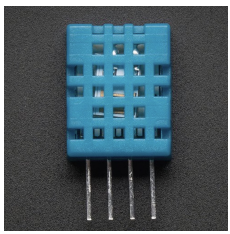
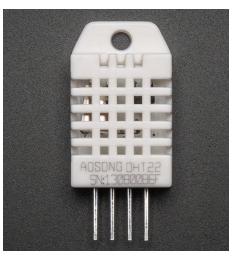
Humidity & Temperature Sensor

https://learn.adafruit.com/dht

go to the left bar of this website for usage & related documents.
This sensor is super convenient!





DHT11

- Ultra low cost
- 3 to 5V power and I/O
- 2.5mA max current use during conversion (while requesting data)
- Good for 20-80% humidity readings with 5% accuracy
- Good for 0-50°C temperature readings ±2°C accuracy
- No more than 1 Hz sampling rate (once every second)
- Body size 15.5mm x 12mm x 5.5mm
- 4 pins with 0.1" spacing

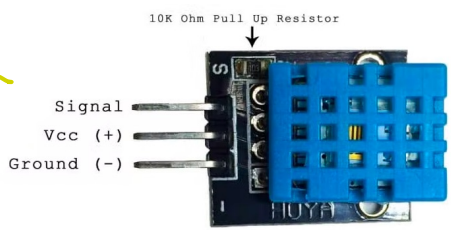
DHT22 / AM2302 **(Wired version)**

- Low cost
- 3 to 5V power and I/O
- 2.5mA max current use during conversion (while requesting data)
- Good for 0-100% humidity readings with 2-5% accuracy
- Good for -40 to 80°C temperature readings ±0.5°C accuracy
- No more than 0.5 Hz sampling rate (once every 2 seconds)
- Body size 15.1mm x 25mm x 7.7mm
- 4 pins with 0.1" spacing

Yellow line: Data out

Red line: 3.3V-5V in

Black line: GND (ground)



https://create.arduino.cc/projecthub/pibots555/how-to-connect-dht11-sensor-with-arduino-uno-f4d239

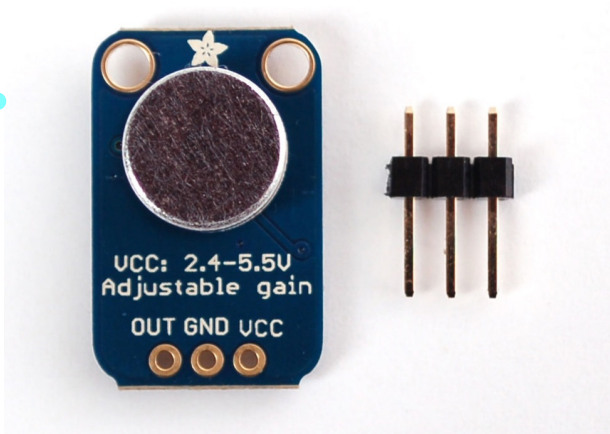
* Refer to the website for including the selective library and detailed usage.

Eletret Microphone Amplifier

https://www.adafruit.com/product/1063#description

Guess we have the same manufacturer as our humidity & temp sensor. This website does not contain too much useful info though.

Using it is simple: connect GND to ground, VCC to 2.4-5VDC. For the best performance, use the "quietest" supply available (on an Arduino, this would be the 3.3V supply). The audio waveform will come out of the OUT pin. The output will have a DC bias of VCC/2 so when it's perfectly quiet, the voltage will be a steady VCC/2 volt (it is DC coupled). If the audio equipment you're using requires AC coupled audio, place a 100uF capacitor between the output pin and the input of your device. If you're connecting to an audio amplifier that has differential inputs or includes decoupling capacitors, the 100uF cap is not required.



A sample project using this microphone to detect noise level:

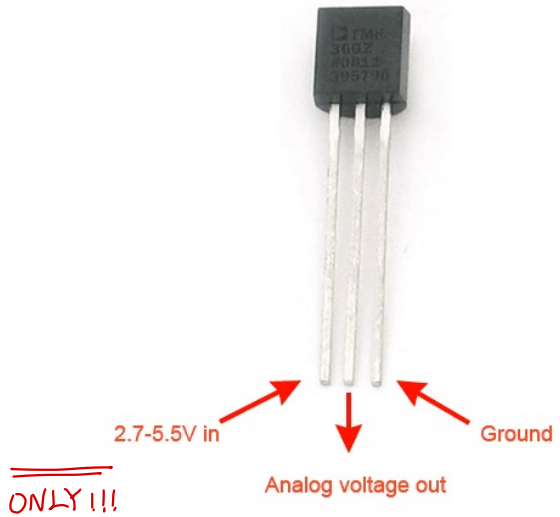
https://hester.mtholyoke.edu/idesign/SensorAmp.html

TMP36 Temperature sensor

https://learn.adafruit.com/tmp36-temperature-sensor

same old manufacturer! This webpage contains some VERY useful information.

Wide range, low power temperature sensor outputs an analog voltage that is proportional to the ambient temperature. To use, connect pin 1 (left) to power (between 2.7 and 5.5V), pin 3 (right) to ground, and pin 2 to analog in on your microcontroller. The voltage out is 0V at -50°C and 1.75V at 125°C. You can easily calculate the temperature from the voltage in millivolts: Temp °C = 100*(reading in V) - 50



ONLY !!!

Tutorial on how to read temperature from this sensor using Arduino: https://create.arduino.cc/projecthub/ingo-lohs/temperature-sensing-with-tmp36-b51ddb

* we will likely not utilize this sensor..

Light Dependent Resistor

https://create.arduino.cc/projecthub/SBR/working-with-light-dependent-resistor-ldr-1ded4f

↑ code soure

Image Source: https://sclronics.com/?product=ldr

```
const int LDR = A0;
int input_val = 0;

void setup()
{
  Serial.begin(9600);
}

void loop()
{
  input_val = analogRead(LDR);
  Serial.print("LDR Value is: ");
  Serial.println(input_val);
  delay(1000);
}
```

there is not a certain definitive answer to the values we will read from this sensor, so we will need to experiment & find our thresholds.

Traditionally resistance increases when brightness decreases. So the brightness is proportionally related to the current going through the LDR.

PIR Motion Sensor

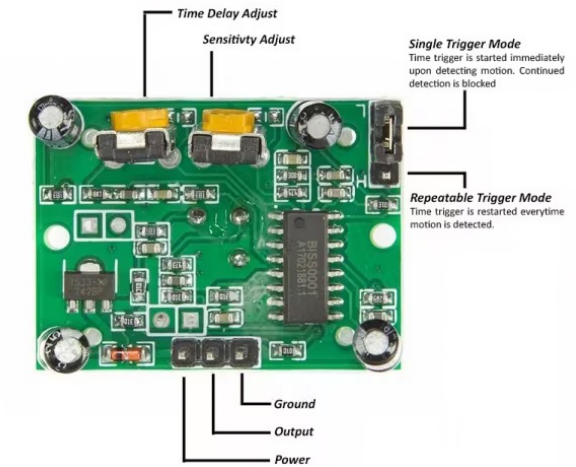
https://electropeak.com/pir-motion-sensor

Passive Infra Red sensors can detec movement of objects that radiate IR ligh (like human bodies). Therefore, using these sensors to detect human movement or occupancy in security systems is very common.

For proper calibration, there should not be any movement in front of the PIR sensor for up to 15 seconds (until pin 13 is turned off).

Source:

https://create.arduino.cc/projecthub/electropeak/pir-motion-sensor-how-to-use-pirs-w-arduino-raspberry-pi-18d7fa



It uses digitalRead(PM_number) to see if any one passed by. When it is equal to HIGH, the sensor detects activities and vice versa.

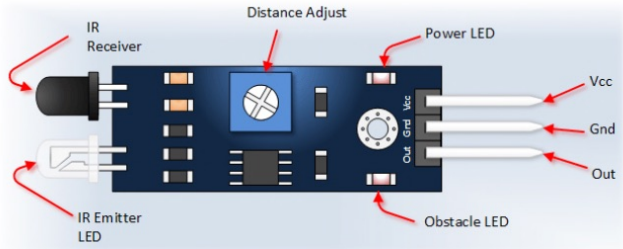
Might need to implement a few more for accurate detection of movements or population density.

Also, it is important to track frequency of human activity. See how delay(time_in_ms) can help with that.

IR OBSTACLE DETECTION MODULE

https://osoyoo.com/2018/12/21/ir-obstacle-avoidance-module/

Lots of info on manufacturer's website



Pin, Control Indicator	Description
Vcc	3.3 to 5 Vdc Supply Input
Gnd	Ground Input
Out	Output that goes low when obstacle is in range
Power LED	Illuminates when power is applied
Obstacle LED	Illuminates when obstacle is detected
Distance Adjust	Adjust detection distance. CCW decreases distance. CW increases distance.
IR Emitter	Infrared emitter LED
IR Receiver	Infrared receiver that receives signal transmitted by Infrared emitter.

can be used to see if the sensors are being blocked by objects that might disrupt its normal functionalities.

According to the website:

- threshold adjusted by a potentiometer
- uses digitalRead(pin_number)
- reads LOW when obstacle detected.

should maybe implement a delay(time_in_ms) as well to see if the obstacle is persistent.