Contents

Note: If you need to watch the assembly video, please click the link below to view the assembly video for the corresponding kit.

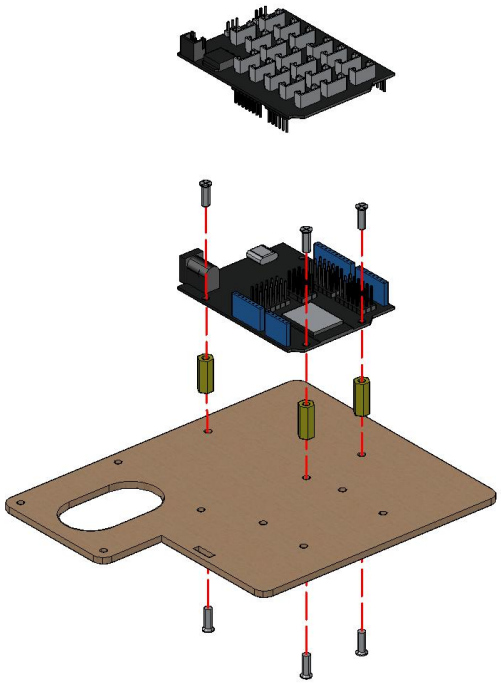
https://www.youtube.com/playlist?list=PLkW5fEtHNu6KdMIjKjBdHsWoRj9bcn

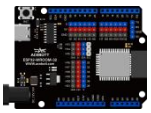
Log

Or scan the QR code below.

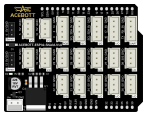
01 Build Your Robotic Arm

Step 1：Install the ESP32 controller board.

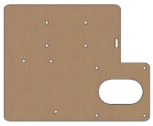




ESP32 controller boardx 1



ESP32Expansion Board x 1

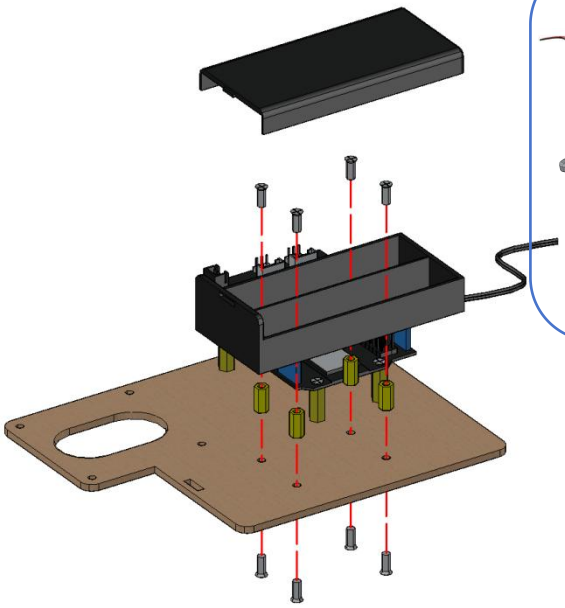


Robotic Arm Base Board x 1

M3*8MM Flat Head Screw x 6

M3*12MM Dual-pass Copper Pillar x 3

Step 2：Install the battery holder.

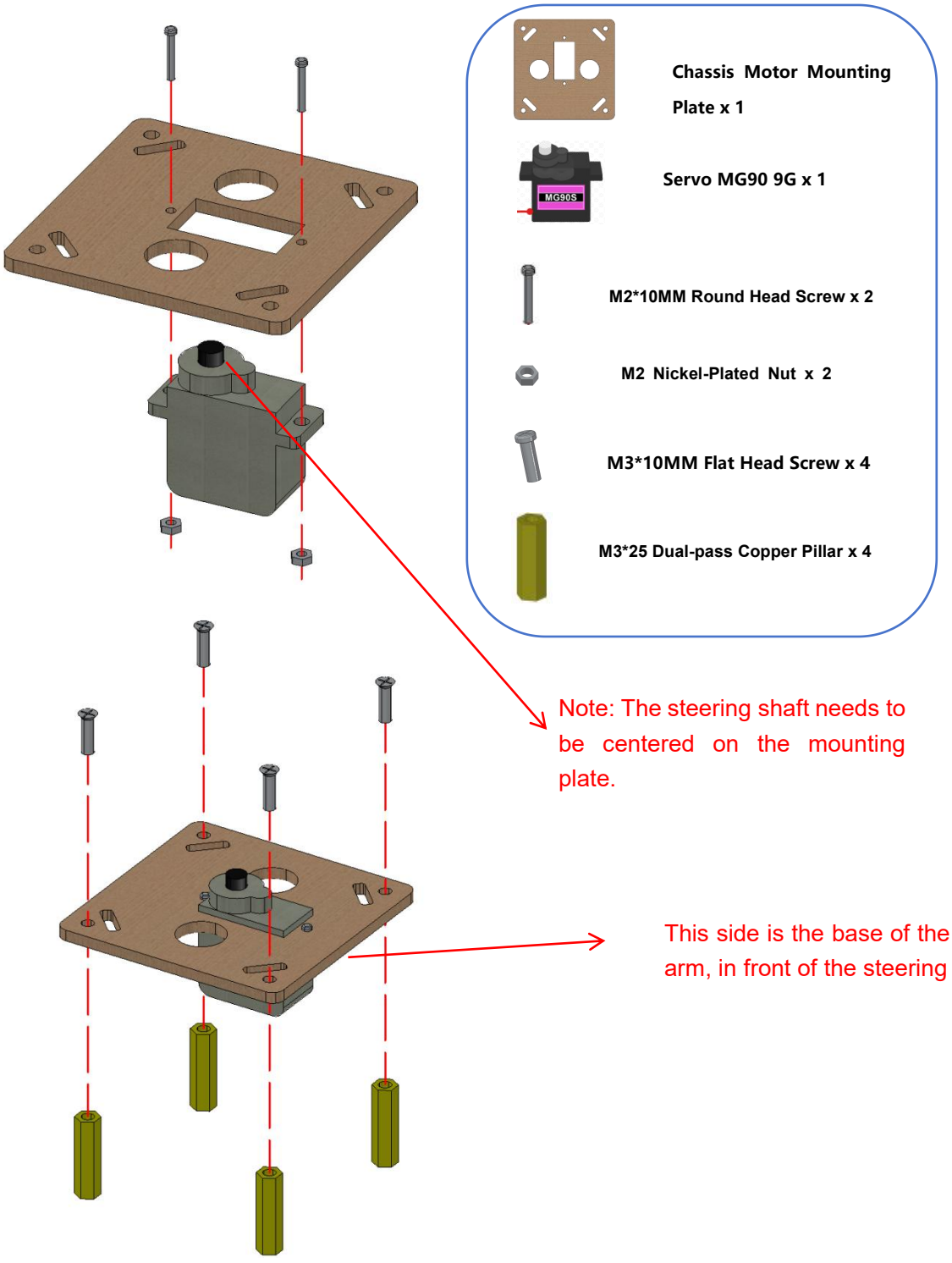


18650Battery Holder x 1

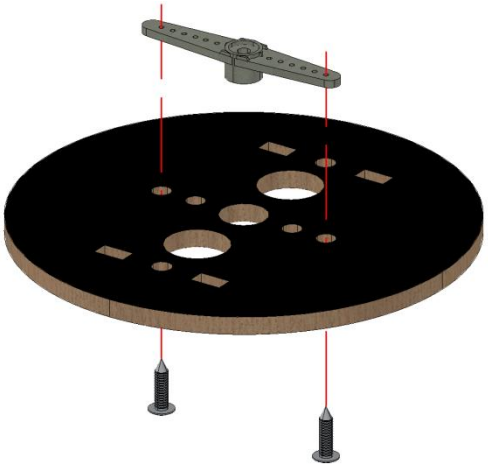
M3*8MM Flat Head Screw x 8

M3*12MM Dual-pass Copper Pillar x 4

Step 3：Install the chassis servo motor of the Robotic Arm.



Step 4： Assemble the servo horn on disc for the chassis servo.

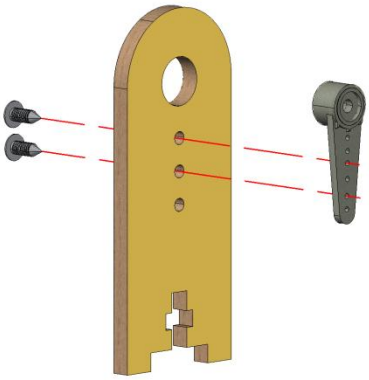


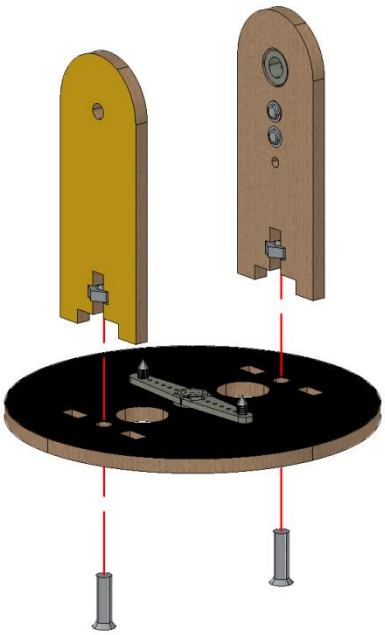
Base Disk x 1

servo horn x 1

M1.7*6 Large Round Flat Head Tapping Screw x 2

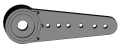
Step 5：Install the bracket on the disc.





Disc bracket a x 1

Disc bracket b x 1



Half servo horn x 1

M1.7*6 Large Round Flat Head Tapping Screws x 2

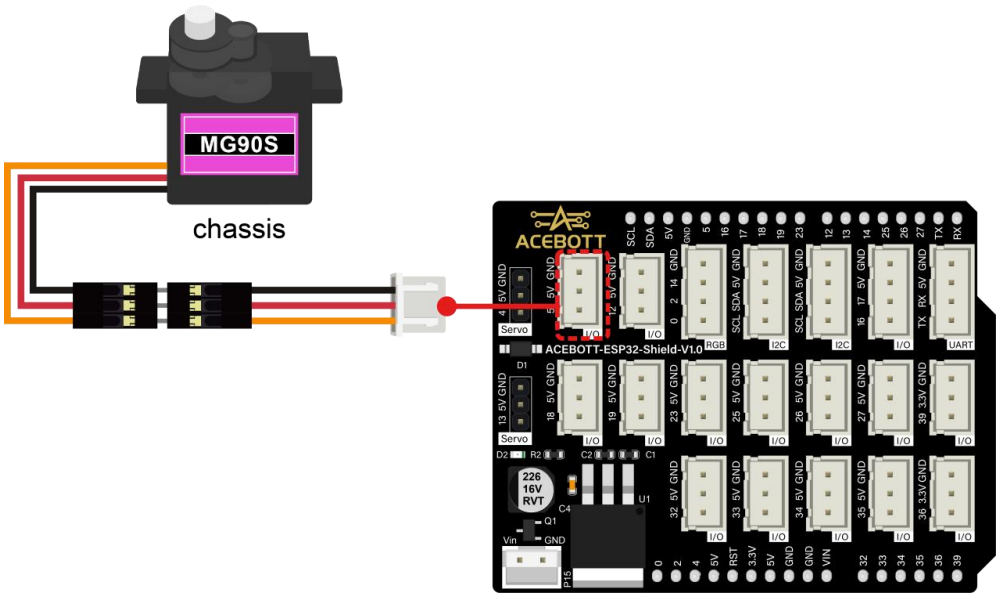
M3*10 MM Flat Head Screw x 2

M3 Nickel-Plated Nut x 2

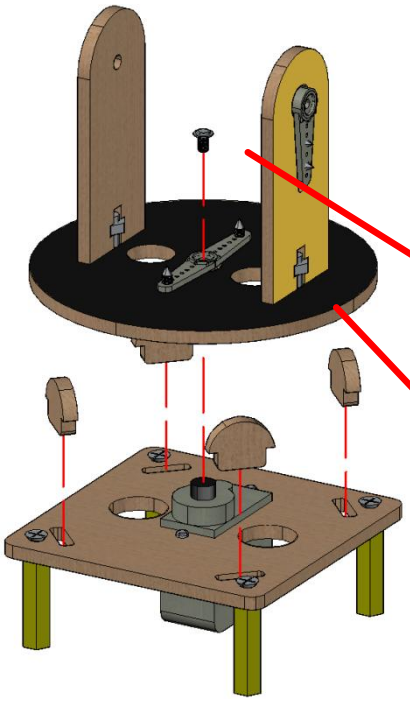
Step 6：The disc for fixing the motor to the base.

Note:Before fixing the disc, please complete the following steps first:

(1) Connect the chassis motor to the ESP32 pin 5. Connect the servo wire to the servo extension cable, and then connect the servo extension cable to pin 5.



(2) Connect the ESP32 controller board to a power source, turn on the power, click here to open the servo initialization program, upload the program to the ESP32 controller board, and install the servo disc after the servo rotates to the 90° position.



M2.5*4Round Head Screw(Servo pack includes accessories)x 1

Support Platex 4

Do not lock the screws too tightly to prevent blockage of the steering gear

Note the installation direction of the disc, the side with the steering wheel is at the bottom of the mechanical arm on the right side of the steering gear

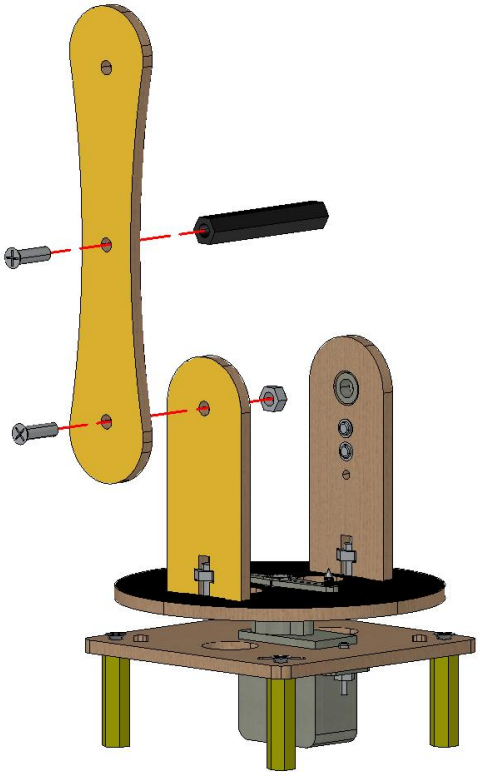
Step 7： Install the left side linkage of the shoulder joint on the robotic arm.

The left shoulder joint arm linkage x 1

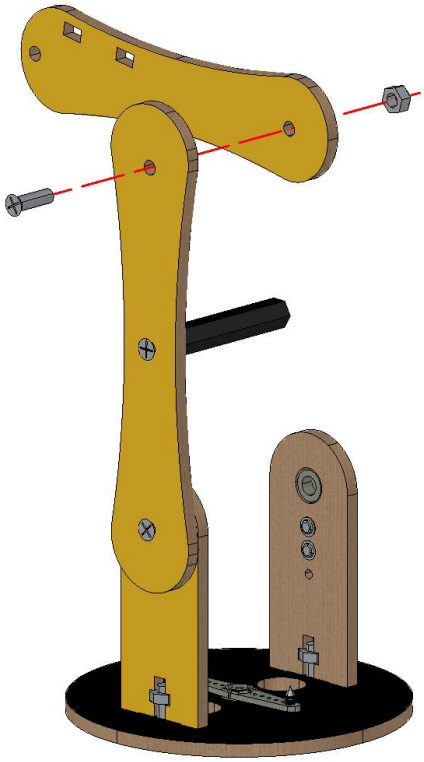
M3*35Nylon column x 1

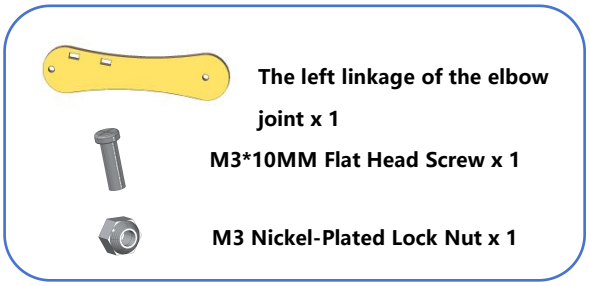
M3*10MM Flat Head Screw x 2

M3 Nickel-Plated Lock Nut x 1

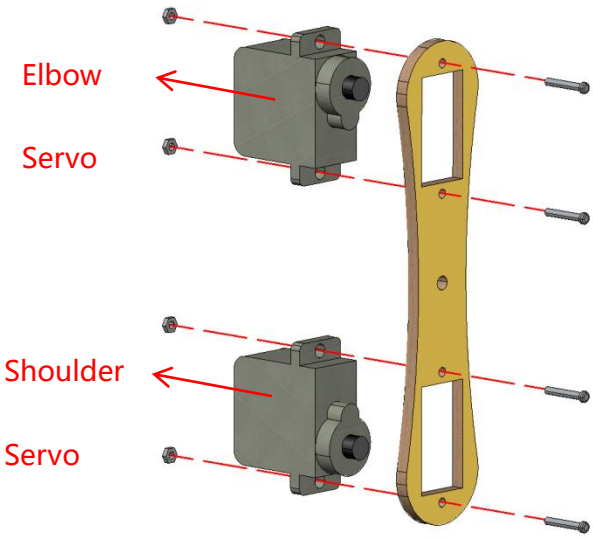


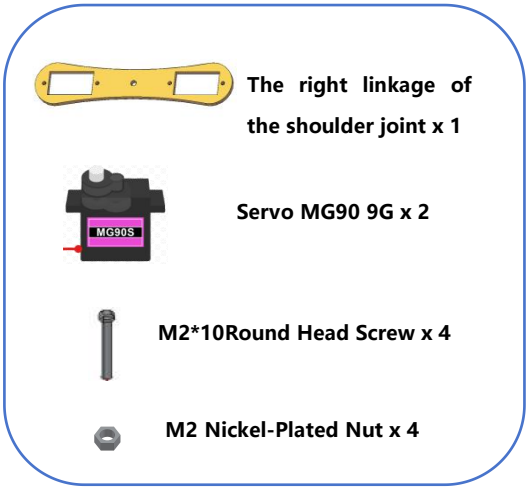
Step 8： Install the left linkage of the elbow joint on the robotic arm.





Step 9：Install the servos for the left shoulder joint and elbow joint of the robotic arm.

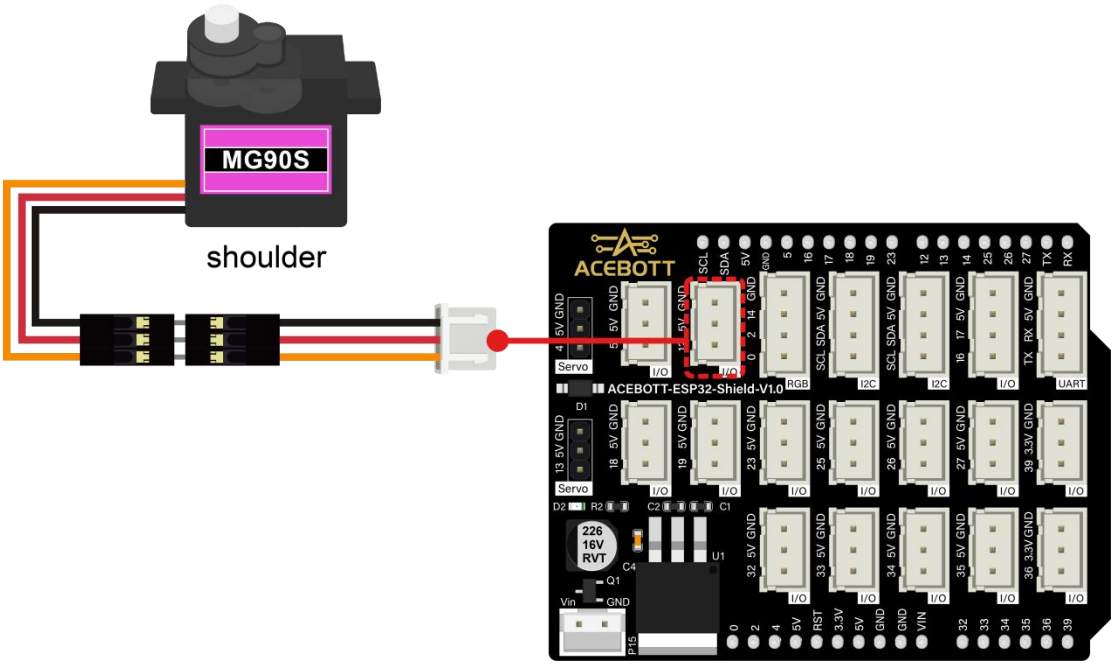




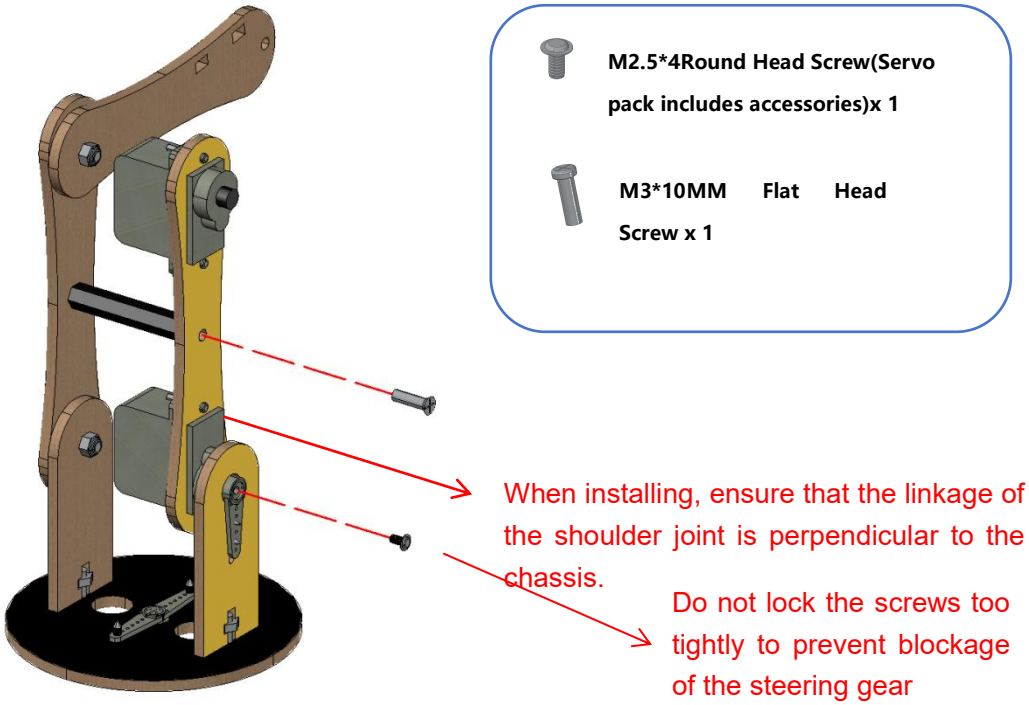
Step 10： Mount the servo for the shoulder joint of the robotic arm.

Note:Before mounting the shoulder servo, please follow these steps:

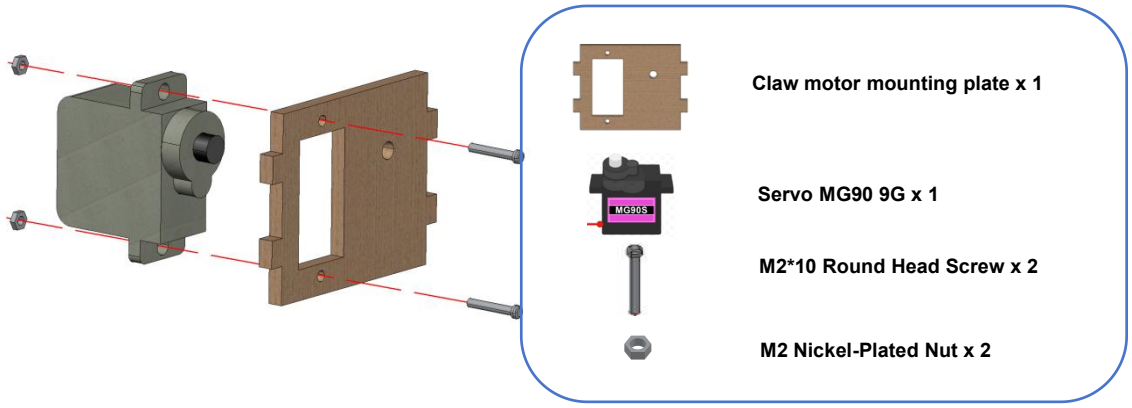
(1) Power off the ESP32 and connect the shoulder servo to pin 12 of the ESP32. Attach the servo wire to the servo extension cable, and then connect the extension cable to pin 12.



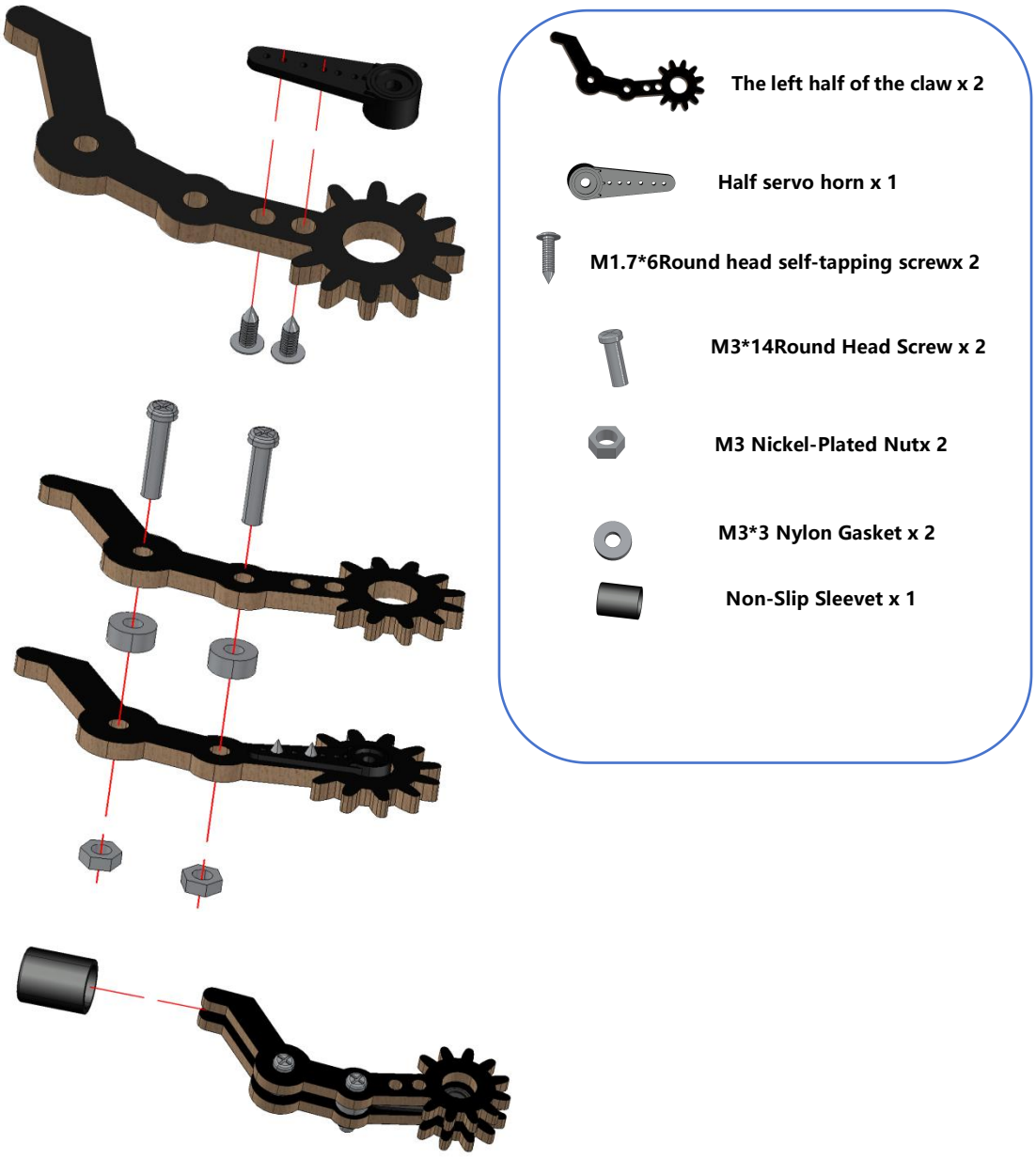
(2) Connect the ESP32 controller board to a power source and turn it on. Wait until the shoulder servo rotates to the 90° position before securing the shoulder servo.



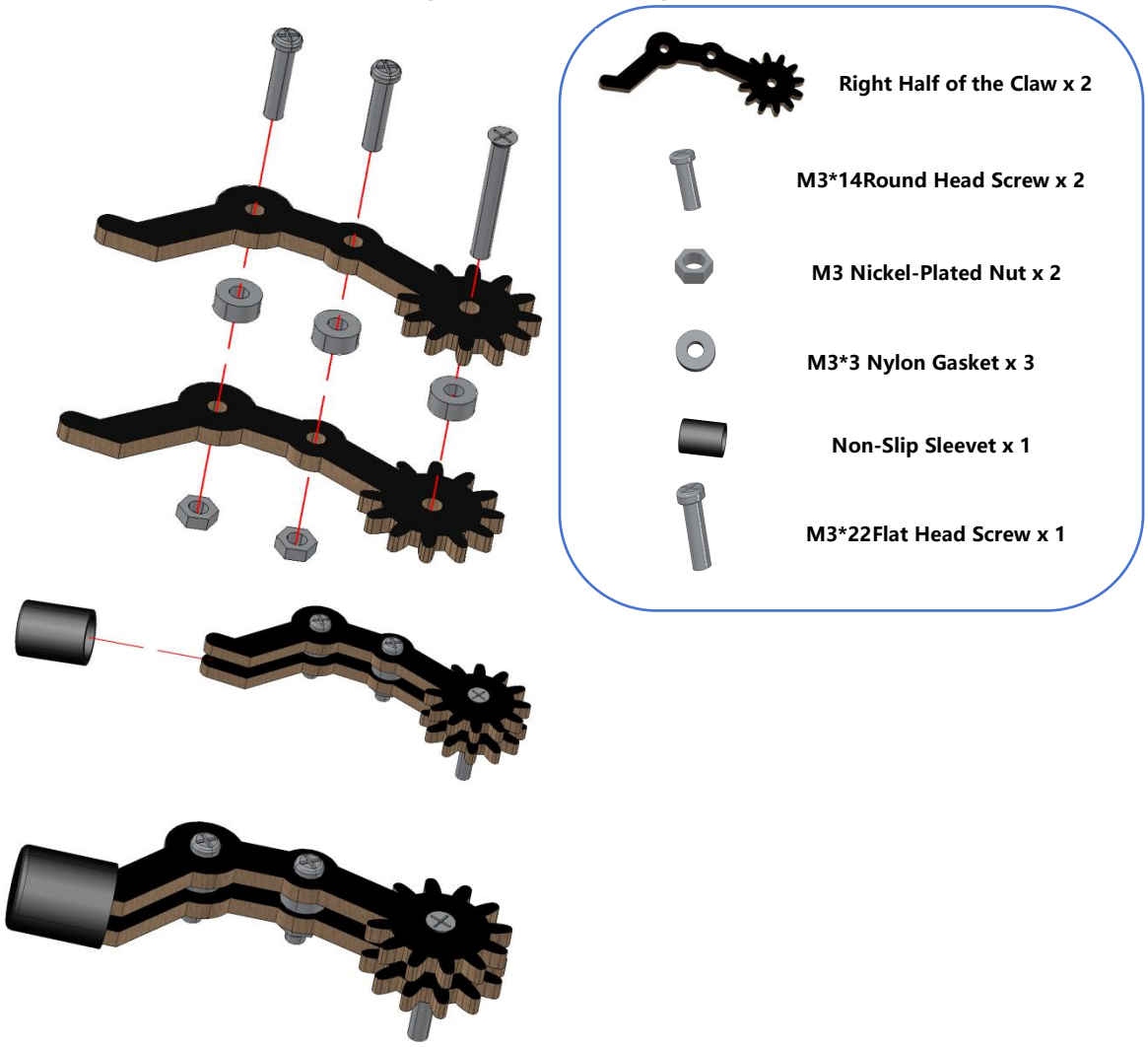
Step 11： Install the servo for the Claw joint.



Step 12：Assemble the left half of the claw.



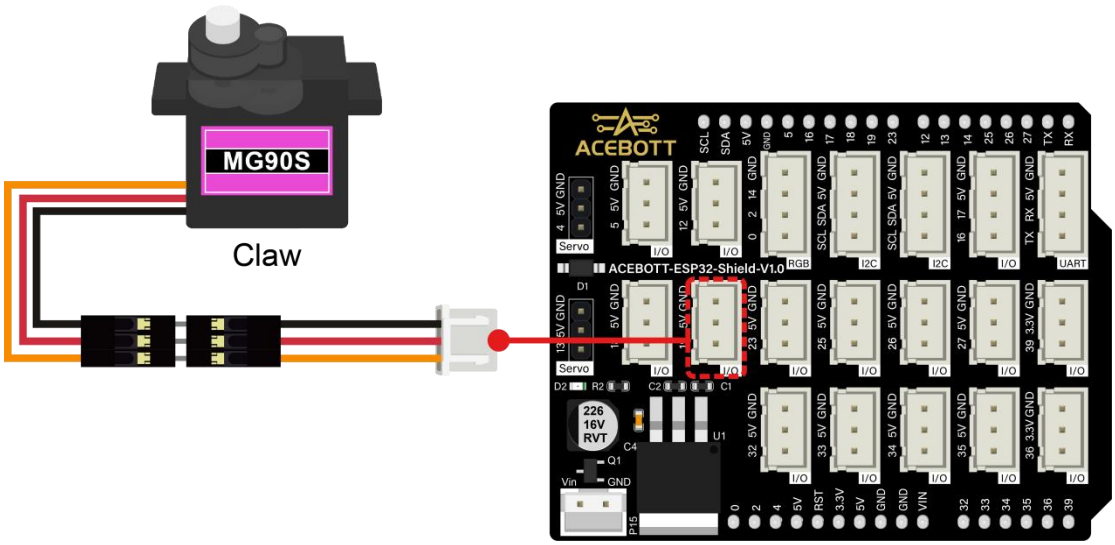
Step 13：Assemble the right half of the gripper.



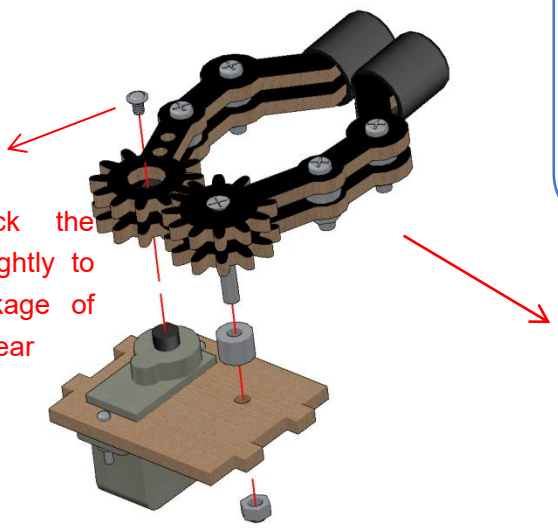
Step 14：Secure the claw.

Note:Before securing the claw, please complete the following steps first.

(1) Disconnect the power supply of the ESP32, connect the calw servo to pin 19 of the ESP32. Connect the servo wire to the servo extension cable, and then connect the extension cable to pin 19.



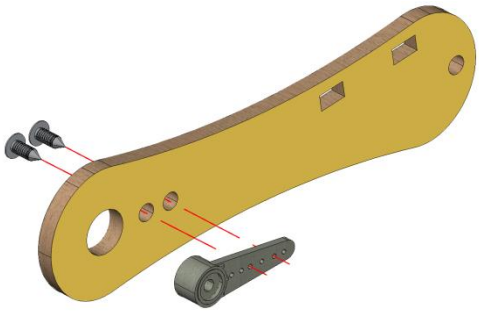
(2) Connect the ESP32 controller board to a power source and turn it on. Wait until the claw servo rotates to the 90° position before securing the claw.



Do not lock the screws too tightly to prevent blockage of the steering gear

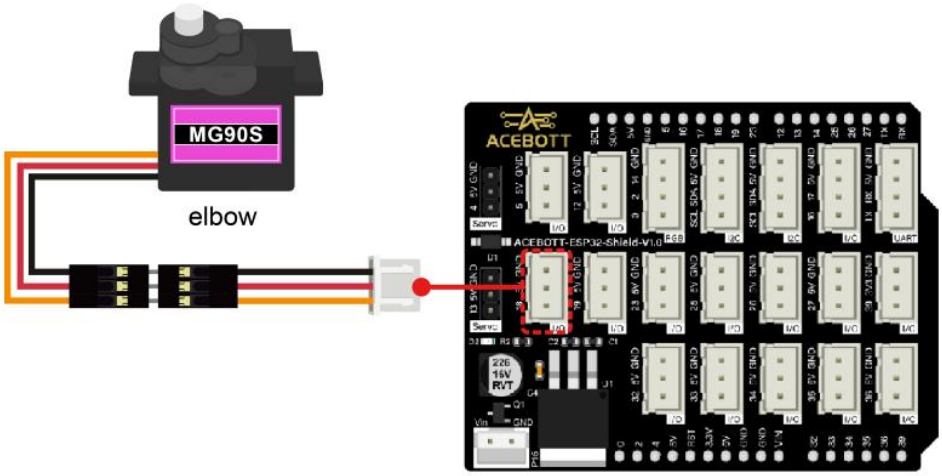
Install the claw in the closed position.

Step 15：Install the elbow link and claw of the robotic arm.

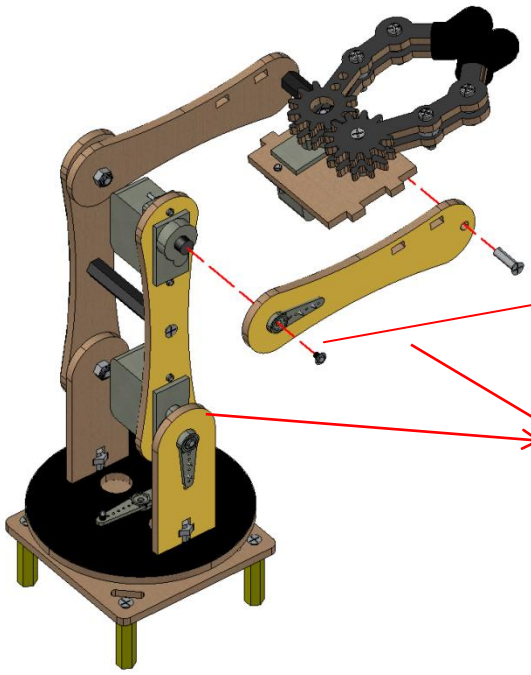


Note: Before installing the elbow link, please complete the following steps first:

(1) Power off the ESP32 and connect the elbow servo to pin 18 of the ESP32. Connect the servo wire to the servo extension cable, and then connect the extension cable to pin 18.



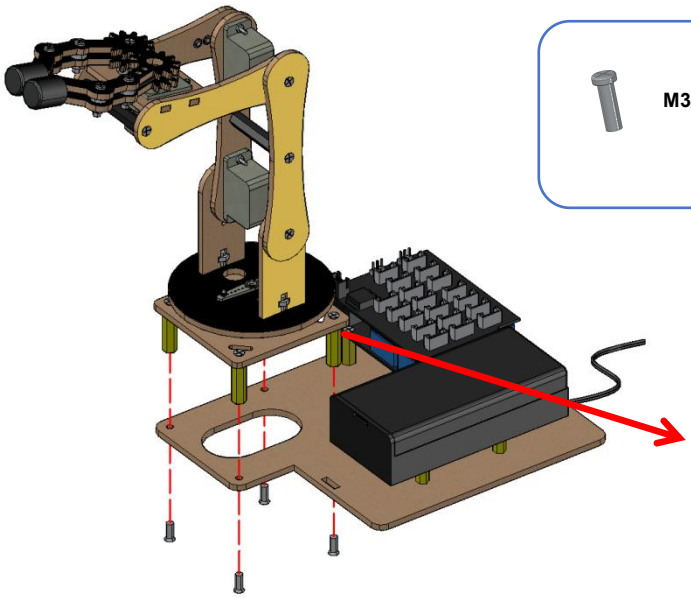
(2) Connect the ESP32 controller to a power source and turn it on. Wait until the elbow servo rotates to the 90° position before installing the elbow link.



Do not lock the screws too tightly to prevent blockage of the steering gear

Install the shoulder link and elbow link in a perpendicular state.

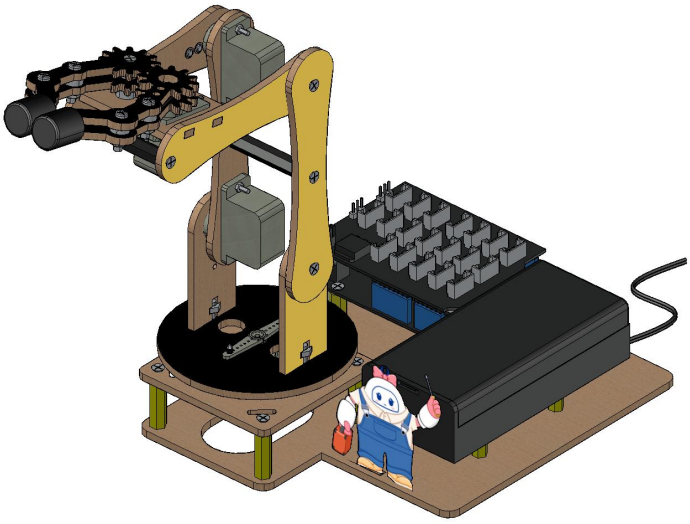
Step 16：Secure the robotic arm to the base.



M3*10MM Flat Head Screw x 4

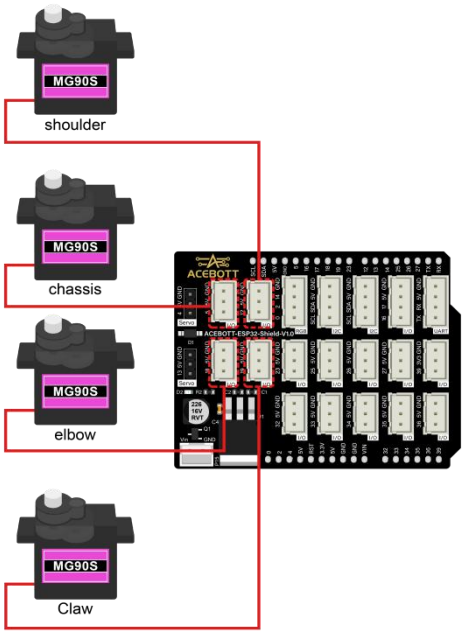
Note the installation direction, the front of the base motor towards the outside, the claw should be above the claw steering gear.

Step 17：Install the LUNA standing board.



Luna standing board x 1

Step 18：Wiring



Note: When connecting the servo, you need to use DuPont cables with pin header to fast connector adapters.

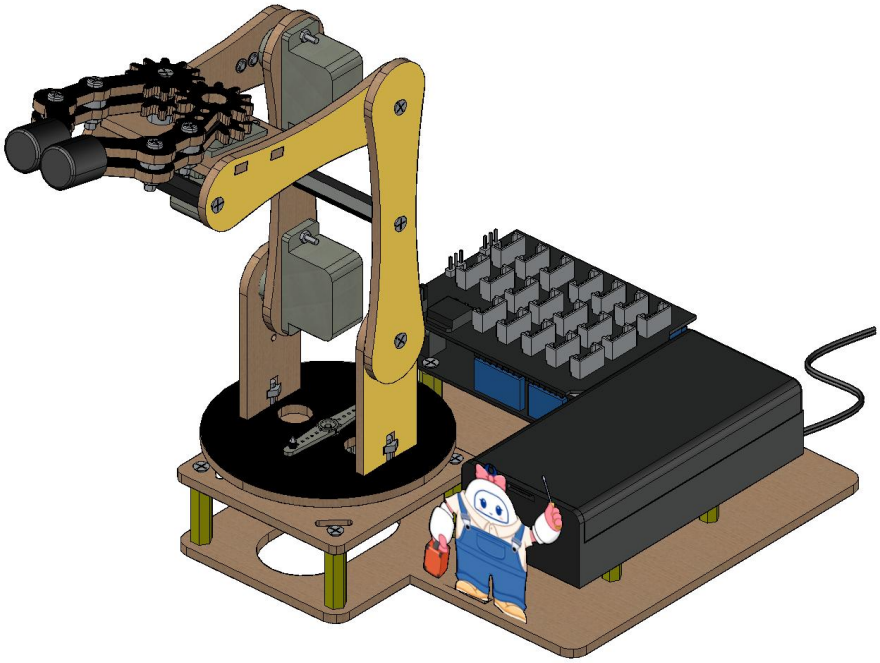
Wiring Instruction:

Module Name	Module Pin	ESP32 Pin
Chassis Servo	S	Pin5
	V	5V
	G	GND
Shoulder Servo	S	Pin12
	V	5V
	G	GND
Elbow Servo	S	Pin18
	V	5V
	G	GND
Claws Servo	S	Pin19
	V	5V
	G	GND

Note:Please make sure to strictly follow the wiring instructions when connecting the module to the ESP32 controller board. Incorrect wiring may cause a short circuit and damage the ESP32 controller board.

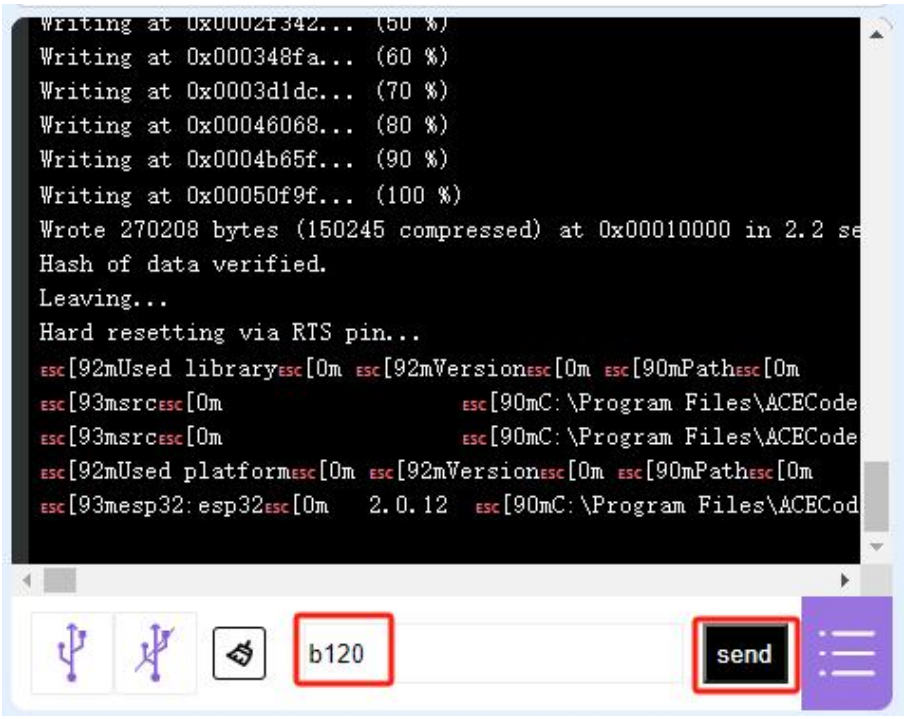
02 Joint Motion of Robotic Arm

Note: The structure of this project is the same as that of the previous project; please follow the structure of the previous project.



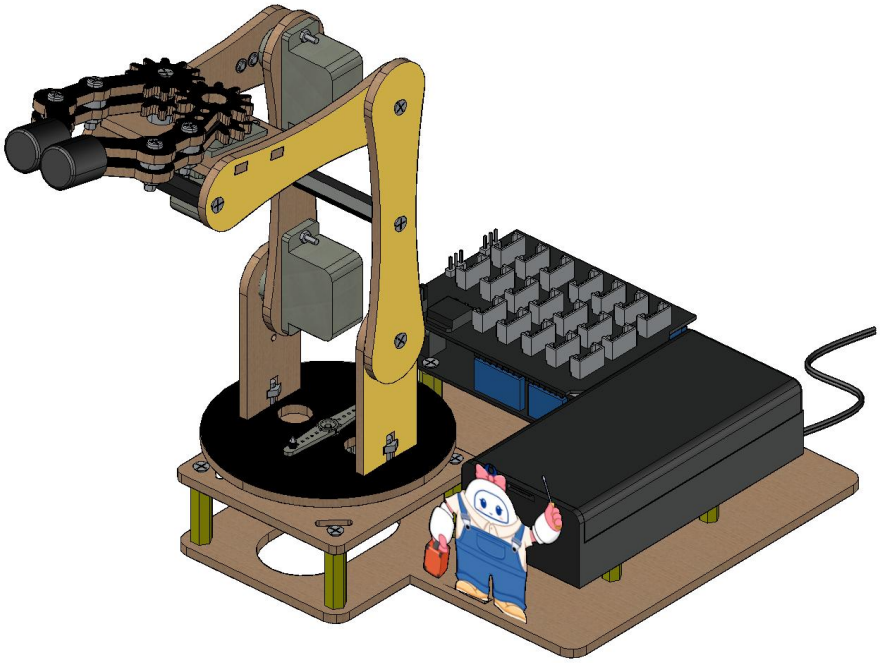
Click here to get the program for this project.

After uploading the program, you can enter the name and angle value of the joint in the serial port input box of the serial port monitor located at the bottom right corner. Press the send button, and the corresponding joint servo will move to the input angle position.


Writing at 0x0002f342... (50 %)
Writing at 0x000348fa... (60 %)
Writing at 0x0003d1dc... (70 %)
Writing at 0x00046068... (80 %)
Writing at 0x0004b65f... (90 %)
Writing at 0x00050f9f... (100 %)
Wrote 270208 bytes (150245 compressed) at 0x00010000 in 2.2 se
Hash of data verified.
Leaving...
Hard resetting via RTS pin...
esc[92mUsed libraryesc[Om esc[92mVersionesc[Om esc[90mPathesc[Om
esc[93msrcesc[Om esc[90mC:\Program Files\ACECode
esc[93msrcesc[Om esc[90mC:\Program Files\ACECode
esc[92mUsed platformesc[Om esc[92mVersionesc[Om esc[90mPathesc[Om
esc[93mesp32:esp32esc[Om 2.0.12 esc[90mC:\Program Files\ACECod
b120
send

03 Speed Control of Robotic Arm

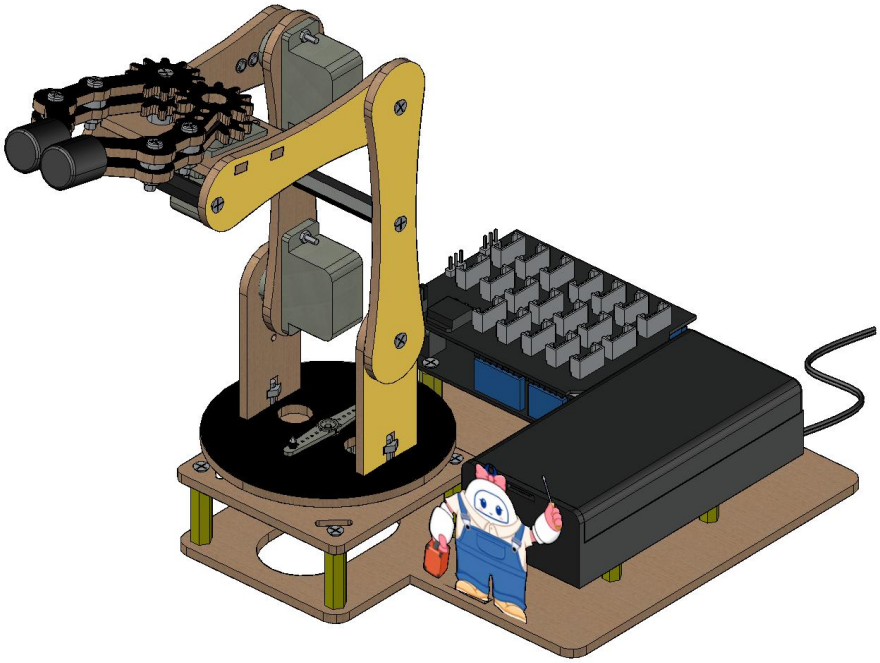
Note: The structure of this project is the same as that of the previous project; please follow the structure of the previous project.



Click here to get the program for this project.

04 Smart Handling

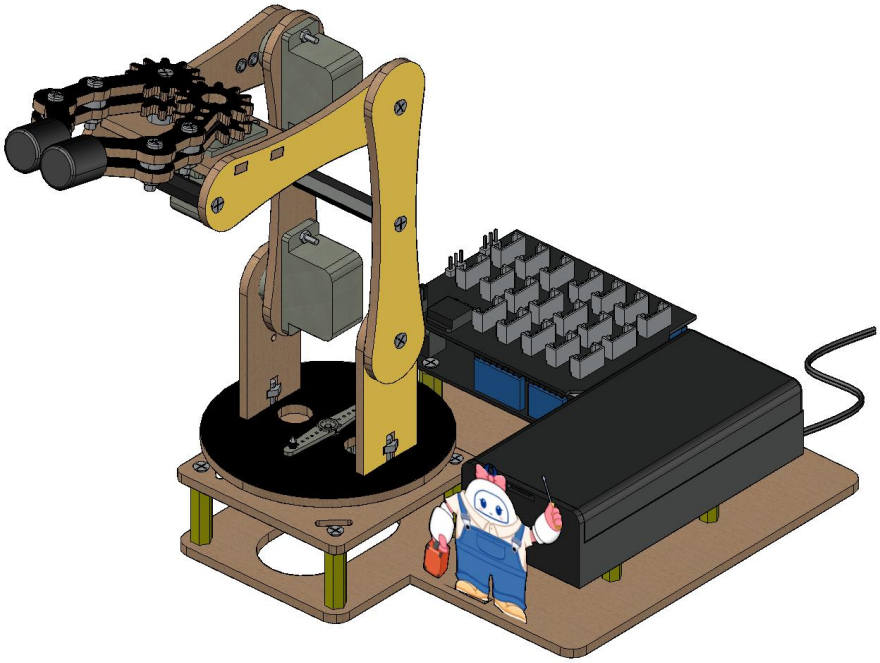
Note: The structure of this project is the same as that of the previous project; please follow the structure of the previous project.



Click here to get the program for this project.

05 Robotic Arm Coordinate Control

Note: The structure of this project is the same as that of the previous project; please follow the structure of the previous project.

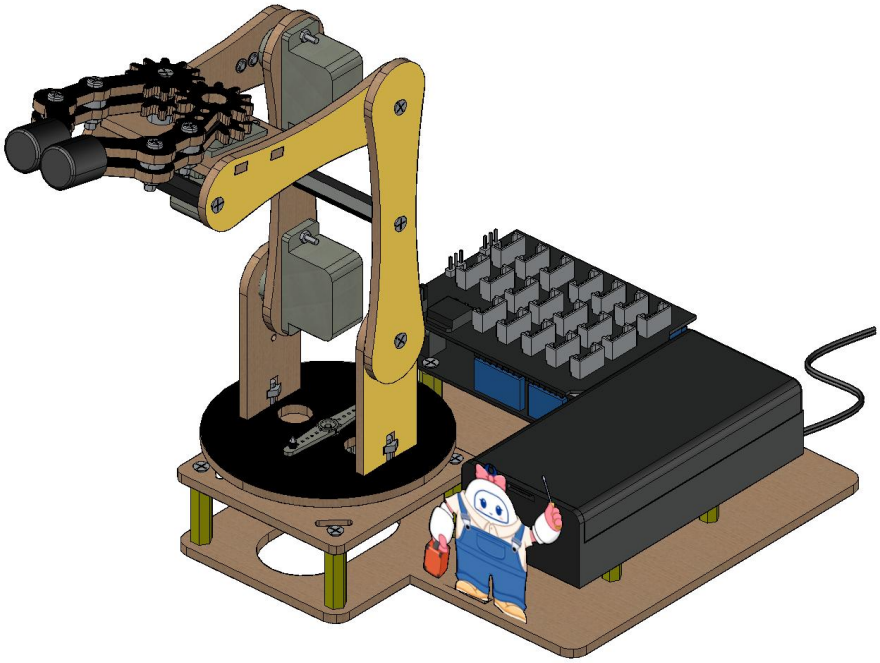


To control the robotic arm more intuitively and accurately using spatial coordinates, this project provides a coordinate map as a spatial reference coordinate system. Click here to obtain the Cartesian coordinate map of the robotic arm. Place the center of the robotic arm's base disc at the origin of the coordinates.

Click here to get the program for this project.

06 Robotic Arm Palletizing

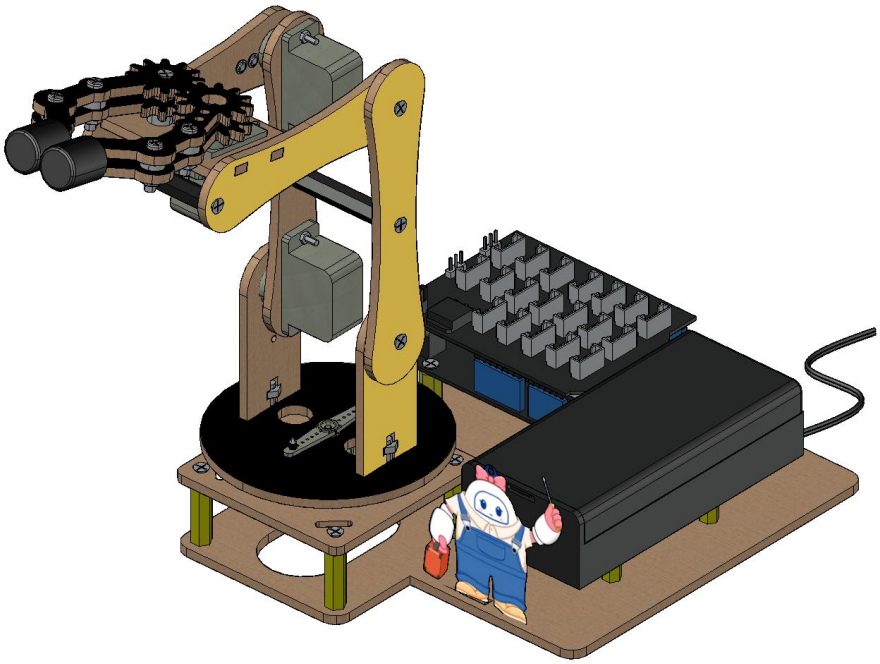
Note: The structure of this project is the same as that of the previous project; please follow the structure of the previous project.



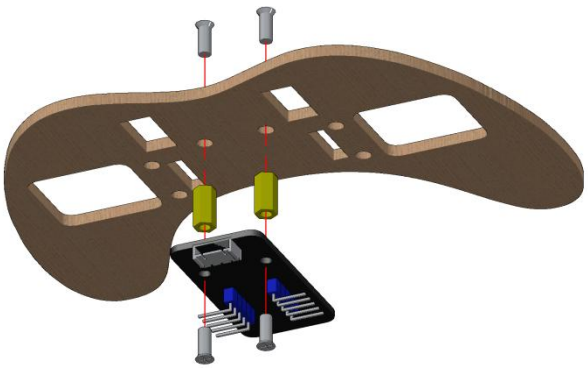
Click here to get the program for this project.

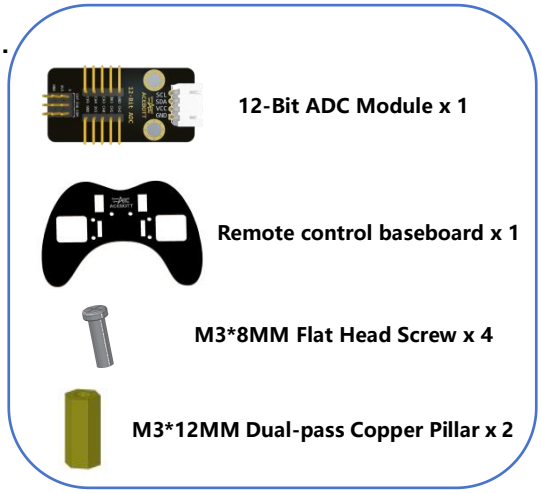
07 Remote Control of Robotic Arm

Note: The structure of this project will be based on the robotic arm structure from the previous project. The specific assembly of the robotic arm will not be demonstrated here, and we will start directly with the installation of the joystick module.

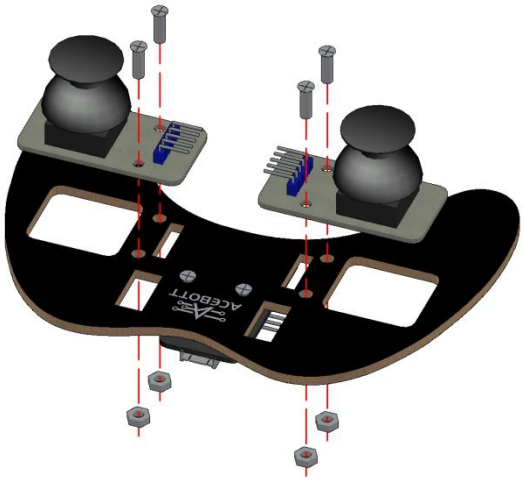


Step 1：Install the 12-bit ADC module.





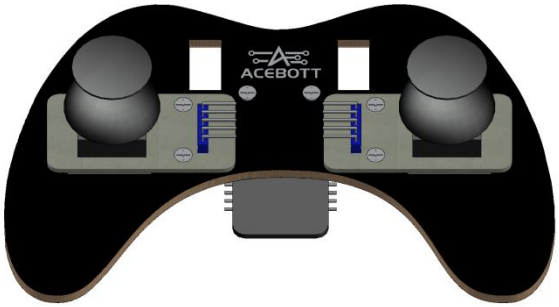
Step 2：Install the joystick module.

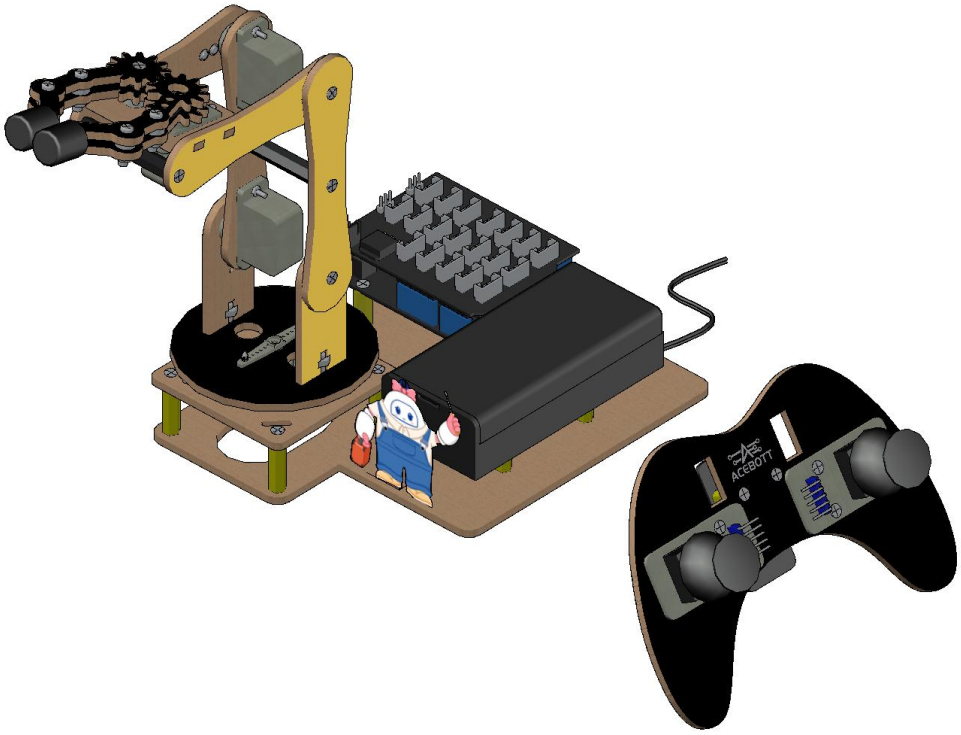


Joystick Modulex 2

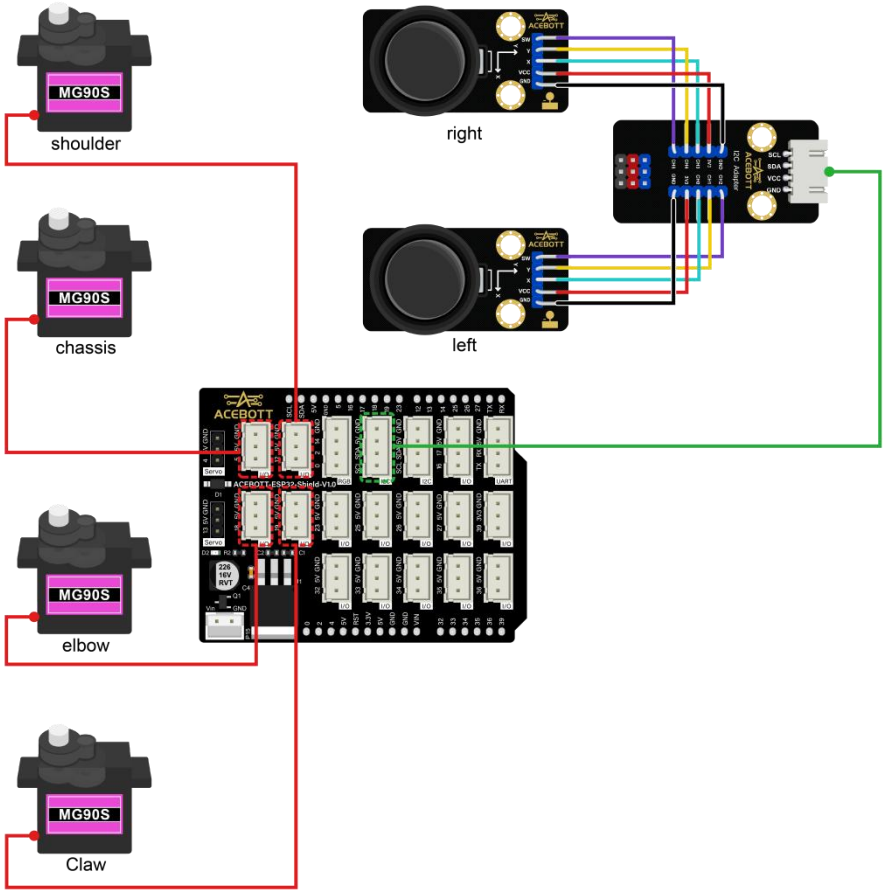
M3*10MM Flat Head Screw x 4

M3Nickel-Plated Nut x 4





Step 3：Wiring



ESP32 Controller Board Wiring Instruction:

Module Name	Module Pin	ESP32 Pin
Chassis Servo	S	Pin5
	V	5V
	G	GND
Shoulder Servo	S	Pin12
	V	5V
	G	GND
Elbow Servo	S	Pin18
	V	5V
	G	GND

Claws Servo	S	Pin19
	V	5V
	G	GND
12-bit AD Module	SCL	SCL
	SDA	SDA
	VCC	5V
	GND	GND

Joystick Module and 12-Bit ADC Module Wiring Instruction:

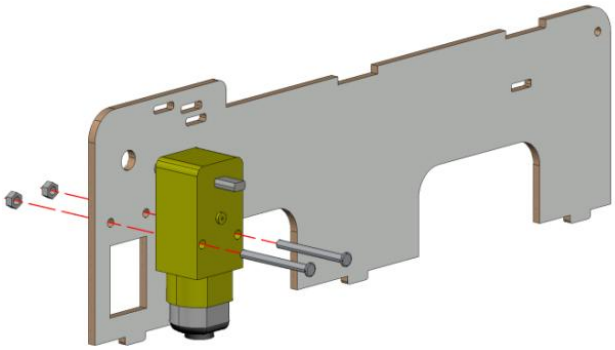
Module Name	Module Pin	12-bit ADC Module Pin
Left Joystick Module	SW	CH2
	Y	CH1
	X	CH0
	VCC	5V
	GND	GND
Right Joystick Module	SW	CH5
	Y	CH4
	X	CH3
	VCC	5V
	GND	GND

Note:Please make sure to strictly follow the wiring instructions when connecting the module to the ESP32 controller board. Incorrect wiring may cause a short circuit and damage the ESP32 controller board.

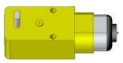
Click here to get the program for this project.

08 Conveyor Control

Step 1：Install TT DC geared motor.



Conveyor Support Board a x 1

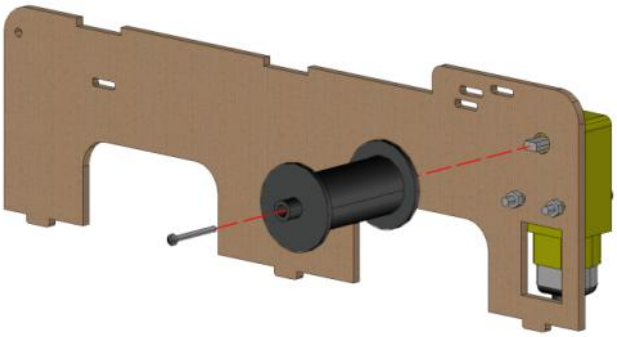


TT DC Geared Motor x 1

M3*30Round Head Screw x 2

M3Nickel-Plated Nut x 2

Step 2：Install the conveyor belt driving shaft.

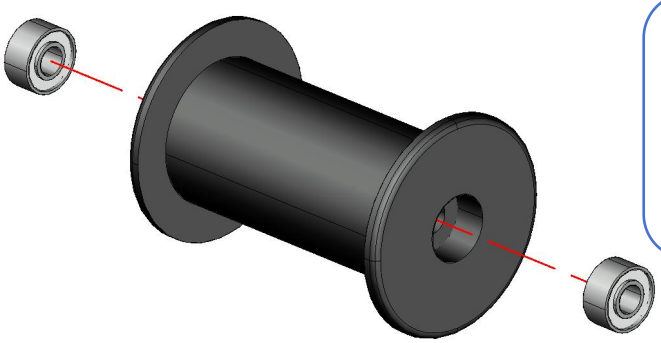


Driving Shaft x 1

M2*25Round head self-tapping screwx 1

Step 3：Install bearings on the driven shaft

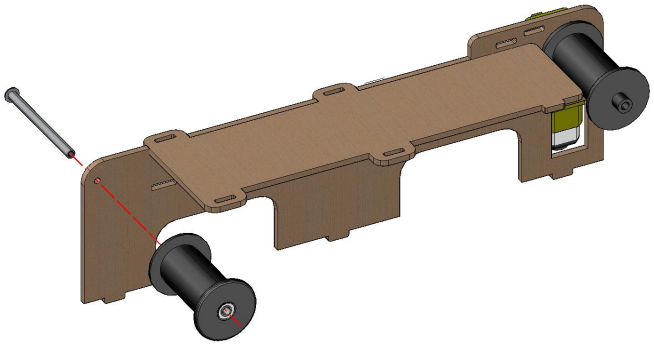
Note: Please confirm first whether your product includes bearings. If the product does not contain bearings, skip this step and begin installation from step four.

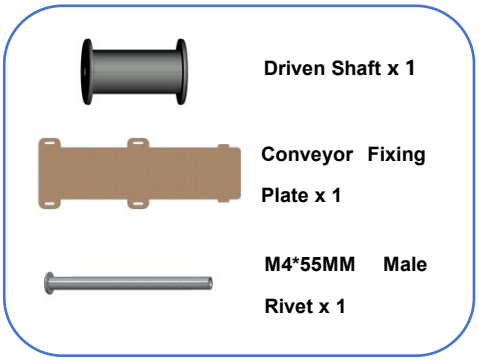


Driven Shaft x 1

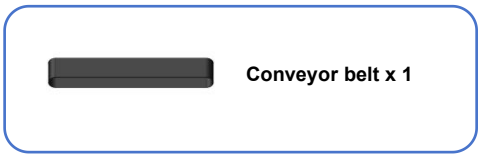
Bearing x 2

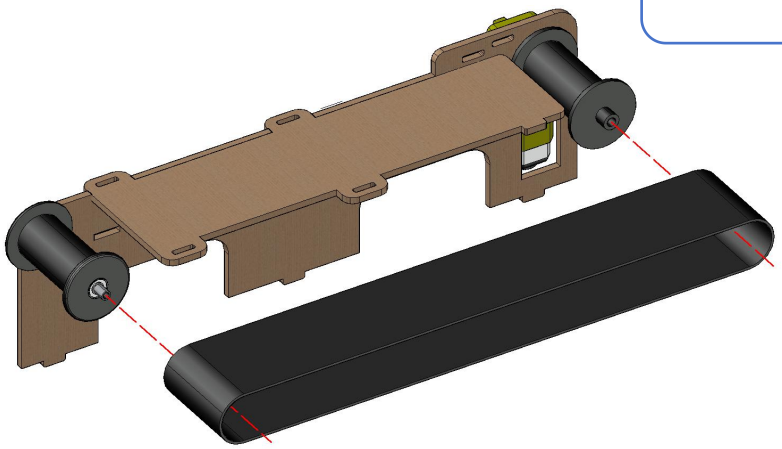
Step 4：Install the conveyor belt driven shaft.



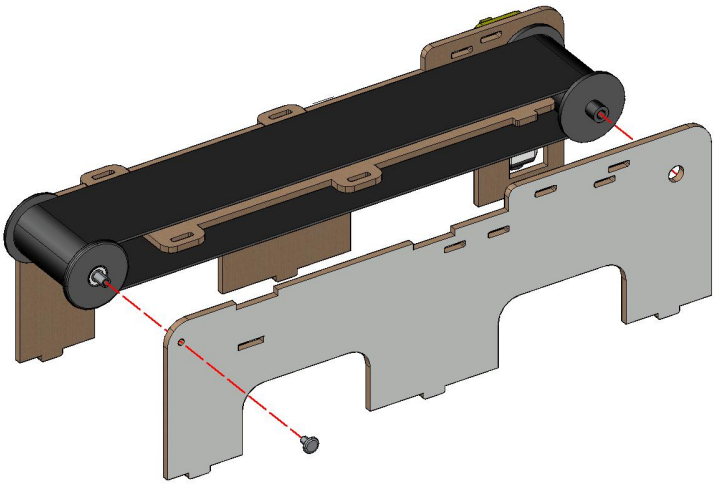


Step 5：Install the conveyor belt.

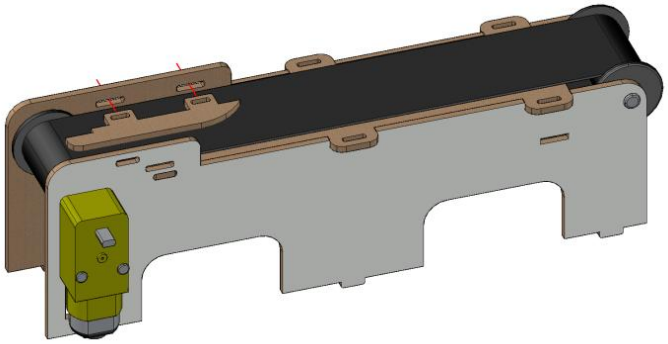


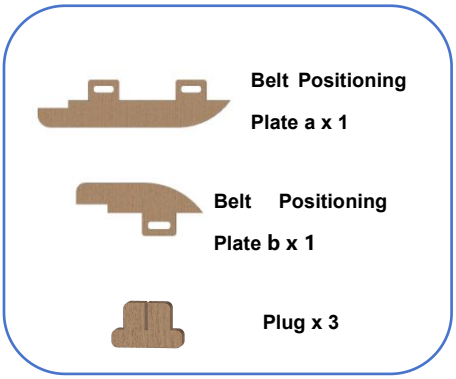


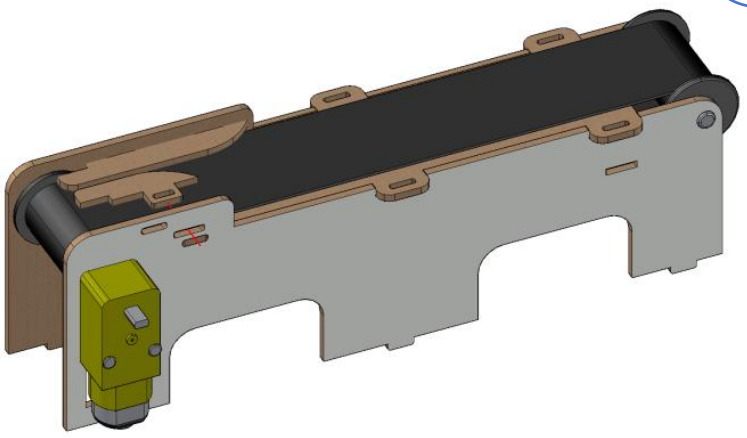
Step 6：Secure the conveyor.

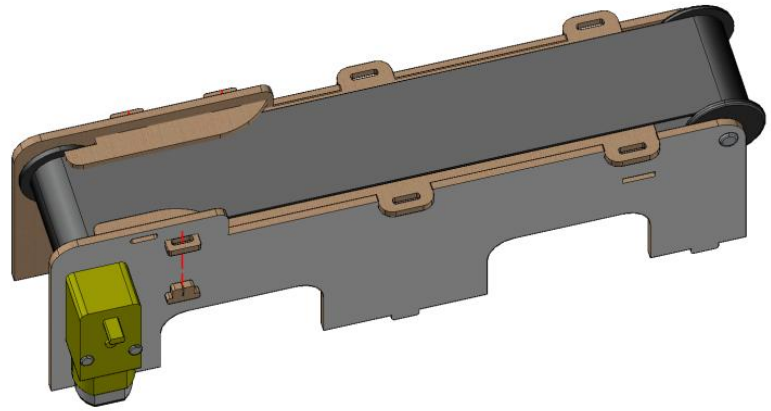


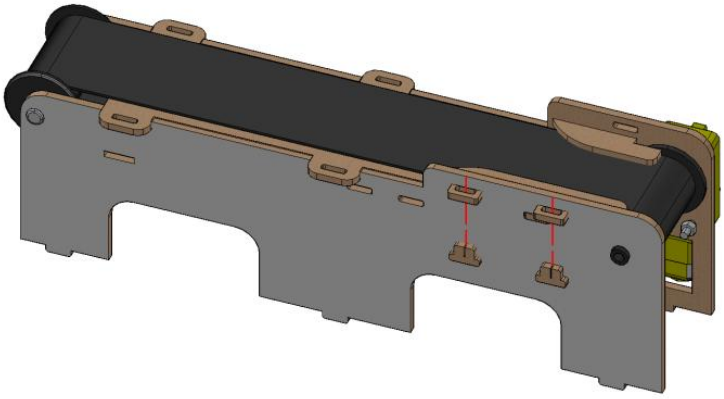
Step 7： Install the tensioning device above the conveyor belt.



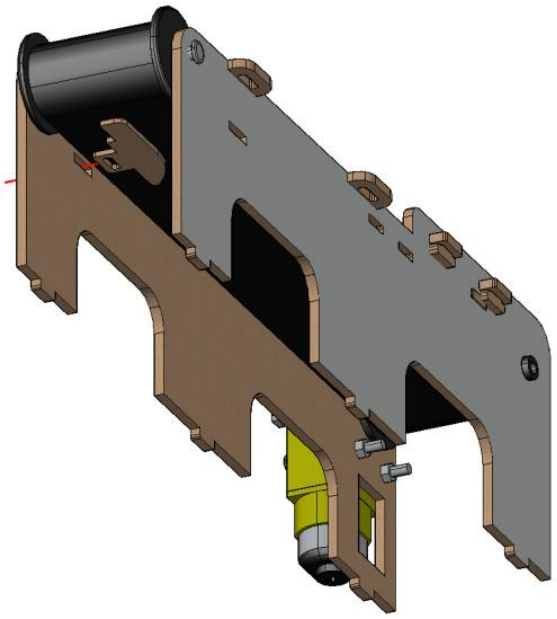






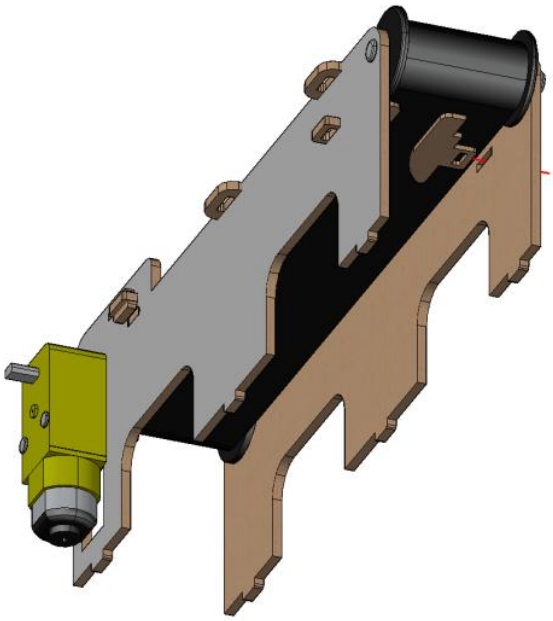


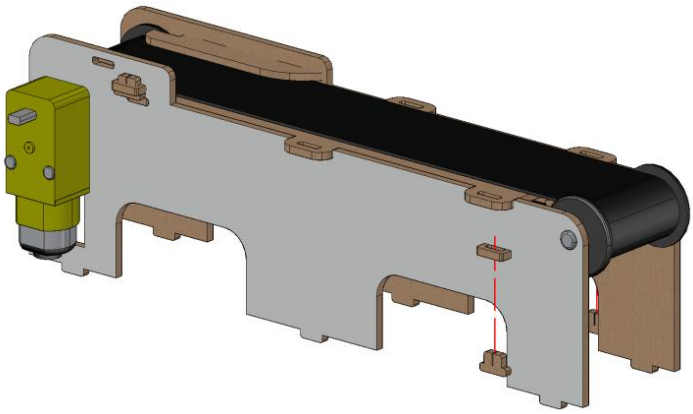
Step 8：Install the tensioning device below the belt.



Belt Positioning Plate c x 2

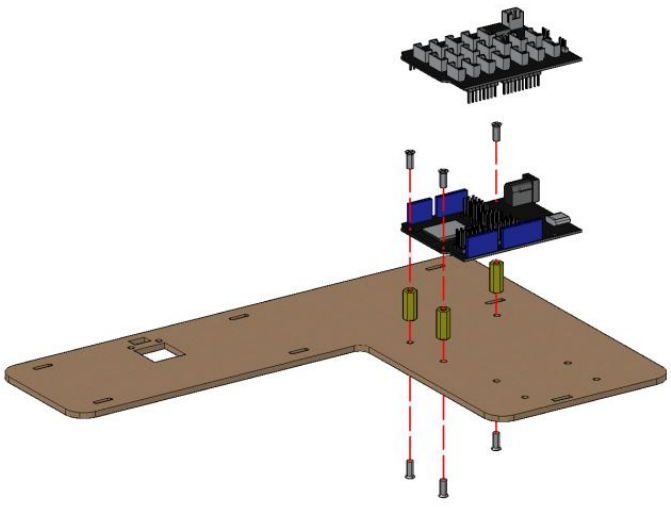
Plug x 2

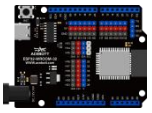




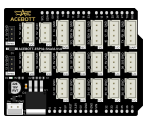
Step 9：Install the ESP32 Controller Board.

Note: To complete this step, you will need to remove the ESP32 controller board from the previous project.

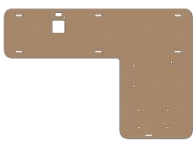




ESP32 Controller Board x 1



ESP32-Shield Board x 1



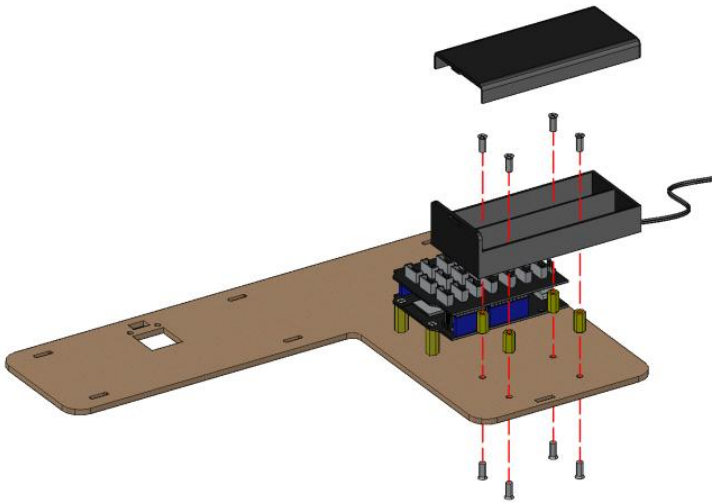
Conveyor Base

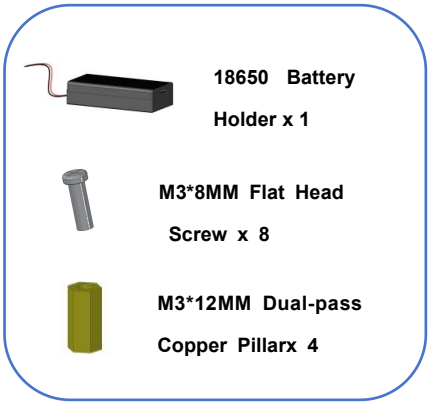
M3*8MM Flat Head Screw x 6

M3*12MM Dual-pass Copper Pillar x 3

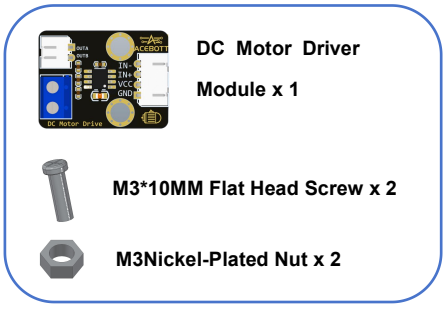
Step 10：Install the battery holder.

Note: To complete this step, you will need to remove the battery holder from the previous project.

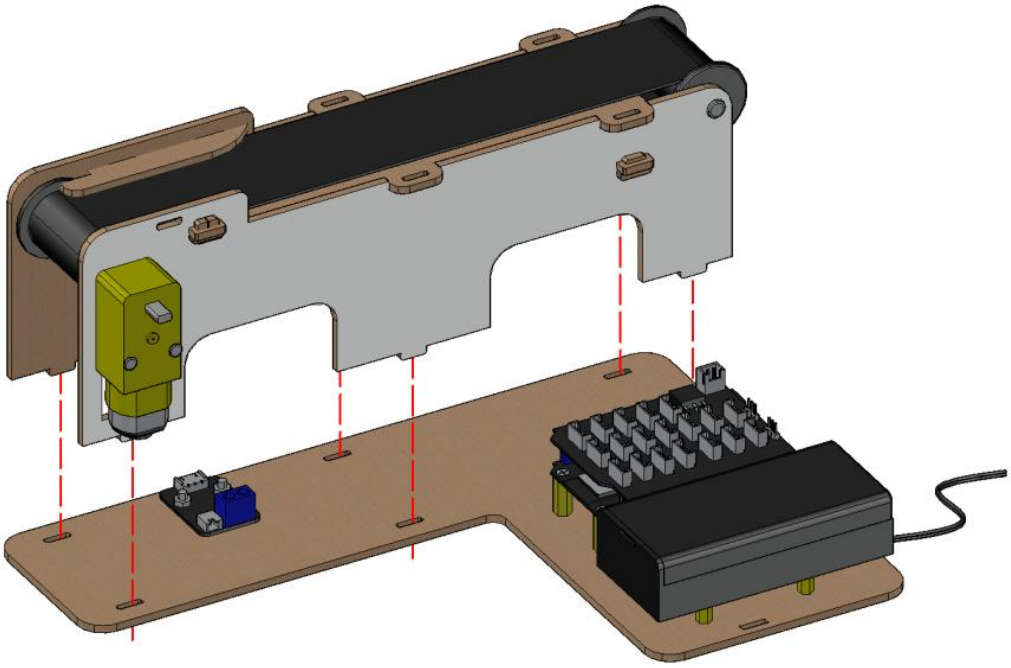


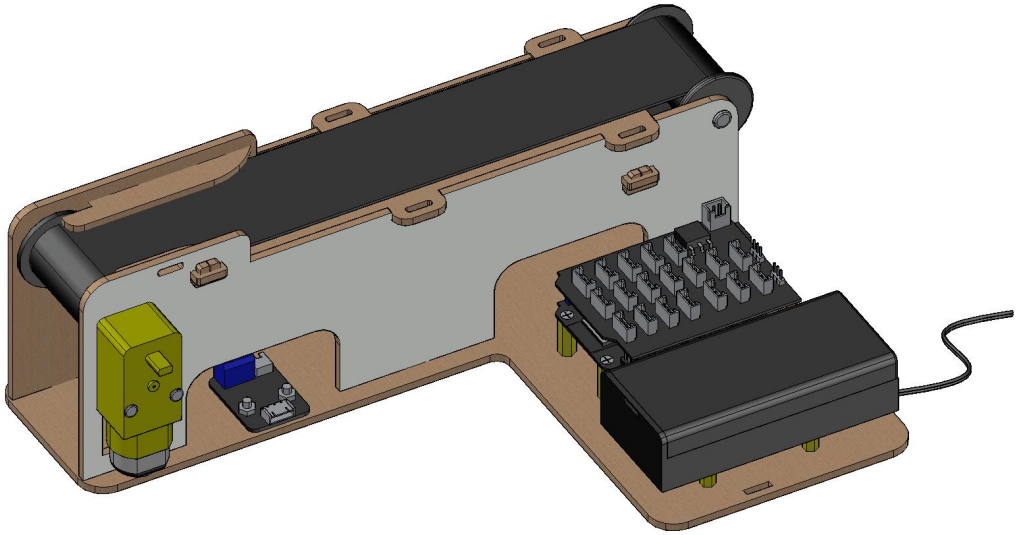


Step 11：Install the DC motor driver module.

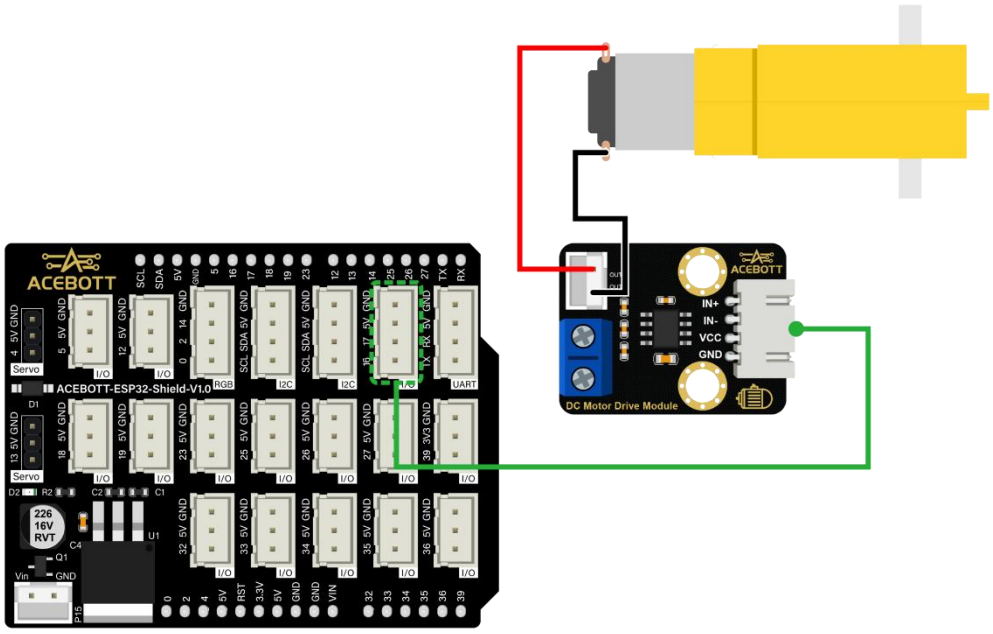


Step 12：Mount the conveyor belt on the baseboard.





Step 13：Wiring



ESP32 Controller Board Wiring Instruction:

Module Name	Module Pin	ESP32 Pin
DC Motor Driver Module	IN+	Pin16
	IN-	Pin17
	VCC	5V
	GND	GND

Note:

1.Connect the TT DC geared motor power wires to the output ports of the driver module.

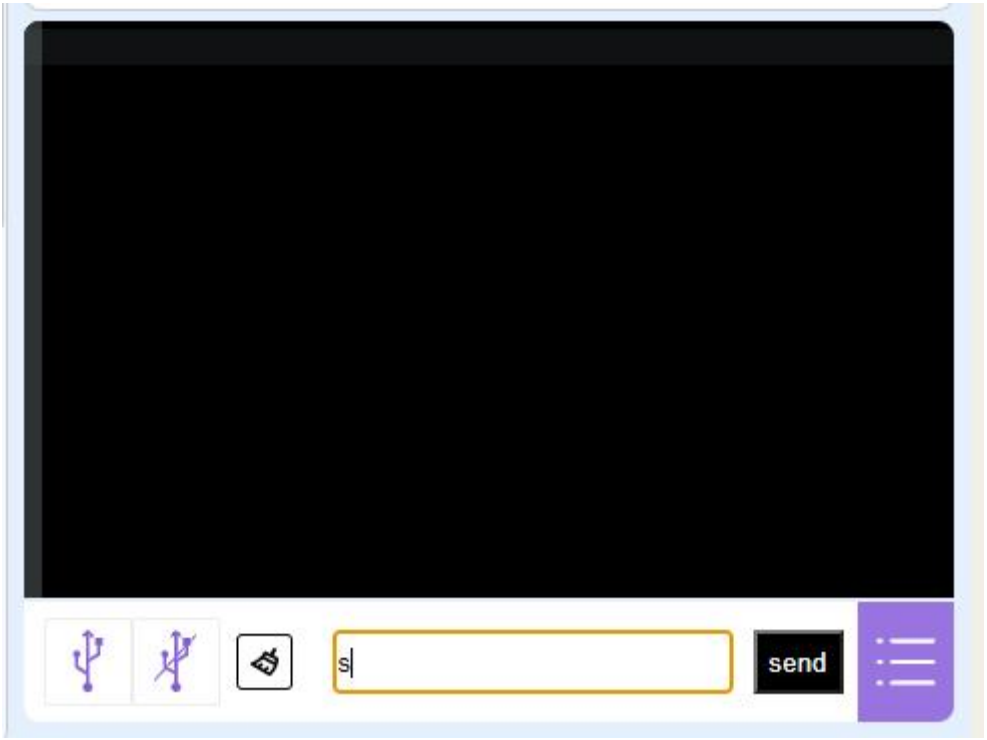
2.Please make sure to strictly follow the wiring instructions when connecting the module to the ESP32 controller board. Incorrect wiring may cause a short circuit and damage the ESP32 controller board.

3. The conveyor belt cannot run for a long time, otherwise it will cause the motor to burn and may cause damage to the motor.

Click here to get the program for this project.

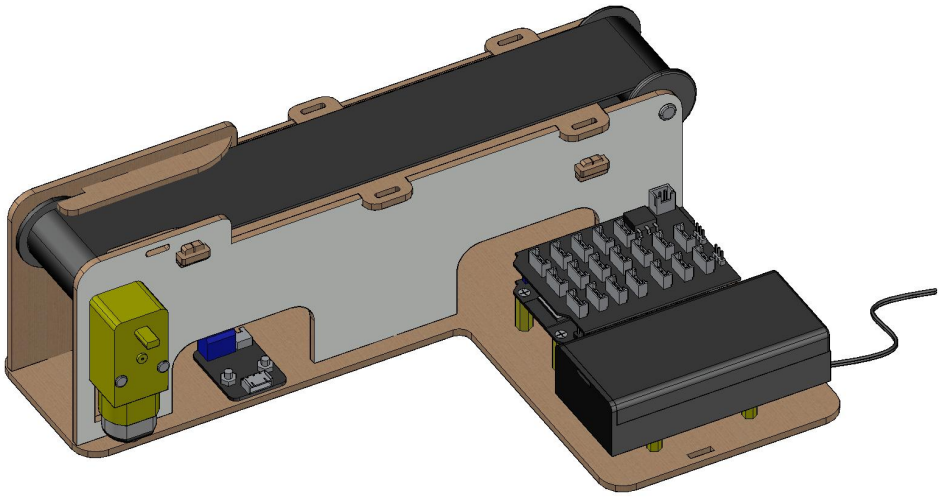
4. Before running the conveyor belt, make sure the battery is fully charged.

5. After the program is uploaded, open the serial port monitor control, the serial port monitor enters "s" to open the conveyor belt, and enters "p" to close the conveyor belt.



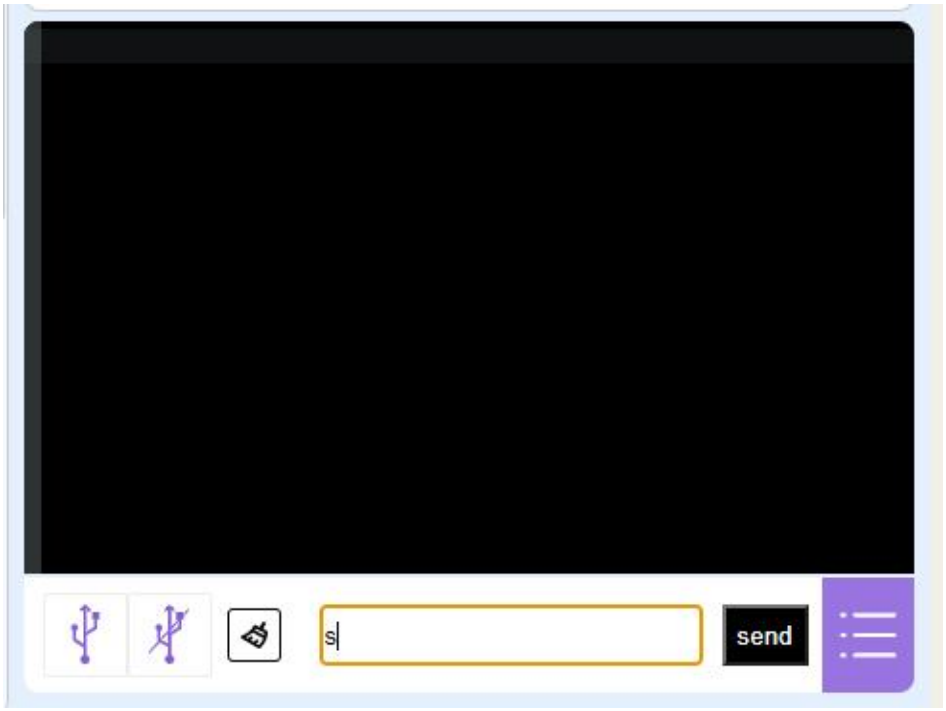
09 Speed Control of Conveyor

Note: The structure of this project is the same as that of the previous project; please follow the structure of the previous project.



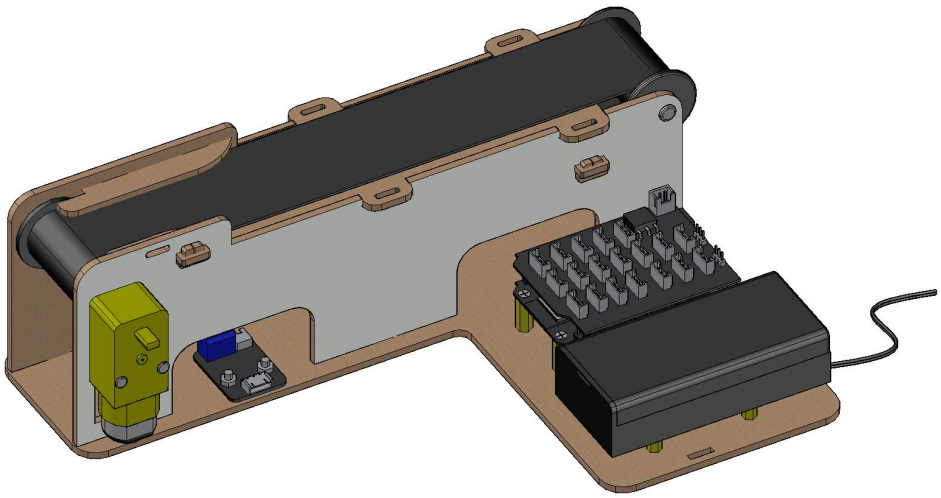
Click here to get the program for this project.

Note: After the program is uploaded, open the serial monitor control, enter "s" to close the conveyor belt on the serial monitor, and enter "1", "2", "3" to adjust the speed of the conveyor belt.

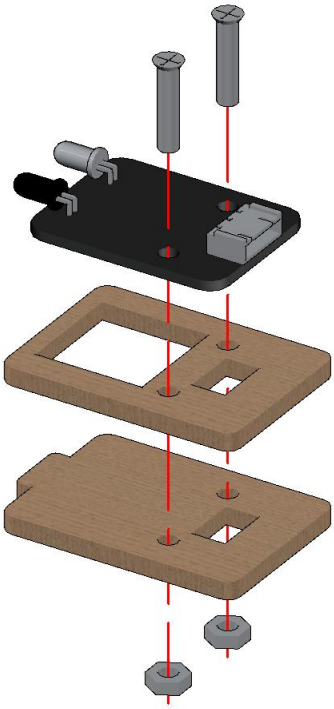


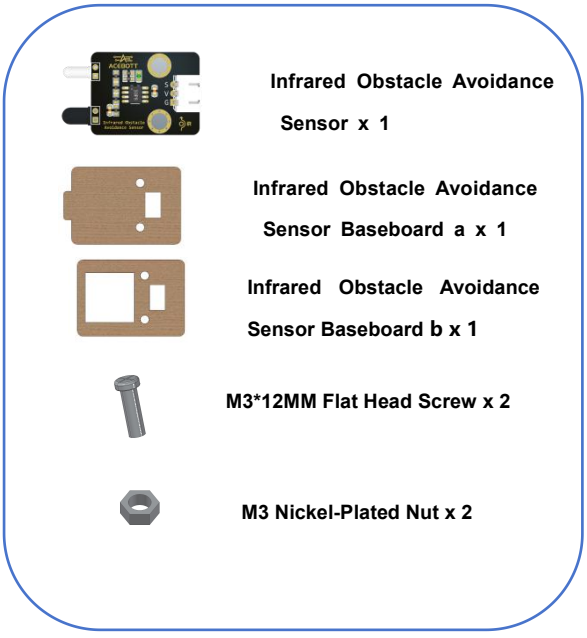
10 Smart Conveyor

Note: The structure of this project is based on the previous one and continues to be built upon it. The specific steps for constructing the conveyor belt will not be shown again; we will start directly from setting up the infrared obstacle avoidance sensor.

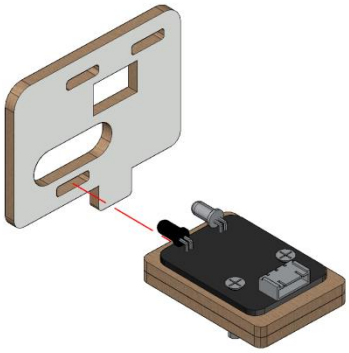


Step 1: Install the infrared obstacle avoidance sensor baseplate.

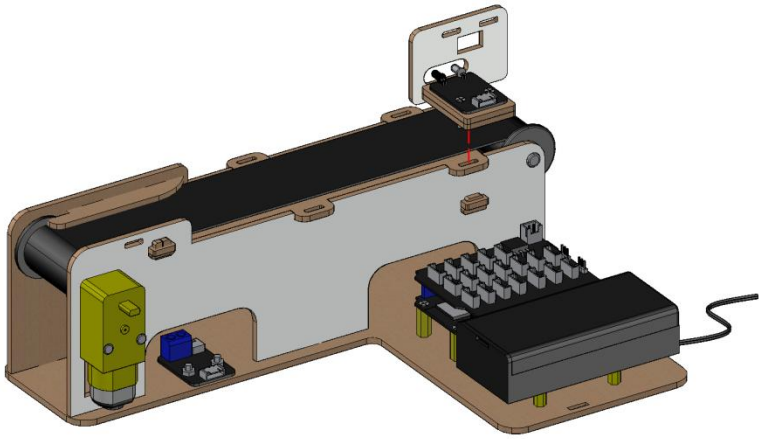


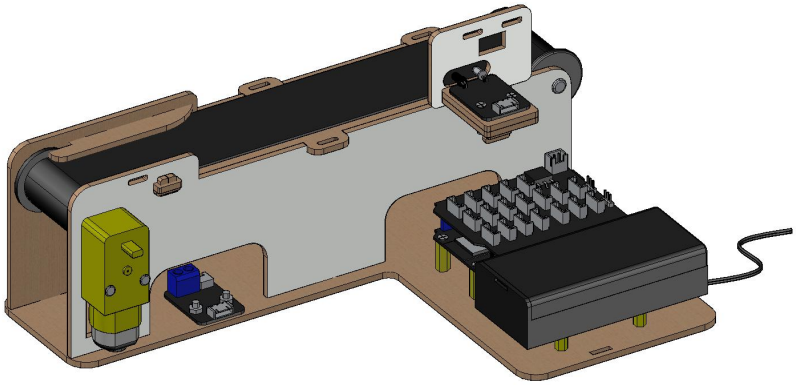


Step 2：Secure the infrared obstacle avoidance sensor in place.

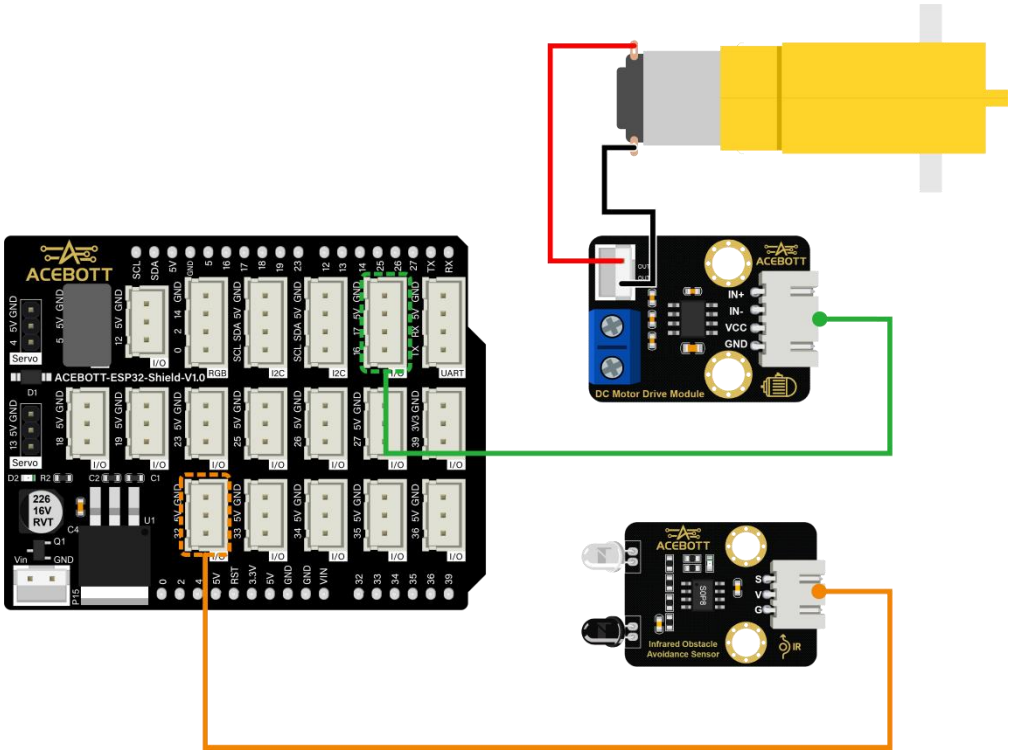


Infrared Obstacle Avoidance Sensor Bracket x 1





Step 3：Wiring



ESP32 Controller Board Wiring Instruction:

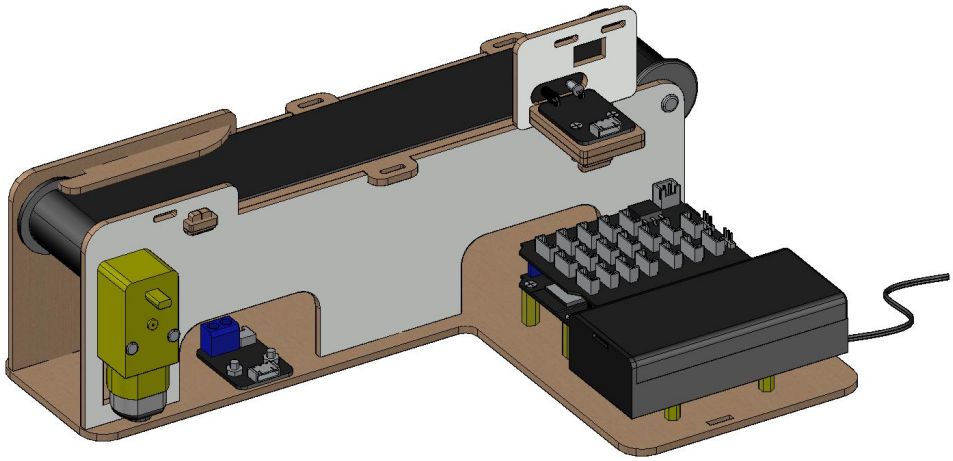
Module Name	Module Pin	ESP32 Pin
DC Motor Driver Module	IN+	Pin16
	IN-	Pin17
	VCC	5V
	GND	GND
Infrared Obstacle Avoidance Sensor	S	Pin32
	V	5V
	G	GND

Note:Please make sure to strictly follow the wiring instructions when connecting the module to the ESP32 controller board. Incorrect wiring may cause a short circuit and damage the ESP32 controller board.

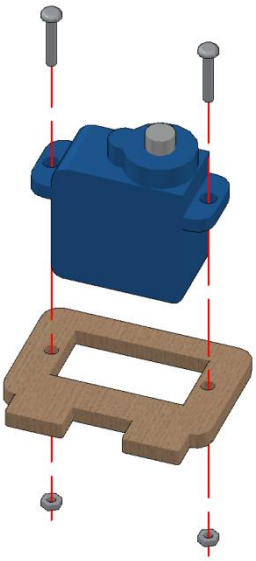
Click here to get the program for this project.

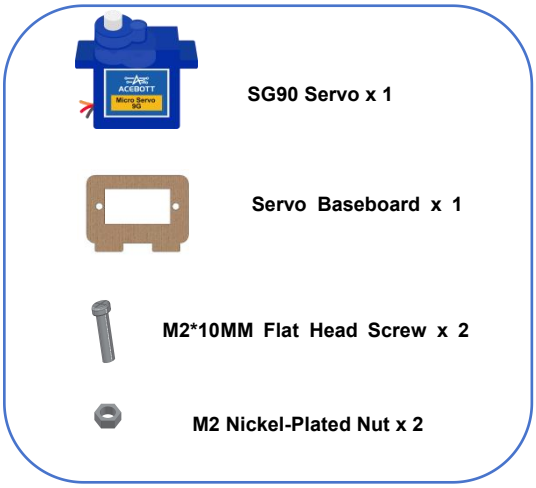
11 Smart Sorting

Note: The structure of this project is built upon the previous project's structure, and the specific construction steps will not be shown again. We will start directly with the assembly of the servo.

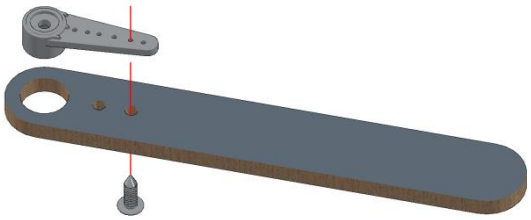


Step 1：Install servo.

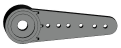




Step 2：Install servo horn.



flap x 1



Half servo horn x 1

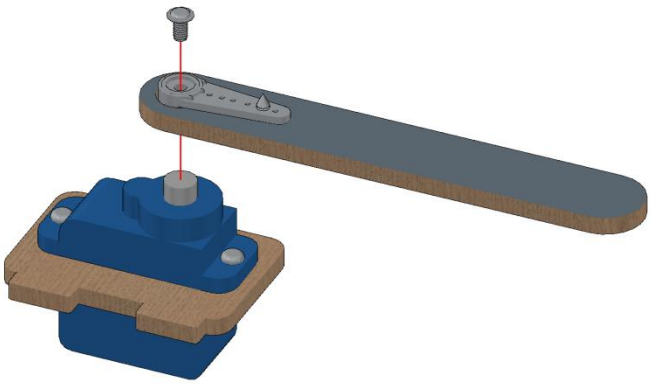
M1.7*6 Large Round Flat Head Tapping Screws x 1

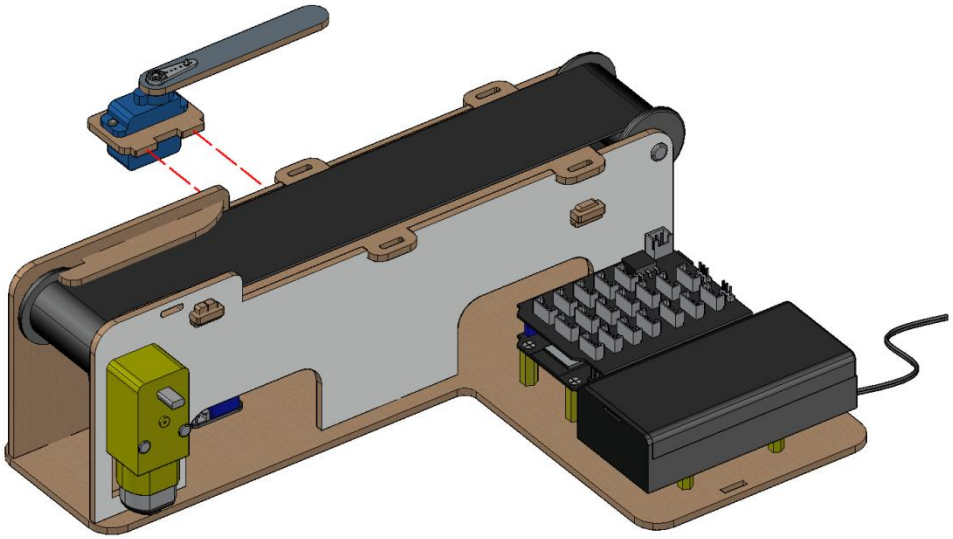
M2.5*4Round Head Screw(Servo pack includes accessories)x 1

Note: Before fixing the servo horn, please complete the following steps:

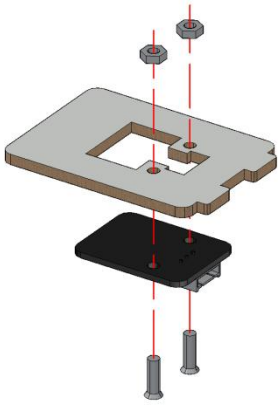
(1) Connect the servo motor to pin 4 of the ESP32.

(2) Connect the ESP32 controller to a power supply and turn it on. Click here to open the servo initialization program and upload the program to the ESP32 controller. Wait until the servo rotates to the 175° position before installing the servo horn.

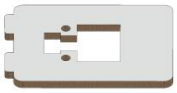




Step 3：Install the color sensor.



Color Sensor x 1

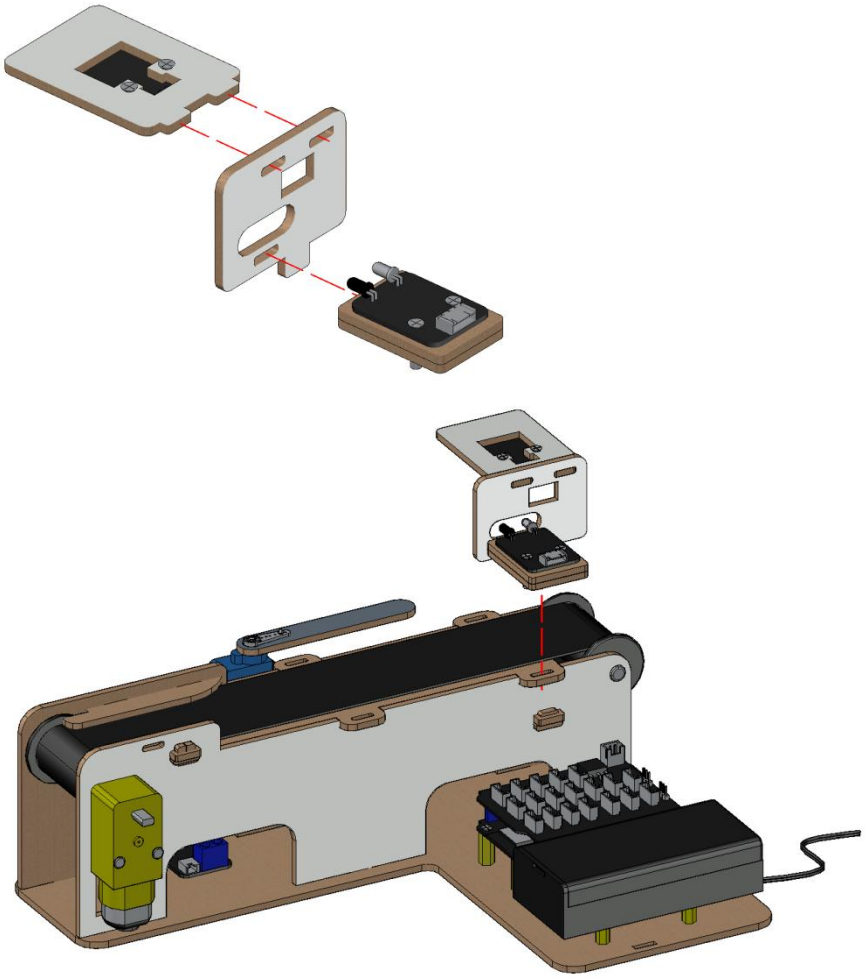


Color Sensor Baseboard x 1

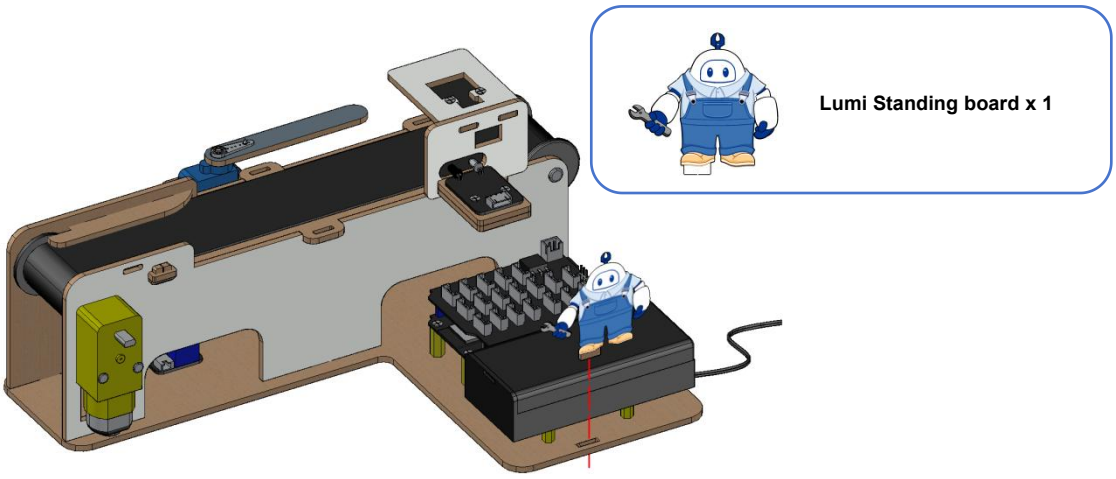
M3*10MM Flat Head Screw x 2

M3Nickel-Plated Nut x 2

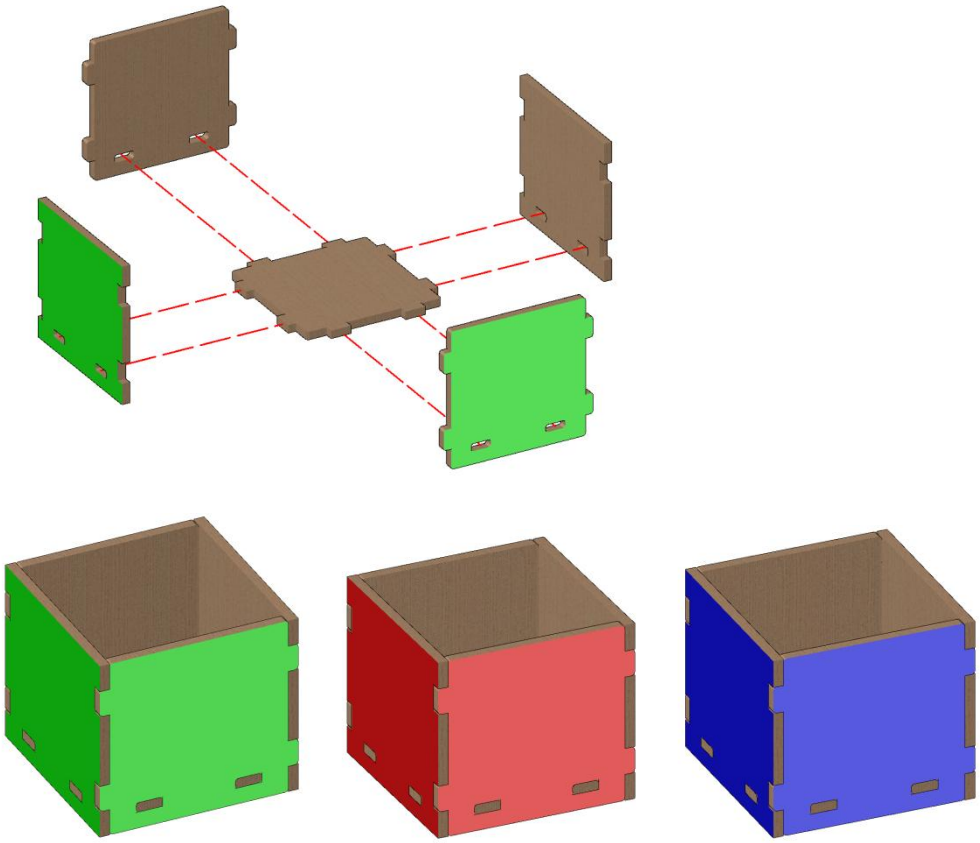
Step 4：Mount the color sensor.

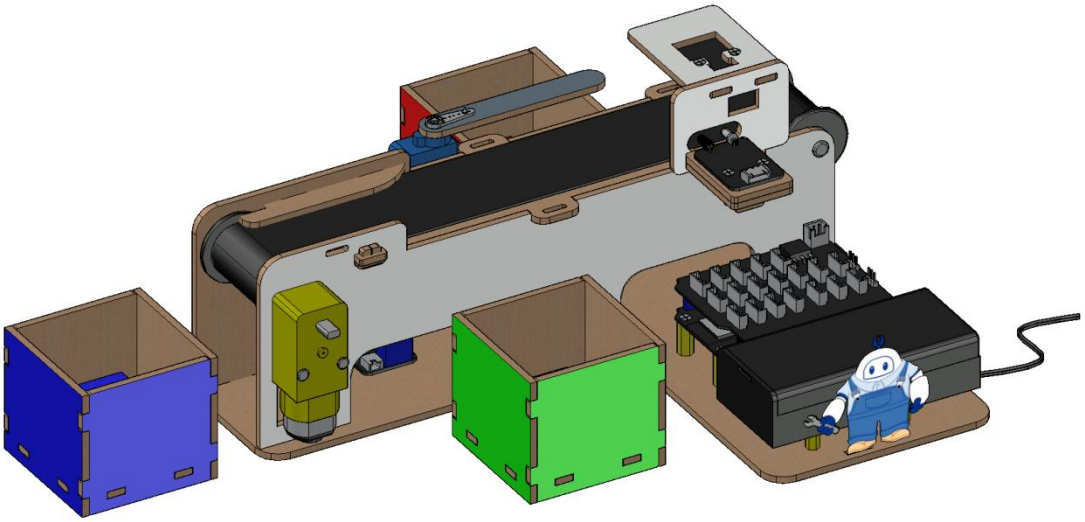


Step 5：Install the Lumi.

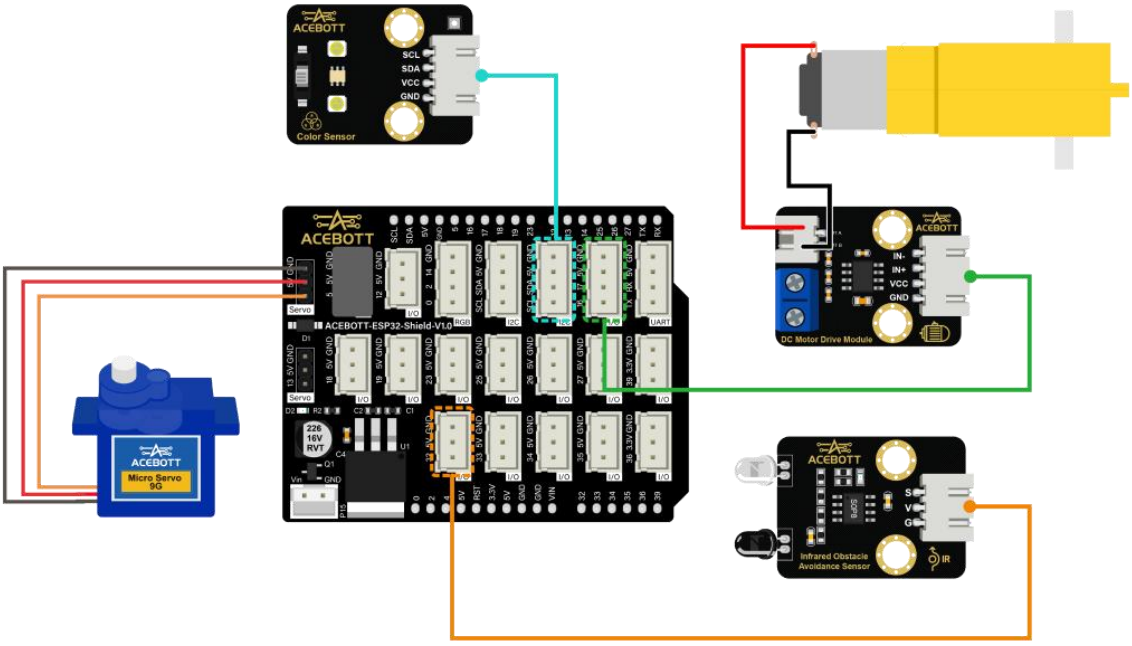


Step 6：Assemble the box.





Step 7： Wiring



ESP32 Controller Board Wiring Instruction:

Module Name	Module Pin	ESP32 Pin
DC Motor Driver Module	IN+	Pin16
	IN-	Pin17
	VCC	5V
	GND	GND

Infrared Obstacle Avoidance Sensor	S	Pin32
	V	5V
	G	GND
Color Sensor	SCL	SCL
	SDA	SDA
	VCC	5V
	GND	GND
SG90 Servo	Orange Wire	Pin4
	Red Wire	5V
	Brown Wire	GND

Note:

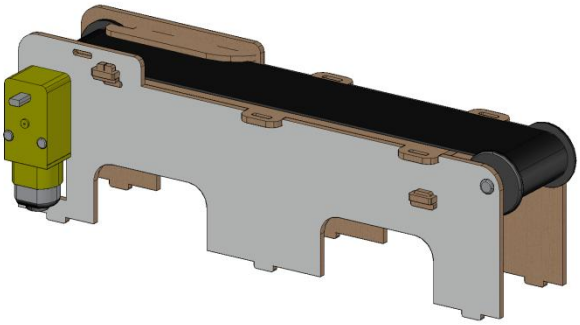
1.Please make sure to strictly follow the wiring instructions when connecting the module to the ESP32 controller board. Incorrect wiring may cause a short circuit and damage the ESP32 controller board.

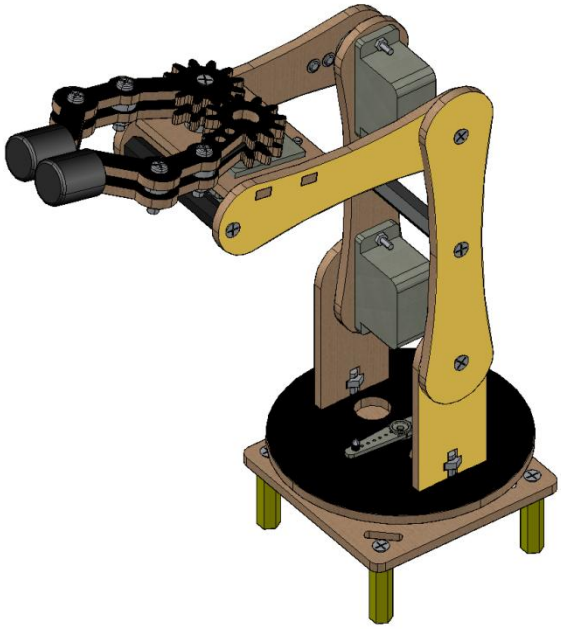
2.When the color sensor is working, you need to turn on the LED switch on the color sensor to provide illumination for color measurement and improve measurement accuracy.

Click here to get the program for this project.

12 Smart Storage

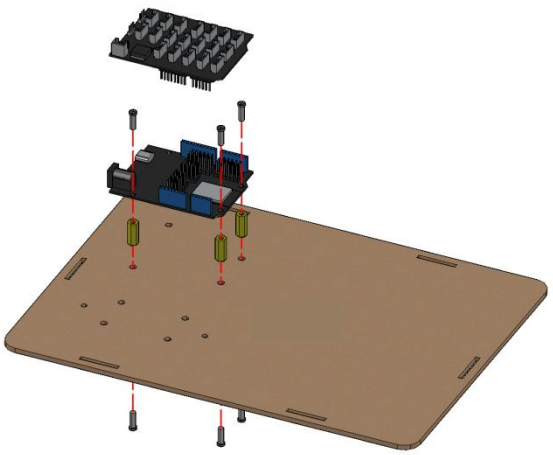
Note: The structure of this project is built upon the previous robotic arm structure and conveyor structure, without showing the specific assembly steps.

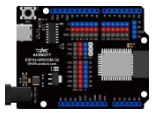




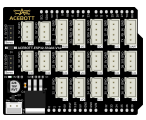
Step 1： Install the ESP32 Controller Board

Note: To complete this step, you will need to remove the ESP32 controller board from the previous project.

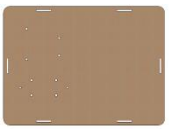




ESP32 Controller Boardx 1



ESP32-Shield Board x 1



The bottom plate of the smart warehouse x 1

M3*8MM Flat Head Screw x 6

M3*12MM Dual-pass Copper Pillarx 3

Step 2：Install the battery holder.

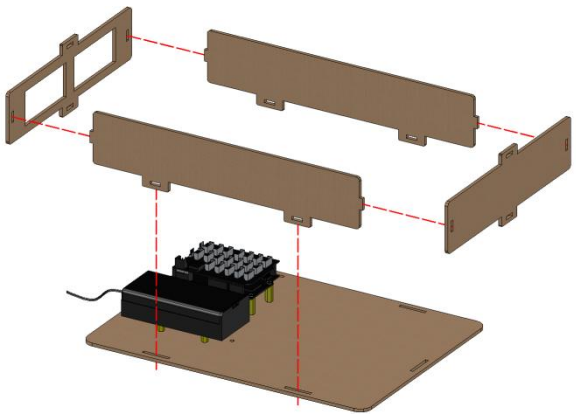
Note: To complete this step, you will need to remove the battery holder from the previous project.

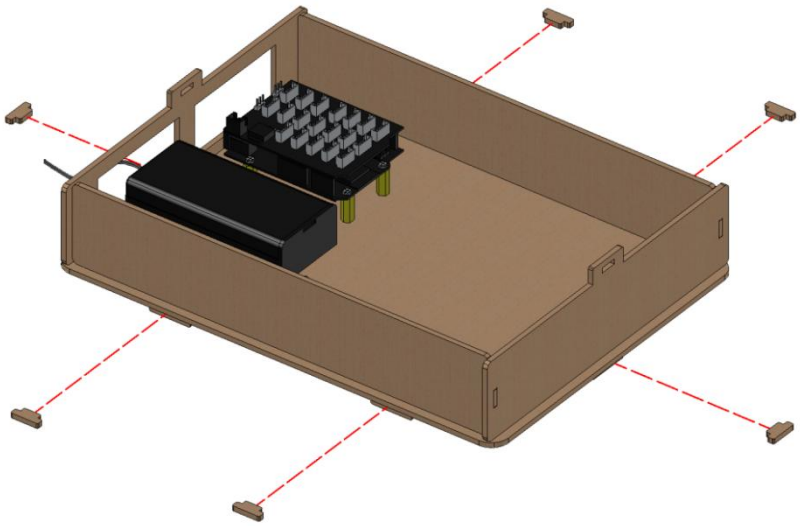
18650 Battery Holderx 1

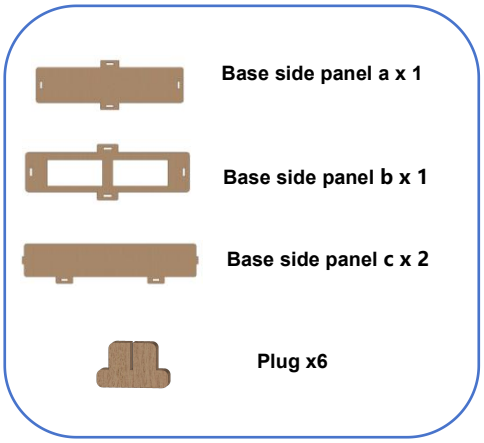
M3*8MM Flat Head Screw x 8

M3*12MM Dual-pass Copper Pillar x 4

Step 3：Install the base stand brackets.

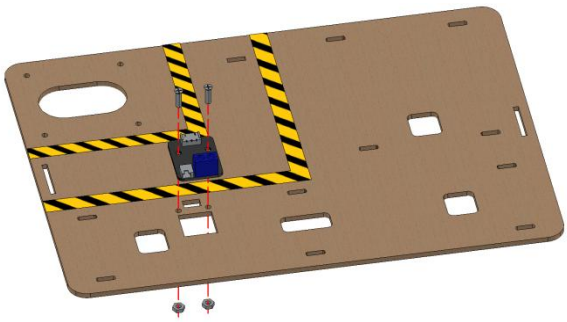


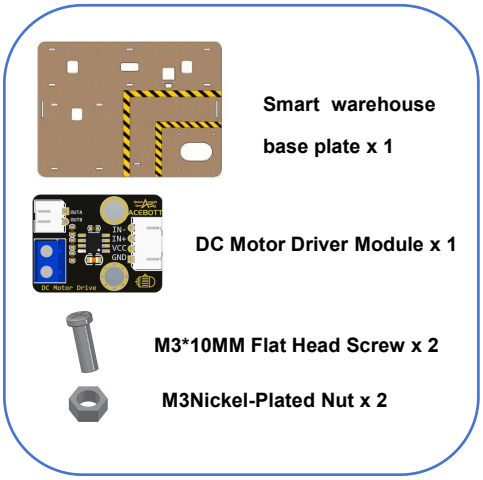




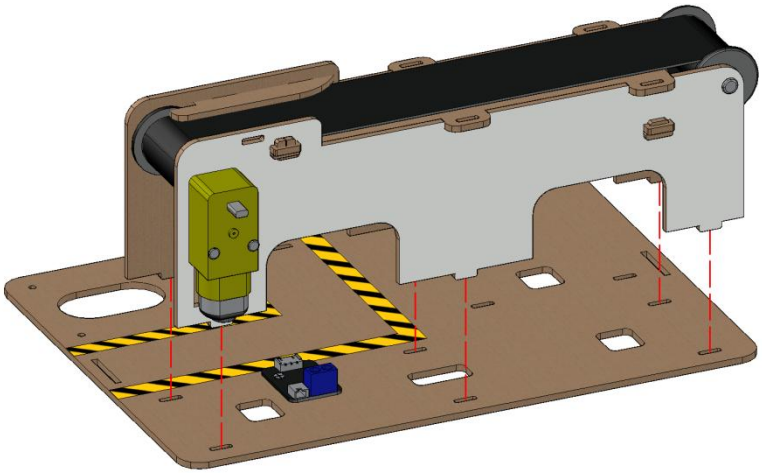
Step 4：Install the DC motor driver module.

Note: To complete this step, you will need to remove the DC motor driver module from the previous project.

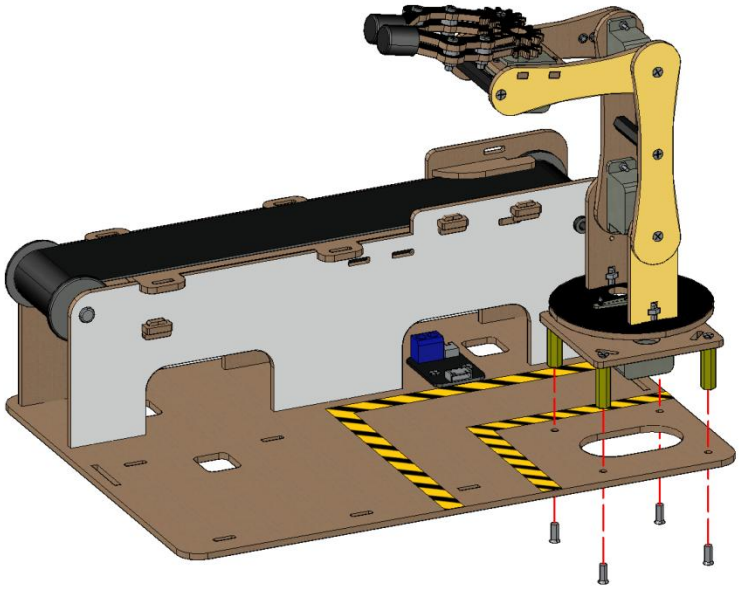




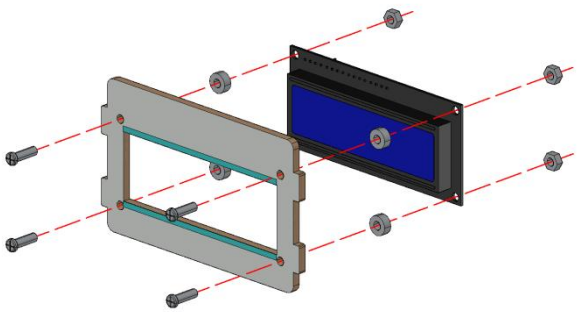
Step 5： Install the conveyor on the base plate in the smart warehouse.

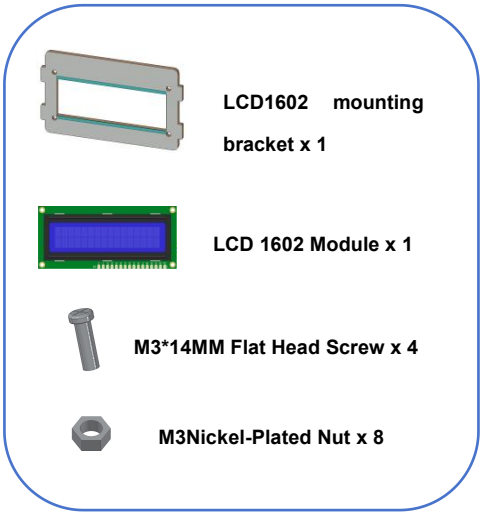


Step 6： Install the robotic arm on the base plate of the smart warehouse.

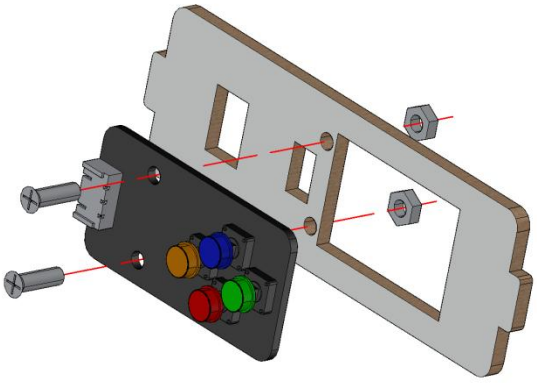


Step 7： Install the LCD1602 module.





Step 8：Install the 4 Button module.



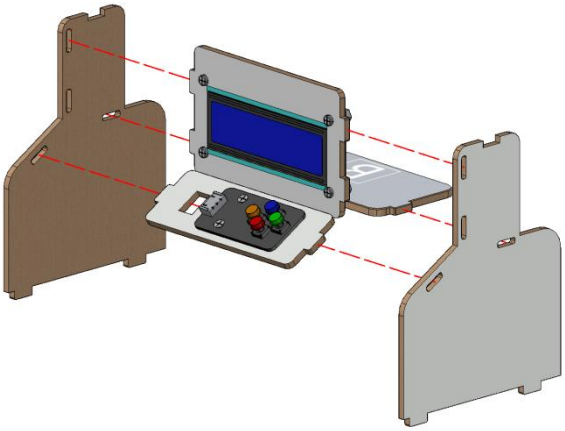
4 Button Module Mounting plate x 1

4 Button Module x 1

M3*10MM Flat Head Screw x 2

M3 Nickel-Plated Nut x 2

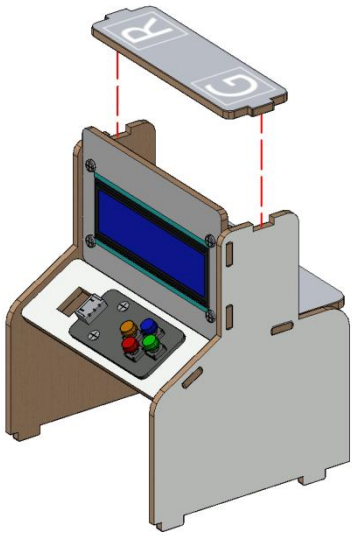
Step 9：Assemble the shelving.

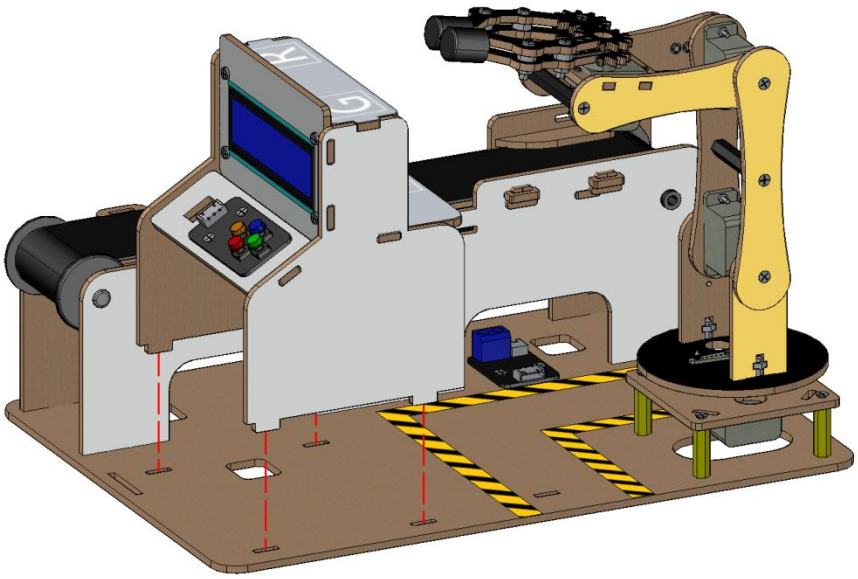


Shelf side panel x 2

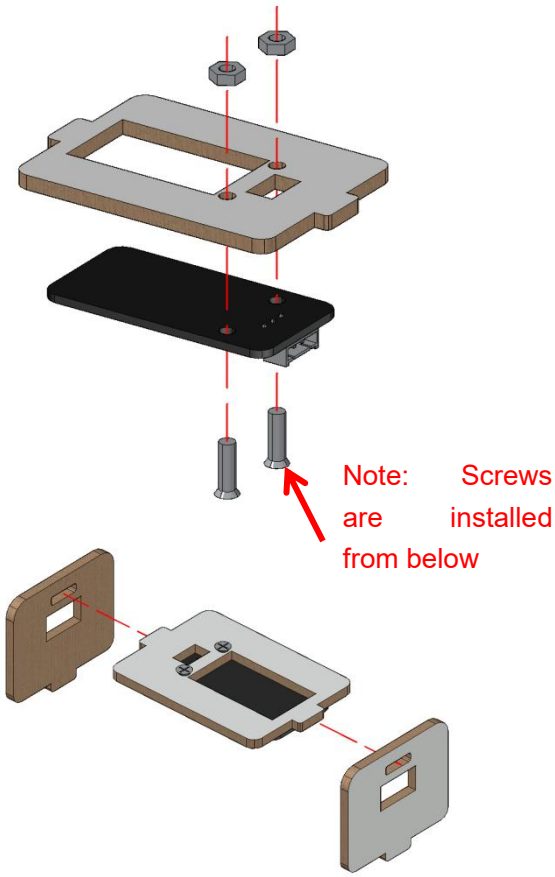
Shelf base plate a x 1

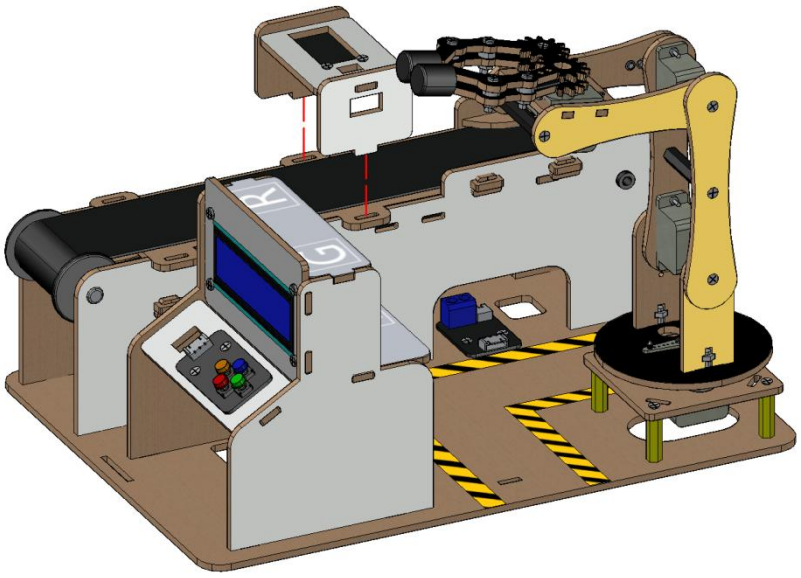
Shelf base plate b x 1



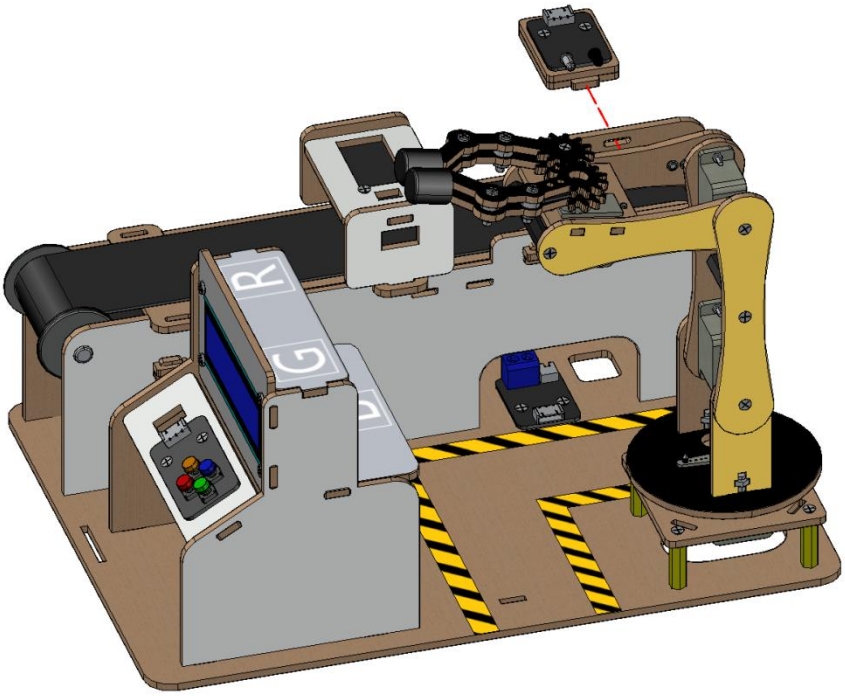


Step 10：Assemble the RFID module.

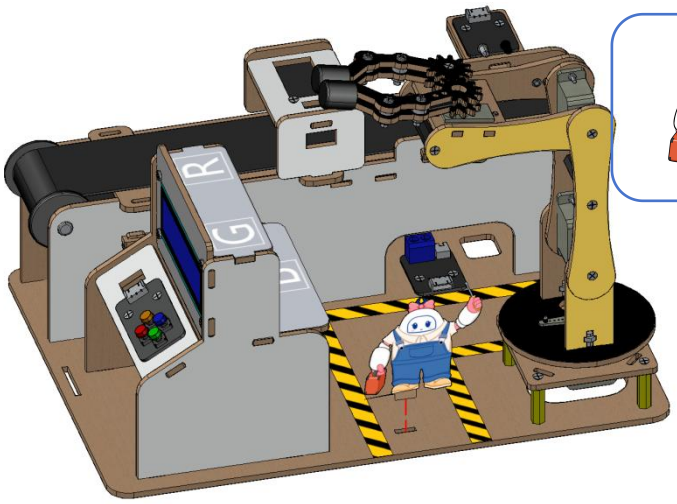




Step 11：Mount the infrared obstacle avoidance module.

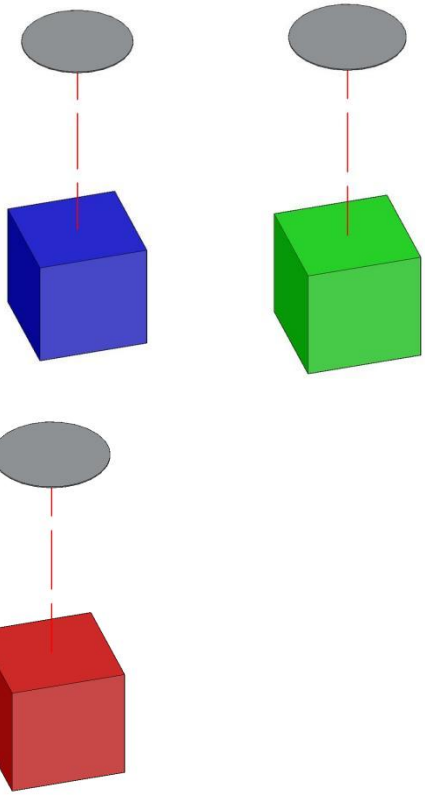


Step 12：Install the Luna standing board.



Luna Standing Board x 1

Step 13:Attach the electronic tags.



electronic tag x 3

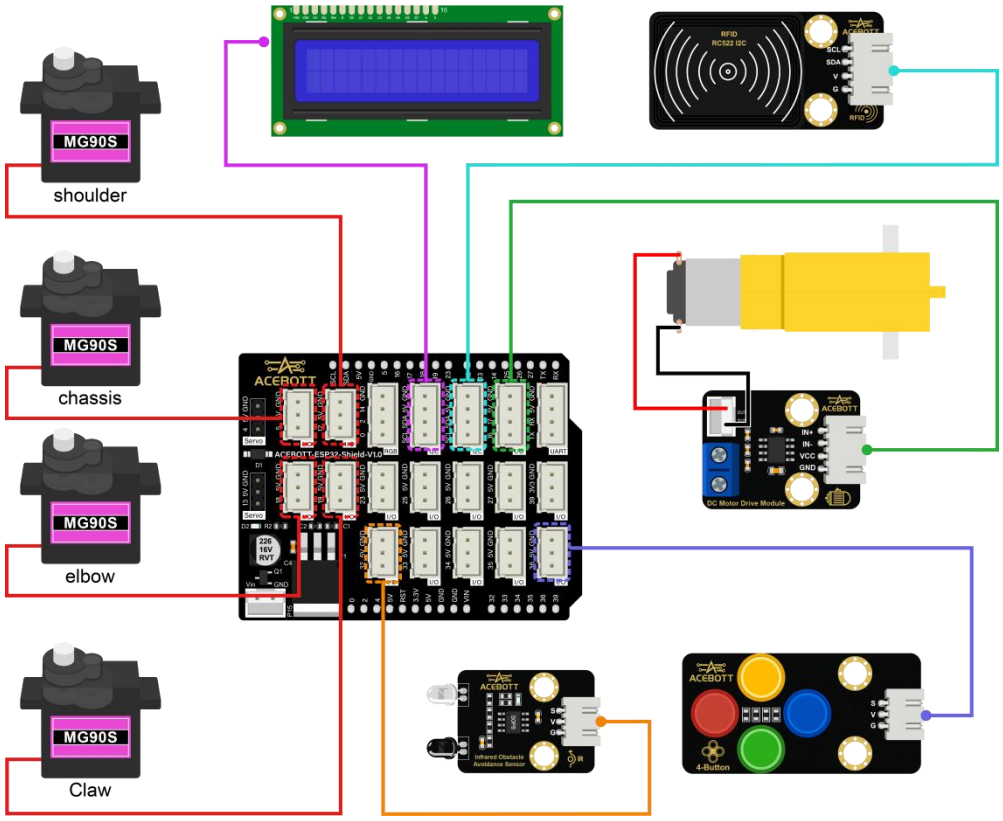
Cube x 3

Note: You can follow the steps below to obtain the ID of the electronic tag.

(1)Connect the RFID module to the I2C interface of the ESP32 controller.

(2)Click here to access the program for testing the RFID module. Upload the program to the ESP32, and bring the electronic tag close to the RFID module. Check the ID of each electronic tag in the Serial Monitor .

Step 14：Wiring



Wiring Instruction:

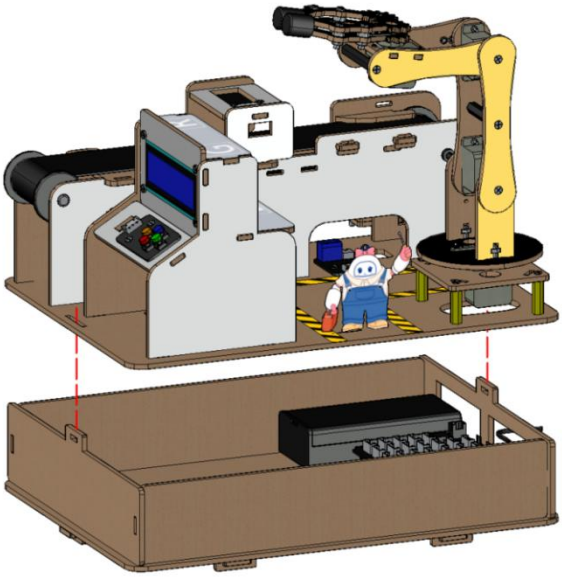
Module Name	Module Pin	ESP32 Pin
Chassis Servo	S	Pin5
	V	5V
	G	GND
Shoulder Servo	S	Pin12
	V	5V
	G	GND
Elbow Servo	S	Pin18
	V	5V
	G	GND
Claws Servo	S	Pin19
	V	5V
	G	GND

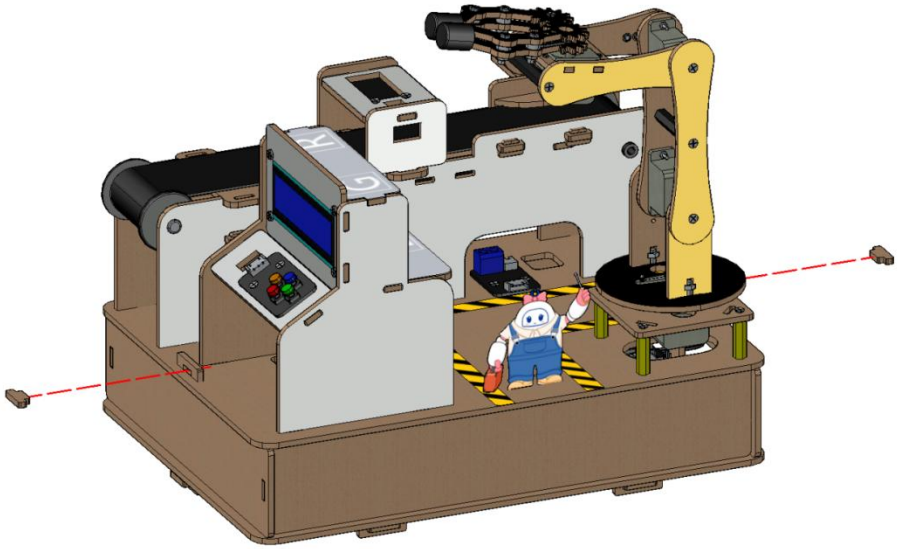
4 Button Module	S	Pin36
	V	3.3V
	G	GND
Infrared Obstacle Avoidance Sensor	S	Pin32
	V	5V
	G	GND
DC Motor Driver Module	IN+	Pin16
	IN-	Pin17
	VCC	5V
	GND	GND
LCD 1602 Module	SCL	SCL
	SDA	SDA
	VCC	5V
	GND	GND
RFID Module	SCL	SCL
	SDA	SDA
	VCC	5V
	GND	GND

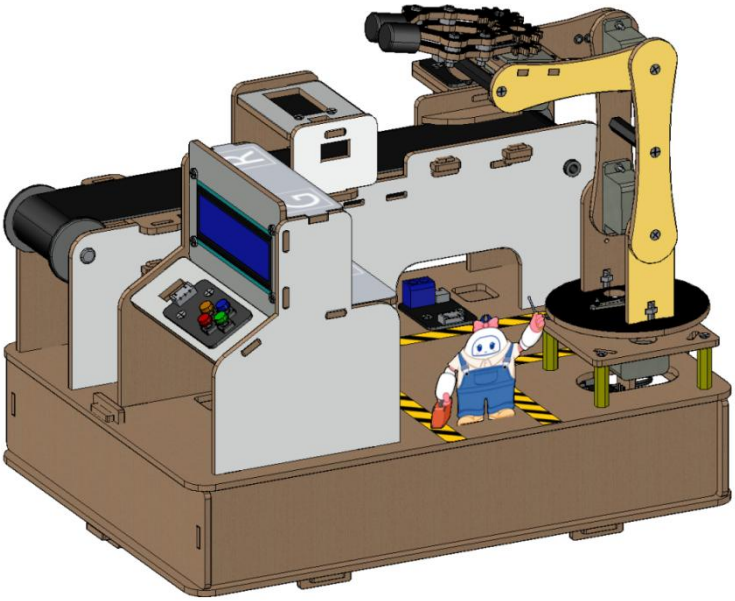
Note:Please make sure to strictly follow the wiring instructions when connecting the module to the ESP32 controller board. Incorrect wiring may cause a short circuit and damage the ESP32 controller board.

Step 15：Assemble the complete smart warehouse.

Plug x 2



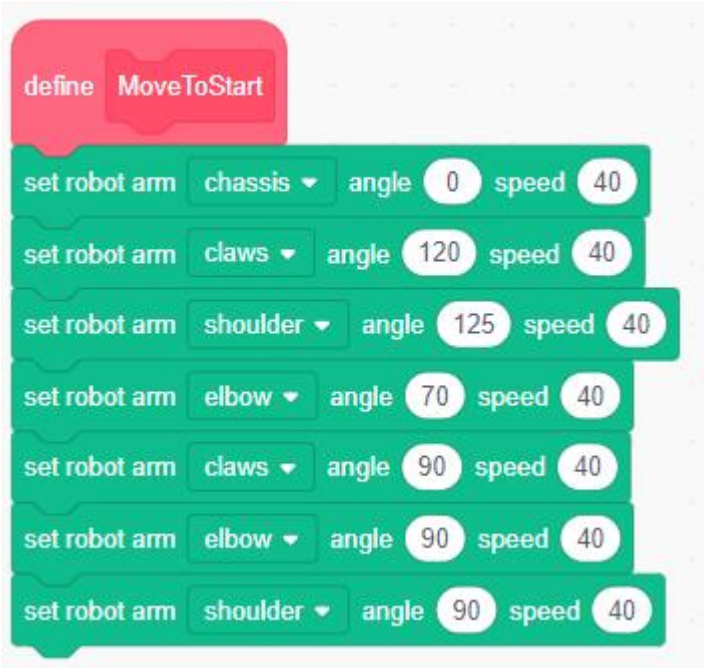




(1)Click here to get the program for this project.

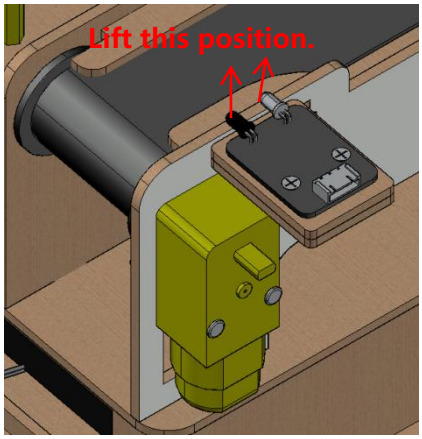
(2) Please modify the value of the electronic label according to the actual situation (refer to Step 13).

(3) Due to the error factors of the servo, there may be a deviation in the position of the robotic arm, and it is necessary to adjust the angle according to the actual situation.



For example, when the robotic arm grabs an item, the position of the robotic arm is inaccurate, and the angle can be coded here. When there is a deviation in other positions, the angle of the corresponding code is enough.

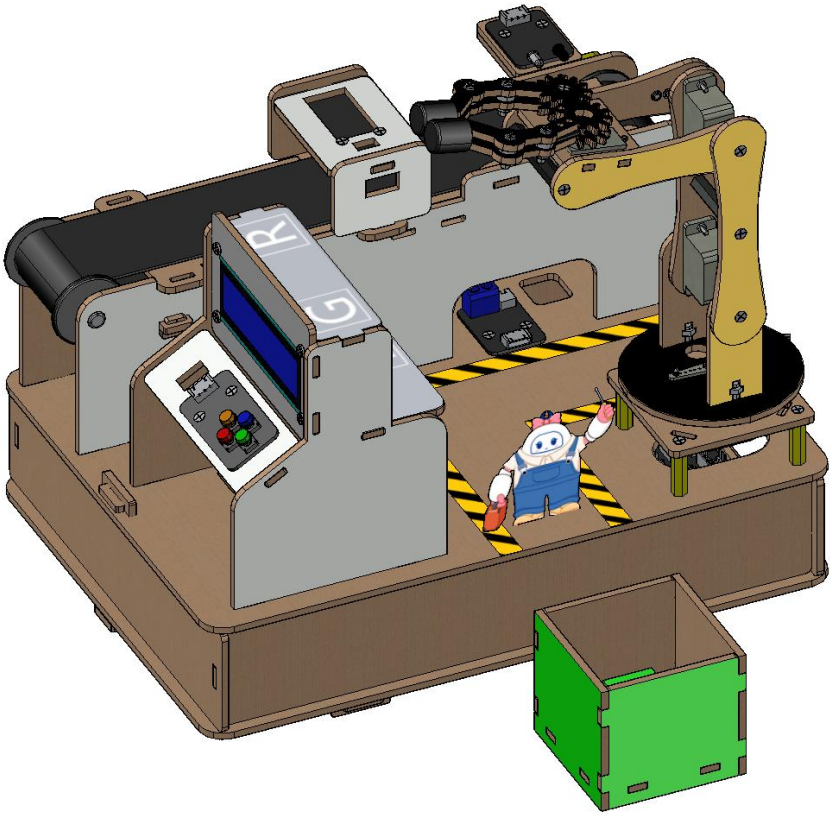
(4) If the infrared obstacle avoidance sensor keeps detecting a signal, it can be corrected by adjusting the position of the infrared emission device of the infrared obstacle avoidance sensor.



(5) The infrared obstacle avoidance sensor will be affected by strong light, and it needs to be placed in a normal lighting condition environment when in use.

13 Smart Outbound Logistics

Note: The structure of this project is the same as that of the previous project; please follow the structure of the previous project.

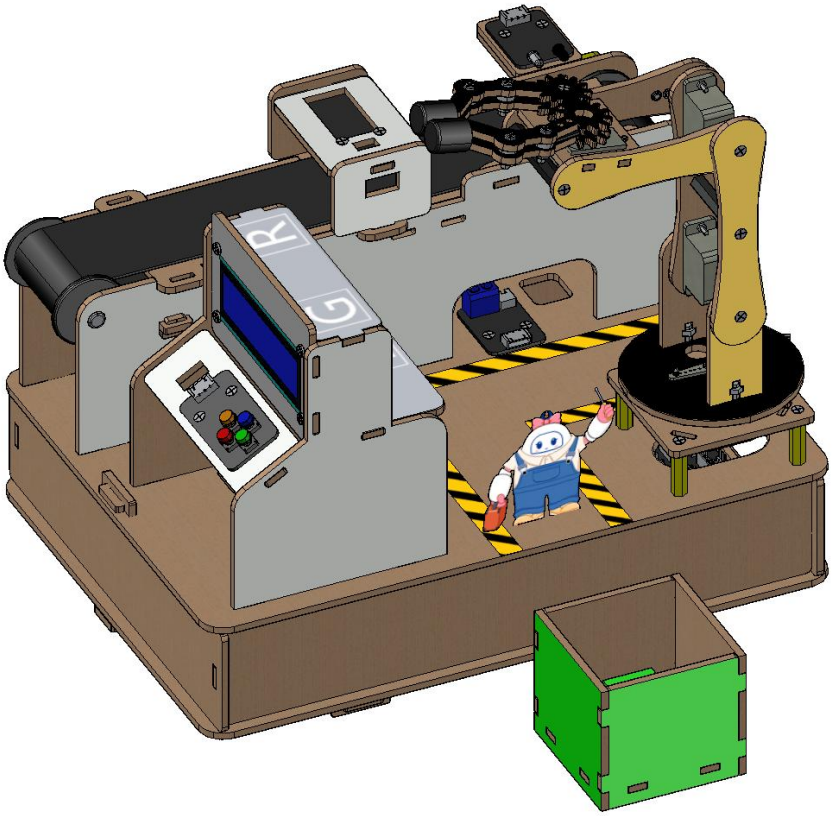


Click here to get the program for this project.

Note:Due to the error factors of the servo, there may be a deviation in the position of the robotic arm, and it is necessary to adjust the angle according to the actual situation.

14 Smart Warehousing Integrated System

Note: The structure of this project is the same as that of the previous project; please follow the structure of the previous project.



Click here to get the program for this project.

Note:Due to the error factors of the servo, there may be a deviation in the position of the robotic arm, and it is necessary to adjust the angle according to the actual situation.