

Lab 1: Arduino and their Integrated Development Environment (IDE)

Objective: Familiarization with the Arduino and its software environment.

Description of Lab 1:

In the past this type of programming assignment was known as a “Hello World” assignment, since the objective was to simply print “Hello World” on the display. As simple as this task appears, one learns a lot from such an assignment, such as how to enter a program, compile it and execute it on the computer.

Well in the case of an embedded computer, we don't always have a screen on which to display a message. So instead the displaying a message on a screen, we commonly start by simply blinking a light on the board. These programs are commonly called Blinky Light programs. In this assignment we will be working on the “proper” way to blink the LED on the board as close to 1 second and as efficiently as possible.

Now one of the most important things is to ***not use the delay function*** provided by the Arduino IDE. The problem with the delay function is it will tie up the processor, doing nothing but waiting for a certain amount of time to pass. Rather we will want to continue looping, until the requested time has passed. This continued looping can be achieved by using the timer function millis().

The function millis() returns the number of milliseconds that have passed since the system was powered up. Thus if we were to take a reading of this function at the start of your program and then test the current value of millis() each time you go through your loop, you will be able to tell when a second has passed, and still keep looping until that time.

The structure of the program would look something like this

declare a unsigned long named LedTimer

SetUp:

- Set LED pin to Output using pinMode()
- Record value of millis() in a variable say LedTimer.

Loop:

- if millis() - LedTimer is greater than or equal to 1000
 - if LED pin is high using digitalRead()
 - Set LED pin low using digitalWrite()
- else
 - Set LED pin high using digitalWrite
- Update LedTimer by adding 1000 to it.

Functions Needed for Lab: pinMode() , digitalWrite(), digitalRead(), and millis()

Documentation for all for these functions can be found at the Arduino website
<http://www.arduino.cc/en/Reference/HomePage> .

Lab Assignment:

Prelab: Write the program that implements the steps above. Note the Arduino IDE is free online at <http://www.arduino.cc/en/Main/Software> and is available on most of the ECE computers.

Lab 1:

- 1) Enter in the program done in the prelab, upload it to the Arduino, and verify that it is flashing, changing every second. The functioning program is to be demonstrated to your lab instructor.
- 2) Adapt the program to toggle a second pin (pin 10) every 3 seconds. This can be done by establishing a second timer (LedTimer3), which detects when 3 seconds has passed. The functioning program is to be demonstrated to your lab instructor.

Note: Only one LED is available on the board, so the second pin will need to be monitored with a logic probe.