Course Syllabus

ELCT 302 – Real time Systems Laboratory

Course Coordinator: Undergraduate Program Committee

Catalog Description: Control systems design

Credit Hours 3

Prerequisite(s) by course ELCT301, ELCT331 (or Co-req)

Prerequisite by topics Circuit design and C-level programming

Required Textbook Fast and Effective Embedded Systems Design: Applying the ARM mbed, Rob Toulson and Tim Wilmshurst, Newnes, 2012

Learning Outcomes:
Students who successfully complete the course will be able to:

1. design and build optical and electromagnetic sensing and measurement circuits
2. model the permanent magnetic DC motor and derive the transfer function
3. design and analyze PID controller using a transfer function approach
4. program microcontroller to accomplish control and data acquisition tasks
5. use Matlab/Simulink to assist microcontroller programming
6. execute functional decomposition of a system, design the subsystems, and build the integrated multidisciplinary system including software and hardware components.
7. analyze data and write technical reports to summarize findings and results.
8. teaming skill

Course Topics:

- Open Loop Microcontroller-based DC Motor Control and Speed measurement
- Model Identification for a DC Motor Drive; Electrical part
- Model Identification for a DC Motor Drive; Mechanical part
- Closed-Loop Control Design: Simulation
- Closed-Loop Control Design: Implementation
- Data and Image Acquisition
- Steering and Control and Logic Control for an Autonomous Vehicle
- teaming skill (define what this is)

Course Contribution to Program Outcomes:
ELCT 302 contributes to an achievement of:

- Outcome 1 – an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
• Outcome 2 – an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

• Outcome 3 – an ability to communicate effectively with a range of audiences

• Outcome 5 – an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

• Outcome 6 – an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusion.

General Course Policies

The EE Department will make every attempt to obtain necessary components for each team's designs. Generic electronic components will be made available. However, these items will not be replaced in the event of damage. Each team will be responsible for replacing damaged, destroyed or lost items. Small parts such as transistors, op-amps, logic gates, etc. are expected to be discarded when damaged. It is expected that some of these types of components will be damaged during the design cycle. The Department will attempt to provide these components as needed but there is not an infinite supply nor is easy access a substitute for good engineering practice.

Academic Integrity
Students are expected to follow the University of South Carolina Honor Code and they should expect that every instance of a suspected violation will be reported. Students found responsible for violations of the Code will be subject to academic penalties under the Code in addition to whatever disciplinary sanctions are applied.

It is expected that some sharing of techniques and/or generic knowledge of hardware components or software will occur between project teams during the semester. However, under no circumstances is there to be sharing of specific circuit designs or software algorithms. Each project team is expected to do all designs necessary for completion of the project independent of other teams. "Sharing" of specific designs amongst teams is considered as grievous as copying on an exam and will be treated as such by the EE Department.

Accommodating Disabilities
Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, contact the Office of Student Disability Services: 777-6142, TDD 777-6744, email sasds@mailbox.sc.edu, or stop by LeConte College Room 112A. All accommodations must be approved through the Office of Student Disability Services.

Diversity
When scheduling exams, I have attempted to avoid conflicts with major religious holidays. If, however, I have inadvertently scheduled an exam or major deadline that creates a conflict with your religious observances, please let me know as soon as possible so that we can make other arrangements.

Recommended Study Habits
• Read the assigned material before class.
• Bring thoughtful questions to class for discussion.
• Prepare for the exams in study groups.
• Take notes during class discussions and while completing reading assignments.

Deviations
Minor deviations from the syllabus are a normal part of any adaptive teaching and learning process.