

Plenary Speaker: Prof. Girish Kumar

IIT Bombay, Powai, Mumbai, India



****Title of the Plenary talk**** **CELL PHONE/TOWER RADIATION HAZARDS AND SOLUTIONS**

Cell phone technology has grown rapidly in India, and currently there are more than 100 crores cell phone subscribers and nearly 6.0 lakhs cell phone towers. Cell operators are allowed to transmit 20W of power per carrier from individual cell tower antenna. One operator may have 4 to 6 carrier frequencies and there may be 2 to 4 operators on the same roof top or tower. Thus, total transmitted power may be 100 to 400W. From Sep. 1, 2012, India has adopted 1/10 of ICNIRP Guidelines, which implies safe power density of 450 milliWatt/m² for GSM900 and 920 milliWatt/m² for GSM1800 after Inter-Ministerial Committee (IMC) report came out in Jan. 2011, which mentioned several health hazards due to radiation.

Interphone study report in May 2010 mentioned that excessive users of mobile phones (i.e., 1/2 hour/day over 8 to 10 years) have doubled to quadrupled brain tumor risk. On May 31, 2011, WHO reported, “The electromagnetic fields produced by mobile phones are classified by the International Agency for Research on Cancer as possibly carcinogenic to humans.”

A large number of scientists prepared Bio-Initiative Report in 2007 and gave 2000 references and they proposed safe radiation density of 1.0 milliWatt/m² for outdoor, cumulative RF exposure and 0.1 milliWatt/m² for indoor, cumulative RF exposure. Again, 29 scientists from 10 countries prepared Bio-Initiative Report 2012 and gave additional references of 1800 scientific/technical papers. We have also carried out radiation measurements at thousands of places and can say with certainty that adverse health effects occur over a few years of continuous exposure at 1.0 milliWatt/m². The most common complaints are: sleep disorder, headache, irritability, concentration

problems, memory loss, depression, hearing loss, joint problems, etc. More severe reactions include seizures, paralysis, miscarriage, irreversible infertility, and cancer. Children and pregnant ladies are more vulnerable.

Expert Group formed by Environment Ministry, India submitted their report in Oct. 2011 on “Impacts of communication towers on Wildlife including Birds and Bees”. They gave 919 scientific/technical references and mentioned that 593 papers reported adverse effect, 130 papers reported no effect, and 196 papers reported inconclusive/neutral effect. Thus, apart from humans, cell tower radiations also affect birds, animals, plants, and environment. Yield of fruit bearing trees near the cell towers and in the main beam is going down significantly.

Cell phone industry may not admit that there are harmful effects just like cigarette industry. People of India must unite to convince policy makers to adopt stricter radiation norm of less than 1 milliWatt/m², which will compel cell operators to transmit less power from each antenna mounted on the tower.

****Speaker Biography****

Girish Kumar received Ph.D. degree in Electrical Engineering from IIT Kanpur in 1983. From 1983 to 1985, he was a Research Associate in the Electrical Engineering Department, Univ. of Manitoba, Winnipeg, Canada. From 1985 to 1991, he was an Assistant Professor in the Electrical Engineering Department, Univ. of North Dakota, Grand Forks, USA. Since 1991, he is at IIT Bombay, where he is currently a Professor in the Electrical Engineering Department. His areas of interest are: Antennas, Microwave Circuits and Systems. He has written more than 300 papers in the international and national journals and conference proceedings. He is author of four books and has filed 9 patents. He has been working on hazards of microwave radiation for the last one decade. Has written several reports and given presentations at various forums on the topic related to Cell Phone and Tower Radiation Hazards and Solutions. He was chairman of the company “Wilcom Technologies Pvt. Ltd.”, an IIT Bombay incubated company. Wilcom had developed several products, such as, mobile phone jammers, signal enhancers, radiation shield, antennas, power dividers, couplers, filters, amplifiers, etc.

Keynote Speaker I

Dr Nirupam S. D.

Senior Scientist, Head of IoT and Artificial Intelligence
Energy Research Institute @ NTU, Singapore



****Title of the talk****

THE HOW INDUSTRIAL IOT - SETTING YOURSELF UP FOR SUCCESS

Internet of things (IoT) is a smart technology that connects anything anywhere at any time. Such ubiquitous nature of IoT is responsible for draining out energy from its resources. Therefore, the **energy efficiency of IoT resources** has emerged as a major research and development issue.

In this talk, sharing an information on implementation effort of our **proposed energy-efficient architecture for IoT, which consists of several layers, namely, sensing and control, information processing, and presentation**. The architectural design allows the system to integrate **energy harvesting/self-powered battery**, ultra-low power sensors, robust radio's etc. This mechanism allows the energy-efficient utilization of all the IoT resources. The **experimental & deployment results show a significant amount of energy saving** in the case of sensor nodes and improved resource utilization of cloud resources.

Highlights on how **AI provides new solutions by centralized or distributed intelligence to analyze and extract meaningful data insight and provide autonomous decision support**. Also, **present an information on our successful spinoff company funded by Singapore national research foundation (SG NRF)** and few of our Next generation connected intelligent IoT solutions integration with AI/ML and successful deployment of our **MultiSense wireless Sensors**, Multiprotocol communication gateways, AI/ML based Data fusion platform and security, Data analytics engine.

Also, in this talk outline the challenges related to features of connected intelligent systems, design metrics with layered architectures, edge computing, connectivity, data visualization, modelling and deployment of IoT applications that will benefit from wireless technologies, AI & Blockchain and potential research directions in resolving these challenges.

****Speaker Biography****

An Agile coach, Conference speaker, Entrepreneur, Engineering leader with 20 years of global executive experience in Internet of Things (IoT), Artificial intelligence (AI), Cloud computing, Data analytics, Visual Computing (Video AI), Connected vehicles, Smart cities. Focus on Design Strategy, Innovation, New business development and expansion, Commercial strategies, Presales, Thought leadership, Joint ventures and Public private partnership (PPP). Served as chief ICT architect and chief instrumentation expert for ICT driven future (smart) cities and on not-for-profit boards.

Nirupam is a successful entrepreneur, Spin-off a three deep tech companies in IoT, AI, Block chain & Big data fusion domain, raised Multi-mil \$ fund from venture capitalists (VC's) and Singapore National Research Foundation (Singapore NRF). Pioneer in IoT, AI, Video AI, Big data Fusion, MultiSense Wireless Sensing and Block chain technologies implementation. Nirupam is an expert in the IoT space, leading successive generations of remote connectivity platforms and solutions, playing key roles in designing, evangelizing, and realizing innovative connected product solutions, successful deployment of connected products in the marketplace. Built world's leading open IoT platform, has proven capability to Connect & Analyse over Trillions of Devices and Data events, connected & address the needs of verticals such as Automotive, Energy, Utilities, Healthcare, Industrial, Retail, Smart homes, Smart Cities, Financial services, Manufacturing, Oil Gas sector. Built successful IoT operation and IoT products from scratch. Nirupam is an IEEE distinguished speaker on IoT, AI, Big data Fusion & Industry 4.0, Panel moderator and delivered plenary talks at Europe, Asia-Pacific and Global conferences with audience sizes ranging up to 500+ attendees. He speaks across different industries such as IoT, Smart cities, Energy & Utilities, Big Data & Cloud Tech, Automotive, Manufacturing, Supply chain logistics. Virtual agents/Assistants (AI Chatbots) in Banking, Insurance, Healthcare, Government, Multimedia and Telecom area. His audience and associations has covered C-Suite & technology leaders, Programme directors & managers, Product Managers, Data scientists, Security, Risk & Compliance professionals, Actuarial, Marketing, Pre-sales, start-ups mentors.

Keynote Speaker II

Mombasawala Mohmedsaeed

General Manager – Applications
Keysight Technologies India Pvt. Ltd



****Title of the talk****

UNDERSTANDING 5G NR REL 15,16 STANDARDS

Wireless communication landscape has been ever changing with the advent of modern technologies to meet the needs of a connected world. Last two and half decades of wireless communication was focused on connecting human beings with the network. The next wave in this domain has multiple facets viz. connecting **machines and things to the network**, servicing **mission critical applications** with commercial wireless technologies and **spreading augmented reality** to masses.

This lecture briefly discusses the three base 5G objectives which are enhanced mobile broadband (eMBB), massive machine type communication (mMTC) and ultra-reliability and low latency communication (uRLLC). These three visionary objectives demand novel innovations in the technology and therefore make innovative test methodologies and platforms an imperative. 3GPP Release 15 defines eMBB and uRLLC services in mmWave bands specifically 24 GHz, 28 GHz, 37 GHz, 45 GHz. eMBB is also pushing the communication bandwidth requirements to go as wide as 2 GHz. With current 3GPP 5G NR specifications, the cellular industry is developing a 5G -NR chipsets and gNB. The details of 3GPP 5G NR and upcoming specs in Release 16 like V2X, non-terrestrial 5G networks, released towards end of 2019 will be explained in this lecture.

To achieve 5G objectives, a massive revamp of the stack is required which encompasses physical layer, protocol layer and layer above these. This lecture will briefly cover the proposed architectures of new physical layer and their corresponding test methodologies. 5G features such as beamforming at mm-Wave and spectrum sharing increase test complexity considerably. It is critical to emulate all the 5G system elements flexibly, make accurate measurements and make informed decisions during the prototyping phase. In this lecture, Keysight will introduce 5G Protocol R&D Toolset to help engineers streamline current and future 5G device workflow and efficiently prototype advanced 5G

protocol features for **3GPP 5G NR, SDAP, beamforming at mm-Wave frequencies** and non-standalone use cases.

****Speaker Biography****

Mombasawala Mohmedsaeed currently heads the Application Engineering Organization at Keysight Technologies India Pvt. Ltd. Mombasawala Mohmedsaeed has 29 years of experience in various technology domains in the field of Electronics, Communication, Optical and Network Operations. Mombasawala earned his bachelor's degree in Electronics and Communication Engineering from SVNIT- Surat. He received a Post-Graduate Diploma in Business Management (Marketing) from IGNOU.

Mombasawala's proficiency in English and Hindi language communication coupled with his immense knowledge on Science, Engineering and General Trends makes him a strong orator and interface to external world for Keysight. Mombasawala has strong strategic thinking, is visionary and is a man of integrity. He is very adaptive and strong team worker. He is also known for perfect execution of complex projects in Industry. Mombasawala has an excellent skill on handling multiple tasks at the same time. Mombasawala's hobbies include reading, listening to music and watching science fiction movies.

Keynote Speaker III

Dr Chetan Singh Thakur

IISc Bangalore, India_



****Title of the talk****

LOW-POWER NEUROMORPHIC COMPUTING ARCHITECTURES FOR EDGE-COMPUTING

Neurobiological processing systems are remarkable computational devices. Their basic computing elements, the neurons, are slow, heterogeneous and stochastic in nature, and yet they outperform today's most powerful computers at real-world tasks such as vision, audition, and motor control. When compared with digital computers, the brain consumes much less power (~20W) and is highly adaptive. The loss of merely one transistor can wreck a microprocessor, but brains lose neurons all the time without losing functionality.

Neuromorphic engineering is an interdisciplinary approach to the design of information processing electronic systems that are inspired by the function, structural organisation, and physical foundations of biological neural systems. We will demonstrate our novel low-power CMOS-Memristor based neuromorphic architectures, which utilizes promising features from the neuromorphic analog architecture, memristor synaptic memory, and the hardware-friendly learning algorithm. We will also discuss another novel computational framework, which is scalable and enables its implementation for low-power, high-density and memory constrained embedded application.

****Speaker Biography****

Dr Chetan Singh Thakur received his PhD in neuromorphic engineering under the supervision of Prof. André van Schaik at the MARCS Research Institute (Brain, Behaviour and Development), Western Sydney University in 2016. He then worked briefly as a research fellow for Defence Science and Technology, Australia. He completed his MTech from the Indian Institute of Technology, Bombay in 2007.

Dr Thakur worked as a research fellow at the Johns Hopkins University with Prof Ralph Etienne-Cummings and Prof Ernst Niebur for a year before joining IISc as an Assistant Professor. In addition, Dr Thakur has extensive industrial experience. He worked for 6 years with Texas Instruments Singapore as a senior Integrated Circuit Design Engineer, designing IPs for mobile processors. He has been trained by world leaders in the field of neuromorphic engineering, and his research expertise lies in neuromorphic computing, mixed signal VLSI systems, computational neuroscience, probabilistic signal processing, and machine learning. His research interest is to understand the signal processing aspects of the brain and apply those to build novel intelligent systems.

Keynote Speaker IV

Dr. Vishwas Patil

Senior Research Scientist @ IIT-Bombay
PhD in Information Security, La Sapienza
Bachelor of Computer Engineering, SVNIT-Surat

****Title of the talk****

THE PLATFORM ECONOMIES AND PRIVACY AS THEIR CURRENCY

In the recent past, graphs have become a preferred way to store, annotate, and retrieve data in recent years. There are several compelling reasons for online services to do so. Graphical databases provide a flexible way to represent and access data by the nodes in the graph. This flexibility in accessing data comes with certain challenges. In this talk, we shall take help of Facebook's social graph to understand how this graph type of new data platform operates in terms of access control. We shall discuss Facebook's business model built around this dynamic graph, how the advertisement campaigns are designed and the privacy implications to the users. We shall also discuss and correlate the reasons behind some of the challenges the platform is facing, the solutions (including Libra currency) being devised, and their limitations. The talk will help the system architects to understand the notions necessary to build systems that provide "privacy-by-design."

****Speaker Biography****

Dr. Vishwas Patil is a Senior Research Scientist at Department of Computer Science and Engineering, IIT Bombay. His research interests include all aspects of Security and Privacy in information systems. His current works include addressing challenges in: privacy in healthcare systems, authentication and authorization in federated environments, land management using blockchains, offline payment systems, volatility in cryptocurrency baskets, large-scale programmable environment to conduct security experiments using micro-services. Vishwas is a PhD from University of Rome and an alumnus of NIT Surat. He has been associated with TIFR (Tata Institute of Fundamental Research at Mumbai), A*STAR (Agency for Science, Technology and Research at Singapore), BNP-Paribas bank Singapore.