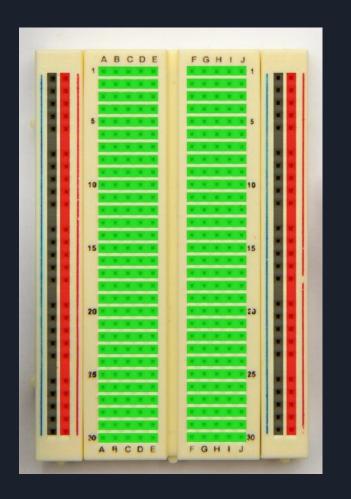
IOT Lab Assignment 2

GPIO - Button and leds

What is GPIO

- GPIO is a signal pin on an integrated circuit or board that can be used to perform digital input or output functions. By design it has no predefined purpose and can be used by the hardware or software developer to perform the functions they choose. Typical applications include controlling LEDs, reading switches and controlling various types of sensors.
- If you are new to hardware, a few words on basic safety are in order. Since the voltages on a Raspberry Pi and similar boards are low (5 volts or less), the risk of electric shock is minimal. The most likely accident is to inadvertently damage your Raspberry Pi or other device. Connecting a GPIO or other pin to the wrong voltage can easily damage the board and render it unusable. Also be aware that many devices, including the Raspberry Pi, use 3.3 volt logic levels and can be damaged if connected to 5 volts, which is used by many other devices like Arduino and is present on the GPIO connector

Bread Board

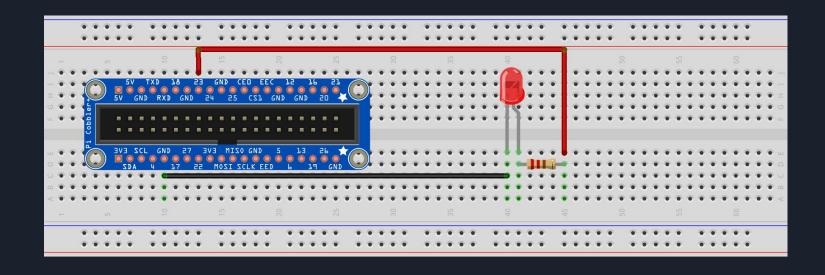


Raspberry PI pinout





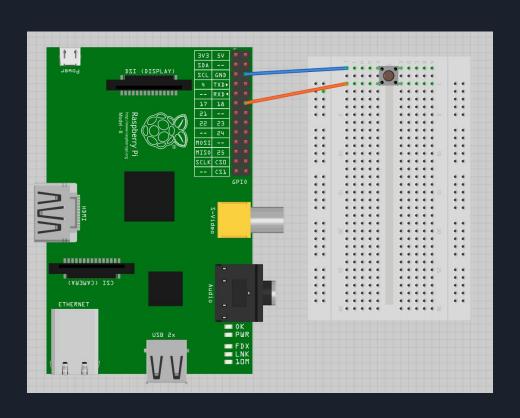
LED Wiring



Basic pi gpio programing examples

output.py

Button Wiring

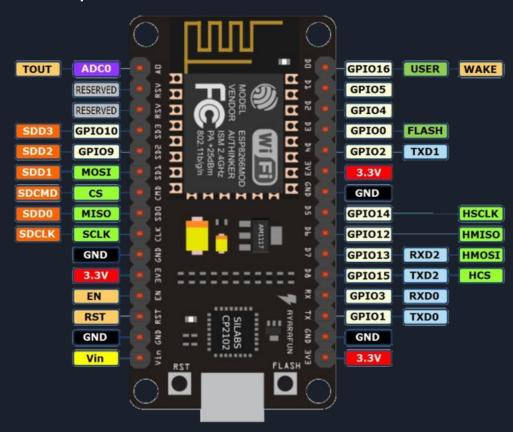


endlessbutton.py

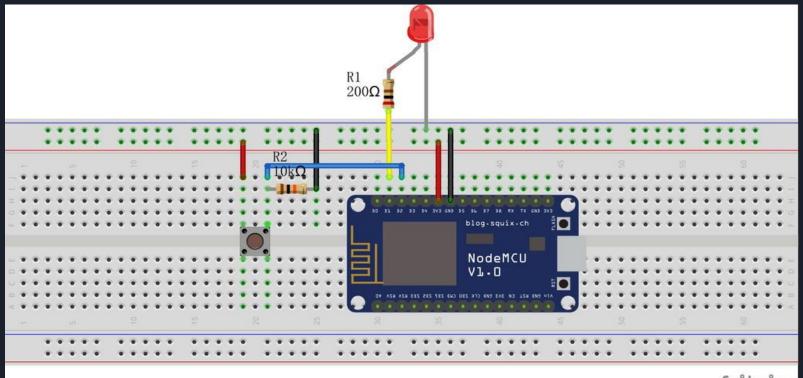
buttonprint.py

bouncebutton.py

Esp8266 pinout



Button and LED wiring to the esp8266



Basic Arduino Programing

Setup:

- Function runs at boot once then falls into loop function
- Good place to setup gpio pins, wifi settings, initialize variables

Loop:

- Function runs repeatedly
- Do the main work of your program here

General arduino programming guide <u>here</u>

```
sketch_jan28a | Arduino 1.8.6
File Edit Sketch Tools Help
   sketch jan28a
void setup() {
   // put your setup code here, to run once:
}
void loop() {
   // put your main code here, to run repeatedly:
F9), v2 Lower Memory, Disabled, None, Only Sketch, 115200 on /dev/ttyUSB1
```

Serial printing

Serial.begin(9600);

• Setup serial port

Serial.println("hey");

Print statement just like C

```
test | Arduino 1.8.6
File Edit Sketch Tools Help
void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600); // opens serial port
void loop() {
 // put your main code here, to run repeatedly:
Serial.println("hey"); // print something
Sketch uses 249528 bytes (23%) of program storage space. Maximum is 1044464 bytes.
Global variables use 27636 bytes (33%) of dynamic memory, leaving 54284 bytes for local variables. Maxi
                                                /dev/ttyUSB0
                                                                                                        Send
✓ Autoscroll  Show timestamp
                                                                                              ▼ Clear output
                                                             Newline
                                                                               9600 baud
```

print

GPIO (General Purpose Input Output)

pinMode(LED, OUTPUT);

Setup pin as output

digitalWrite(LED, HIGH);

- Set pin to high (on)
- Can also be set to LOW (off)

```
test | Arduino 1.8.6
File Edit Sketch Tools Help
  test §
#define LED 4 //define led pin var
void setup() {
  // put your setup code here, to run once:
  pinMode(LED, OUTPUT); // setup pin for output
void loop() {
  // put your main code here, to run repeatedly:
  delay(1000); // delay one second
  digitalWrite(LED, HIGH); //turn led on
Done uploading
```

MISPIFFS), v2 Lower Memory, Disabled, None, Only Sketch, 115200 on /dev/ttyUSB0

ledon

GPIO (General Purpose Input Output)

pinMode(BUTTON, INPUT);

Set pin as input

digitalRead(BUTTON);

- Read the value of the pin
- Will equal HIGH or LOW (0/1)

```
test | Arduino 1.8.6
                                                              ×
File Edit Sketch Tools Help
  test
#define BUTTON 5 //define led pin var
void setup() {
  // put your setup code here, to run once:
  Serial begin (9600):
  pinMode(BUTTON, INPUT); // setup pin for input
void loop() {
  // put your main code here, to run repeatedly:
 Serial.println(digitalRead(BUTTON));
Done uploading.
```

Global variables use 28060 bytes (34%) of dynamic memory, l Uploading 255552 bytes from /tmp/arduino_build_888763/test

3M SPIFFS), v2 Lower Memory, Disabled, None, Only Sketch, 115200 on /dev/ttyUSB0

butonstate

buttonbounce

Assignment

- Wire up the button and led for the pi and arduino
- Create a program on each device that will toggle the state of the led when the button is clicked (each click changes the current state of the led)

Take a video of both devices functioning

Email me the video and your code before the start of next class for credit

dpivonka@redhat.com