

Name:

Date:

**Objectives:** *Be familiar with the basic of Arduino Uno Microcontroller,*

1. Components of Arduino Microcontroller
2. Software Downloading / Installing & Interface
3. Learn basic Arduino coding

Steps for Downloading Arduino software:

- i. Go to [www.arduino.cc](http://www.arduino.cc) to download the latest version of the Arduino software (Direct link: <http://arduino.cc/en/Main/Software> and select your operating system; such as Windows).
- ii. Save the ZIP file to your desktop.
- iii. It is convenient to create a new folder called “Arduino” under “Program Files”. To do this, go to “My computer” -> “C:” (or the drive where the operating system is installed) -> “Program Files”, then left click once on “program Files” folder, then select “New”->”Folder” on the main menu.
- iv. Extract the entire ZIP folder to this new “Arduino” folder
- v. Create a short cut on your desktop
- vi. In the software, select “Tools” --> “Port” --> COM # (note that if you have several COM ports. If any problem, go to Device Manager to see which COM port is assigned to your board.
- vii. To run the Arduino programme just double click on the short cut icon.
- viii. Plug one end of the USB into the Arduino and the other end into your computer.
  - I. Load blink programme to blink on board LED.  
Open Arduino programme > File > 0.1Basics > Examples > Blink
  - II. Compile it by clicking on the ✓ on the toolbar of Arduino programme on the top row.  
*Note: If there is any error on the programme you will notice on the bottom of the screen. After fixing it compile it again till no error is seen.*
  - III. Download the programme into the Arduino by clicking on the ➡ on the Arduino toolbar. Watch the small LED on the Arduino board flashing every second.
  - IV. Now change the time to 0.2 second by changing delay (200) for both delays and compile the programme and download it into the Arduino and watch the speed of blinking LED on the circuit board. *Notice the change.*
  - V. Now we want to use the external LED to blink the original programme. We need to do the following: Add the following statement into the programme:  
**int LED=13;**  
and change the original statement `pinMode(13, OUTPUT);` to **`pinMode(LED, OUTPUT);`**  
*note: notice that OUTPUT and INPUT use capital letter*
  - VI. Compile and download the programme into the Arduino.  
*Note: You also can directly send the programme into the Arduino without first compiling it. This will be done automatically by the programme.*
  - VII. Change the speed of the LED by changing the Delay (1000) to a lower number and observe the change on the LED.  
*Note: 1000 mean 1000 milliseconds which means one second.*  
Make sure you LED is connected to the same pin number which you mentioned in your programme.
  - VIII. Fade the LED light by doing the following programme.  
// Fade the brightness of LED light  
`int ledPin = 11;`  
// Pins 3,4,5, 9,10, 11 are PWM and could be used any of those pins.

```

void setup() {
  pinMode (ledPin, OUTPUT);
}
void loop() {
  for (int i=250;i>0; i--)
  {
    analogWrite(ledPin, i);
    delay(15);
  }
  delay(2000);  // delay 2 seconds before the next loop starts
}

```

- IX. Use the above programme to make the LED become bright which is opposite than the fade.  
 Note: you should increase the number of i in your for loop.
- X. Connect 3 LEDs on port number 13 (Green LED), 10 (Red LED), and 3 (Blue LED) and make them to be on one at a time with a delay of half (1/2) second.  
*Note: Use only one resistor about 330  $\Omega$  will be good. Connect the resistor to the ground of the Arduino and the other lead to the LED.*

Complete the programme below and download it into your Arduino

```
int G = 13;
```

```
int R = 10;
```

```
int B = 3;
```

```

void setup( ) {
  // initialize digital pin 13 as an output.
  pinMode(G, OUTPUT); // will give you 4.5 volts otherwise give you 3 Volts or less.
  pinMode(??????);
  pinMode(??????);
}

```

// the loop function runs over and over again forever

```

void loop( ) {
  digitalWrite(G, HIGH);
  delay(500);
  digitalWrite(???, LOW);
  delay(???);
  digitalWrite(?, HIGH);
  ??????
  digitalWrite(R, LOW);
  delay(500);
  digitalWrite(?, HIGH);
  ??????
  digitalWrite(?, LOW);
  delay(500);
}

```