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Help

SYLLABUS

The best way to understand what you will learn in this class is to list the labs you will complete and the example projects we will build. You will complete each lab first in simulation and then on the real board. For each module we will design a system and you will build and test a similar system.

Module 1: Welcome and introduction to course and staff

Module 2: Fundamental concepts: numbers, computers, and the ARM Cortex M processor
Example. Develop a system that toggles an LED on the LaunchPad
Lab 2. Run existing project on LaunchPad with switch input and LED output

Module 3: Electronics: resistors, voltage, current and Ohm's Law

Module 4: Digital Logic: transistors, flip flops and logic functions

Module 5: Introduction to C programming
Example. Develop a system that inputs and outputs on the serial port
Lab 5. Write a C function and perform input/output on the serial port

Module 6: Microcontroller Input/Output
Example. Develop a system that inputs from a switch and toggles an LED output
Lab 6. Write C software that inputs from a switch and toggles an LED output

Module 7: Design and Development Process
Example. Develop a system that outputs a pattern on an LED
Lab 7. Write C functions that inputs from two switches and toggles an LED output

Module 8: Interfacing Switches and LEDs
Example. Develop a system with an external switch and LED
Lab 8. Interface an external switch and LED and write input/output software.

Module 9: Arrays and Functional Debugging
Example. Develop a system that debugs by dumping data into an array
Lab 9. Write C functions using array data structures that collect/debug your system.

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Module 10: Finite State Machines

Example. Develop a simple finite state machine

Example. Develop a vending machine using a finite state machine

Example. Develop a stepper motor robot using a finite state machine

Lab 10. Interface 3 switches and 6 LEDs and create a traffic light finite state machine

Module 11: UART - The Serial Interface, I/O Synchronization

Example 11. Develop a communication network using the serial port

Lab 11. Write C functions that output decimal and fixed-point numbers to serial port

Module 12: Interrupts

Example 12. Develop a system that outputs a square wave using interrupts

Example 12. Develop a system that inputs from a switch using interrupts

Example 12. Develop a system that outputs to a DC motor that uses pulse width modulation

Lab 12. Design and test a guitar tuner, producing a 440 Hz tone

Module 13: DAC and Sound

Example 13. Develop a system that outputs analog signal with a R-2R digital to analog converter

Lab 13. Design and test a digital piano, with 4 inputs, digital to analog conversion, and sound

Module 14: ADC and Data Acquisition

Example 14. Develop a system that inputs an analog signal with an analog to digital converter

Example 14. Develop an autonomous robot that uses two DC motors and two distance sensors

Lab 14. Design and test a position measurement, with analog to digital conversion and calibrated output

Module 15: Systems Approach to Game Design

Lab 15. Design and test a hand-held video game, which integrates all components from previous labs.