

IAT 884

Week 3

Intro to Micro-controllers: Arduino Outputs

**Preparation:**

1. Visit the Arduino website and familiarize yourself with the Arduino Microcontroller's functionality and hardware specs.
2. Download and install the Arduino software on your laptop:  
<http://www.arduino.cc/en/Main/Software>

**Installation Instructions:**

**Windows:** Follow the instructions here: <http://www.arduino.cc/en/Guide/Windows>  
*\*Please note that you will not be installing the default Windows driver.*

**Macintosh:** Follow the instructions here: <http://arduino.cc/en/Guide/MacOSX>

**Linux:** <http://www.arduino.cc/playground/Learning/Linux>

**Required Reading:**

In *Programming Interactivity*: [Chapter 4](#) (p. 91-128)

*\*For this week focus on pages 91-100, 102-107, 115-122, 126-128.*

In Physical Computing read:

[Digital Output](#): p.87 - 89

[Analog Output](#): p.102 - 104

**Suggested reading and resources:**

Arduino software download page: (<http://www.arduino.cc/en/Main/Software>)

Arduino programming language reference: <http://www.arduino.cc/en/Reference/HomePage>

Arduino Hardware: <http://www.arduino.cc/en/Guide/Board>

Intro to Arduino Course from TodBots:

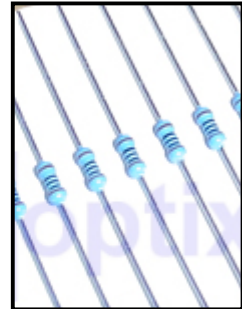
[http://todbot.com/blog/wp-content/uploads/2006/10/arduino\\_spooky\\_projects\\_class1.pdf](http://todbot.com/blog/wp-content/uploads/2006/10/arduino_spooky_projects_class1.pdf)

### In Class Exercise

**For this workshop you will be developing small projects using the Arduino microcontroller and the accompanying programming environment.**

#### **Materials:**

- Arduino Board
- USB Cable
- Breadboard
- 2 x LEDs
- Wire
- 2 x 1k Ohm Resistors (Brown, Black and Red striped)



#### **Tasks:**

1. Digital Out: Make 2 LEDs blink so that when one is on the other is off.
2. PWM Out: Make 2 LEDs fluctuate in brightness. The two LEDs should be in sync so that when one LED is lit, the other is completely dark.
3. Optional Challenge: Use keystrokes to dim/brighten an LED (Uses Serial Communication).

## Serial Data Reference:

To start serial communication you must open the serial port at a specific baud rate:

```
Serial.begin(9600)
```

To send binary data to the serial port, you use the write() function:

```
Serial.write(data); or Serial.Writeln(data);
```

// Adding 'ln' prints each data point on a new line in the serial monitor

To send the characters representing the digits of a number, or a string, use the print() function instead.

```
Serial.print(data) or Serial.println("string");
```

To read data from the serial port that has been sent from an application to the Arduino you use:

```
Serial.read();
```

This will return either an integer, the first byte of serial data available, or a -1 if there is no serial data to read.

The following code will write the number 0 -255 in succession to the serial port.

```
int currentValue = 0; // variable to hold the analog value

void setup() {
  // open the serial port at 9600 bps:
  Serial.begin(9600);
}

void loop() {
  for(int i=0; i<256; i++){
    currentValue=i;
    Serial.println(currentValue, DEC); //print number between 0-255
    delay(500); //wait ½ sec before taking next serial reading
  }
  currentValue = 0;
}
```

### ***Notes on sending Serial Data:***

From: <http://itp.nyu.edu/physcomp/Labs/Serial>