IA based Embedded Curriculum Summary

Course Name: Embedded Systems Programming

Course Type: presentation

Target Student/Semester: 40

Student Number (per year): 40

Course Duration: 45 hours in one semester

Prerequisite Courses: Computer organization, embedded microprocessor, and C/C++ programming

IA based Embedded Curriculum Characteristic

Curriculum/Course Characteristic:

1) To understand the design issues of embedded software and gain an in-depth knowledge of development and execution environment.
2) To understand the functions and the internal structure of device interfaces, drivers, and real-time operating systems.
3) To acquire the skill to develop multi-threaded embedded software in target environment.
4) To develop feasible task scheduling and carry out system performance and task schedulability analyses.

IA based Embedded Curriculum Key Points

Curriculum/Course Key Points:

1) Embedded software
2) Device driver and kernel programming
3) Management of concurrency

IA based Embedded Curriculum Difficult Points

Curriculum/Course Difficult Points:

1) Abundant material in embedded system design and development courses, from architecture, OS, and software development.
2) The ATOM platform used in the course, AIMB-212, does not allow flexible IO access.
3) Programming practice is necessary for the course, but it is time consuming.

IA based Embedded Curriculum Experience Sharing

1. Overall, many assignments for students to practice
   - students know the subjects are useful and interesting
   - they learn (or observe) how to make it work, but hardly ask the design decisions, performance issues, or alternatives.
2. CSE 438 – a difficult course to teach
   - system level comprehension
   - no textbook, use Internet document, code examination, and manual
   - for students, time consuming and challenging
   - the Devil is in the details
3. Plan to work on
   - projects that can be integrated as a sequence and lead to useful applications
   - pedagogy for embedded systems that is effective and inspiring

IA based Embedded Curriculum Resource

1. Linux Device Drivers (3rd Edition) Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman, 2005
2. The Linux Kernel Module Programming Guide, Peter Jay Salzman, Michael Burian, and Ori Pomerantz, 2007, ver 2.6.4.
3. Intel IA32 Software developer's manual, Atom processor and ICH8 Datasheets.
4. VxWorks Application API Reference and Application Programmer's Guide.
5. Writing Linux Device Drivers: a guide with exercises, Jerry Cooperstein, ISBN: 978-1448672387
6. Real-time Systems, by Jane Liu, Prentice Hall; ISBN: 0130996513.