EEL4734 - Embedded Operating Systems
Three Credits, One hour and fifteen minutes, Engineering Topic.

Instructor: Dr. Alexander Pons.

Textbook: Chris Simmonds Mastering Embedded Linux Programming, 2nd Edition

Specific Course Information:
This course is intended to provide a practical understanding of embedded operating systems. The emphasis is on the hardware and software aspects of embedded computing encompassing the composition of the embedded operating system and the development of embedded systems. It also provides students with the knowledge and skills to begin developing and implementing embedded applications with the practical aspects of embedded computing. Since the course is intended to serve students with a background in Computer Engineering related majors, computer programming skills are expected. These include C, or C++, Python programming and background of Computer Architecture. Topics covered include bootloader, Linux Kernel, and root file system

Specific Goals for the Course

a. Specific outcomes of instruction
Upon successful completion of this course, the student will:
1. Understand the composition of an embedded operating system.
2. Comprehension of the bootstrapping and boot loading of embedded systems.
3. Understand and be able to analyze problem and develop an embedded application.
4. Facilitate embedded operating system to develop an embedded application.
5. Understand and be able to apply basic operating system concept.
6. Analyze data science techniques to build machine learning models from IoT data.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

In this course the student will have to show
(a) an ability to apply knowledge of mathematics, science, and engineering (X)
(b) an ability to design and conduct experiments (simulations), as well as to analyze, interpret data (N/A)
(c) an ability to design a system, component, or process to meet desired needs (X)
(d) an ability to function in multi-disciplinary teams (N/A)
(e) an ability to identify, formulate, and solve engineering problems (homework) (X)
(f) an understanding of professional and ethical responsibility (N/A)
(g) an ability to communicate effectively (through project reports) (N/A)
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context (X)
(i) a recognition of the need, and an ability to engage in life-long learning (X)
(j) a knowledge of contemporary issues (X)
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (X)
(l) a knowledge of probability and statistics (N/A)
**Brief list of the topics to be covered**
1. Introduction to Embedded Operating System
2. Bootstrapping and Bootloading process
3. System-On-Chip options
4. Understanding the Linux Kernel
5. Root File System and User Space Initialization
6. Device Driver Basics
7. Understanding Memory Technology Devices
8. BusyBox tool set
9. Building embedded OS and applications
10. Development tools and cross-platform development
11. Linux/Ubuntu commands and Utilities
12. Bash, makefile, fix-ups and run-time linker

**GRADING:**

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<th>Course Requirements</th>
<th>Weight</th>
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