UMass Lowell 16.480/552 Microprocessor Design II and Embedded Systems

Lab 1: Sensor Design and Analog Digital Conversion
Due Date: See the course's piazza page.

rev:09/04/14

Objectives

- Learn how to design sensors with embedded microcontrollers
- Understand the operation of ADC
- Understand the design of sensor circuitry

Description

It is often necessary that we understand the surrounding environment using sensors. To design sensors and their associated circuitry, and to obtain and processor sensory data are important tasks in the design of an embedded system.

In this lab, you will need to design a light intensity sensor controlled by a PIC microcontroller. The parts given include a PIC16F688, a photoresistor, a LED and assorted diodes and resistors. You can use a breadboard or a wire-wrapping prototype board to implement your circuit. The ADC module in PIC16F688 will be used to convert an analog signal to corresponding digital value.

Your PIC based light sensor device must:
1. Convert the light intensity information to a variable voltage (0-5V).
2. Obtain an analog input signal (sensory data) via an analog pin of the PIC (e.g. AN0)
3. Use the internal ADC of PIC to convert analog signals to digital values
4. Turn on a LED if the sensor is encapsulated in a dark box or put in a dark environment.
5. Turn off the LED if the sensor is placed in a well-lighted environment.

Deliverables

A zipped file containing
1. Schematic of the design (in both native and pdf formats)
2. Source code (adequate comments required)
3. Reports

References

[1] PIC16F688 datasheet.
http://ww1.microchip.com/downloads/en/DeviceDoc/41203E.pdf
[2] Source code template git repository : http://github.com/yanluo-uml/micro2.git