EE 107 Lab 3 (Week 4)

Title: Port I/O and L.E.D.s

Description: This laboratory session is intended as a primer for the Arduino microcontroller board and its firmware functions. There are two distinct tasks to complete. The first involves programming (via upload) the Arduino board with the results of compiling a sample program designed to blink an L.E.D. (Light Emitting Diode). The second task involves connecting the Arduino board to four protoboard L.E.D.s and blinking them at a rate controlled by a variable resistor (potentiometer) on the protoboard. You will need to implement a voltage divider using the potentiometer and a resistor from the resistor box at each station. Completing the tasks require you be familiar with the built-in firmware functions of the Arduino Integrated Development Environment (IDE). See below for details on the tasks and for the format and content of the required report to be submitted at the beginning of the next laboratory session.

Task 1 Specifics:

1) Create the following sub-directory in your mapped mavdisk drive (or M drive), "M:/My_Private_Files/Lab3".

2) Open the Blink.INO file found in the sub-directory C:/arduino-1.0/examples/1.Basics/Blink and save it to "M:/My_Private_Files/Lab3/Blink_Modified.INO".

3) Verify and upload the C-code file which blinks the L.E.D. There are buttons at the top of the IDE window which allow you to do this with two buttons. Once the IDE window dialog at the bottom states that the verification has occurred without error and the upload occurred without error, connect an L.E.D. between digital pin 13 and the adjacent ground pin on the Arduino board. Note the polarity of the L.E.D. The flat side is the ground side. Your L.E.D. should be blinking at a frequency of about 0.5 Hz. Verify the frequency using the oscilloscope.

4) Modify the program to blink the L.E.D. at 55 Hz by changing the value sent to the delay() functions. Verify that 55 Hz is achieved by re-programming the board and using the oscilloscope to check the frequency. This may take several iterations. Note the final value used for the delay() functions. Include this information in the report.

Task 2 Specifics:

1) Create a new program using the Arduino IDE to read in an analog voltage from 0-4V and blink four L.E.D.s at frequencies 100-20Hz, e.g. if 0V is measured, the L.E.D.s should blink at 100Hz rate and if 4V is measured, the L.E.D.s should blink at 20Hz rate.

You will need to use the analogRead(), pinMode(), digitalWrite() and delay() functions.

2) Follow the circuit construction as described during the laboratory session.

Report Format and Guidelines:

Your report must include the following at a minimum:

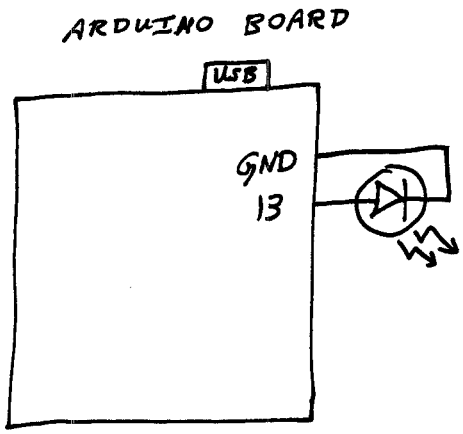
1) A title page containing the experiment number, experiment title, date of lab, due date of report and printed names of the group members.

2) A paper copy of all source code. Ensure all programs include header and statement comments as described in class.

3) A summary of the tasks completed for this laboratory session and a description of your solution to complete Task 2.

Your report should be typed, stapled and written with proper grammar and correct spelling. Your report will be graded on readability as well as content.

Task 1 circuit



TASK 2 circuit