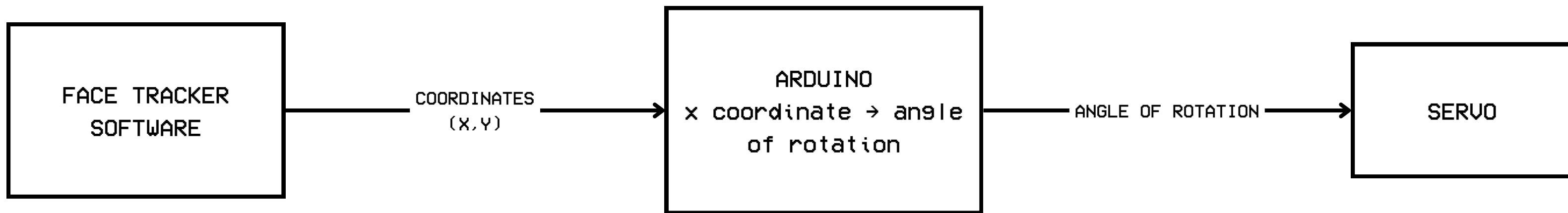
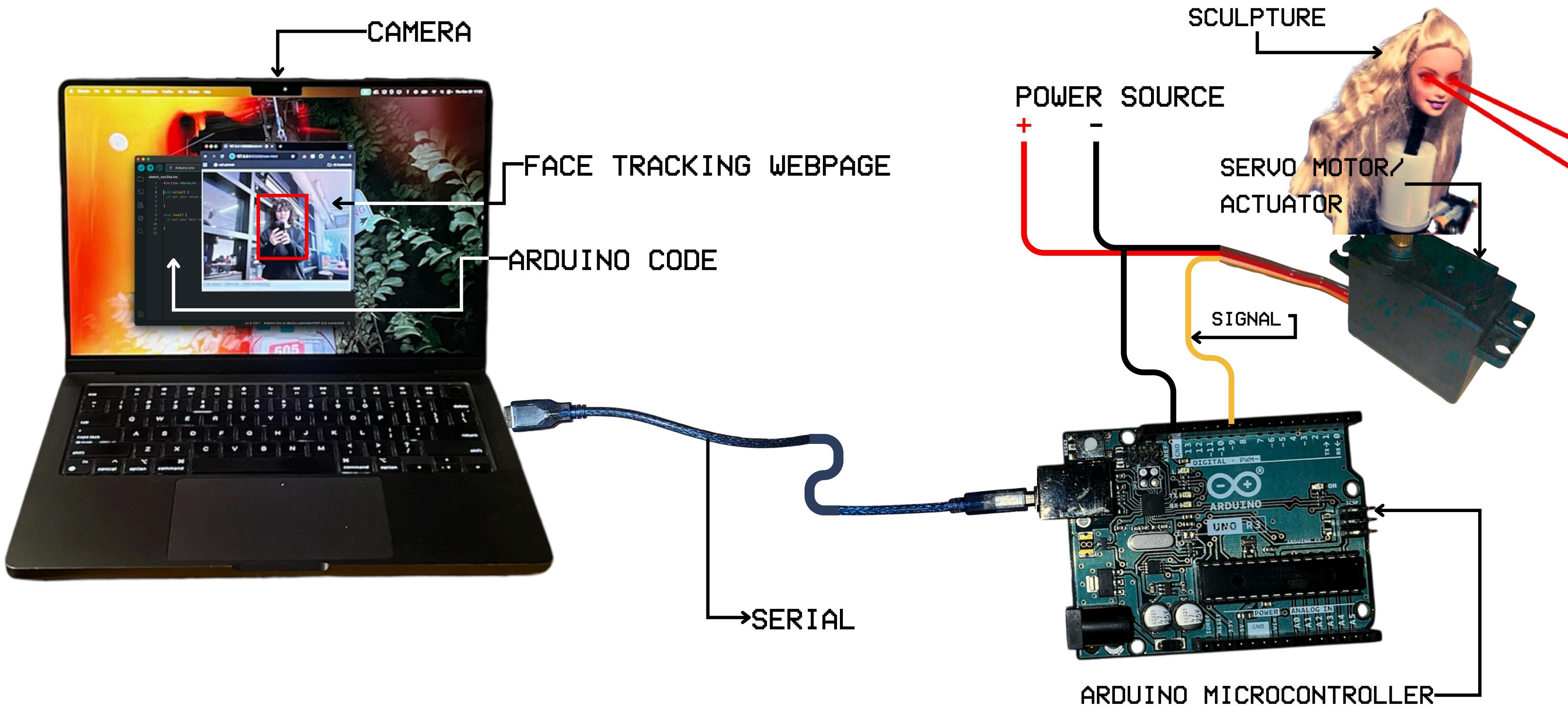


WELCOME TO CREEPY CREATURES HOW TO BUILD A FACE TRACKING ROBOT

OVERVIEW



THE BUILD



THE PLAN

PHASE 1 : WIRE AND TEST

- CONNECT SERVO TO ARDUINO
- UPLOAD TEST CODE
- VERIFY SERIAL COMMUNICATION

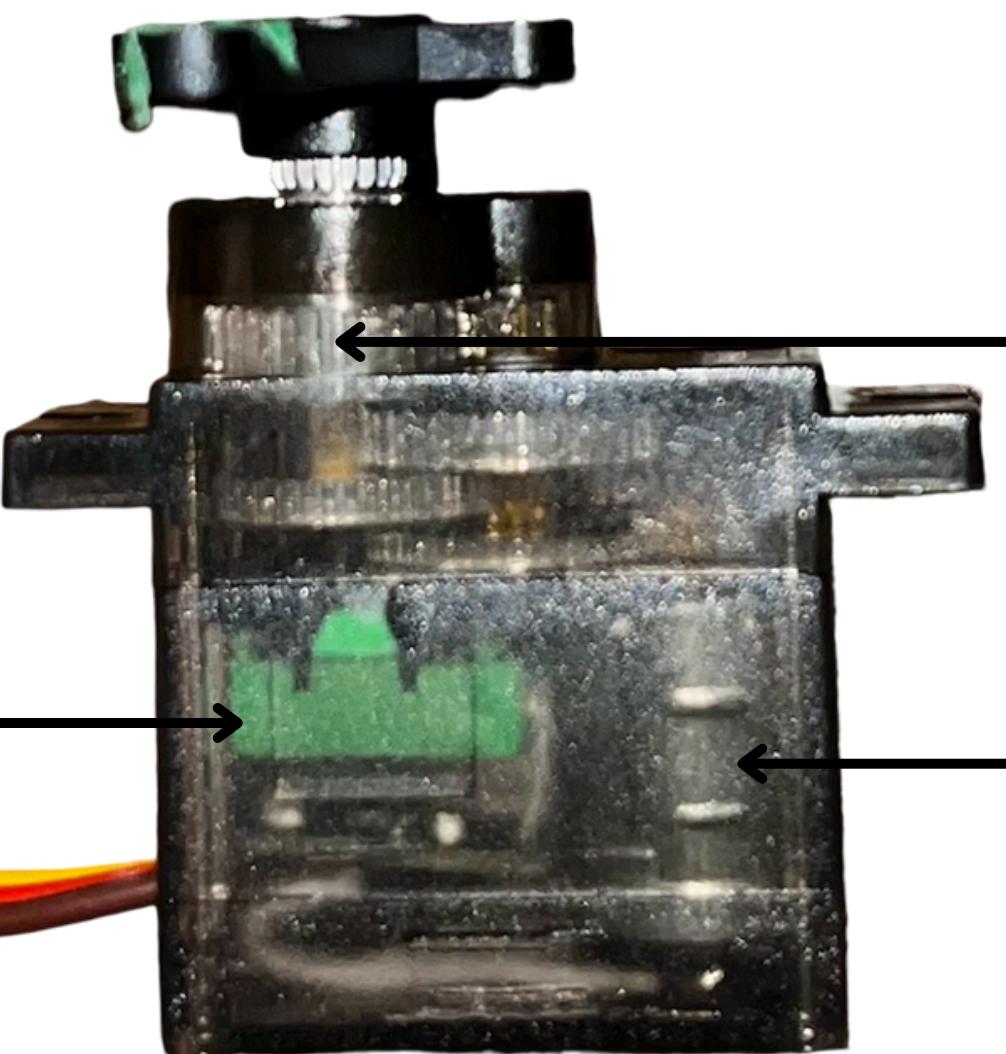
PHASE 2 : FACE TRACKING

- UPLOAD TRACKING CODE
- CONNECT TO WEBPAGE
- GET THE SERVO FOLLOWING FACES

PHASE 3 : BUILD AND ITERATE

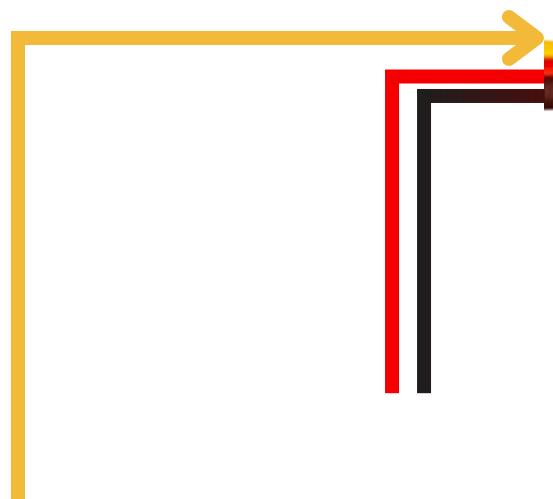
- BUILD YOUR CREATURE
- ADD IMPROVEMENTS TO THE CODE
- SHOW OFF

SERVO



POTENTIOMETER AND CONTROL CIRCUIT

measures the shaft position and changes it's position based on the control signal it receives from the arduino + where it's already at



PWM SIGNAL

digital pins 3,5,6,9,10,11
support this

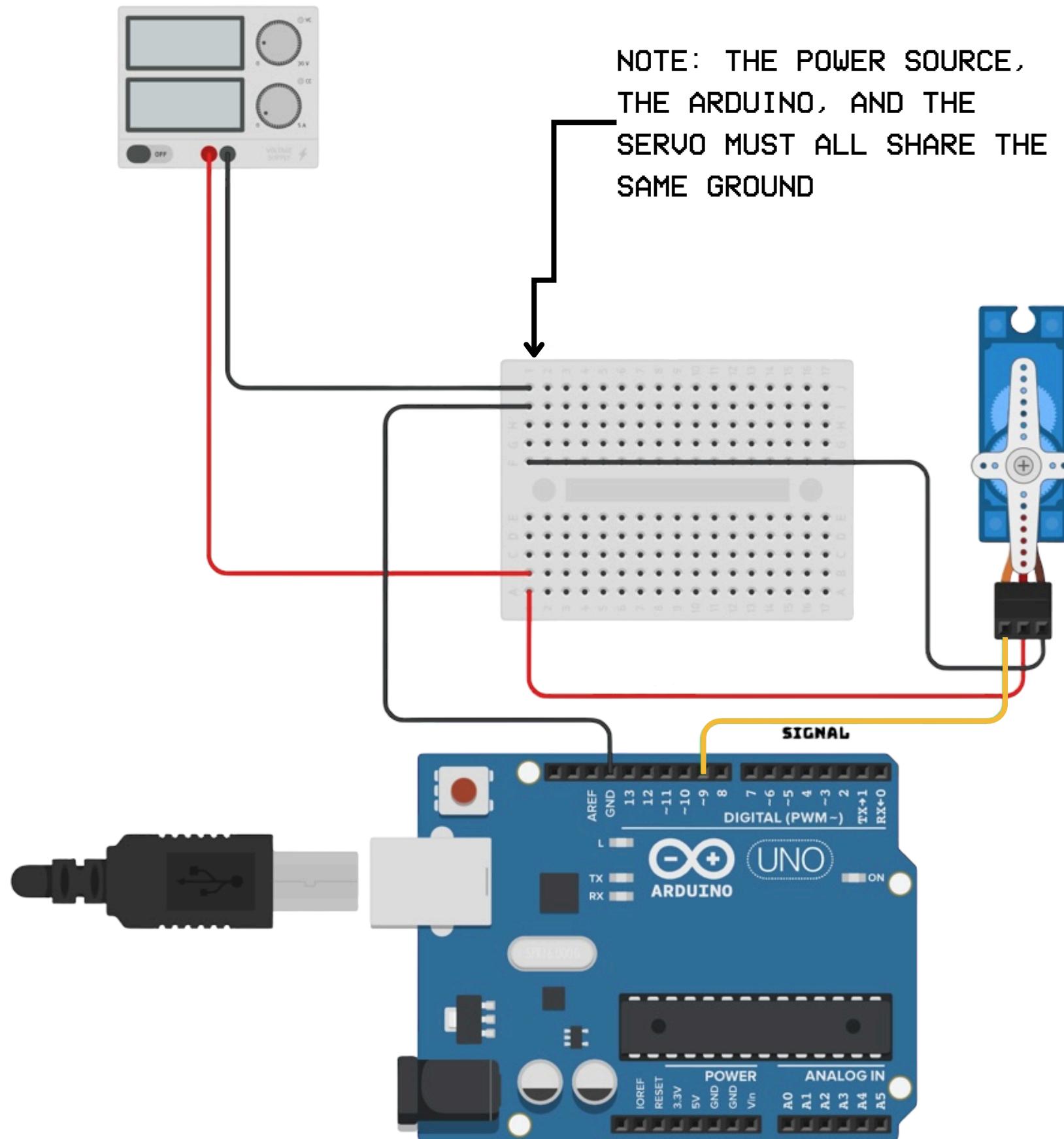
GEARBOX

reduces speed,
increases torque

DC MOTOR

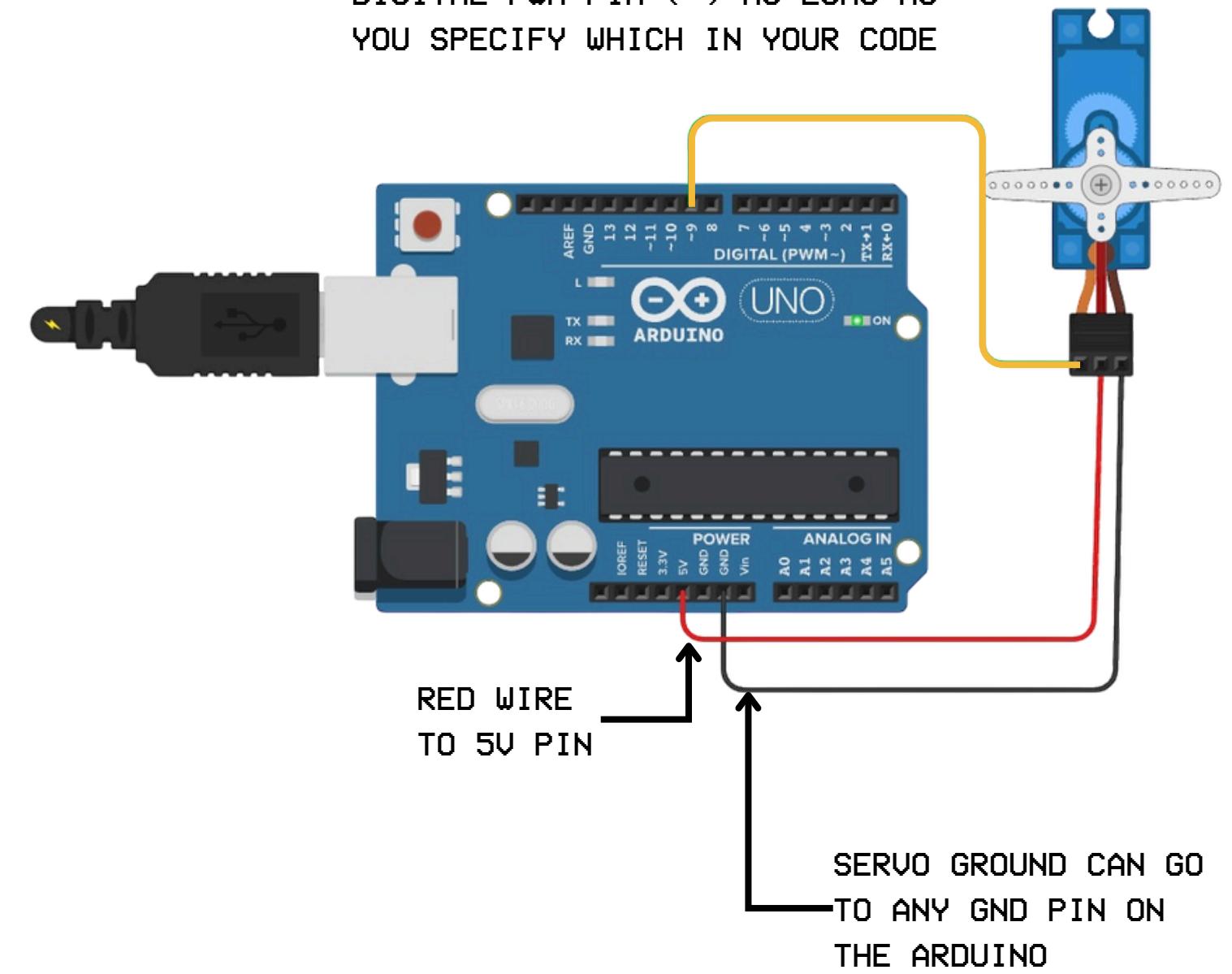
does the spinning

WIRING



NOTE: THE POWER SOURCE,
THE ARDUINO, AND THE
SERVO MUST ALL SHARE THE
SAME GROUND

THE SIGNAL WIRE CAN GO TO ANY
DIGITAL PWM PIN (~) AS LONG AS
YOU SPECIFY WHICH IN YOUR CODE



THE EASY WAY

- WHEN YOU'RE ONLY USING 1 SMALL SERVO THAT DOESN'T DRAW A LOT OF CURRENT YOU COULD CONNECT IT DIRECTLY TO THE BOARD AND IT SHOULD BE CHILL

THE IDEAL WAY • MORE IMPORTANT WITH MULTIPLE
COMPONENTS OR HIGHER TORQUE

LINKS

ALL THE CODE



[HTTPS://GITHUB.COM/CIRCLEFOUR/CREEPY-CREATURES](https://github.com/circlefour/creepy-creatures)

[HTTPS://TRACKER-PEACH-SIGMA.VERCEL.APP](https://tracker-peach-sigma.vercel.app)

FACE TRACKING FROM YOUR BROWSER

GITHUB.COM/CIRCLEFOUR/CREEPY-CREATURES

The screenshot shows the GitHub repository page for 'creepy-creatures'. At the top, it displays the repository name 'creepy-creatures' (Public), a 'Pin' button, and a 'Watch' button with 0 notifications. Below this, there are buttons for 'main' (selected), '1 Branch', '0 Tags', a search bar ('Go to file'), and a 'Code' dropdown. The main content area shows a list of commits:

- circlefour Add LED trigger webpage link to README · cf1f677 · 36 minutes ago · 5 Commits
- arduino-scripts added arduino code · 10 hours ago
- face-tracker added arduino code · 10 hours ago
- .gitignore adding workshop related content · 11 hours ago
- README.md Add LED trigger webpage link to README · 36 minutes ago

Below the commits, there's a 'README' section with the following text:

creepy creatures : build a face tracking robot

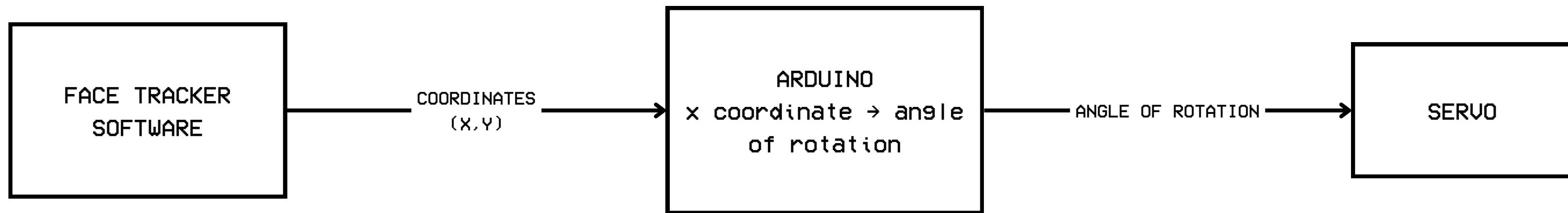
welcome to the first installment of creepy creatures build a face tracking robot. we'll be learning the basics of how to wire components up to an arduino, use serial to communicate between devices, and trigger movements based on received data. all arduino starter code is provided in the associated directory.

DESCRIPTION AND
LINKS

ARDUINO FILES TO
COPY AND PASTE INTO
YOUR IDE FROM

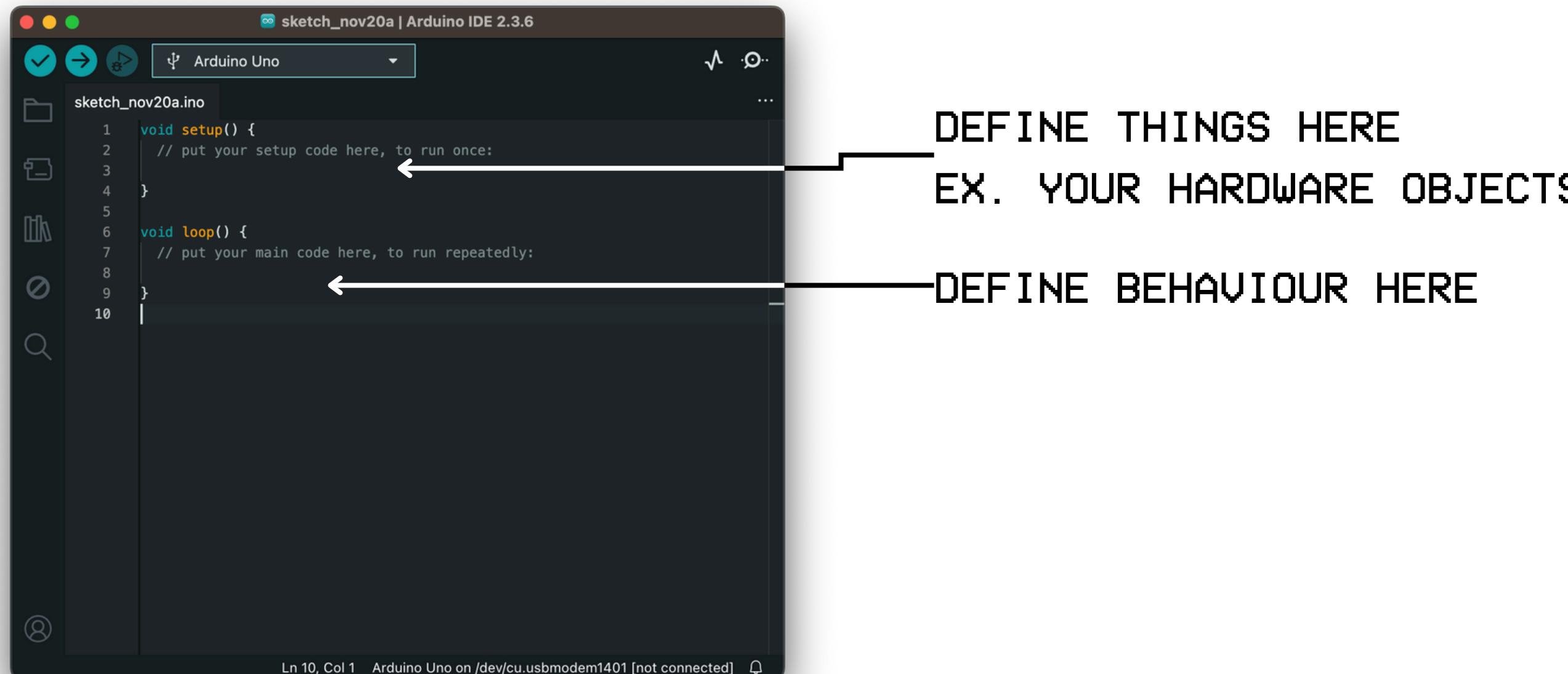
THE CODE FOR THE
FACE TRACKER
we may not get to this, but
check it out if you're
curious how it works.

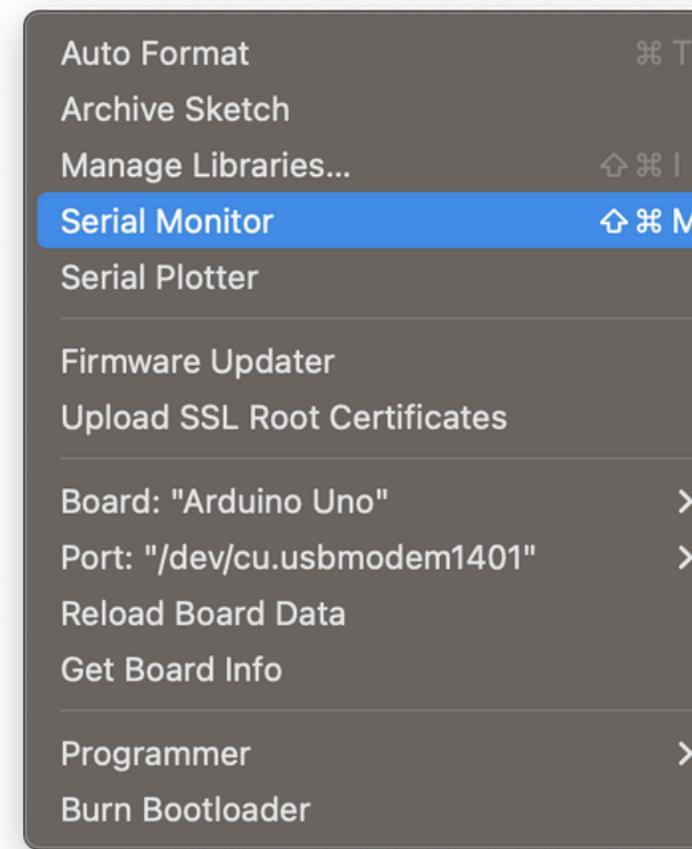
STEP 1 : CAN OUR COMPUTER TALK TO THE ARDUINO?



SETTING UP OUR ENVIRONMENT

ANATOMY OF AN .INO FILE





LINK TO SERIAL
REFERENCE IN ARDUINO
DOCUMENTATION



```
sketch_nov21a.ino
1 void setup() {
2     Serial.begin(115200);
3     pinMode(LED_BUILTIN, OUTPUT);
4 }
5
6 void loop() {
7     String message = Serial.readStringUntil('\n');
8     if (message == "on"){
9         digitalWrite(LED_BUILTIN, HIGH);
10    }
11    else if (message == "off"){
12        digitalWrite(LED_BUILTIN, LOW);
13    }
}
```

TEST THIS OUT AND SEE WHAT HAPPENS

MAKE SURE THESE NUMBERS MATCH

OPEN THE SERIAL MONITOR AND WRITE STUFF HERE

Message (Enter to send message to 'Arduino Uno' on '/dev/cu.usbmodem1401')
New Line 115200 baud

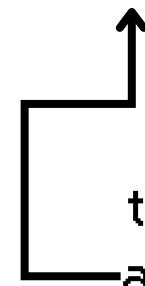
Ln 13, Col 1 Arduino Uno on /dev/cu.usbmodem1401

USING THE BUILTIN LED

IN SETUP

```
pinMode(LED_BUILTIN, OUTPUT);
```

telling the arduino that we're
sending signals to the led,
not receiving signals



this references a special pin
associated with the on board
led

IN LOOP

```
digitalWrite(LED_BUILTIN, HIGH);  
digitalWrite(LED_BUILTIN, LOW);
```

high signal turns led on

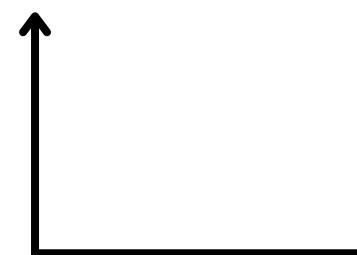


low signal turns
the led off

TALKING OVER THE SERIAL PORT (USB)

BEGIN A SERIAL CONNECTION

```
Serial.begin(115200);
```



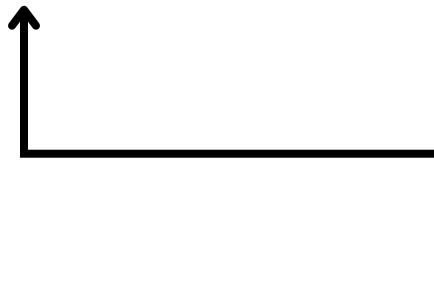
specify a transmission speed that we promise to adhere to (bits per second / baud rate).



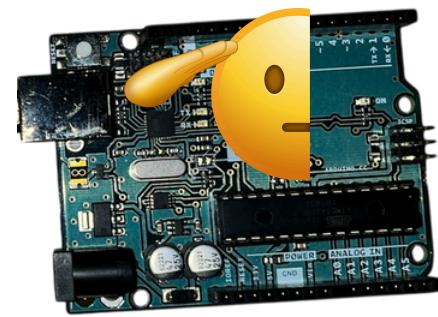
i want to read from the usb/serial until the 'enter' key has been pressed.

RECEIVE A MESSAGE

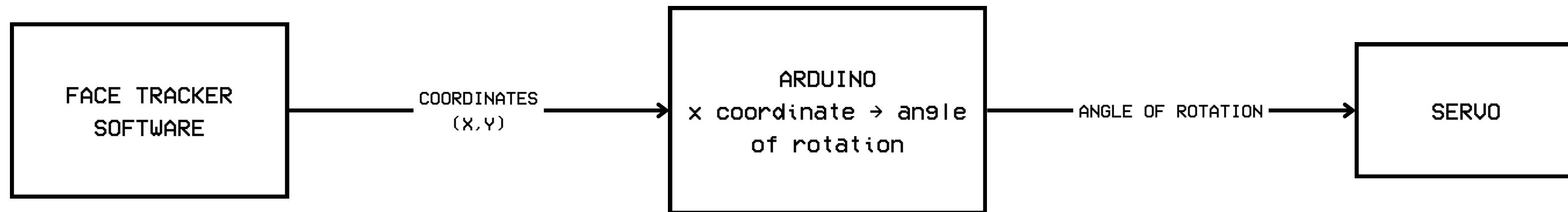
```
String command = Serial.readStringUntil('\n');
```



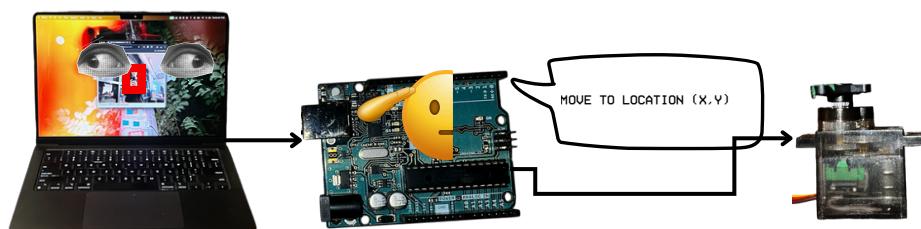
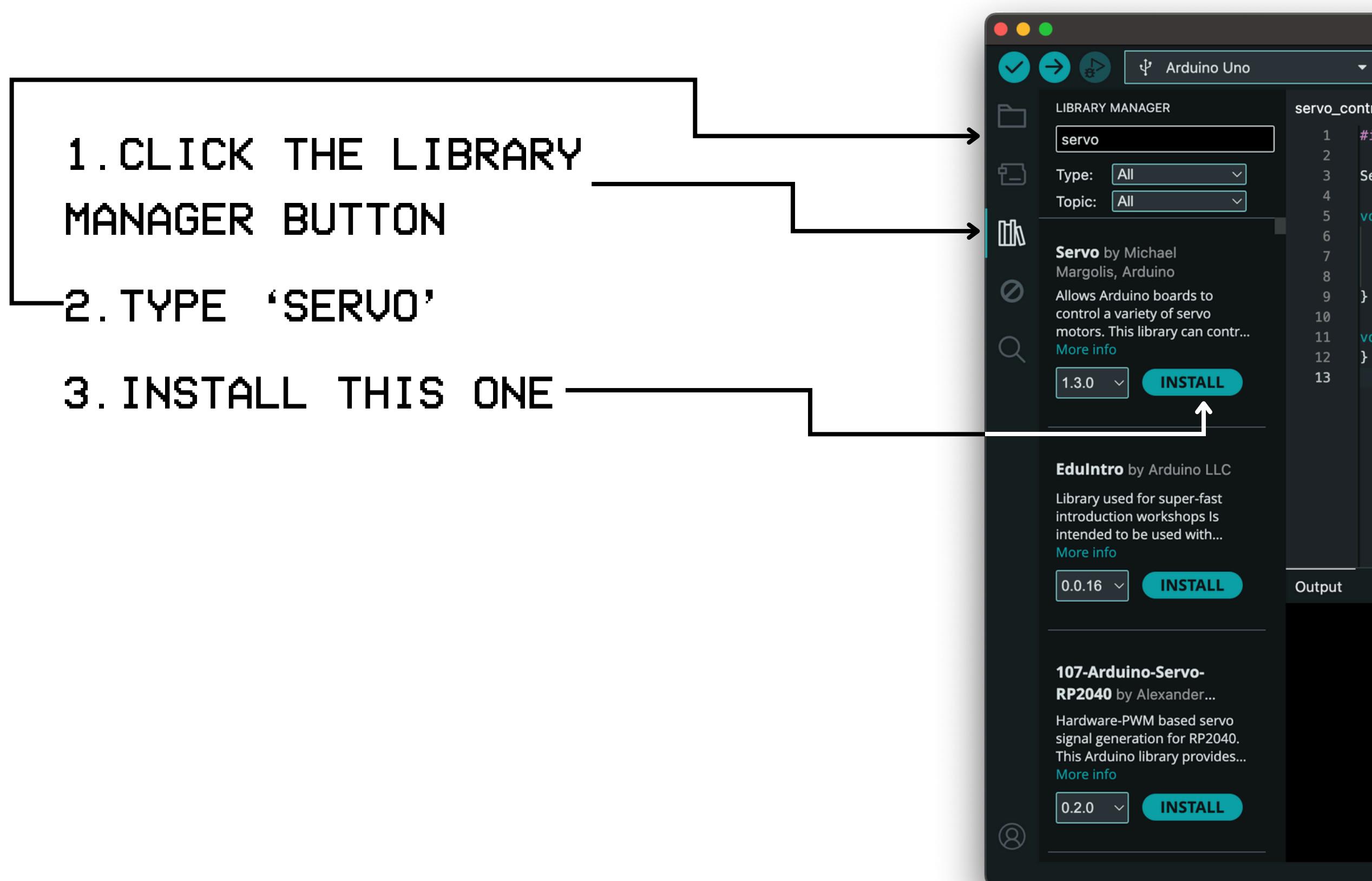
i'm expecting a string (word or sentence).



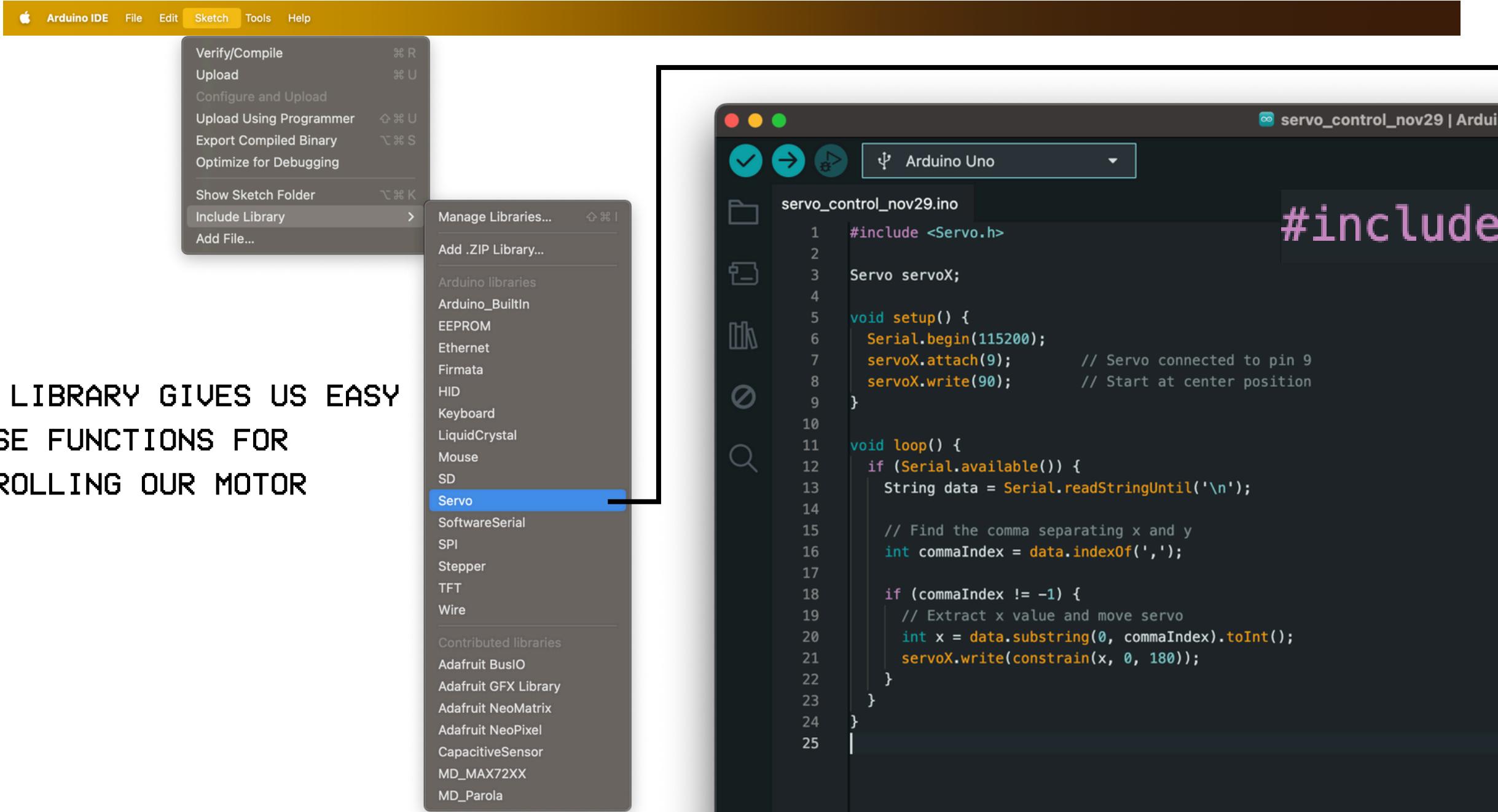
STEP 2 : CAN OUR ARDUINO TALK TO THE SERVO?



TO USE THE SERVO OBJECT IN ARDUINO:



THIS LIBRARY GIVES US EASY
TO USE FUNCTIONS FOR
CONTROLLING OUR MOTOR



THIS IS HOW WE CAN INCLUDE
IT IN OUR SKETCH
(OR TYPE IT OUT MANUALLY)

The screenshot shows the Arduino IDE with a sketch named 'servo_control_nov29.ino' open. The code is as follows:

```
#include <Servo.h>
Servo servoX;
void setup() {
  Serial.begin(115200);
  servoX.attach(9); // Servo connected to pin 9
  servoX.write(90); // Start at center position
}
void loop() {
  if (Serial.available()) {
    String data = Serial.readStringUntil('\n');

    // Find the comma separating x and y
    int commaIndex = data.indexOf(',');
    if (commaIndex != -1) {
      // Extract x value and move servo
      int x = data.substring(0, commaIndex).toInt();
      servoX.write(constrain(x, 0, 180));
    }
  }
}
```

A large black arrow points from the text 'THIS IS HOW WE CAN INCLUDE IT IN OUR SKETCH (OR TYPE IT OUT MANUALLY)' towards the '#include <Servo.h>' line in the code. The status bar at the bottom right of the IDE window shows 'Ln 25, Col 1 Arduino Uno on /dev/cu.usbmodem21401 [not connected]'. A small diagram at the bottom left shows a laptop connected to an Arduino Uno board, which is connected to a servo motor.

USING THE SERVO LIBRARY

GLOBALLY

```
#include <Servo.h>
```

says "hey, we're using this special object that comes with pre-written functions that abstract servo control."

```
Servo servox;
```

defines the servo with a variable that we can use later in the script.

by storing the position of the comma, we can separate x and y from the coordinate it sends us

SETUP

```
servox.attach(9);
```

tells the arduino that we're connecting our servo on Pin 9.

LOOP

```
int commaindex = data.indexOf(',') ;
```

the face tracking software is sending data in the form X,Y

```
int x = data.substring(0, commaindex).toInt();
```

our x value will be between the 0th index and the commaindex

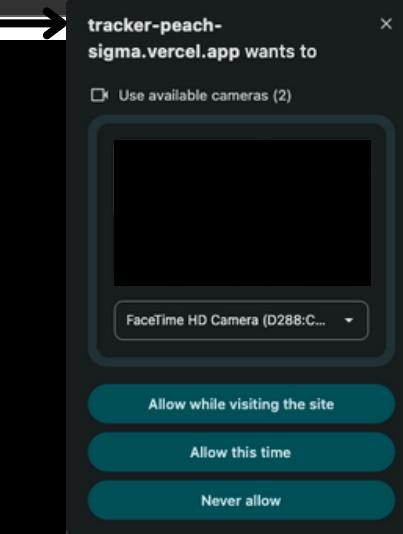
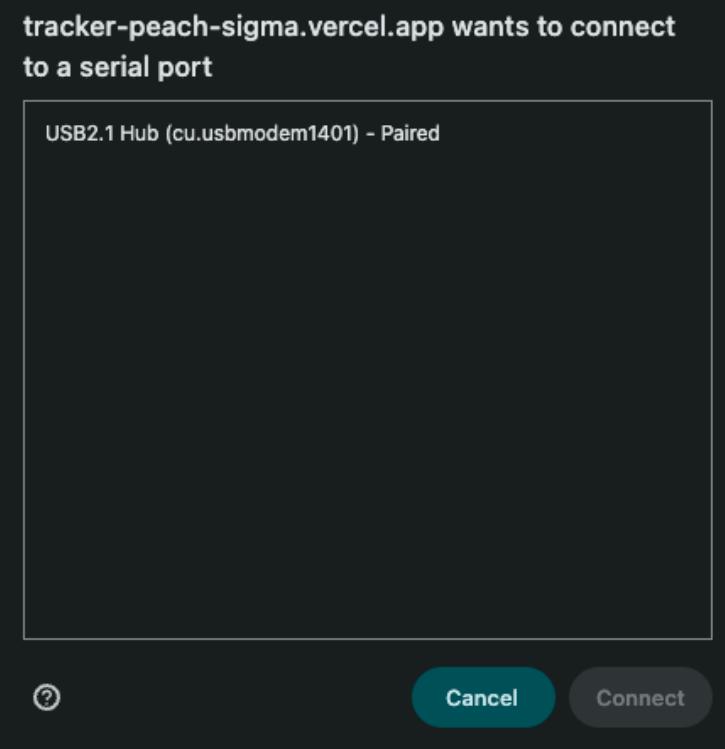
```
servox.write(constrain(x, 0, 180));
```

makes sure our values are between 0 and 180 so we don't send stuff the servo isn't expecting

IT'LL ASK YOU TO SHARE CAMERA

tracker-peach-sigma.vercel.app

MAKE SURE YOUR ARDUINO IS
CONNECTED TO YOUR COMPUTER AND
THAT YOUR CODE HAS ALREADY
BEEN UPLOADED



CONNECT TO ARDUINO HIDE VIDEO

START TRACKING

TURN LED ON

HIDE VIDEO

NEXT

1. BUILD YOUR CREATURES

- GO CRAZY WITH IT.
- NO RULES.

2. MODIFY THE CODE.

- MAKE THE MOVEMENTS YOUR OWN.
- SOLVE THE CHALLENGES.
- ADD ANOTHER MOTOR IF THERE ARE EXTRAS.

3. CREATURE VS CREATURE FACE OFF

CONTACT INFO

WEBSITE: CIRCLE-4.NET

EMAIL: C_4@GMX.COM

feel free to reach out