoral Fellow at United States Army Research Laboratory (ARL), Adelphi. He was a research intern at Mitsubishi Electric Research Labs (Cambridge) and at Qualcomm (San Jose) in 2015, and Andrew and Erna Finci Viterbi and Lady Davis postdoctoral fellow at the Viterbi Faculty of Electrical Engineering, Technion – Israel Institute of Technology during 2015-2017. He has been a Visiting Scholar at IIHR – Hydroscience & Engineering since 2015 and an honorary Research Fellow at SnT – Interdisciplinary Centre for Security, Reliability and Trust, University of Luxembourg since 2018. He is on the board of Singapore-based automotive radar start-up Hertzwell as its Technical Adviser since 2018. He is the recipient of Royal Meteorological Society Quarterly Journal Editor's Prize (2017), Technion EE Excellent Undergraduate Adviser Award (2017), DRDO LRDE Scientist of the Year Award (2006), NITH Director's Gold Medals for 1st rank in the Department of Electronics and Communication Engineering and entire university during the undergraduate commencement (2003), and NITH Best Student Award (2003). His research interests include signal processing, remote sensing, electromagnetics, communications, and deep learning.

Workshop 01

Title: Impact of Emerging Standards, 5G and Beyond, and Machine Learning on Connected Vehicles

Session: December 16, 2019 | 09:30 – 13:00

Venue: DLT - 7

About the Workshop:

The field of connected vehicles stands at the confluence of three evolving disciplines – the Internet of Things (IoT), emerging standards for connectivity of vehicles, and AI/machine learning. The number of connected IoT devices is expected to grow from 9.5 billion devices in 2019 to 22.5 billion devices in 2025. Fueling the growth in the evolution of vehicles towards total automation is the development of novel sensors, 3D cameras, lidars and radars and their ability to connect to the Internet, upload the data to a cloud. Whether or not the vehicles are autonomous, one of the key features of connected vehicles is that they are able to share data between themselves in real-time. The workshop will help in understanding the role of these sensors with use cases. Facilitating the connectivity of vehicles is the development of standards in various standards organizations. They are aimed at ensuring communication takes place between various entities in a connected vehicles network – Communications Technologies – vehicle-to-vahicle (V2V), vehicle-to-infrastructure (V2I), infrastructure-to- vehicle (I2V), vehicle-to-pedestrian (V2P), and vehicle-to-nomadic devices (V2ND).

Standards can target both long range and short range communications. Long range communication usually may have relaxed latency constraints whereas short range communication may impose stringent latency constraints. Obviously, the intent is to facilitate the vision of connected vehicles with the help of widely deployed cellular technology and meet the bandwidth and latency constraints. The workshop will address the standards development for connected vehicles and their performance. The vast amount of raw data collected must by mined for it to become useful in ensuring traffic safety by means such as intelligent rerouting of traffic or distribution of information on roadwork activities or accidents. Machine learning is a mechanism that has become extremely powerful in extracting meaningful data. A number of machine learning algorithms exist and can be broadly classified under unsupervised, supervised, and reinforcement learning algorithms. A number of algorithms exist under each category. The workshop will address the impact of machine learning and their applications to connected vehicles with several use cases.

Workshop Organizer(s):

Organizer 01: **Dr. Seshadri Mohan** is currently a professor in Systems Engineering Department at University of Arkansas at Little Rock, where, from August 2004 to June 2013, he served as the Chair of the Department of Systems Engineering. Prior to the current position he served as the Chief Technology Officer (CTO) and Acting CEO of IP SerVoniX, where he consulted for several telecommunication firms and venture firms and served as the CTO of Telsima (formerly known as Kinera). Besides these positions, his industry experience spans a decade at New Jersey-based

Telcordia (formerly Bellcore) and Bell Laboratories. Prior to joining Telcordia, he was an associate professor at Clarkson and Wayne State Universities.

Dr. Mohan has authored/coauthored over 125 publications in the form of books, patents, and papers in refereed journals and conference proceedings with citations to his publications in excess of 5570. He has co-authored the textbook Source and Channel Coding: An Algorithmic Approach. He has contributed to several books, including Mobile Communications Handbook and The Communications Handbook (both CRC Press). He holds fourteen patents in the area of wireless location management and authentication strategies as well as in the area of enhanced services for wireless. He is the recipient of the SAIC Publication Prize for Information and Communications Technology. He has served or is serving on the Editorial Boards of IEEE Personal Communications, IEEE Surveys, IEEE Communications Magazine, Journal of Mobility and Cyber Security and International Journal on Wireless Personal Communications (Springer) and has chaired sessions in many international conferences and workshops. He has also served as a Guest Editor for several Special issues of IEEE Network, IEEE Communications Magazine, and ACM MONET. He served as a co-guest editor of the Feature Topic "Human Bond Communications," that appeared in the February 2019 issue of IEEE Communications Magazine. He served as a guest editor of 2015 October IEEE Communications Feature Topic titled "Social Networks Meet Next Generation Mobile Multimedia Internet," March 2012 IEEE Communications Feature Topic titled "Convergence of Applications Services in Next Generation Networks" as well as the June 2012 Feature Topic titled "Social Networks Meet Wireless Networks." In April 2011, he was awarded 2010 IEEE Region 5 Outstanding Engineering Educator Award. He received the best paper award for the paper "A Multi-Path Routing Scheme for GMPLS-Controlled WDM Networks," presented at the 4th IEEE Advanced Networks and Telecommunications Systems conference.

Dr. Mohan is a co-founder of the startup IntelliNexus, LLC, the objective of which are the development of innovative adhoc vehicular networking to advance the notion of connected cars and the development of IoT and IoV applications to improve traffic safety and reduce accidents and congestion. Dr. Mohan holds a Ph.D. degree in electrical and computer engineering from McMaster University, Canada, the Masters degree in electrical engineering from the Indian Institute of Technology, Kanpur, India, and the Bachelors degree in Electronics and Telecommunications from the University of Madras, India.

Organizer 02: **Dr. Sachin Sharma** is presently serving as the Associate Dean, International Affairs and Associate Professor, Department of Computer Science and Engineering at Graphic Era Deemed to be University, Dehradun, UK, India. He is also Co-founder and Chief Technology officer (CTO) of IntelliNexus LLC, Arkansas, USA. He also worked as a Senior Systems Engineer at Belkin International, Inc., Irvine, California, USA for two years. He received his Ph.D. degree in Engineering Science and Systems with specialization in Systems Engineering and the M.S. degree in Systems engineering from University of Arkansas (UA) at Little Rock, USA and the B.Tech. degree from SRM University, Chennai. During his B.Tech he participated in the student exchange program between UA Little Rock and SRM and spent two years at UA Little Rock. His research interests include wireless communication networks, IoT, Vehicular ad hoc networking and network security.

Speaker 01: **Dr. Ashok Chandra,** an Indian Engineering Services officer of 1976 batch did his PhD in Electronics and Doctorate of Science (D.Sc.) in Radio Mobile Communications. He has worked as Guest Scientist on DAAD Fellowship at the Institute of High Frequency Technology, Technical University (RWTH), Aachen, Germany and at Bremen University, Bremen (Germany), where he undertook a series of research studies in the area of radio mobile communications. Dr. Ashok Chandra is having Technical Experience of over 35 years in the field of Radio Communications/Radio Spectrum Management including about 7 years of experience dealing with Technical Education matters of Indian Institutes of Technology (IIT), Indian Institute of Science (IISc), IIITs, NITs etc. He has contributed/presented over 30 research papers at various International Conferences in the areas of EMI, Radio Propagation etc. He had played a key role in the establishment of new Indian Institutes of Technology, Indian Institute of Management and Indian Institutes of Information Technology. Dr. Chandra is registered with International Telecommunications Union (ITU) as an Expert on "Radio Spectrum Management".

He had visited various technical Institutions and Universities abroad and took several lectures in the area of radio mobile communications. He has chaired various Technical Sessions at the International Conferences on Wireless Communications.

Dr. Chandra superannuated on November 30, 2012 (DoB: November 2, 1952) from the post of Wireless Adviser to the Government of Indi. In his responsibility as Wireless Adviser, he was associated with spectrum management activities, including in spectrum planning and engineering, frequency assignment, frequency coordination, spectrum monitoring, policy regarding regulatory affairs for new technologies and related research & development activities, etc. During his tenure as the Wireless Adviser, he had played a key role in preparing necessary documents for the auction of radio spectrum for 3 G and BWA applications in the year 2010.

He served as a Vice-Chairman, Study Group 5 of International Telecommunications Union (ITU)-Radio Sector. He has represented India to a large number of ITU meetings including World Radio Conferences (WRC). He served as Councillor from Indian Administration in the ITU Council.

Dr. Chandra was Adjunct Professor for three years from February 2013 at the Indian Institute of Technology (IIT), Bombay. He was TPC Executive Chair of Global Wireless Summit (GWS) 2015. Dr. Chandra was Guest Professor at V. National Institute of Technology (VNIT), Nagpur (India). He had organized 'Short-term Training Programme on Radio Spectrum Management'.

Speaker 02: **Dr Purnima Lala Mehta** received her bachelor's degree and master's degree in the field of Electronics and Communications Engineering (ECE) from Bharati Vidyapeeth's College of Engineering for Women (BVCOEW), University of Pune, India, and Northcap University (formerly ITM University), Gurgaon, India respectively. She has received Doctor of Philosophy (PhD) degree, in the field of "Wireless Communications through Aerial Drones" from Aarhus University, Denmark. Her research study focused on relieving congestion in the future wireless cellular networks through the deployment of ad-hoc network of aerial base stations. An alternate and intelligent network layer working as an independent network service delivery system has been proposed by her considering various aspects like improvisations in the SINR and user throughputs, alternate backhauling network and multiple configurations of deploying the aerial base stations.

Perspective on business model innovation in implementing this concept has also been proposed through her research study.

On the academic work front, she has been working as an Assistant Professor since July 2012 and has over 7+ years of teaching and research experience including international exposure at countries like Denmark, Germany, China, Portugal etc. She is a Member of IEEE and IETE. Her research interests include the areas of Mobile Computing, Aerial Drone based Wireless Communications, Wireless Ad-Hoc Networks, Millimeter Wave Communications, Future Generations of Communications, and Business Modelling.

Speaker 03: **Mr. Akshay Yuwale** is currently pursuing his final year of Bachelor's Degree in Computer Engineering & Science from MIT School of Engineering, Pune. Recently he completed a research internship at UA Little Rock, Little Rock, USA, which involved implementing and testing a "Real-Time V2V communication with a Machine Learning-based System for Detecting Drowsiness of Drivers."

Speaker 04: **Mr. Ravi Puvvala** is the founder and CEO of Savari. He is a visionary of the future of mobility. He serves as an advisory member to transportation institutes and government bodies. He is a frequent speaker on the subject of V2X in various trade organizations, forums and conferences.

Mr. Puvvala has 25 years of experience in the Automotive and Telecommunication industry. He has worked for various startups and fortune 100 companies in the Silicon Valley during his career. He has completed his BS degree from Bangalore University in India and MS degree from Arizona State University.

Speaker 05: **Ms. Vimala Mathew** is working as a Scientist/Engineer 'at National Institute of electronics & Information Technology, Calicut Ministry of Electronics & Information Technology where she serves as the Chief Investigator for projects implemented by Central & State government departments. She is also involved in teaching computer science courses to post-graduate students. Her research interests include data science, machine learning and video analytics. She received the Bachelor of Technology in Computer Science & Engineering from Cochin University of Science & Technology. She is currently pursuing her PhD degree.

Time Slot	Speaker	Topic
09:30	Dr, Seshadri Mohan	Impact of Emerging Standards, 5G and Beyond, and Machine Learning on Connected Vehicles
10:00	Dr. Ashok Chandra	Spectrum issues related to connected vehicles
10:30	Mr. Ravi Puvvala	How V2X will complement existing on board sensors for connected & autonomous vehicles?
11:30	Mr. Akshay Yuwale	Real-Time V2V communication with a Machine Learning-based System for Detecting Drowsiness of Drivers.
11:55	Dr. Purnima Lala	Drone-based mesh network for traffic congestion control
12:20	Ms. Vimala Mathew	Person re-identification through face detection from videos using Deep Learning
12:30	Open panel discussion with audience participation	

Workshop 02

Title: Edge Stack Workshop

Session: December 17, 2019 | 09:30 – 13:00

Venue: DLT - 6

About the Workshop:
Launched in 2018, and now part of the LF Edge umbrella, Akraino Edge Stack is creating an open source software stack that supports a high-availability cloud stack optimized for edge computing systems and applications. Designed to improve the state of edge cloud infrastructure for enterprise edge, OTT edge, and carrier edge networks, it offers users new levels of flexibility to scale edge cloud services quickly, to maximize the applications and functions supported at the edge, and to help ensure the reliability of systems that must be up at all times. The Akraino Edge Stack blueprints use several upstream open source projects such as ORAN Alliance, CNCF, Openstack, ONF, ONAP, TIP and the community works with open source communities to enhance any missing edge functionality.

This workshop will provide an overview of Akraino Edge Stack with a focus on engaging service providers and enterprises in India so they can leverage Akraino blueprints for deploying edge computing solutions for their use cases of interest.

Led by experienced architects, designers and academics this workshop will provide a unique opportunity to learn best practices and acquire needed skills in edge computing space. Besides providing comprehensive coverage of topics in edge computing there will be an opportunity for peer networking to connect with fellow professionals and expert practitioners from industry.

Workshop Organizer(s):

Organizer 01: **Dr. Deepak Kataria** has over 25 years' experience in communications and networking industry having worked in various technical leadership roles in the entire ecosystem comprising of service provider (AT&T Bell Labs), system OEM (Ericsson, Fujitsu, Lucent Technologies), and silicon & system integrator (Agere Systems, LSI, HCL). He has strong end-to-end architecture and project management expertise having led the delivery of complex, multi-domain solutions covering cloud, orchestration, and networks in 5G edge computing space. Currently, he is an active contributor to Linux Foundation Edge Akraino project where he is engaged in delivering an automation framework that integrates Linux Foundation Continuous Integration pipeline and Customer's Continuous Development environment to provide an end-to-end solution for development and validation of complex integration projects for edge computing. His other projects include delivering an end-to-end data center network automation solution for edge deployment.

He holds 10 US patents and has several others in pending status and has published extensively in industry and IEEE publications. He serves as the Chair of IEEE Princeton Central Jersey Section (Region 1) and has been the General Chair of IEEE Sarnoff Symposium since 2015. He served as General Co-Chair of IEEE ANTS in 2012, 2014 and 2015 and has been in the steering committee of IEEE ANTS since 2012. He served as Guest Editor for IEEE Communication Magazine Special Issue on Femto Cells (Sept. 2009 & Jan. 2010). He holds a B.S. in Electronics and Communications

Engineering, and pursued M.S. and Ph.D. degrees in Electrical Engineering from Rutgers University, NJ. He has completed Harvard's Emerging Leader's professional program on virtual leadership covering strategy, customer focus, corporate governance, and innovation.

Speaker 01: **Prof Huzur Saran** is a Professor in the Department of Computer Science IIT Delhi. Prior to joining IIT Delhi in 1990, he did his Ph. D in Computer Science from the University of California, Berkeley in 1989 and, a B.Tech from IIT Delhi in 1983. His research is focused on Wireless Networks, Computer Systems & Security and Algorithms. He has served as the Head of the Computer Science Dept and the Amar Nath & Shashi Khosla School of IT, at IIT Delhi from 2007-2014 & 2015-18. He is currently the co-odinator of the Centre of Excellence in Cyber Security at IIT Delhi.

Prof Saran has been actively working in 4G and 5G wireless technologies. He is currently a PI at IITD for the 5G Testbed Project funded by the Deportment of Telecom. During 2000-2002 he was a Visiting Professor at the Information Systems Lab, Stanford where he worked on the media access control layer of an early 4G wireless system. Dr Saran was a consultant in the past with AT&T Research and Lucent Bell Labs in the area of Network Performance Analysis.

Dr Saran has also been looking at various aspects of Computer Systems Security. Dr Saran was a consultant to Solidcore Inc, a Software Startup. He helped define and build a novel software protection technology. Solidcore was purchased by Mcafee in 2009 for its pathbreaking Dynamic Whitelisting technology.

Speaker 02: **Prof D. Manjunath** received his BE from Mysore University, MS from Indian Institute of Technology, Madras and PhD from Rensselaer Polytechnic Inst, Troy NY in 1986, 1989 and 1993 respectively. He has worked in the Corporate R & D center of General Electric in Scehenctady NY during the summer of 1990. He was a Visiting Faculty in the Computer and Information Sciences Dept of the University of Delaware and a Post-Doctoral Fellow in the Computer Science Dept of the University of Toronto. He was on the ElectricalEngineering faculty of the Indian Inst of Technology, Kanpur during December 1994 - July 1998. He has been with the Dept of Electrical Engineering of IIT, Bombay since July 1998.

Speaker 03: **Ms. Chitti Nimmagadda** is a Senior Director - Network Virtualization at the Ericsson Digital Services Business Unit. He has over 20 years of experience in software industry, and his current focus and passion is in bringing the cloud native technologies to the telecom industry. Most recently, he was a Principal Architect at Citrix and helped build the high performance datacenter networking product NetScaler SDX from the ground up using virtualization technologies. Previously, he worked in many technology areas, including embedded systems, real time operating systems and data warehousing. Chitti holds a Master's degree in Computer Science Engineering from the Indian Institute of Technology, Kanpur.

Speaker 04: **Ms. Deepthi V V** is a Senior Software Engineer at Lumina Networks. She has experience in working with open source projects such as OpenDaylight and Openstack and has worked on OpenDaylight since its inception. At Lumina, she is developing applications on OpenDaylight for data center networks.

Speaker 05: **Mr. Khemendra Kumar** has 11+ years of experience in embedded, networking, SDN and Cloud/Edge computing. He worked in FD.io and DPDK community for VPP performance optimization, porting on multiple platforms, lightweight Host stacks like DMM with LWIP etc. Currently he is active in Akraino community to build lightweight Edge stack ELIOT for resource constraints devices. In Akraino, he is Project Team Lead (PTL) for Enterprise Edge Lightweight and IOT (ELIOT) Blueprint and is a Akrino Technical Steering Committee (TSC) member.

Time Slot	Speaker
09:30	Welcome remarks and Introduction to Akraino Edge Stack
10:00	Reliance Jio
10:20	Airtel
10:40	Ms. Chitti Nimmagadda
11:30	Prof. Hazur Saran
11:50	Prof. D. Manjunath
12:10	Ms. Deepthi V V
12:30	Mr. Khemendra Kumar
12:50	Closing Remarks

Workshop 03

Title: Fast Packet Processing using Data Plane Development Kit (DPDK)

Session: December 17, 2019 | 09:30 – 13:00

Venue: DLT - 7

About the Workshop:
Network Function Virtualization (NFV) enables software based implementations of network functions to provide middle-box services. It avoids the problem of inflexible, purpose-built hardware for network operators since Virtual Network Functions (VNFs) can be run on top of commodity hardware. NFV has attracted many use cases ranging from virtual Customer Premises Equipment (vCPE) to virtual Evolved Packet Core (vEPC) and virtual Radio Access Network (vRAN). Fast packet processing libraries such as Data Plane Development Kit (DPDK) are the building blocks to enable NFV. The advancements in these libraries are the key factors fueling the rapid deployment of VNFs. This workshop aims to introduce the architecture of DPDK and give hands-on experience of working with sample applications of DPDK. In addition, the hands-on sessions would focus on setting up a simple experimental topology by using network namespaces. This would allow the participants to quickly get started with learning DPDK and explore its features.

The uniqueness of this workshop is that it helps the users to get started with DPDK quickly by setting up an experimental environment on a local machine. This environment is sufficient to get familiar with DPDK, before moving ahead with DPDK based NFV deployment in real networks. It would enable the users to play with sample applications of DPDK to gain an in-depth understanding of its optimizations and obtain performance measurements.

Workshop Organizer(s):

Organizer 01: **Mohit P. Tahiliani** is an Assistant Professor of Computer Science and Engineering at NITK Surathkal, India. He obtained Ph.D in Congestion Control Mechanisms for the Next Generation Internet, completed from the Department of Computer Science and Engineering at NITK Surathkal in 2013. Mohit has been using and contributing to open source projects since past 11 years. Together with his students, Mohit has contributed towards developing new models in ns-3. He is a Member of the Steering Committee of ns-3 Consortium. Recently, his team at NITK Surathkal contributed to the mainline of Linux kernel (v5.1). Currently, he is actively working on fast packet processing techniques and efficient NFV deployments.

Organizer 02: **Leslie Monis** is a Project Fellow in the Department of Computer Science and Engineering at NITK Surathkal, India. He holds a B.Tech in Computer Science and Engineering, completed from NITK Surathkal in 2019. Leslie is an open source enthusiast and enjoys exploring Linux kernel. He led the team which contributed code to Linux kernel. He has also developed a virtual testbed by using network namespaces to efficiently evaluate congestion control and queue management algorithms. Currently, he is focusing on data plane optimizations.

Workshop 04

Title: Blockchain for Cyber-Physical Systems and IoT

Session: December 17, 2019 | 15:30 – 18:00

Venue: DLT - 8

About the Workshop:
Cyber-physical systems (CPSs) combine physical objects or systems with integrated computing facilities and data storage. Such cyber-physical systems can be interconnected in networks, within which they can exchange and share data and information with other objects and systems. However, the current centralized architecture models in CPS and also more general Internet of Things (IoT) systems will struggle to scale up to meet the demands of future CPSs. To solve these issues, the decentralized and consensus-driven Blockchain and the combination of cryptographic processes behind it can offer an intriguing alternative. For many researchers, the blockchain technology has been seen as one of the most important innovations since the Internet and even of this century. However, it is still in it's infancy. Thus, the workshop will elaborate the key aspects of the use of blockchain for IoT and CPS applications, and will essentially provide an opportunity for the attendees to gain hands-on experience on how to use blockchain for IoT and CPSs use cases.

Workshop Organizer(s):

Organizer 01: **Madhusanka Liyanage** received a Doctor of Science (DSc.) degree in communication engineering from the University of Oulu, Oulu, Finland. He is currently an Assistant Professor/Ad Astra Fellow at University College Dublin, Ireland. He is also adjunct professor at the Centre for Wireless Communications, University of Oulu, Finland. He is also recipient of Marie Skłodowska-Curie Action Individual Fellowship. He has received several best paper awards and co-authored more than 80 scientific publications including three edited books with Wiley. His research interests are SDN, IoT, Blockchain, MEC, mobile and virtual network security.

Organizer 02: **Anshuman Kalla** is working as Associate Professor at Department of Computer and Communication Engineering, Manipal University Jaipur, India. Dr. Kalla has more than ten years of teaching and research experience. He graduated as Engineer from Govt. Engineering College Bikaner. He did Master of Science in Telecommunications and Wireless Networking from ISEP, Paris, France in 2008 and another Master from University of Nice Sophia Antipolis, France in 2011. He obtained Ph.D. degree in 2017. Dr. Kalla was recipient of Masters scholarships from Government of France for pursuing both the Master programs. Dr. Kalla has also successfully completed two internships; First from Alcatel-Lucent, Paris, France during 2007 – 2008 and Second at Orange Labs, Sophia Antipolis, France during 2011. Dr. Kalla has delivered invited sessions and talks during STC, FDP, Workshop and Conferences at reputed institutes like Malviya National Institute of Technology (MNIT, Jaipur), Institute of Engineers India New Delhi, Govt. Polytechnic College, Barmer etc. He has also been Technical Program Committee member and session chair for various international conferences. Dr. Kalla has organized International Conferences, Workshops and Seminar. His area of interest is Future Networking - Blockchain, ICN, IoT, SDN.

Organizer 03: **Raaj Anand Mishra** is an engineering student at the Department of Computer and Communication Engineering, School of Computing and Information Technology, Manipal University Jaipur, India. Raaj has experience in Full-Stack Web Development, Mobile Application Development and Blockchain-based Decentralized Application (DApp) Development. Raaj has successfully completed three internships: First, at DecodersCo, Delhi, India in 2018 during which he worked with technologies like React JS, Express, Node, Wordpress and MongoDB; Second at Stickman Services, Vadodara, India in 2019 and worked on Wordpress; Third, at Dell EMC, Bengaluru, India in 2019 where he worked with React JS, AngularJS, SpringBoot, Express, Android Studio, Node, PostgreSQL and Pivotal Cloud Foundry. His work on Blockchain based sharing of students' credentials recently got accepted at IEEE CCNC 2020, Las Vegas.

Time Slot	Content
15:30	**Introduction:** Use of Blockchain for CPS and IoT
15:45	**Installations and Initial Setup:** VirtualBox, Raspbian, Remix IDE, etc.
16:00	**Preliminaries and Background:** Creation of efficient smart contracts using Ethereum blockchain and use of remix tool for cost computation
16:30	**In-chain Secure Data Storage:** Uploading of data captured by IoT devices and storing it immutably on the Ethereum blockchain
17:20	**Off-loading Blockchain by Off-chain Storage:** Storing the IoT captured data on the IPFS and corresponding metadata on the Ethereum blockchain
18:00	**Smart Contract Based Automation**: Use of Node JS scripts and smart contracts to access and drive automated operation

Workshop 05

Title: 5th DST UKIERI International Workshop on "Towards Intelligent Communication Networks"

Session: December 18, 2019 | 09:30 – 18:30

Venue: DLT - 7

About the Workshop:

The telecommunications industry is riding high on the waves of the tech revolution and digital transformation. The surge in internet usage, smartphones, social media and online video streaming has heralded an explosive growth in the amount of data being created, which makes it increasingly challenging to store, transmit and process this data. As providers of the gigantic infrastructure for the new world of interconnected things, telecoms will get their hands on vast datasets. It's simply impossible for humans to process all of this data—and even more so with traditional methods—even if you cut down the sample size. While the unprecedented volume of wireless data traffic may suggest tougher communications system designs, machine learning (ML) embraces unique opportunities that can be a game changer for breaking the wireless communications bottlenecks in the next generation 5G and beyond wireless networks. ML is a type of AI that allows digital devices to learn, without being explicitly programmed. AI and ML is more of a solution to the problems than a challenge. Telecoms need machine learning to be able to process and analyse the data in many areas: customer experience, network automation, business process automation, new digital services, and infrastructure maintenance. As a key technique for enabling artificial intelligence (AI), ML has been shown to be capable of solving complex problems without explicit programming. Motivated by its successful applications to many practical tasks like image recognition and recommendation systems, both industry and the research community have advocated the applications of ML in wireless communication.

Workshop Organizer(s):

Organizer 01: **Vimal Bhatia** (SM'12) received the Ph.D. degree from Institute for Digital Communications with the University of Edinburgh, Edinburgh, U.K., in 2005. During Ph.D., he also received the IEE fellowship for collaborative research on OFDM with Prof. Falconer with the Department of Systems and Computer Engineering, Carleton University, Ottawa, ON, Canada, and is Young Faculty Research Fellow from MeitY. He is currently working as a Professor with the Indian Institute of Technology Indore, India. He has over 200 peer-reviewed publications, book chapters and 11 patents filed. His research interests are in the broader areas of non-Gaussian non-parametric signal processing with applications to communications. He is a reviewer for IEEE, OSA, Elsevier, Wiley, Springer, and IET. He is currently senior member of IEEE and Fellow IETE. He is also General Co-chair for IEEE ANTS 2018, and General Vice-chair for IEEE ANTS 2017. He is PI for external funding of over USD 2.0 million. He is also adjunct faculty at IIT Delhi and IIIT Delhi, India.

Organizer 02: **B. N. Bharath** obtained his bachelor's degree (B. E.) in Electrical and Electronics Engineering from B. M. S. College of Engineering, Bangalore in 2005. After a short stint in the industry, he obtained a Ph.D. degree from the Electrical Communication Engineering (ECE) Department of the Indian Institute of Science (IISc), Bangalore. He worked at Qualcomm, Inc. from 2013 to 2014. Currently, he is working as an assistant professor in the Department of Electrical Engineering at the Indian Institute of Technology Dharwad. His research interests include signal processing and machine learning for communication/network problems, information theory, optimization theory and stochastic optimization.

Organizer 03: **Tharmalingam Ratnarajah** (A96-M05-SM05) is currently with the Institute for Digital Communications, the University of Edinburgh, Edinburgh, U.K., as a Professor in Digital Communications and Signal Processing. He was a Head of the Institute for Digital Communications during 2016 – 2018. His research interests include signal processing and information theoretic aspects of 5G and beyond wireless networks, full-duplex radio, mmWave communications, random matrices theory, interference alignment, statistical and array signal processing and quantum information theory. He has published over 375 publications in these area and holds 4 U.S. patents. He has supervised 15 Ph.D. students and 20 post-doctoral research fellows, and raised $9 million+ USD of research funding. He was the coordinator of the EU projects ADEL (3.7M €) in the area of licensed shared access for 5G wireless networks and HARP (4.6M €) in the area of highly distributed MIMO and EU Future and Emerging Technologies projects HIATUS (3.6M €) in the area of interference alignment and CROWN (3.4M €) in the area of cognitive radio networks. Dr Ratnarajah was an associate editor IEEE Transactions on Signal Processing, 2015-2017 and Technical co-chairs, The 17th IEEE International workshop on Signal Processing advances in Wireless Communications, Edinburgh, UK, 3-6, July, 2016. Dr. Ratnarajah is a member of the American Mathematical Society and Information Theory Society and Fellow of Higher Education Academy (FHEA).

Organizer 04: **Mathini Sellathurai** (SMIEEE, FHEA) is a full Professor in Signal Processing and Intelligent Systems and Heriot-Watt University, Edinburgh, U.K. In her 15-year research on Signal Processing for Communications, she has made seminal contributions on MIMO wireless systems. She has published 200 IEEE entries, given invited talks and has written a book and several book chapters in topics related to this project. She received the IEEE Communication Society Fred W. Ellersick Best Paper Award in 2005, and Best Ph.D. thesis medal from NSERC Canada in 2002. She is also a member for IEEE SPCOM Technical Strategy Committee (2014 – 2018), Editor for IEEE TSP (2009 – 2014, 2015 – 2018). She is also the General Co-chair of IEEE SPAWC 2016 in Edinburgh.

Organizer 05: **Prof. Ganapati Panda** currently is a Professorial Fellow at Indian Institute of Technology Bhubaneswar. During 2009-13, Professor Panda served as the Deputy Director of this Institute. Prior to this, he was working as Dean (Academic Affairs) and Head, School of Electrical Sciences of this Institute. He also served as Dean (Administration) at National Institute of Technology, Rourkela. He was a member of Board of Governors of IIT Bhubaneswar and NIT Rourkela. He was the founder Head of School of Electrical Sciences at IIT Bhubaneswar as well as the founder Head of Electronics and Communication Engineering department of NIT Rourkela. He

also served as Director of National Institute of Technology, Jamshedpur. He also acted as Co-ordinator, World Bank Project at National Institute of Technology, Rourkela.

He has served 47 years in teaching and research in leading technical institutions of Odisha like College of Engineering Burla (16 years), National Institute of Technology, Rourkela (22 years) and Indian Institute of Technology, Bhubaneswar (9 years). He did his Post-Doctoral research work at the University of Edinburgh, UK (1984-86) and Ph. D. from IIT, Kharagpur in 1981 in the area of Electronics and Communication Engineering. He has already guided 38 Ph.Ds in the field of Signal Processing, Communication and Soft- computing. He has published more than 365 research papers in various referred International and Indian Journals and Conferences with 8784 citations, h-index of 47 and i-index of 150. Two more PhD students are continuing their PhD work under his active guidance. Most of his research papers are extensively cited.

He has successfully completed number of research projects from AICTE, MHRD, ISRO, DRDO, DST and British Council, UK. He has also edited two books in the area of DSP. He was nominated as the Fellow of the National Academy of Engineering, India (FNAE) and Fellow of National Academy of Science, India (FNASc) for his significant research contribution to signal processing and telecommunication. He has been awarded with Outstanding Teacher Award by INAE in 2017 for outstanding contribution to engineering, education and research. For the year 2012, Dr. Panda has received Biju Patnaik award for Scientific Excellence in recognition of his outstanding life time contributions in the field of science and technology. He also received Samanta Chandra Sekhar award from the department of Science and Technology, Govt. of Orissa for his high quality research work in the field of Engineering. He is a Senior Member of IEEE, Fellow of IET, Fellow of IETE, Fellow of IE, Life Member of CSI, Life Member of ISTE and Life Member of System Society.

He is a regular reviewer of many international journals including IEEE, IET and Elsevier. He has chaired and delivered keynote addresses in many international conferences in India and abroad. He has travelled extensively in India and abroad. His research interests are Digital Signal Processing, Digital Communication, Soft Computing, Intelligent Instrumentation, Evolutionary Computing, Computational Finance, Sensor Networks and Distributed Signal Processing.

Organizer 06: **Dr. V. V. Mani** received her B.E, M.E degree in Electronics and communication Engineering from College of Engineering, Andhra University and PhD in Electrical Engineering from Indian Institute of Technology , Delhi. She joined NIT Warangal in April 2008 as Assistant Professor in ECE dept, where she has been an Associate Professor since March 2018.

Prior to joining with NIT Warangal she worked as a Software Engineer Capricon Global Solutions Pvt. Ltd, Hyderabad, Worked as Assistant Professor at GITAM University and Full Time Research Associate at Indian Institute of Technology Delhi (IITD), India.

Her area of interest includes wireless communication, Signal processing for Communication, optical communication and design of real time trestbed for 5G using SDR . She has more than 60 papers in credit in national and international conferences and Journals. She supervised 4 Phd students, 1 submitted their thesis and currently 3 more students are working under her towards their dissertation. She completed 2 projects and two are ongoing with DST SERB and SPARC with international collaboration . She visited many countries and presented her research papers. She

spent 3 months at RICE University, Texas, USA under research exchange program. She held various administrative responsibilities at NIT Warangal and also served as Student Branch Counselor for IEEE Student Branch NIT Warangal and won Darrel Chang Bronze award for Best student activities.

Dr Mani and her research team developed a wireless communication Laboratory for M.Tech Advanced Communication Systems using SDR platform.

She is a fellow of Institute of Electronics and Telecommunication Engineers (IETE), India and Senior member of IEEE.

Workshop 06

Title: 4th International Workshop on 5G and Future Wireless Technologies

Session: December 18, 2019 | 09:30 – 15:45

Venue: DLT - 6

About the Workshop:

5G Wireless is one of the most importance research areas at present. Several working groups all over the world are investigating various aspects of 5G Wireless/Cellular Systems. Few groups of researchers in India from Industry and academia too are carrying out researches in the 5G. It is expected that the contribution from Indian researchers in the field of 5G would be significant. A number of collocated workshops in different, specific and focused areas of 5G are being organized in many of important and very good conferences in different parts of the globe. IEEE ANTS, an annual event in India, is an important and one of the high rated, valued international level conferences focused on telecommunication area. To enhance the research activities and to strengthen the ANTS conference, a workshop on broad area of 5G is being proposed. The organizer would like to cover a broad range of spectrum of 5G investigation and some highlights of future wireless communication era. The proposed workshop on 5G Wireless/Cellular and future wireless Communications and technology ensembles greatly in the scope of ANTS.

Workshop Organizer(s):

1. Dr. Navin Kumar, Amrita University, Bangalore, India
2. Dr. Arpita Thakre, Amrita University, Bangalore, India
3. Mr. Ashutosh Dutta, AT&T, New Jersey, USA

Time Slot	Speaker	Topic
09:30	Dr. Navin Kumar	Introduction and Highlight of ComSoc and future network activities
09:40	Dr. Sudhir Dixit	Visionary talk: Beyond 5G
10:20	Mr. Subodh Gajare	5G transport design and architecture
11:30	Dr. Dilip Krishnaswamy	Blockchain in 5G
12:10	Subhas C Mondal	Co-existence of 5G and WiFi 6 – Complement or Compete?
12:45	Nishant Krishna	Industrial IoT Protocols
14:15	Dr. Navin Kumar	Paper presentation (20 min per paper)

Workshop 07

Title: Underwater Communication and Networking

Session: December 18, 2019 | 09:30 – 13:00

Venue: DLT - 7

About the Workshop:

From the scientific and commercial point of view, a continuous real-time, effective and synoptic sampling of ocean has gained huge importance. From the necessity of various possible applications such as ocean environmental monitoring, undersea exploration, seismic monitoring, assisted navigation, tactical surveillance and so on, a new technology of Underwater Acoustic Sensor Network (UASN) has been developed. UASN can be considered as a conglomeration of underwater acoustic wireless communication and Wireless Sensor Network (WSN).

This workshop will introduce the topic of underwater acoustic communication and networking. It will also introduce UnetStack, Underwater Network Simulator developed by Acoustic Research Laboratory (ARL) of the National University of Singapore.

Workshop Organizer(s):

Organizer 01: **Dr. Sarang C. Dhongdi** is Asst. Professor in Dept. of EEE at BITS-Pilani, K K Birla Goa Campus, Goa, India. He completed his Ph.D. from BITS-Pilani, K K Birla Goa Campus, Goa, in the area of underwater acoustic sensor networks. His research interests include Underwater Acoustic Sensor Networks, Wireless communication and Digital Signal Processing.

Organizer 02: **Prof. Mandar Chitre** is currently the Head of the Acoustic Research Laboratory (ARL) at the Tropical Marine Science Institute (TMSI) in Singapore. He is also an Associate Professor and Associate Head of Department (Undergraduate Programs) at the Department of Electrical & Computer Engineering (ECE) of the National University of Singapore (NUS). He also serves as the Editor-in-Chief for the IEEE Journal of Oceanic Engineering. Mandar's research interests include underwater acoustic communications & networking, ambient noise imaging (ANI), collaborative underwater robotics, and acoustic signal processing.

Apart from academic interests, Mandar has a passion for photography, technology, scuba diving, chilies, wine and contract bridge. He also enjoys a good game of squash and badminton.

Time Slot	Speaker	Topic
09:30	Dr. Sarang Dhongdi	a) Details of underwater acoustic channel. b) Impact of underwater acoustic channel on the development of MAC, Routing and upper layers of UASN. c) Details of various software, hardware tools, simulation platforms and test-beds of UASN.
11:30	Prof. Mandar Chitre	Exploring Unetstack3 to perform underwater network simulations

Panel Discussion 01

Title: Ubiquitous Computing and Hyperconnected World

Session: December 18, 2019 | 14:00 – 15:00

Venue: DLT - 5

About:

Pervasive computing is a new paradigm in computing, which has started to come to fruition over the recent years. Furthermore, because of economic reasons, social reasons and anthropological observations, the possibility for pervasive computing to rise as a dominant and common area of computing is becoming more realistic. Most major computing companies have started research and development in areas of pervasive computing, and it is also on the rise in academic departments. At the heart of pervasive computing is an interest in user centric design, which facilitates our everyday lives, and augments our environments. Anyone interested in HCI (Human-Computer Interaction) will hopefully see the range of possibilities which are created through the development of pervasive scenarios.

Similarly, Ubiquitous networks combined with computing is a new paradigm in computing and communication. It has a convincing modalities to fulfill the key factors, like ensuring feasibility, acceptability, and usability in every sector of social relevance for information connect with continuous computing support using high speed and low latency networks, embedded processors and storage technologies promoting the uptake of ubiquitous networks and computing for improved quality of social life.

While we look at these aspects, we must ensure security of IoT devices and networks, as billions and may be trillions of them would occupy all facets of our future lives. Hence, we must safeguard it from all possible attackers and remove attack vectors from spoiling our smart cities.

Machine Learning and Artificial Intelligence are becoming key and almost indispensable technologies in today's world. An ML based prediction model for resources optimization in the IoT and ubiquitous networking environment for QoS provisioning is a necessary computing requirement. Here the network resources like bandwidth, energy, processors, etc., as QoS parametres and their provisioning can be achieved by efficient utilization of the resources in the IoT environment, also supporting security aspects based on the packet flow and users' behavioral patterns. Since the architecture, systems and protocols become more stable, the adoption of IoT increases the data volume and thereby use and misuse of data. Security threats to the data of IoT systems needs more attention to develop and establish stabilized IoT echo system for providing required Quality of Service.

As 5G is knocking the doors, and LTE, LTE-a are ruling the roost in all our systems, one must make ensure the newer avatars of wireless do not pose a threat to our lives. Embedded level security combined with possibility to use Blockchain to ensure transparency and bring in greater Trust factor in implementation of our software, middleware and hardware.

Extelligence or External Intelligence is a powerful form of knowledge or intelligence. This "sum of human intelligence" or "collective knowledge" is the currency for success for today's citizens in the hyperconnected world. IoT devices, when they get help in terms of external intelligence and knowledge, tend to outperform their tasks. An IoT Middleware can make the IoT devices and their use cases much more powerful by adding the Extelligence factor.

Panelist(s):

1. Mr. N. Kishor Narang, Mentor & Principal Design Architect, Narnix Technolabs Pvt. Ltd.
2. Dr. Vijaya Kumar B P, Professor & Head, Ramaiah Institute of Technology, Bangalore
3. Mr. Nishant Krishna, Co-founder & CTA, Tech-Machinery and More Pvt. Ltd.
4. AT Kishore, CEO, VifhyaSangha Technologies
5. Mr. S. Chetan Kumar, CEO, Aikaan Labs Pvt. Ltd.

Panel Discussion 02

Title: 5G Challenges and Opportunities in India

Session: December 18, 2019 | 14:00 – 15:00

Venue: DLT - 5

About:
This panel will deliberate on challenges and opportunities for deploying 5G in India providing perspectives from cellular operators, TSDSI, 5G test bed, and system OEMs.

Topics covered include target use cases, potential revenue opportunities, spectrum considerations, fronthaul/backhaul issues, rural connectivity challenges, migration strategies, Capex/Opex constraints, deployment and rollout timelines, standardization objectives, role of - government, open source and startups, edge computing aspects, among others.

Panelist(s):

1. Mr. Vikram Tiwathia, Deputy Director General, Cellular Operators Association of India
2. Mr. Dilip Krishnaswamy, Vice President, Reliance Jio
3. Ms. Bindoo Srivastava, General Manager, Telecommunication Standards Development Society, India
4. Prof. Huzur Saran, IIT Delhi, 5G Test Bed
5. Mr. Subrata Kumar Mitra, Vice President, Ericsson India
6. Mr. Subodh Gajare, Lead Architect, Cisco
7. Mr. Kalyan Kumar Asangi, Associate Vice President, Huawei

Technical Session 01

DAY – 01 | December 16, 2019 | 16:00 – 17:30		
Wireless Technologies (WL) – 01 (Venue: DLT – 5)		
16:00	Stephen Ekwe	Community-Aware Pricing Game for Utility Maximization in 5G Heterogeneous Networks
16:16	Parvez Shaik	Ergodic Capacity Analysis of Device-to-Device MIMO Relay System with Imperfect CSI
16:31	Sandhya Soni	DF Cooperative-NOMA Scheme in Presence of SIC Errors for Ubiquitous Coverage
16:46	Parvez Shaik	ASER Analysis of Cross QAM for TAS/MRC-MIMO Cooperative Relay System with Imperfect CSI
17:01	Sharvari Ravindran	Required Delay-based Network Sub-Slices Resource Optimization for 5G Radio Access Network
17:17	Suraj Dhar	On outage analysis of two user cooperative NOMA with Hybrid SWIPT protocol
Network Applications and Technologies (NAT) – 01 (Venue: DLT – 6)		
16:00	Shyam Sundar	Remote Attestation Based Software Integrity of IoT Devices
16:19	Pradeepkumar Bhale	LORD: LOw Rate DDoS Attack Detection and Mitigation Using Lightweight Distributed Packet Inspection Agent in IoT Ecosystem
16:37	Rajesh Shrivastava	Preventing data tampering in IoT networks
16:56	Rohan Nathi	Secured and Lightweight Communication Scheme on UDP for Low End IoT Devices
17:14	Krishna Delvadia	An Efficient Routing Strategy for Information Centric Networks
Emerging Technologies (EMT) – 01 (Venue: DLT – 7)		
16:00	Seema Jangra	Trust Based Taxology of Nodes in Vehicular Delay Tolerant Network
16:19	Antonysamy Justin Gopinath	Enhancement of IEEE802.11p-based Channel Access Scheme for Internet of Vehicle (IoV)
16:37	Jeevan Ravishankar	Determination of Participating Nodes in Opportunistic Networks for VANET
16:56	Mahabaleshwar Kakkasageri	Trust and Delay based Routing for VANETs
17:14	Mahabaleshwar Kakkasageri	Connectivity and Delay Aware Reliable Routing in Vehicular Ad hoc Networks

Technical Session 02

DAY – 02 | December 17, 2019 | 15:30 – 17:00		
Wireless Technologies (WL) – 02 (Venue: DLT – 5)		
15:30	Sanjib Mog	Performance Analysis of SM-based Hybrid MIMO FSO/RF System
15:45	Debashisha Mishra	A Matching-theoretic Framework for Consolidation of Flexible Cloud-native Central Units in 5G-RAN
16:00	Mohd Hamza Shaikh	Energy Efficiency Enhancement in Full-Duplex Relay System through Adaptive Antenna Allocation
16:16	Suneel Yadav	On the Secrecy Performance of Cooperative Cognitive Vehicular Relay Networks
16:31	Rahul Bajpai	A Novel Throughput Improvement Algorithm for High Density Wireless LAN
16:46	Sanjoy Debnath	Optimal Resource Allocation in Two Tier Heterogeneous Network
Network Applications and Technologies (NAT) – 02 (Venue: DLT – 6)		
15:30	Nidhi Gupta	LandLedger: Blockchain-powered Land Property Administration System
15:45	Denson George	A Blockchain based Solution to Know Your Customer (KYC) Dilemma
16:00	Mini TT	Secure Device Identifiers and Device Enrollment in Industrial Control System
16:16	Hemant Sharma	Secrecy Analysis of MRC Diversity Schemes over Nakagami-m Fading Channels
16:31	Pranay Agarwal	Preserving Users' Privacy for Location-Based Services
16:46	Abhishek Gupta	Modeling and Analysis of Heterogeneous Traffic Networks with Anarchists and Socialist Traffic
Emerging Technologies (EMT) – 02 (Venue: DLT – 7)		
15:30	Sandesh Jain	Low Complexity Kernel-MSER based Equalizer for Crosstalk Mitigation in Multicore Fiber Communication
15:49	Satish Kumar	Hardware Implementation of Automatic Modulation Classification with Deep Learning
16:07	Yashwant Patel	Deep Learning Based Resource Allocation For Auto-Scaling VNFs
16:25	Dibyadip Chatterjee	Deep Learning Architectures for Modeling Communication Systems
16:44	Raja Sattiraju	Channel Estimation in C-V2X Using Deep Learning

Technical Session 03

DAY – 02 | December 17, 2019 | 17:00 – 18:00		
Wireless Technologies (WL) – 03 (Venue: DLT – 5)		
17:00	Supongmen Walling	A Low-cost Real-time IoT based Air Pollution Monitoring using LoRa
17:15	Vibhutesh Singh	A Low Overhead Frame Configuration for Improved Preamble Based Channel Estimation in FBMC-OQAM
17:31	Shruti Lad	An Online Algorithm for Energy Harvesting Cognitive Radio IoT Network
17:47	Zilmarij Iqbal	Light-weight, Real-time Internet Traffic Classification

Technical Session 04

DAY – 03 | December 18, 2019 | 09:30 – 11:00		
Wireless Technologies (WL) – 04 (Venue: D - 101)		
09:30	Sanjay Biswash	Node-to-Node Communication and Mobility Management Scheme for 5G Fog Networks
09:45	Deepak Saluja	Modeling and Performance Analysis of FFR-aided Dense Cellular Network in 3-D Environment
10:00	Aritra Chatterjee	Downlink Coverage Analysis of 3-D Ultra Dense Networks with Realistic Propagation Conditions
10:16	Bhawna Kamra	Performance of Battery-Assisted Energy Harvesting DF Relay over Nakagami-m Channels
10:31	Rupender Singh	Physical Layer Security of MRC in Fisher- Snedecor F Fading Channels
10:46	Kuna Venkateswararao	Dynamic selection of Virtual Small Base Station in 5G Ultra-Dense Network using Initializing Matching Connection Algorithm
Network Applications and Technologies (NAT) – 03 (Venue: DLT – 5)		
09:30	Basant Subba	A Neural Network based NIDS framework for intrusion detection in contemporary network traffic
09:45	Subhasish Banerjee	A Novel Key Generating Scheme of Automatic Variable Key
10:00	Vinti Agarwal	Identifying Anomalous HTTP Traffic with Association Rule Mining
10:16	Abhay Deep Seth	De-Authentication Attack Detection using Discrete Event Systems in 802.11 Wi-Fi Networks
10:31	Anil Kumar	A Novel Approach for FPGA Implementation of Register Exchange Based Viterbi Decoder and Re-Encoding based Node Synchronizer
10:46	Neha Jain	Comparison Between IPv4 and IPv6 using OSPF and OSPFv3 on Riverbed Modeler
Emerging Technologies (EMT) – 03 (Venue: DLT – 8)		
09:30	Rahul Pal	A Cross Entropy Minimization based Beam Selection for Time-Variant mmWave Beamspace MU-MIMO Communication System
09:48	Yaseen Mohammed	Wideband mmWave Massive MIMO Channel Estimation Using Stagewise Weak Conjugate Gradient Pursuit
10:07	Rahul Pal	Performance Study of mmWave Beamspace MU-MIMO-NOMA Communication System
10:26	Fnu I. Zakir Ahmed	ADC Bit Allocation for massive MIMO using modified dynamic programming
10:45	Satish Kumar	Deep learning based Massive-MIMO decoder

Technical Session 05

DAY – 03 | December 18, 2019 | 11:30 – 13:00		
Wireless Technologies (WL) – 05 (Venue: D – 101)		
11:30	Asif Sardar	Predation Blocking Strategy in Presence of Fraudulent Incumbent Service Provider
11:45	Tarun Patidar	OASIS: A Framework for Enhanced Live Video Streaming over Integrated LTE Wi-Fi Networks
12:00	Thomas Valerrian Pasca Santhappan	A Packet Level Steering Solution for Tightly Coupled LWIP Networks
12:16	Haijun Gao	An Evaluation of the Proportional Fair Scheduler in an Physically Deployed LTE-A Network
12:31	Pratap Khuntia	Resource Sharing For Energy Harvesting Based D2D Communication Underlaying Cellular network
12:46	Shuchi Tripathi	System-Level Performance Analysis of DOA Estimation in Cellular Networks using Stochastic Geometry
Network Applications and Technologies (NAT) – 04 (Venue: DLT – 5)		
11:30	Rohit Kumar	Optimized Link Utilization Based Approach for Traffic Engineering in SDWSN
11:45	Niranjhana Narayanan	Mitigation of security attacks in the SDN data plane using P4-enabled switches
12:00	Mohammad Alhowaidi	Cache Management for Large Data Transfers in Named Data Networking using SDN
12:16	Upendra Singh	SDN Based Dynamic Resource Scheduling for Large Scale Data Centers
12:31	Lunde Chen	Point-to-multipoint virtual link embedding in Multi-domain SDN Networks
12:46	Tanusree Chatterjee	LowSHeP: Low-overhead forwarding and update Solution in ndn with Hexadecimal Patricia trie
Emerging Technologies (EMT) – 04 (Venue: DLT – 8)		
11:30	Henning Idsøe	Phase-noise Impact on the Performance of mmWave-RADARs
11:48	Swaminathan K	A Novel Hybrid FSO/mmWave/RF System Design And Analysis For Next Generation Wireless Communication
12:06	Dattaraj Mulgaonkar	Fading-Averaged Symbol Error Probability Analysis of Millimeter Wave Downlink over Nakagami Fading
12:25	Sashmita Panda	Performance of a Leaky-Integrate-and-Fire Model vis-a-vis Measured Response of Diseased Neurons
12:44	Mikhail Belkin	Studying 5G Pico-Cell Base Station as Fiber to Millimeter-Band Wireless Interface

Technical Session 06

DAY – 03 | December 18, 2019 | 15:00 – 16:30		
Wireless Technologies (WL) – 06 (Venue: D – 101)		
15:00	Kshitija Dolas	Time Allocation and Scheduling in Energy Harvesting Wireless Networks
15:19	Dharmaraja Selvamuthu	Tradeoff Between Performance and Energy-Efficiency in DRX Mechanism in LTE-A Networks
15:37	Shailesh Khanolkar	ABC optimization aided Joint User and Throughput Maximization in underlay D2D communication
15:56	Jagadeesha Rb	Incentive Based Relaying in D2D Social Networks
16:15	Pratik Chakraborty	Performance of Underlay Device-to-Device Communication with a Mode Selection Strategy
Network Applications and Technologies (NAT) – 05 (Venue: DLT – 5)		
15:00	Chetna Singhal	Efficient QoS Provisioning Using SDN for End-to-end Data Delivery in UAV Assisted Network
15:19	Pravati Swain	CoDRL: Intelligent Packet Routing in SDN Using Convolutional Deep Reinforcement Learning
15:37	Priyanka Bardalai	DoubleTrApp: A Weak Vertex Cover based DDoS Detection and Mitigation scheme using SDN approach
15:56	Suraj R	DebriNet: An Opportunistic Software Defined Networking Framework over PSLV Debris
16:15	Barun Saha	Flow Allocation in Industrial Intent-based Networks
Emerging Technologies (EMT) – 05 (Venue: DLT – 8)		
15:00	Uday Singh	Vector-Valued KLMS based Multiple Target Range and Velocity Estimation using IEEE 802.11p Waveform for Autonomous Vehicle
15:19	Palash Kundu	Finding Practicable Nesting Level in Multi-level Nested Mobile Networks
15:37	Pranav Godway	Smart Traffic Management System Based on Software Defined Internet of Things Architecture
15:56	Goutam Sahoo	AISS for Road Anomaly Detection using WSN-Based Distributed Strategy
16:15	Saketha Chilukuri	A Unique IoT Solution for Vehicle Tracking and Safety

Technical Session 07

DAY – 03 | December 18, 2019 | 17:00 – 18:30		
Wireless Technologies (WL) – 07 (Venue: D – 101)		
17:00	Meghraj Pawar	Design and implementation of frequency reconfigurable antenna for wireless applications
17:15	Amit Dey	Design of Flexible and Dual Wideband Antenna for Compact Wireless Devices
17:31	Venkatareddy Akumalla	Optimal Power Operation of Energy Detector for Random Signals in Gaussian Noise
17:47	Gurram Venkataramana	Optimization of Polyphase Orthogonal sequences for MIMO Radar Using Genetic Algorithm with Hamming scan
18:02	Banani Talukdar	Analytical Modelling and Performance Evaluation of a Prediction based EH-Cooperative CRN under Erlang Distribution
18:17	Md. Hussain	Group Based Semi-orthogonal User Scheduling for Massive MIMO Wireless Communication
Network Applications and Technologies (NAT) – 06 (Venue: DLT – 5)		
17:00	Sanjay Biswash	Freshness Management of Cache Content in Information-Centric Networking
17:19	Shajulin Benedict	IoT Blockchain Solution for Air Quality Monitoring in SmartCities
17:37	Kamalesh Karmakar	Resource Scheduling of Workflow Tasks in Cloud Environment
17:56	Abhijit Mitra	Capacity Benefits of Operation Over C+L Band Elastic Optical Network in the Indian Network Scenario
18:14	Ravi Yadav	Trust Aware Framework for Application Placement in Fog Computing
Emerging Technologies (EMT) – 06 (Venue: DLT – 8)		
17:00	Iman Chatterjee	Smartphone-based drowsiness detection system for drivers in real-time
17:15	Sara El Alaoui	STAN+PETRA: A Statistical Analysis Aided Routing Algorithm for QoS in Mission-Driven IoT Networks
17:31	Krunal Saija	A Machine Learning Approach for SNR Prediction in 5G Systems
17:47	Aarohi Vora	A Score Level Fuzzy Rule based Multi-Biometric Framework for enhancing security of cloud access scenario
18:02	Emy George	Multi-Class Delay Sensitive Medical Packet Scheduling in Inter-WBAN Communication
18:17	Vinay Trivedi	Error Rate Analysis and Efficient Channel Dependent Scheduling for SC-FDMA Uplink

Technical Session 08

DAY – 04 | December 19, 2019 | 09:30 – 11:00		
Wireless Technologies (WL) – 08 (Venue: D – 103)		
09:30	Sayed Hasan Hariq	Link Adaptation Algorithms for Free-Space Optical Communication Systems
09:53	Ananth A	Scaled Selection Combining for SSK in Decode and Forward Cooperative Relaying
10:17	Ajit Kumar	Performance of MIMO-VLC system for Different Radiation Patterns of LED in Indoor Optical Wireless Communication System
10:40	Priyanshu Mishra	Machine Learning Techniques for Channel Estimation in Free Space Optical Communication Systems
Network Applications and Technologies (NAT) – 07 (Venue: DLT – 8)		
09:30	Rashmiranjan Nayak	Video-based Real-time Intrusion Detection System using Deep-Learning for Smart City Applications
09:48	Asif Middya	An approach to detect Travel Patterns using Smartphone Sensing
10:07	Paul Orim	Cluster-based Random Access Scheme for 5G URLLC
10:26	Amit Dua	Fuzzy Rough Set based Social IoT Recommender System
10:45	Srikant Kala	ODiN: Enhancing Resilience of Disaster Networks through Regression Inspired Optimized Routing
Short Paper Presentation (SP) – 01 (Venue: DLT – 5)		
09:30	Arzad Kherani	On Achieving Hidden Markov Model Estimation Freshness in Sensor Networks
09:43	SatyaJaswanth Badri	Audio and Video Transmission Using Visible Light Transmission
09:56	Aniq Ur Rahman	Test-bench for Task Offloading Mechanisms: Modelling the Rewards of Non-stationary Nodes
10:09	Arzad Kherani	Improved Packet Detection in LoRa-like Chirp Spread Spectrum Systems
10:22	Saket Thool	Magnetic Induction-based Communication System for Underground Applications: A Testbed
10:35	Anumoy Ghosh	Dual Band Metamaterial Absorber Using Concentric Split-Ring Structures For Wireless Applications
10:48	Sandip Chakraborty	Performance of Random Access Games over an IEEE 802.11ac Testbed

Technical Session 09

DAY – 04 | December 19, 2019 | 11:30 – 13:00		
Wireless Technologies (WL) – 09 (Venue: D – 103)		
11:30	Rajesh G	Correlation Analysis of Multimodal Sensor Data in Environmental Sensor Networks
11:46	Govind Gupta	Optimal path planning for UAV using NSGA-II based metaheuristic for sensor data gathering application in Wireless Sensor Networks
12:01	Shivam Gujral	Cooperative Communication in Hybrid User Scenario incorporating Backscattering and Energy Harvesting
12:16	Nikumani Choudhury	Re-synchronization in a Synchronized IEEE 802.15.4 Cluster-tree network
12:32	Soumen Moulik	Reliable Transmission of Critical Packets in IEEE 802.15.4-based Body Area Networks
12:47	Binoy Babu	Minimum delay scheduling under average power constraint for 802.11ax downlink
Network Applications and Technologies (NAT) – 08 (Venue: DLT – 8)		
11:30	Munir Mohammed	IEEE Standards for 5G and IoT
11:53	Nikhil Mitaliya	6 Key Challenges of the Internet of Things
12:17	Soma Kumawat	Development of odd weight code construction for KS code with Ex-OR detection for SAC-OCDMA system
12:40	Nikita Joshi	Task allocation in three tier Fog IoT architecture for Patient Monitoring System using stackelberg game and matching algorithm
Short Paper Presentation (SP) – 02 (Venue: DLT – 5)		
11:30	Subham Kumar	Detecting Domain Generation Algorithms to prevent DDoS attacks using Deep Learning
11:43	Akhil Donka	Multi-band multi-location RF power survey and ambient RF energy harvesting circuit
11:56	Khagendra Joshi	Experimental Observations on the Feasibility of VLC-Based V2X Communications under various Environmental Deterrents
12:10	Saaransh Pandey	Visible Light Communication Modulation Toolkit using Reconfigurable GNU Radio Framework
12:23	Yash Gupta	A Smart User-Centric Visible Light Communication system
12:36	Harshavardhan Singh	An asymmetrical slot circularly polarized on-chip antenna for wireless SoC applications at 2.45 GHz
12:49	Sneha Agarwal	SDR Compatible Constant Current LED Driver Circuit Design for Visible Light Communication Applications

Technical Session 10

DAY – 04 | December 19, 2019 | 14:15 – 15:45		
Wireless Technologies (WL) – 10 (Venue: D – 103)		
14:15	Anders Frøytlog	Design and implementation of a long-range low-power wake-up radio and customized DC-MAC protocol for LoRaWAN
14:33	Raja VaraPrasad	Integrated Framework for Farmer Centric Agriculture Applications Using IoT Architectures
14:52	Akshay Jadhav	A Novel PHY Layer Approach for Enhanced Data Rate in LoRa using Adaptive Symbol Periods
15:10	Dipti Trivedi	Inferring Occupants Count from Low Power IP based Devices in Building through Data Fusion
15:29	Vineeth Bala Sukumaran	A study of Average and Peak Age-of-Information for MAC protocols in Contiki
Network Applications and Technologies (NAT) – 09 (Venue: DLT – 8)		
14:15	Surender Redhu	Multi-Sensor Data Fusion for Cluster-based Data Aggregation in IoT Applications
14:39	Hamid Malik	Performance Analysis of Blockchain based Smart Grids with Ethereum and Hyperledger Implementations
15:02	Prasenjit Maiti	Deployment of Multi-tier Fog Computing System for IoT Services in Smart City
15:26	Bhaskara Santhosh Egala	SHPI: Smart Healthcare System for Patients in ICU using IoT
Emerging Technologies (EMT) – 07 (Venue: DLT – 7)		
14:15	Jihas Khan	Learning Based CoMP Clustering for URLLC in Millimeter wave 5G networks with Blockages
14:30	Mahendra Thakur	Volterra-DFE based Nonlinear Equalizer for Diffusion based Molecular Communications
14:45	Indranil Sarkar	An Optimized Task Placement in Computational Offloading for Fog-Cloud Computing Networks
15:01	Mahendra Thakur	Weighted Higher Order Detector for Diffusion based Molecular Communications
15:16	Rishu Raj	Optimization of LED Semi-Angle in Multipath Indoor Visible Light Communication Links
15:31	Subhas Mondal	Improving Efficiency of Optical Camera Communication using Dynamic Rate Adaptation

Technical Session 10

DAY – 04 | December 19, 2019 | 14:15 – 15:45		
Short Paper Presentation (SP) – 03 (Venue: DLT – 5)		
14:15	Sanjeev Sharma	Hybrid Modulation Scheme and Modified Energy Detector for Molecular Communications
14:28	Giap Le	Logical Network Mapping With Content Connectivity Against Multiple Link Failures in Optical Metro Networks
14:42	Gourab Ghatak	Coverage Enhancement in Indoor Millimeter Wave Systems Under Random Human Blockages
14:55	Sampashree Nayak	Analyzing Malicious URLs using a Threat Intelligence System
15:08	Pramod Tripathi	A simulation based study to identify optimal number of controllers for multi-application scenarios in Software Defined Wireless Sensor Network (SDWSN)
15:21	Abhijeet Gaonkar	H Shaped Dielectric Resonator Antenna for Wideband Applications
15:34	Shailesh Khanolkar	Null Steering and Sidelobe Canceller using Frequency Response Masking approach for Antenna Arrays

13th IEEE International Conference on
Advanced Networks and Telecommunication Systems
December 16 – 19, 2019 | Goa, India

IEEE ANTS Women in Engineering (WiE) Mini-Conference

Date: December 18, 2019

Venue: D - 103

"WiN with WiT"

(Women in Networking with Women in Telecommunications)

Message from the Women-in-Engineering Chair

A warm welcome to all our dear participants of the 13th edition of IEEE International Conference on Advanced Networks and Telecommunications Systems (IEEE ANTS 2019) being held in BITS Pilani Goa. On 18th Dec 2019, a Women in Engineering mini-conference is being held, aiming to provide a unique opportunity for women engineers to network and showcase their skill and expertise. The program schedule is enclosed. We urge our women participants to utilize this unique opportunity provided to network and further their professional career forward. Let us leverage on this forum opened for only the fourth time in IEEE ANTS and celebrate Women In Engineering!

- Dr. Mydhili K. Nair, Ramaiah Institute of Technology, Bengaluru

Women in Engineering (WiE) Technical Sessions

DAY – 03 | December 18, 2019 | 09:00 – 11:20		
WiE 01 | 5G, Network Security		
09:00	Dr.Sakshi Kaushal	UAV Augmented Intelligent Monitoring and Surveillance System
09:20	Pimmy Gandotra	Adaptive Beamforming Approach for Green D2D Communication in 5G
09:40	Shilpa Rao	Relay Selection for Energy Harvesting Cooperative NOMA
10:00	Srivalli Gundala	Compact High Gain Hexagonal Fractal Antenna for 5G applications
10:20	Tanu Goyal	An Efficient Handover Management Technique For Improving QoS in Next Generation Networks
10:40	Dhebeha Mj	Mechanism of context-aware and adaptive data collection, aggregation and analysis
11:00	Shivani Sharma	Classification of Security Attacks in WSNs and Possible Countermeasures: A Survey
WiE 02 | Cognitive Radio, Optical Wireless		
11:40	Shilpa Thakur	Secrecy performance Analysis for Underlay Cognitive Radio Network with Optimal Antenna Selection and Generalized Receiver Selection
12:00	Nikita Goel	Performance Analysis of Drone assisted Cooperative Communication in Hybrid channel Environment
12:20	Akanksha Srivastava	A Game Theory based Approach for Opportunistic Channel Access in Green Cognitive Radio Networks
12:40	Rima Deka	Performance Analysis of Decode-and-Forward based Hybrid RF/FSO-VLC system
WiE 03 | IoT, PetriNets		
14:00	Dr.Mydhili K Nair	Role of Women Educators To Apply Knowledge Acquired for Societal Causes
14:20	Manu Singh	Secure and Lightweight Communication Scheme for VANETs using Identity Based Encryption
14:40	Krati Rastogi	AQCI: An IoT Based Air Quality and Thermal Comfort Model using Fuzzy Inference
15:00	Aruna Raveendran	A Judicious Spectrum Sensing Technique in Cognitive Radio Assisted Internet of Vehicles
15:20	Saylee Kanadje	Application of game theory to cooperative underlay cognitive radio IoT
15:40	Charushila Raskar	A prototype of the dynamic traffic management: Smart barricade system

Women in Engineering (WiE) Technical Session

DAY – 03 | December 18, 2019 | 09:00 – 11:20		
WiE 03 | IoT, PetriNets		
16:00	Nithuna P S	Blockchain Based Framework For Driver Profiling in Smart Cities
16:20	Priyanka Gupta	Handling concurrent requests in a secret sharing based storage system using Petri Nets
WiE 04 | Security, Trust, WBAN, Optical Comm.		
17:00	Yugnanda Malhotra	1Tb/s - Super Combined DWDM System
17:20	Paramita Dey	Hierarchical Ego based Community Detection in Social Network
17:40	Jesty Santhosh	Defending against Sybil Attacks in Vehicular Platoons
18:00	Shagun Gupta	Feasibility of Lab-On-Chip Theranostic Platforms in Wireless Body Area Network (WBAN)
18:20	Sonam Jain	Rateless Code-Aided Transmission Scheme to Achieve Secrecy in a Delay-Constraint Environment

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