HARDWARE PROTOTYPING WITH ARDUINO

And an introduction to Raspberry Pi
WHAT’S ARDUINO?

- Rapid prototyping tool
- Based on a microcontroller board and development environment
- The microcontroller uses inputs, performs calculations and gives an output
- The development environment enables the user to tell the microcontroller what to do with the input using software
- USB Programmable
- Multi-platform - Windows, Mac OS X, Linux
- Inexpensive - ~$35
WHAT CAN I DO WITH AN ARDUINO BOARD?

• Depends…..

• What components do you have?

• What do you want to do?

• [https://www.youtube.com/watch?v=nz_tgDD8FNg](https://www.youtube.com/watch?v=nz_tgDD8FNg)
STARTER KIT COMPONENTS

- The Arduino Development Board
- Breadboard
- Capacitors
- DC motor
- Diode
- LEDs
- LCD
- Piezo
- Light dependent resistor
- Push buttons
- Resistors
- Temperature sensor
- USB cable
THE BREADBOARD
THE ARDUINO BOARD

1. USB
2. Barrel Jack
3. Ground
4. 5V supply
5. 3.3V supply
6. Analog input (Eg. temp sensor)
7. Digital input/output
8. Pulse Width Modulation
9. Analog Reference
10. Reset Button
11. Power LED
12. TX/RX LED
13. ATmega microcontroller
14. Voltage Regulator
15. Pin 13 LED

HTTPS://LEARN.SPARKFUN.COM/TUTORIALS/WHAT-IS-AN-ARDUINO
LET’S GET IT STARTED

• Connect your Arduino to the computer with the USB cable

• Make sure you see the green “ON” LED

• Open the Arduino application

• TOOLS > BOARD > ARDUINO UNO

• TOOLS > SERIAL PORT > /dev/tty.usbmodemfd1311
Most Arduinos have an on-board LED you can control. On the Uno and Leonardo, it is attached to digital pin 13. If you're unsure what pin the on-board LED is connected to on your Arduino model, check the documentation at [http://arduino.cc](http://arduino.cc)

This example code is in the public domain.

modified 8 May 2014
by Scott Fitzgerald
*/

// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin 13 as an output.
  pinMode(13, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(13, HIGH);  // turn the LED on (HIGH is the voltage level)
  delay(1000);  // wait for a second
  digitalWrite(13, LOW);  // turn the LED off by making the voltage LOW
  delay(1000);  // wait for a second
We will just use an example program to blink the onboard LED.

The LED is connected to pin 13.

FILE > EXAMPLES > 01.BASICS > BLINK

Click to verify your code.

Click to upload to the board.
FIRST EXPERIMENT
HELLO WORLD :-) 

• Repeat the same experiment with an LED on the breadboard

• You need to use a 220 ohm resistor (RED, RED, BROWN, X)

• The LED is connected to pin 13

• Click ✔️ to verify your code

• Click ➔ to upload to the board
THE SWITCH

• Repeat the same experiment with a switch between the positive terminal and the LED
FADE IN FADE OUT

- TOOLS > EXAMPLES > 01.BASICS > FADE

- Notice that a variable is used to represent pin 9

- Change the digital pin connection to 9

- Click ✅ to verify your code

- Click ➡️ to upload to the board
TEMPERATURE SENSOR

• TOOLS > EXAMPLES > 10.0StarterKit > LoveOMeter

• Circuit on page 44 - Arduino Project Book

• If touching the temperature sensor doesn't give you any output, lower the base temperature
BREAK-OUT BOARDS

https://www.sparkfun.com
RASPBERRY PI

- "Hybrid" between an embedded system and desktop computer
- 700Mhz, ARM11 Core
- 512MB RAM
- HDMI
- USB port
- Ethernet port
- SD Card slot (Upto 32GB)
THE RASPBERRY PI DESKTOP
ARDUINO VS RASPBERRY PI
THANK YOU