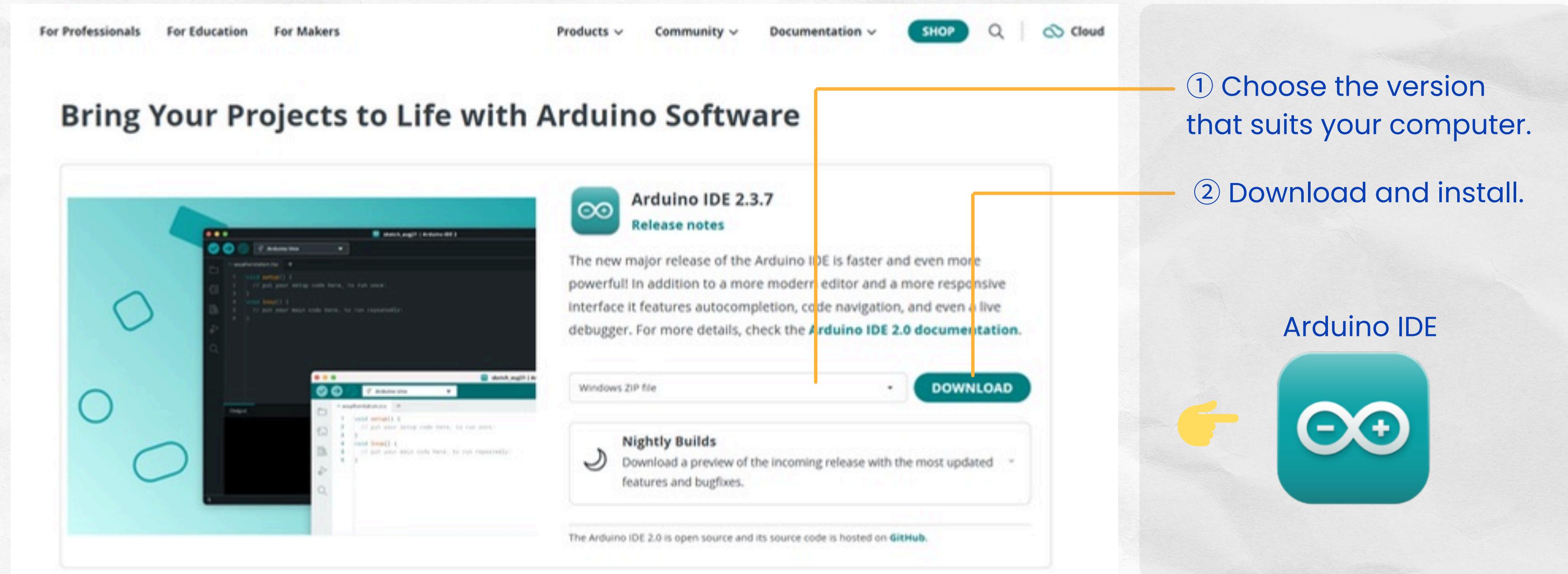


Welcome to Mechanical Flower Workshop!

Please install the **Arduino IDE** first.

<https://www.arduino.cc/en/software/>

Github Link: <https://shorturl.at/8tspg>



For Professionals For Education For Makers

Products Community Documentation SHOP Cloud

Bring Your Projects to Life with Arduino Software

 **Arduino IDE 2.3.7**
Release notes

The new major release of the Arduino IDE is faster and even more powerful! In addition to a more modern editor and a more responsive interface it features autocompletion, code navigation, and even a live debugger. For more details, check the [Arduino IDE 2.0 documentation](#).

Windows ZIP file  DOWNLOAD

 **Nightly Builds**
Download a preview of the incoming release with the most updated features and bugfixes.

The Arduino IDE 2.0 is open source and its source code is hosted on [GitHub](#).

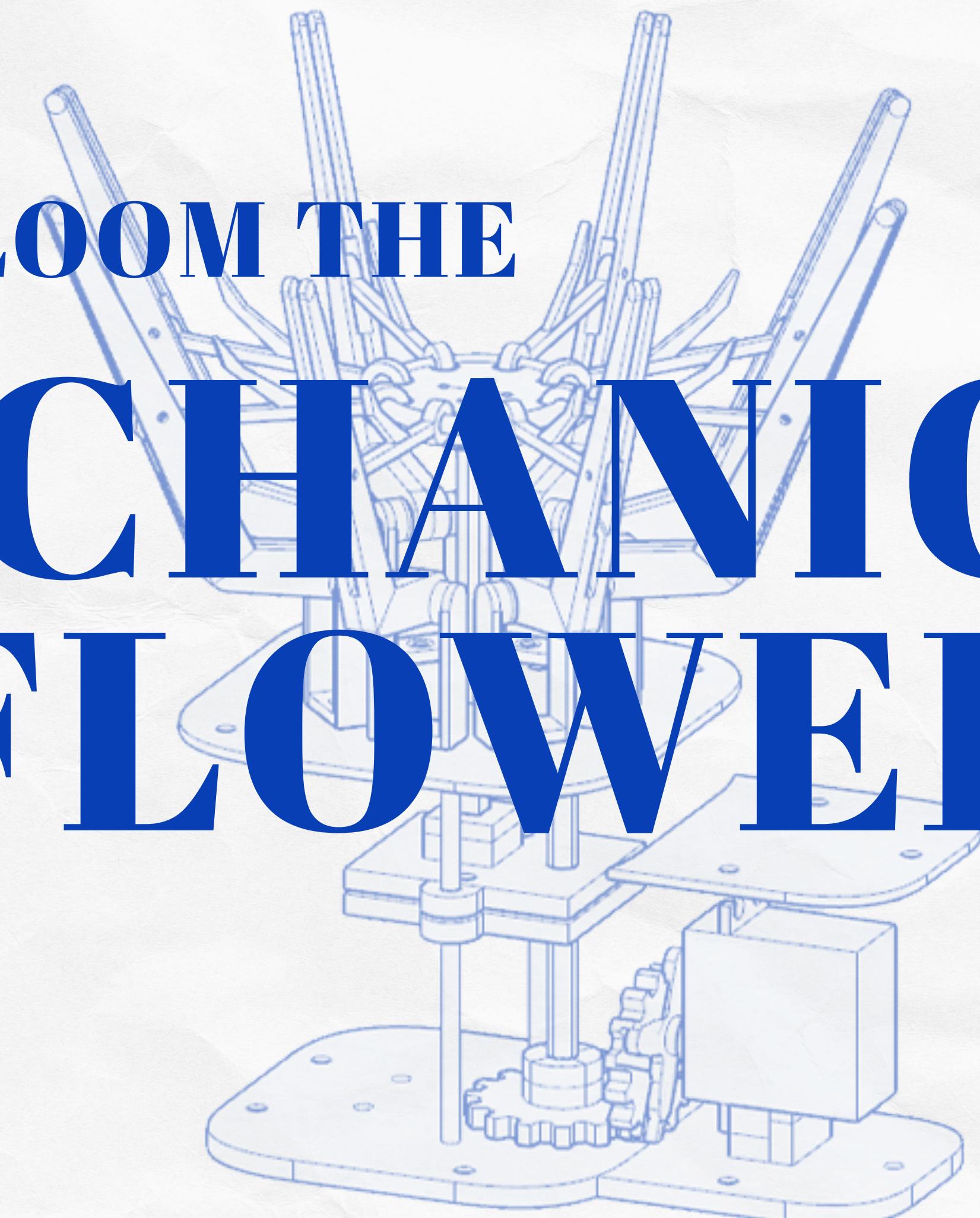
① Choose the version that suits your computer.

② Download and install.

Arduino IDE



LET'S BLOOM THE MECHANICAL FLOWER

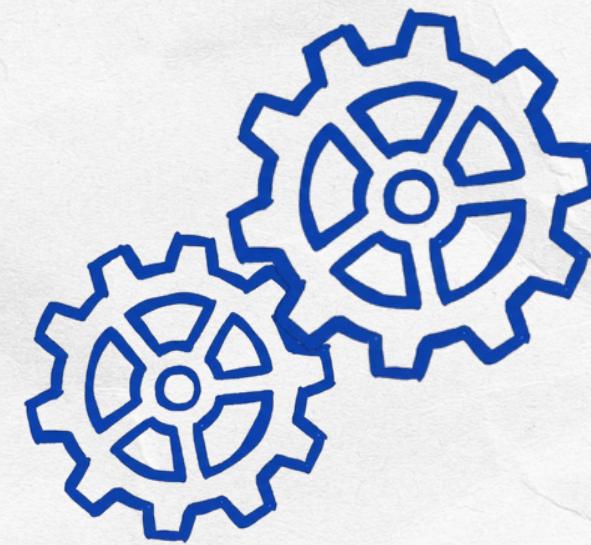


11/02/2026

Makerspace A
14:00 - 16:30

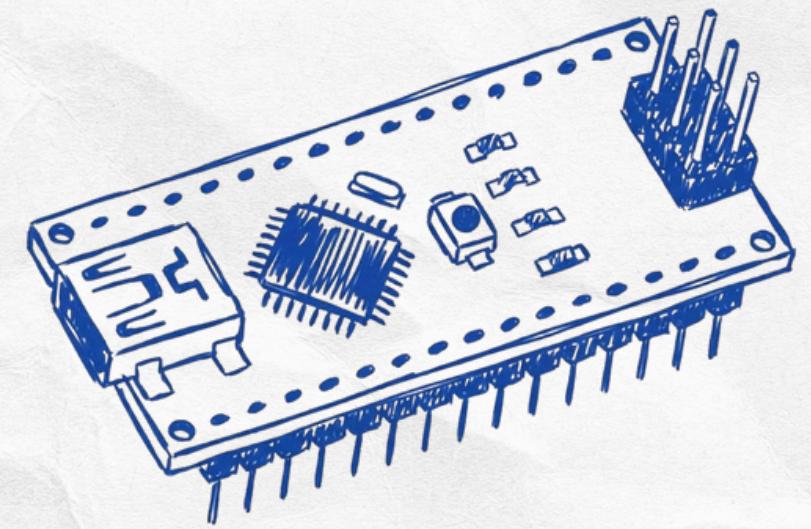
by Wickey & MAX

Introduction



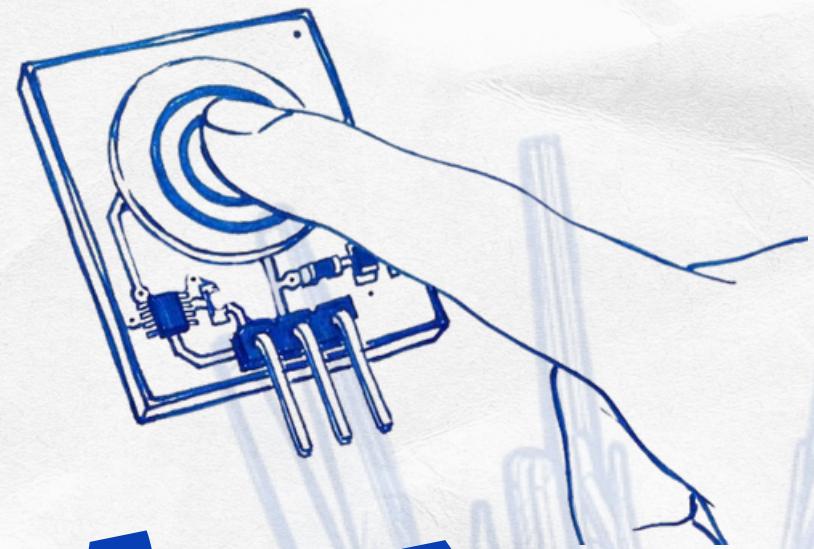
Transmission

How gears drive the flower bloom?
Step-by-step to assemble it!



Arduino

Configure the Arduino environment;
Drive the MG996R servo by command.

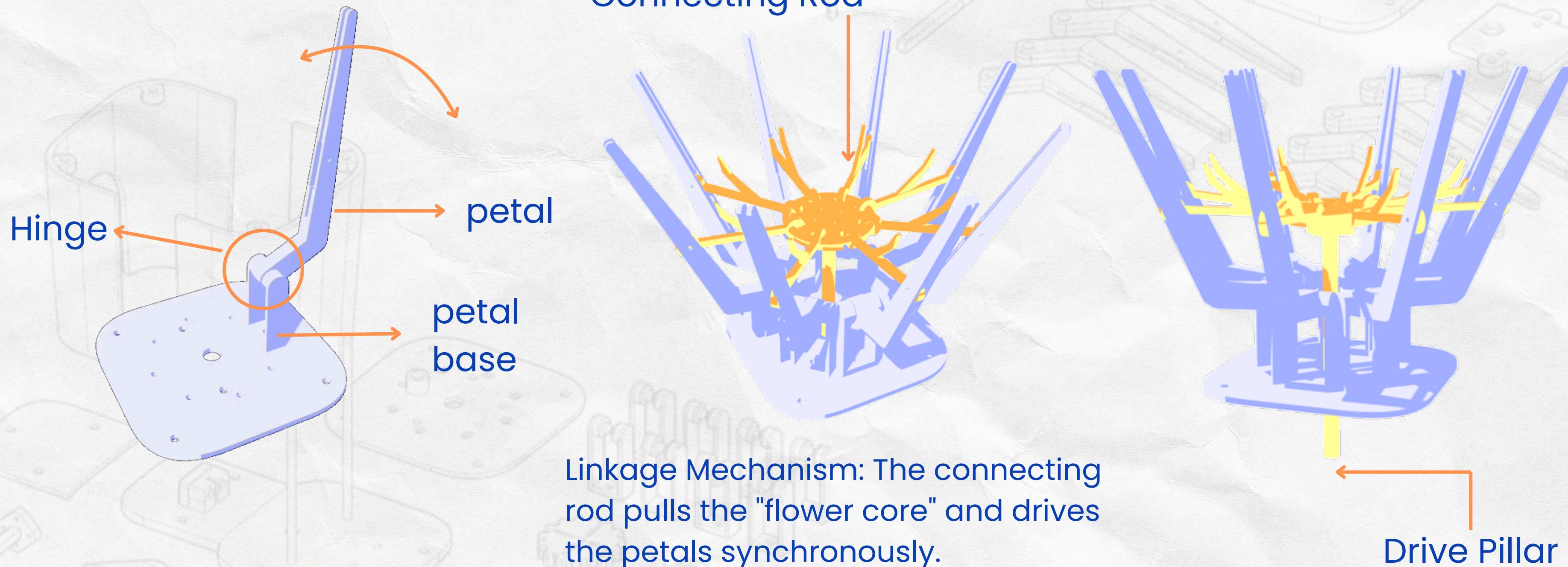


Sensor

Button, Touch Sensor, LDR Sensor

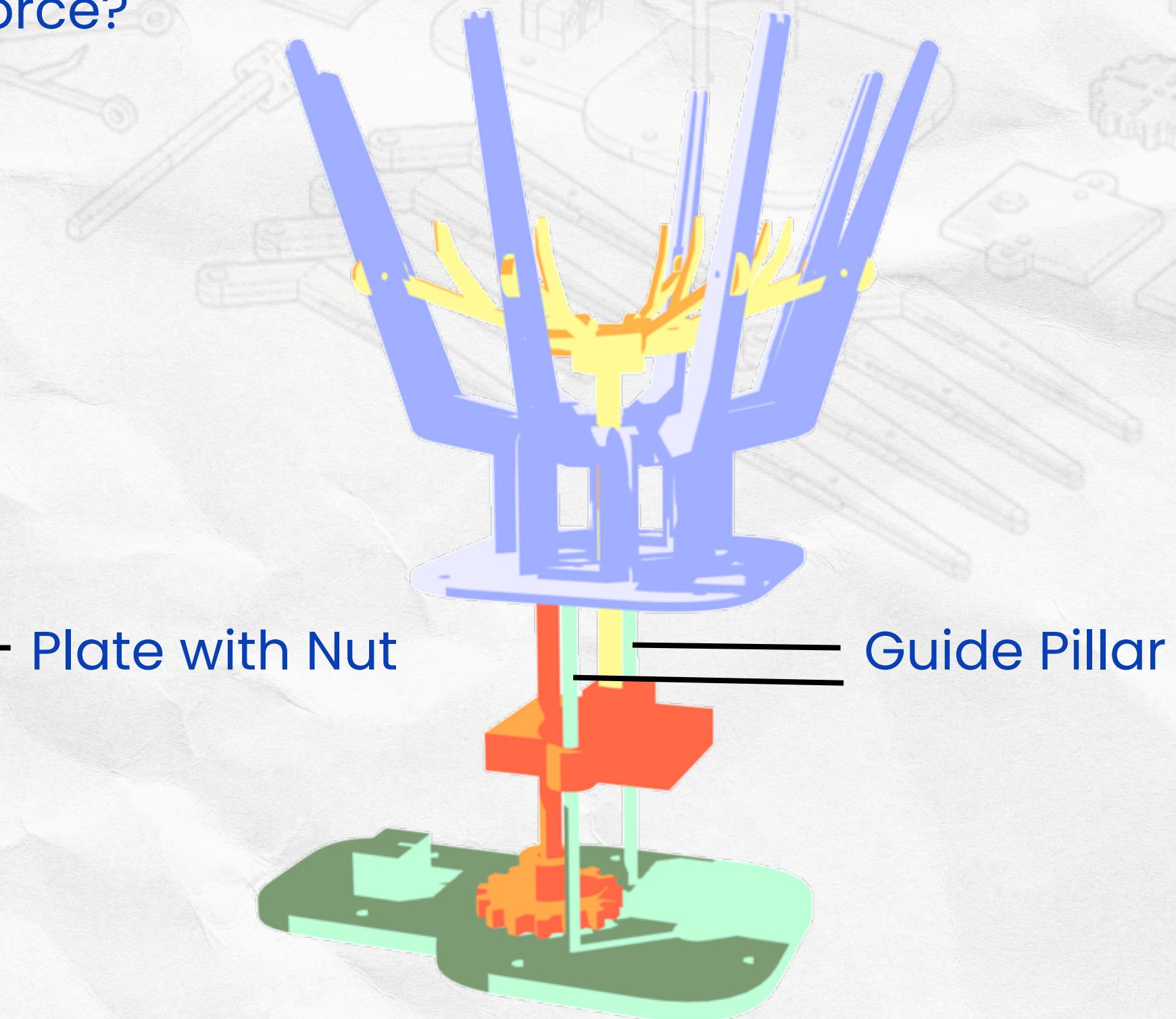
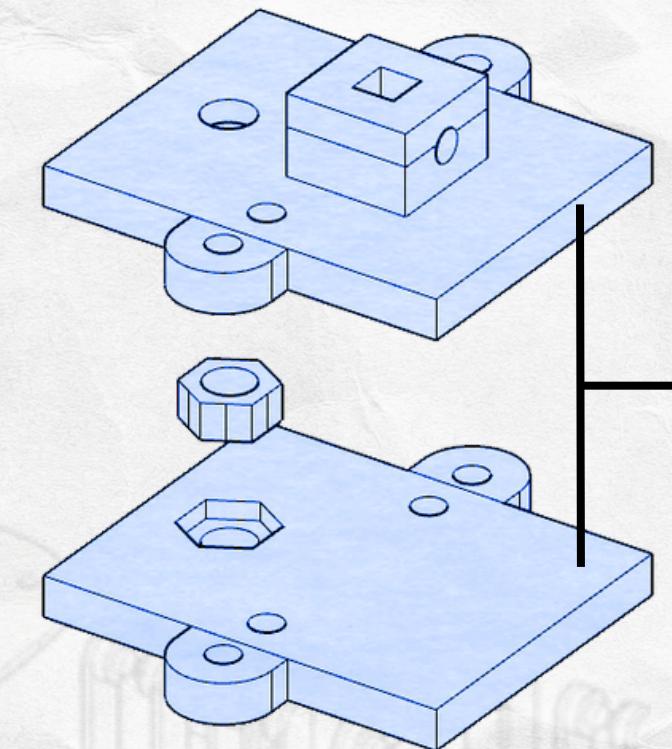
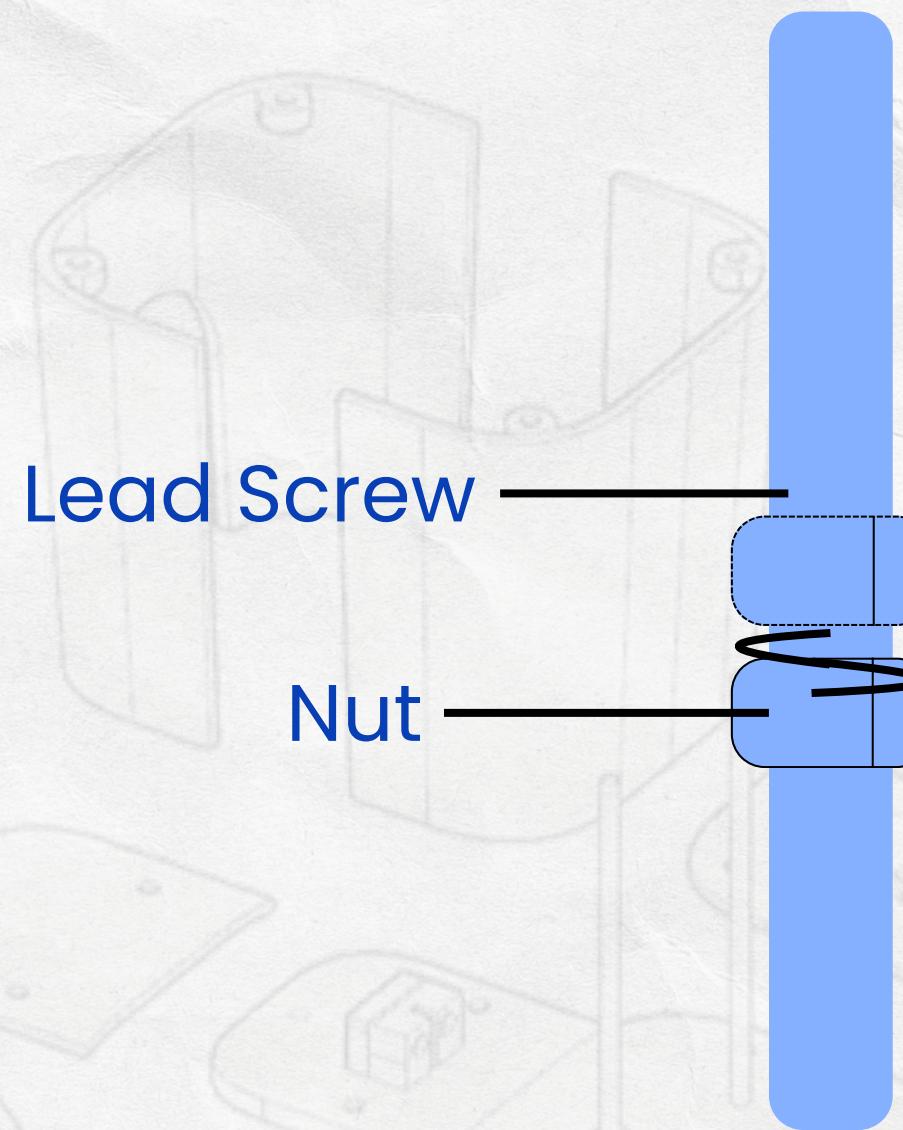
How do the mechanical parts move like flower?

1. Let the petal parts move like a real flower



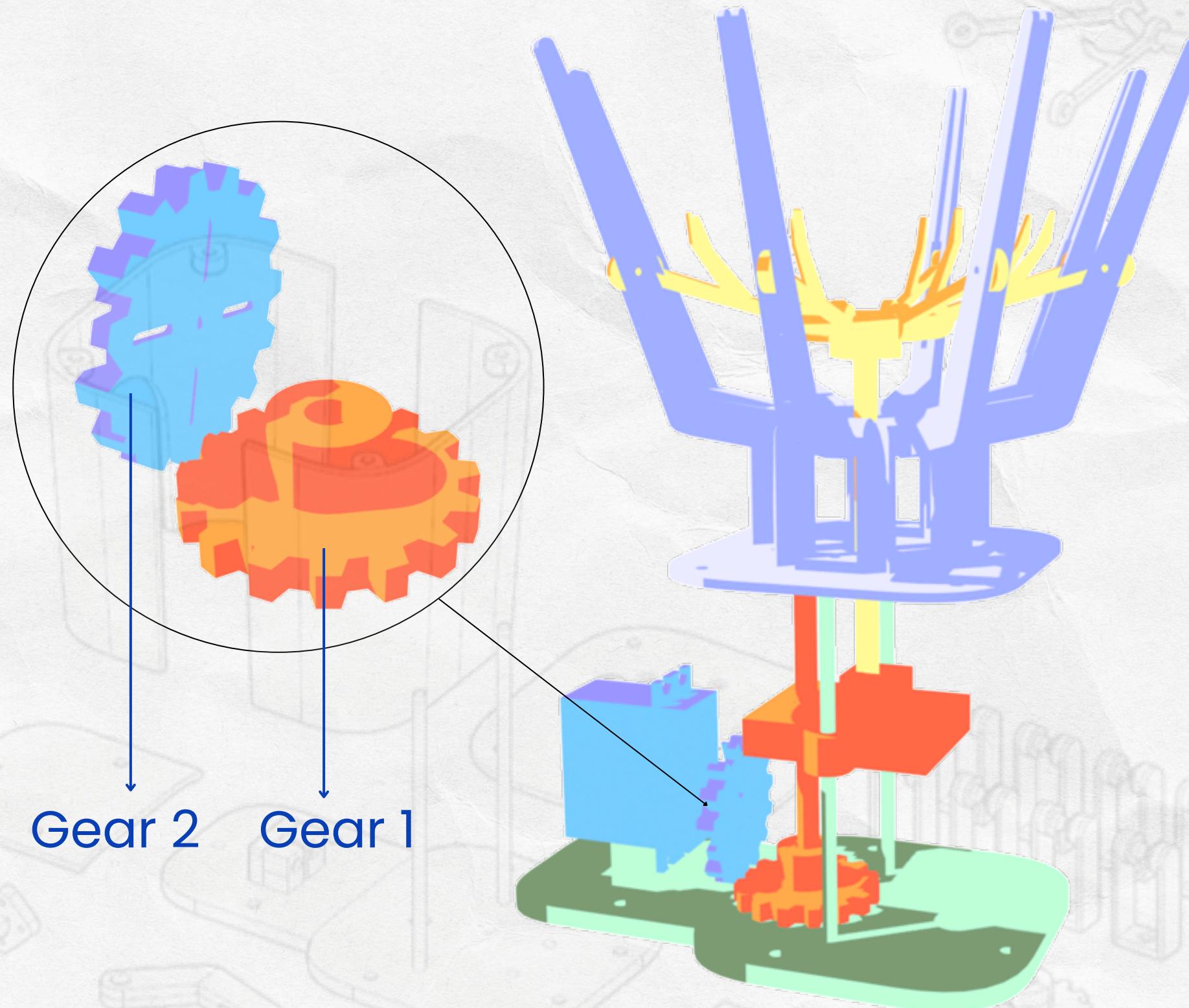
How do the mechanical parts move like flower?

2. How to generate a vertical up-and-down force?



How do the mechanical parts move like flower?

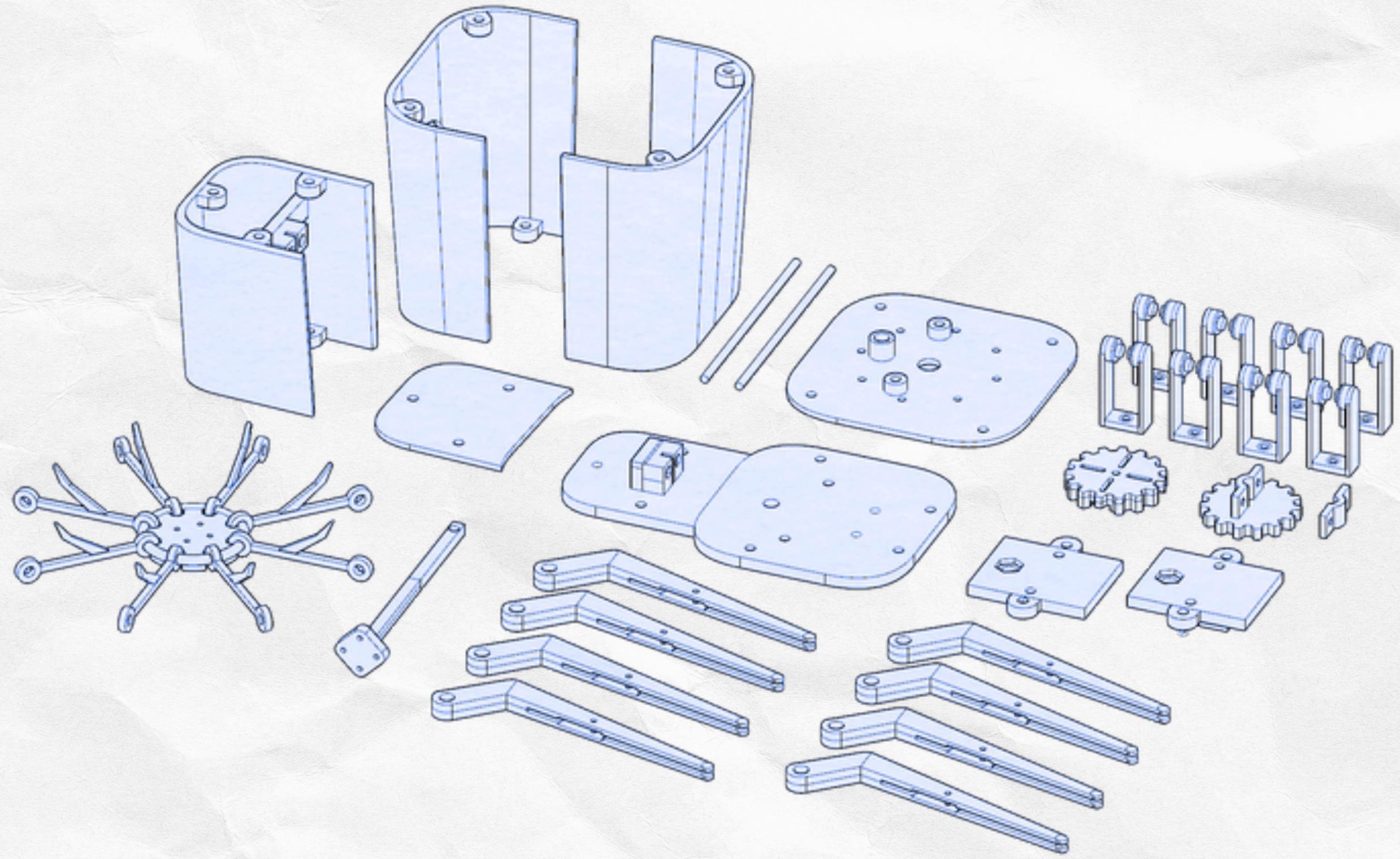
3. Gear transmission



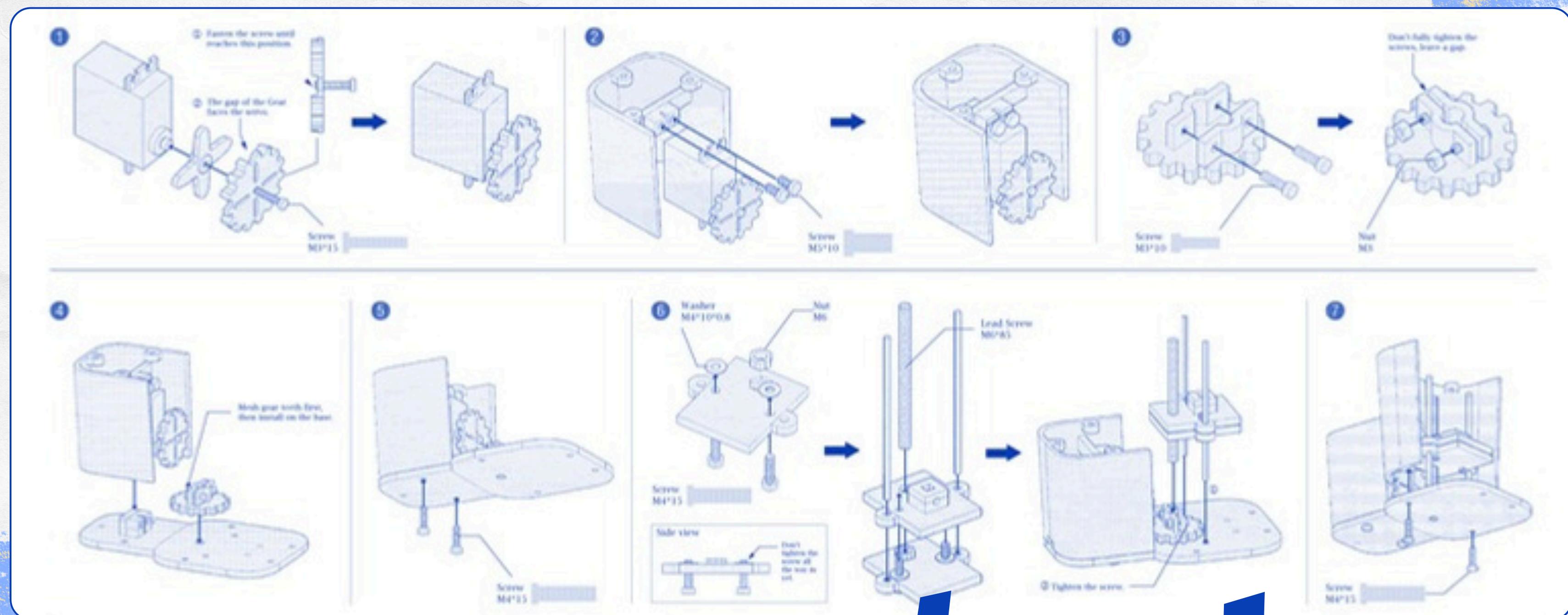
Why?

Change the Direction of Power:
From rotational to linear motion

3D Printing Parts

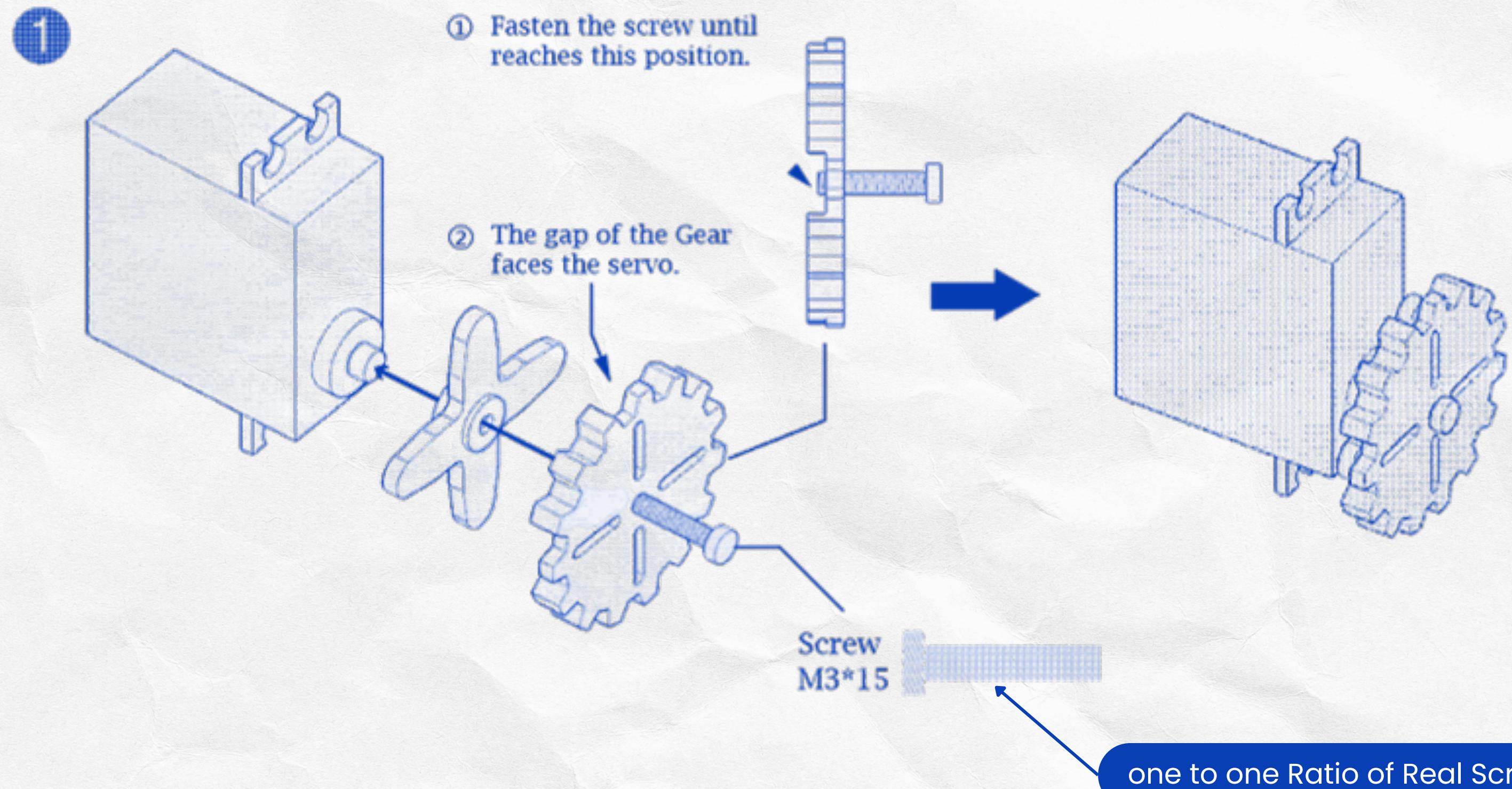


Please check the guidance sheet on your table.

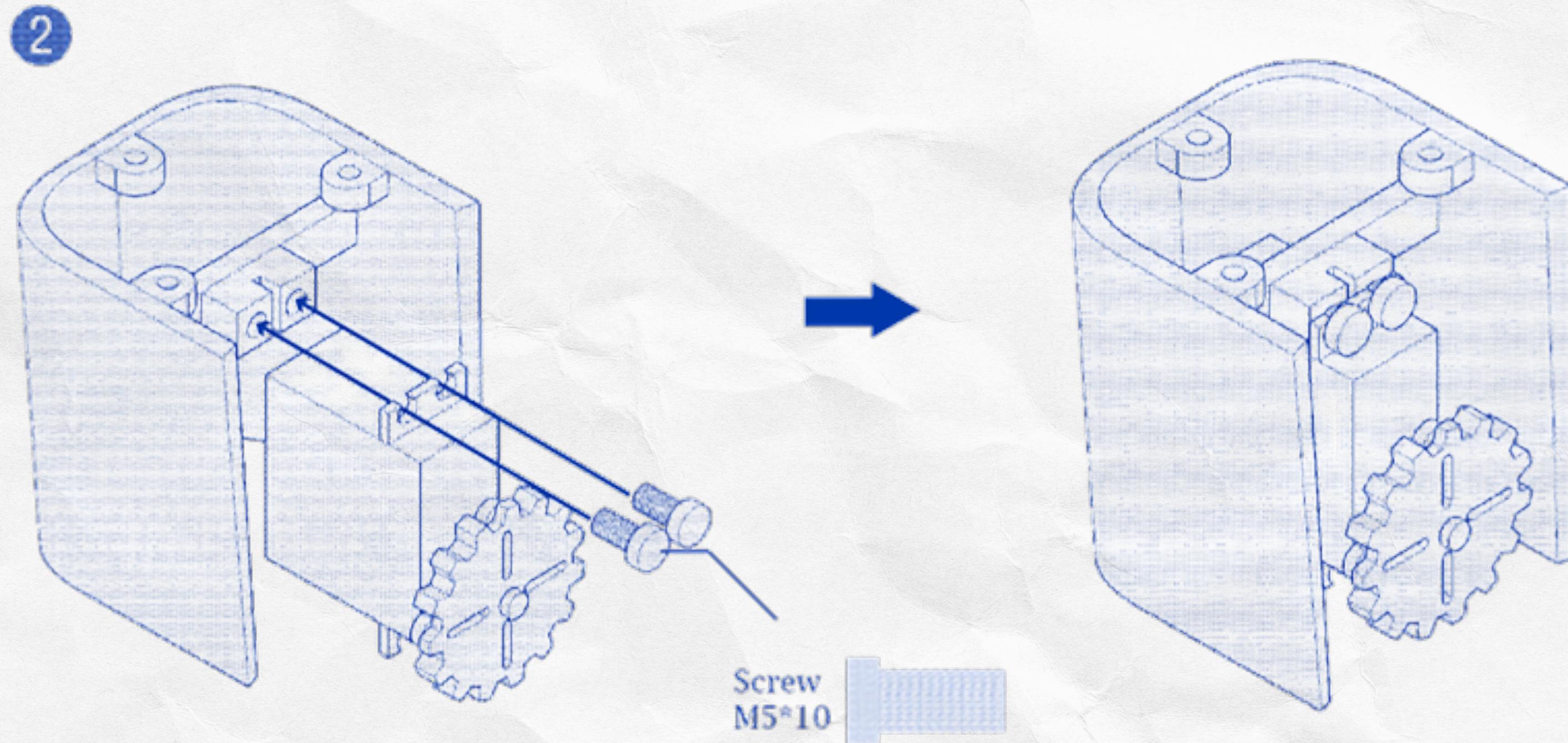


ASSEMBLE IT!

Let's ASSEMBLE it!

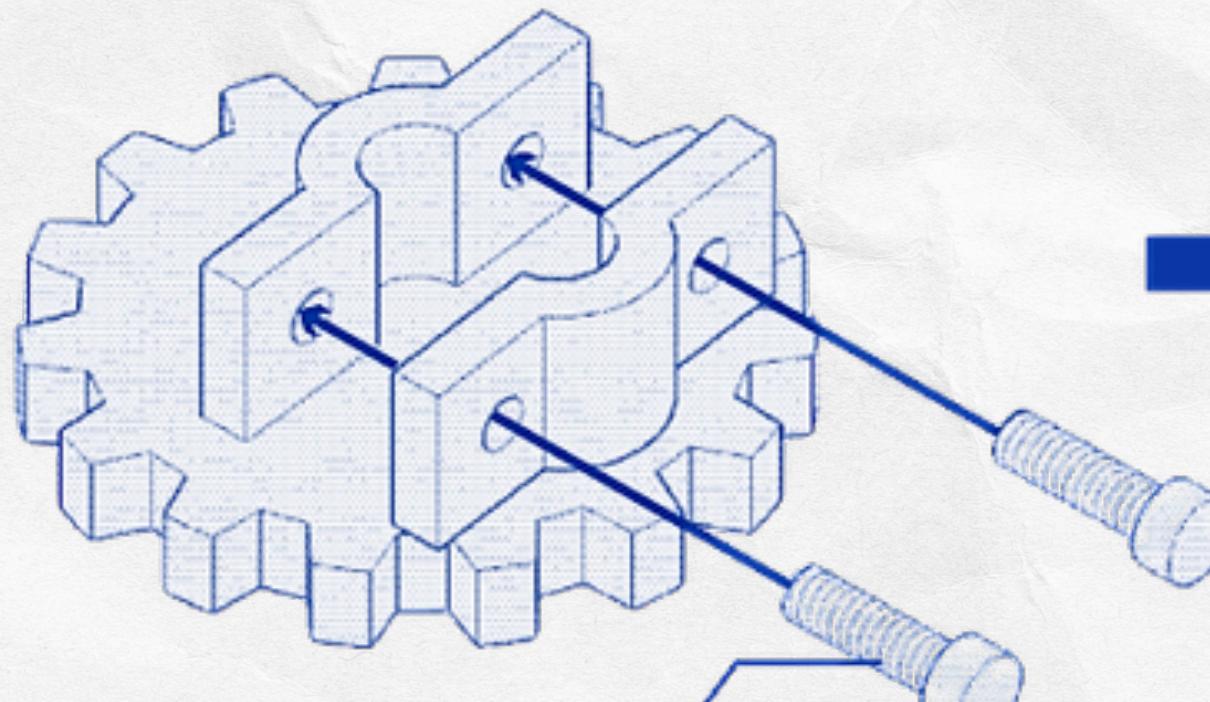


Let's ASSEMBLE it!



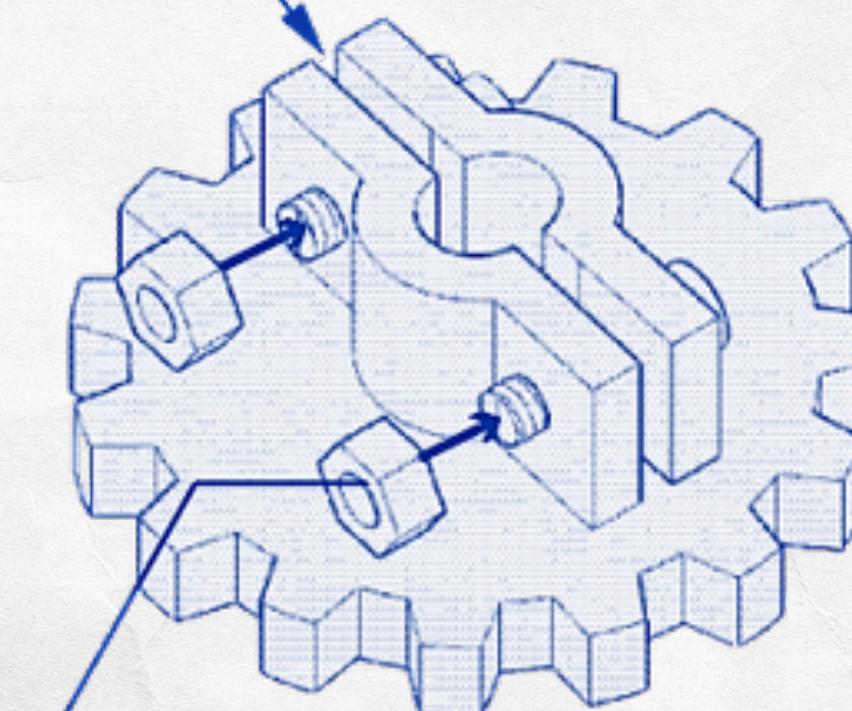
Let's ASSEMBLE it!

③



Screw
M3*10

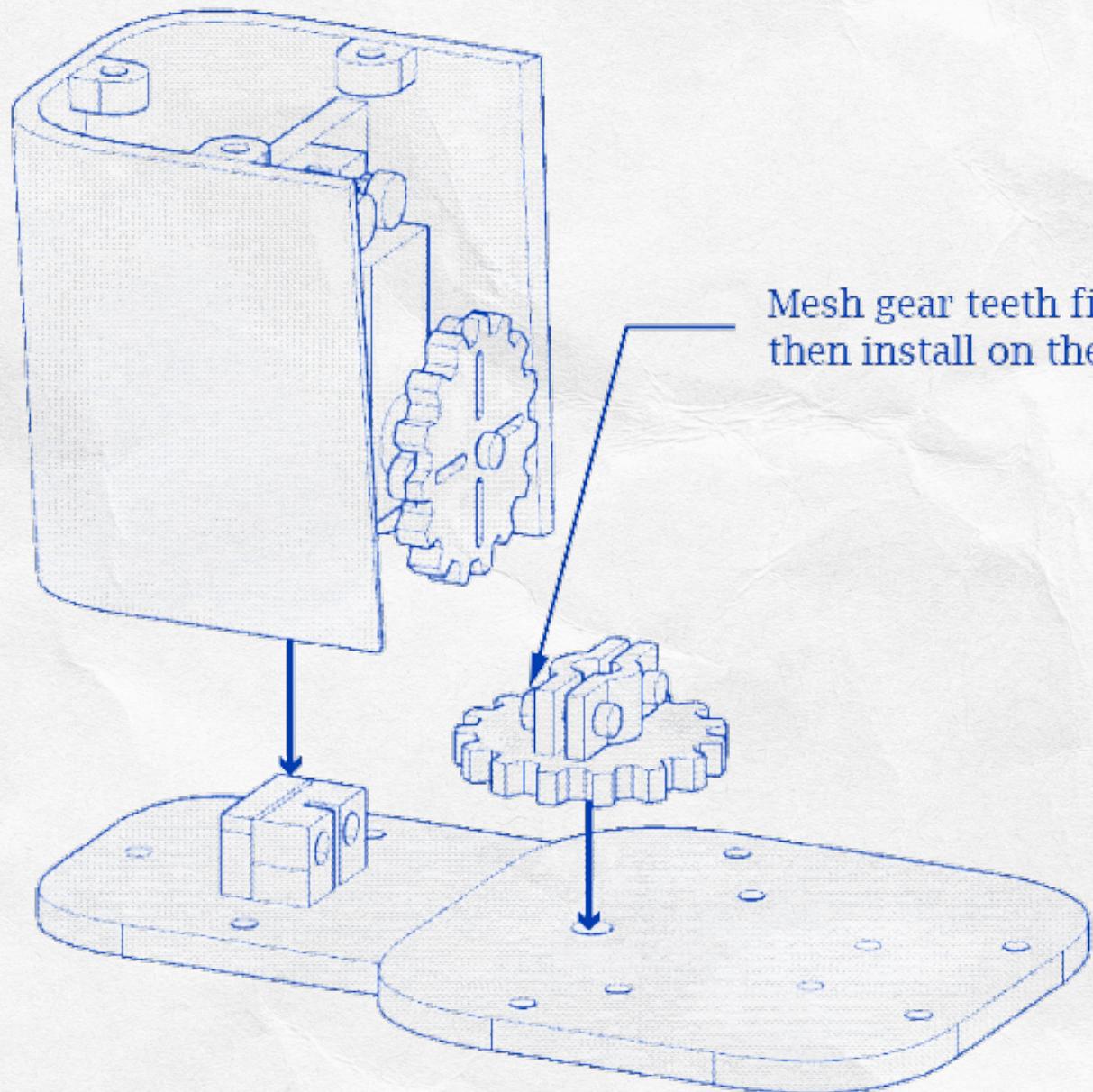
Don't fully tighten the
screws, leave a gap.



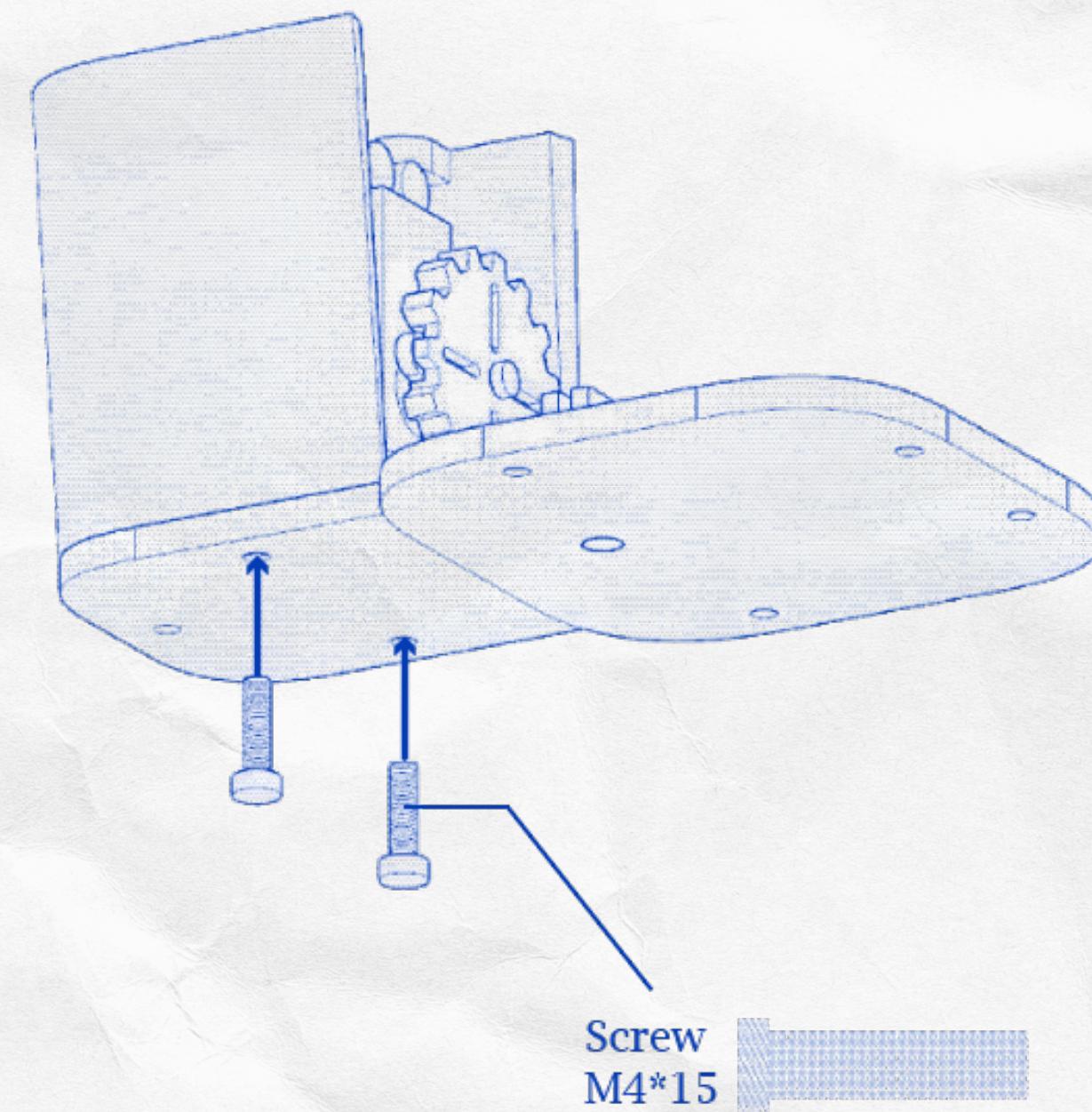
Nut
M3

Let's ASSEMBLE it!

4



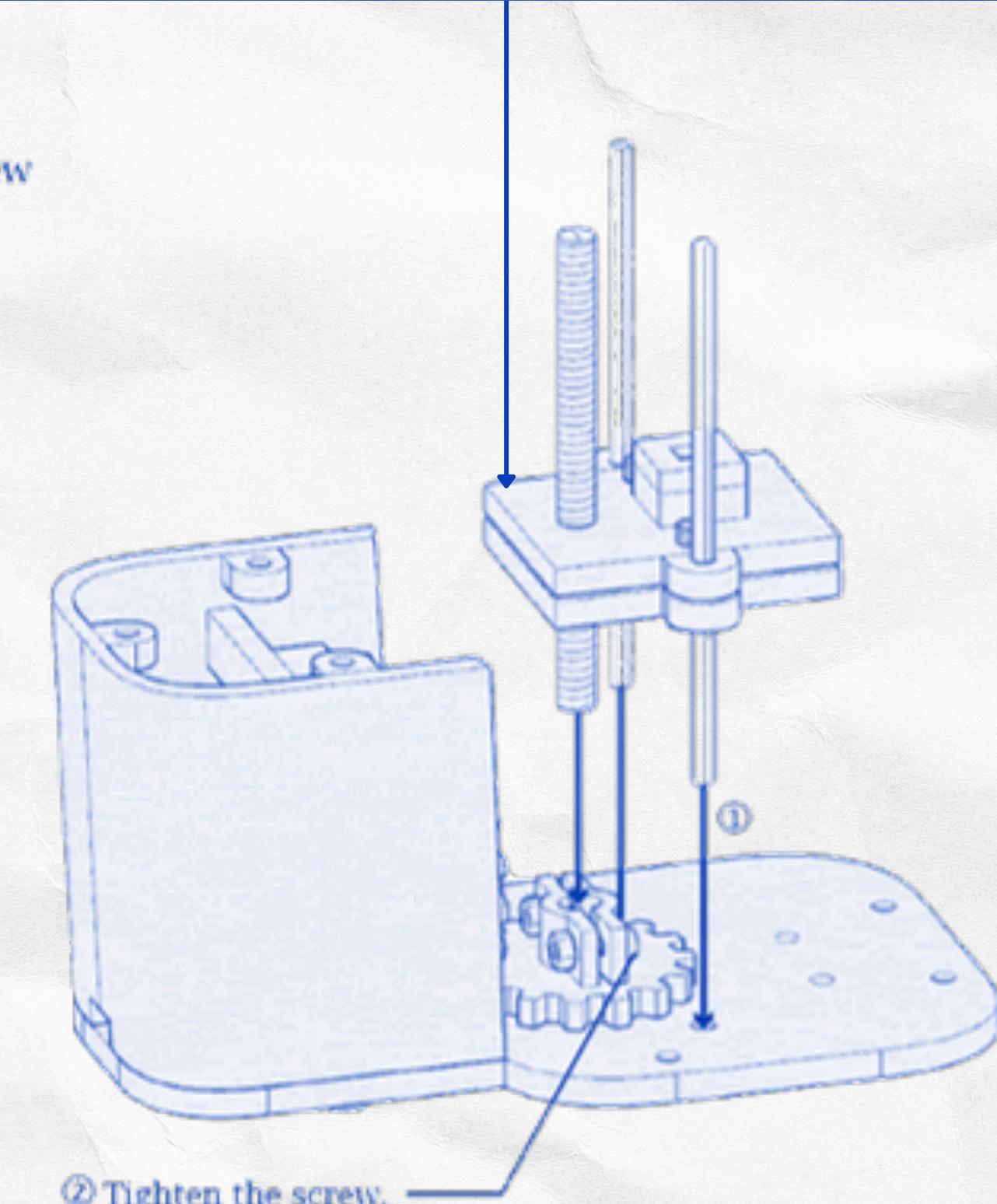
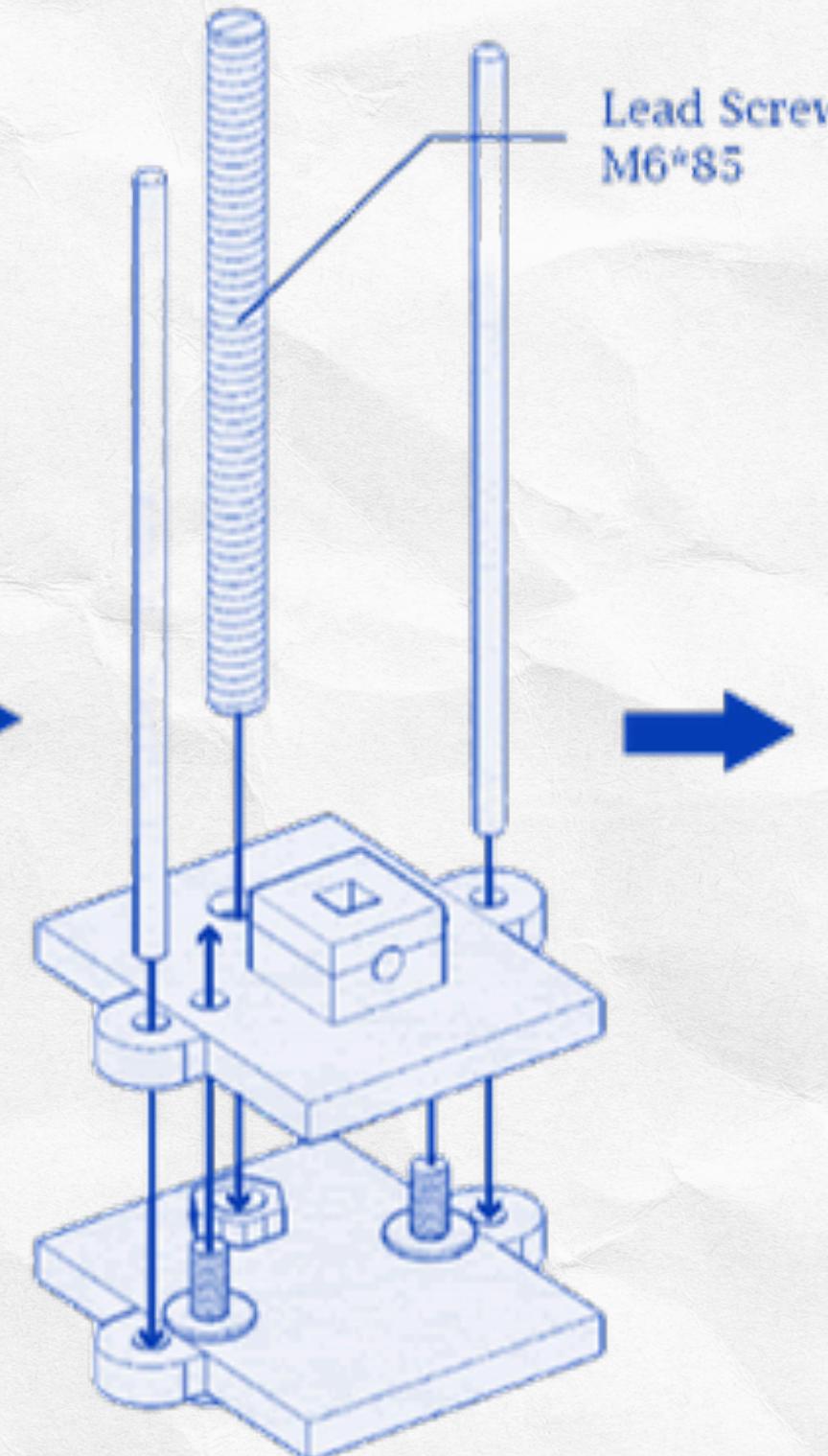
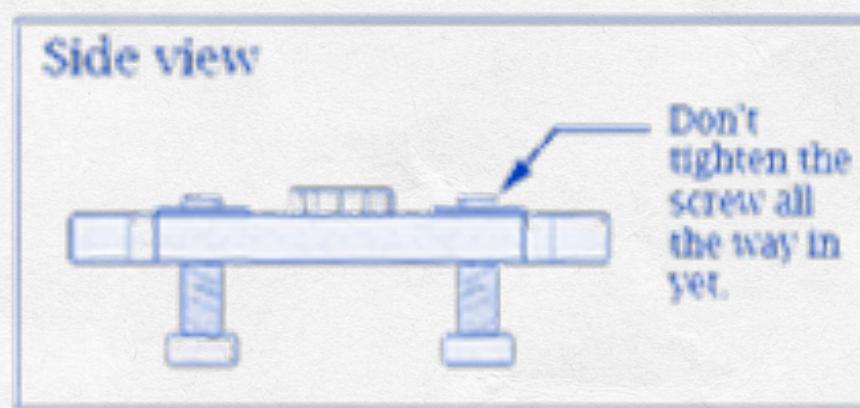
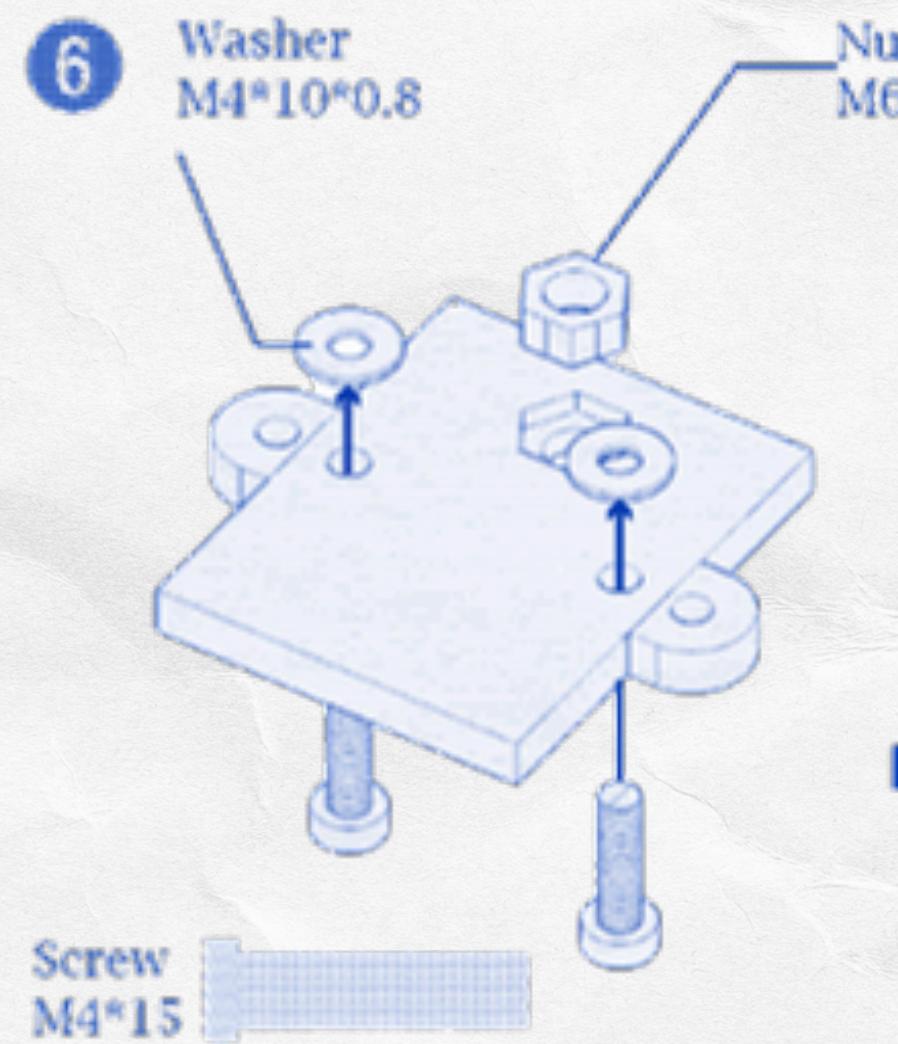
Mesh gear teeth first,
then install on the base.



Screw
M4*15

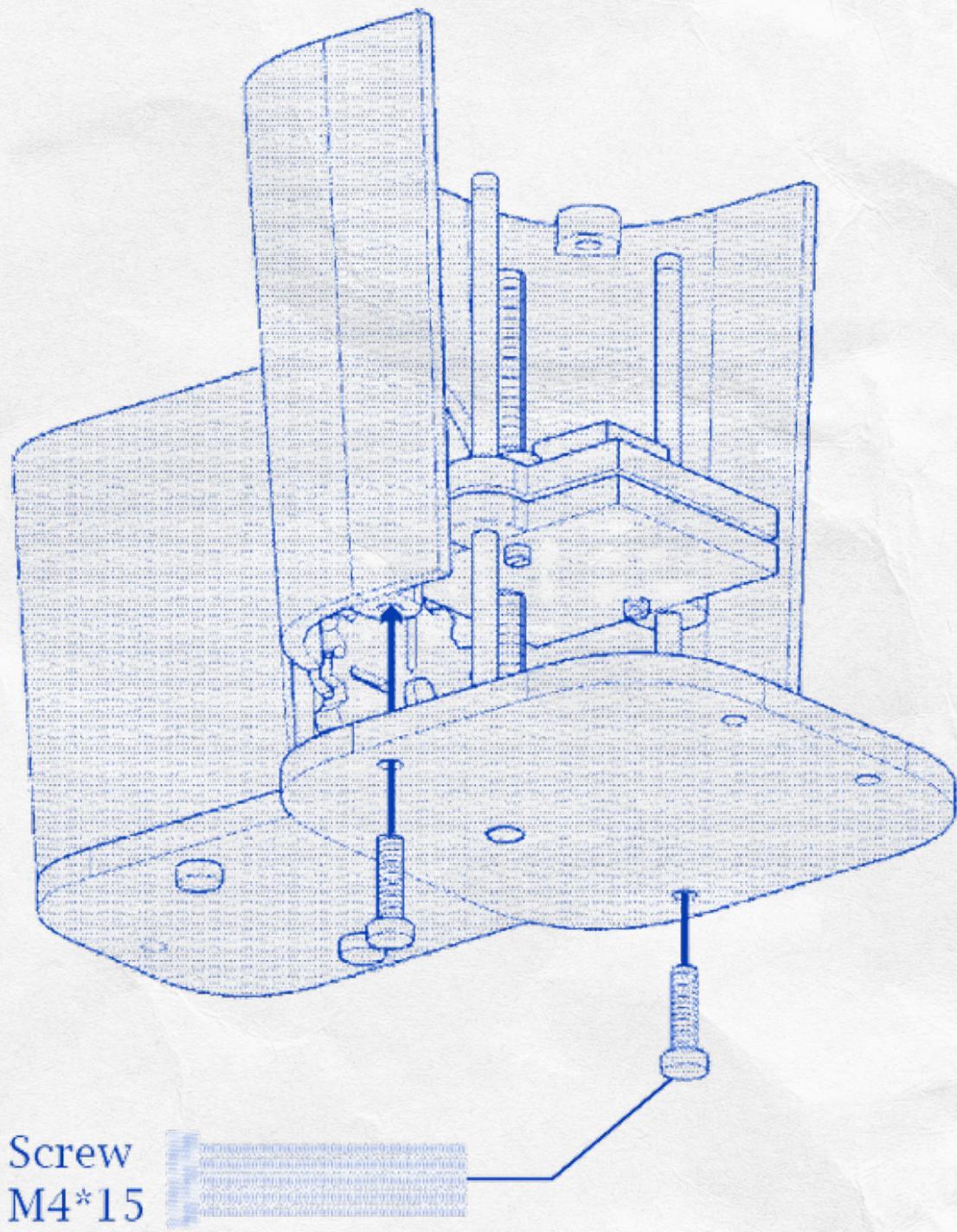
Let's ASSEMBLE it!

Caution: Put the nut in the middle of the lead screw

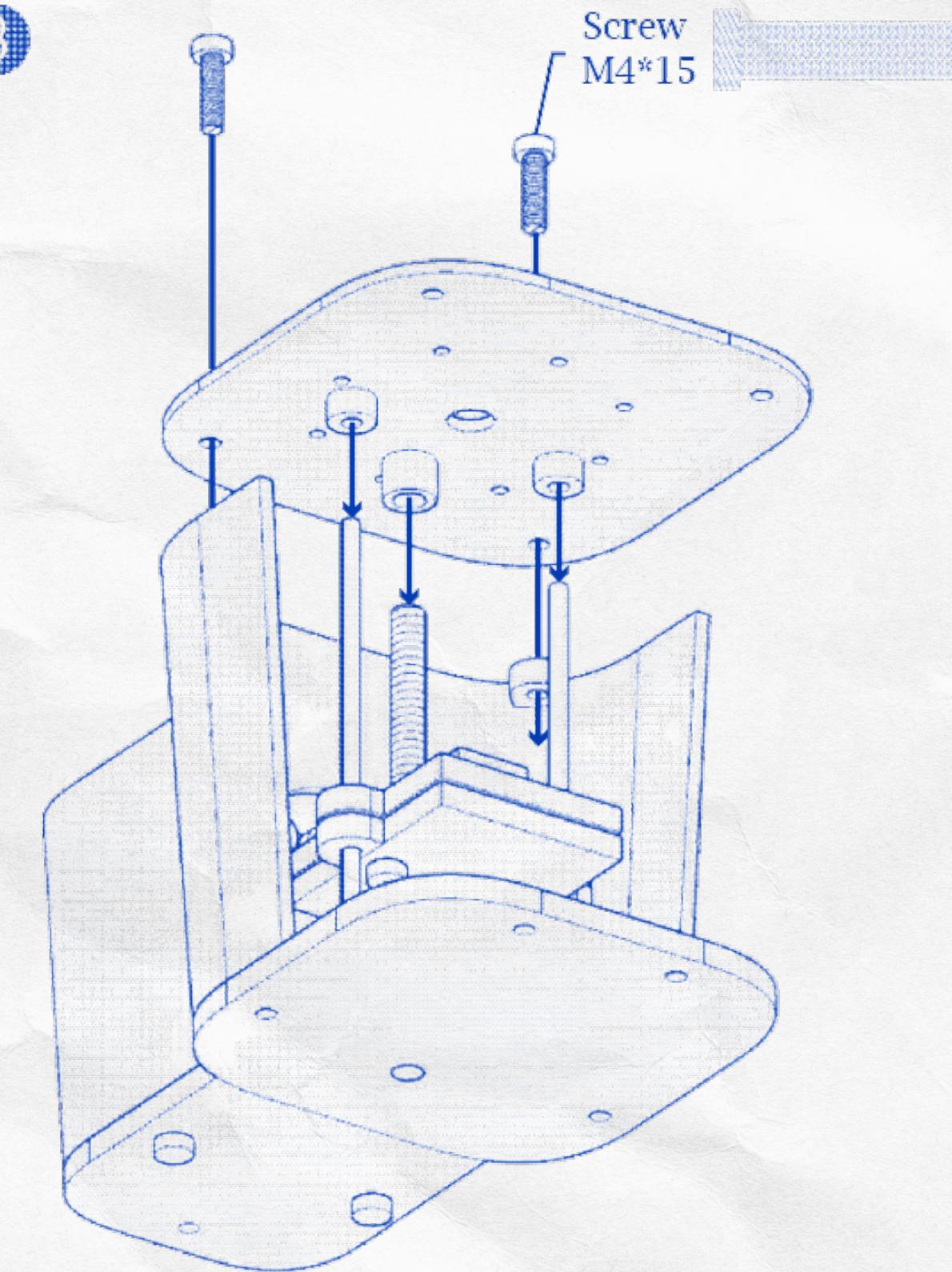


Let's ASSEMBLE it!

7

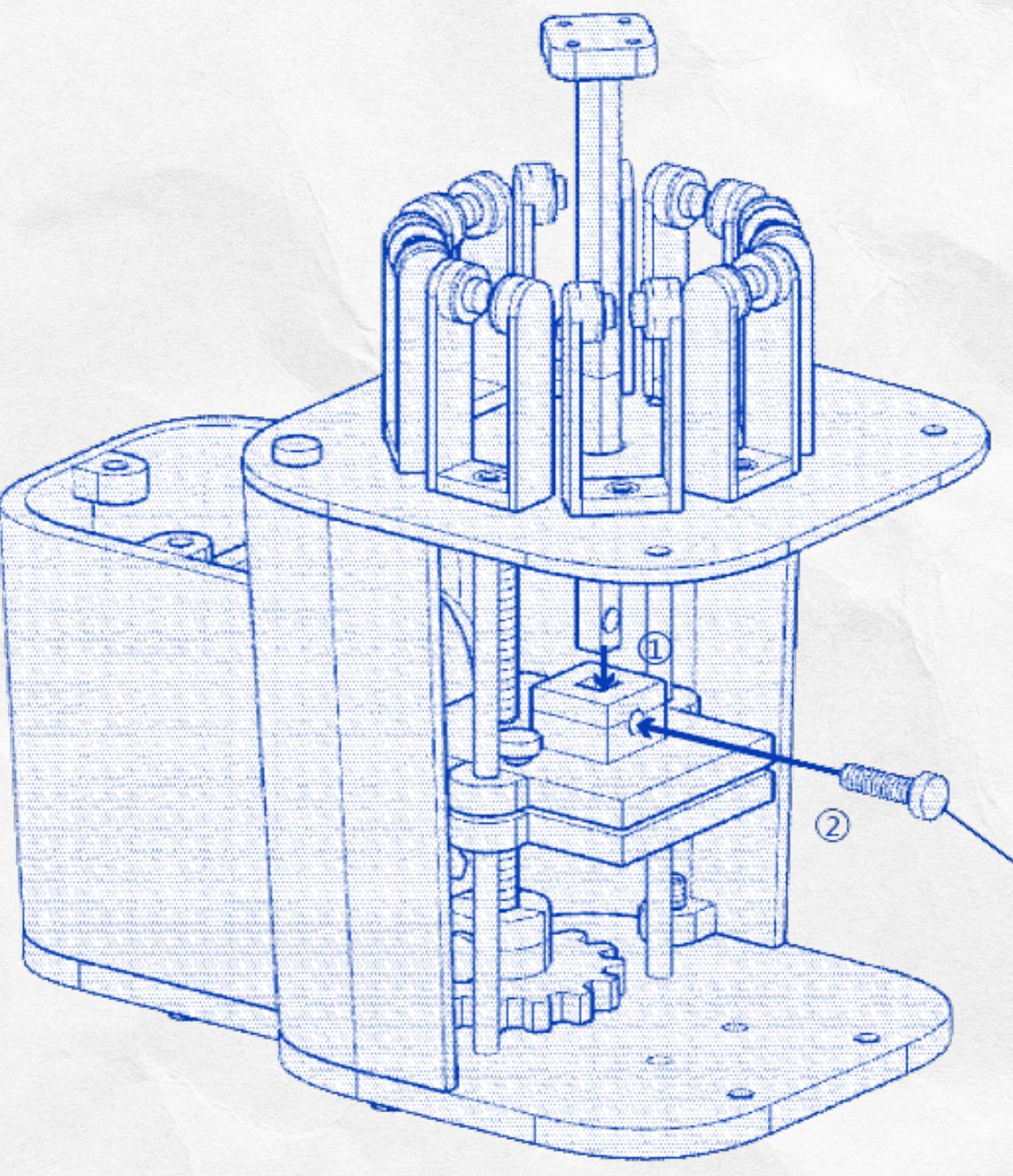


8



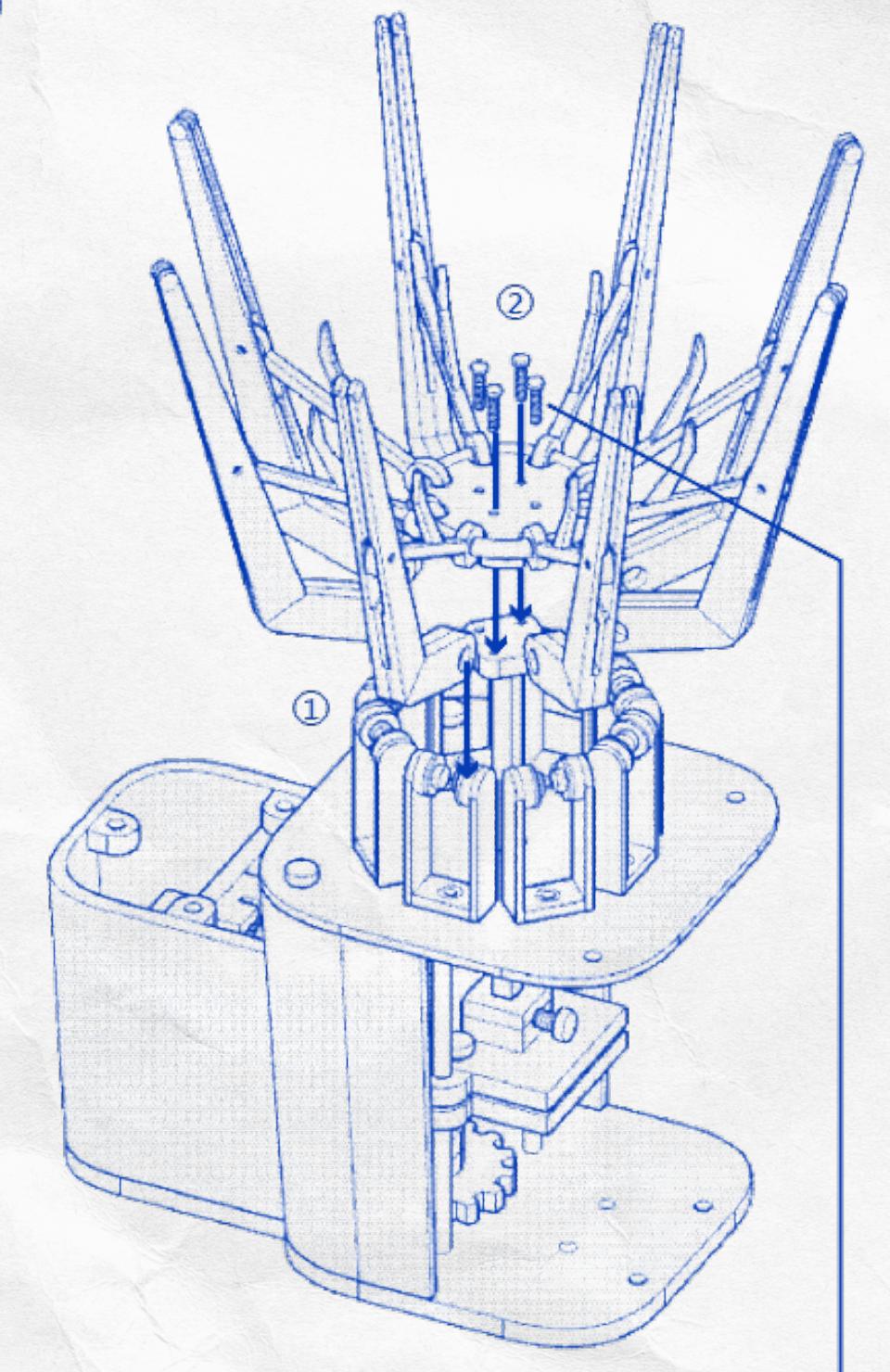
Let's ASSEMBLE it!

9



Screw
M4*15

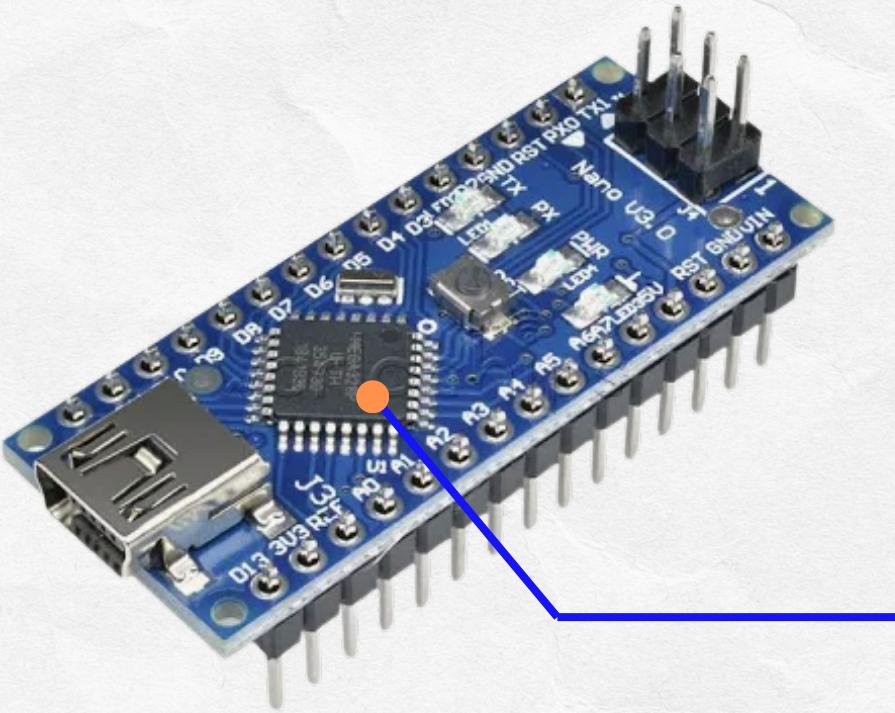
10



Screw
M2*10

“Brain” of Mechanical flower

Development Board: Arduino Nano



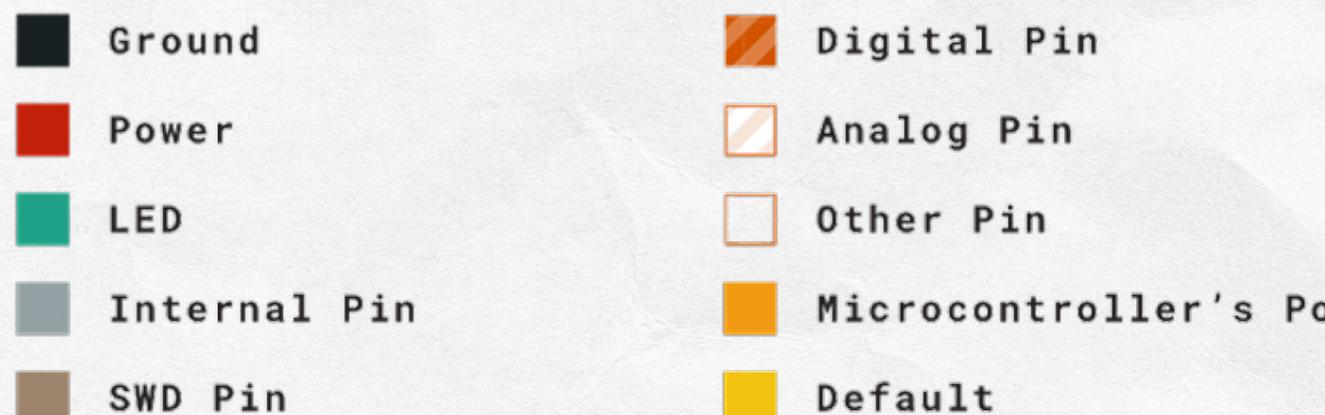
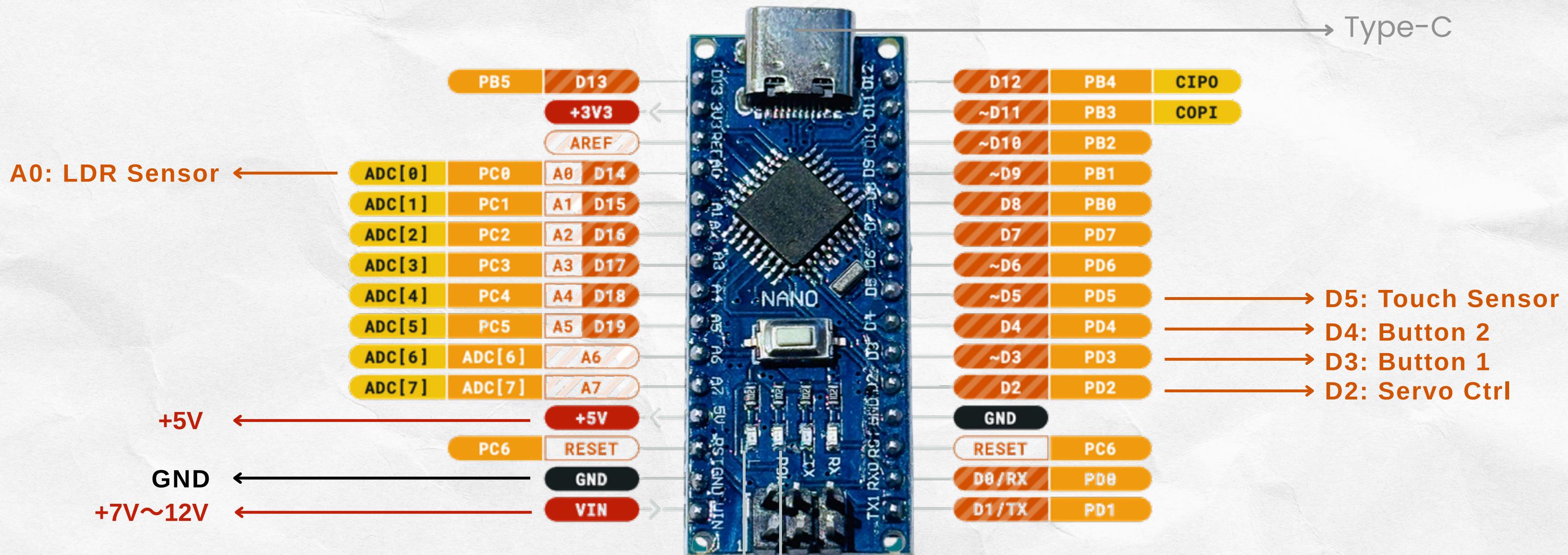
- Based on ATmega328P Microcontroller
- Low cost, low power, and easy for embedded projects

ATmega328P



Arduino Nano Pinout Diagram

30 pins in total



<https://docs.arduino.cc/resources/pinouts/A000005-full-pinout.pdf>

<https://docs.arduino.cc/hardware/nano/>



Install Arduino IDE



Arduino IDE (Integrated Development Environment)

```
sketch_feb6a | Arduino IDE 2.3.7
Arduino Nano

sketch_feb6a.ino
1 void setup() {
2     // put your setup code here, to run once:
3
4 }
5
6 void loop() {
7     // put your main code here, to run repeatedly:
8
9 }
10
```

<https://shorturl.at/8tspg>

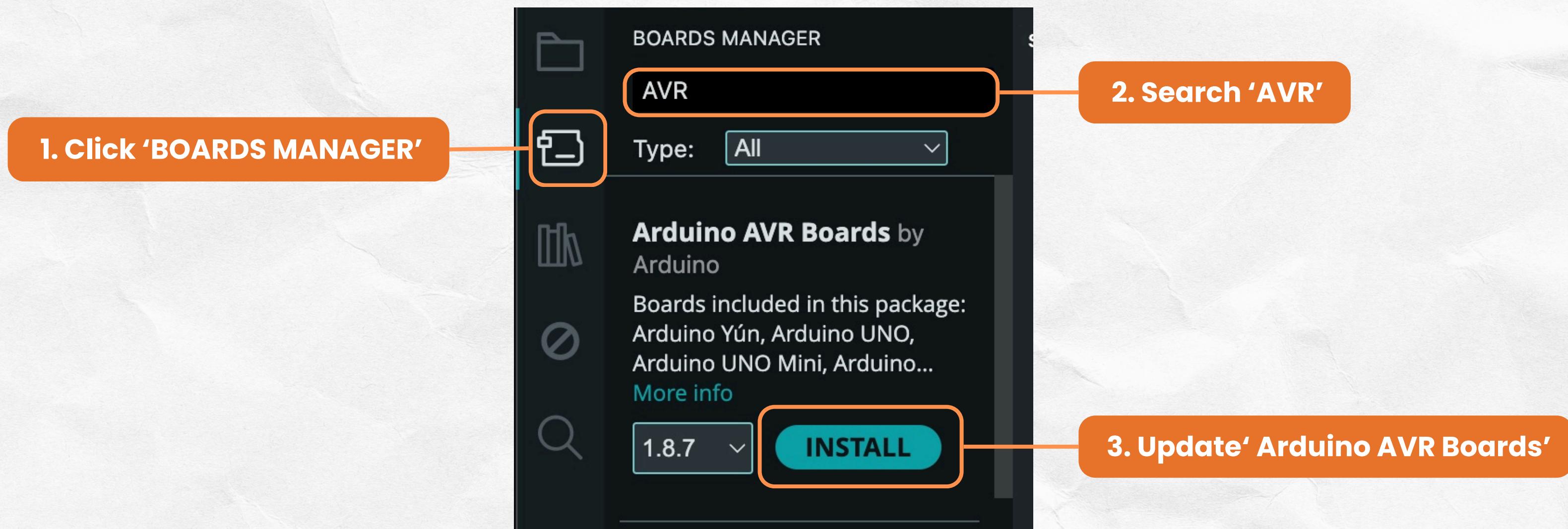
MacOS needs to install CH340 Driver

CH341SER_MAC.ZIP



Development Environment Configuration

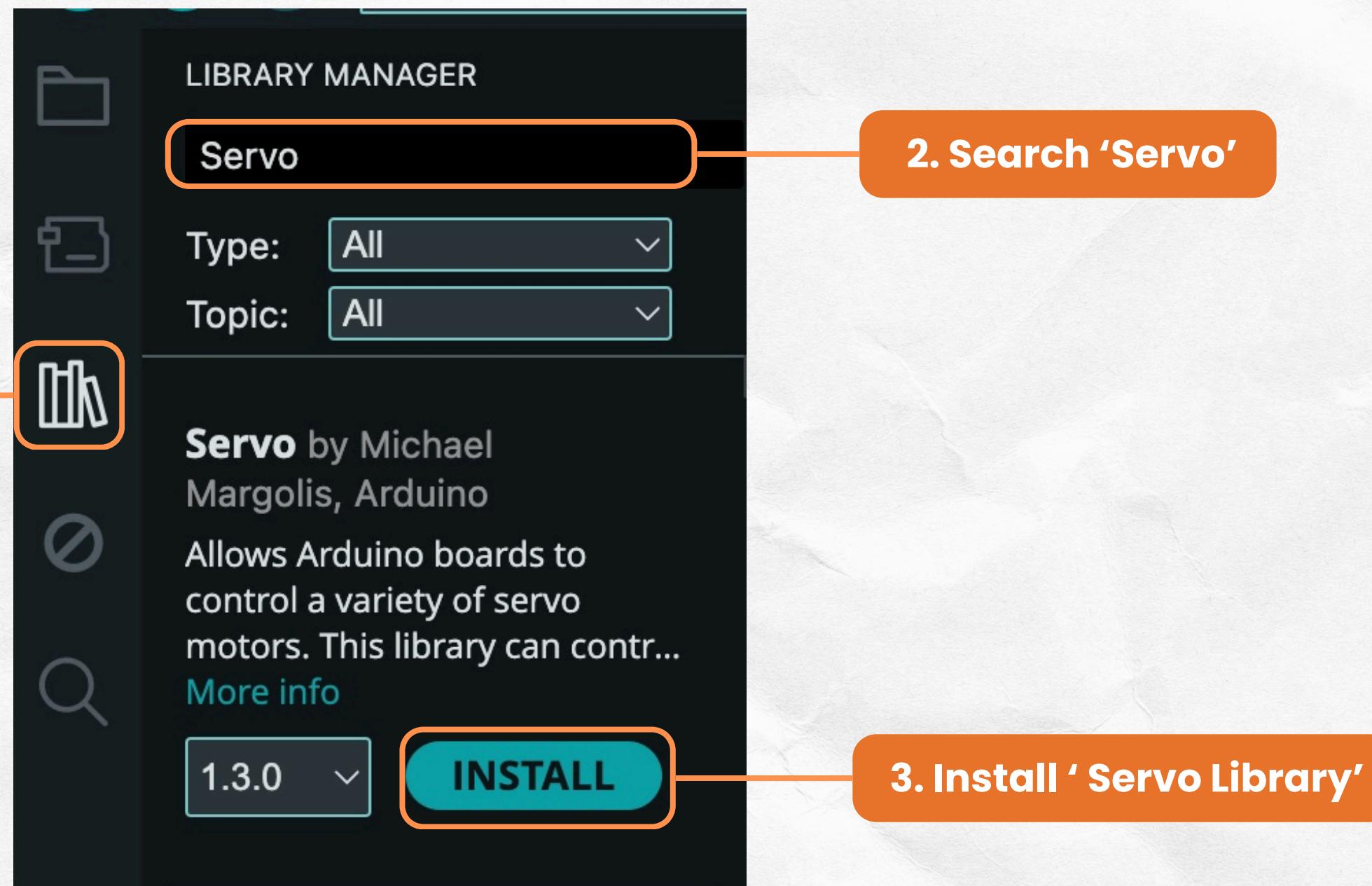
Update Board manager

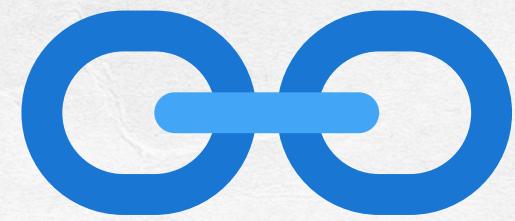




Development Environment Configuration

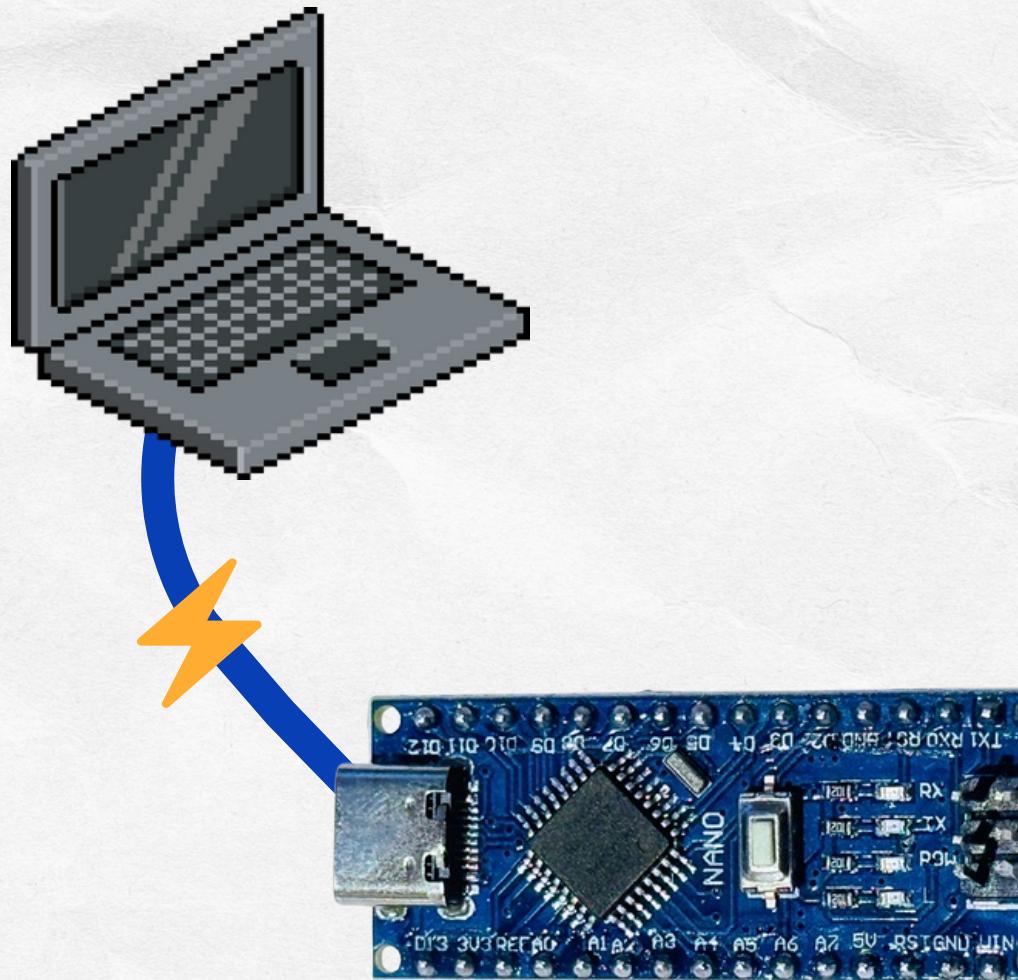
Install Library



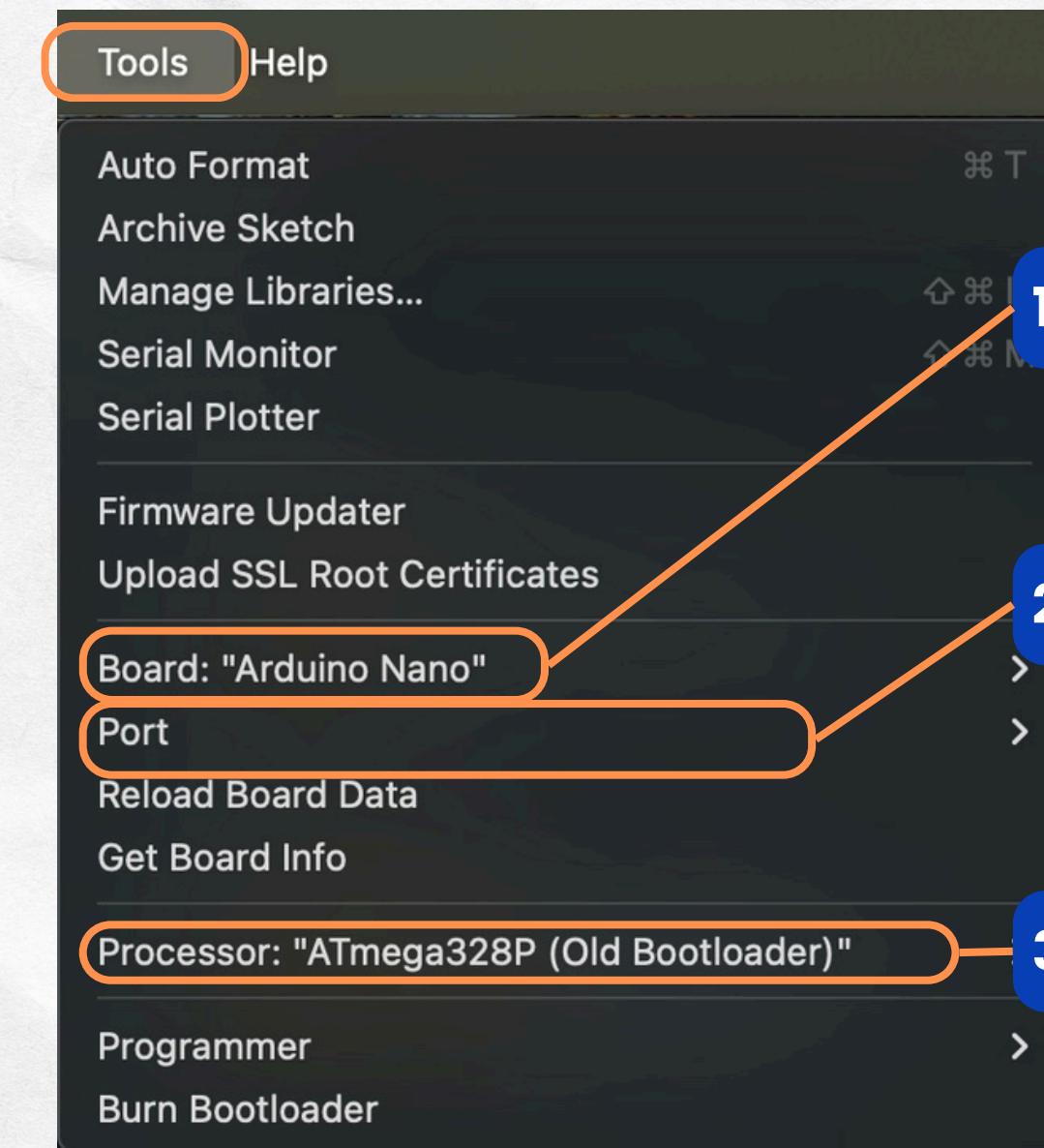


Let's Test Your Laptop Communicate with Arduino Nano Successfully !

- 1 Connect the Laptop with Arduino Nano



- 2 Select respective Board, Port, Processor



1. Select 'Arduino Nano'

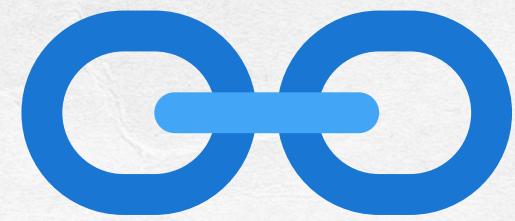
in AVR Arduino

2. Select newest port

Windows always is COMx;
Mac is /dev/cu.usbserial-xxx)

3. Select 'ATmega328P(Old Bootloader)'





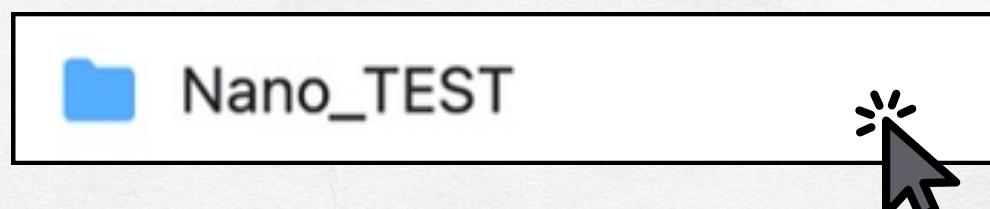
Let Test Your Laptop Communicate with Arduino Nano Successfully !

- 3 Use simple code to test the communication



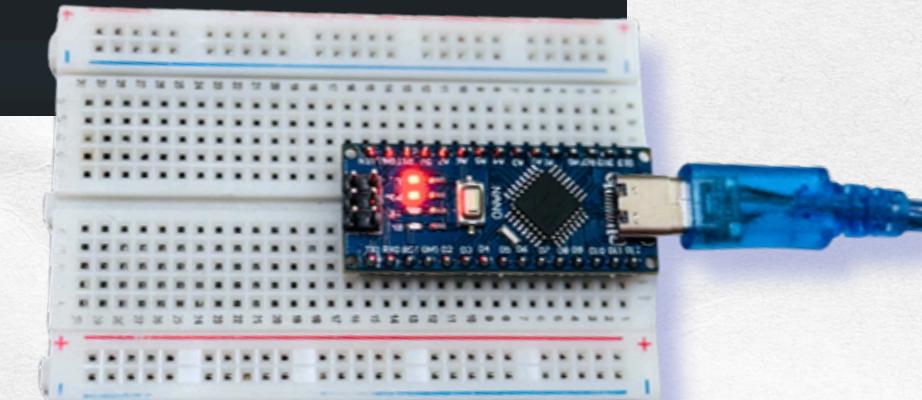
<https://shorturl.at/8tspg>

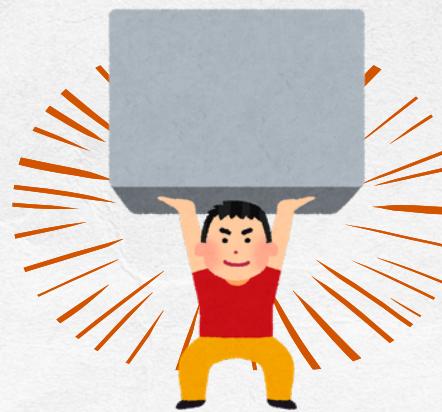
Please copy the 'Nano_TEST' code



- 1.Verify
- 2.Upload

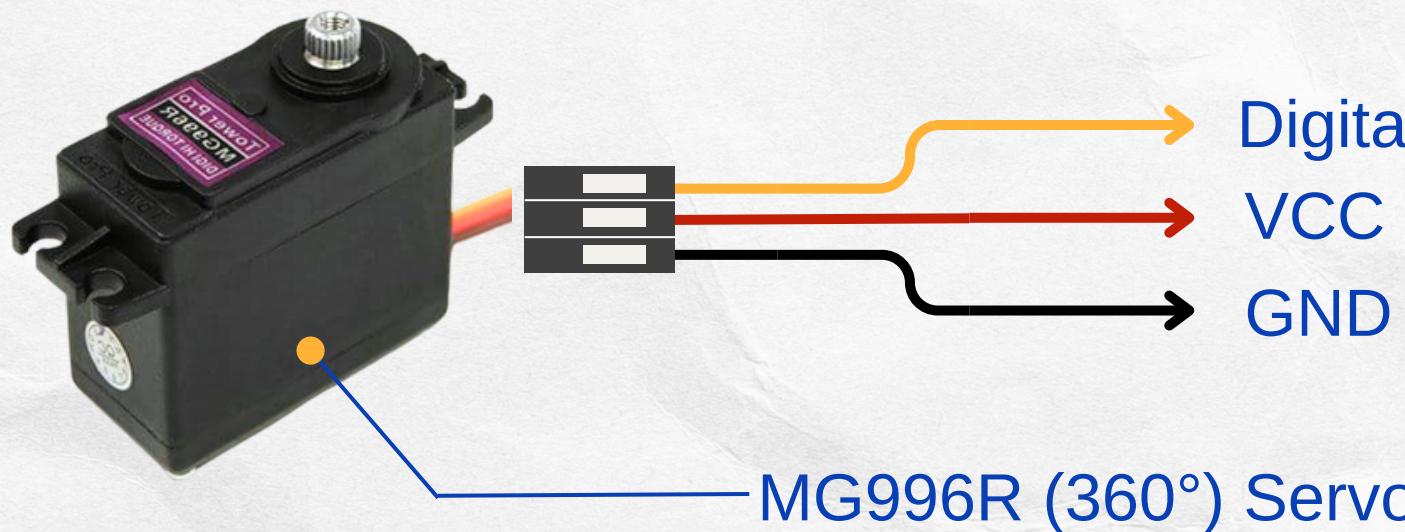
```
//Validation Communication
void setup() {
  pinMode(LED_BUILTIN, OUTPUT);
}
void loop() {
  digitalWrite(LED_BUILTIN, HIGH);
}
```





Let's make the flower move with the Servo!

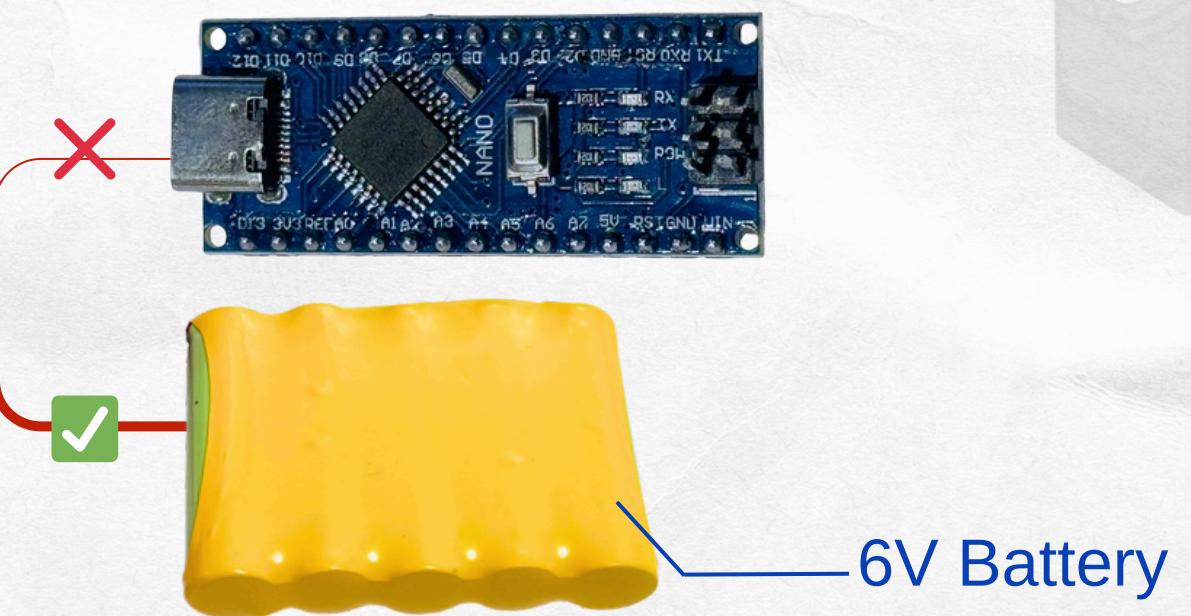
MG996R (360°) Servo



Digital Pin (D2)
VCC (4.8V~7.2V)
GND



- Metal Gear (Durable)
- High Torque (10kg·cm)
- No need motor driver board
- Like, pet feeder, automatic curtain machine...

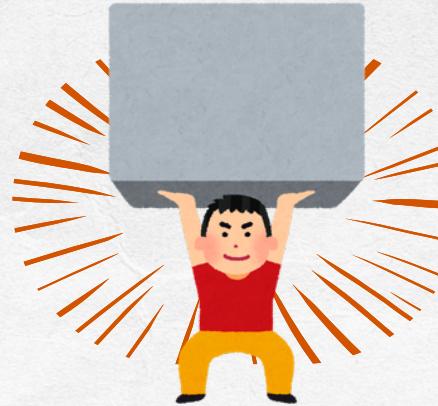


Servo Max Current: **2500mA (Servo Stuck)**
Nano Max Current (5V Pin): **800mA**

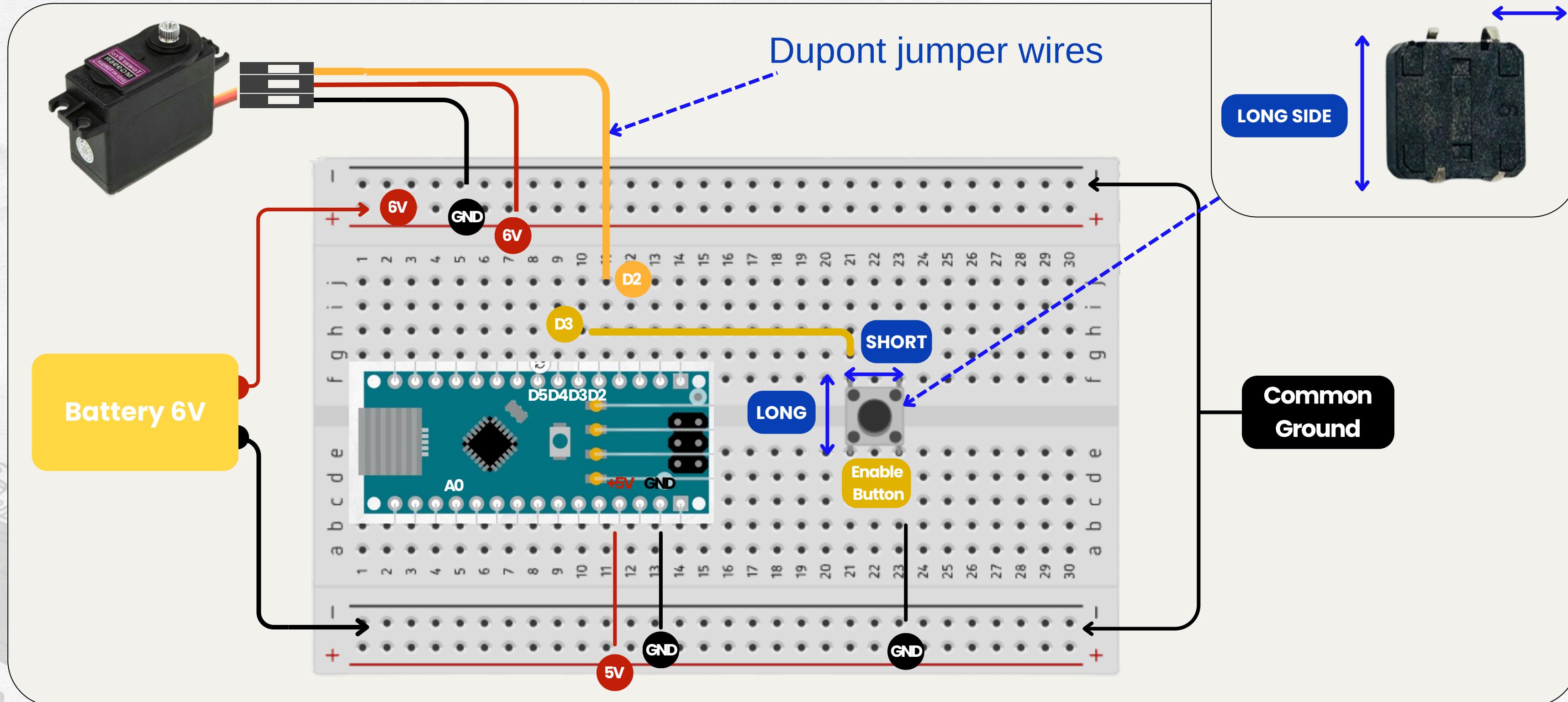
Servo Rated Current: 500mA ~ 900mA
Servo Rated Current (5V Pin): 400mA ~ 500mA

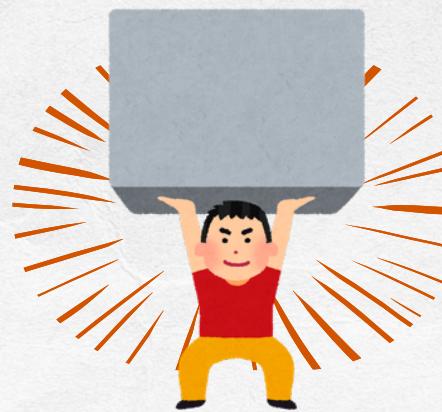
✗ Do not connect the servo with 5V pin on Nano

Let's make the flower move with the Servo!



Follow the diagram to connect:



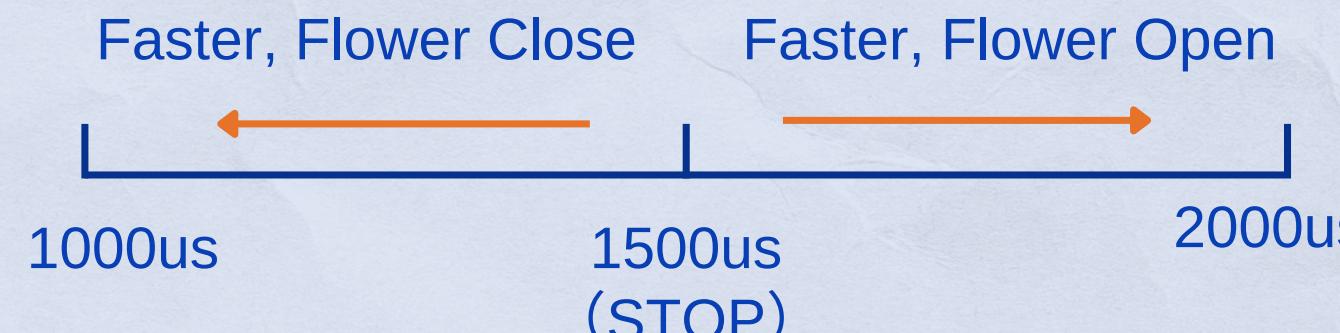


Let's make the flower move with the Servo!

The principle of servo control

MG996R (360°) doesn't support position control, only speed

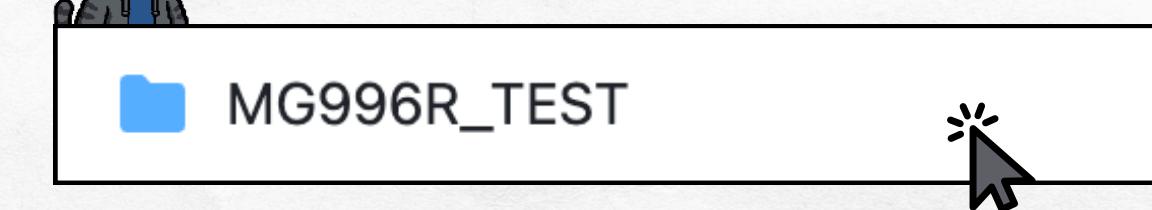
writeMicroseconds(1500);



⚠ Safety First: Be ready to unplug the battery if the mechanism gets stuck!



Github: <https://shorturl.at/8tspg>



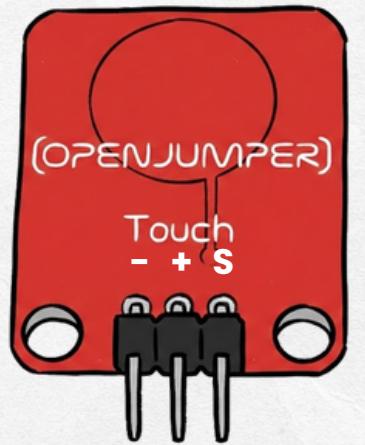
```
// Servo Stop
Servo_MG996R.writeMicroseconds(1500);
delay(1000);

// The direction of closing the flower
Servo_MG996R.writeMicroseconds(1200); // 1000 ~1499
delay(20000);

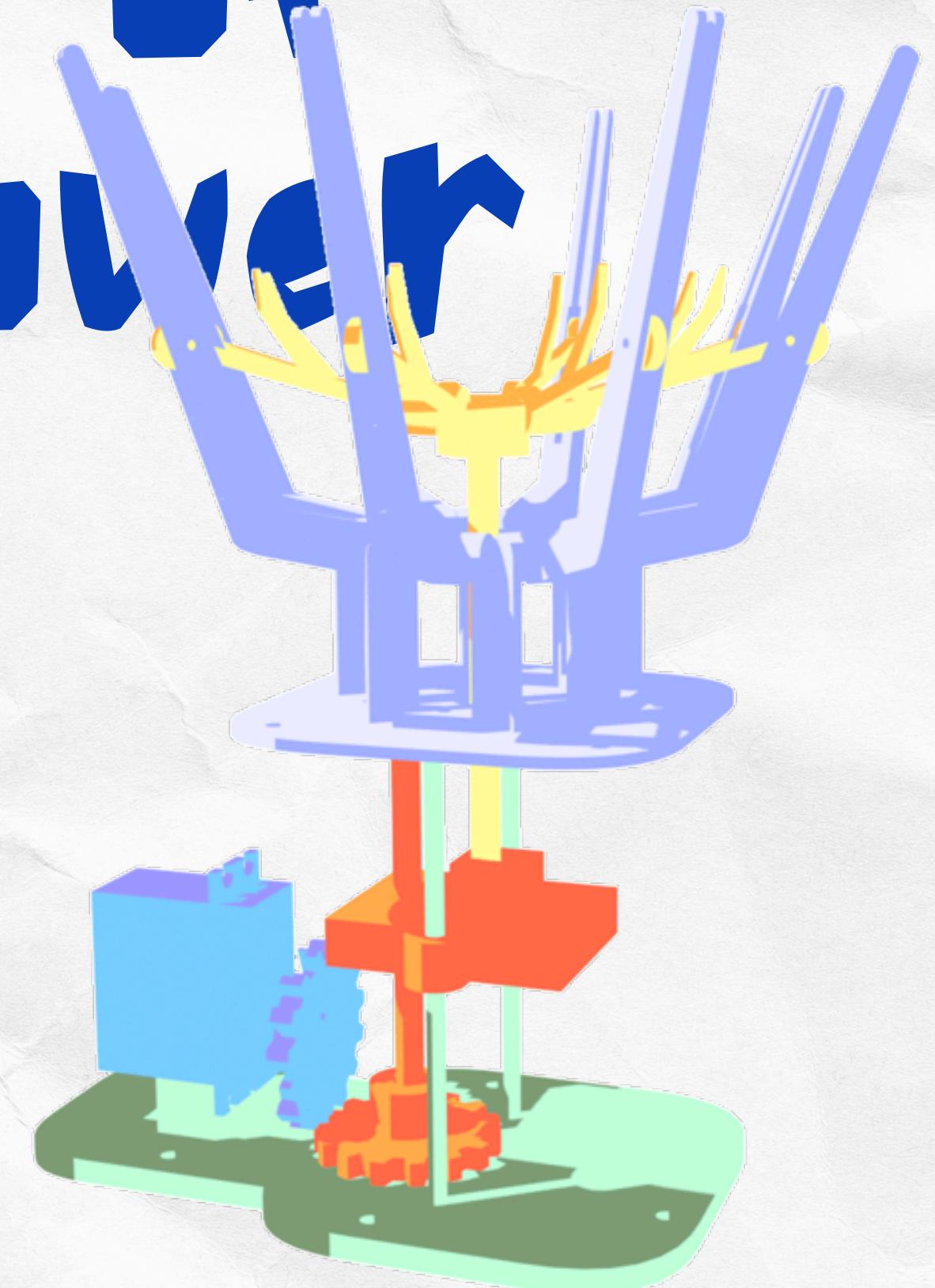
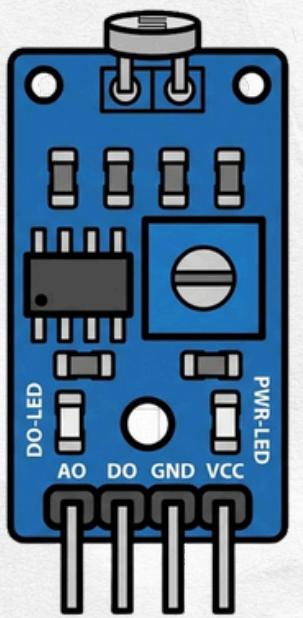
// The direction of opening the flower
Servo_MG996R.writeMicroseconds(1800); // 1501~2000
delay(20000);
```

"interaction" of Mechanical flower

Touch Sensor

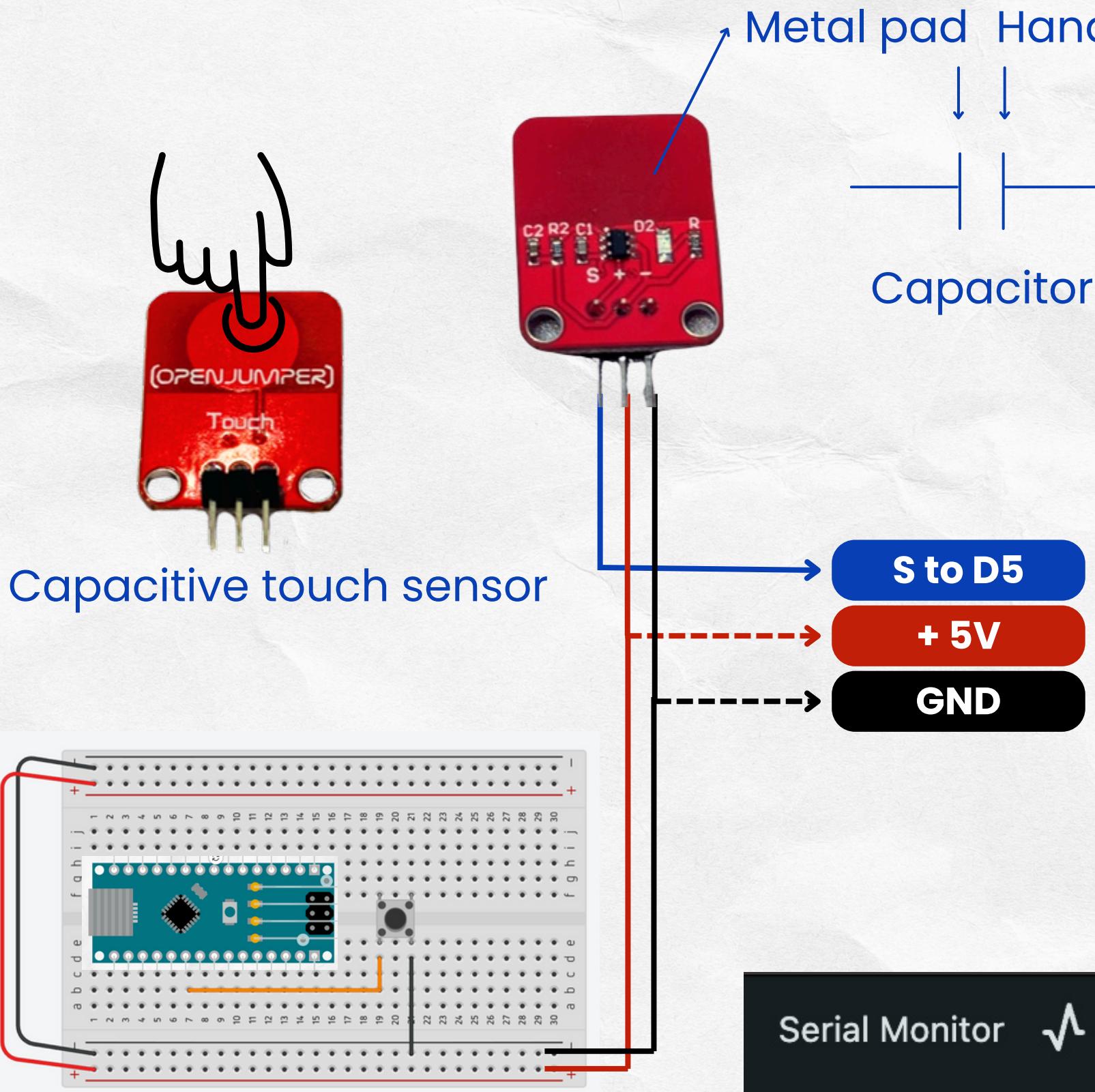


LDR Sensor



Let's Bloom Flower with Interaction!

Touch Sensor Control the Servo —— Reading Sensor State

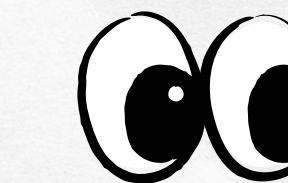


Please copy the 'MF_Touch_READVALUE'

MF_Touch_READVALUE.ino

```
1 // Touch Sensor Read Value
2 int touchPin = 5; //D5
3
4 void setup() {
5
6   Serial.begin(9600);
7   pinMode(touchPin, INPUT);
8
9 }
10
11 void loop() {
12
13   int touchState = digitalRead(touchPin); // Translate
14
15   if(touchState == HIGH){
16     Serial.println("Touched! (1)");
17   } else {
18     Serial.println("No Touch (0)");
19   }
20
21   delay(100);
22 }
```

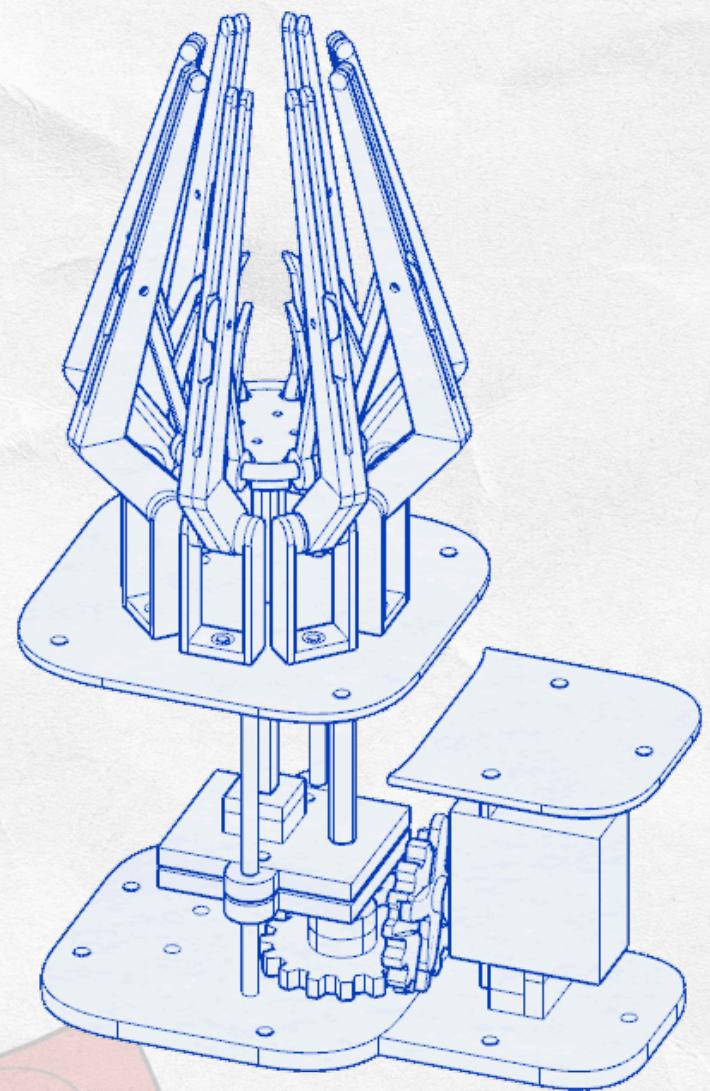
Touch : High(1)
Untouch: Low(0)



Try to use press the touch sensor and see what happen on your Serial Monitor

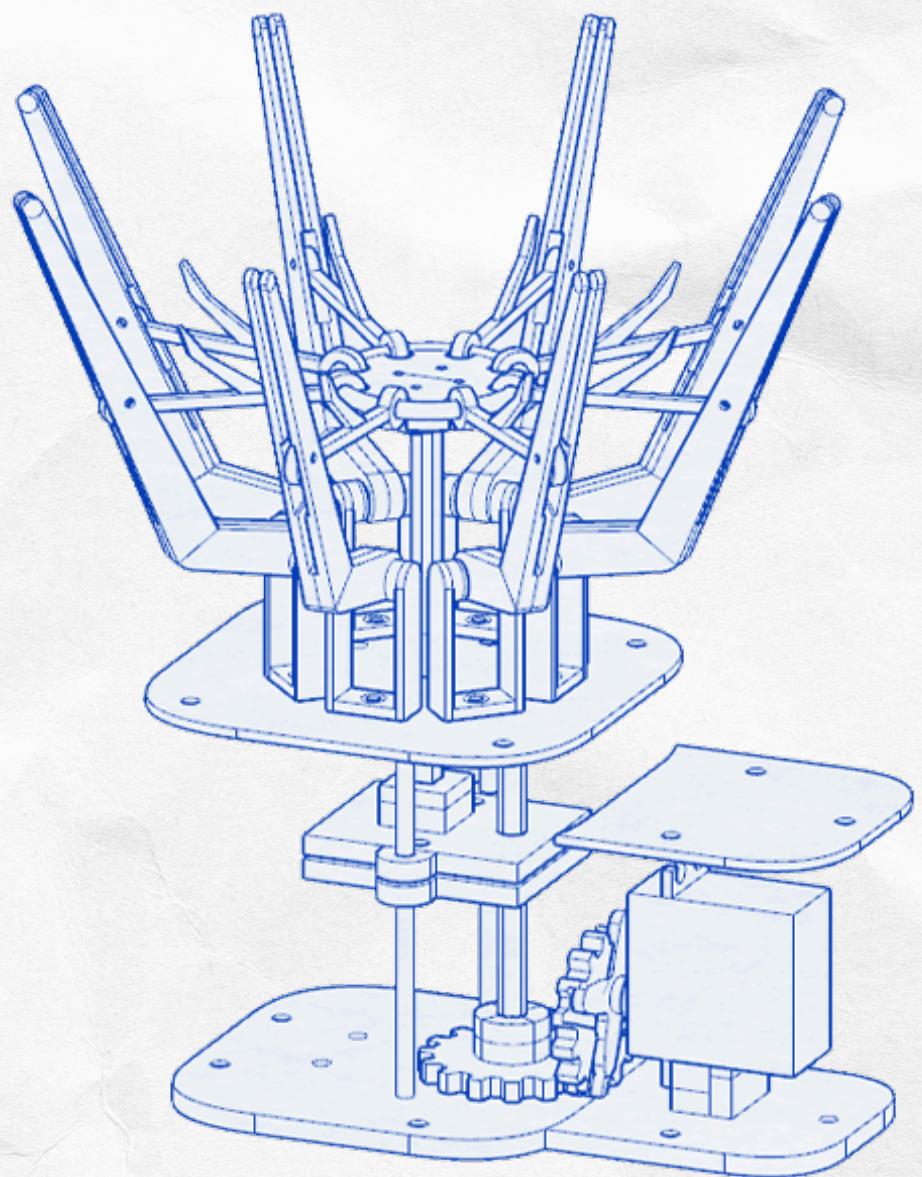
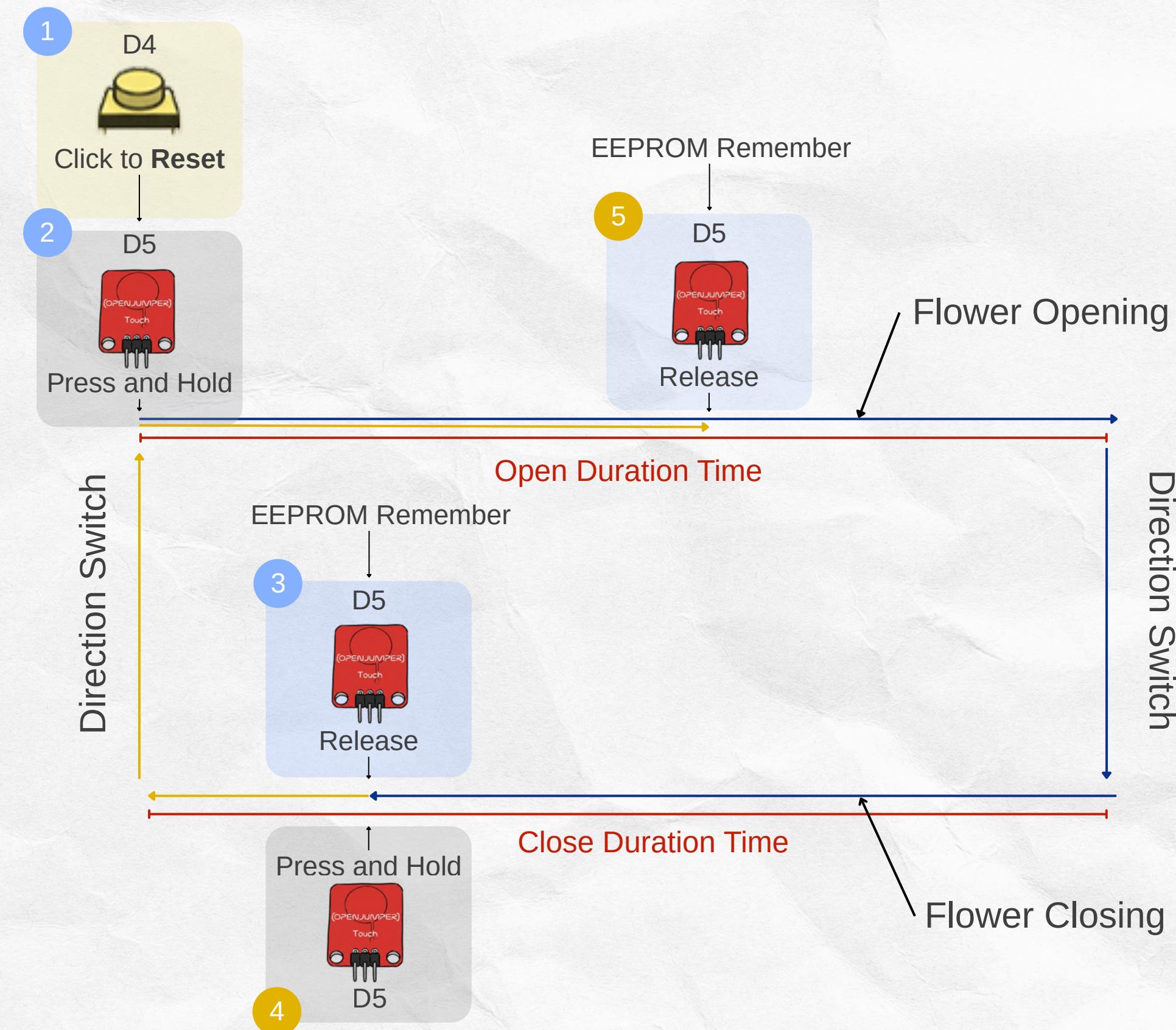
Let's Bloom Flower with Interaction!

Touch Sensor Control the Servo — Control Logic



Start from Closed State

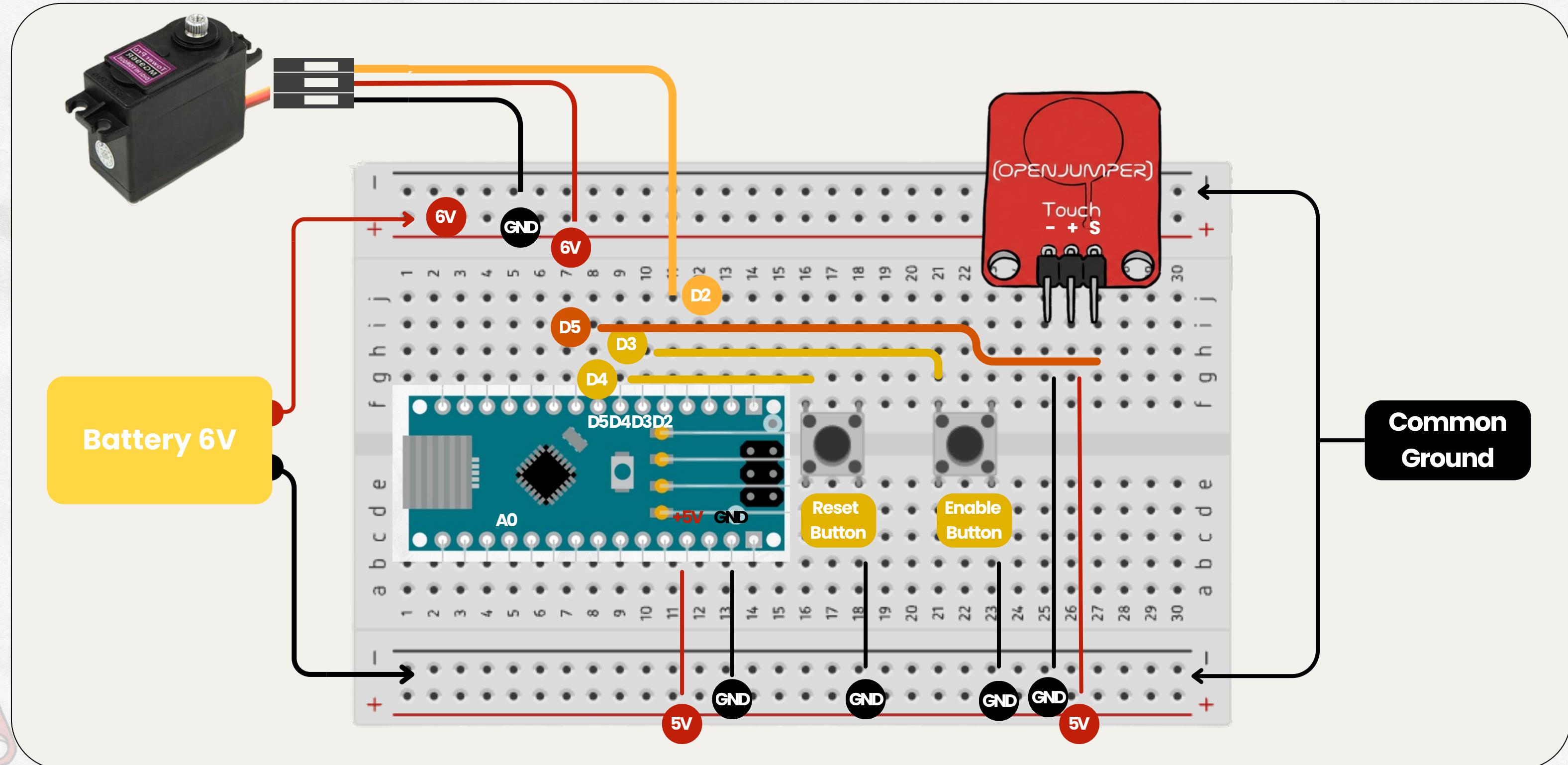
MF_Button_RESET



Let's Bloom Flower with Interaction!

Touch Sensor Control the Servo —— Connection

Follow the diagram to connect:

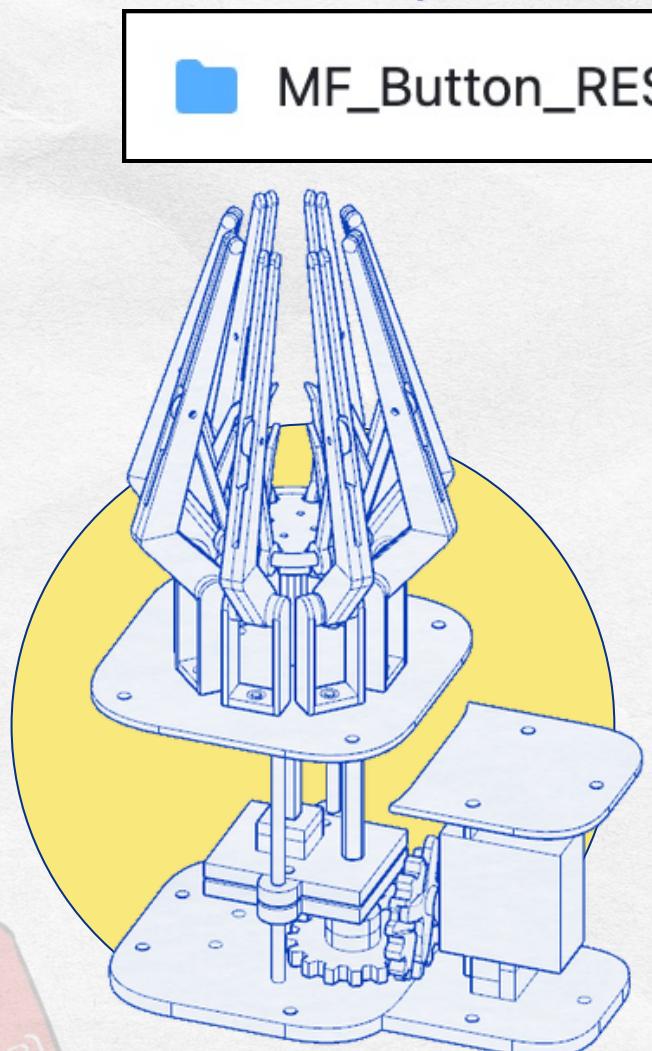


Let's Bloom Flower with Interaction!

Touch Sensor Control the Servo —— Coding

1 Drive the servo to adjust the flower to the **closed position**. Test your desired flower opening speed.

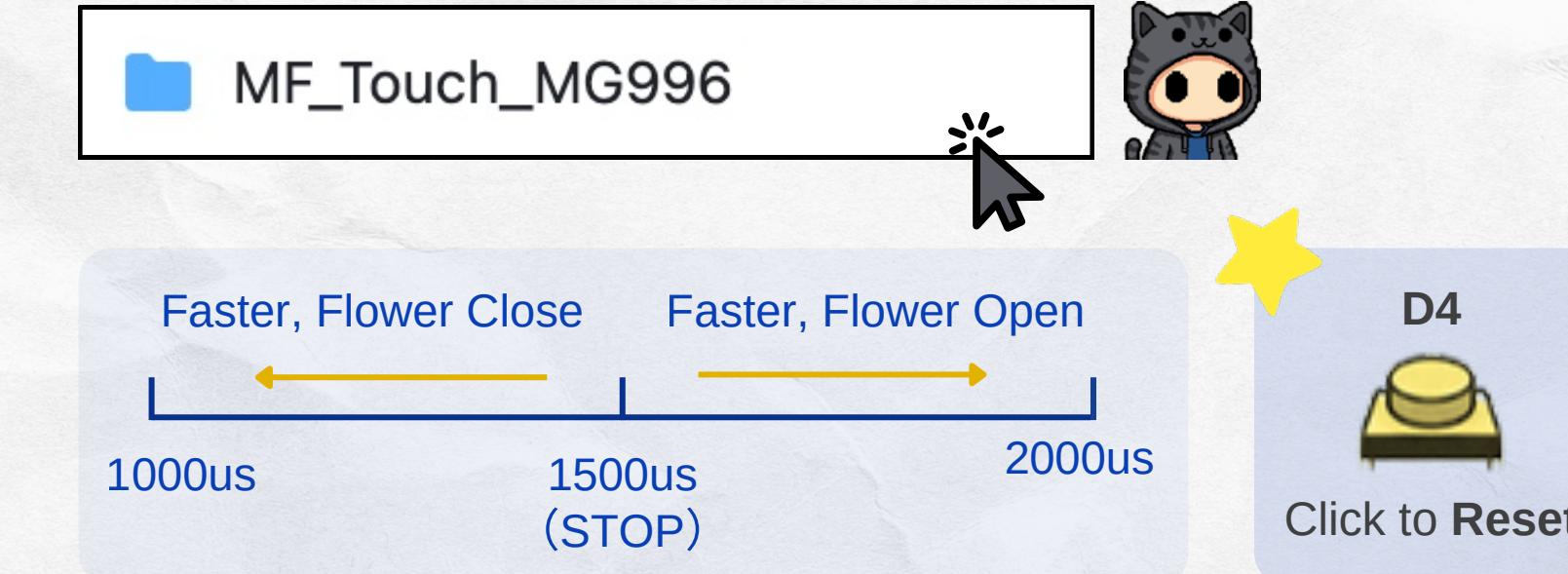
Github: <https://shorturl.at/8tspg>



Touch Sensor Logic

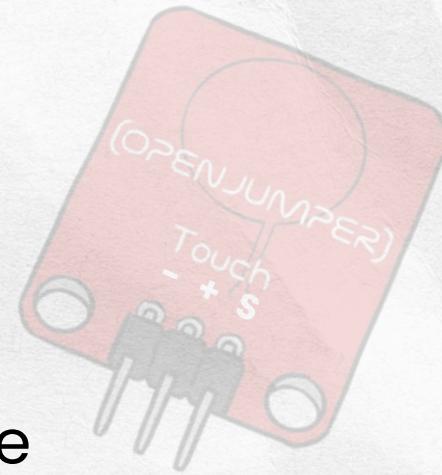
⚠ Note: The sensor automatically stops the signal (resets) if held for more than **15s**.

2 Control the flower with the touch sensor, press the **reset button**, and adjust the open/close duration time.



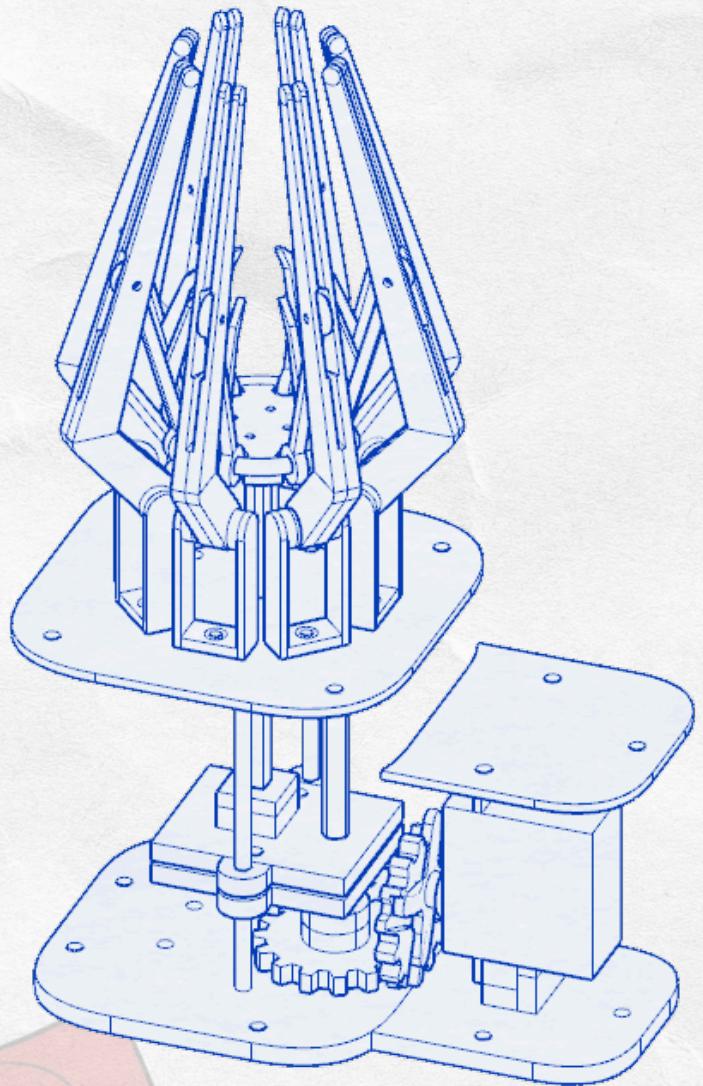
```
const int SERVO_STOP_US = 1500;  
const int SERVO_OPEN_US = 1900;  
const int SERVO_CLOSE_US = 1100;
```

```
const unsigned long OPEN_DURATION = 27000;  
const unsigned long CLOSE_DURATION = 29000;
```

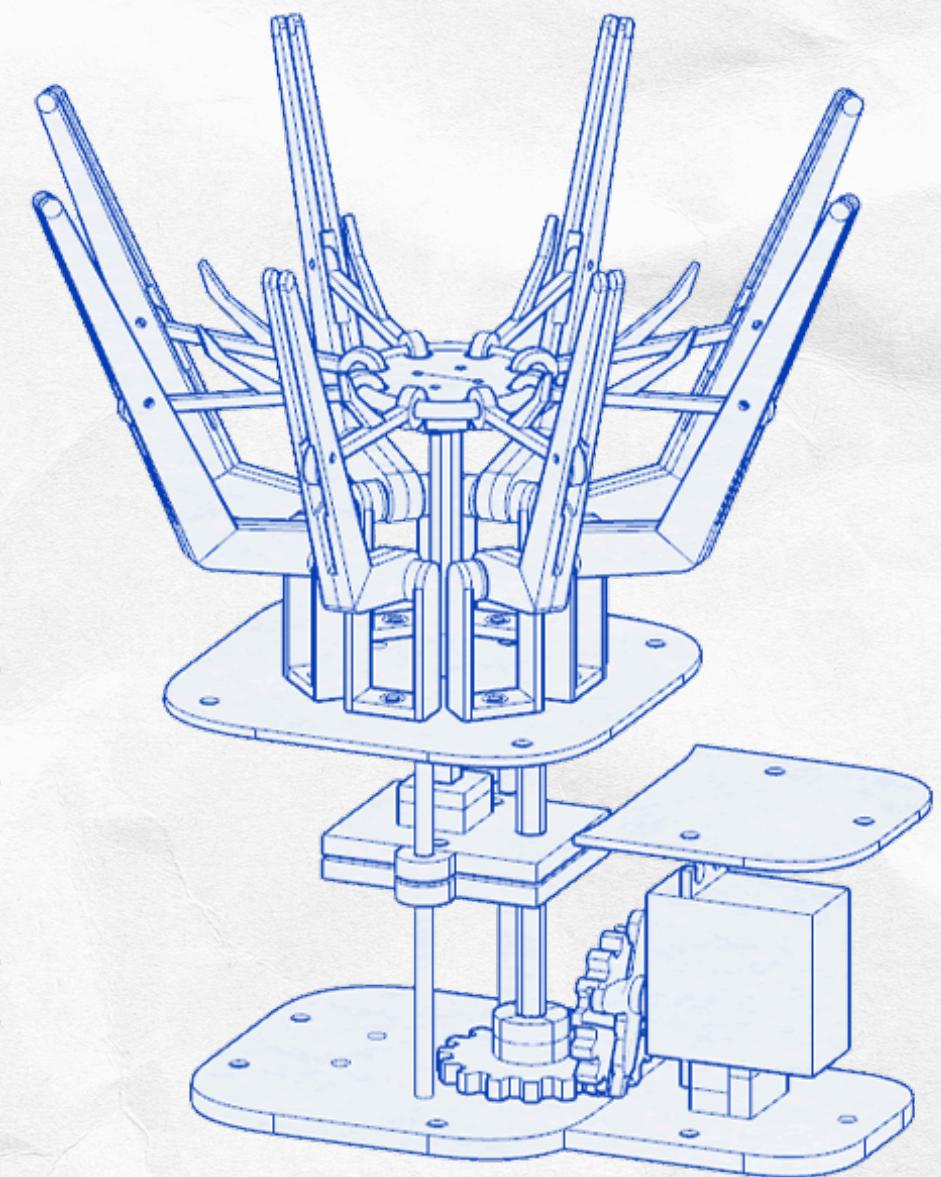
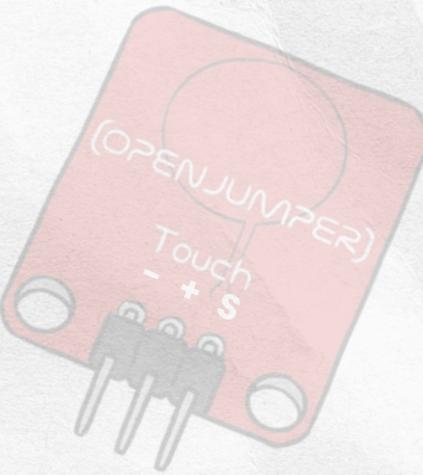
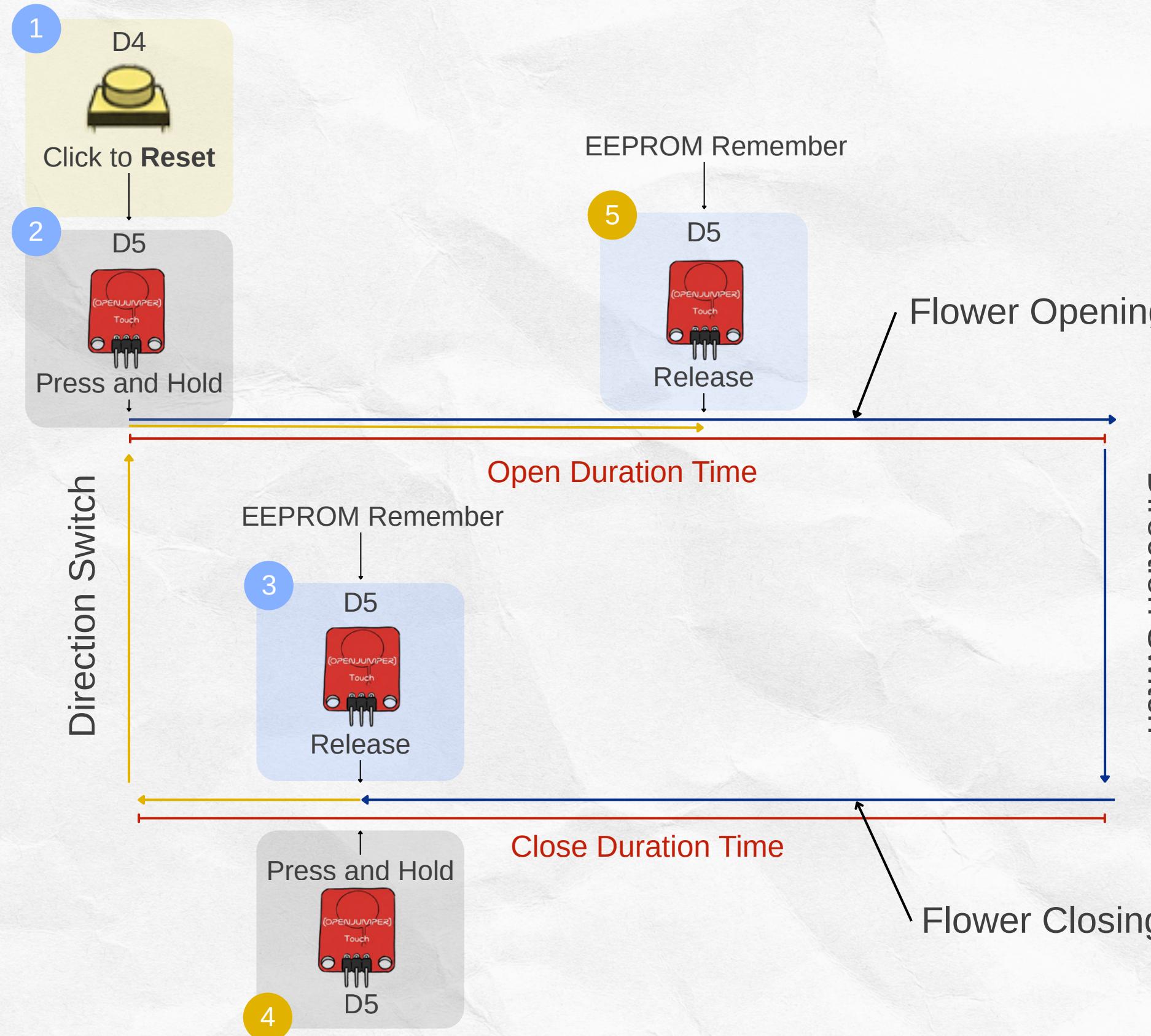


Let's Bloom Flower with Interaction!

Touch Sensor Control the Servo —— Control Logic



Start from Closed State



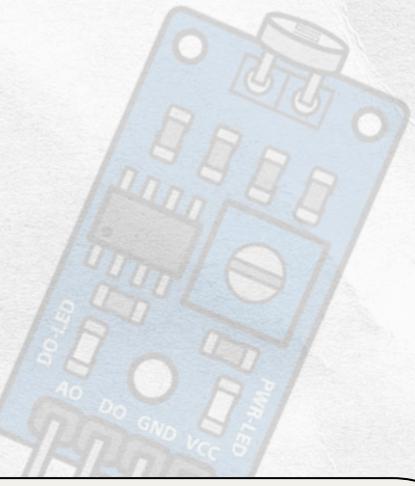
Touch Sensor Logic

Logic: Same as the Button (D3).

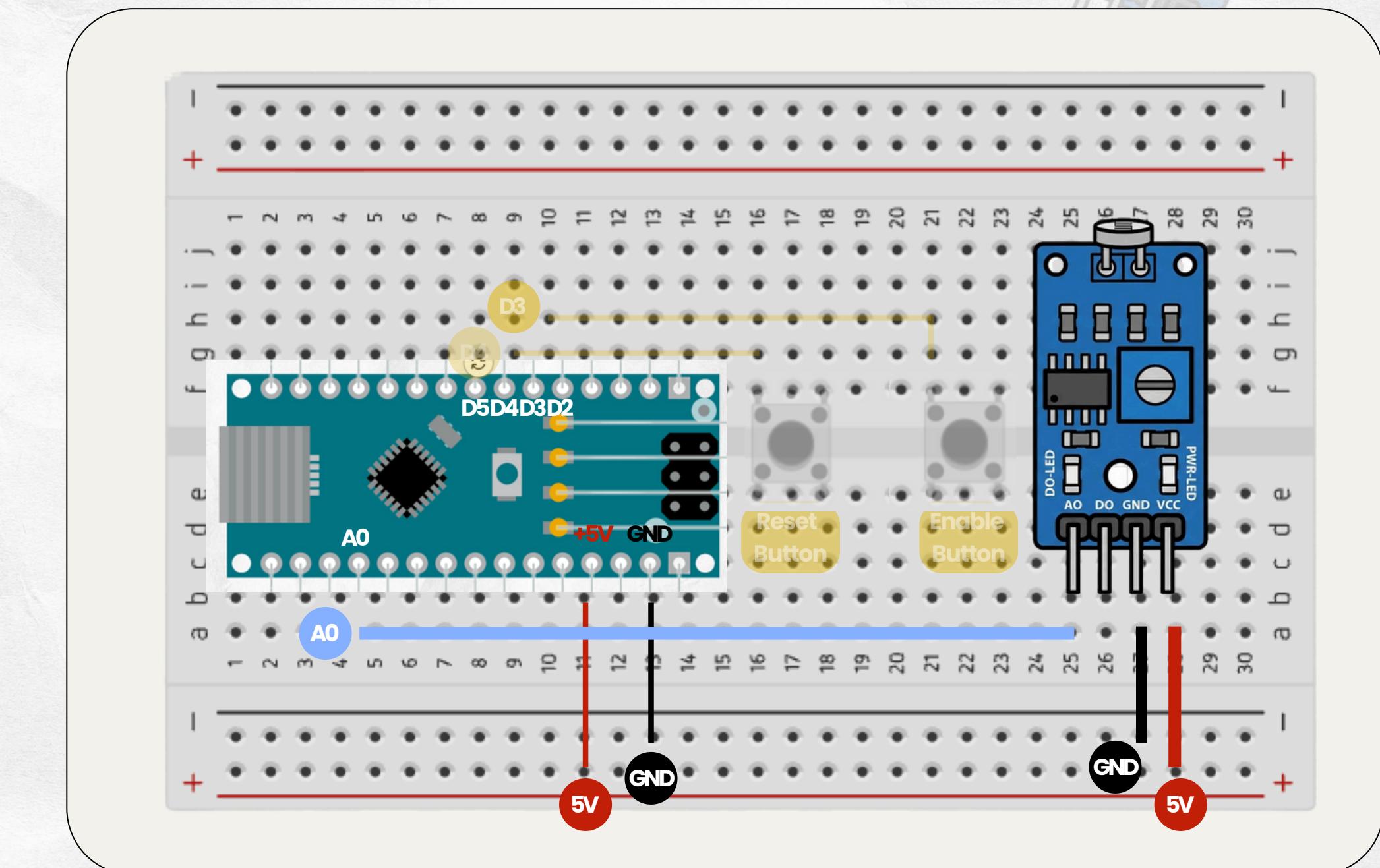
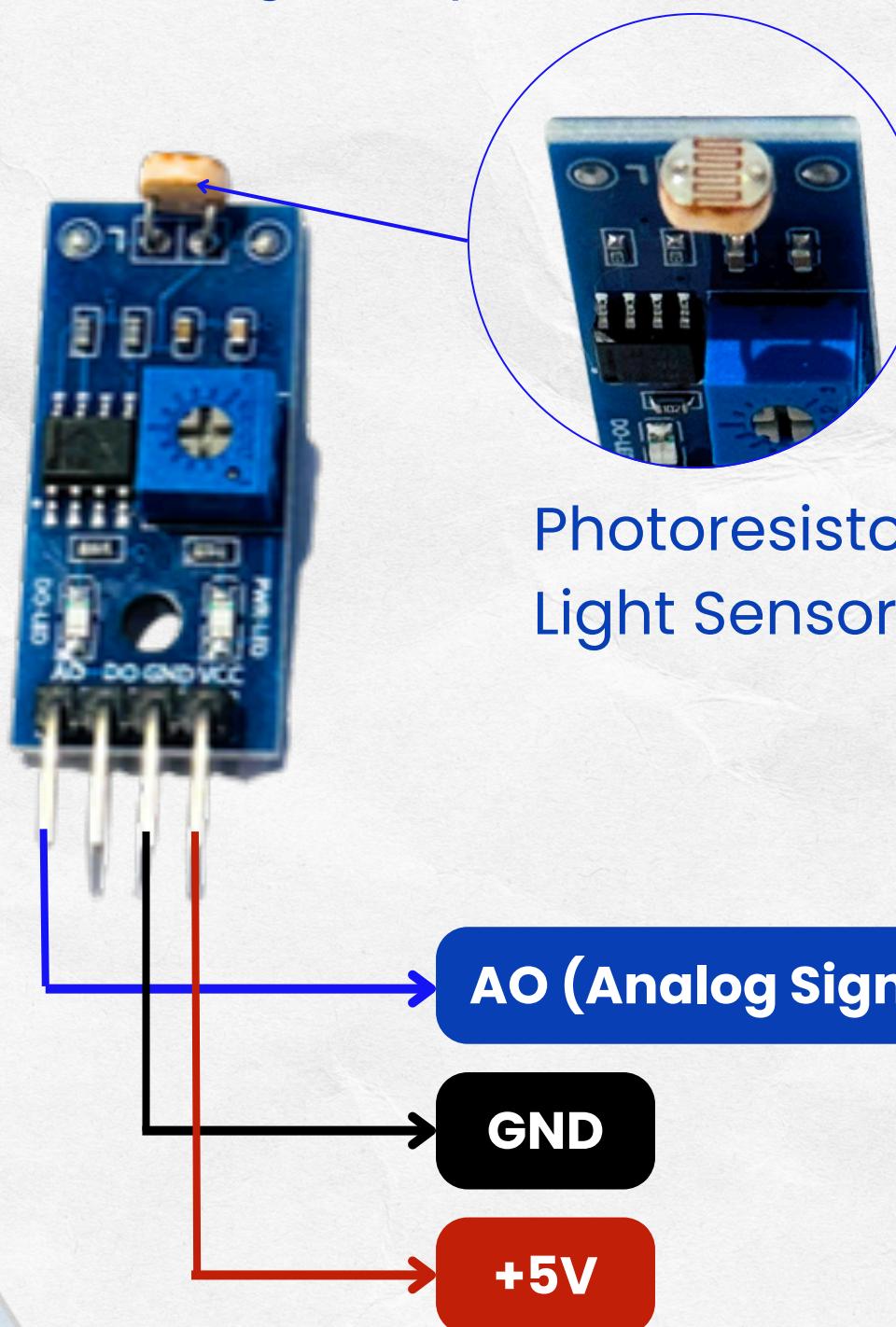
⚠ Note: The sensor automatically stops the signal (resets) if held for more than 15s.

Let's Bloom Flower with Interaction!

LDR Sensor Module — Reading Sensor Value



1 LDR — Light Dependent Resistor

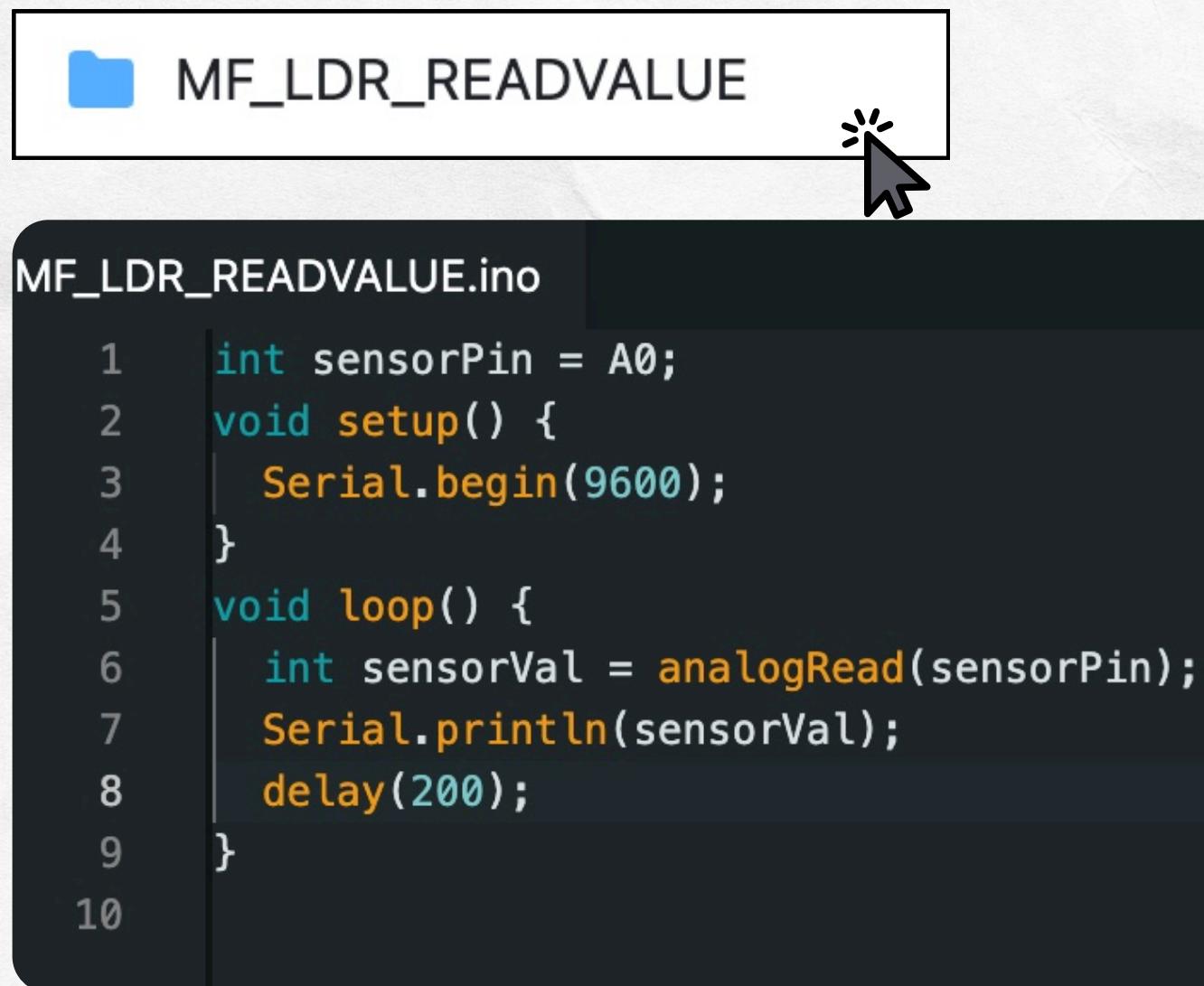


WARNING: Do not reverse VCC and GND! !

LDR (Light Dependent Resistor) Sensor Module

Reading Sensor Value

- 2 Upload "MF_LDR_READVALUE"

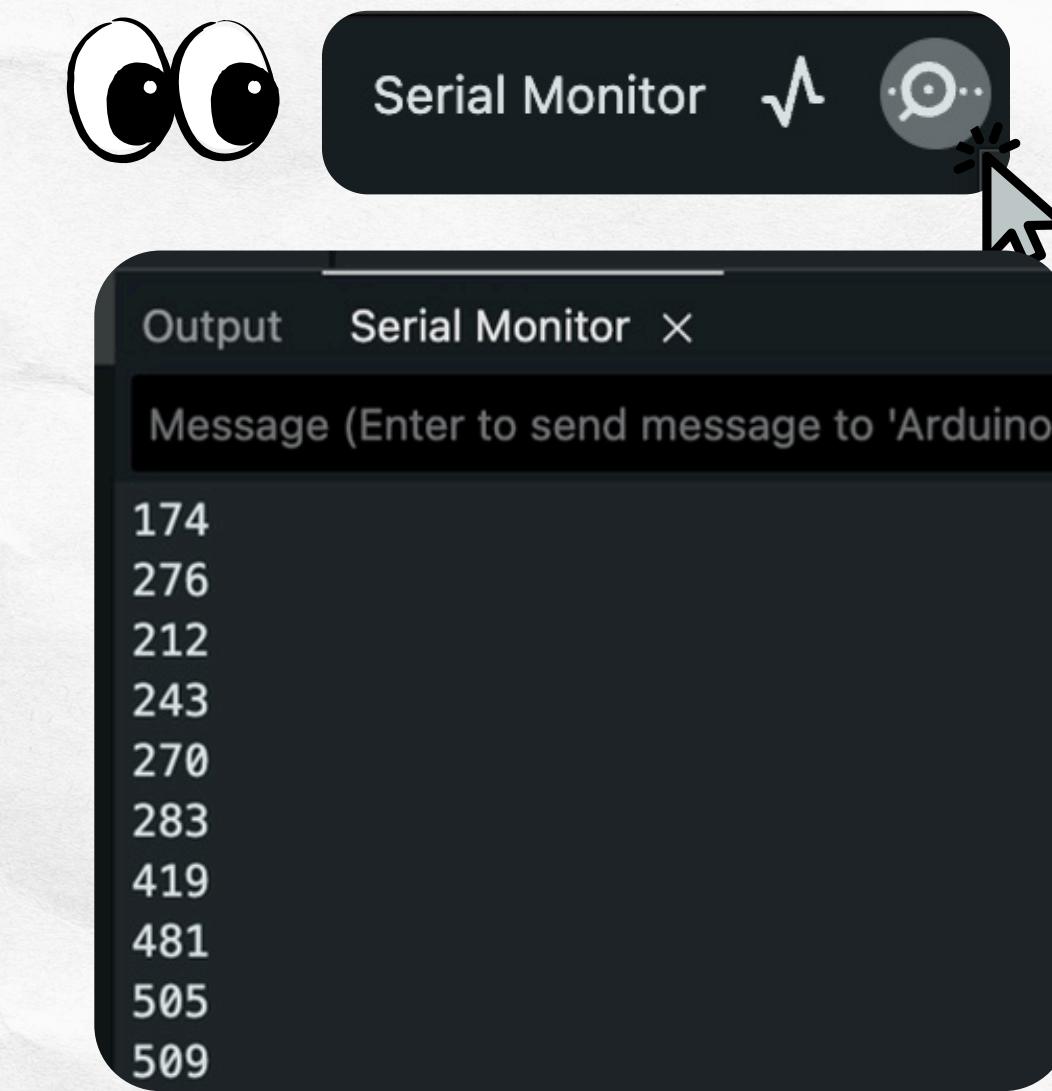


MF_LDR_READVALUE

```
MF_LDR_READVALUE.ino
1 int sensorPin = A0;
2 void setup() {
3     Serial.begin(9600);
4 }
5 void loop() {
6     int sensorVal = analogRead(sensorPin);
7     Serial.println(sensorVal);
8     delay(200);
9 }
10
```

analogRead()

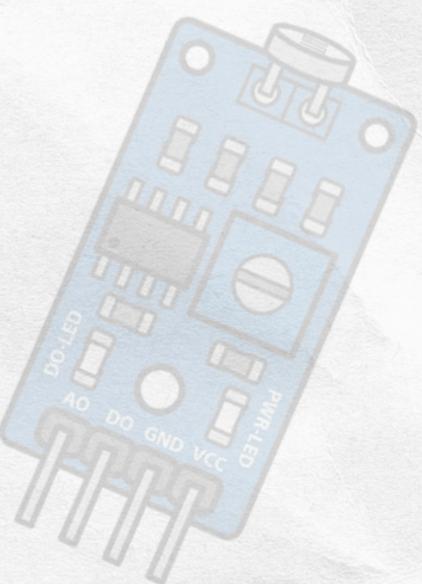
returns an integer value between 0 and 1023.
Maps 0-5V(LDR AO) to 0-1023.



Serial Monitor

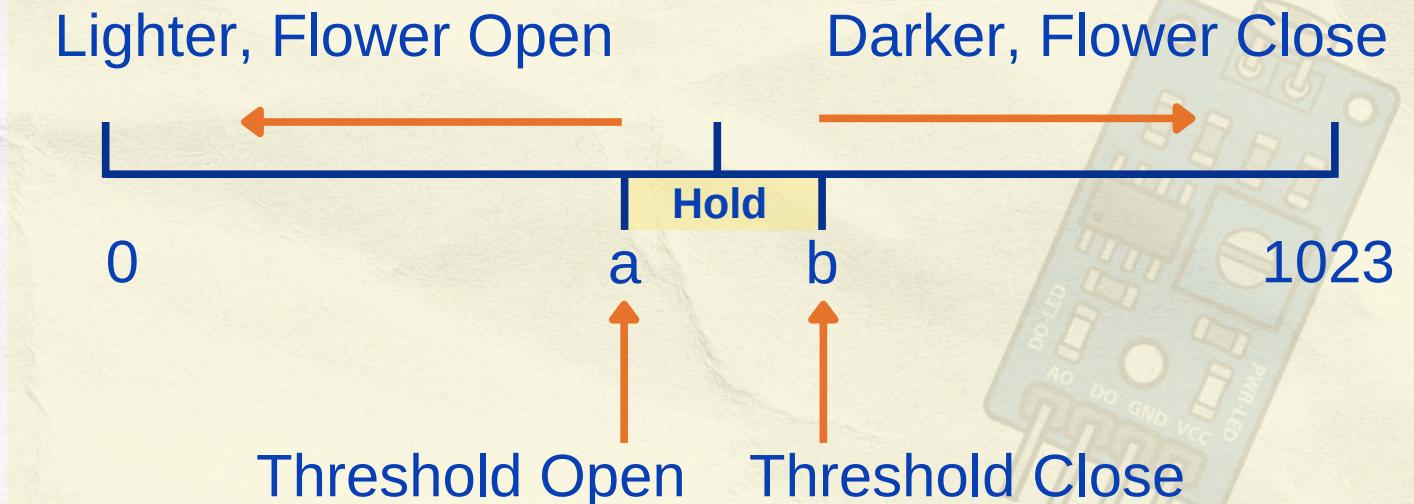
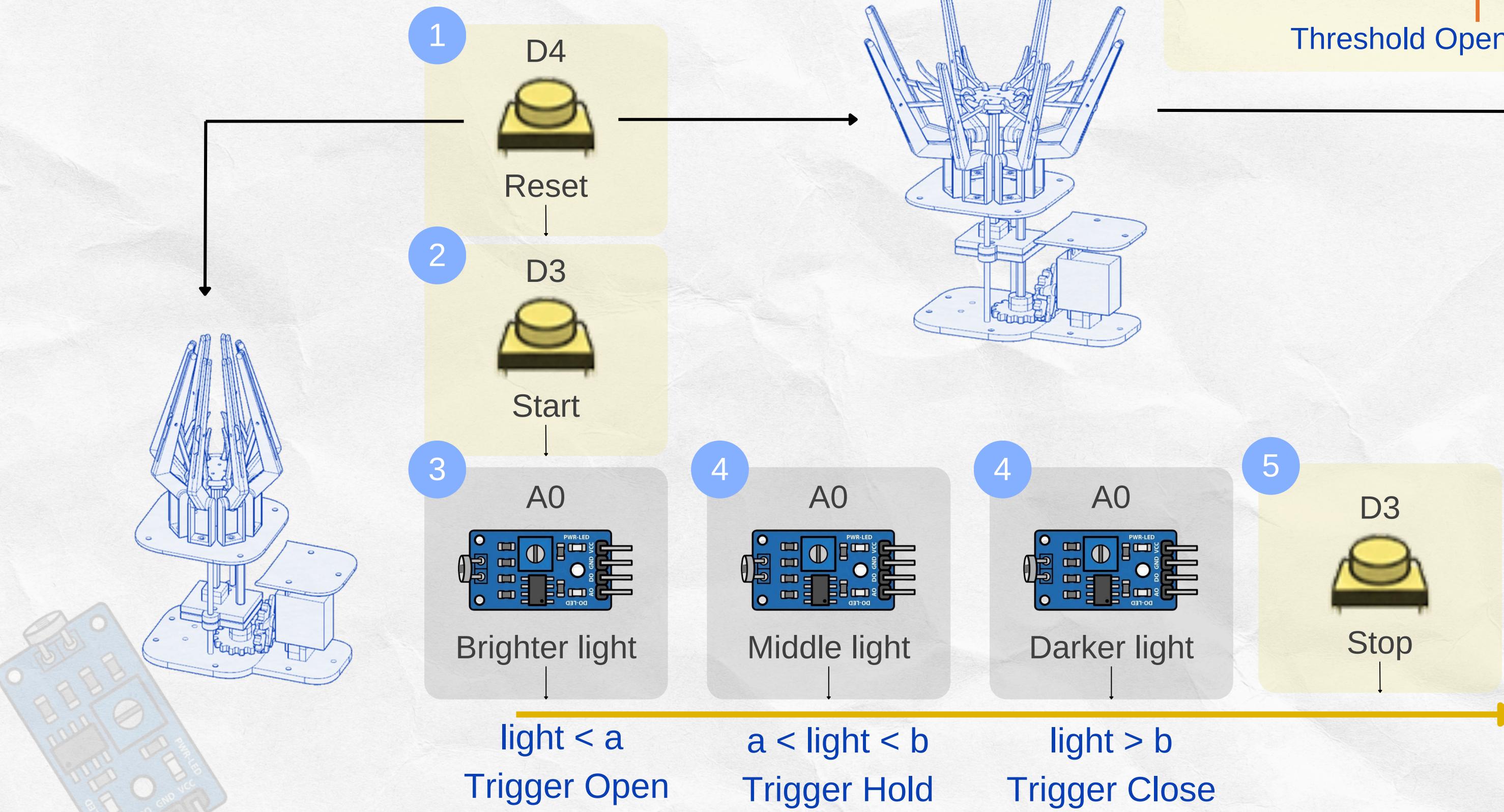
Output	Serial Monitor
Message (Enter to send message to 'Arduino')	
174	
276	
212	
243	
270	
283	
419	
481	
505	
509	

Cover the LDR with your hand and observe the value changes on the Serial Monitor;



LDR Sensor Module

LDR Control — Control Logic

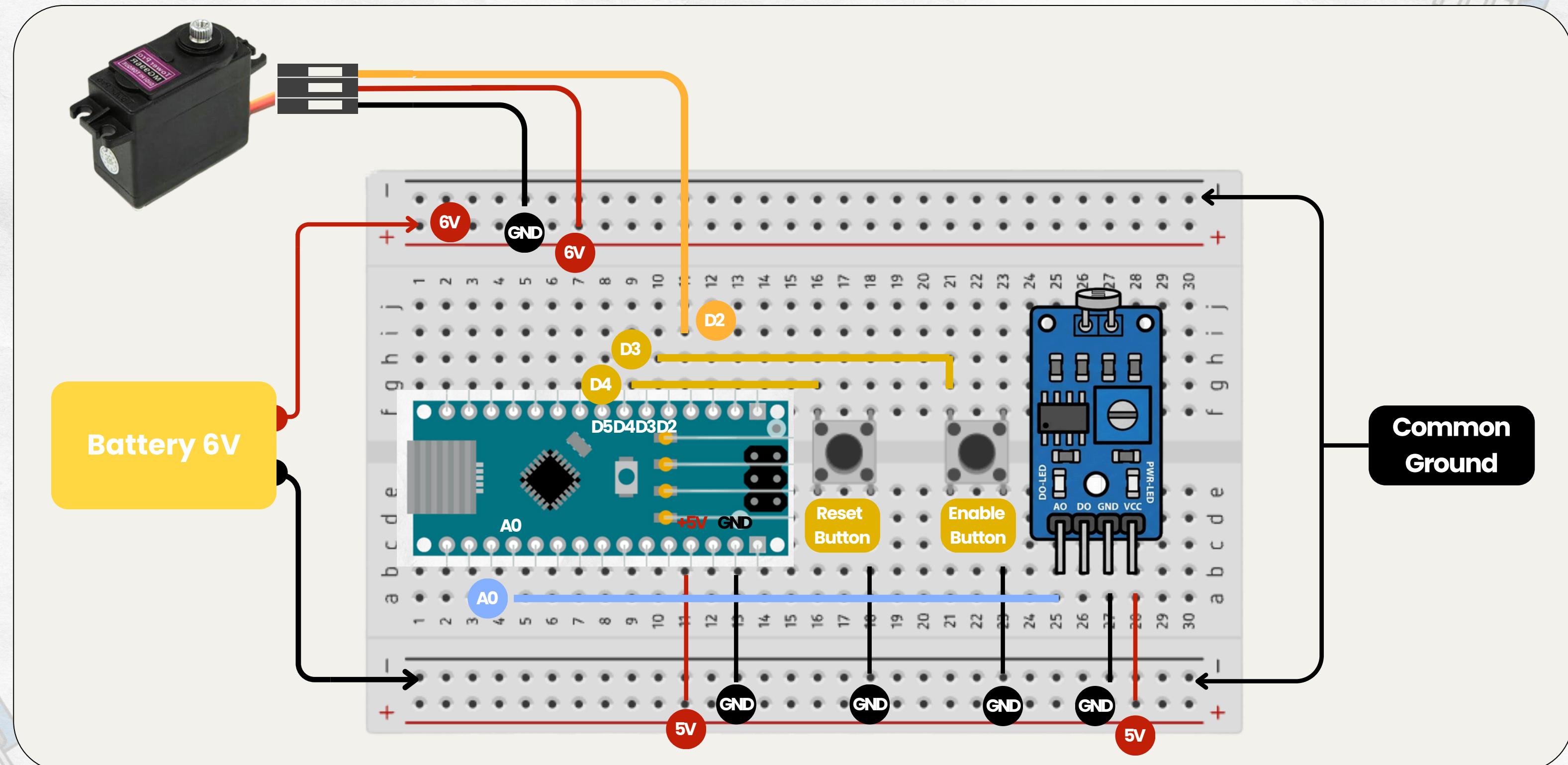


LDR Sensor Module

LDR Control System

3

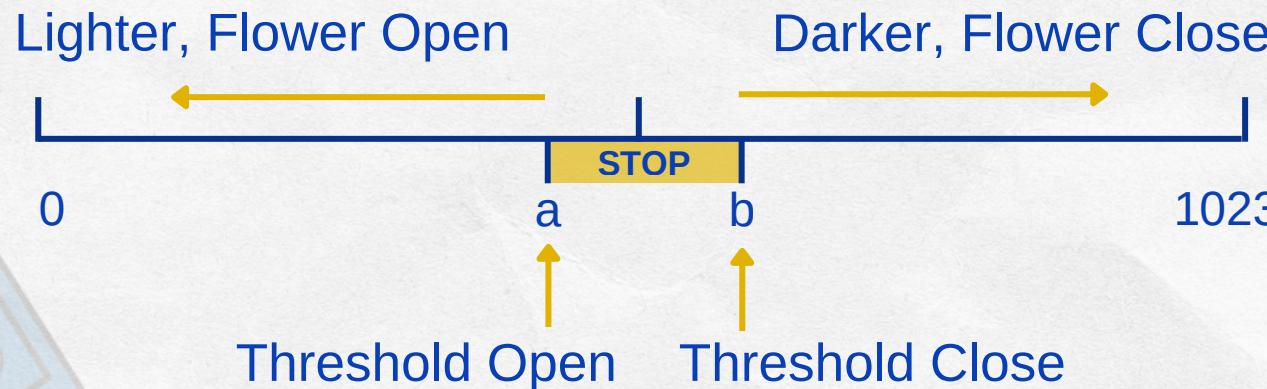
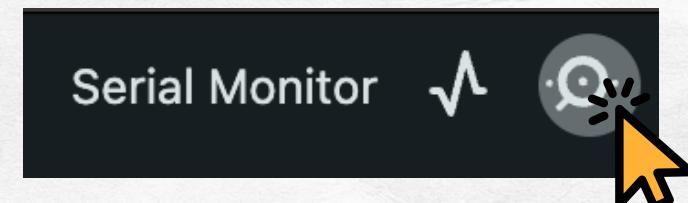
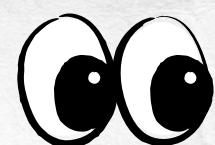
Follow the diagram to make the connections



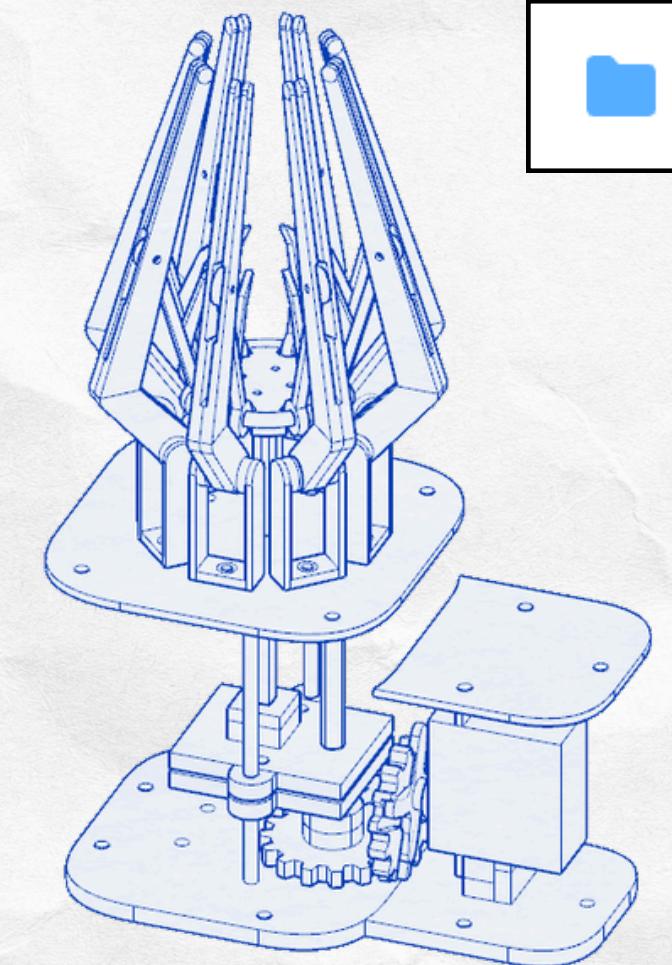
LDR Sensor Module

LDR Control System

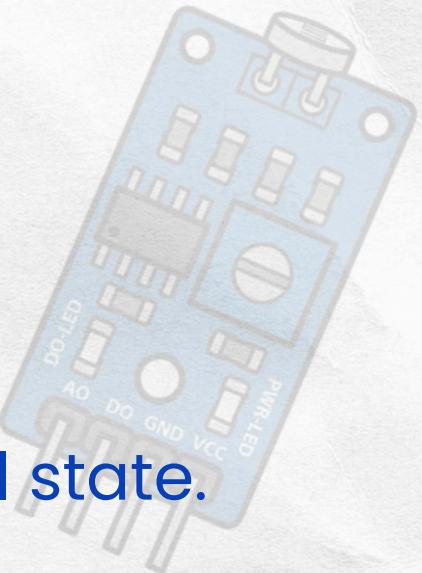
4 Read and record the thresholds a and b.



5 Reset the flower to the closed initial state.

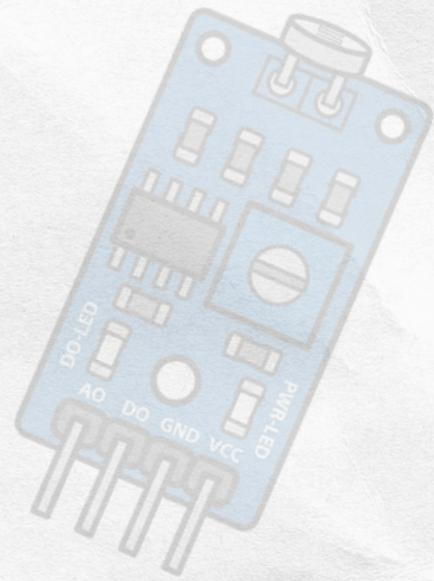


Github: <https://shorturl.at/8tspg>

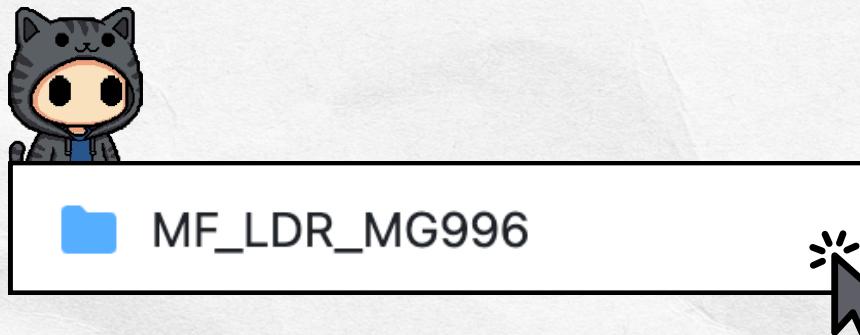


LDR Sensor Module

LDR Control System



- 6 Copy “MF_MDR_MG996” on Arduino IDE,

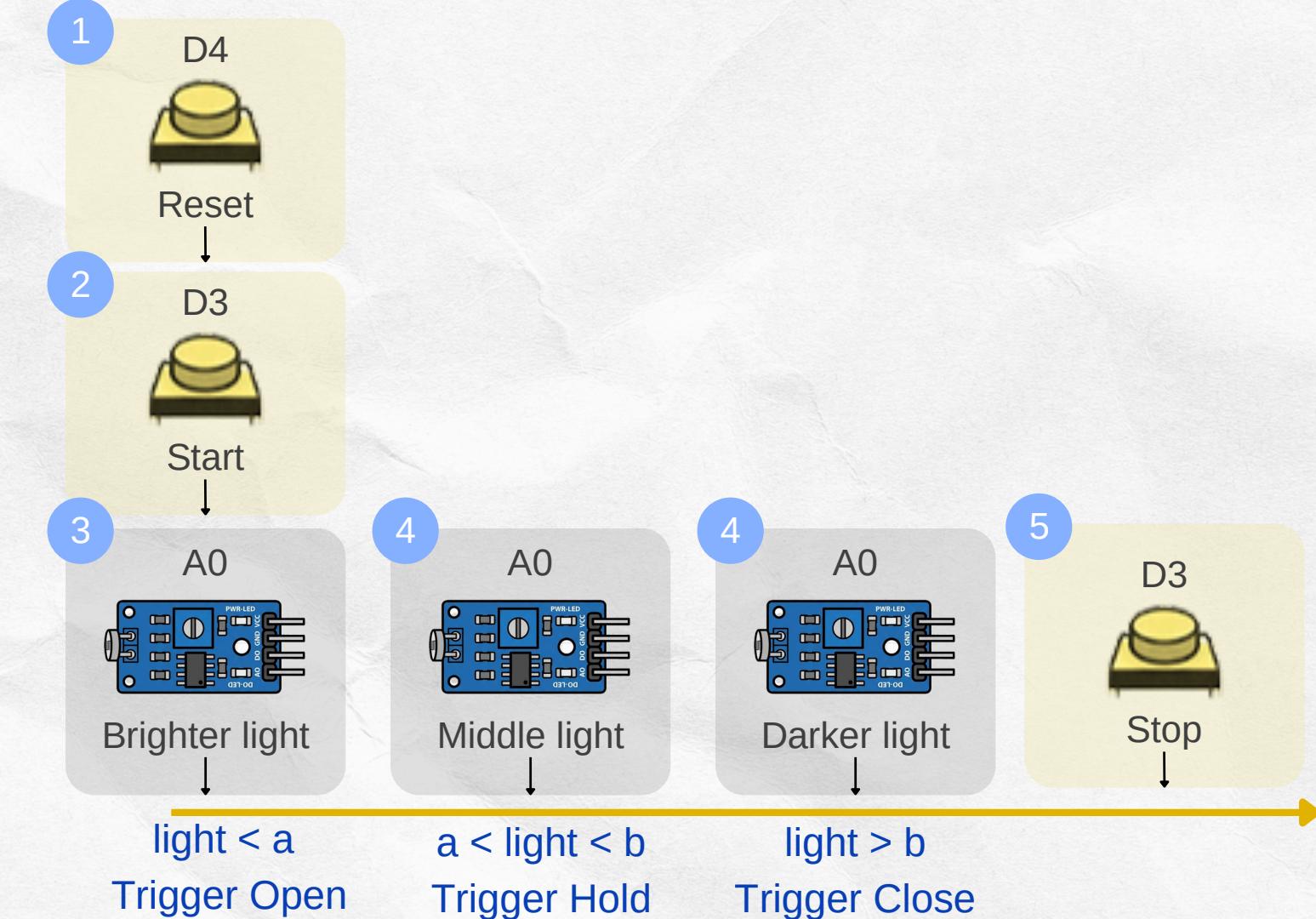


- Set your thresholds a and b;
- Preset the Servo open/close speed;
- Preset the open/close duration time.

```
const int THRESH_OPEN = 220; //a  
const int THRESH_CLOSE = 270; //b
```

```
const int SERVO_OPEN_US = 1900;  
const int SERVO_CLOSE_US = 1100;  
const unsigned long OPEN_TOTAL_MS = 30000; //ms  
const unsigned long CLOSE_TOTAL_MS = 32000; //ms
```

- 7 Upload the “MF_MDR_MG996”,
Press the reset button(D4);
Press the D3 button to activate LDR sensor;
and adjust the open/close duration time.



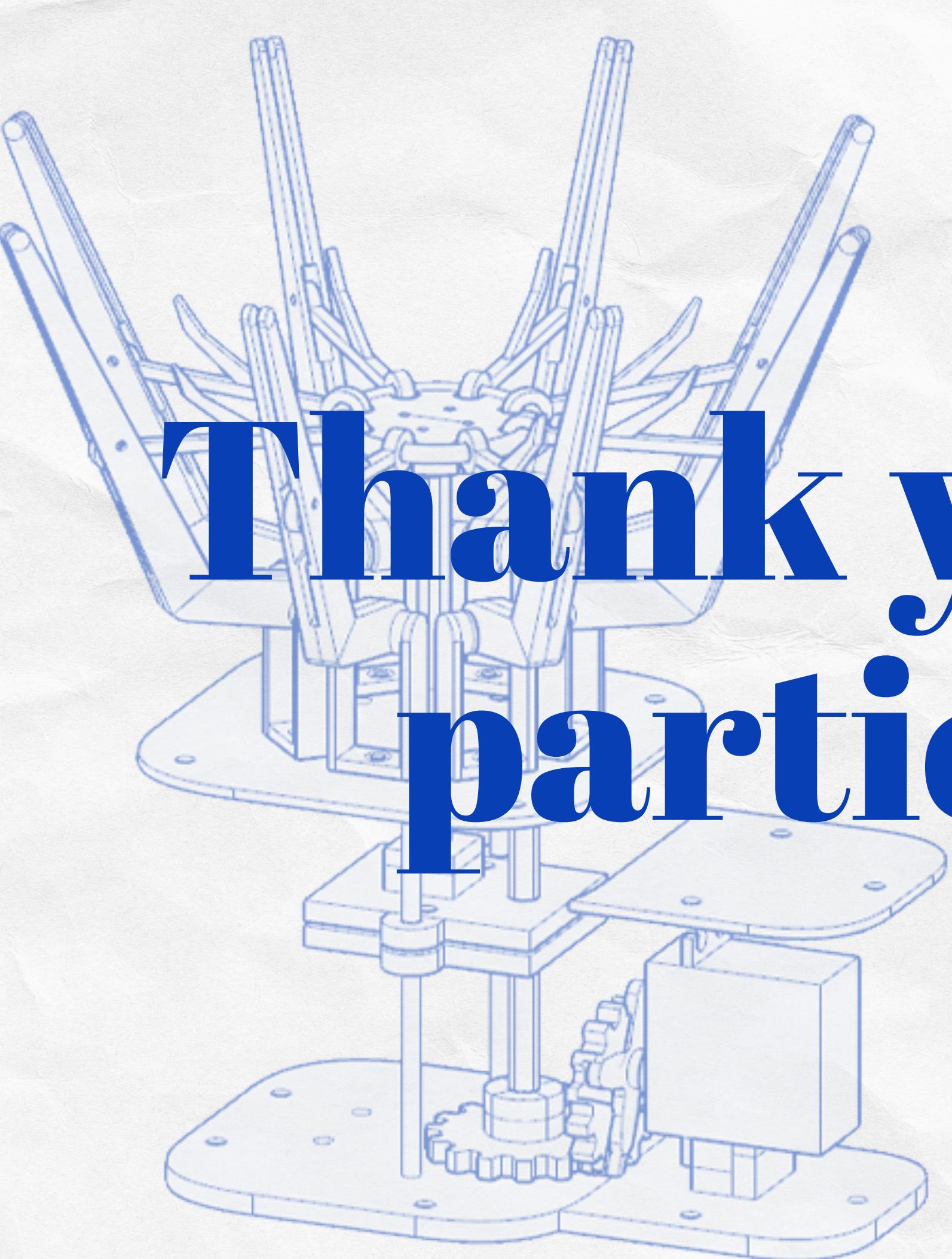
Design a new Mechanical Flower By your imagination!



Mechanical Design: What other mechanical configurations could achieve the same movement?

Integration & Packaging: How might we design an enclosure to integrate the breadboard and mechanical components into a single unit?





**Thank you for your
participation!**

**3D Model: Max
Coding: Wickey
Helpers: Miffy Joey Emma Mo Ryan Leonie Theo**

