

Internet of Things (IoT) Solutions for Real World Problems

Overview

World over, more and more electronic devices are being connected to the Internet. This Internet of Everything paradigm has enabled remote monitoring, controlling, data collection, tracking and environmental sensing leading to applications in varied fields touching almost all aspects of human life. The technology evolutions in computing power, memory storage, and battery capacity at much lower cost, low power consumption, and small size have enabled the development of very small electronic devices, which are portable and possess enhanced intelligence & efficiency for identification/communication/computing. These small devices, which could further be embedded into larger devices, systems and facilities, have three characteristics, in principle: (i) Comprehensive perception, (ii) Reliable transmission, and (iii) Intelligent Processing. The beneficiary domains and facilities include agriculture, healthcare and biomedical, home, safety, environment protection, electric-grid, industry, logistic, supply chain and manufacturing, smart transportation, and many others. The issues related to IoT devices and technology include policy, standardization, research, and interoperability.

The search for a generic IoT architecture is imperative but evasive. We propose to cover a training programme on the IoT domain with a focus on Electronic Technologies like sensor design and deployment, hardware-software codesign, communication, design automation, communication, and privacy and security aspects. We will discuss several representative applications of IoT, with global impact. The lectures will provide a general framework of IoT to address these applications. To provide students with hands-on understanding, we will choose one readily available application, smart city, for the labs and training sessions. The proposed GIAN course would be conducted through online mode. The primary objectives of the course are as follows.

1. Exposing participants to the end-to-end design of Internet-of-Things applications from sensors to cloud, as well as hardware design/security aspects
2. Building confidence and capability amongst the participants regarding electronics, sensors, and software through hands-on labs.
3. Providing exposure to practical problems and their solutions, through case studies using EDA Tools (Electronic Design Automation tools).
4. Enhancing the knowledge of the participants about Security and privacy needs, and the analysis required to address these needs.

Modules	Date: 06/06/2022 to 11/06/2022 [online Mode] Timing: 5.30 pm to 8.30 pm
You Should Attend if you are ...	<ul style="list-style-type: none">▪ Executives, engineers and researchers from semiconductor manufacturing, design, embedded systems domain; government organizations including R&D laboratories.▪ Student students at all levels (BTech/MSc/MTech/PhD) or Faculty from reputed academic institutions and technical institutions.
Fees	The participation fees for taking the course is as follows: Participants from abroad: US \$50

Industry/ Research Organizations: 1000 INR

Academic Institutions: 500 INR

The above fee include all materials, tutorials and assignments.

The Faculty



Prof. Sandip Ray is an Endowed IoT Term Professor at the Department of Electrical and Computer Engineering, the University of Florida at Gainesville, Florida, USA. His research involves developing correct, dependable, secure, and trustworthy computing through the cooperation of specification, synthesis, architecture and validation technologies. He focuses on next-generation computing applications, including Internet-of-Things applications, autonomous automotive systems, smart homes, intelligent implants, etc. Before joining the University of Florida, Dr Ray was a Senior Principal Engineer at NXP Semiconductors, where he led the R&D on security architecture and validation of hardware platforms for automotive and IoT applications. Prior to that, he was a Research Scientist at Intel Strategic CAD Labs, where he led research on pre-silicon and post-silicon validation technologies for security and functional correctness of SoC designs, design-for-security and design-for-debug architectures. In addition to NXP and Intel, his research has found applications in several other companies including AMD, Galois, IBM, Microsoft, and Rockwell Collins. Dr. Ray is the author of three books and over 60 publications in international journals and conferences. He has given over 40 invited presentations in a variety of international conferences and meetings. He has served as a program committee member in more than 40 international conferences, and as program chair for Formal Methods in Computer-Aided Design and International Workshop on ACL2 Theorem Prover and Its Applications. He currently serves as an Associate Editor for IEEE Transactions on Multi-Scale Computing and Springer Journal of Hardware and System Security. Dr. Ray has a Ph.D. from the University of Texas at Austin and is a Senior Member of IEEE.



Prof. Debdeep Mukhopadhyay is currently Professor at IIT Kharagpur (consent awaited)

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Prof. Vineet Sahula Working with a group of research-scholars/faculty members on various aspects of Trust & Security in Chips & Embedded Systems; Modeling of Cognition, cognitive algorithms/architectures. He is a Member of the faculty group who visited Canadian Universities- Saskatchewan, Toronto Calgary University, for academic & research collaboration, 14th -21st Sept. 2013. He is also a member of the faculty group that visited North Dakota State University, Fargo for academic & research collaboration, 23rd -27th March 2009. He was Visiting Faculty, Microelectronics programme at Asian Institute of Technology Thailand, Autumn 2004

Dr. Amit M. Joshi completed his M.Tech and Ph.D. from Sardar Vallabhbhai National Institute of Technology, Surat (SVNIT, Surat) in 2009 and 2015 respectively. He is currently an Assistant Professor at Malaviya National Institute of Technology, Jaipur (MNIT Jaipur) since July 2013. His area of specialization is Biomedical signal processing, Smart healthcare, VLSI DSP Systems, and embedded system design. He is a senior member of IEEE, member of IETE, and member of IEEE. He also received the honour of UGC Travel fellowship, the award of SERB DST Travel grant, and CSIR fellowship and also attended well known IEEE Conferences TENCON-16, TENCON-17, ISCAS-18, MENACOMM-19, etc across the world. He has served as track chair of ICCE-2021, publicity chair of ISVLSI-2021, and program vice-chair of ISES-2021. He has also served as Mentor for IEEE Engineering in Medicine and

Course Co-ordinator(s)

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Biology Society student mentorship program 2021. He has supervised 4 Ph.D. thesis, 25 M.Tech dissertations, and 19 B. Tech projects in Biomedical Signal Processing, VLSI/Embedded Systems.