



Networked Embedded Systems

TGI Course,
Dept. of Computer Science,
University College Cork
21st - 25th July 2014
TGI Module Code: TGI_N06
Prof. Chenyang Lu

Networked embedded systems are pervasive computing systems consisting of smart sensors and actuators embedded in physical environments. Networked embedded systems provide a basis for new computing paradigms that challenges many classical approaches to distributed computing and networking. Embedded operating systems, wireless sensor networks, and approaches to power management, real-time and middleware services fundamentally change when confronted with this new environment. This course will cover foundations and recent advances in embedded systems, wireless sensor networks, machine to machine (M2M), Internet of Things, and cyber-physical systems. Students will perform hands-on projects using motes (embedded devices consisting of sensors, radios, and microprocessors).

Schedule

21st - 25th July 2014

Date	9-10:30	11-12:30	2-3:30	4-5:30
Monday	Introduction	Embedded OS		Discussion
Tuesday	Mote/TinyOS Tutorial			Hands-on 1
Wednesday	Low-Power Wireless Networking			Hands-on 2
Thursday	Industrial Wireless Sensor-Actuator Networks			Hands-on 3
Friday	Cyber-Physical Systems			Exam

Outline

1. Introduction
2. Embedded Operating Systems
 - a. Real-Time Operating Systems
 - b. TinyOS and nesC
3. Tutorial: Motes, TinyOS and nesC
4. Low-Power Wireless Sensor Networking
 - a. Low-Power Wireless Properties
 - b. Media Access Control (MAC)
 - c. Transmission Power Control
5. Industrial Wireless Sensor-Actuator Networks
 - a. WirelessHART Standard

- b. Real-Time Transmission Scheduling
- 6. Cyber-Physical Systems**
 - a. Wireless Control
 - b. Structural Health Monitoring
 - c. Clinical Monitoring
- 7. Hands-on and Discussion Sessions**
 - a. Discussion: Applications of today and future
 - b. Hands-on 1: Write your first TinyOS application
 - c. Hands-on 2: Wireless networking
 - d. Hands-on 3: Write your own application
- 8. Exam**

This is a 5-credit module. In order to formally pass the module, students must attend for the entire duration of the course and pass the assessment. Note that places are strictly limited.

Instructor: As Professor of Computer Science and Engineering at Washington University in St. Louis, Dr. Chenyang Lu has over a decade of experience of teaching courses on embedded systems, wireless sensor networks and real-time systems. A leading researcher on networked embedded systems, he is currently Editor-in-Chief of [ACM Transactions on Sensor Networks](#), Area Editor of [IEEE Internet of Things Journal](#) and Associate Editor of [Real-Time Systems](#). He also chaired premier conferences such as IEEE Real-Time Systems Symposium (RTSS), ACM/IEEE International Conference on Cyber-Physical Systems (ICCPs) and ACM Conference on Embedded Networked Sensor Systems (SenSys). He is the author and co-author of over 100 research papers [with over 11,000 citations and an h-index of 49](#).

TO REGISTER FOR THIS COURSE PLEASE COMPLETE FORM ON NEXT PAGE



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REGISTRATION FORM
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Last Name	
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Institution	
Address	
Phone Number	
Current Status (eg. Student)	
Programme currently undertaking (eg. PhD etc.)	
Year	
Name of Supervisor	
Does your Supervisor approve this module registration?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Current area(s) of research	

Email completed form to m.noonan@cs.ucc.ie

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