Lab 3 FYSS 585
**By Rattanaporn Norarat**

Getting start with Arduino:

The goal of this lab is to learn how to set-up a programmable interface controller (PIC). The stages is the development the code, how to compile and implement it. This lab will basically get you up and running using the Arduino software and uploading a sketch to the Arduino board. In this lab we (i) construct the LED in circuit board (ii) use the software to send sketches to the Arduino board and (iii) start writing your own sketches.

Introduction

Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments [1]. Here is the link of specification of Arduino board http://arduino.cc/en/Main/ArduinoBoardUno.
To get started, download the software http://arduino.cc/en/Main/Software and follow the instructions for your operating system and connecting it to an Arduino board.

1. Blinking Circuit.

1. Place the resistor and LED as shown in the picture below and connect with the Arduino board [2].
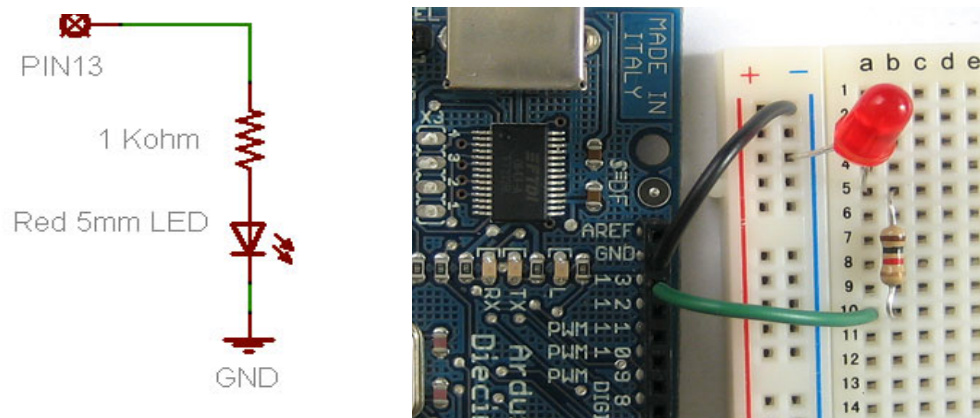

2. Start up the Arduino software and open the Blink example sketch (File ➔ Examples ➔ Basics ➔ Blink).
3. The first step to getting a **Sketch (**the unit of code that is uploaded to and run on an Arduino board) ready for transfer over to the Arduino is to **Verify/Compile** it. That means check it over for mistakes (sort of like editing) and then translate it into an application that is compatible with the Arduino hardware. After a few seconds, you should see the message **Done compiling.** in the **Status Bar** and **Binary Sketch Size:** in the **Notification area.** Success this stage means the sketch was well-written and is ready for uploading to the Arduino board!

4. Before you select the **Upload** menu item. Make sure the Arduino is plugged in, the green light is on and the correct Serial Port is selected. Select **Upload to I/O Board** from the **File menu.** After a few seconds you should get this screen, with the message **Done uploading.** in the status bar.
5. After upload to the board, you should see a blinking light in LED.
6. Modify the example sketch and experiment with different delay values
    a. Modify the code so that the light is on for 500 msec and off for 500 msec
    b. Modify the code so that the light is on for 50 msec and off for 50 msec, what happens?
    c. Modify the code so that the light is on for 10 msec and off for 10 msec, what happens?
    d. Now pick up the Arduino and gently wave it back and forth, in a dark room. What happens?
    e. What do you think is happening here (from question d)?

2. A bicycle safety light

The next step is to start playing with input, with the Arduino responding to outside events. In this lesson we will begin with the most basic kind of input, a push-button switch.
1. Place the resistor, LED and a push-button as shown in the picture below and connect with the Arduino board [2].
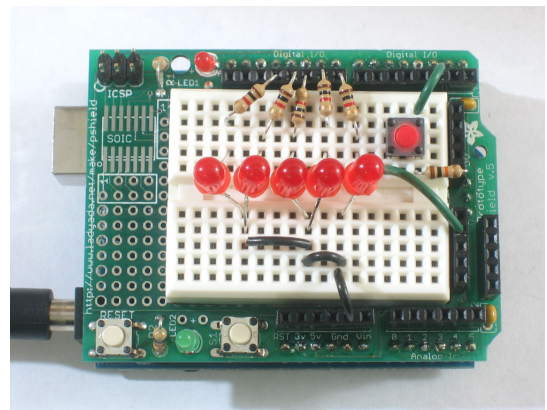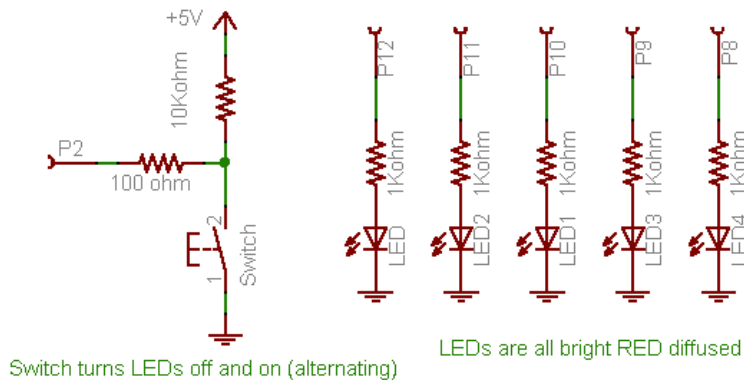
2. Copy and paste the sketch file "bright_1" from the course webpage into the Arduino software and upload it to the Arduino. Verify that when the button is pressed, the LED turns on and when the button is pressed again, the LED turns off. Here is a video demonstrating the functionality of this sketch.
    http://blip.tv/ladyada/bike-light-1-463022
3. Modify the previous sketch and upgrade it to have at least 4 modes: off, all-on, blinking LEDs, and 'wave'. Here is a video demonstrating the functionality of the light with 4 modes http://blip.tv/ladyada/bike-lite-final-466034
    Hint: Here is the information how to modify the code and upgrade to 4 modes, http://www.ladyada.net/learn/arduino/lesson5.html

4. In report, it's include the sketch for 4 modes bicycle safety light, what you have learned from Arduino and do you have any idea for using Arduino for application.

References:

[1] http://www.arduino.cc/

[2] http://www.ladyada.net/learn/arduino/lesson5.html