Department of Electrical and Computer Engineering

EEL 6894 – REAL TIME COMPUTING AND APPLICATIONS

Spring, 2018

Instructor	:	Dr. Gang Quan
Class Time	:	TH: 5:00 p.m. – 7:40 p.m.
Classroom	:	EC1105
Office Hours	:	TTh: 10:00 a.m. - 11:00 a.m. or by appointment
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Course Description:

Real-time systems and applications are the ones with a variety of timing constraints, and their correctness depend on not only if the computing results are logically correct, but also when these results are delivered. The late result is as worse as the wrong results. Real-time systems are NOT computing systems that very fast or with high performance. Some real-time systems need high performance computing infrastructure to satisfy the timing constraints, but high-performance computing and real-time computing are distinctly different.

This course introduces the basic principles and scheduling techniques in design of real-time systems and applications. The course content consists of two sections: the lecture section and the seminar section. In the first section, the instructor will introduce the fundamentals about real-time systems and applications using the form of the lecture. An exam will be arranged to test the students' understanding of these basic concepts and techniques. During the second part of the semester, students will choose or be assigned a related research topic. Each group will study one or two research papers in depth or conduct a survey on a specific topic, and make a presentation in class. There is one semester-long topic research project assignment for students. Each group will introduce the problem, present the research ideas, and discuss their project outcomes in class. Finally, each group will also submit a formal project report, in the IEEE proceeding format.

Topics Covered:

1. Introduction of real-time systems and the role of scheduling
2. Single processor scheduling: rate monotonic scheduling, earliest deadline first
3. Single processor scheduling with resource sharing
4. Other single processor scheduling techniques
5. Multiple processor scheduling and design optimization
6. Power-aware real-time scheduling
7. Thermal aware real-time scheduling

Grading:

Exam (take home): 40%

Topics research: 20%
1. One page written proposal submitted in time and approved by the instructor
2. Prepare slides and do a 25 - 30 minutes presentation in class
3. Three-page introduction and summary.

Projects: 35%
1. One page written proposal submitted in time and approved by the instructor
2. Research efforts, ideas, and results
3. A 25-30 minutes oral presentation in class
4. Formal project report.

Participated and attendance: 5%

Prerequisites: None, EEL 4746 recommended

Textbook:

The lectures will be substantially based on technical papers from literature most of which can be found from on-line databases such IEEE eXplore and ACM digital library (accessible on-line in FIU campus). It is your responsibility to print and read related papers. Lecture material will also be drawn from various books and other resources, some of them are listed as follows. There is no particular need to buy these books.

*   ***Real-Time Systems***, J.W.S Liu, Prentice Hall, 2000 (recommended)

Policies:
*   Discussion and studying together in groups is encouraged. For individual work submitted, it is expected that each student will submit their own ***original*** work. Any evidence of duplication, cheating or plagiarism will result at least a failing grade for the course.
    "Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook."

*   You are required to attend the class in time. Absences are excused for medical reasons and extenuating circumstances only with proper documentation. Conflicts with work and situations regarding personal decisions are *NOT* acceptable excused absences. Unexcused absences will result in the loss of points from your final grade.