Tutorial 1: Five Years of Research and Innovation Experience in IoT: Lessons Learnt DOs and DON'Ts

Date: 12 December 2016
Time: 11:30- 13:00
Room: Grand Ballroom F (60)

Presenter

Raffaele Giaffreda
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Raffaele Giaffreda is Chief IoT Scientist at OpenIoT group of CREATE-NET. He has been involved in telecommunications research activities for the past 20 years out of which the last five have been dedicated to Internet of Things. He obtained funding grants for collaborative research and has managed big research and innovation projects / teams in this domain. Raffaele is also IEEE IoT Newsletter Editor-in-Chief and, besides research in IoT, his main interests relate to technology transfer, business models and go-to-market strategies.

Abstract - This tutorial will present lessons learnt in the past 5 years of R&D in the domain of Internet of Things and it will be structured in three main parts (research, development and business) reflecting and sharing the personal journey of the presenter in this exciting field. More in detail, the first part will consist on current research challenges for integrating the powerful monitoring capabilities of IoT with cognitive systems that can transform such data into knowledge using machine learning. The second part will illustrate what it takes to transform research ideas and demo prototypes into viable solutions that address real market needs, focusing on the creation of an IoT based eHealth platform for the remote monitoring of elderly and cognitively impaired people. The third part will focus on the business part of IoT. It will share the experience gathered from initiating technology transfer activities targeted at creating a viable go-to-market strategy for a particular asset that, within the scenes set by the previous two tutorial parts, aims at addressing various IoT problems such as interoperability, scalability and privacy within a viable business context.

Tutorial 2: Development of IoT-based Applications for Smart Cities

Date: 12 December 2016
Time: 14:30 - 16:30
Room: Grand Ballroom F (60)

Presenter

Prof. Carlos Alberto Kamienski
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Carlos Kamienski received his Ph.D. in computer science from the Federal University of Pernambuco (Recife PE, Brazil) in 2003. He is an associate professor of computer science at the Federal University of ABC (UFABC), Brazil, where currently he holds the position of director of international relations. His current research interests include Internet of Things, smart cities, cloud computing and network softwarization.

Abstract - Cities are becoming smarter as new technologies, such as IoT, are increasingly used for providing a variety of services and applications. In order for IoT-enabled services for Smart Cities to become reality, application development must be made easy. Currently, many software components have to be engineered from scratch to address fragmentation issues, thus requiring huge amounts of efforts, as developers must have a deep understanding of the technologies, the new application domain, and the interplay with legacy systems. This tutorial will synthesize key advances in this area, such as the use of context-aware management, mixed-criticality systems, data management and communication issues for IoT. Also, this tutorial will approach different issues related to the development of applications for smart cities, such as software architectures and middleware, and will discuss lessons learned from a theoretical and also hands-on perspective. Finally, it will introduce some current research challenges in this area.

Tutorial 3: CDSA and BSON: The Two Key Enablers of Lean, Elastic and Proactive Wireless Networks Needed for Future IoT

Date: 13 December 2016
Time: 11:30-13:00
Room: Grand Ballroom F (60)

Presenter 1

Dr. Ali Imran
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Dr. Ali Imran has been leading several multinational projects in CDSA and BSON as enablers for IoT, MTC and D2D, for which he has secured research grants of over $2million. He is the founding director of Big Data Enabled Self-Organizing Research Center (www.bsonlab.com) at the University of Oklahoma. Before joining OU, he has worked as a Research Scientist in IoT at QMIC, in Qatar. Between Oct-2007 and Oct-2011, he has worked in the Centre for Communications Systems Research, (CCSR), (now 5G Innovation Center), University of Surrey, UK. In that position, he has contributed to a number of pan-European and international research projects while working in close collaboration with key industrial players. Dr. Imran's research interest include BSON, CDSA based aerial and terrestrial deployments as enablers for IoT, H2H, D2D and MTC. He has published over 60 refereed journal and conference papers on these topics.

Presenter 2

Prof. Muhammad Ali Imran
University of Glasgow, UK
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Professor Muhammad Imran has led a number of multimillion-funded international research projects encompassing the areas of energy efficiency, fundamental performance limits, sensor networks and self-organising cellular networks. He led the new physical layer work area for 5G innovation centre at Surrey and currently leading the Wireless Communications and Radar Systems research as Vice Dean Glasgow College UESTC. He has supervised 20+ successful PhD graduates and published over 200 peer-reviewed research papers including more than 20 IEEE Transaction papers. He has been awarded IEEE Comsoc's Fred Ellersick award 2014, Sentinel of Science Award 2016, FEPS Learning and Teaching award 2014, twice nominated for Tony Jean's Inspirational Teaching award and a shortlisted finalist for The Wharton-QS Stars Awards 2014 for innovative teaching and VC's learning and teaching award in University of Surrey. He is a senior member of IEEE and a Senior Fellow of Higher Education Academy (SFHEA), UK.

Abstract - Realization of an all-encompassing IoT supporting 5G network hinges on enablers that can make the future wireless networks lean, elastic and proactive. This tutorial will provide a novel prospective on how the road towards an IoT supporting networks can be paved from the crossroads of: Control and Data Plane Split Architecture (CDSA) based RAN and Big Data Enabled SON (BSON). The presenters of this tutorial are authors of seminal papers on CDSA and BSON and are leading several international projects in this space. Leveraging this experience, the overcharging goal of this tutorial is to discuss answers to following questions: 1) What requirements of IoT call for a paradigm shift from conventional cellular architecture and design?; 2) What characteristics these requirements induce in design space of an IoT supporting wireless network, e.g., 5G?; 3) How a system design based on CDSA and BSON can ensure a network that can support range of IoT applications?; 4) What is dark data and how it can act as key enabler to implement CDSA and BSON to support IoT?. 5) How does a CDSA and BSON based system design fare in terms of different KPIs against a conventional design such as HetNet for supporting IoT?.

Tutorial 4: Compressive Sensing – Applications to Energy Efficient IoT Sensor Networks

Date: 13 December 2016
Time: 14:30 - 16:30

Room: Grand Ballroom F (60)

Presenter 1

Dr. Venkat Natarajan
Senior Staff Engineer, Signal and Systems Lab
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Dr. Venkat Natarajan is currently a senior staff researcher in the Signals & Systems Lab with Wireless Communications Research organization in Intel Labs, Bangalore, India. He has received a PhD in Mechanical Engineering from Carnegie Mellon University, Pittsburgh, PA with a Bachelors of Technology from Indian Institute of Technology, Chennai, India. He has more than twenty years of product design & research experience in the area of electronic and telecom systems working in Lucent-Bell Labs (New Jersey), Andrew Corporation & Intel Labs. Venkat has published over 30 peer-reviewed publications & has 12 patents. His current research includes signal processing, compressive sensing and energy-efficient IoT networks.

Presenter 2

Apoorv Vyas
Systems Engineer, Signal and Systems Lab
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Apoorv Vyas received Bachelors of technology in Electronics & Electrical engineering from Indian Institute of Technology, Guwahati, in 2014. He is currently working as a Systems Engineer in Signals and Systems Labs at Intel Labs, India. He has 2 patents and 2 peer-reviewed publications. His current research includes signal processing, compressive sensing and machine learning.

Abstract - Explosion in sensor technologies & ubiquitous sensing in IoT applications has resulted in massive amounts of data being generated that need to be effectively managed. Compressive Sensing is an emerging technology that promises to efficiently manage the data deluge by advanced signal processing theory that directly seeks out the information content of a signal avoiding any redundant measurements whatsoever. Compressive Sensing is considered to be highly promising for a wide range of IoT applications such as smart cities, smart wearables, wireless sensing, communication networks, imaging etc. The tutorial includes the following topics: (i) Theory, formulations & mechanics of Compressive Sensing (ii) Practical embodiments of Compressive Sensing in smart wearables applications (e.g. smartwatch) on a body sensor network to minimize MCU power consumption and radio throughput to increase node battery life (iii) Application of Compressive Sensing for energy-efficient data aggregation from spatially-distributed sensor nodes for different IoT WSN topologies including joint optimization of sensing and routing layers for improved network power-efficiencies.

Tutorial 5: Intelligence At the EDGE: Using Mobile Edge Computing to Deliver Consumer Centric IoT Services

Date: 14 December 2016
Time: 11:30-13:00
Room: Grand Ballroom E

Presenter

Soumya Kanti Datta
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Soumya is a Research Engineer in EURECOM, France. His R/D focuses on innovation, development of next-generation technologies and standardization in Internet of Things, Smart Cities, and Edge Computing. He is an active

member of IEEE Consumer Electronics Society, its Future Directions Committee. He is also a Co-Founder and CEO of Future Tech Lab, India, a start-up working on Industrial IoT.

Abstract - This tutorial highlights the challenges of cloud based IoT platforms that include supporting ultra-low latency and high mobility consumer IoT services. To mitigate these challenges, the industry is exploring edge computing (EC) as an alternative. Proximity to consumers, dense geographical distribution, support for mobility and availability of many powerful devices (e.g. smartphone, raspberry pi) are enabling the industry to utilize EC for video distribution, consumer IoT, localized analytics, edge caching of data, augmented reality and more. Connected vehicles scenarios will be utilized to further illustrate the requirements, architecture and building blocks of EC. The purpose of the tutorial is to highlight the intelligence at the edge and how it can be utilized to deliver consumer centric IoT services.