STEAM CLOWN™ PRODUCTIONS

ARDUINO STEAM ACADEMY

Art without Engineering is dreaming. Engineering without Art is calculating.

- Steven K. Roberts

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SENSORS & OTHER I/O

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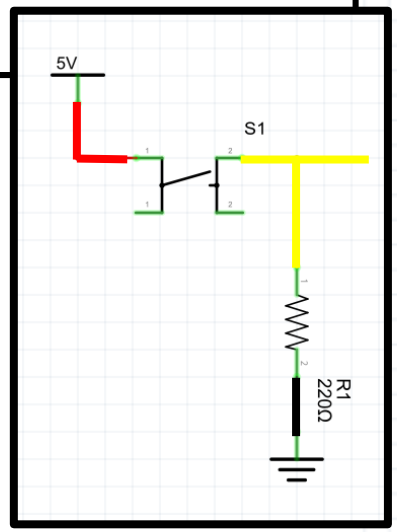
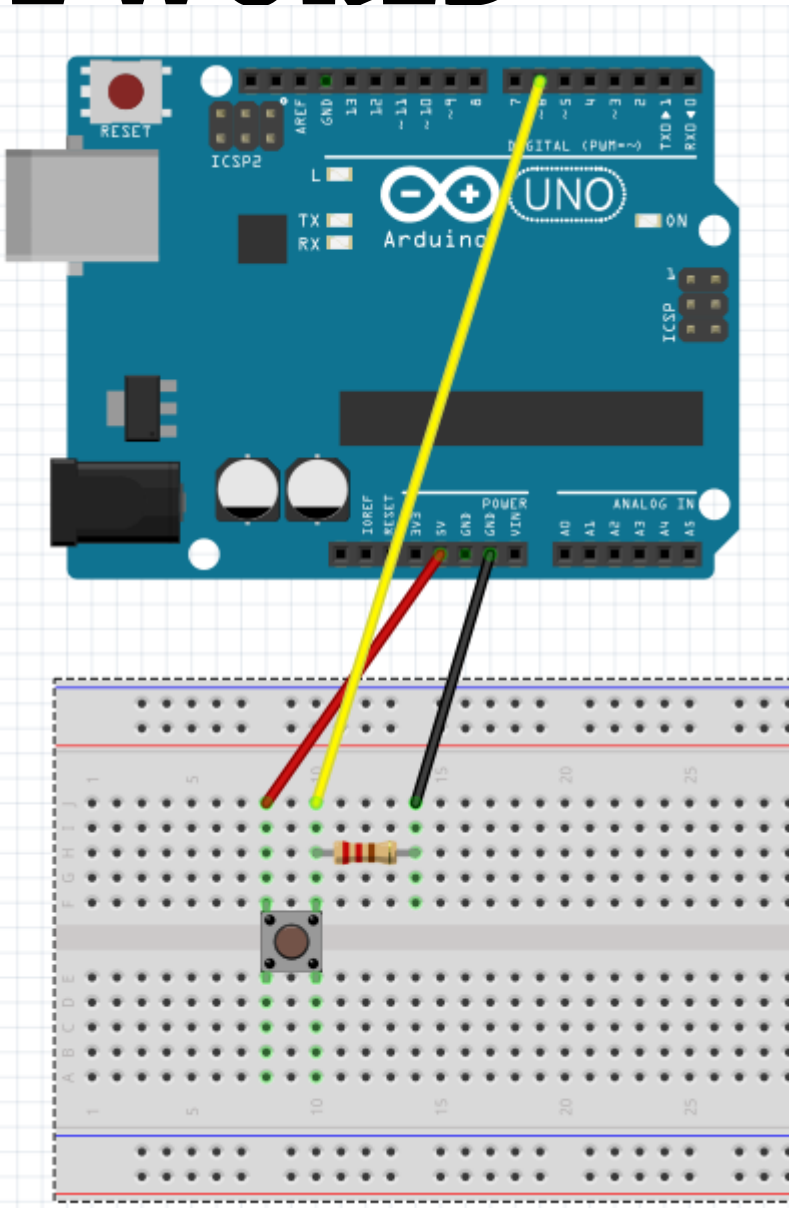
SEEING AND HEARING THE WORLD

```
const int arduinoBoardLED = 13;         // LED on pin 13
const int pushButton = 6;       // input pin for Push Button sensor
int buttonVal = 0;     // variable to store the read value

void setup()
{
pinMode(arduinoBoardLED, OUTPUT);  // set pin 13 as output
pinMode(pushButton, INPUT);      // set pin 6 as input
}

void loop()
{
buttonVal = digitalRead(pushButton);  // read the input pin
digitalWrite(arduinoBoardLED, buttonVal);  // sets the LED to button's
value
}
```





PullDown?

When the button is “open” the Yellow wire is “pulled” to a “LOW” potential

Imagine the button is a valve, and the wire is a water hoses

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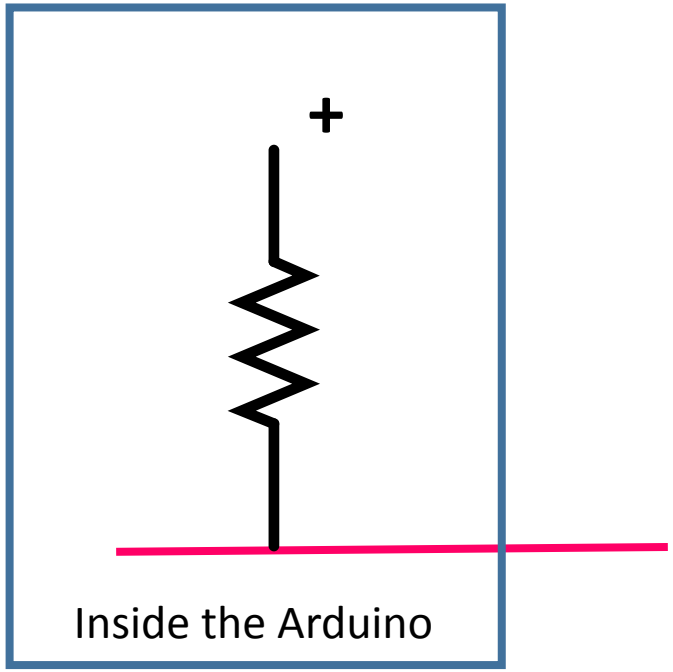
PULLUP

```
pinMode(buttonPin, INPUT);
digitalWrite(buttonPin, HIGH);  // set pullup on analog pin 0
```



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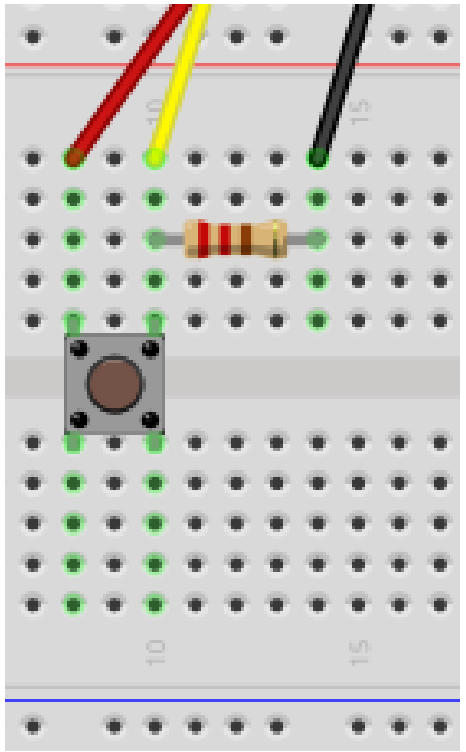
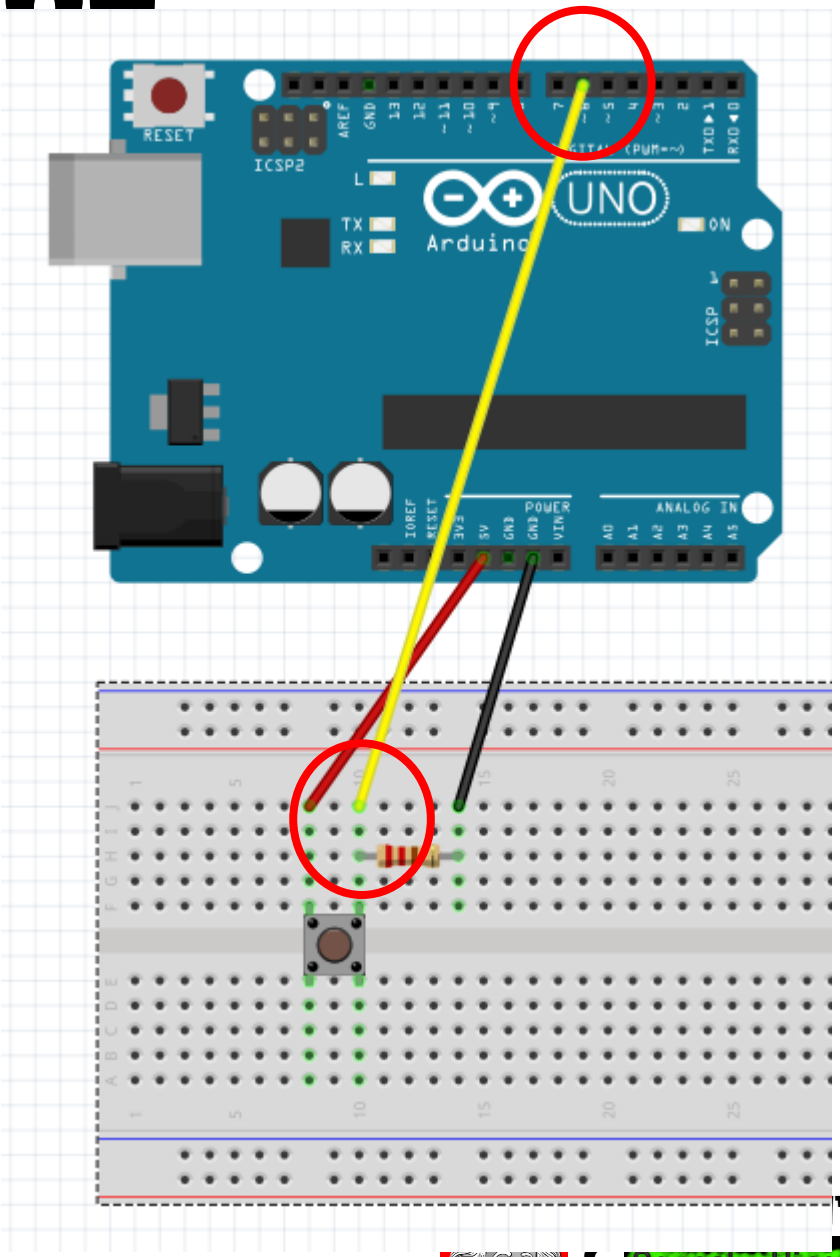
CONNECTING THE PUSH BUTTON

- Connect the Red wire to the 5V pin on the Arduino
- Connect the Black wire to the GND pin on the Arduino
- Connect the Yellow wire to the Digital pin 6 on the Arduino





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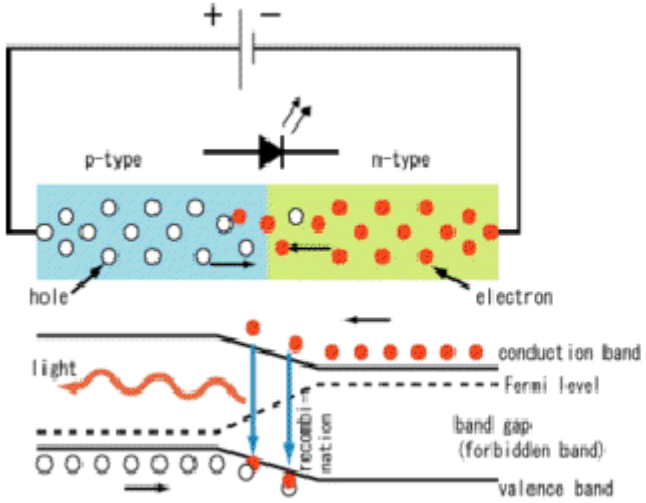
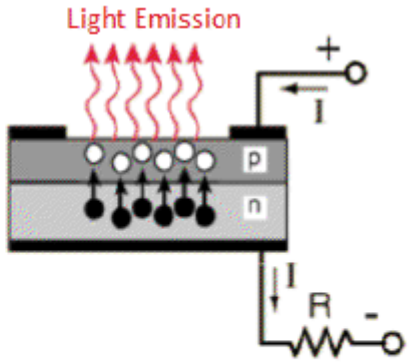
WHAT IS AN LED?

- Light-emitting diodes (LED) are semiconductors. As electrons pass through this type of semiconductor, it turns into light.
  - LEDs are efficient in turning energy into light.
  - Don't have a filament that will burn out, and they don't get especially hot
  - T
    s





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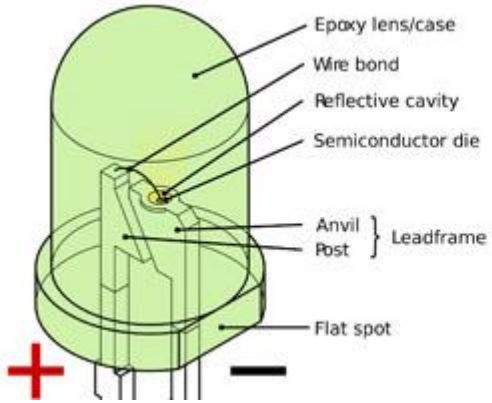

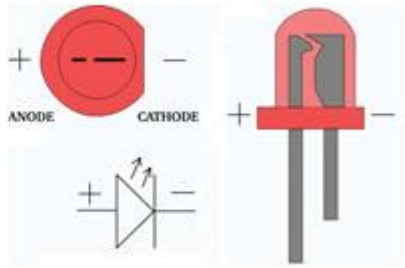

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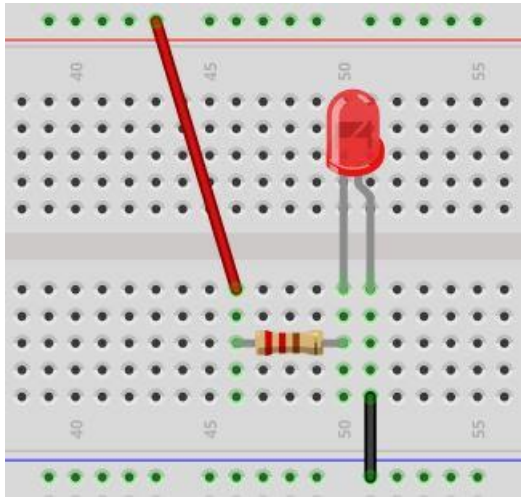
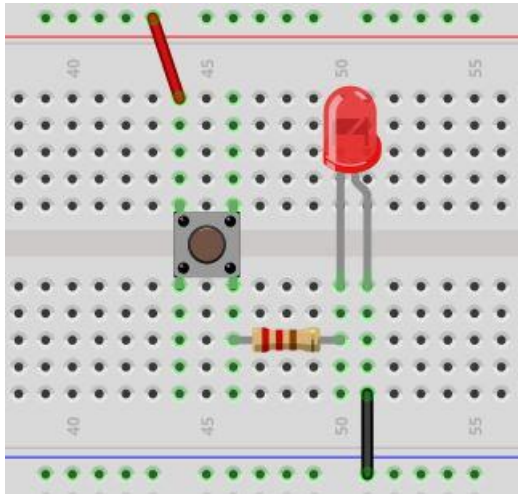
BREAD BOARDING AN LED CIRCUIT





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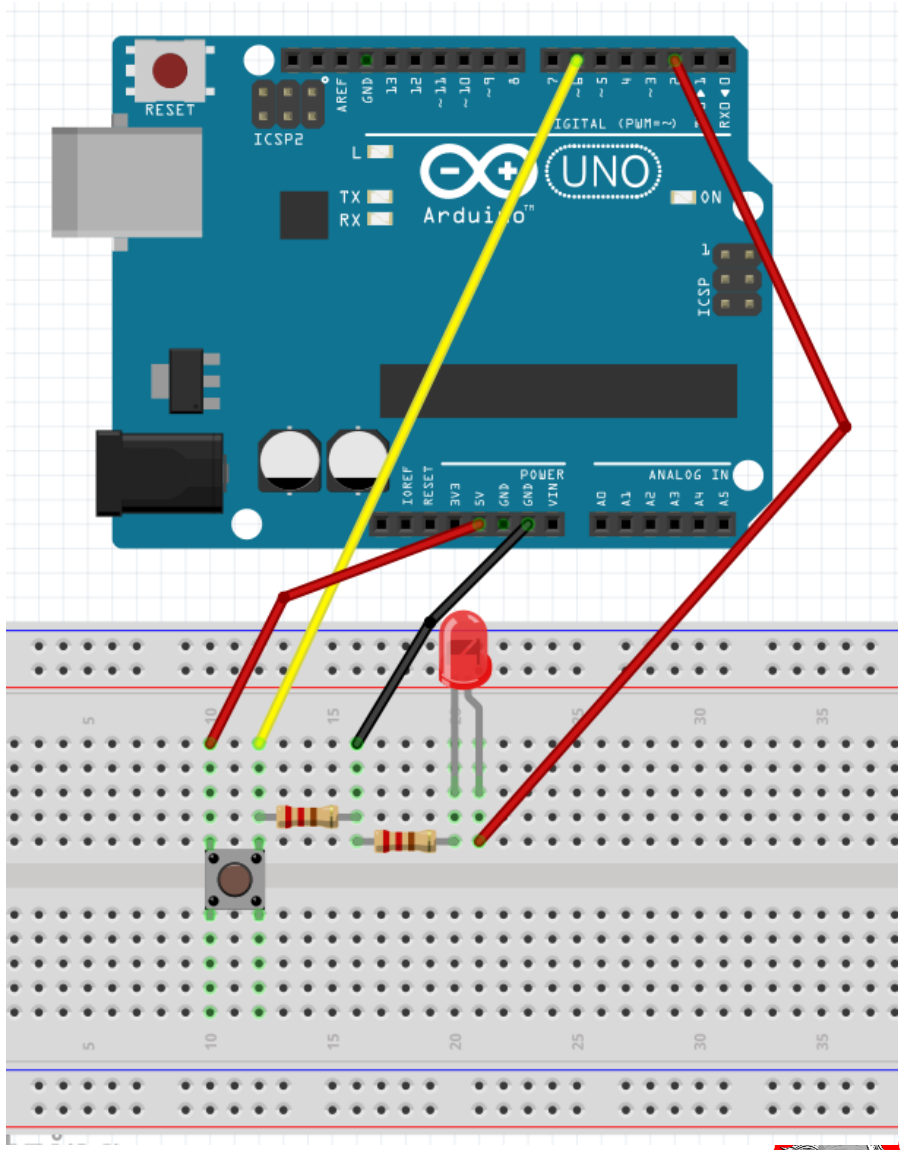
OUTPUT HOW?

- We already see how to connect to the Arduino Board LED

```
const int brdLED = 13;  // LED on pin 13

Setup()
{
pinMode(brdLED, OUTPUT); // LED output
}
```

- Edit the Sketch blink to have an output on pin 2



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OK, YOU HAVE A BUNCH OF LEDS AND BUTTONS…

- Connect a few more buttons
- Connect a few more LEDs
- Make the LEDs Blink at different rates
- Make the LEDs Blink one after the other
- Make them Blink at the same time, but different rates…
- Come up with something different…

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REFERENCE SLIDES

Reference

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ARDUINO RUBE GOLDBERG

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YOU TUBE LINKS

- Arduino Reuben Goldberg (2:34)
- Rube GoldBerg Project (3:02)
- Bill Nye The Science Guy & Simple Machines & Full Episode (22:32)

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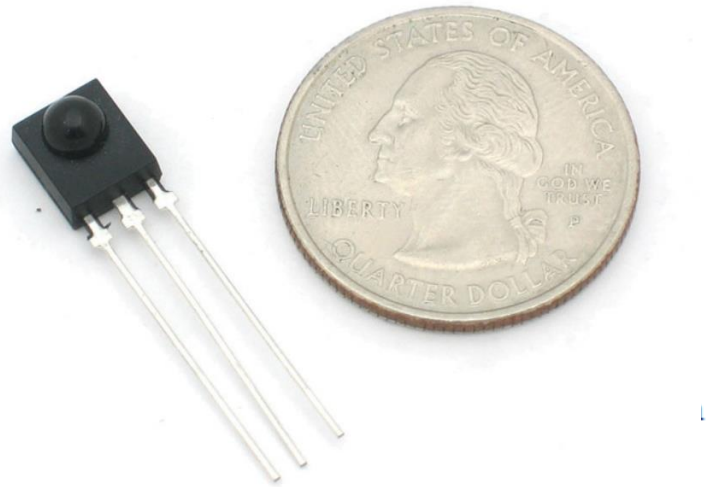
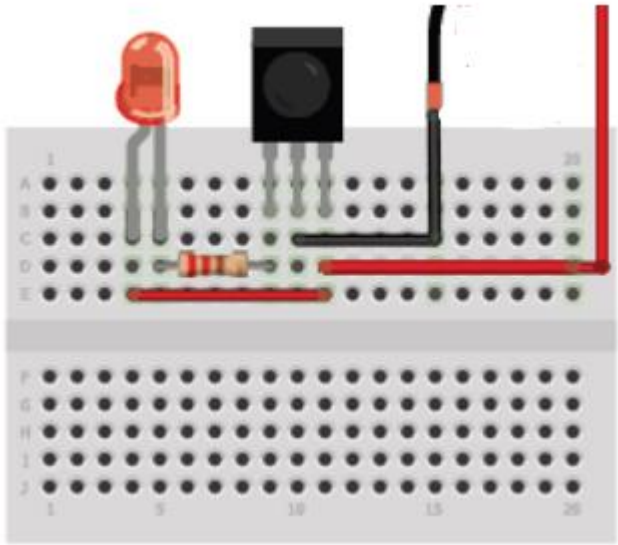
IR SENSOR (TSOP38238)

https://learn.adafruit.com/ir-sensor

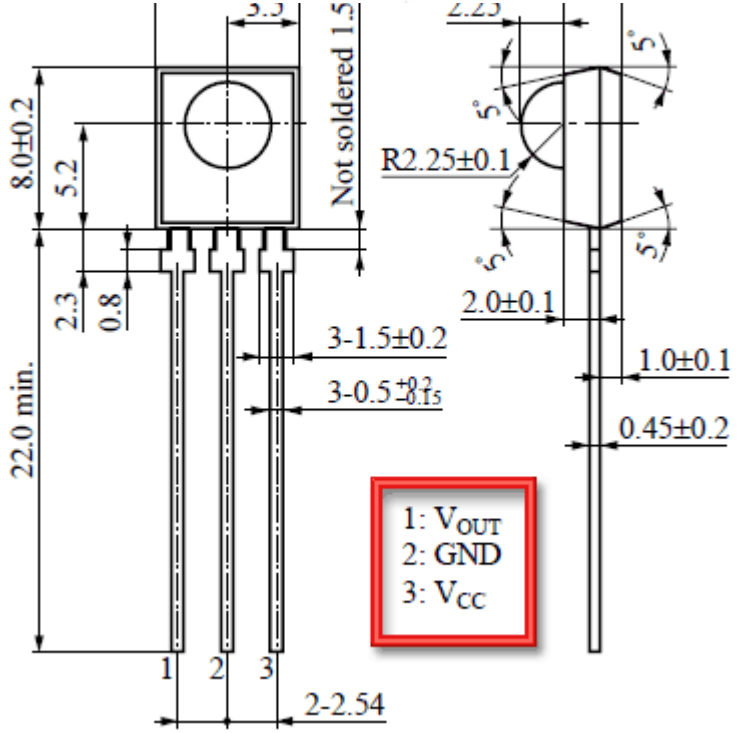


IR detectors are little microchips with a photocell that are tuned to listen to infrared light. They are almost always used for remote control detection - every TV and DVD player has one of these in the front to listen for the IR signal from the clicker. Inside the remote control is a matching IR LED, which emits IR pulses to tell the TV to turn on, off or change channels. IR light is not visible to the human eye, which means it takes a little more work to test a setup.

When the detector sees IR signal, it will pull the output low, turning on the LED - since the LED is red its much easier for us to see than IR!



Now grab any remote control like for a TV, DVD, computer, etc. and point it at the detector while pressing some buttons, you should see the LED blink a couple times whenever the remote is pressed



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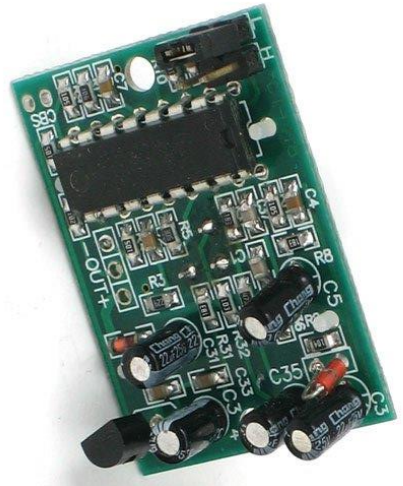
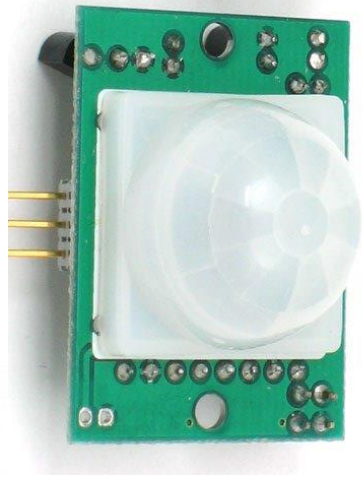
PIR SENSOR

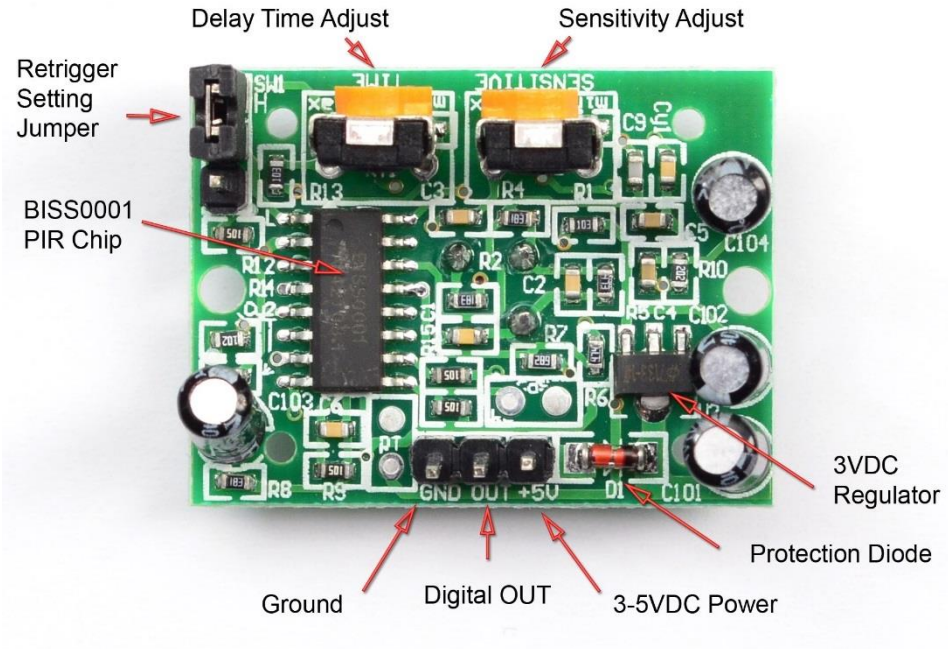
https://learn.adafruit.com/pir-passive-infrared-proximity-motion-sensor

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.





When the detector sees PIR signal, it will pull the output low,



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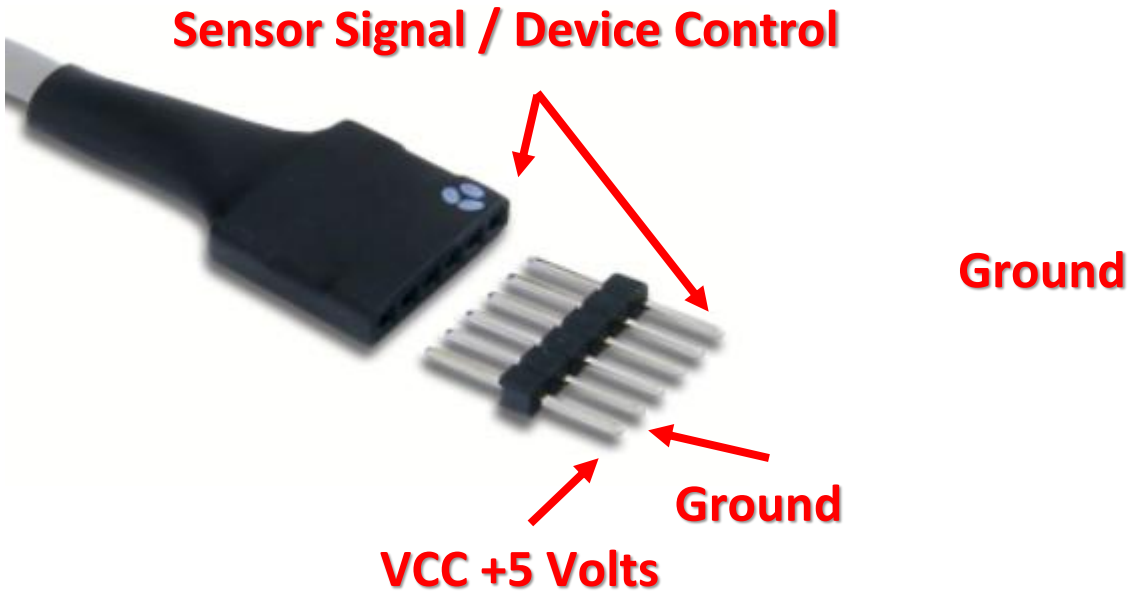
TYPICAL SENSOR SIGNAL / DEVICE CONTROL



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APPENDIX

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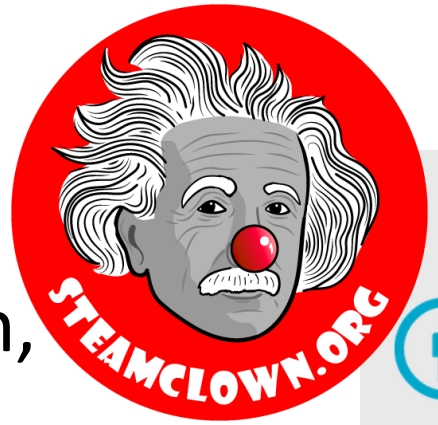

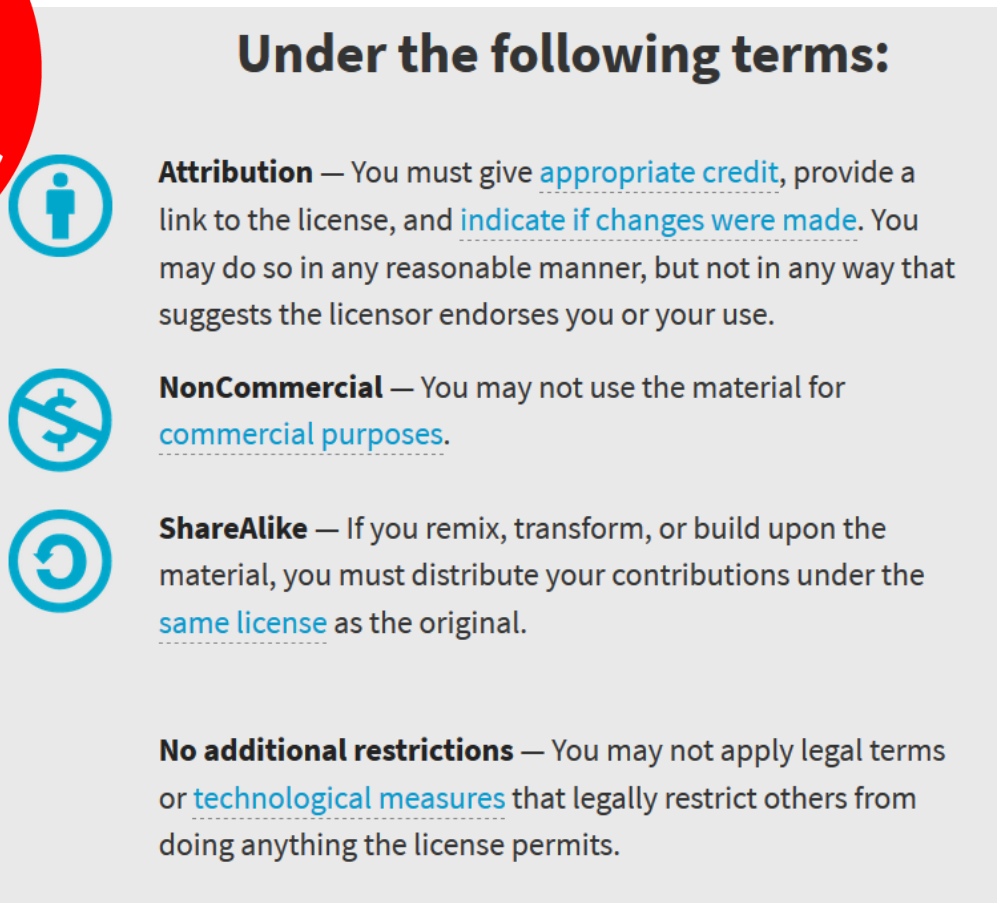

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Appendix B: Attribution for Sources Used

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REFERENCE SLIDES

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Is it possible to get help?

- Git Hub – See Steam Clown's Files
- http://www.arduino.cc/ ← Official Arduino Site
- http://www.arduinobook.com/
- Google Is Your Friend…
  - Google Arduino Getting Started
  - Google Arduino Tutorials
  - Google Arduino Sketches
- PDF books
  - Arduino Programmers Notebook
  - Arduino in a Nutshell
  - Introduction to Arduino - A piece of cake!
- YouTube
  - Arduino: Your First Arduino Sketch
  - Tutorial 01 for Arduino: Getting Acquainted with Arduino

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