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MHRD Scheme on

Global Initiative of Academic Networks (GIAN)

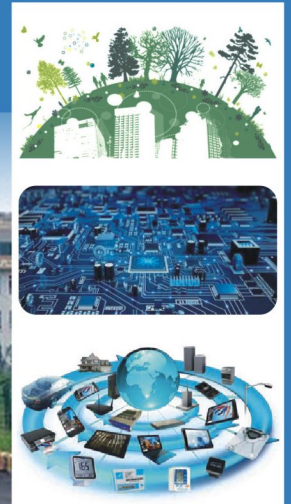
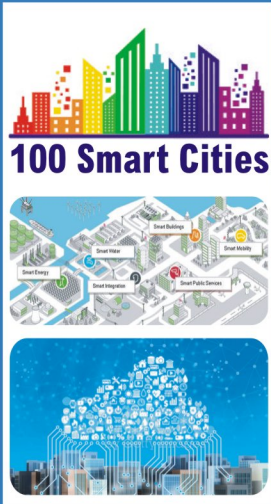


GIAN Course

Internet of Things (IoT) Security: Issues, Innovations, and Interplays

12th to 16th December 2016

Dept of Computer Science and Engineering, Indian Institute of Technology, Patna



About GIAN

Union Cabinet has approved a program titled **Global Initiative of Academic Networks (GIAN)** in higher Education, aimed at tapping the talent pool of scientists and entrepreneurs Internationally to encourage their engagement with the institutes of higher education in India, so as to augment the country's existing academic resources, accelerate the pace of quality reforms, and elevate India's scientific and technological capacity to global excellence. GIAN is envisaged to catalyze higher education institutions in the country, and that will initially include all IITs, IIMs, Central Universities, IISc Bangalore, IISERs, NITs and IIITs. Subsequently, good state universities where the spin off is vast, shall also be covered. GIAN is an evolving scheme which will initially include participation of foreign faculty in Institutes as Distinguished / Adjunct / Visiting faculty / Professors of practice. They will be delivering their expertise in short or semester-long courses. More information: <http://www.gian.iitkgp.ac.in/>

Overview of the course: IoTs: III

Internet of Things (IoT) has emerged into a rapidly growing application space of paramount significance that promises a staggering 75 billion connected devices to be embedded in our environment within the next five years. Fuelled by higher level of computing efficiency and miniaturization coupled with ubiquitous connectivity, IoT devices create new application opportunities in diverse domains – from smart implants/wearables to smart homes and smart cities. With continued advances in technology, design of new and advanced sensors, pervasive connectivity, and the trend in business towards cloud-driven data-centric solutions, the future is projected to see an even higher proliferation of electronic systems comprising of such devices that coordinate through cloud to solve complex, distributed tasks.

While the IoT space provides huge set of opportunities to manufacturers and consumers alike, it creates new demands in terms of security, trust, and privacy in the computing and communication platforms used in these devices. The unique demands of diverse IoT systems including their ubiquitous connectivity and long life in potentially harsh environments, make them vulnerable to many security issues, including unprecedented ones. This panel will focus on some of the pressing issues related to IoT security and privacy, which are relevant to both industry and academia, challenges, and emerging solutions.

This short course will consist of several lectures and interactive discussion sessions, which will cover general security issues, solutions as well as specific case studies related to the security issues and solutions during the design and deployment of example IoT devices including smart implants, wearables, and drones. The course will touch upon several fundamental questions in this field, as below, and stimulate interest in students and researchers to explore further.

Objectives

The primary objectives of the course are as follows:

- i) To teach principles of security design and analysis from Internet of things (IoT) perspective;
- ii) To equip students with industry standard skills relating to management of information and sensor data processing systems,
- iii) To teach emerging needs in terms of security and privacy in the emerging IoT space. Specific aspects which will be covered in detail are: difference between traditional embedded security and IoT security; the new attacks; and new vulnerabilities,
- iv) To understand key challenges of security of IOT devices, interplays between security and other IoT design parameters, such as power and reliability.
- v) To explore and understand security solutions for diverse IoT devices including how industry is approaching in this space. Students will learn the major research topics and the areas, which need major innovations.
- vi) To understand challenges, and solutions in the IoT security field. It will describe practical experiments and labs to train future engineers and users of IoT devices about the security issues and measures to protect themselves and the nation.

Course details

Module A: Computer security in Internet-of-Things (IoT) space

- **Basics of Internet of Things (IoT) and Application Space**
- **IoT Security Issues**
- **How to design an IoT system?**
- **Distinctive features of IoT systems and their security implications**
- **Hardware, software and network security related to IoT systems**
- **Security analysis of IoT systems: hardware, software and network perspective**

Module B: Security architecture of IoT and challenges

- **Basics of cryptographic solutions for IoT applications**
- **Security primitives for IoT applications**
- **Problem solving session with examples: several case studies with real IoT devices**
 - (1) Demonstration of IoT devices security issues using example systems
 - (2) Demonstration of IoT hardware security issues
 - (3) Demonstration of IoT software security issues
 - (4) Demonstration of IoT network (wireless and wired) security issues
 - (5) Discussion on cryptography solutions and security primitives
 - (6) Discussion on emerging security vulnerabilities
- **Challenges with IoT security, privacy and trust**
- **Hardware modules for secure IoT devices: Principles, Analysis, and Examples**
- Emerging challenges and design/validation solution for secure and trustworthy IoT devices in the nanoscale era
- Discussion on major research topic in this area of emerging significance

Who can attend?

- Members from academic institutions/ Industry/ Research Organizations
- Research scholars and postgraduate students from academic institutions

How will I register?

Step 1: One Time Registration: In order to register for any course under GIAN, candidate will have to get registered at the GIAN Portal of IIT Kharagpur using the following steps:

1. Create login and password at <http://www.gian.iitkgp.ac.in/GREGN/index>
2. Login and complete the Registration Form.
3. Select course to be attended
4. Confirm your application and payment information.
5. Pay **Rs. 500/- (non-refundable)** through online payment gateway.
6. **Download and print “pdf file”** of your enrolment application form for your personal records and copy of the same to be sent to the course coordinator.

Step 2: Institute Registration

1. Institute registration process is an **offline process**. Contact course co-ordinators

Registration Fees

Participants from abroad	:	US \$100
Industry/ Research Organizations:	:	Rs. 2500/-
Faculty members from Academic Institutions	:	Rs. 2500/-
Research Scholars/Students	:	Rs. 1000/-

The above fee include all instructional materials, computer use for tutorials, 24 hr free Internet facility. The participants will be provided with accommodation, if available, on payment basis.

Teaching Faculty

Dr. Swarup Bhunia, Professor, University of Florida, Gainesville, FL, USA

Dr Rajat Subhra Chakraborty, Associate Professor . Computer Science and Engg. IITKGP

Swarup Bhunia received his Ph.D. from Purdue University in 2005. Currently he is a professor of Electrical and Computer Engineering at University of Florida. Earlier he was the T. and A. Schroeder Associate Professor of Electrical Engineering and Computer Science at Case Western Reserve University, Cleveland, OH, USA. He has over fifteen years of research and development experience with over 200 publications in peer-reviewed journals and premier conferences in the area of integrated circuit and system design, computer-aided design tools and test techniques. His research interests include hardware security and trust, adaptive nanocomputing with emerging technologies, computing at extreme, and implantable/wearable microsystems. Dr. Bhunia received the IBM Faculty Award, National Science Foundation (NSF) career development award, Semiconductor Research Corporation (SRC) technical excellence award as a team member, several best paper awards and best paper nominations, and SRC Inventor Recognition Award. He has been serving as an associate editor of IEEE Transactions on CAD, IEEE Transactions on Multi-Scale Computing Systems, Springer Journal of Electronic Testing, ACM Journal of Emerging Technologies, and Journal of Low Power Electronics; served as guest editor of IEEE Design & Test of Computers (2010, 2013), IEEE Journal on Emerging and Selected Topics in Circuits and Systems (2014), and IEEE Computer (2016). He has given numerous invited talks and tutorials on diverse topics related to computer security and energy-efficient adaptive electronic systems. He is co-founder of a start-up company, Hakham Systems, which focuses on developing hardware module for cybersecurity training. He is a senior member of IEEE. More information: <http://swarup.ece.ufl.edu/>



Rajat Subhra Chakraborty is an Associate Professor in the Computer Science and Engineering Department of Indian Institute of Technology Kharagpur. He has a Ph.D. in Computer Engineering from Case Western Reserve University and a B.E. (Hons.) in Electronics and Telecommunication Engineering from Jadavpur University (India) in 2005. His research interests include: Hardware Security, VLSI Design and Design Automation, and Reversible Watermarking. He holds two U.S. patents, and is the co-author of three published books, six book chapters, and close to 75 publications in international journals and conferences of repute. His work has received about 1400 citations. He has served as a guest editor of ACM Transactions on Embedded Computing Systems. Dr. Chakraborty has received IBM Faculty Award, IBM Shared University Research Award and Royal Academy of Engineering (U.K.) Research Exchange Fellowship. He is a senior member of IEEE. For more information visit: <http://cse.iitkgp.ac.in/~rschakraborty>

Course Coordinators /Host Faculties



Contact Details:

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