

AI for STEM Competition

Asia Pacific STEAM_AI Technology Innovation Challenge

Mechanical trolley assembly

CocoRobo

P

O

P

W

R

E

0



Device set-up

Material List

Hardware



Motor Mount



Battery Holder



Mechanical arm bracket



Mechanical Arm Base



Servo motor bracket



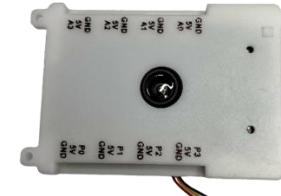
Barrel x1
Wheel gear x1



Claw Holder x1



Pallet x 1



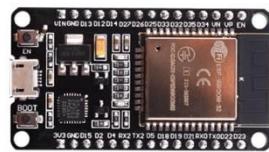
Ball Holder x1



Battery



Friction Wheel x1
ESP32 Bluetooth Module x1



MG90s Servo x2



Motor x4



High Torque Servo (360) x 1



Small Motor x 1



High Torque Servo (180) x 1



Wheels x 4

Device set-up

Fasteners



Flat Head
Screws
 $M3*25mm \times 10$



Nyloc M3mm $\times 10$



Nut M3mm $\times 22$



Flat Head
Screws
 $M3*8mm \times 37$



Self-tapping
Screws
 $M1.4*5mm \times 6$



Screws
 $M2.0*8mm \times 2$



Screws
 $M2.3*6mm \times 17$



Standoffs
 $M3*15mm \times 3$



Standoffs
 $M3*35mm \times 7$



Screwdriver $\times 1$



Cross socket
tool $\times 1$

Note: There are 1~2 backups
for the firmware

Composition of a mechanical trolley



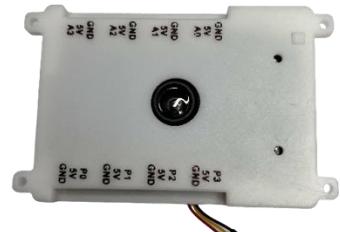
Base



Claw



Cannon

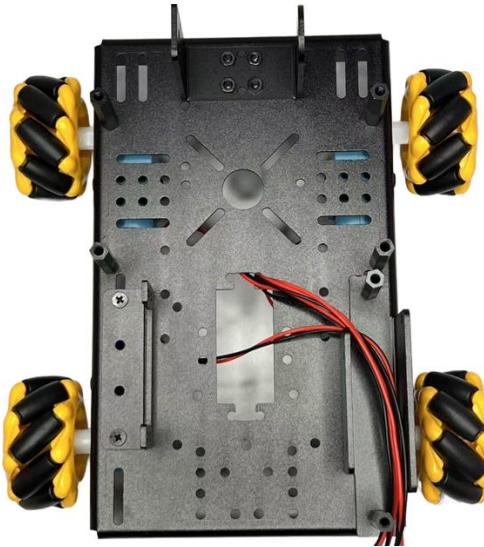


Module





Assembly Content



Base

Parts Needed:



Base × 1



Servo motor bracket
× 1



Battery Holder × 1



Accessories Box
x 1



Claw Bracket × 1



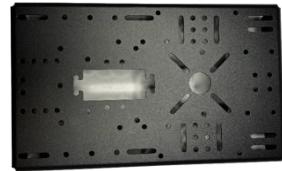
Screwdriver × 1



Device set-up

Step 1 Servo Motor Bracket Installation

Parts Needed



Base



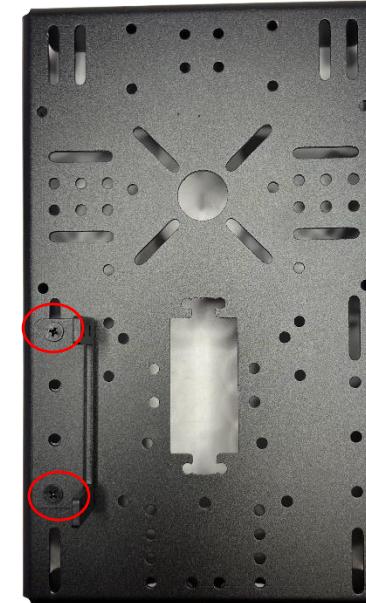
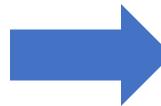
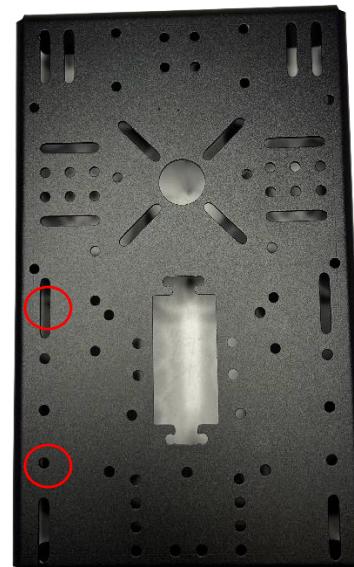
Servo motor bracket

Nuts x2
M3mm

Scerwdriver

Screws x2
M3*8mm

Use a screw and nut to secure the servo motor bracket to the base of the car, tighten the screw from the top, and the bottom is secured with a nut.



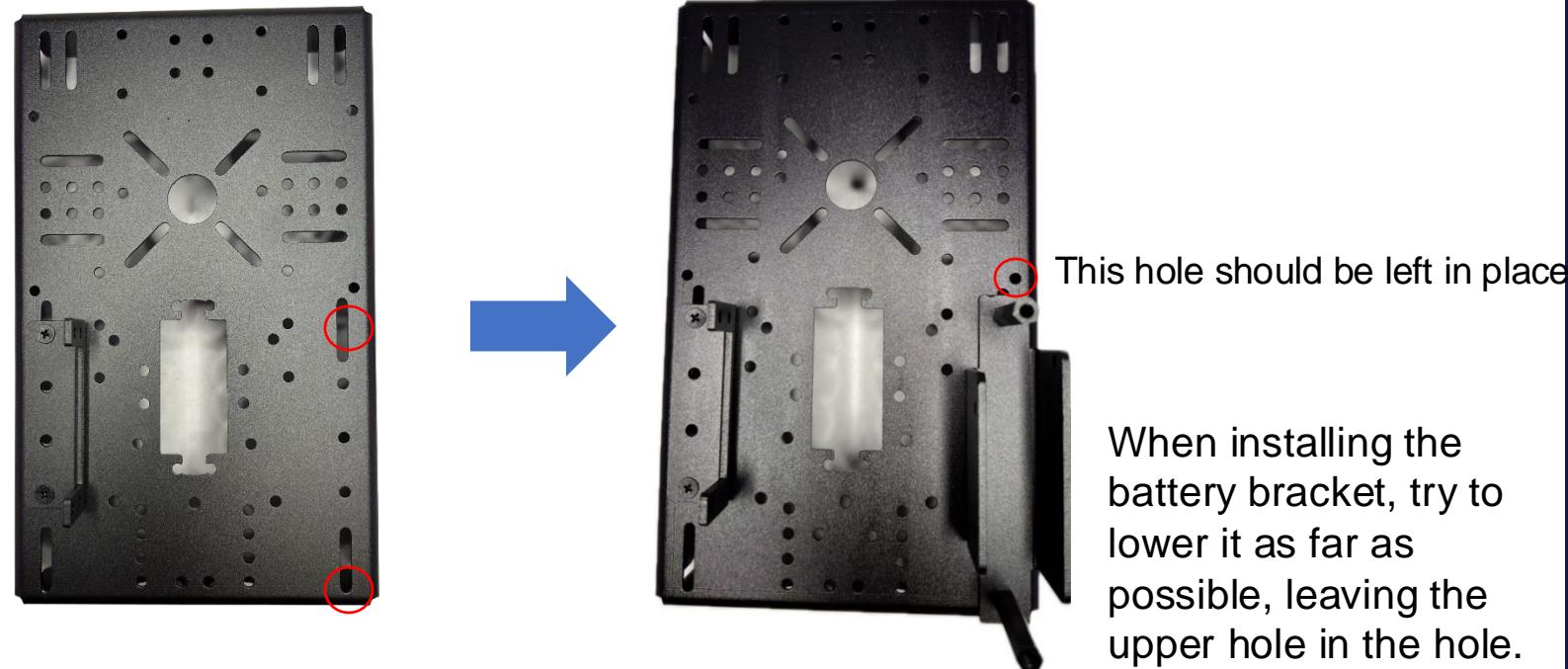
Device set-up

Step 2 Install the battery holder

Parts Needed



Use a screw and a standoff to secure the battery holder to the base of the car, and tighten the screw from bottom to the top, and the top is fixed with a standoff.



Device set-up

Step 3 → Install the Claw bracket

Parts Needed



Claw Bracket



Screwdriver

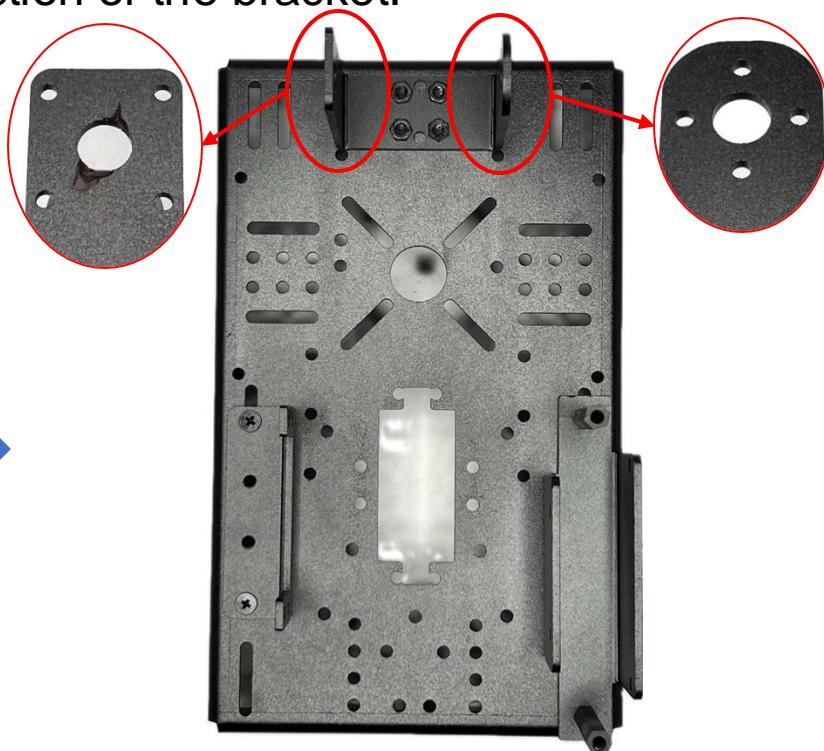
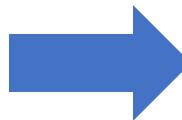


Nuts ×4
M3mm



Screws ×4
M3*8mm

Use the screw and nut to fix the claw bracket to the base of the car, the screw is threaded from the bottom to the top, and the top is fixed with the nut, pay attention to the direction of the bracket.



Device set-up

Step 4 → Install the standoffs

Parts Needed

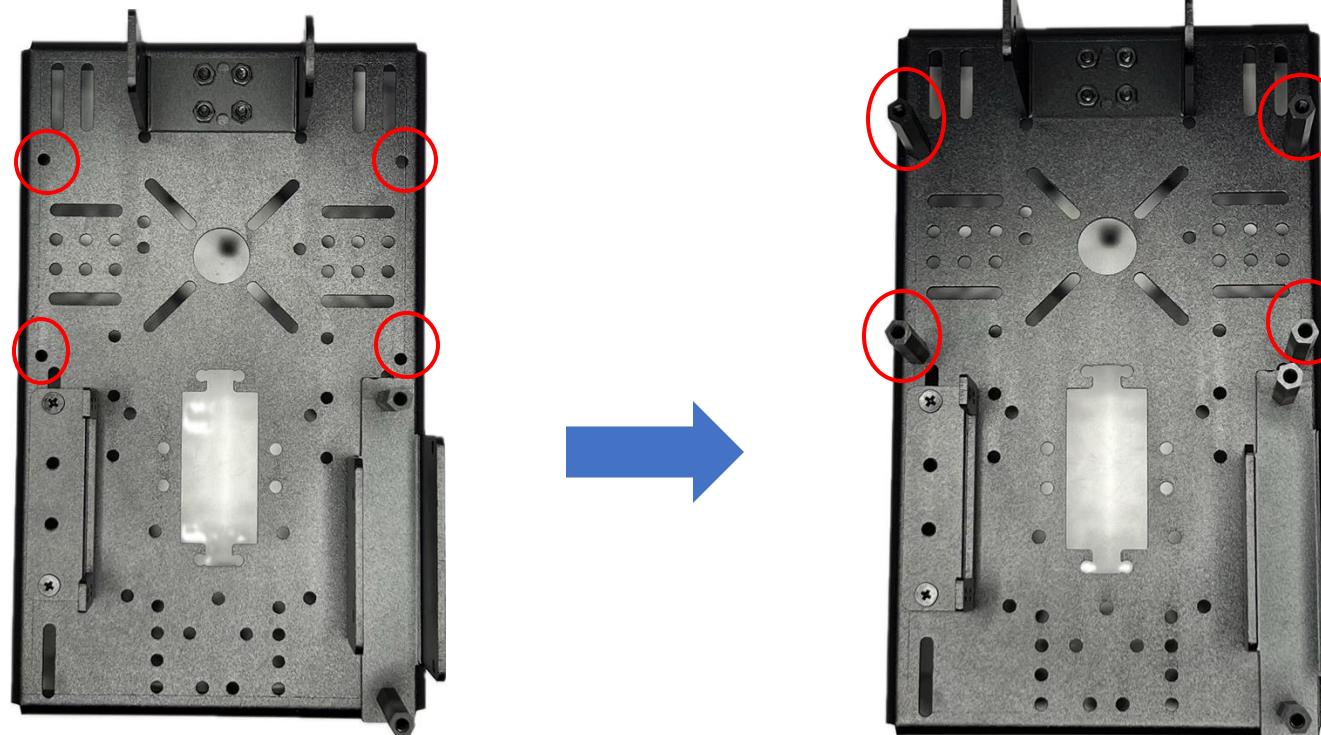


Standoffs ×4
M3*35mm



Screws ×4
M3*8mm

The screw is used to attach the standoff to the base of the car and is used as a support, and the screw is threaded from the bottom to the top, and the top is fixed with the standoff.



Device set-up

Step 5 Install the motor

Parts Needed



Motor x
4



Screws
x8
M3*25mm

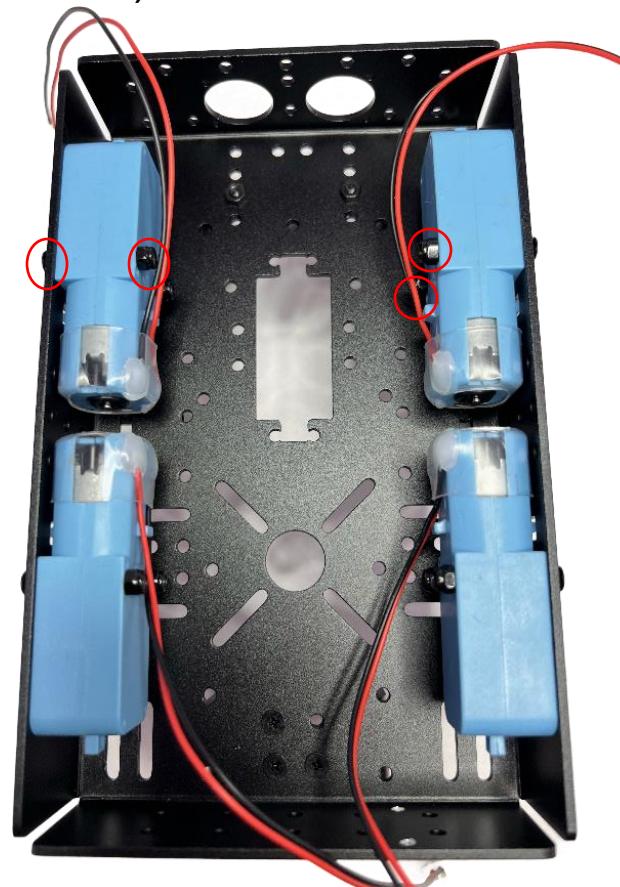


Cross
Socket
Tool



Nyloc x8
M3mm

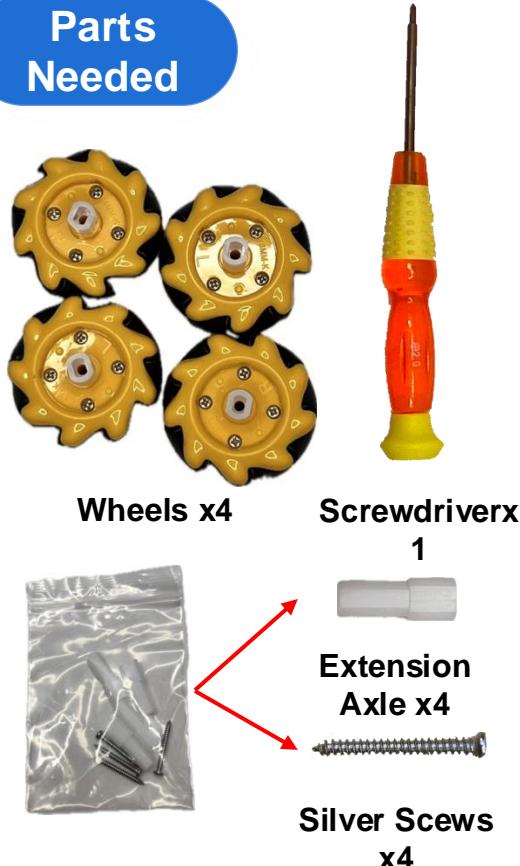
Use the screw to secure the Nyloc to the base of the car (you can use a cross socket tool to stabilize the Nyloc and use a screwdriver to tighten it).



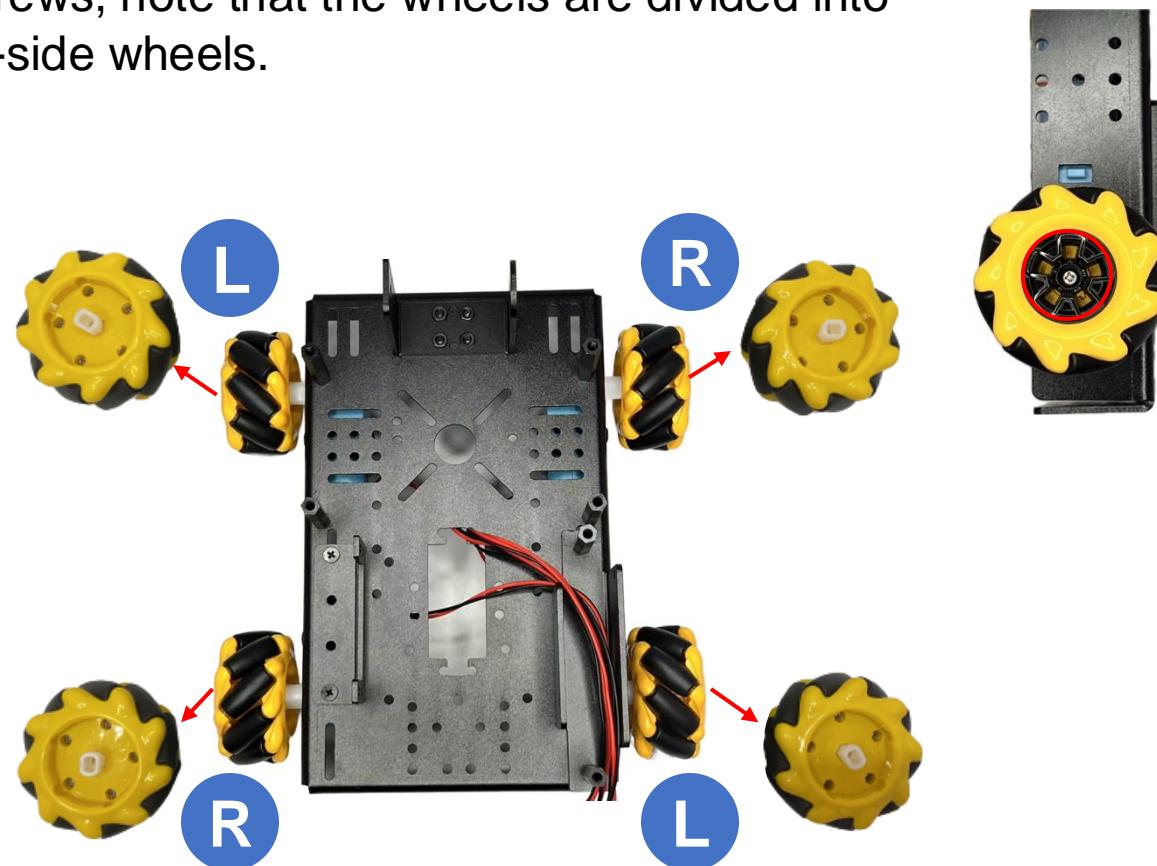
Device set-up

Step 6 → Install the wheels

Parts Needed



Insert the extension axle into the wheel, and then insert the wheel with the extension axle into the motor shaft, and finally fix it with silver screws, note that the wheels are divided into left-side and right-side wheels.





Assembly Contents



Claw

Parts Included:



Accessories
Box ×1



High Torque
Servo (360)×1



Screwdriver ×1



Servo motor bracket
×1



Claw Holder ×1



MG90s Servo
x1



Claws ×1



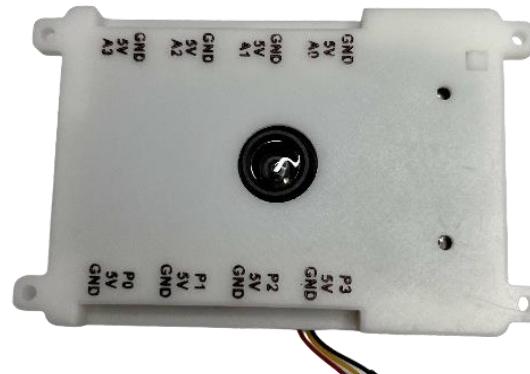
Accessories pack
for high torque
servo x1



Device set-up

Step 1 Servo motor angle calibration

Connect the servo motor to the S1 port on the side of the cocopi and supply power to the cocopi via a computer or power bank



or



Device set-up

Step 6 Servo motor angle calibration

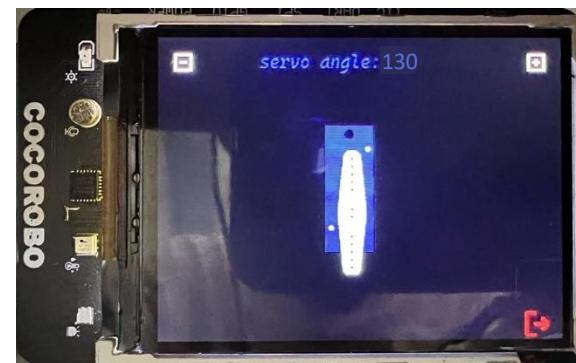
After connecting the Cocopi to a power supply, the servo motor angle can be set using the built-in sample



Press the A key to enter the sample menu



Press the C key to move down, find Servo Control, press the B key to run



Press C and D key to adjust the angle to 130 degress

Device set-up

Step 8 → Install the servo motor steering disc

Parts Needed

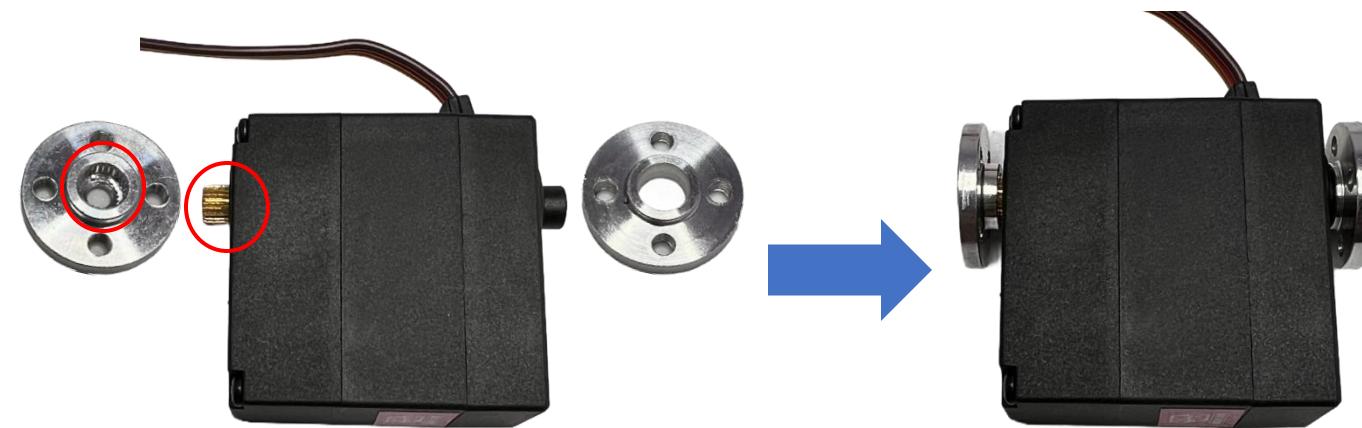


High Torque Servo (360) x 1

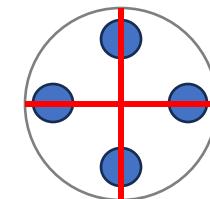


Accessories pack for servo x 1

Install the servo motor disc on both sides of the servo motor, and note that the servo motor disc with gears needs to be connected to the servo motor metal shaft. In addition, **the servo motor metal shaft cannot be rotated when the steering wheel is fixed**, otherwise the calibrated angle will be adjusted.



The holes of the discs on both sides need to be in the shape of +, because the screw holes corresponding to the servo motor bracket are in the shape of +.



Device set-up

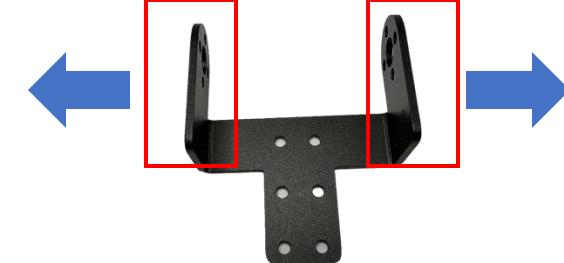
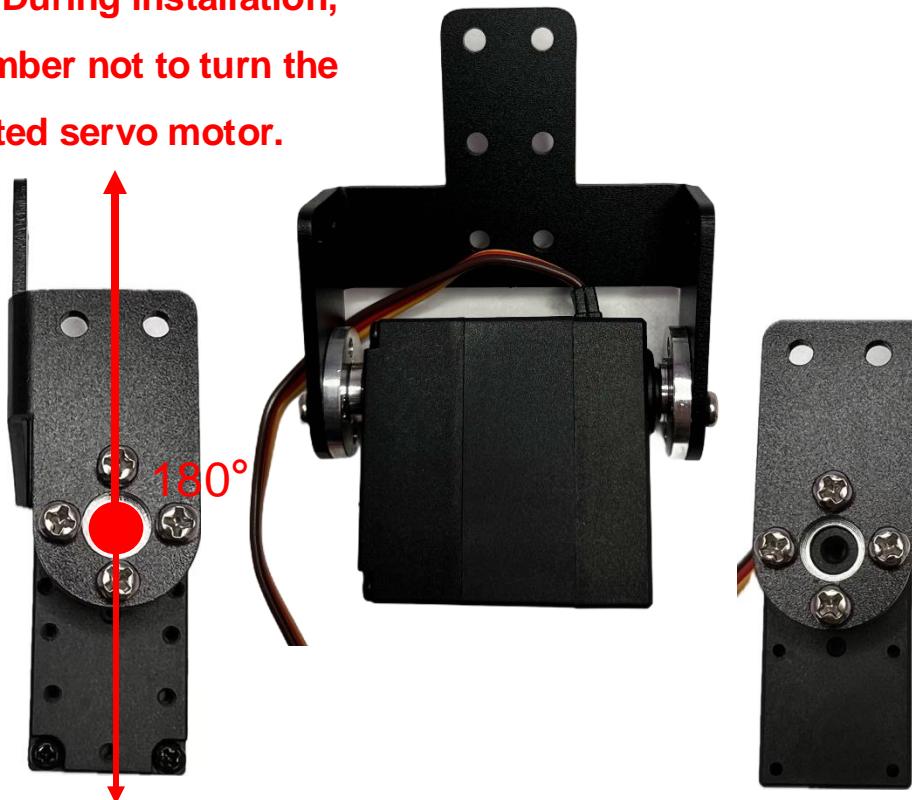
Step 9 Fixing Servo

Parts Needed



Use the silver screws that come with the servo motor and the servo motor bracket, and pay attention to the vertical fixation between the servo motor and the bracket

Note: During installation, remember not to turn the adjusted servo motor.



If installation is difficult, you can pull both sides of the bracket to make it loose.

Device set-up

Step 10 Fixing Servo

Parts Needed



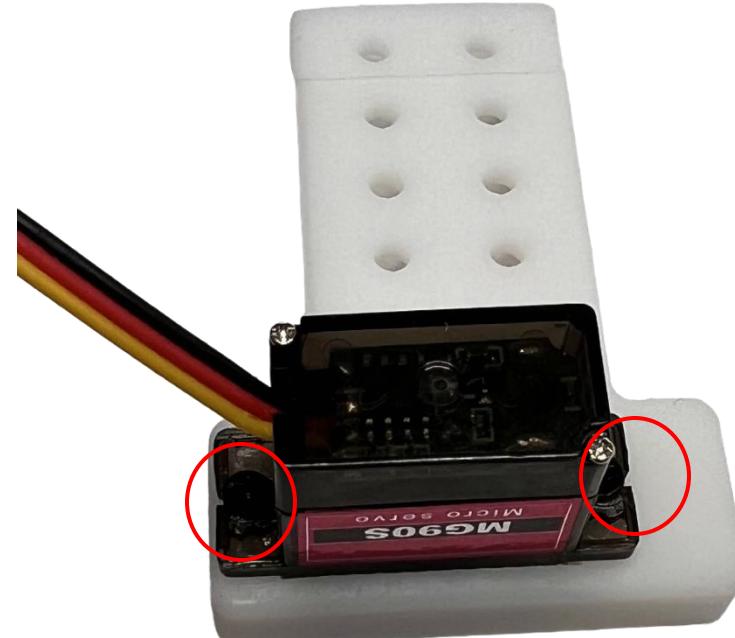
Screws x2
M2.3*6mm

MG90s Servo
x1



Claw Holder x1

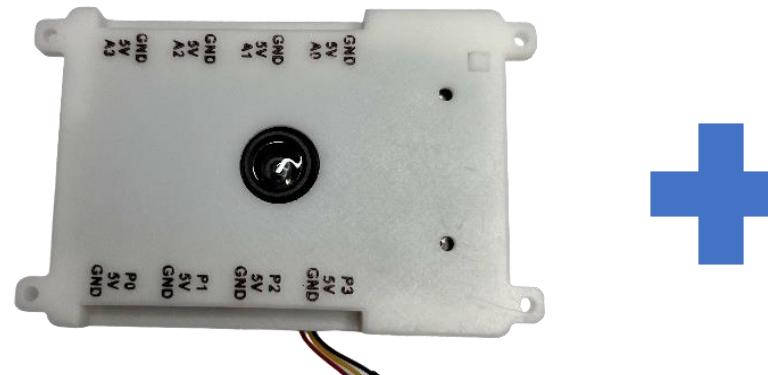
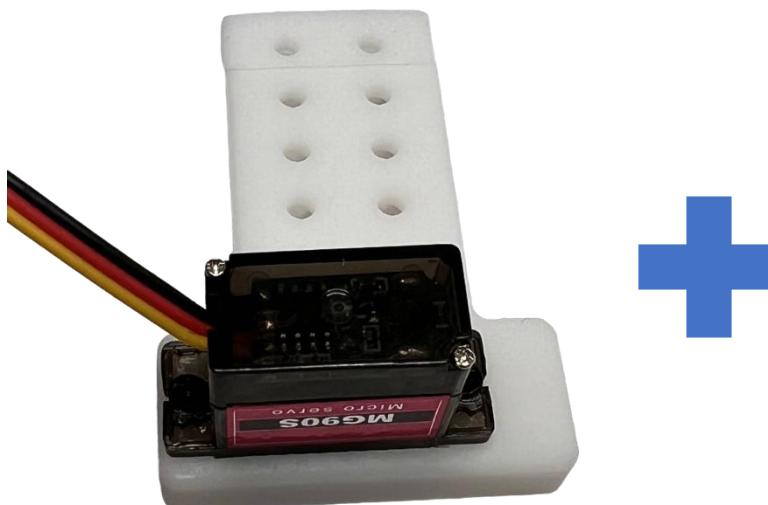
Install the servo motor to the claw holder and screw it in.



Device set-up

Step 11 → Servo motor angle calibration

Connect the servo motor to the S1 port on the side of the cocopi and supply power to the cocopi via a computer or power bank.



or



Device set-up

Step 11 → Servo motor angle calibration

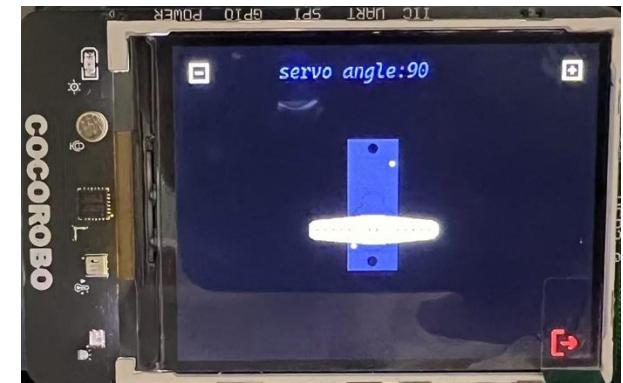
After connecting the Cocopi power supply, the servo motor angle can be set using the built-in sample



Press the A key to enter the sample menu



Press the C key to move down, find Servo Control, press the B key to run



Press C and D keys to adjust the angle to 90 degrees

Device set-up

Step 12 Assemble the Claw

所需材料



右爪 x1



舵臂 x1

Self-
Taping
Screws
M1.4*5mm

The servo motor claw is embedded in the corresponding position of the right claw and fixed with two self-tapping screws.



Note: Check the helm arm for visible gears with the side with the internal gear facing up before installation.

Device set-up

Step 13

Assemble the
Claw

Parts
Needed



Right
Claw x1



Arm x1



Screws x1

Attach the gripper with swing arm to the servo motor rudder disc and lock it with the silver screws that come with the servo motor.



Device set-up

Step 14 Fixing Claw

Parts Needed

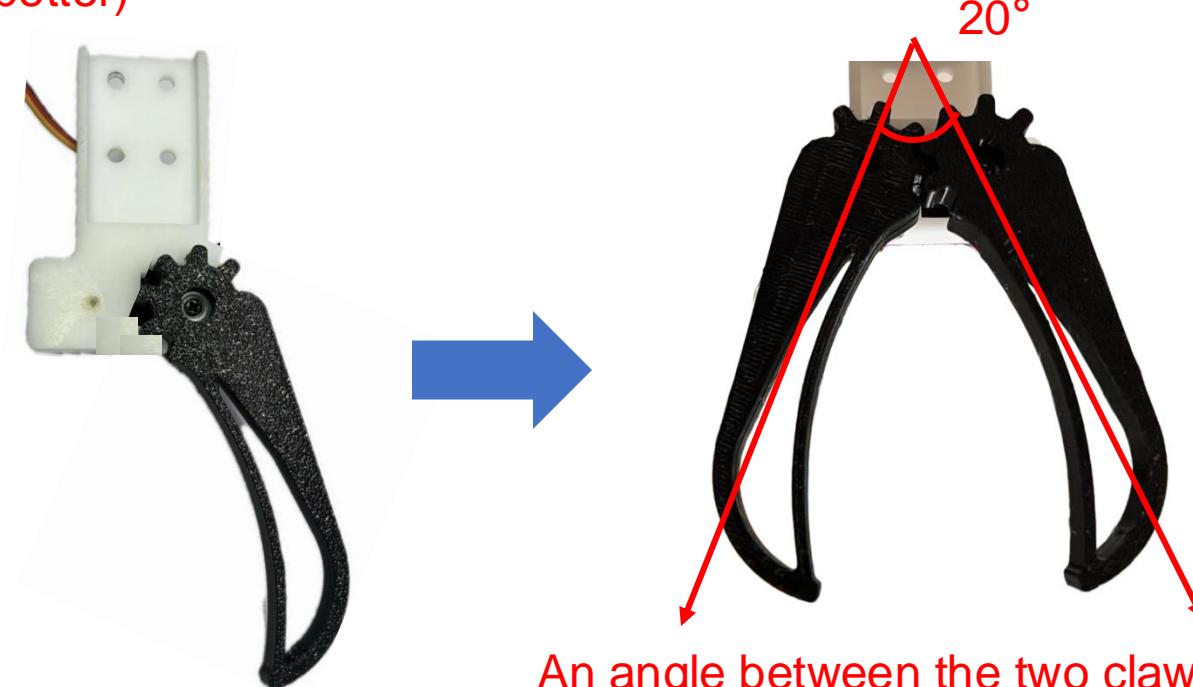


左爪x1

自攻螺絲
M2.0*8mm

Engage the other gripper with the rod of the fixed gripper, lock it, and loosen it by turning it halfway.

(Note: The purpose of loosening a little is to make the mechanical claw rotate better)

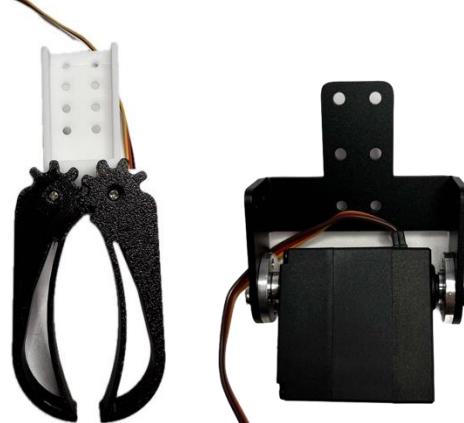


An angle between the two claws is required, about 20°

Device set-up

Step 15 → Install the arm

Parts Needed



Screws ×4
M3*8mm



Nuts ×4
M3mm

Use screws and nuts to secure the claws and brackets.



Device set-up

Step 16 → Install the arm

Parts Needed



Self
Tapping
Screws x7
M2.3*6mm

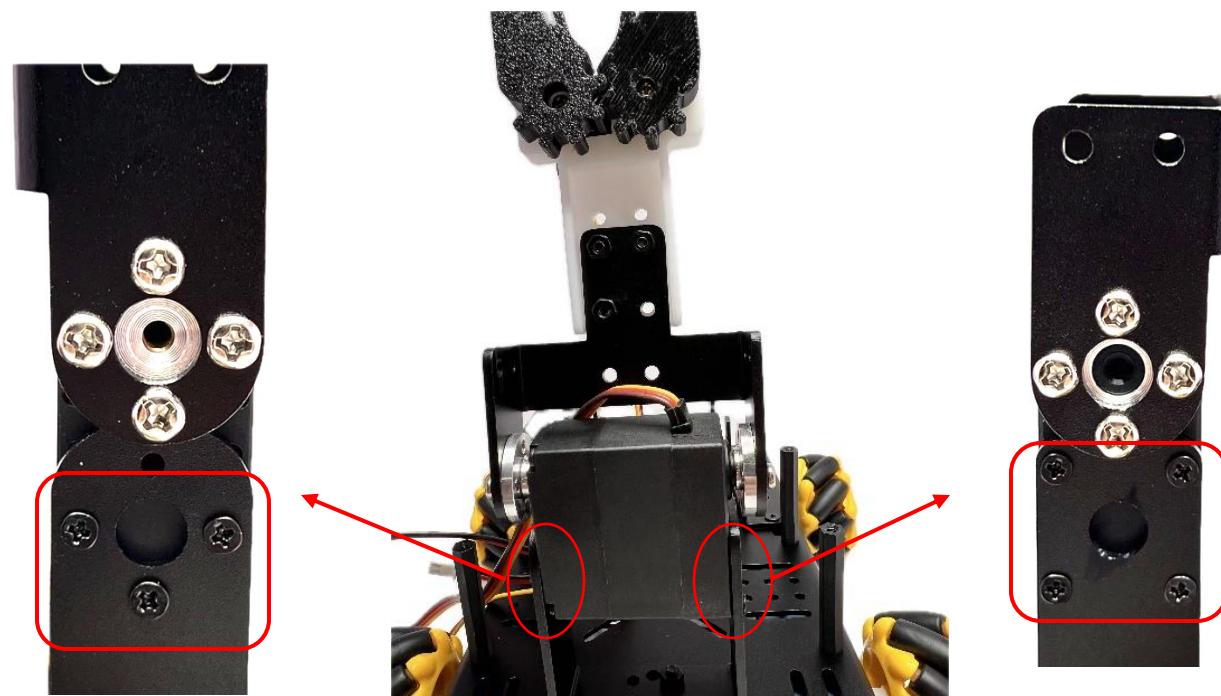


Base



Claw
Assembly

Use the self-tapping screws to secure the entire mechanical claw with the bracket on the base of the trolley.





Assembly Contents



Barrel

Parts Included:



High Torque Servo
(180)×1



Barrel mount×1



Pallet × 1



Accessories
Box×1



MG90S Servo×1



Ball
Holder×1



Barrel
×1



Screwdriver×1



Micro Motor×1



Motor Mount×1



Friction
Wheel×1



Wheel
Gear×1



Accessories
pack ×1



Device set-up

Step 16

Wheel Gear
Assembly

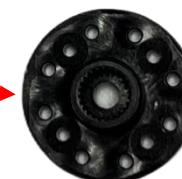
Parts
Needed



Parts Bag x 1



Self-
Tapping
Screws x2
M2.3*6mm



Servo motor
disc x1



Wheel
Gear x1

Use self-tapping screws to fix the black servo motor disc with the 3D printed rotating gear.

The holes on the black disc correspond to the four holes of the 3D printed gear



The gear side
should face
forward

Device set-up

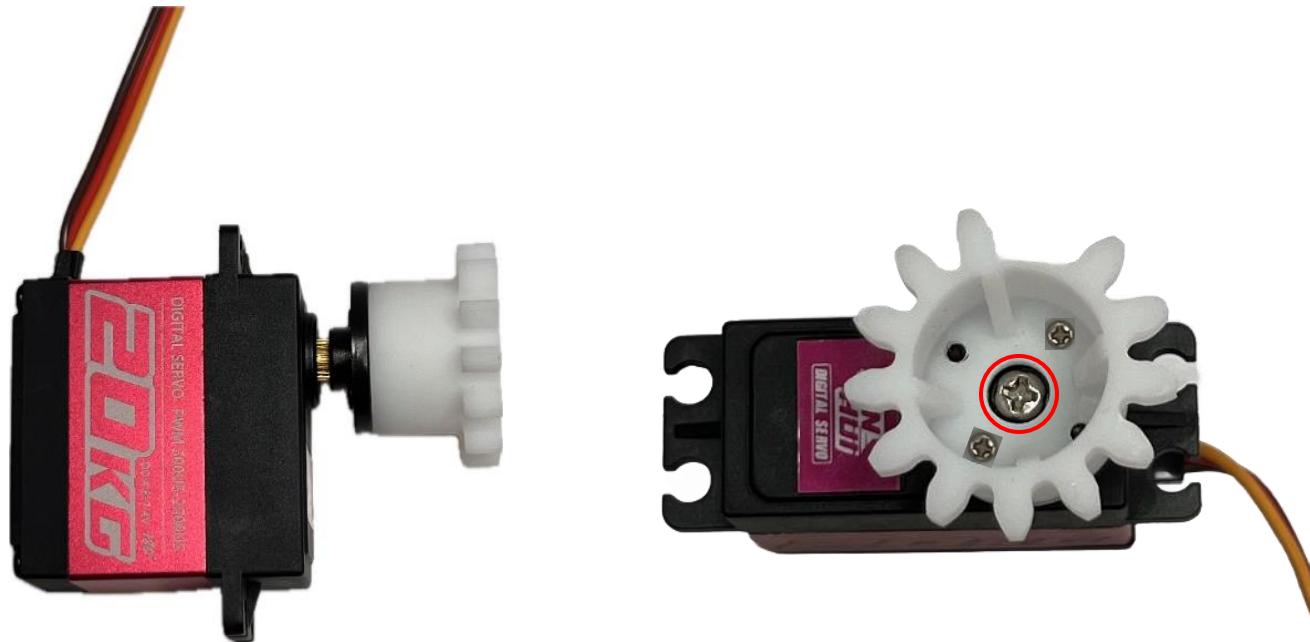
Step 17

Assembling
Wheel Gear

Parts
Needed



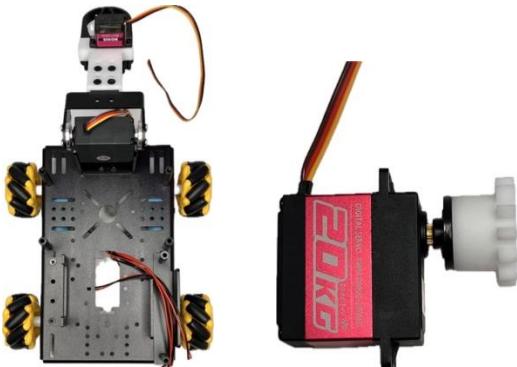
Use the small screws that come with the servo motor to lock the servo motor.



Device set-up

Step 18 Install the Wheel Assembly

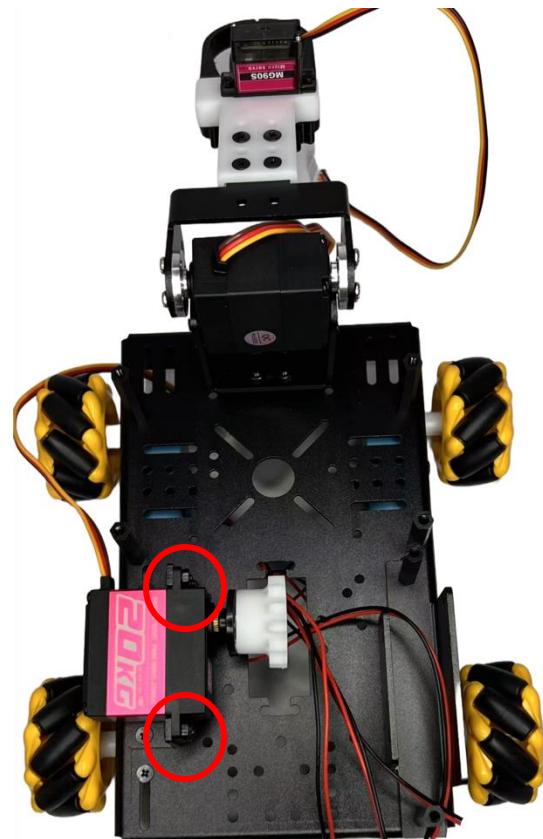
Parts Needed



Screws x4
M3*8mm

Nuts x4
M3mm

Use the screw and nut to secure the servo motor where the rotating wheel is located to the base bracket of the car.

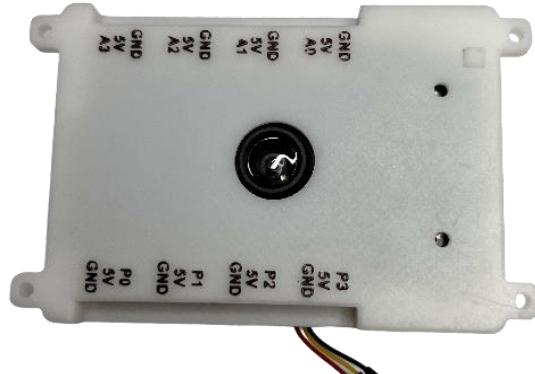


Screw from the outside in

Device set-up

Step 19 → Servo motor calibration

Connect the servo motor to the S1 port on the side of the cocopi and supply power to the cocopi via a computer or power bank.



or



Device set-up

Step 19

Servo motor
calibration

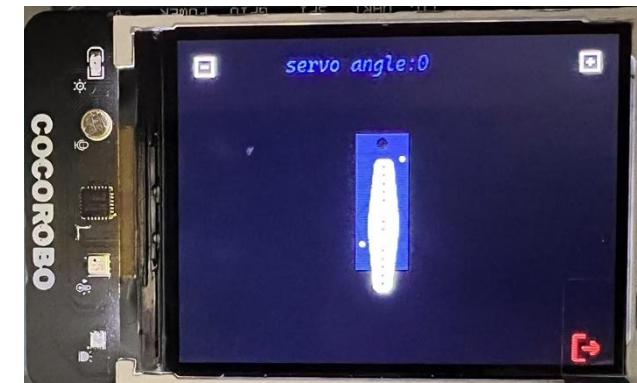
After connecting the Cocopi to a power supply, the servo motor angle can be set using the built-in sample



Press the A key to enter the sample menu



Press the C key to move down, find Servo Control, press the B key to run



Press C and D keys to adjust the angle to 0 degrees

Device set-up

Step 20

Ball Holder
Installation

Parts
Needed



Ball Holder x1



Servo
swing
armx1



Self-
Tapping
Screws x1
M1.4*5mm

The servo motor swing arm is inserted into the ball holder and fixed from the middle with self-tapping screws.



Device set-up

Step 21

Installing Ball Holder

Parts
Needed



Ball Holder x1



Barrel x1

Insert the ball holder hinge diagonally into the hole like the figure below, while lowering the other end of the ball holder .

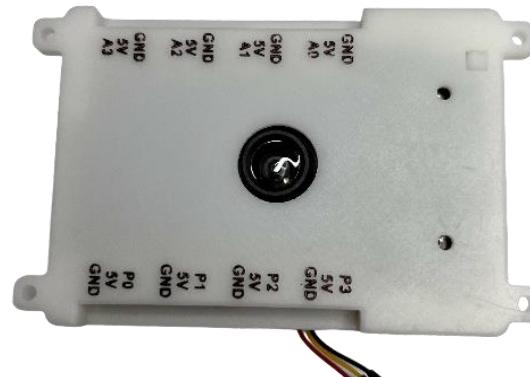
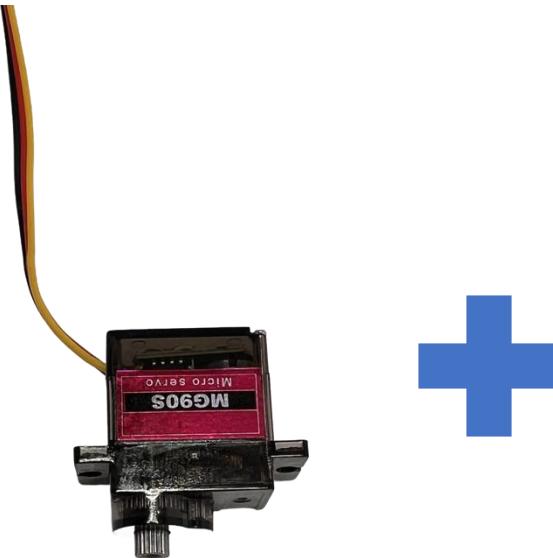


Device set-up

Step 22

Servo motor calibration

Connect a new MG90S servo motor to the S1 port on the side of the cocopi and power the cocopi via a computer or power bank.



Device set-up

Step 22

Servo motor
calibration

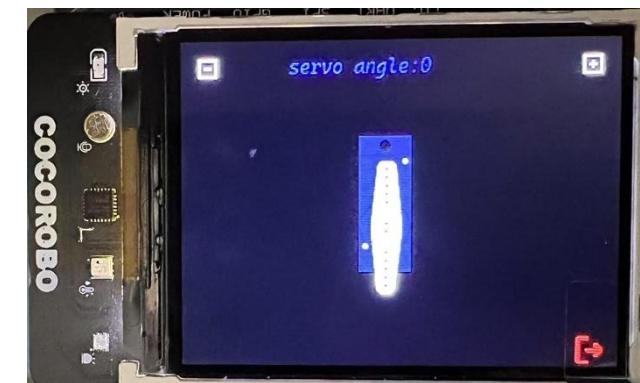
After connecting the Cocopi power supply, the servo motor angle can be set using the built-in sample.



Press the A key to enter the sample menu



Press the C key to move down, find Servo Control, press the B key to run



Press C and D keys to adjust the angle to 0°

Device set-up

Step 23

Install the servo

Parts
Needed



Barrelx1



MG90S Servo
x1



Self-
Tapping
Screws x2
M2.3*6mm

The servo motor metal axis is inserted into the upper arm of the ball holder and the self-tapping screw is fixed to the two small holes.



Device set-up

Step 24

Friction Wheel Installation

Parts Needed



Motor
Bracket x1



Small
Motor x1



Friction
Wheel x1

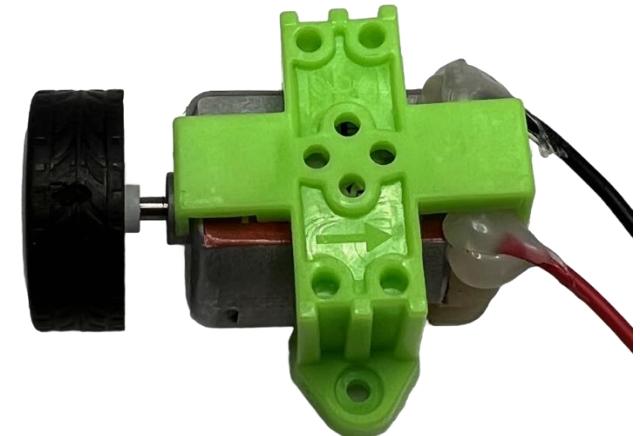
① Look at the motor bracket to find the longer side and the shorter side at the top.



② Plug the shorter side of the top towards the tail of the small motor.



③ Insert the friction wheel into the small motor to turn the shaft.



Device set-up

Step 25

Assembling
friction wheel

Parts
Needed

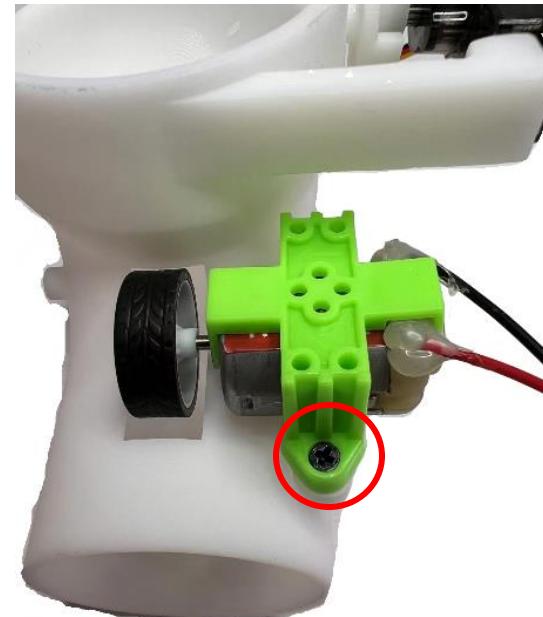


Self-
Tapping
Screws x1
 $M2.3 \times 6mm$



Self-
Tapping
Screws x1
 $M2.0 \times 8mm$

Align the friction wheel assembly with the position of the barrel, and screw the black M2.0*8mm screws into the small holes on both sides.



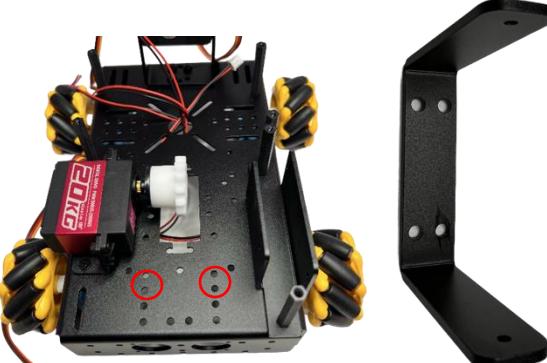
There may be unevenness between the small motor and the barrel, and one side might be slightly warped, so M2.0*8mm screws are required for the warped side.

Device set-up

Step 26

Fixing Barrel
Mounts

Parts
Needed



Body x1

Barrel
Holder x1

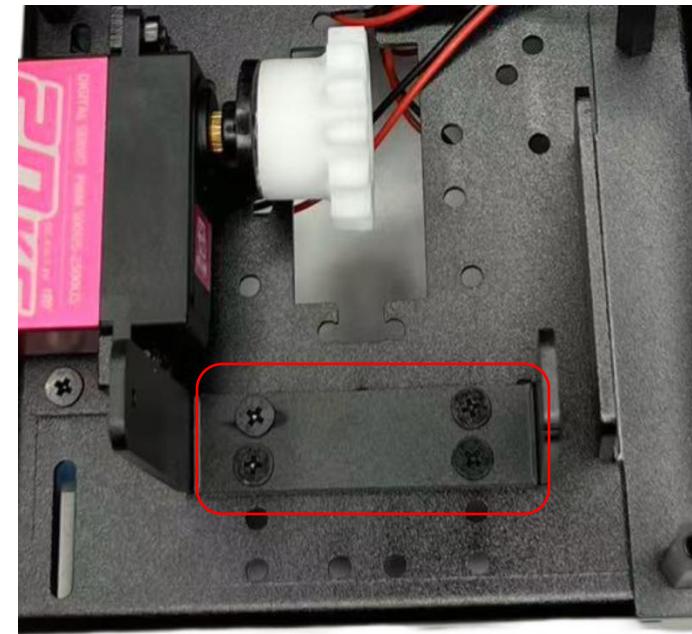
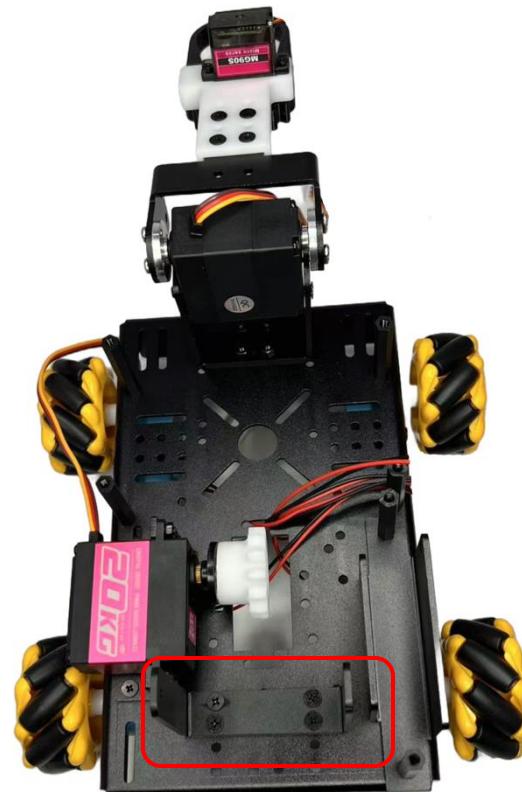


Screws x4
M3*8mm



Nuts x4
M3mm

Fix the barrel bracket to the base using M3*8mm screw and nuts.



Device set-up

Step 27 Fixing Barrel

Parts Needed



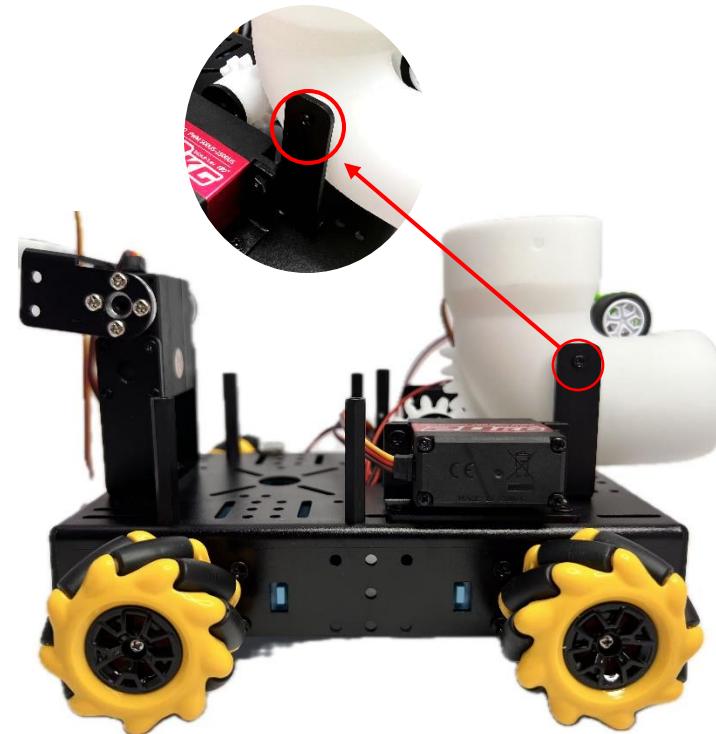
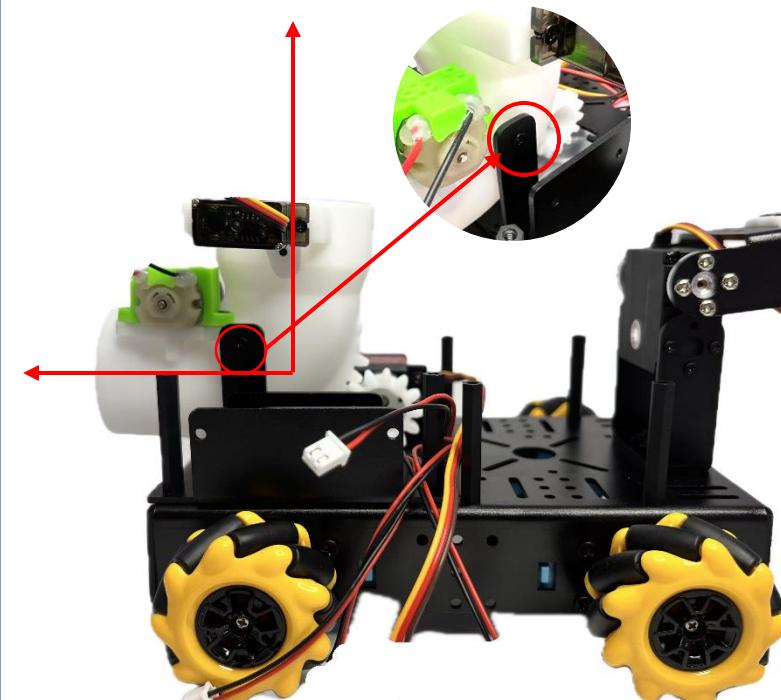
Car x1



Barrel x1

Self-Tapping
Screws x2
M2.3*6mm

Insert the barrel into the barrel bracket, and screw in M2.3*6mm self-tapping screws from the small holes on both sides of the barrel bracket.



Note: The barrel needs to be installed horizontally

Device set-up

Step 27

Fixing Tray

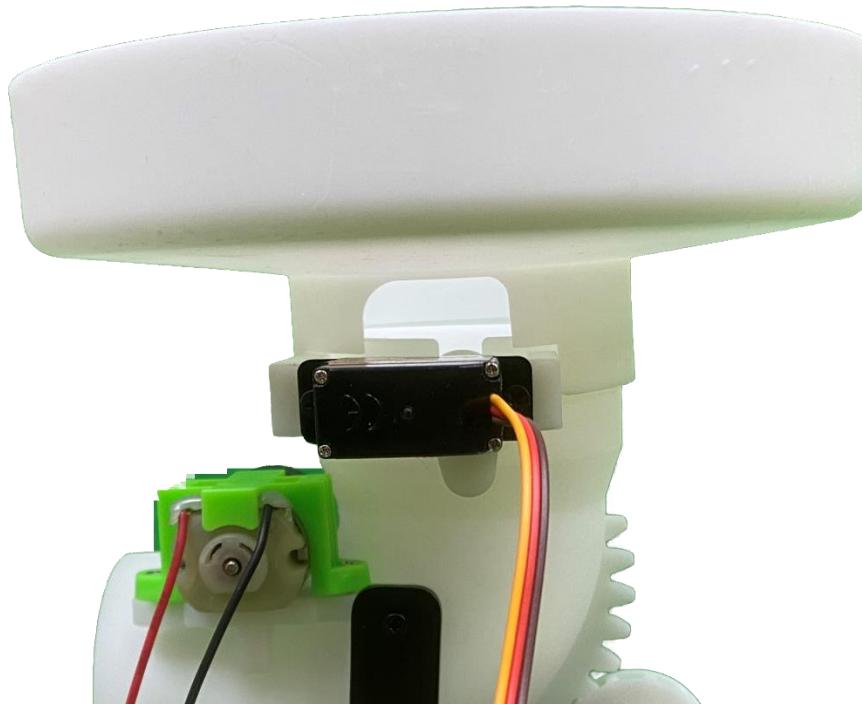
Align the tray notch with the servo motor and insert it.



Body x1



Tray x1



Device set-up

Step 28

Assembling
Module

Parts
Needed



Body x1

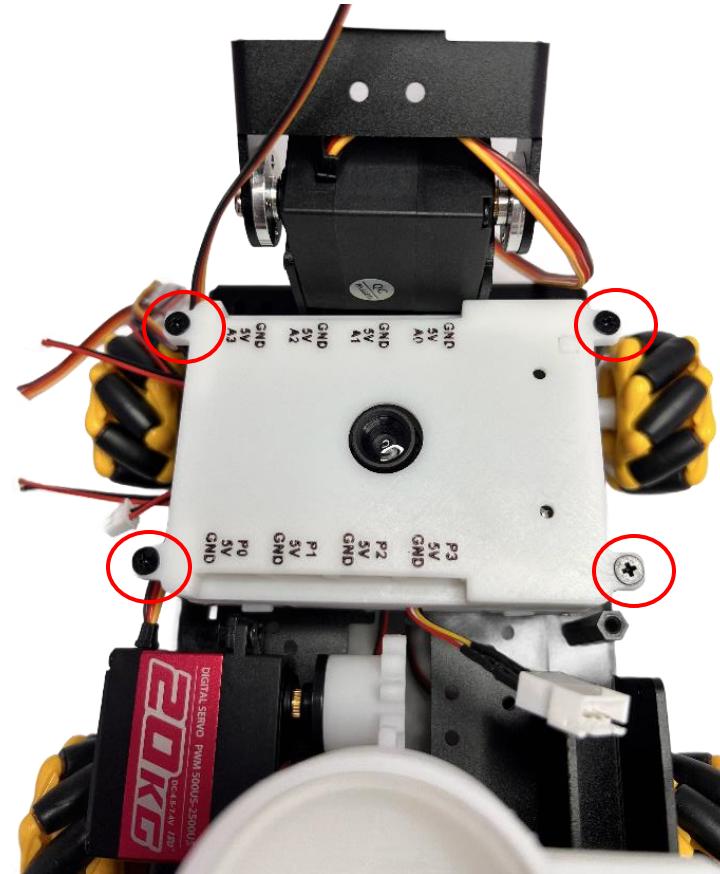


CocoPi
Module x1



Screws ×4
M3*8mm

Attach the module to the four standoffs at the base.

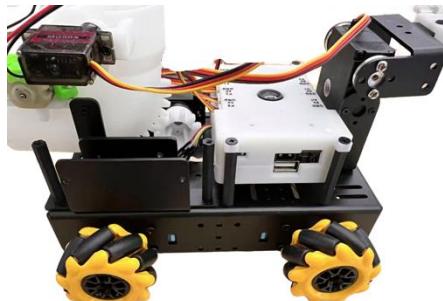


Device set-up

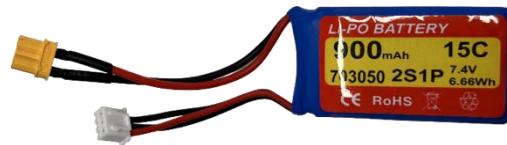
Step 29

Assembling
Battery

Parts
Needed

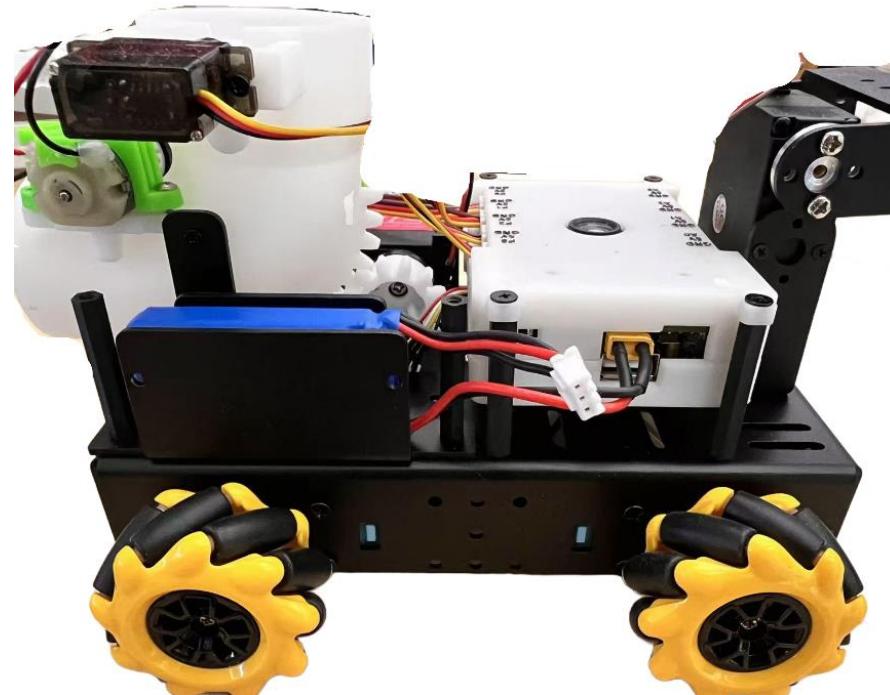


Body x1



Battery x1

Put the battery into the base battery holder and insert it into the corresponding interface on the right side of the module, note that the yellow XT30 plug should be used, and the white one should be used for charging and voltage measurement



Device set-up

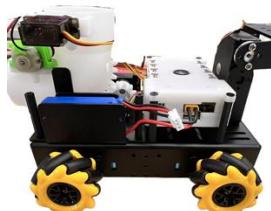
Step 30

Bluetooth Module Assembly

Parts
Needed

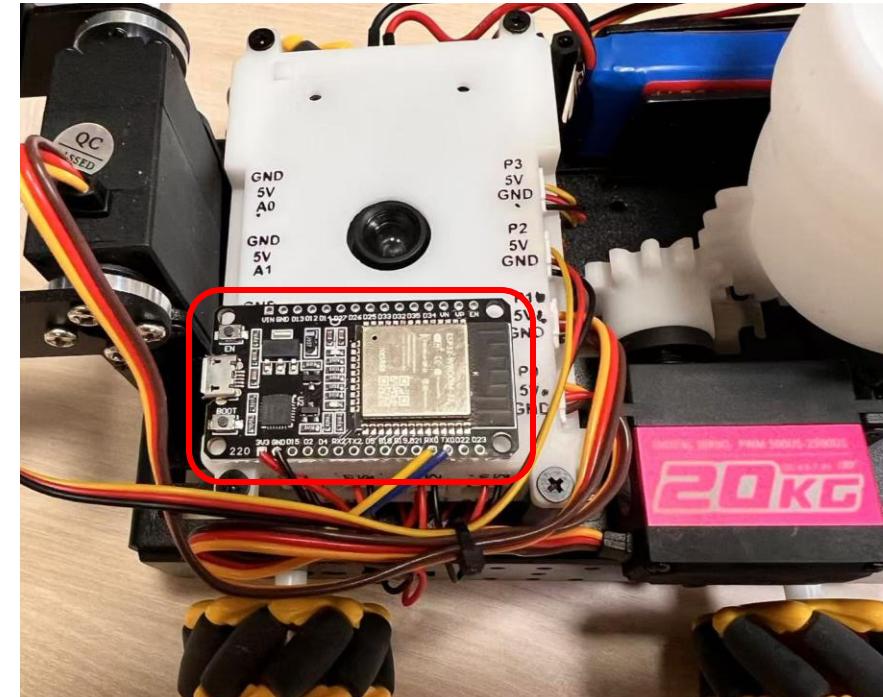


Bluetooth
Module ×1



Body ×1

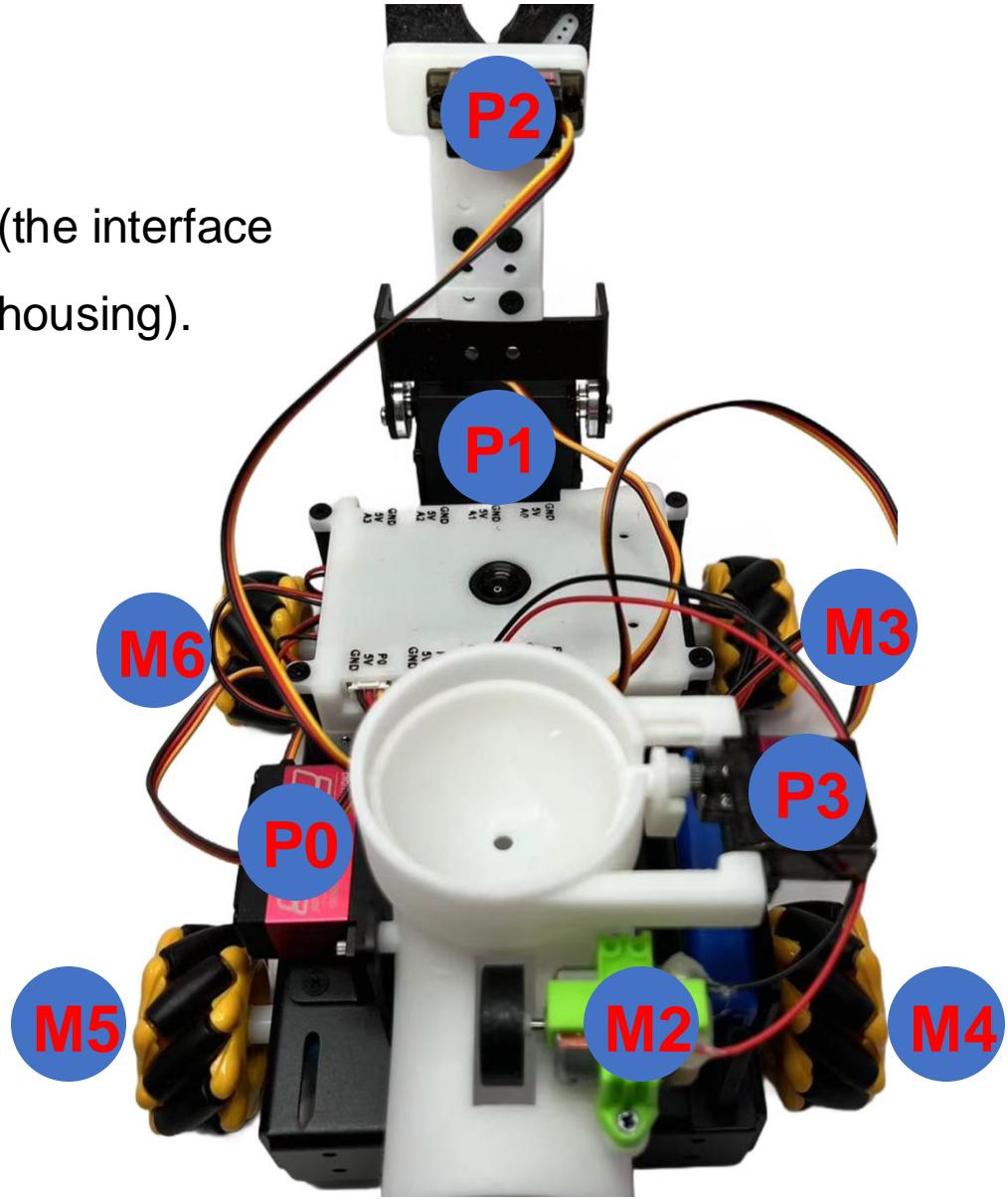
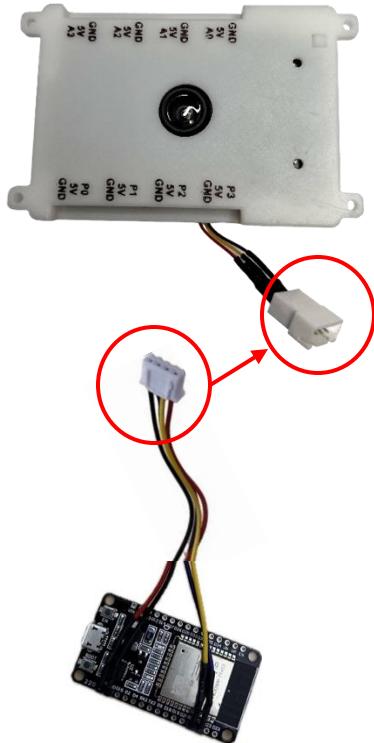
Use a 3M pad to attach the ESP32 bluetooth receiving module to the module.



Device set-up

Step 31 Connection

Follow the icon for wiring (the interface number is on the module housing).



● Assembly Complete!

