TI Day@McMaster - September 2016

This is an interactive day where the following 4 sessions will be covered (TI will provide all hardware needed to complete the labs, and all necessary downloads will be made available upon registration):

Session 1: Fundamentals of Micro Controllers (2 hrs)

In this session, we will cover the basic operation of microcontrollers. We will discuss general microcontroller architecture to understand the fundamentals of data flow through the device. Micro code and program structure will also be explained. Throughout this session, you will work on multiple labs in which you must develop and modify sample code to achieve a specific task. Labs include:

Lab1: The purpose of this lab is to show the "hello world" of microcontrollers – blinky.

Lab2: Create and understand a program that reads input from a pin.

Lab3: Create and understand a program that communicates over a serial port.

Session 2: Integration of Motors (1.5 hrs)

After you have familiarized yourself with the internal workings of microcontrollers, we will begin to add peripherals. In this session, we will examine motor drive and what it actually takes to spin a motor. To begin, we will work our way through motor fundamentals and conclude with spinning a motor with the help of the microcontroller. Labs include:

Lab1: Generate a PWM output from the microcontroller, and spin a DC motor.

Lab2: Control the speed of the motor using a communications interface like a serial port.

Session 3: Integration of Sensors (1 hr)

In real world applications, digital systems typically react to a specific event that is being monitored. The monitoring of such events is often accomplished by sensors that can be connected to a processor (i.e. microcontroller). In this session, we will take a look at the common set of sensors a microcontroller can monitor. We will breakdown sensor monitoring to its fundamental signal chain and discuss how we can alter the alert conditions to achieve a different output ("reaction") from the microcontroller. Labs include:

Lab1: Read the integrated temperature sensor on the microcontroller.

Lab2: Read one of the other sensors via serial port such as the OPT3001 optical sensor.

Session 4: Integration of Wireless Connectivity (2 hrs)

Wireless connectivity is an important requirement for most embedded systems. Typically, in most applications (especially IoT), communication between devices is done across some form of wireless connection. In this session, we will discuss the basics of wireless communication and how we can enable microcontrollers to communicate wirelessly. Labs include:

Lab 1: Establish a wireless connection between two launchpads. Define your own unique protocol so that you can minimize the chance of other groups interfering on your channel.

Lab 2: Integrating it all – Reacting to a sensor event wirelessly! Work with your team to integrate the sensor activity, the wireless communications and the motor control into a complete system.