Intro to Arduino

“Strong Friend”

Hi, I’m Sean

Demo Features

- Digital Output
- Digital Input
- Serial Communication

What is Arduino?

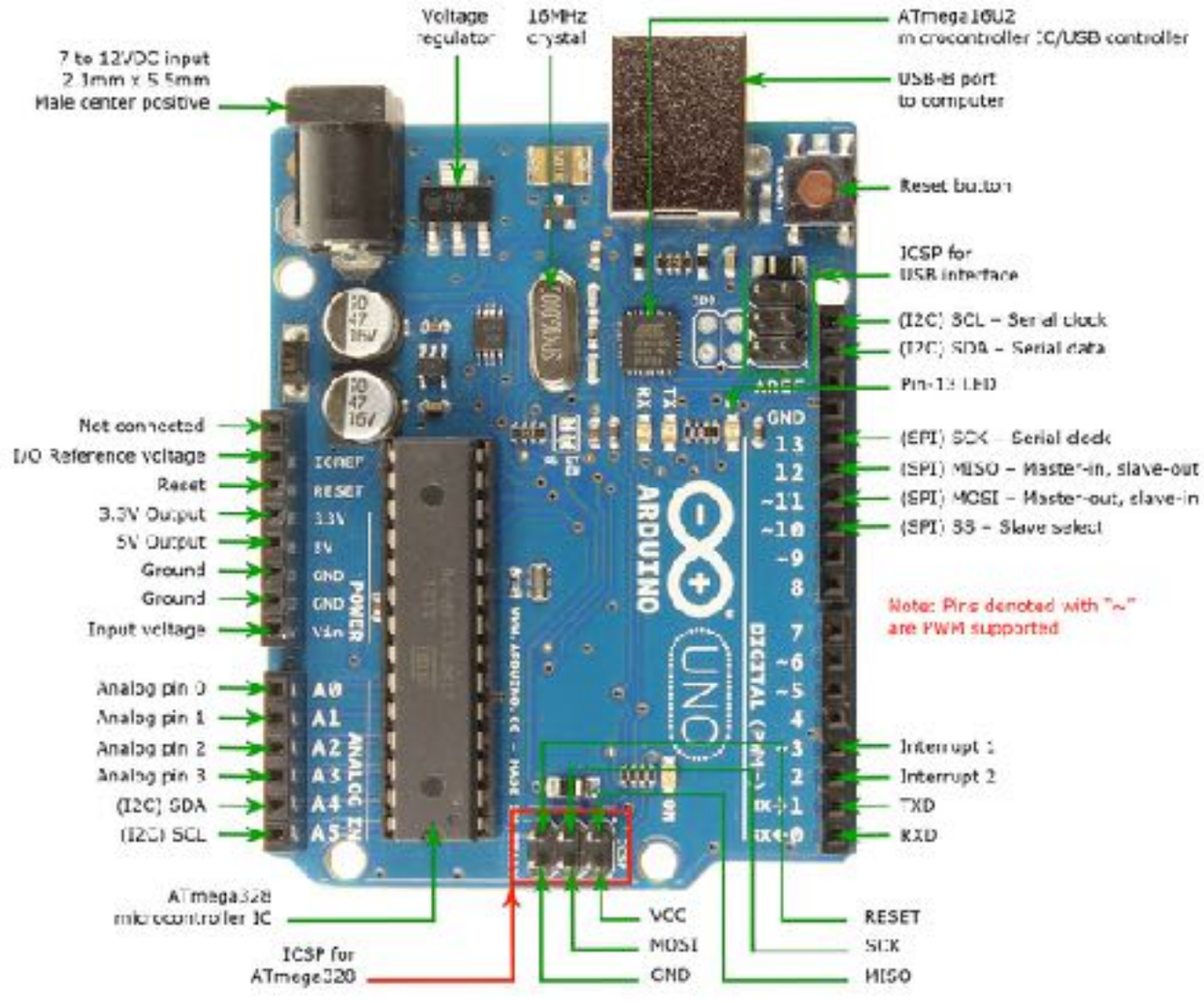
- Arduino Company
  - Arduino Hardware
  - Arduino Software IDE
  - Arduino Library
- OPEN SOURCE!

Arduino Uno

- Microcontroller Board
- Based around the ATMega328
- Power Supply
- Programming Interface
- Support Hardware
- I/O Pins Easily Accessible

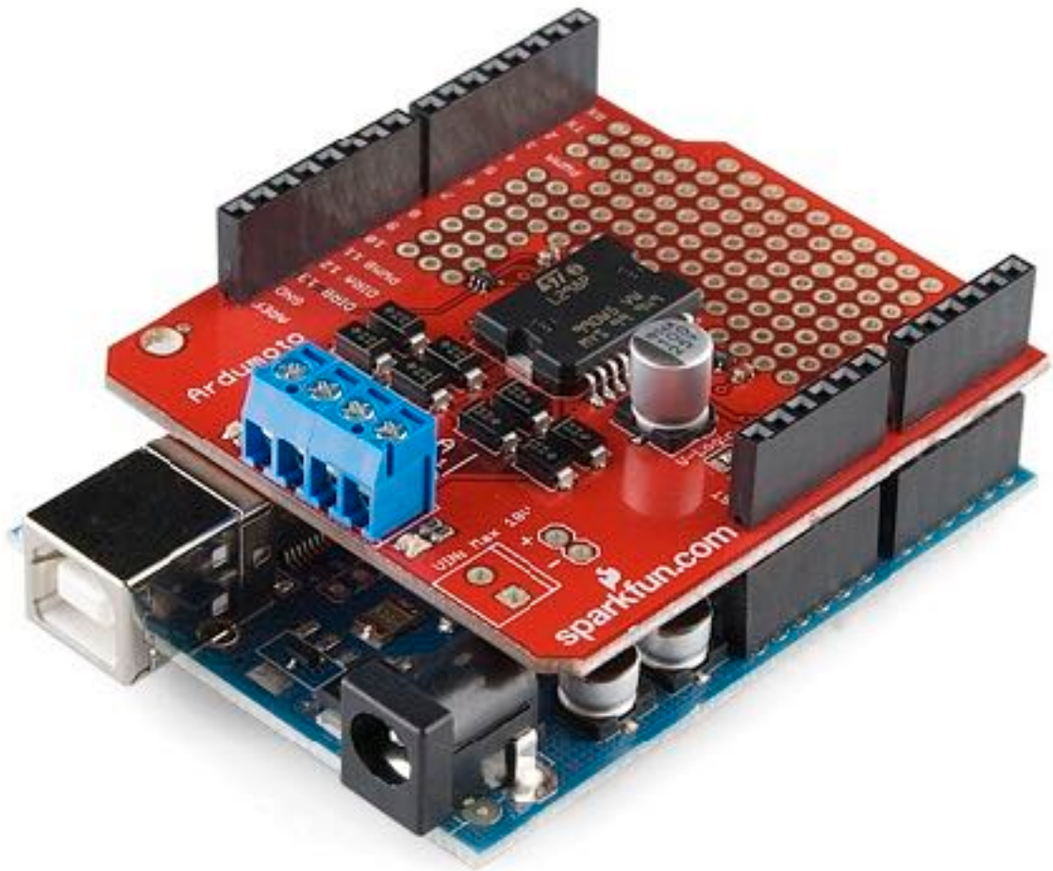
Arduino Uno

- 14 Digital I/O Pins
- 6 Analog Input Pins
- 6 PWM Output Pins
- Operates at 5v
- Runs at 16MHz
- USB Connection for power, serial communication and programming.



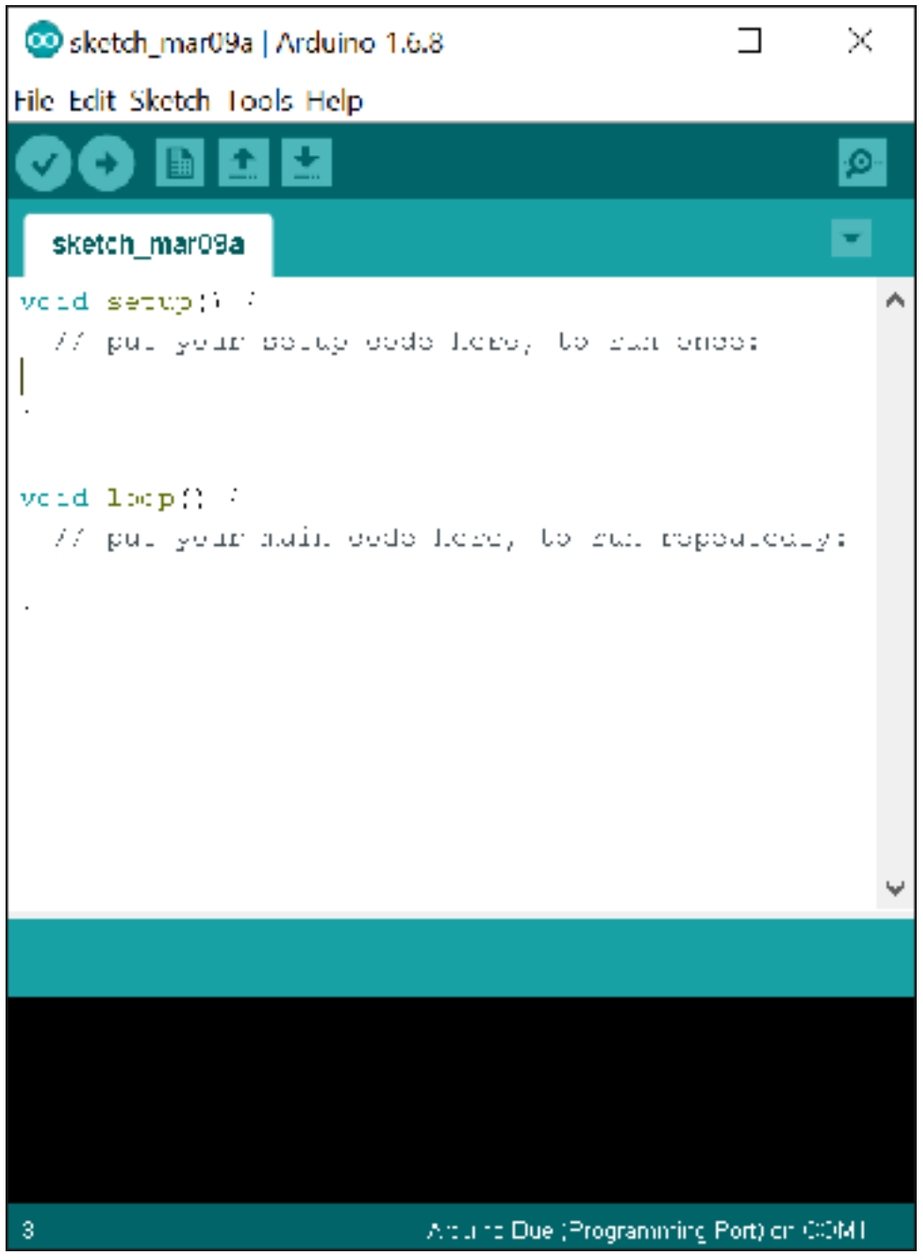
Arduino Shields

- Adds Functionality Simply
- Examples:
  - Motor Shield
  - Ethernet Shield
  - Wifi Shield
  - Bluetooth Shield
  - NFC Shield
  - Relay Shield



Arduino IDE

- Programs are “Sketches”
- Simple Interface to Write Code
- One Click Access:
  - Compile Code
  - Program Board
  - Monitor Serial Console
- Easy to Add Board Support
- Easy to Add Libraries



http://arduino.cc


AND NOW FOR SOMETHING
COMPLETELY DIFFERENT

C++

Comments

- Comments in Code
  - // comments out a single line
  - /* */ comments out multiple lines
- Commented lines are ignored

```
// Ignore me

/*
   This is not the code
   you're looking for.
*/
```

Variables and Functions

- Variables
  - Point to a piece of data in memory
  - Must be declared and given a data type
  - Assign a new value using =

```
int myVar;
myVar = 5;

int sum = myVar + myVar;
// sum = 10
```

Variables and Functions

- Functions
  - Point to a block of code
  - May accept input and/or provide output
  - Defined and Invoked

```
int doMath(int num1, int num2){
    return num1 + num2;
}

int sum = doMath(5,3);
// sum = 8
```

Conditionals and Loops

- Conditionals
  - Make a decision whether to run a block of code.

```
if( a == b ){
   // do something
}else{
   // do another thing
}
```

Conditionals and Loops

- Loop
  - Runs a block of code over and over and over…
  - Iterator , condition , increment

```
for( int i = 0 ; i < 10 ; i++ ){
   // do something
}
```

Data Types

- Strings

```
String myVar;
myVar = “Hello World”;
```

- Numbers: Integers and Decimals

```
int myInt = 5;
float myDecimal = 3.5;
```

- Void

```
void myFunction(){
}
```

Core Arduino Functions

- Setup

```
void setup(){
   // do stuff here
}
```

- Loop

```
void loop(){
   // do stuff here
}
```

Hello, Arduino

- Pin Mode

```
pinMode(13,OUTPUT); // or INPUT or INPUT_PULLUP
```

- Digital Write

```
digitalWrite(13,HIGH); // or LOW
```

- Delay

```
delay(1000); // 1000ms = 1 second
```

DIGITAL OUTPUT

DEMO

Digital Input

- Pin Mode

```
pinMode(8,INPUT_PULLUP);
```

- Digital Read

```
digitalRead(8); // returns HIGH or LOW (1 or 0)
```

DIGITAL INPUT

DEMO

Serial Communication

- Communicates over USB
- Uses Digital Pins 0 and 1
- Master & Slave must agree on speed.
  - For us, 115200 is fine

Serial Comms

- Initialize The Connection

```
Serial.begin(115200);
```

- Output to Computer

```
Serial.println(“Hello World”);
Serial.println(5);
```

SERIAL DEMO

Synchronous Vs. Asynchronous

- Blocking vs. Non-blocking
- delay() is evil*
- Makes a project much seem faster / more responsive
- Use millis() to unblock your loop.

NON-BLOCKING

BLINK DEMO

Demo Code and Slides:

https://github.com/fsdemo/arduino1704

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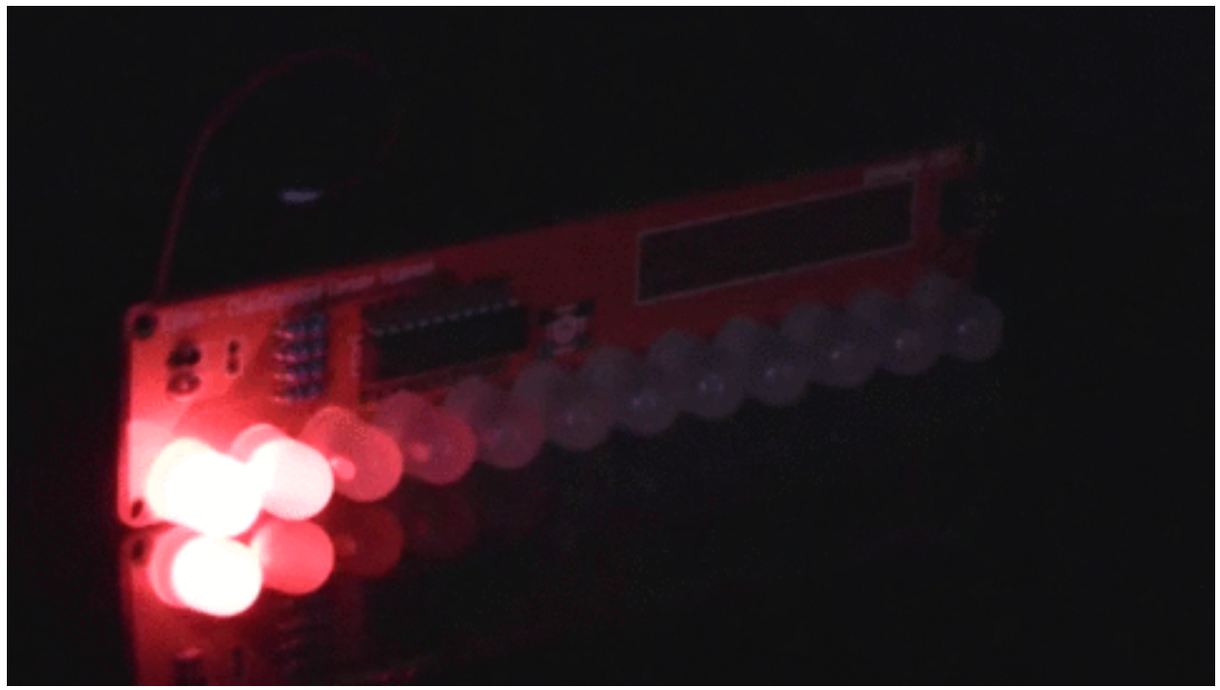
Q & A

Coding Challenge



- Sweep between 5 or more LEDs
- Press a button to stop on a specific LED.
- Must use non-blocking code.