ELEC3300   Introduction to Embedded Systems

Course Description

This course is designed to teach techniques on how to integrate machine-level software and hardware in ARM-core microcontroller based systems. It makes use of industry-standard techniques and technologies, from which students can interface, design and program microcontroller systems. The task of the course will be to complete five laboratory experiments which address different aspects of hardware/software interfacing, and one large microprocessor/microcontroller based project which should result in the design and implementation of a small working embedded system. *Prerequisite(s)*: COMP 2611 OR ELEC 2300 OR ELEC 2350 OR ISDN 4000F

List of Topics

Lecture Outline

1   Introduction to Embedded Systems
2   Basic Computer Structure
3   Embedded System Structure
4   Interfacing LCD
5   Interrupt Organization
6   Timer and Counter
7   ADC and Motor Interfacing
8   Serial Communication
9   DMA
10   Memory Interfacing

Laboratory Topic

1   Use of Equipment
2   I/O Interface, Interrupt function of STM32
3   Graphic LCD Interfacing
4   Timer and PWM Function
5   ADC Conversion
6   I2C Interface with Digital Compass

Tutorial Topic

1   Introduction to use of Equipment
2   Number System and STM32 Structure
3   I/O and Interrupt function of STM32
4   Controlling Graphic LCD using FSMC function of STM32
5   STM32 Timer and PWM Function
6   ADC of STM32
7   I2C function of STM32
8   Project Information

Statement of Objectives/Outcomes:

On successful completion of this course, students will be able to:

CO1: Recognize the marketing and engineering views of embedded system applications.

CO2: Understand and analyze the building blocks of embedded system, and the interfacing techniques of simple external devices.

CO3: Understand and compare different up-to-date computer interfacing technologies.

CO4: Use CAD tools to program and emulate the performance of the micro-controller.

CO5: Execute a complete project in team from problem formulation, time management, design/implementation, up to verification and documentation.

Textbook(s):

No specific Text Book

Reference Books/Materials:

STMicroelectronics STM32F103ZET6 Datasheet
STM32 Reference Manual
STM32 Cortex M3 Programing Manual

Grading Scheme:

In-class activities	8%
Homework assignments	10%
Laboratory experiments	18%
Preliminary proposal discussion (peer)	4%
Final proposal presentation	6%
Interim project demonstration	9%
Final project demonstration and presentation	40% (+3%)
Final report submission	5%

Note: +3% bonus points will be given to the student team which design the project for community.