Opportunities, Challenges and Research Trends in Wireless Sensor Networks

Course Dates: 11-12- 2017 to 15-12-2017

Overview

Wireless Sensor Networks (WSN) has important applications such as remote environmental monitoring and target tracking. The design of a WSN depends significantly on the application and the environment, the application's design objectives, cost, hardware and system constraints, routing mechanism. Wireless sensor networks (WSN) have gained worldwide attention in recent years, particularly with the proliferation of Micro-Electro-Mechanical Systems technology which has facilitated the development of smart sensors and miniaturized sensors. The sensor miniaturization, with limited processing and computing resources are inexpensive compared to traditional sensors. Now a days, Sensor miniaturization is only possible because of the current state of the art in nanotechnology.

Advancement in nanotechnology has made it possible to manufacture sensors, circuits and devices measuring only nanometer in size. This development is creating an extraordinary opportunity to observe, interact and optimize physical systems from the very bottom. Wireless communication and networking at nanoscale, however, faces new challenges not encountered in conventional sensor networks. For example, nanoscale antenna call for wireless communication in the Terahertz band, which encounters new path loss and noise phenomena posing significant challenges for many target applications of such, networking. Nanoscale computing and communication is a new and rapidly growing field of research promoting collaboration between wireless networking, nanotechnology and other fundamental disciplines. The objective of this course is to present the opportunities, challenges and a survey of recent advancement of this new and growing inter-disciplinary field.

Course Details	
	Day1 Introduction to Wireless sensor Networks(WSN),Challenges and Opportunites MAC/PHY protocols :Issues in designing MAC protocols for WSN,classification of MAC protocols,MAC protocols for sensor network,S-MAC,IEEE 802.15.4 Routing protocols:Issues in designing routing protocols , classification of routing protocols. **Day 2** Routing Protocols and performance of regular WSN:Table-driven,on demand, hybrid,flooding,hierachical ,power aware routing protocols Cross Layer Design for WSN , Data Aggregation Techniques for WSN and Dissemination Techniques **Day 3** Energy Harvesting in WSN: Need for Energy Management, Classification,battery,transmission power,Clustering in WSN,Clustering in Sensors,Random Topology, Various security challenges in WSN, Emerging Research Trends in WSN

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Day 4

Applications of Nanoscale WSN including medical,chemical and agricultural applications of nanoscale networking

Energy(energy storage,harvesting and consumption models for nanoscale devices including nanobatteries,nanogenerators and nonotransceivers)

Novel material-based antenna technology as well as new propagation and noise models and tools used to estimate path loss for nanoscale communication in different environments

Day 5

NanoScale WSN-Modulation & coding, Wireless Sensor Networks in Internet of Things, Talk on 5G communication

Number of participants for the course will be limited to fifty.
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<tr><td>You Should Attend If…</td><td>Engineers and researchers from manufacturing, service and government organizations including R&D laboratories. Students at all levels (BTech/MSc/M.Tech/PhD) or Faculty from reputed academic institutions and technical institutions.</td></tr>
<tr><td>Fees</td><td>

The participation fees for taking the course is as follows:

Participants from abroad : US $500
Industry/ Research Organizations: Rs. 6000 /-
Academic Institutions: Rs. 3000 /-
Student participants: Rs. 1,000/-
SC/ST students: Rs. 500/-

The above fee includes all instructional materials, tutorials, assignments and internet facility. On request, accommodation will be provided for few participants (on first come first basis) in the campus on payment.
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<tr><td>How To Register</td><td>

Stage1: Web (Portal) Registration:

Visit http://www.gian.iitkgp.ac.in/GREGN/index and create login user ID and Password. Fill up blank registration form and do web registration by paying **Rs. 500**/- on line through Net Banking/ Debit/ Credit Card. This provides the user with life time registration to enroll in any no. of GIAN courses offered. (If you have already registered in GIAN portal you can skip this step.)

Stage2: Course Registration (Through GIAN Portal):

Log in to the GIAN portal with the user ID and Password already created in Step 1 Click on "Course Registration" option given at the top of the registration form. Select the Course titled **"Opportunities, Challenges and Research Trends in Wireless Sensor Networks"** from the list and click on "Save" option. **Confirm your registration by Clicking on "Confirm Course".**
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<tr><td>Selection & Mode of Payment</td><td>

Candidates registering early will be given preference in short listing process. Selected candidates will be intimated through E-mail. They have to remit the necessary course fee to the Bank as per the details given below.

Account Name	PRINCIPAL UCE OU COORDINATOR GIAN
Account No	37072716197
Bank	State Bank of India
Branch	Osmania University, Hyderabad
IFSC Code	SBIN0020071
MICR Code	500002342
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Prof. Mahbub Hassan - Course Faculty

Prof. Mahbub Hassan is a Full Professor in the School of Computer Science and Engineering, the University of New South Wales, Sydney, Australia. He recently served as Distinguished Lecturer of IEEE (COMSOC) for 2013 to 2016. He delivered keynote and invited speeches at several international conferences and worked as Visiting Professor at Washington University in Saint Louis, Osaka University, Japan and University of Nantes, France. He was a tutorial speaker at IEEE ICC 2016, IEEE WPMC 2014, IEEE ICC 2012, and IEEE VTC 2011. He is currently an Editor of IEEE Communications Surveys and Tutorial and has previously served as Guest Editor for Elsevier Nano Communications Network, IEEE Network and IEEE Communications Magazine. He has served in TPC and organizing committee of numerous international conferences and currently serving in the TPC of the newly established ACM NANOCOM conference. He has co-authored three books, one US patent, and over 150 refereed articles. His book "High performance TCP/IP Networking" has been used in more than 90 universities in America, Europe and Asia. Professor Hassan has earned a PhD from Monash University, Australia, and an MSc from University of Victoria, Canada, both in Computer Science.

Dr. L.Nirmala Devi, Course coordinator

Dr. L.Nirmala Devi received her B.E, M.E and Ph.D degrees in Electronics and Communication Engineering from the Department of Electronics and Communication Engineering, University College of Engineering (Autonomous), Osmania University, Hyderabad, India. She is currently working as an Associate Professor in Department of Electronics and Communication Engineering, Osmania University. She has teaching experience of more than 16 Years in subjects like Digital Signal Processing, Analog Communication, Digital Communication, Adaptive Signal Processing and Wireless Networks. Her research interests include Ad-hoc networks, wireless communication, wireless sensor networks and Signal Processing. Currently, she is working on various research projects sponsored by Ministry of Electronics and Information Technology (MeITY), Government of India, New Delhi**,** Department of Science & Technology (DST) and UGC. She has published many papers in various national & international journals and conferences. She is also a member of IEEE, IEI and OSA.

Location

Department of Electronics and Communication Engineering
University College of Engineering
Osmania University,
Hyderabad, Telangana- 500 007,
India

Course Duration

One Week:
11-12-2017 to 15-12-2017

Course Coordinator

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Course Registration link

http://www.gian.iitkgp.ac.in/GREGN
http://www.uceou.edu/gian/