Electrical and Computer Engineering 5780
Real-Time Systems
Elective

Course Description:
Real-time system design and implementation of basic concepts, including modeling, scheduling, resource access control, synchronization, and communication. Emphasis placed on both theory and practice. Exploration of open topics and current challenges in designing real-time systems. Includes hands-on implementation. Three lectures, one lab.

Prerequisites:
ECE 5720

Textbook:
No textbook required

Course Outcomes:
1. Understand the basics of designing and/or choosing hardware and software for simple and advanced real-time embedded systems.
2. Understand current practical issues in real-time and embedded systems.
3. Understand important design challenges such as timing requirements, resource limitations, and energy consumption, and have a broad understanding on how such challenges may be addressed.
4. Be able to sue a real-time operating system and develop real-time applications in C, C++, Ada, and/or Java.
5. Understand techniques and results for theoretical analysis of real-time scheduling algorithms.

Topics Covered:
- Concept of time and clocks
- Real-time modeling
- Real-time scheduling
- Access control
- Real-time communications
- Multiprocessors
- Fault tolerance
- Overload situations
- Flexible scheduling
- Hardware for real-time systems
- Programming languages for real-time systems
- Real-time operating systems
- Mobile computing / sensor networks
- Multimedia applications
- Energy-aware real-time system design
- Cyber-physical systems
- Network calculus
Outcome Assessments (Grades):

Assignments 20%
Labs 30%
Project Proposal 10%
Progress Report 5%
Final Report 20%
Project Presentation 10%
Participation / Attendance 5%

Class Schedule:

Class Three times a week for fifty minutes.
Lab Once a week for two hours and forty-five minutes.

Contribution of course to meeting the requirements of Criterion 5:
4 credit hours of Engineering Topics and contains significant engineering design content

Relationship of course to student outcomes:

a. An ability to apply knowledge of mathematics, science, and engineering.
b. An ability to design and conduct experiments, as well as to analyze and interpret data.
c. An ability to design a system, component, or process to meet desired needs.
e. An ability to identify, formulate, and solve engineering problems.
i. A recognition of the need for, and ability to engage in, life-long learning.
k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Instructor:
Tam Chantem, Assistant Professor
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