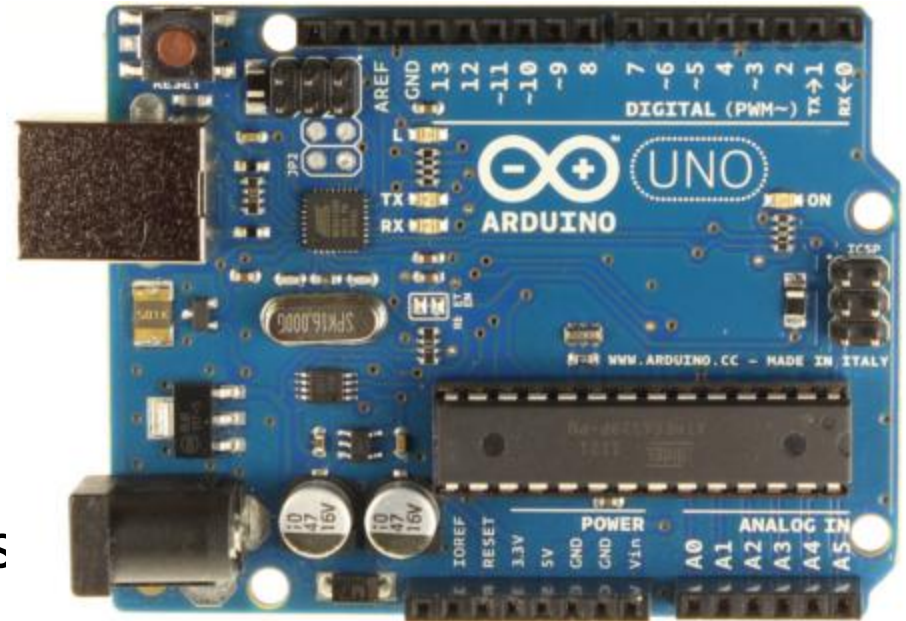


Arduino Tutorial

Gabe Cohn

Arduino

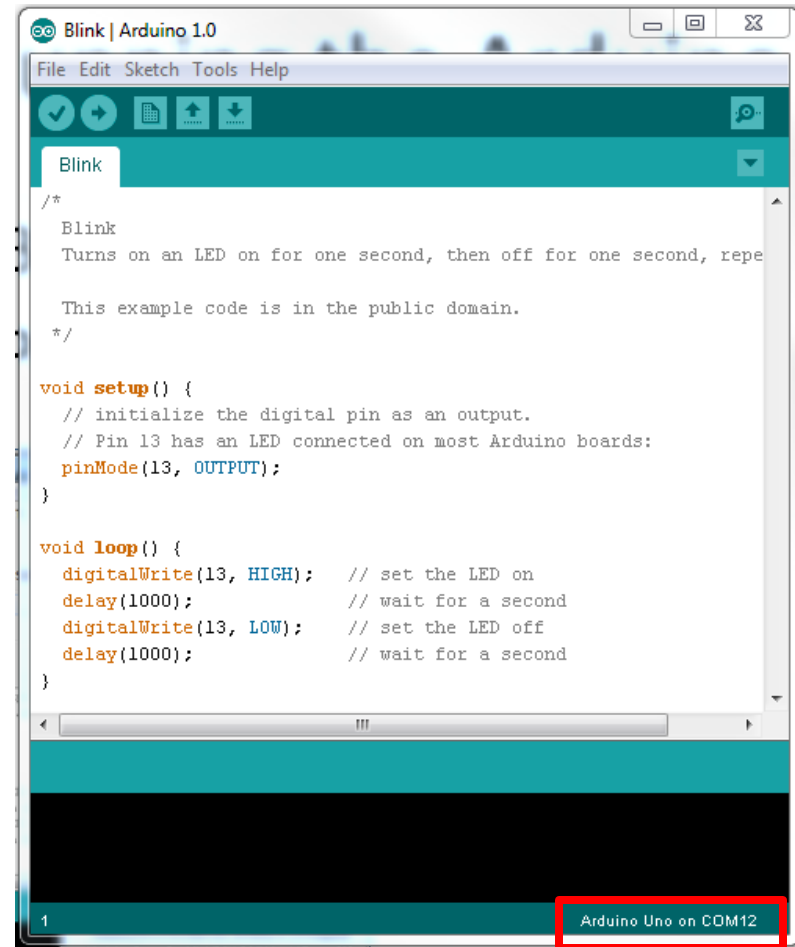
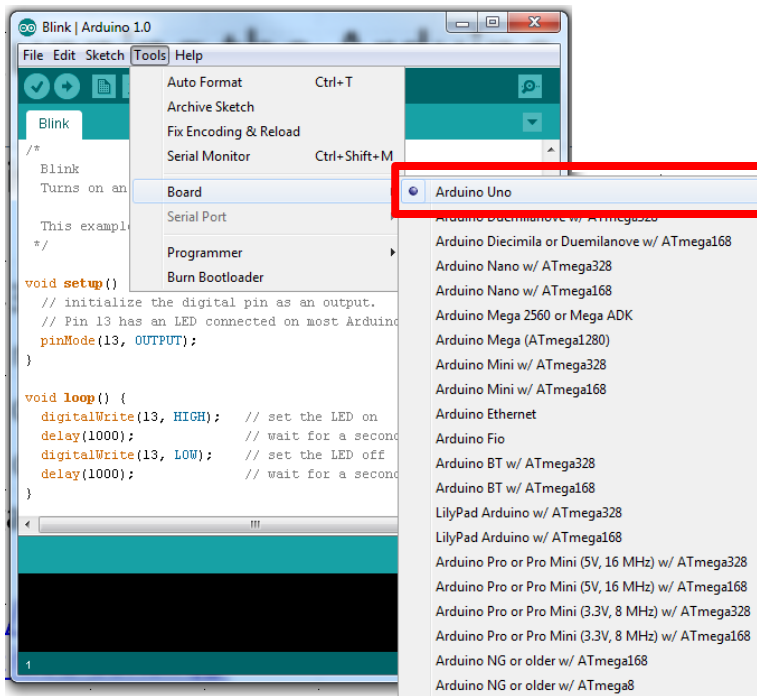
- Uses Atmel AVR
- Hardware contains everything you need
- Simple high-level C/C++ based programming language
- Very easy to use
- Example code and projects
- Large online forums for support
- Can also write to AVR registers for low-level functionality



Arduino UNO

Running the Arduino IDE

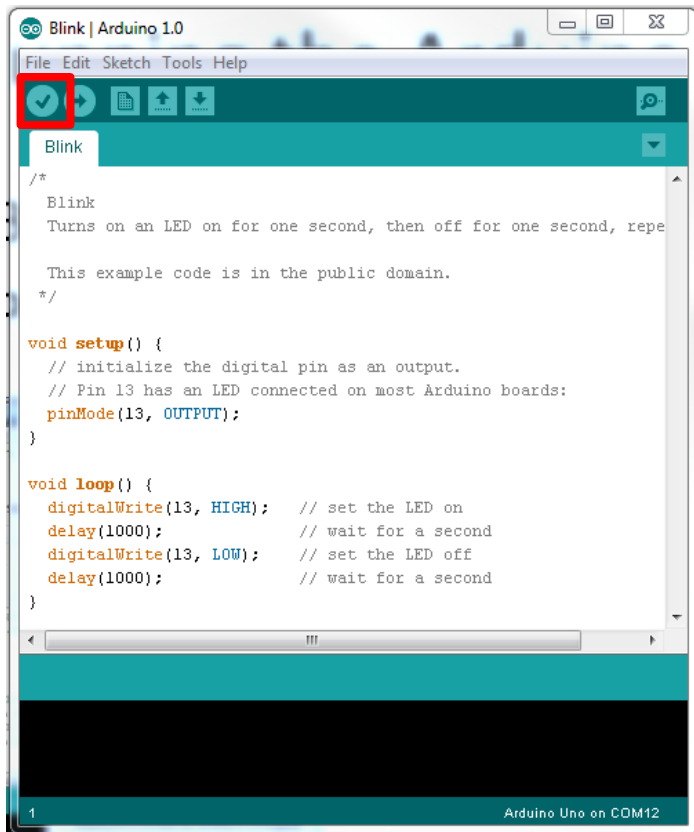
- Select Board
- Select Port



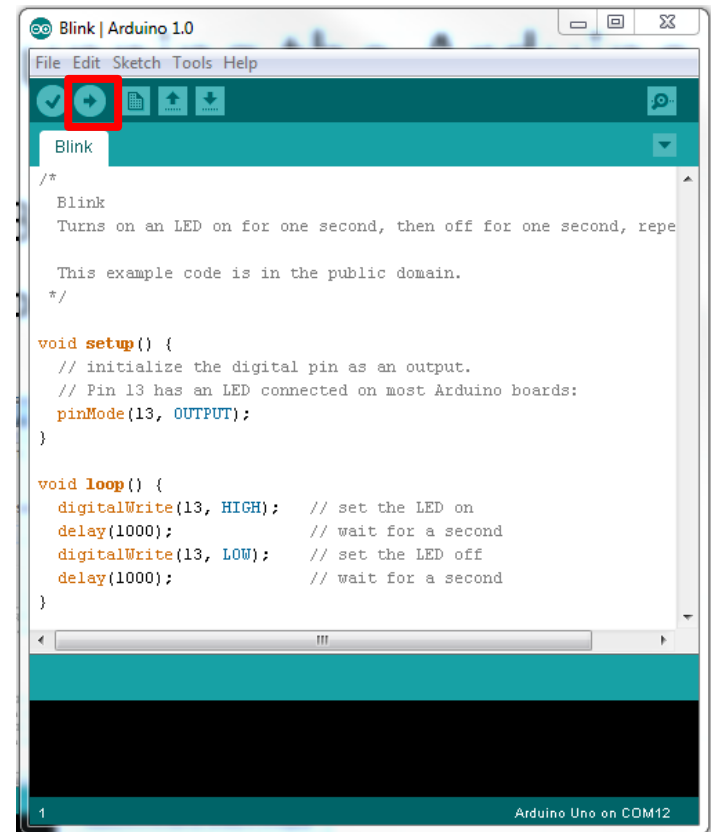
Verify correct board and port

Running the Arduino IDE

- Compile Code



- Download Code to Board



Arduino Code (Hello World)

Can define constants just like in C/C++

```
/* constants */
#define BLINK_DELAY    500    // number of milliseconds between LED toggles

/* pin definitions */
#define LED    13    // LED is on pin 13

/* initialization code */
void setup() {
    pinMode(LED, OUTPUT);    // set LED pin as an output
}

/* mainloop - runs forever */
void loop() {
    digitalWrite(LED, HIGH);    // turn LED on
    delay(BLINK_DELAY);    // wait before turning it off
    digitalWrite(LED, LOW);    // turn LED off
    delay(BLINK_DELAY);    // wait before turning it back on
    // now return to the top of the loop
}
```

Arduino Code (Hello World)

```
/* constants */
#define BLINK_DELAY    500    // number of milliseconds between LED toggles

/* pin definitions */
#define LED    13    // LED is on pin 13

/* initialization code */
void setup() {
    pinMode(LED, OUTPUT);    // set LED pin as an output
}

/* mainloop - runs forever */
void loop() {
    digitalWrite(LED, HIGH);    // turn LED on
    delay(BLINK_DELAY);    // wait before turning it off
    digitalWrite(LED, LOW);    // turn LED off
    delay(BLINK_DELAY);    // wait before turning it back on
    // now return to the top of the loop
}
```

void setup() – code that runs once at startup

Arduino Code (Hello World)

```
/* constants */
#define BLINK_DELAY    500    // number of milliseconds between LED toggles

/* pin definitions */
#define LED    13    // LED is on pin 13

/* initialization code */
void setup() {
    pinMode(LED, OUTPUT);    // set LED pin as an output
}
```

void loop() – code that runs continuously in a loop (mainloop)

```
/* mainloop - runs forever */
void loop() {
    digitalWrite(LED, HIGH);    // turn LED on
    delay(BLINK_DELAY);    // wait before turning it off
    digitalWrite(LED, LOW);    // turn LED off
    delay(BLINK_DELAY);    // wait before turning it back on
    // now return to the top of the loop
}
```

Arduino Demos

- **Hello World**

Blinks an LED

- **Interrupts**

Switch toggles blinking LED (switch press triggers ISR)

- **PWM**

LED brightness changes continuously using PWM

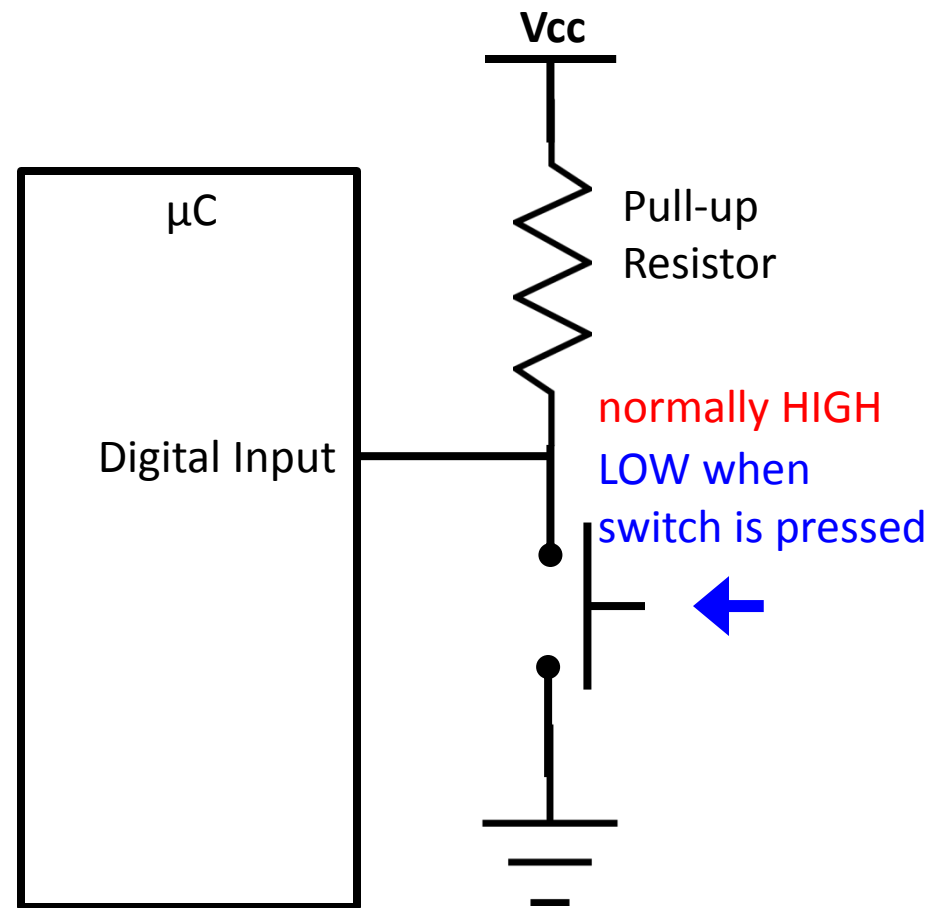
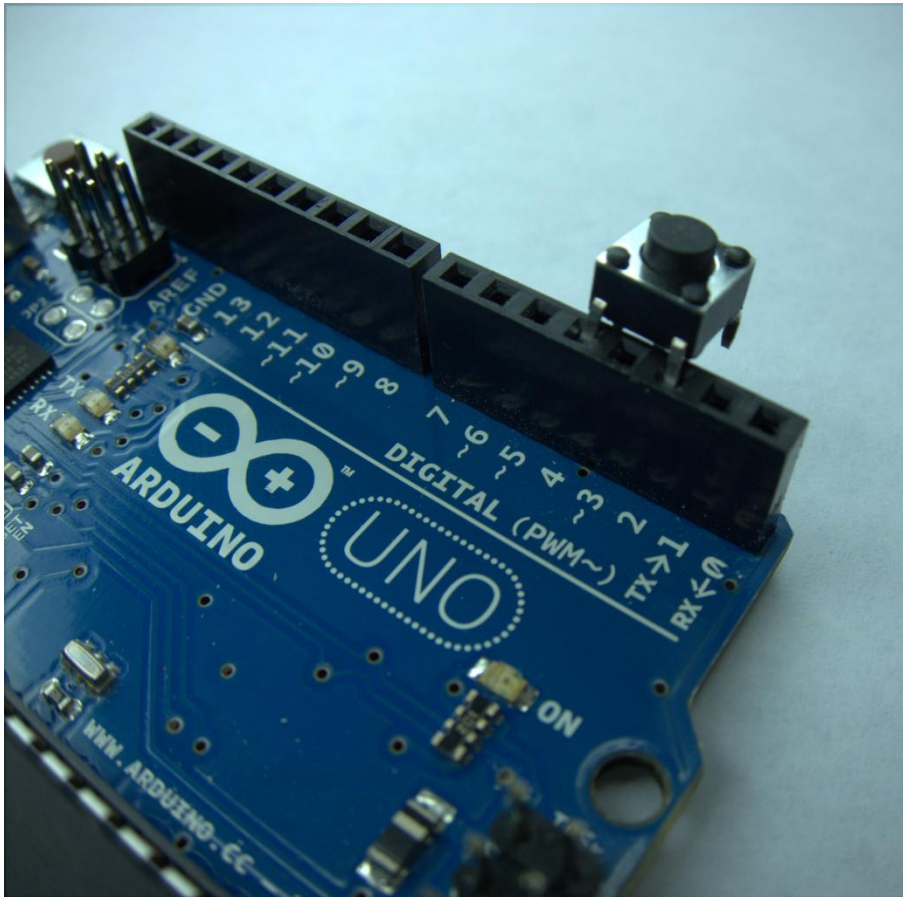
- **ADC**

Periodically samples voltage across light sensor and outputs brightness level using the LED

- Code Available at: www.gabeacohn.com/teaching/micro

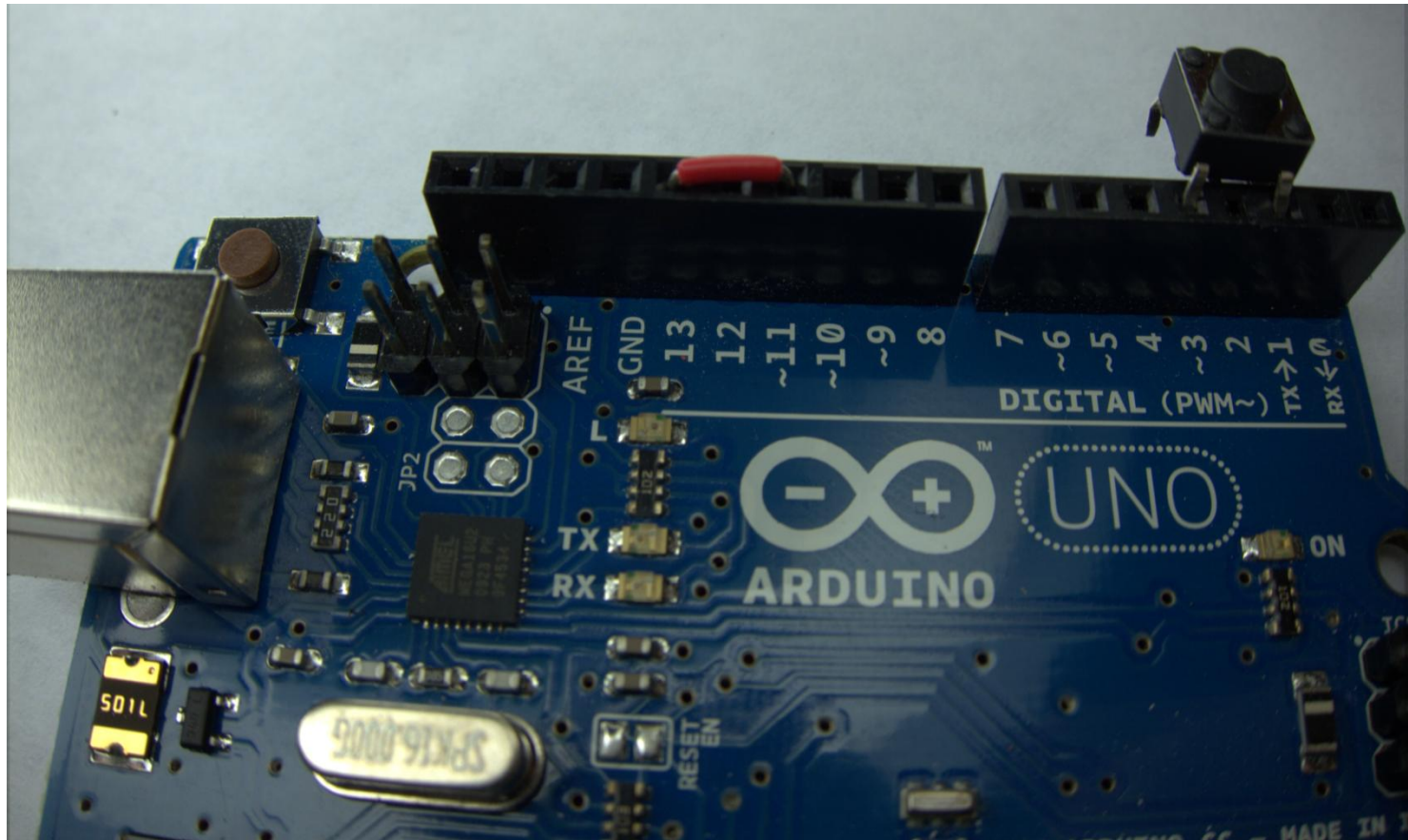
Arduino Interrupts Demo

- Need to connect switch between pins 2 and 4



Arduino PWM Demo

- Need to connect a wire between pins 11 and 13



Arduino ADC Demo

- Need to connect photo-resistor between pin A0 and GND

