Lesson2 - Starting your projects

Find & Sit in groups of 2-3 people

Sample projects

Automatic Trashcan

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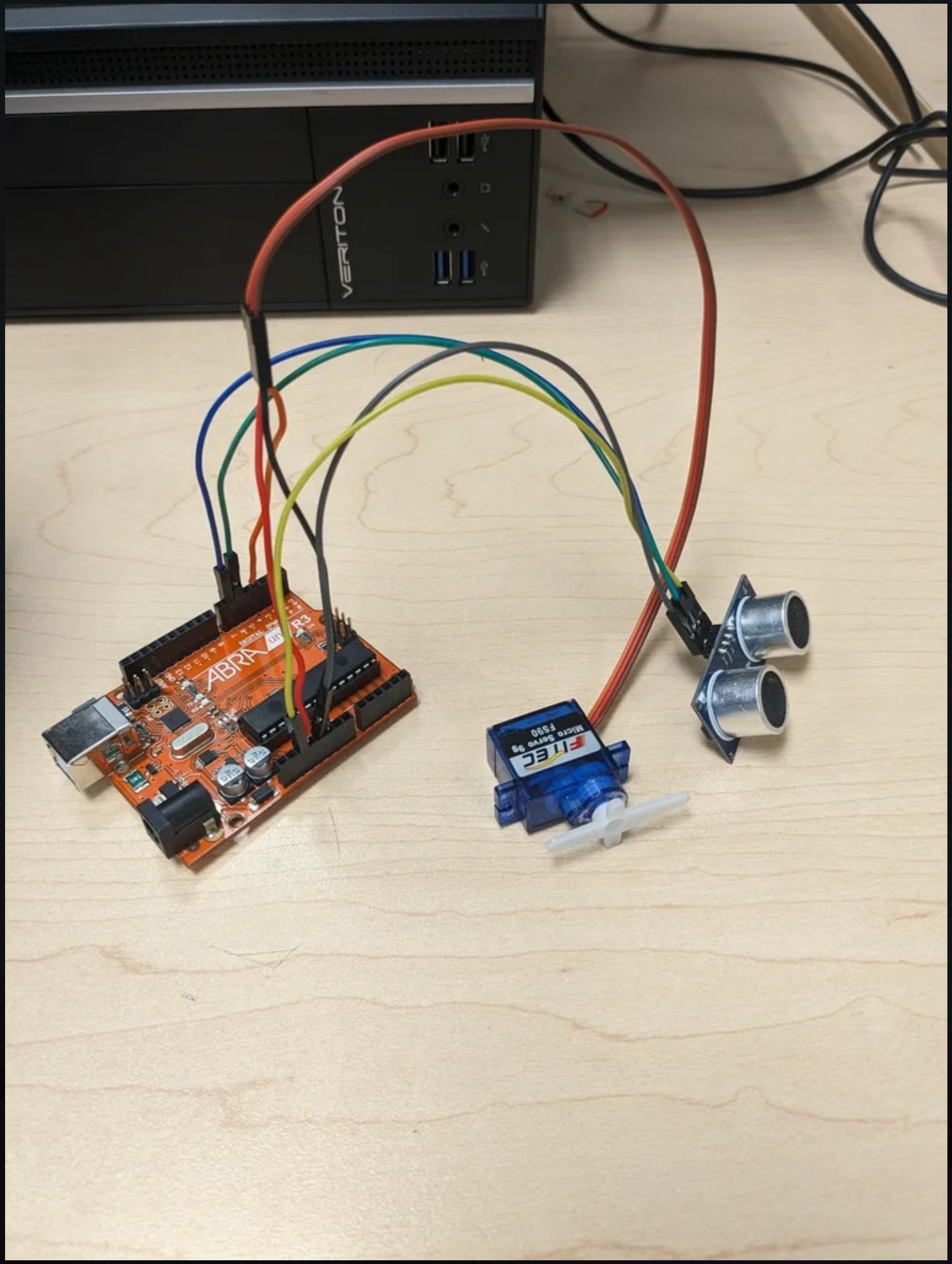
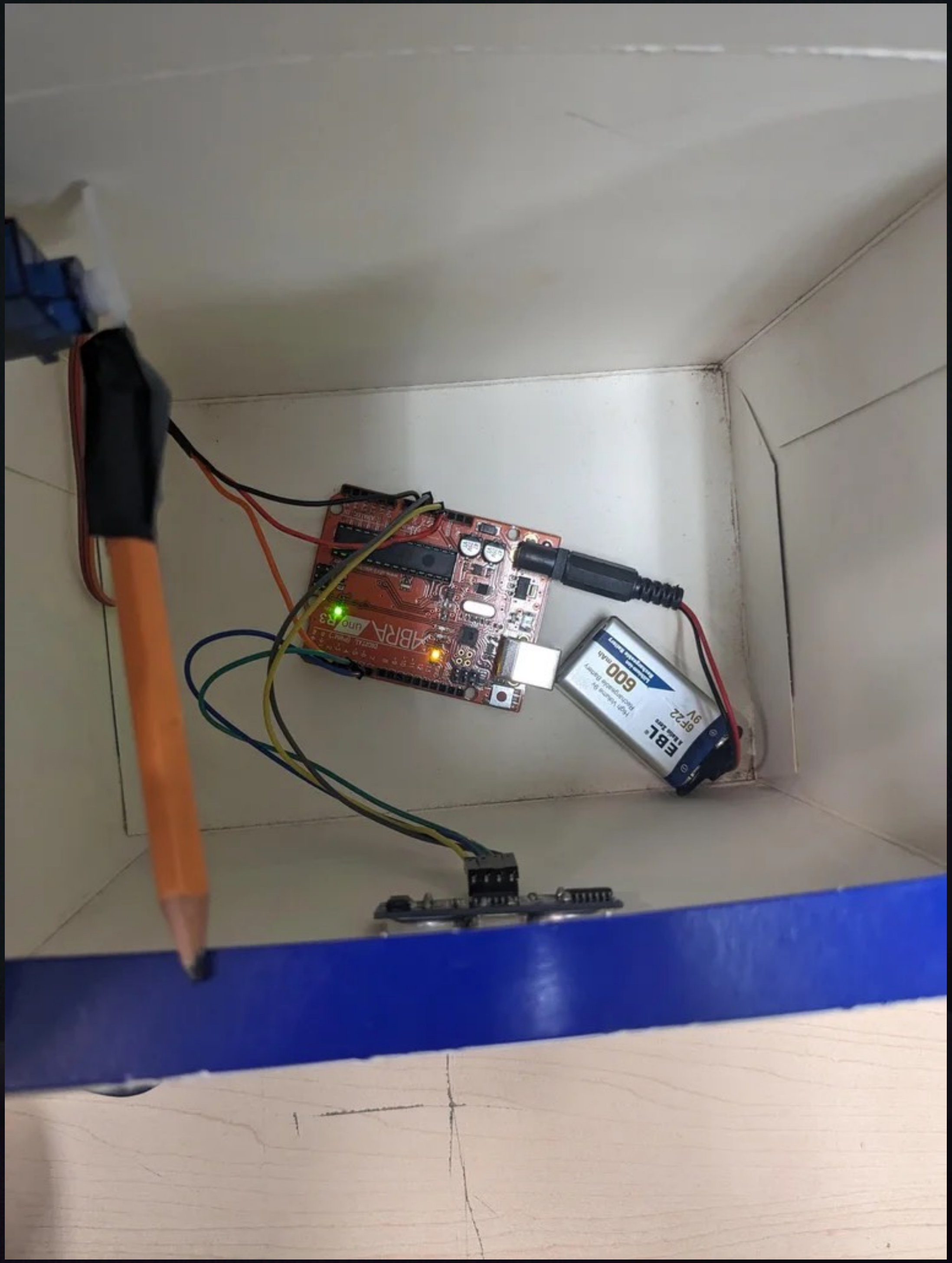
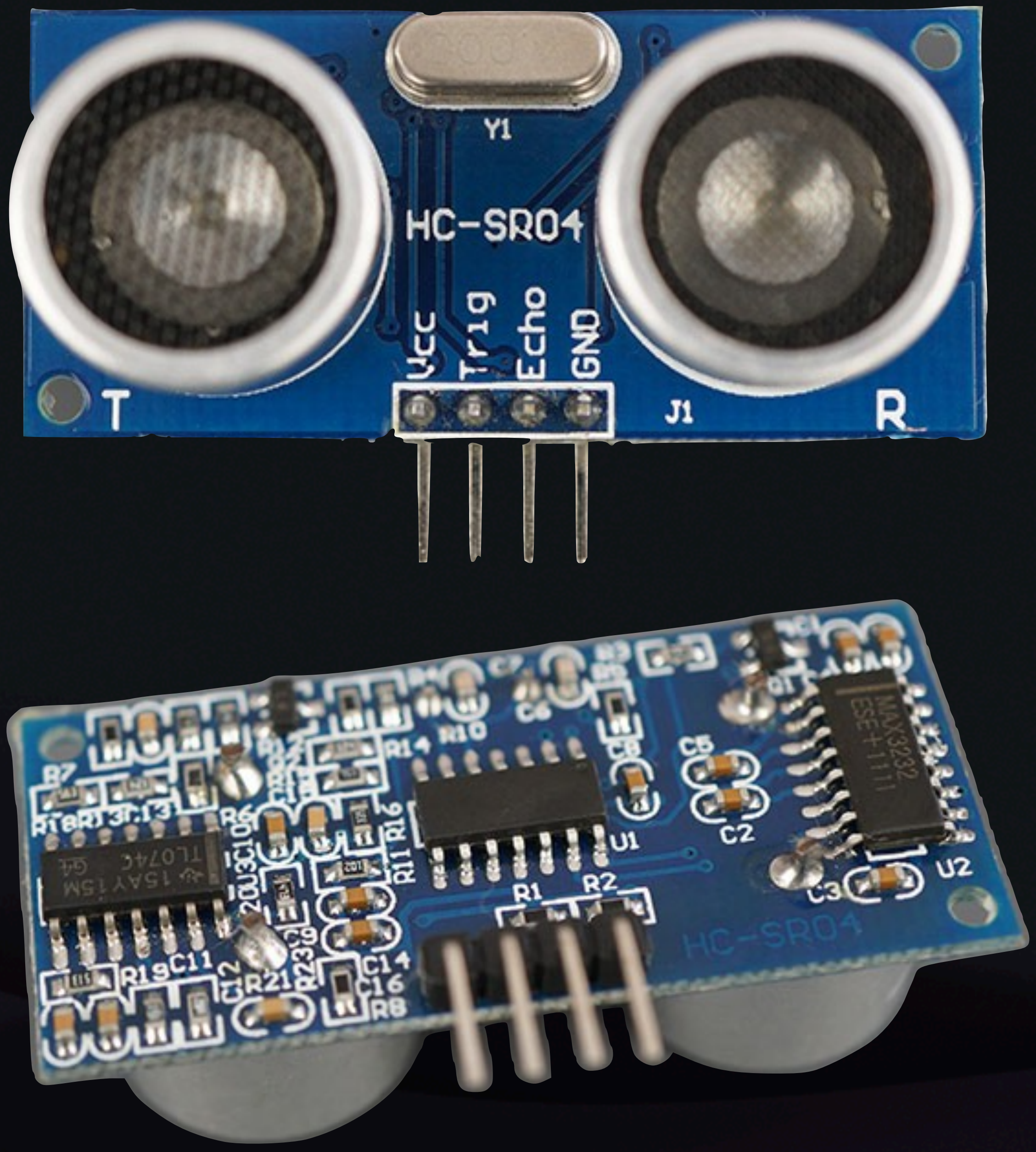


https://www.instructables.com/Automatic-Trashcan/

Automatic Trashcan



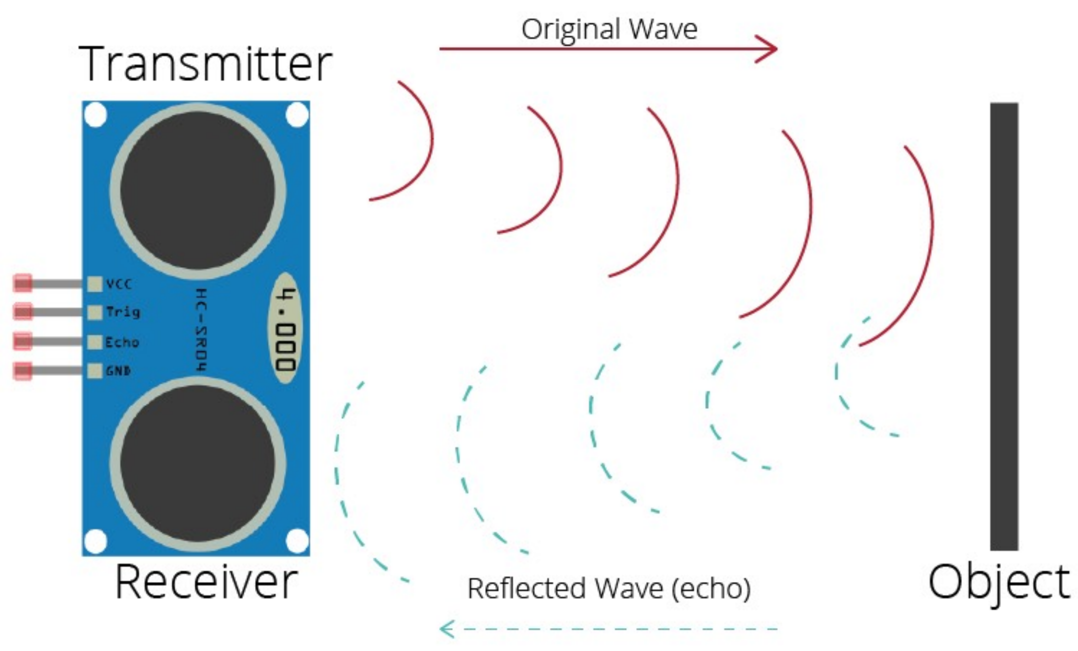
Ultrasonic sensor

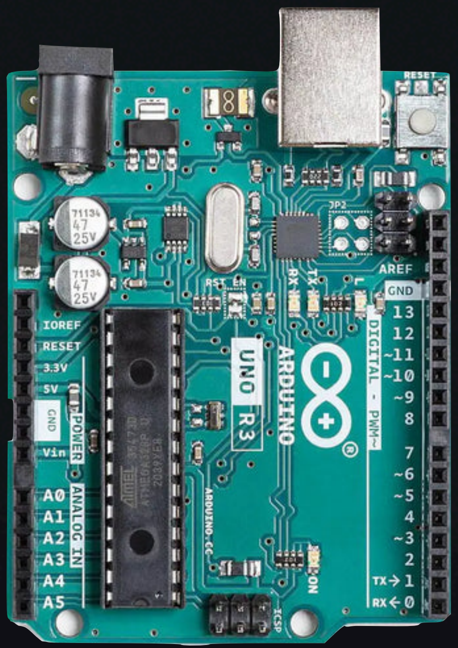


https://www.instructables.com/Automatic-Trashcan/

Input

Ultrasonic sensor





Provides Arduino with Numeric number for distance

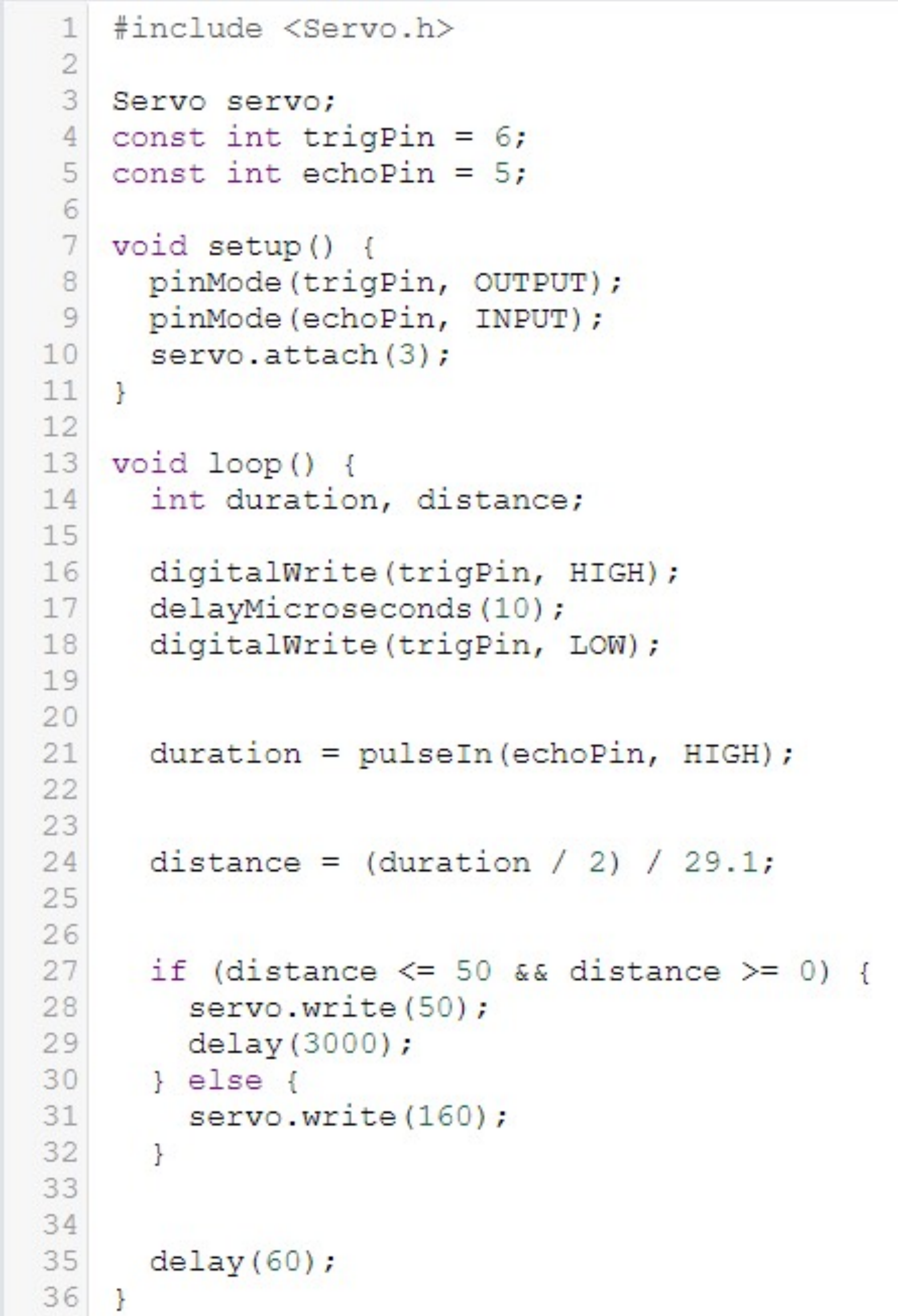
Output

Servo motor

Arduino specifies angle of which the motor goes to

https://www.instructables.com/Automatic-Trashcan/

Code



```
#include <Servo.h>

Servo servo;
const int trigPin = 6;
const int echoPin = 5;

void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  servo.attach(3);
}

void loop() {
  int duration, distance;

  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);


  duration = pulseIn(echoPin, HIGH);


  distance = (duration / 2) / 29.1;


  if (distance <= 50 && distance >= 0) {
    servo.write(50);
    delay(3000);
  } else {
    servo.write(160);
  }


  delay(60);
}
```

Include Servo Library

Declaring Variables and Pin Numbers:

- servo: this allows the servo to rotate from 0 to 180
- trig Pin: this is a digital pin of the trig pin from the ultrasonic distance sensor
- echo Pin: this is a digital pin of the echo pin from the ultrasonic distance sensor

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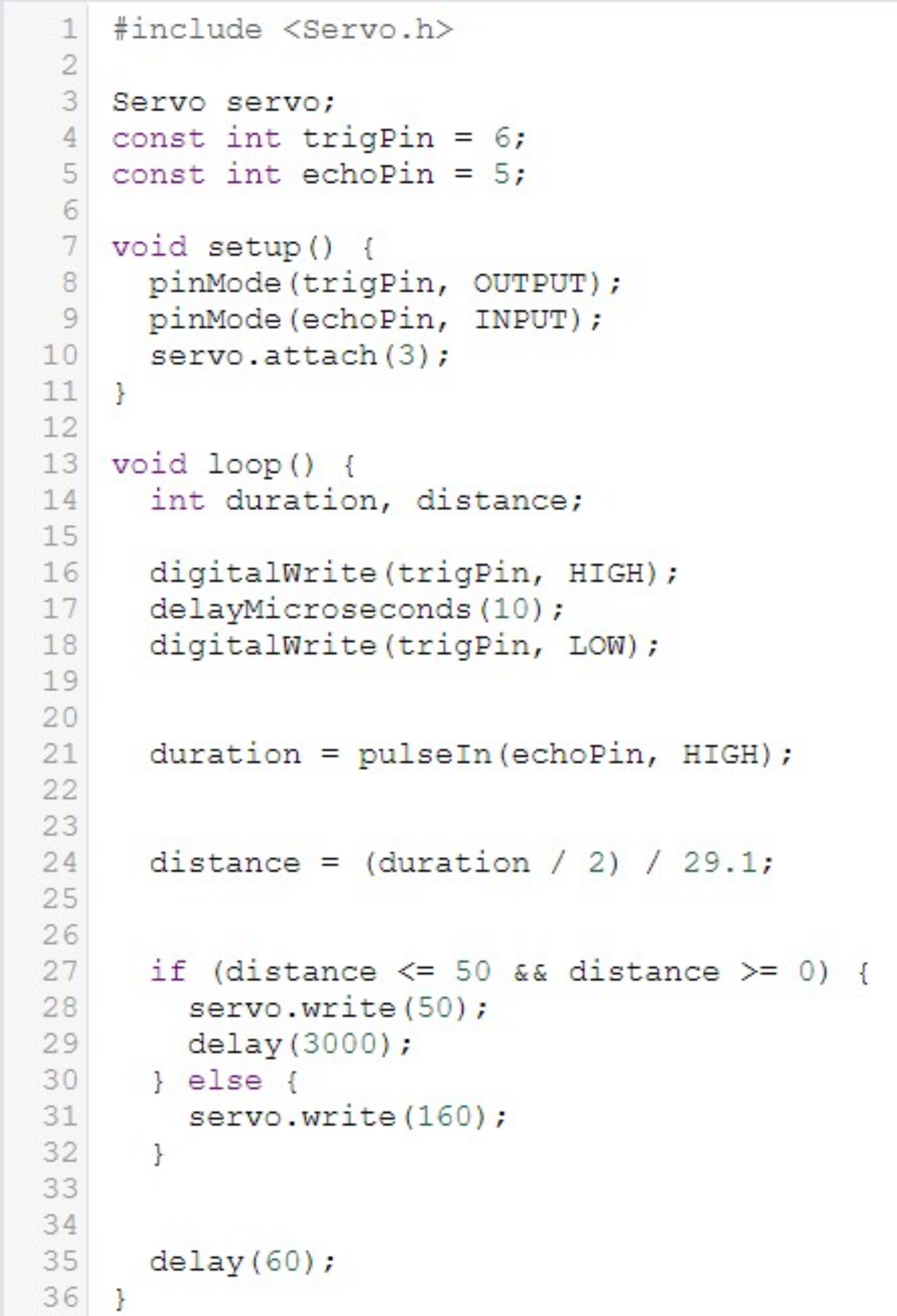
Code



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  digitalWrite(trigPin, LOW);


  duration = pulseIn(echoPin, HIGH);


  distance = (duration / 2) / 29.1;


  if (distance <= 50 && distance >= 0) {
    servo.write(50);
    delay(3000);
  } else {
    servo.write(160);
  }


  delay(60);
}
```

Setup Function:

- Makes the trig Pin into an output and the echo Pin into an input
- Attaches the servo motor to pin 3 (change it if you are using a different pin)

Loop Function:

- Sends a pulse to the trig pin to startup the ultrasonic distance sensor
- Measures the duration of the pulse on the echo pin
- Calculates the distance based on the duration of the pulse
- If the distance is within range which is 50 it moves the servo to 50 degrees otherwise is moves the servo to position 160 degrees
- adds a short delay before the loop starts again

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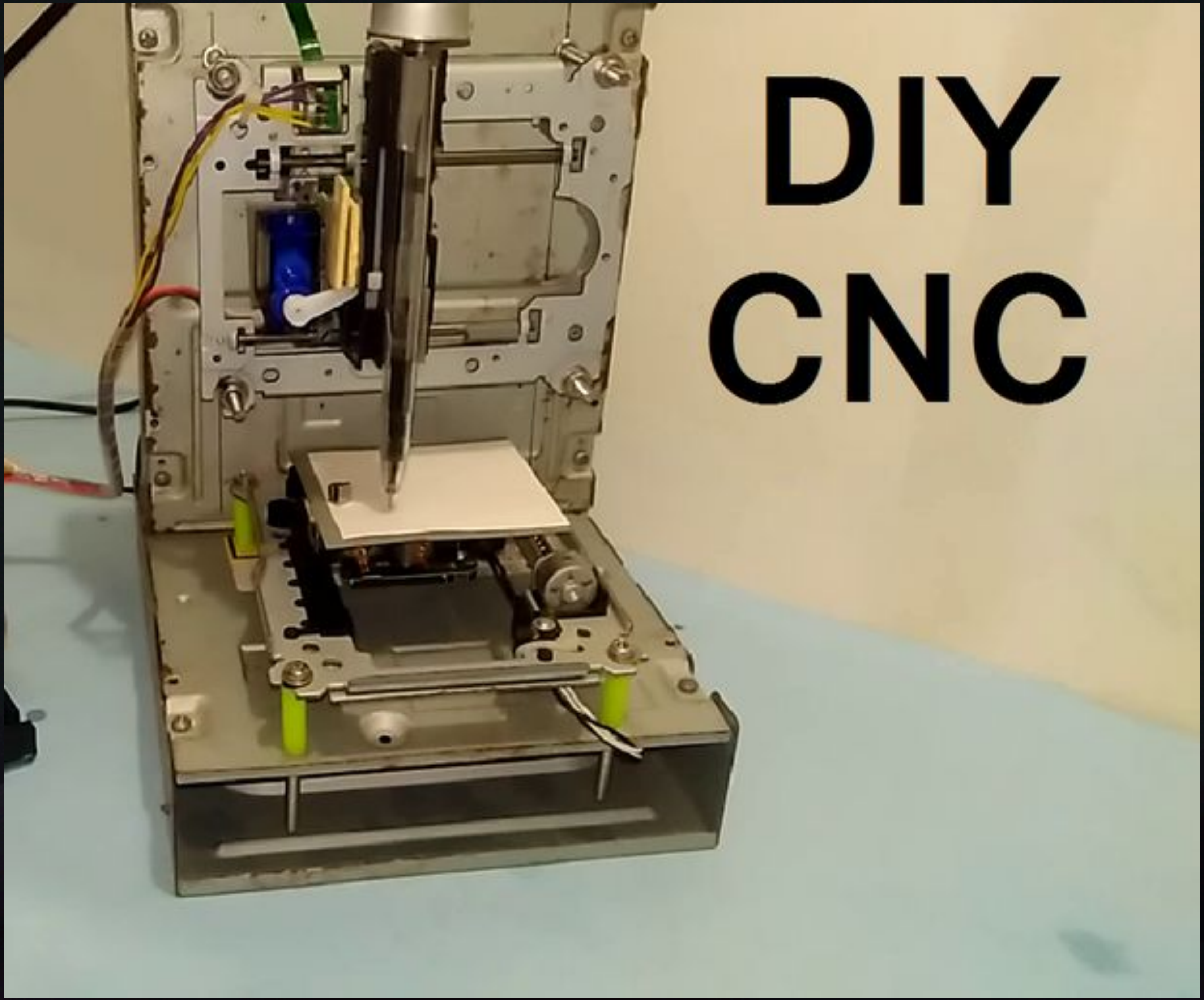
CNC 2D Plotter



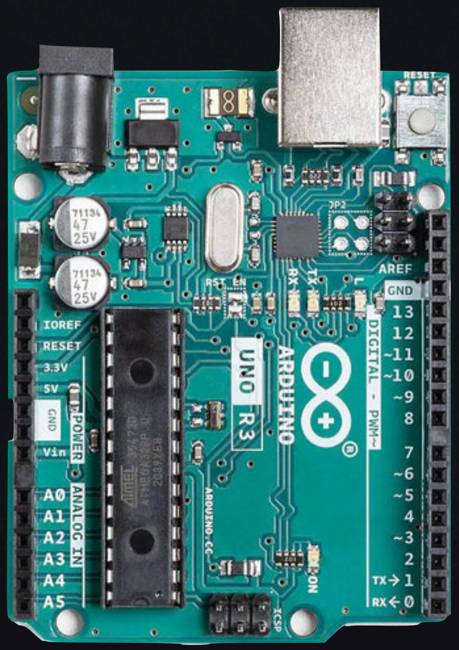
https://projecthub.arduino.cc/Mrinnovative/arduino-based-mini-cnc-2d-plotter-796c2f

Input

Code instructions

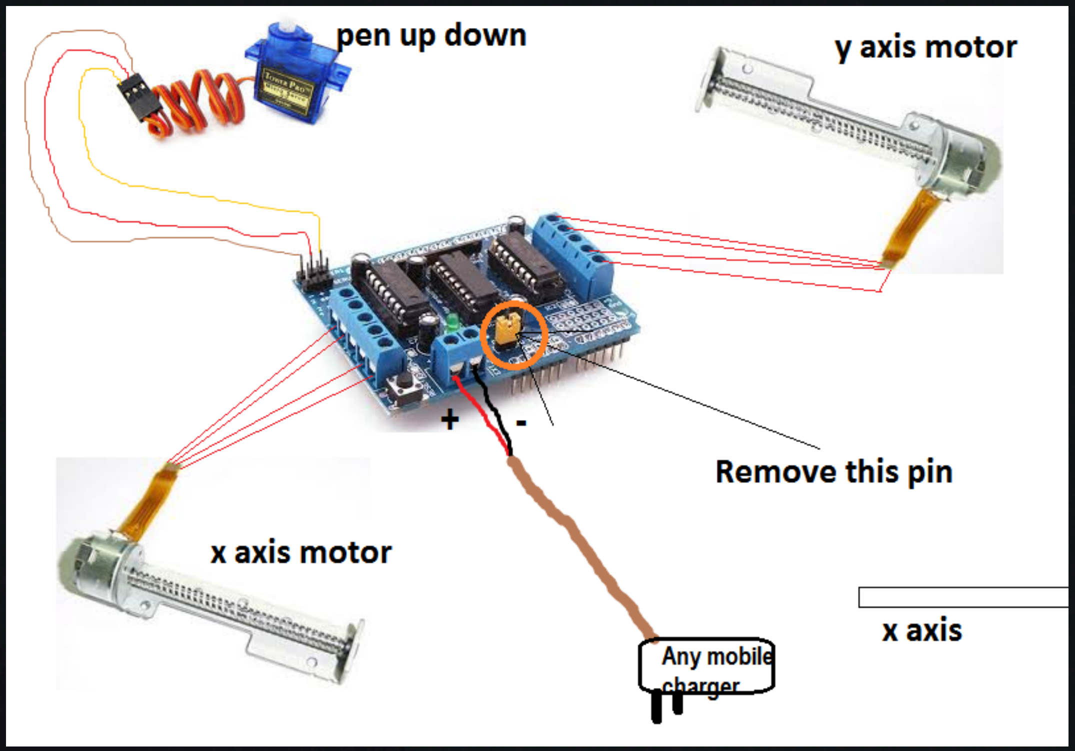
```
//  G1 for moving
//  G4 P300 (wait 150ms)
//  G1 X60 Y30
//  G1 X30 Y50
//  M300  S30 (pen down)
//  M300 S50 (pen up)
```

Computer provides instructions to where the motors should go to



Output

X,Y Axis ; Servo motors



Arduino tells the x y axis where to bring the pen, and the servo to engage the pen

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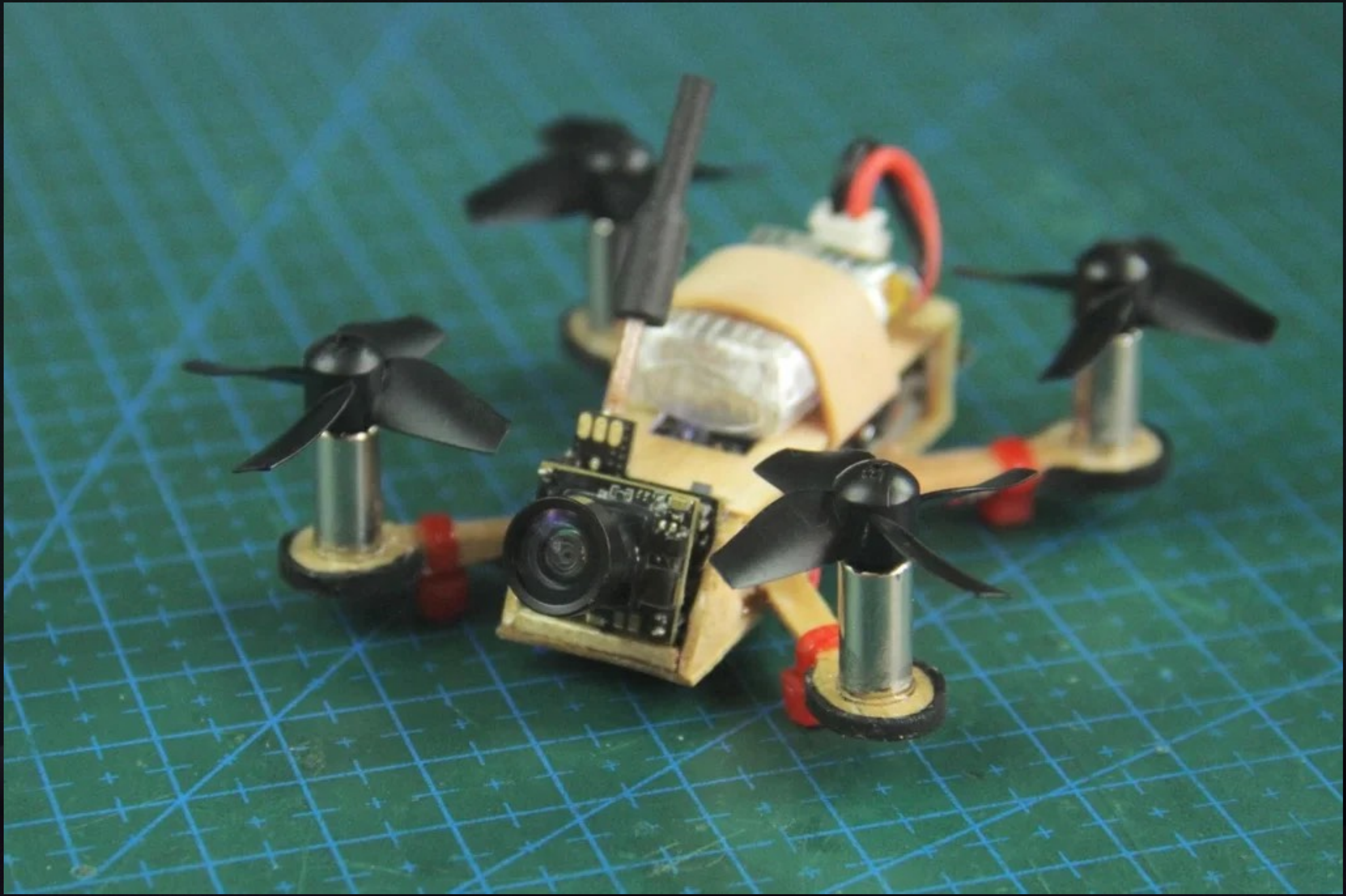
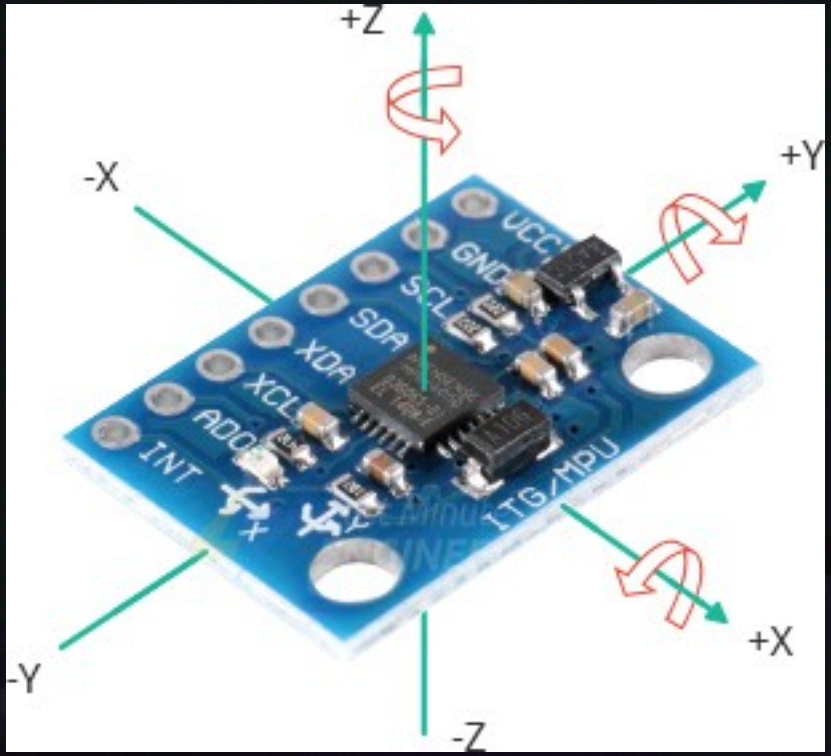
Drone



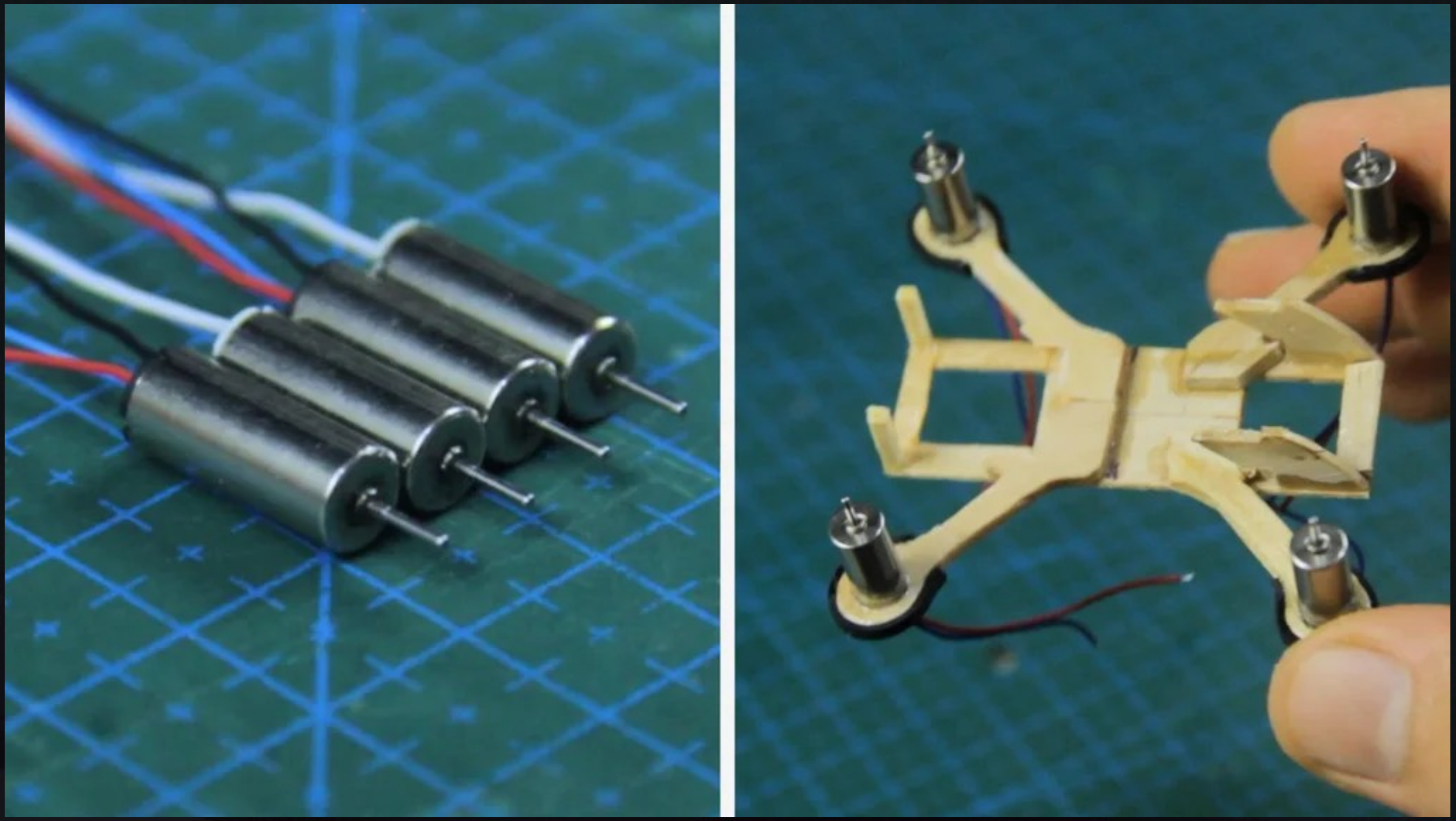
https://www.instructables.com/Make-a-Tiny-Arduino-Drone-With-FPV-Camera/

Drone

Mpu 6050 Gyro + Accelerometer motion sensor



Motors



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Drone

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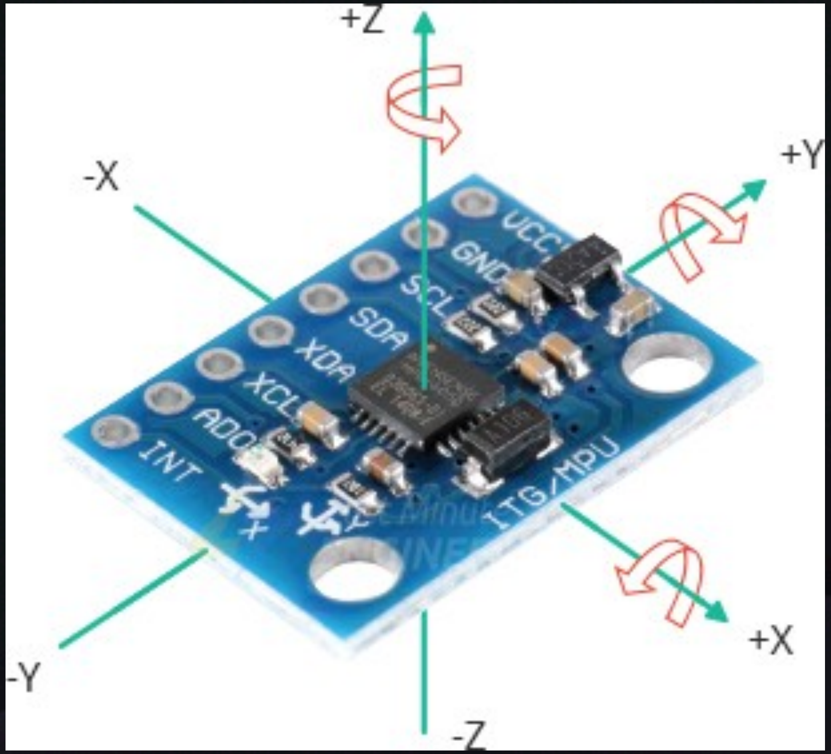
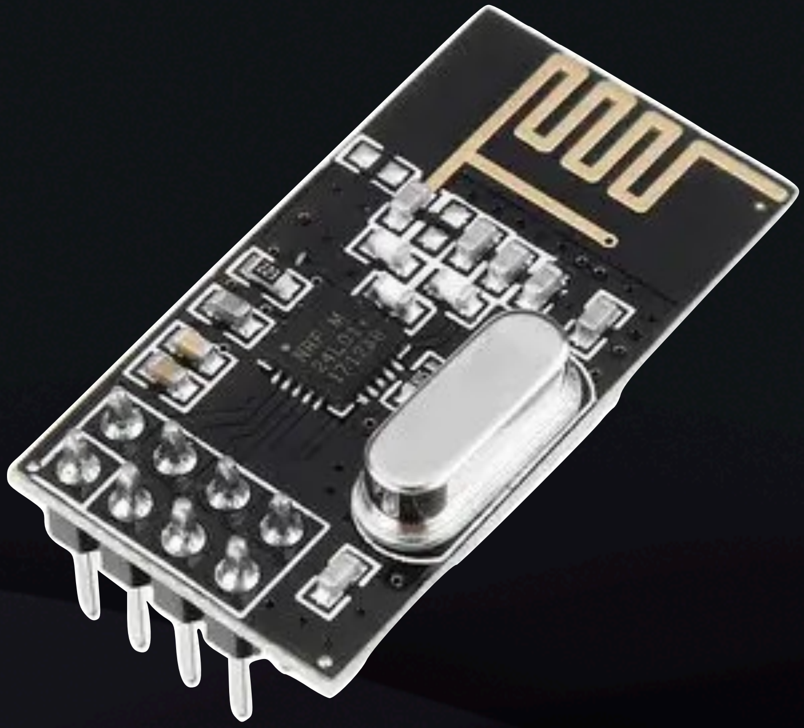
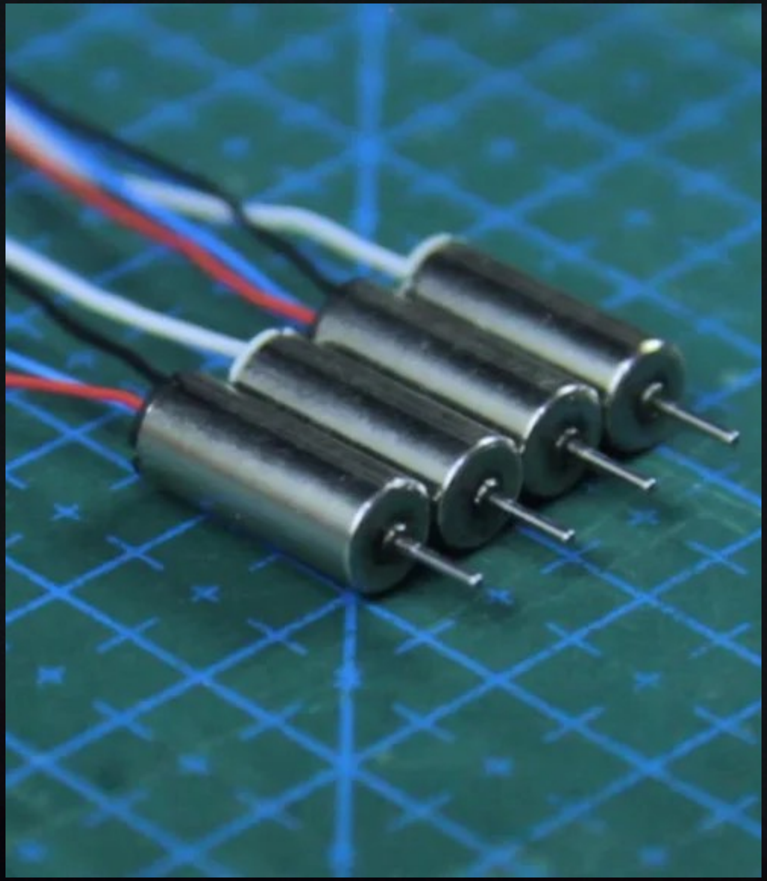


NRF 24L01 RF transceiver



Motors



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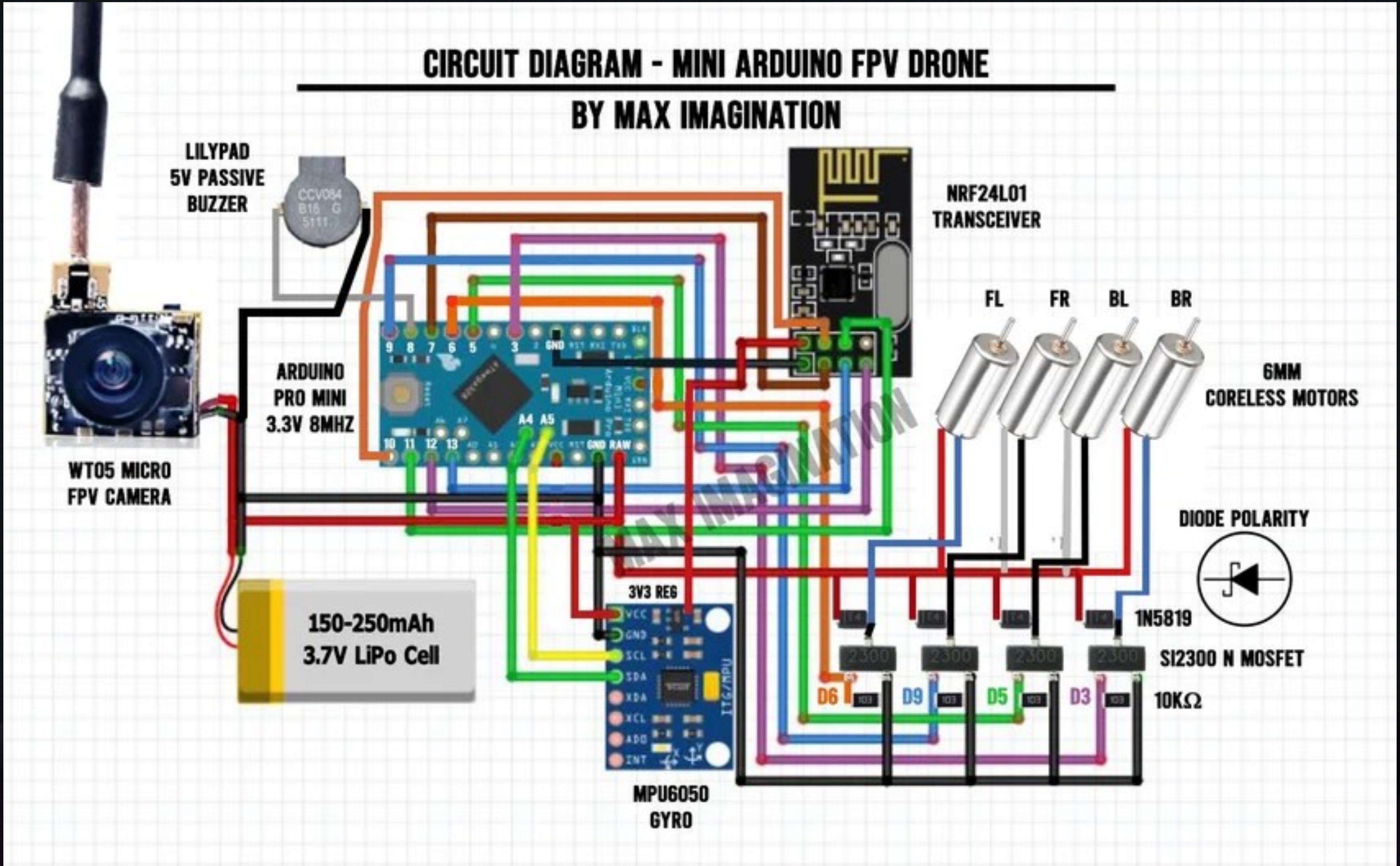
Drone



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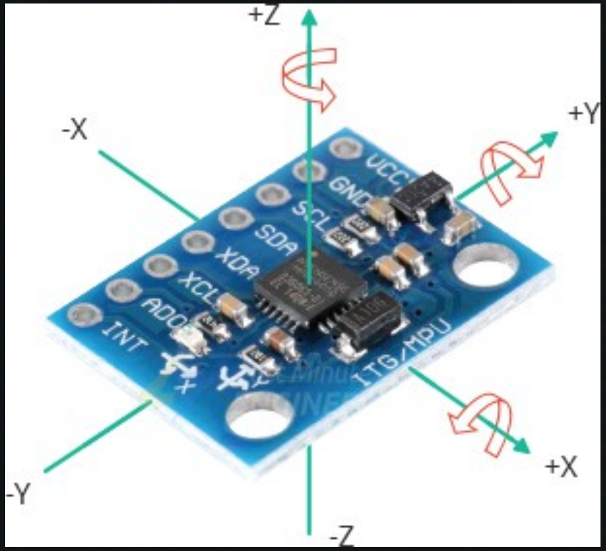
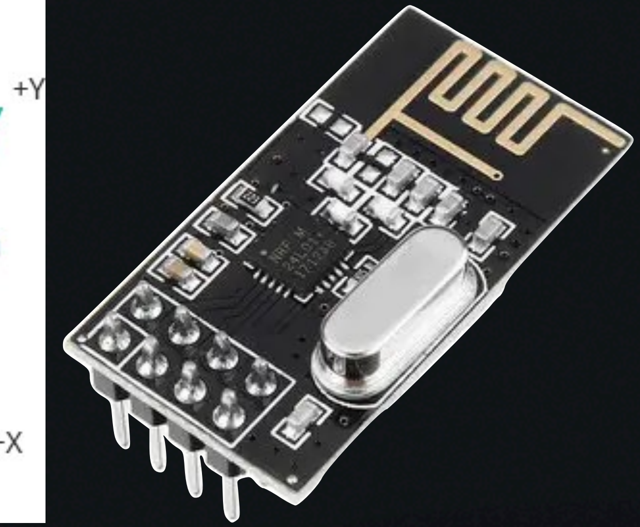
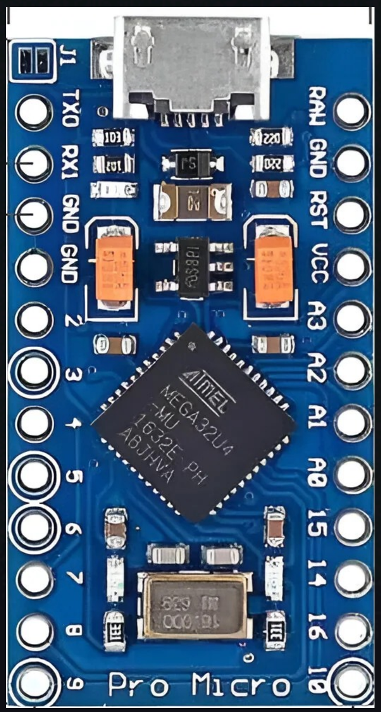
Input

Gyroscope; Radio signals



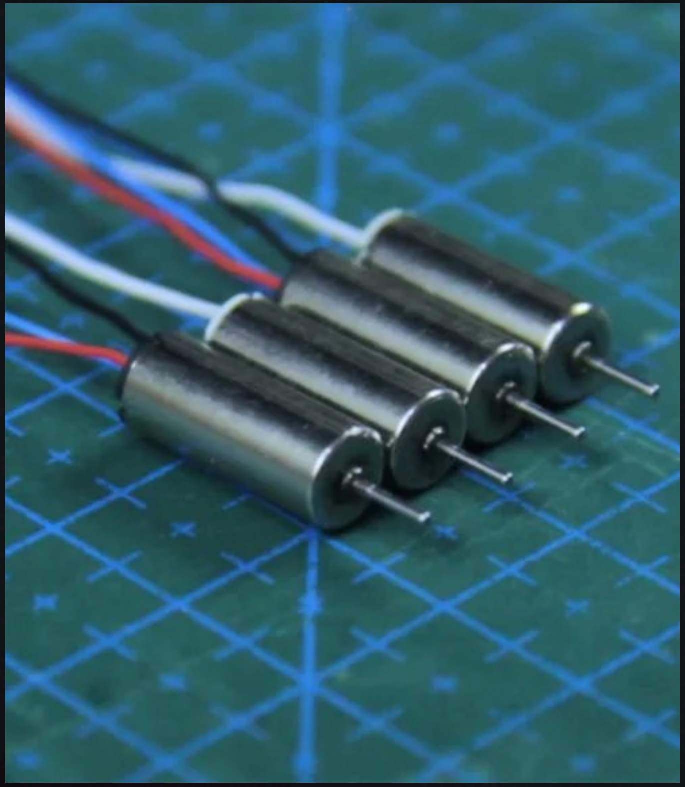




Using a feedback loop using the gyroscope to stabilize, as well as the RF radio receiver to receive instructions

Output

Motor speed



Arduino adjusts different motor's speeds to match desired outcome

https://www.instructables.com/Make-a-Tiny-Arduino-Drone-With-FPV-Camera/

Your turn

1. Find a specific use case / problem

   (it doesn't have to be completely useful, silly things are also welcomed)

2. List out Inputs & outputs

3. Research components needed and list out components