

EECS 298: Embedded Software Synthesis Lecture 3

Rainer Dömer

doemer@uci.edu

The Henry Samueli School of Engineering
Electrical Engineering and Computer Science
University of California, Irvine

Lecture 3: Overview

- Assignments
 - Project proposals and ideas
 - Resources
 - Individual assignments
- Embedded Software
 - Real-time Scheduling
 - Periodic Tasks
 - Embedded Operating Systems
 - RTOS
 - Middleware

Course Assignments

- Overall Assignment
 - Project proposal
 - brief description of the project (half a page)
 - Project execution
 - do your project
 - Project presentation
 - 10-20 minute presentation of the project
 - Project report
 - final report about the project

EECS298: Embedded Software Synthesis, Lecture 3

(c) 2004 R. Doemer

3

Course Assignments

- Project options (1/3)
 - Hands-on experience with Embedded Software
 - Choose an embedded target platform
 - PDA
 - Lego Mindstorm robot
 - Xilinx board
 - ...
 - Choose an application
 - Controller
 - Game
 - ...
 - Implement the application on the platform
 - Report on your implementation

EECS298: Embedded Software Synthesis, Lecture 3

(c) 2004 R. Doemer

4

Course Assignments

- Project options (2/3)
 - Literature research
 - Choose an interesting article from the literature on one aspect of Embedded Software Synthesis
 - see course contents for applicable areas
 - Summarize the article and its context
 - check references, related work
 - compare contributions
 - Analyze and critique the article
 - describe pros and cons
 - Report on your topic

EECS298: Embedded Software Synthesis, Lecture 3

(c) 2004 R. Doemer

5

Course Assignments

- Project options (3/3)
 - Software synthesis example
 - Specify an example system in the SpecC system-level description language
 - Validate your example
 - simulation
 - Synthesize your example down to an embedded software implementation
 - System-on-Chip Environment (SCE)
 - Report on your experiment

EECS298: Embedded Software Synthesis, Lecture 3

(c) 2004 R. Doemer

6

Assignment 1

- Project proposal
 - brief description of your project idea
 - topic
 - approach
 - expected result
 - email to **doemer@uci.edu**
 - due by next week:
 - October 8, 2004, at 12pm (noon)

EECS298: Embedded Software Synthesis, Lecture 3

(c) 2004 R. Doemer

7

Assignment Proposals

- Received project proposals and ideas
 - CBH: Opt. 1 WindowsCE/Xilinx, DSP filter
 - JHB:
 - CJC: Opt. 1 Mobile IP, IPv6
 - HEC: Opt. 1 Lego Mindstorm robot, navigate a maze
 - SYC: Opt. 1 Xilinx board, controller
 - ISG: Opt. 3/1 SpecC / Xilinx
 - AG: Opt. 3 SpecC, digital camera
 - TWH: Opt. 3 SpecC, Tic-tac-toe game
 - SI: Opt. 2/1 Real-time UML / Java app. on PDA
 - GK: Opt. 2 Power management for embedded app.
 - ML: Opt. 1 Instant messenger on mobile phone
 - RL:
 - HL: Opt. 1 Instant messenger on mobile phone
 - KLN:
 - QKN: Opt. 1 Flash Microcontroller, Temperature sensor (budget?)
 - GS: Opt. 3 SpecC, MP3 decoder
 - EKS: Opt. 3/2 SpecC/literature JPEG/H.263
 - KDS: Opt. 2 RTOS, embedded SW, compilers
 - CWS: Opt. 1 Xilinx board, controller
 - HCL: Opt. 1 Embedded Linux kernel

EECS298: Embedded Software Synthesis, Lecture 3

(c) 2004 R. Doemer

8

Assignment Resources

- Available Resources (through lecturer)
 - Option 1:
 - virtual Palm Pilot PDA
 - Internet, google for “Palm Pilot Emulator”
 - Xilinx FPGA Board, Virtex 2
 - MicroBlaze Softcore CPU (similar to MIPS)
 - Option 2: Literature
 - Course literature
 - Books on specific Embedded Systems
 - Option 3:
 - SpecC Reference Compiler and Simulator
 - System-on-Chip Environment (prototype)

EECS298: Embedded Software Synthesis, Lecture 3

(c) 2004 R. Doemer

9

Assignment Resources

- Ideas for Application Examples
 - Controller applications
 - Traffic light controller
 - Elevator controller
 - Plotter controller
 - Codec applications
 - Encryption and decryption engine (e.g. “Tiny”)
 - Voice codec (Vocoder)
 - Audio codec (MP3)
 - Picture codec (JPEG)
 - Video codec (MPEG)
 - Game applications
 - Tic-Tac-Toe, Checkers, Chess, ...

EECS298: Embedded Software Synthesis, Lecture 3

(c) 2004 R. Doemer

10

Assignment Scheduling

- Mapping of proposals to resources and timing slots
 - very much like High-level Synthesis!
(Scheduling, Allocation, Binding)
- Schedule: (to be filled in discussion)
 - Week 4:
 - Week 5:
 - Week 6:
 - Week 7:
 - Week 8:
 - Week 9:
 - Week 10:
 - Final week:

EECS298: Embedded Software Synthesis, Lecture 3

(c) 2004 R. Doemer

11

Embedded Software

- Chapter 4, part 2, of
“Embedded System Design”
by P. Marwedel (Univ. of Dortmund, Germany),
Kluwer Academic Publishers, 2003.
- Embedded Software
 - Real-time Scheduling
 - Periodic Tasks
 - Embedded Operating Systems
 - RTOS
 - Middleware

EECS298: Embedded Software Synthesis, Lecture 3

(c) 2004 R. Doemer

12