

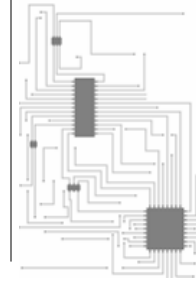
ENGG*4420: Real-Time System Design



Instructor: Radu Muresan

Course Web Page:

<http://www.soe.uoguelph.ca/webfiles/rmuresan/ENG4420-Fall.htm>



Course Description



- Real-time systems have an important place in the computer systems engineering discipline
- Real-time systems, area of applications
 - industrial control
 - communication
 - computing
 - signal processing; etc
- Computers form an integral part of most real-time control systems - referred to as *embedded real-time computers*
- Understanding how to design and build systems containing embedded computers is essential for a systems engineer



Course Outline And References



- **Part 1:** Introduction; Real-Time Computer Control
 - S. Bennet, Real-Time Computer Control, Prentice Hall, 1994
 - M. Chidambaram, Computer Control of Processes, Alpha Science, 2002.
- **Part 2:** Real-Time Concepts for Embedded Systems
 - Jean. L. Labrosse, MicroC/OS-II, CMPBooks, 2002
 - Quing Li, Caroline Yao, Real-Time Concepts for Embedded Systems, CMPBooks, 2003
 - T. D. Morton, Embedded Microcontrollers, Prentice Hall, 2001
 - P. A. Laplante, Real-Time Systems Design, 2004.
- **Part 3:** Modeling of Real-Time Systems; Petri Nets
 - S. Bennett, Real-Time Computer Control, Prentice Hall, 1994
 - Nimal Nissanke, Realtime Systems, Pearson Education, 1997
- **Part 4:** Scheduling Theory
 - Jane W. S. Liu, Real-Time Systems, Prentice Hall, 2000
- **Part 5:** Safety and Fault Tolerance
 - Krishna Shin, Real-Time Systems, 1997;
 - Nimal Nissanke, Realtime Systems, Pearson Education, 1997



Course Text Book



- **Radu Muresan, Real-Time Systems Design, McGraw Hill, 2007 - Available at the University of Guelph Book Store.**



Laboratory References

- References
 - R. Muresan, ENGG4420: Real-Time Systems Lab Manual, 2005, 2006;
 - <http://www.soe.uoguelph.ca/webfiles/rmuresan/ENGG4420-RealTimeLabManual.pdf>
 - R. Muresan, E-Book: Embedded System Development and Labs for ARM, 2005;
 - <http://www.soe.uoguelph.ca/webfiles/rmuresan/EmbeddedSystemsAndLabsForARM-V1.1.pdf>
 - Other lab resources about the board and the processor core – on the course webpage.



Laboratory Classes

- Lab 1: Real-time computer control simulation /experimentation lab using LabView and ARM boards (Weeks: 1- 4)
 - Model a simple hot-air blower plant using LabView
 - Implement the PID control software using LabView and Embest
- Lab 2: Real-time embedded application (Weeks: 5-6)
 - Introduction to the uC/OS-II ARM development system
 - Start-stop watch example implementation
 - Implementation of an intruder alarm system
- Lab 3 and Lab 4: VoIP phone implementation (Weeks: 7-11)
 - Implement the modules of the VoIP phone (voice + text)
 - The class will connect their phones to one master board and demonstrate that the phones can communication with each other



Laboratory Requirements

- Understand the lab examples
- Execute all lab steps
- Submit a lab report of minimum 8 pages and maximum 15 pages
 - Lab report organization (use the outline given in the manual):
 - Introduction
 - Background
 - Lab Implementation
 - Introduction and background should be short; your main focus should be on the lab implementation part
- Demo your lab implementation
- NOTE: **DO NOT COPY YOUR LABS!!** Present authentic work. The copied labs will be reported !!!



Laboratory Marking Scheme

- **Total lab mark: 40%**
- Lab 1: 14%
 - Lab Requirements: 2%
 - Lab report 4%; LabView Demo 4%; Interface Demo: 4%
- Lab 2: 10%
 - Lab Requirements: 2%
 - Lab Report 4%; Lab Demo 4%
- Labs 2 & 3: 16%
 - Lab Requirements: 2%
 - Lab report 4%; Petri Net model 2%; Lab Demo 8%



Course Examination; Course Marking Scheme (0.75 Credits Course)



- **Midterm:** October 23rd, 2006 (Tuesday).
 - Time: 6:00 – 8:00pm, Room: THRN 1103
- **Final Exam:** December 14th, 2007 (Friday).
 - Time: 7 pm – 9 pm, Room: TBA
- Course marking scheme
 - Labs: 40%; Exams: 60%
 - The best of the following:
 - Midterm: 20% + Final exam: 40% or
 - Midterm: 25% + Final exam: 35%
- NOTE:
 - In order to pass the course:
 - the students must develop, demo and present a report for all the labs;
 - write both exams and obtain a passing average for the exams;
 - if the student does not pass the exam the labs will not be counted in the final mark.
 - Copied exams and labs will be reported;
 - MAKE-UP MIDTERMS: **Only with valid doctor certificate**



Course Support



- Instructor: Radu Muresan
 - Office hours (Tentative):
 - Wednesdays: 12:30 pm – 2 pm
 - Fridays: 4 pm – 5 pm
- Course Web Page:
<http://www.soe.uoguelph.ca/webfiles/rmuresan/ENG4420-Fall.htm>
 - Slides Only; Complete Notes
- TAs office hours will be in the Lab:
 - Matthew Mayhew: Office hours: Tu 5:30-6:30 in the lab
 - Mahdi Elghazali: Office hours: Th 2:30 – 3:30 in the lab
- Lab technician
 - Alan Miller: x53873



NOTE

- The instructor reserves the right to change any of the above (lab schedules, due dates, exam dates, etc) in the event of appropriate circumstances, subject to the University of Guelph Academic Regulations.

Questions??? and Suggestions !!!

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