Embedded Systems Design in Sunny SINGAPORE (20 June – 30 July 2011)

In today’s world, embedded systems are everywhere – homes, cars, hospitals, consumer electronics and many more. They are the brains providing specific functions to enable larger systems such as medical equipment and flight controls to operate safely, efficiently and intelligently. The complexities of embedded systems range from stand-alone single processor units to networks of wireless sensors. The more sophisticated systems also have real time performance constraints which must be met for reasons such as safety and usability.

Embedded systems design (ESD) skills are in high demand as industries compete to develop increasingly sophisticated products. If you have a passion for creating innovations, this is the course for you. This course is brought to you by the Electrical & Computer Engineering Department at the National University of Singapore in sunny Singapore.

Singapore is the crossroads of many cultures. It is also known for its research and development activities in a number of areas. Come explore a variety of work and play experiences in Singapore. It is easy to enjoy Singapore with its network of public transportation system and a highly safe environment.

Course Objectives

Real-time systems are increasingly being implemented in networked embedded devices instead of stand-alone computer systems. Meeting real-time constraints in embedded systems poses an even bigger challenge than in traditional real-time systems since memory and computation resources are expensive and scarce commodity in embedded platforms. This course will not only give an in-depth understanding of the underlying concepts in real-time embedded systems via a series of lectures, but also allow the participants to experience and solve various issues on a hardware platform. The topics covered include periodic and aperiodic task scheduling, handling shared resources, real-time operating system, concurrent programming, higher-level synchronization mechanisms and deadlock management. These concepts will be further deepened via hands-on experiments on a Xilinx FPGA board (above) where small projects will be carried out amid embedded systems constraints like limited memory and computational resources. The students will work in small groups on these small lab exercises which will lay the foundation for the major project.

The course will include 5 guided hands-on lab sessions on a Xilinx FPGA board covering real-time and embedded issues like mutual exclusion in hardware and software, message queues and mailboxes, semaphores and priority issues in shared resources. Participants will also work on a real-time embedded project of their choice in teams of 4 to 6 people.
Course Outline

The following topics will be covered in the course:

1. Introduction to real-time embedded systems
2. Periodic and aperiodic task scheduling
3. Handling shared resources
4. Real-time operating systems
5. Concurrent programming
6. Higher-level synchronization mechanisms
7. Deadlock management

Duration of the Course

6 weeks from 20 June to 30 July 2011 @ the National University of Singapore

Target Audience

- Senior Electrical Engineering Students with some background in programming and microprocessor or microcontroller experience
- Product designers, FPGA design engineers, managers, real-time system architects, embedded system engineers looking for a deeper experience in embedded systems design

Other Related Activities

Apart from working in the laboratories at NUS, students will have the opportunities to visit

- Cultural and tourism sites in Singapore
- Research institutes under the Agency for Science, Technology and Research (A*STAR)
- Companies in the electronic industry

For more information about Singapore, please visit http://www.yoursingapore.com/content/traveller/en/experience.html

Estimated Expenses

- Cost of airfare to and from Singapore ~ SGD2500
- On-campus accommodation ~ SGD70-100 per week
- Meals for duration of 6 week stay ~ SGD1000
- Miscellaneous + local travel + insurance ~ SGD500

For more information, please contact A/Prof Loh AP at elelohap@nus.edu.sg

Closing date : 01 May 2011