EMTR 2011-FA

Microcontrollers and Digital Logic

Instructor: Dr. Wilson Wang

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Lectures: 1:00 – 2:30PM, Monday and Wednesday, AT-2006

Office hours: TBA

Lab Instructor: Jason Clemen <jcclemen@lakeheadu.ca>

Teaching assistant: TBA

Textbook: (1) PIC Microcontroller and Embedded Systems, M. A. Mazidi, D. Causey, R. McKinlay, 2nd Edition, MicroDigital Ed, 2016. (Required)

(2) Fundamentals of Digital Logic with Verilog Design, S. Brown and Z. Vranesic, McGraw-Hill, 3rd Edition, 2014.

(3) Reading materials and notes

Objective:

Introduction to microcontrollers and digital logic for Mechatronics systems. Specific topics include: digital systems and number representation; logic gates, Boolean algebra; Karnaugh maps; flip-flops, registers and counters; PIC architecture, microcomputer structure and operation, memory, addressing, I/O port programming, PIC18 timer programming, serial port programming, interrupt, ADC, DAC, and sensor interfacing. Assembly language and C will be used for PIC programming.

Grading policy:

Assignments: 15%
Labs: 15%
Midterm Exam: 25%
Final Exam: 45%

Student Learner Outcomes:

[1] Produce the truth table, timing diagram and gate design of logic functions;

[2] Describe the behavior of the following circuits such as decoder, encoder, multiplexer, flip-flops, registers, counters, and memory;

[3] Appraise the structure of an ALU;

[4] Describe architecture of PIC microcontroller;

[5] Explain the purpose of configuration registers in PIC;

[6] Employ instruction set of PIC and write assembly programs;

[7] Utilize I/O interfaces through practical examples such as LEDs;

[8] Utilize both assembly and C programs for PIC;

[9] Employ interrupt to service different peripherals.

[10] Demonstrate personal responsibility and accountability in conducting the related assignments and labs;

[11] Demonstrate the ability to communicate ideas, issues and conclusions clearly and effectively related to assignments and lab reports.