COCOROBO

AI for STEM Competition

Asia Pacific STEAM_AI Technology Innovation Challenge

Tournament introduction and Hardware platform foundation

CocoPi

COCOROBO

内容大綱

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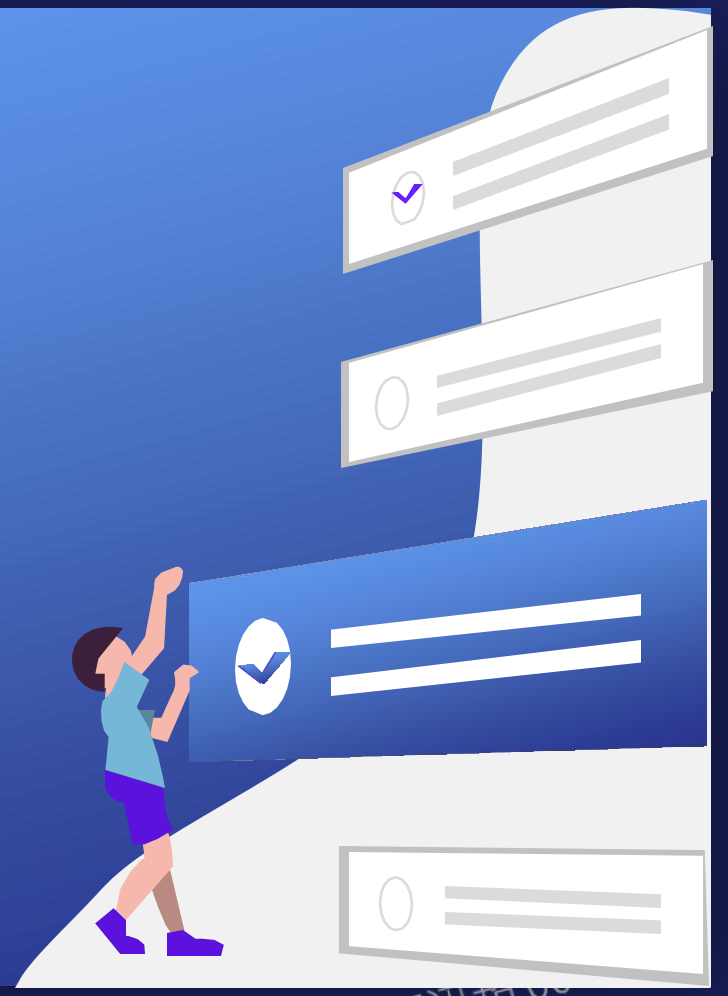
1 Introduction to the competition

2 Participation is required

3 Hardware introduction and use

4 Sample experience



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CHAPTER

P O W E R

ONE.

Contest content

CHAPTER

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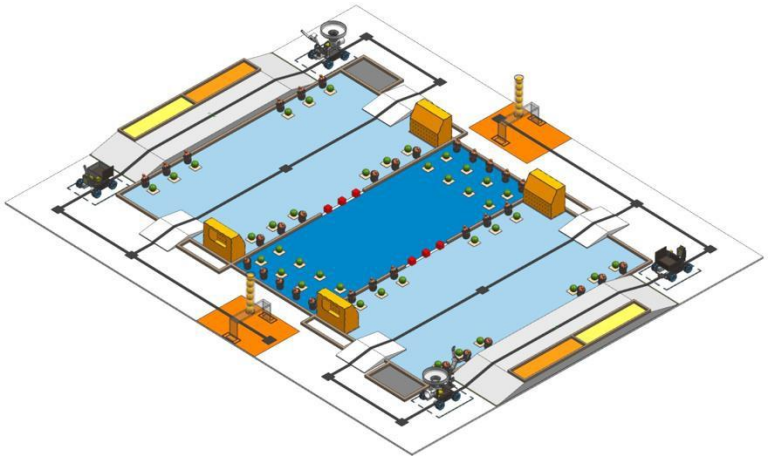
Equipment description

equipment



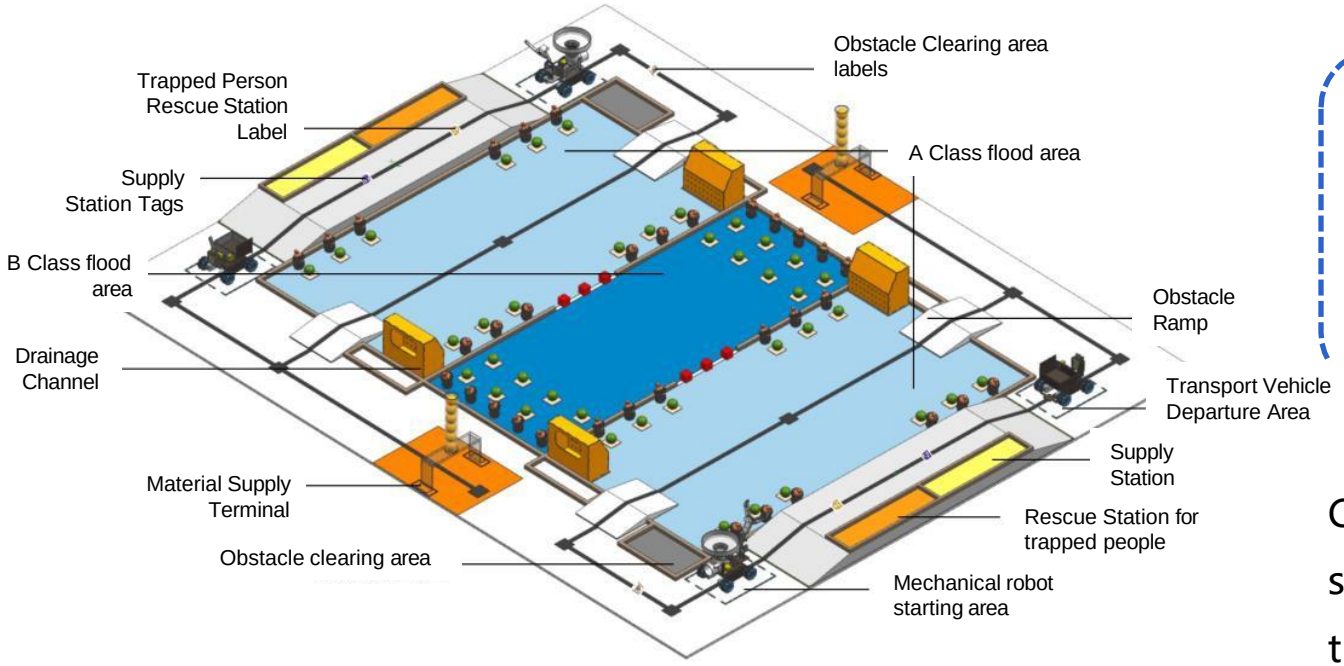
playfield

Transport robot

Mechanical robot

Venue Introduction

venue



Playfield dimensions: 250cm*300cm

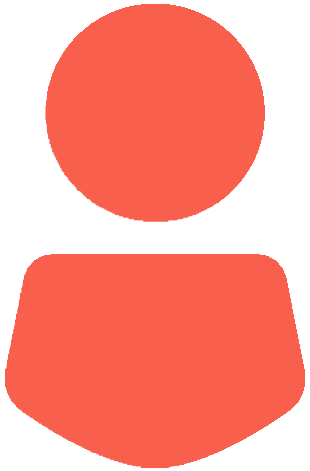
In the playfield there are:

- Departure area
- Supply depots
- Obstacle clearing area
- Supplies Terminal
- Aid station
- Immersion area

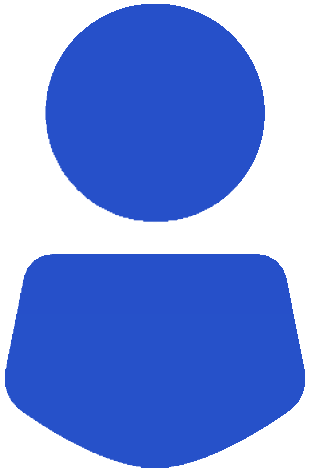
Class B flooded area shared by both sides, with supplies at the supply terminal and floods and trapped people in the flooded area. There are also obstacle blocks in the competition field of the secondary school category.

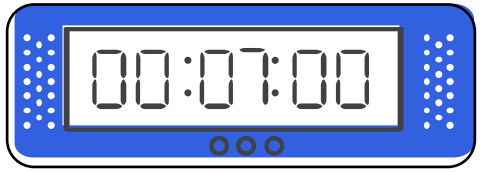
Game time

lineup



VS





The duration of the live game is **7 minutes**
The game ends when the timer of the game phase ends

Mission Analysis

Transport Robot

Turnaround line motion

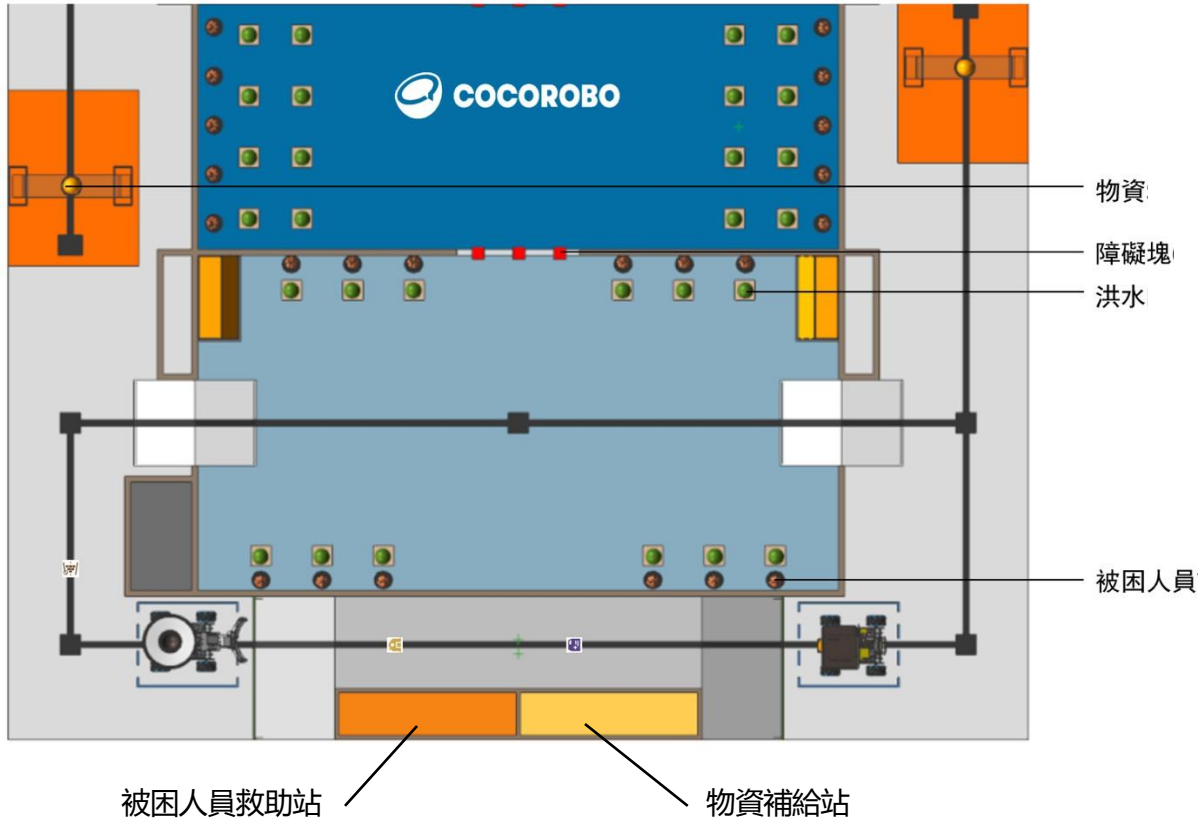
Motor control, line identification

Unloading of items

Servo motor control

Competition Contents

Transport robot



Transporters must depart from the departure area
Follow the line to the supply terminal; After arriving at the supply terminal, the impact device obtains supplies (the supplies will be replenished indefinitely, and the ball will fall into the frame behind the cart, and a maximum of 3 supplies can be loaded at a time); Once successful, transport the item to your supply station. After the mechanical vehicle completes the drainage of the flooded area, the rescued person will be placed on the transport vehicle, and the transport vehicle must transport the trapped person to the trapped person rescue station. (The mechanical vehicle can control the operation of the transporter by identifying a specific tag for the transporter).
After all the flood water in your A-level flooding area has been drained, the mechanical vehicle will carry the obstacle blocks to the transport truck, and then the transport truck will transport the obstacle blocks to the obstacle removal area. (This task is only required for the secondary school group).

Mission Analysis

Mechanical Robot

Motion control
Motor control, gamepad use, Bluetooth communication

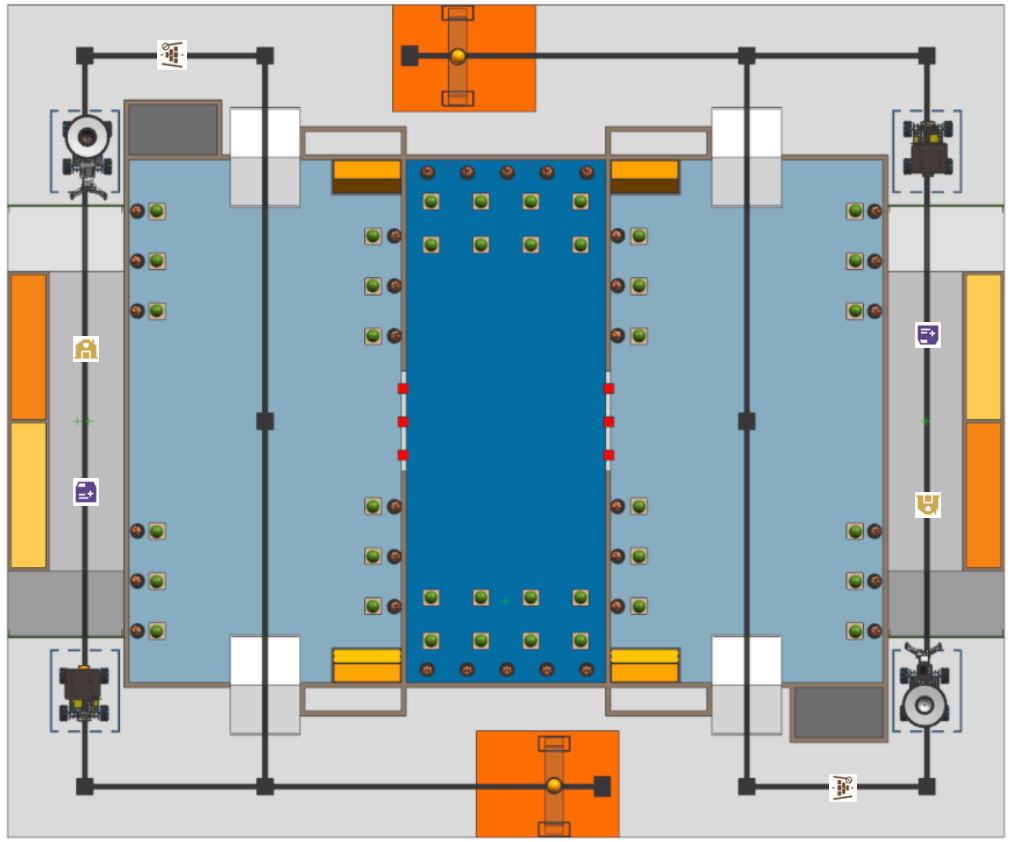
Item Gripping
Servo motor control, gamepad use, Bluetooth communication

Item launch

Servo motor control, motor control, Bluetooth communication

Competition Content

Mechanical Robot



Mechanical vehicles must depart from the departure area,

- The mechanical vehicle must go to the **Class A flooded area, Class B flooded area** to carry out the drainage task (pick up and throw the small ball into the **drainage channel** using the mechanical claw), and successful discharge of 1 flood water into the drainage channel completes 1 drainage.

After the mechanical vehicle completes the drainage of the flooded area, the rescued trapped people will be put on the transport vehicle (using the mechanical claw to pick up the puppet and put it into the transport vehicle), and then the transport vehicle must transport the trapped people to the **trapped person rescue station**.

After all the flood water in the A-level flooding area has been discharged, the mechanical vehicle can lift the obstacle block and put it on the transport vehicle, and then the transport vehicle will transport the obstacle block to the obstacle clearing area. **(This task is only required for the secondary school group).**

Competition Rules

Violations

本規則的解釋權歸大賽組委會

- The robot is required to be placed within the departure area, **vertical projections of the trolley must not exceed the departure area.**
- Teams can ask the referee for an unlimited number of times to reset the robot to the departure area. Props on the robot will be restored to their original position during the reset.
- When the following situations occur, the referee will give the violating party a warning after confirmation. Props on the robot will be returned to the playfield:
    - Transport robots enters A Class flooded area while it is still in a flooded state;
    - The mechanical robot enters the Class B flooded area while Class A flooded area is still flooded;
    - The transport robot enters the Class B flooded area;
    - For secondary school category, the mechanical vehicle enters Class B flooded area while obstacle blocks are not completely cleared;
- In the following violation situation, the referee will give the offender a warning after confirmation. The offending robot is to be brought back to the departure point and kept stationary for **15s.** During the durations, props on the robot will be returned to the playfield.
    - Mechanical robot rescues trapped civilians while flood is still present in the flooded area;
    - For secondary school category, obstacle blocks are moved before the flood water in Class A flooding area is fully discharged;

    move the obstacle blocks;
    - The mechanical robot directly brings the trapped civilians to the personnel rescue station;
    - Robot was removed from the playfield for maintenance during the reset period;

Competition Rules

Violations

本規則的解釋權歸大賽組委會

- If two or more mechanical robots are entangled together due to structural problems and cannot be separated within 10s. Contestants can bring the entangled robots back to their respective departure point after referee confirmation. Props from the entangled robots will be reset back on to the playfield.
- The transport robot can transport up to 3 items at a time. If the limit is exceeded, the referee will remove the excess items without

  affecting the operation of the robot.
- When the transport robot transports supplies, trapped civilians, and obstacle blocks to the designated mission area, the mission will still be deemed completed in the following situations:
    - The supplies bounces out after it contacted the material supply station;
    - The trapped civilian bounces out after it contacted the personnel rescue station;
    - The obstacle block bounces out after it contacts the obstacle clearing area.
- During the match, it is forbidden to maliciously collide with the opposing robot:
    - Under normal circumstances, the first to strike is penalized;
    - If collision in a small area cannot be avoided, both parties will not be punished;
    - After the referee confirms the violation, the offending robot must be reset to the departure area and kept stationary for 15 seconds. The props on the offending robot will be restored to their original position.
    - If a robot loses its ability to move due to a malicious collision, the offending team will score 0 points for that match.

Competition Rules

Violations

本規則的解釋權歸大賽組委會

- It is forbidden to touch the opponent's completed quest items, such as supplies at the Supply Station, personnel at the Trapped Rescue Station, obstacles at the obstacle clearing area, and floods at the drainage channel. After the referee confirms the violation, the offending robot must be reset to the starting area and kept stationary for 15s, props that was on the vehicle will be restored to their original position on the playfield. The touched item will also be returned to where it was removed from.
- It is forbidden to destroy the props during the competition. If the robot causes damage to the field props and other structures through impact, **the offending robot must be reset to the starting area and kept stationary for 15s.** If the game cannot be continued, the offending team will be awarded 0 points for the game.
- Robots are not allowed to cross the separations borders on the playfields. If the contact area between the wheel projection of the mechanical vehicle and the partition is **greater than zero**, the referee will confirm the violation. The violating robot is to be returned to the departure area and props on the violating robot will be returned to the original position.
- During the match, no contact with the robot is allowed unless approval given by the referee. If found to have committed a violation, **the offending robot must be reset to the starting area and kept stationary for 15s.** If the situation is serious, the offending team will score 0 points for that game.

Quantification rules

Scoring Rules (Primary)

Quantity of supplies to be delivered	Number of drains	Number of people trapped in the rescue	Additional points	Score
x 5	x 5	x 5		

Single game score = mission score + extra points

Mission score = number of materials transported * 5 + number of drains * 5 + number of rescued trapped people * 5

Bonus points:

If the quantity of materials transported > the number of rescued trapped people, additional points = number of rescued trapped people * 10;

If the quantity of materials transported < = the number of trapped people rescued, then the extra points = the number of materials transported * 10

At the end of the game, the team with the highest score in a single game wins. If there is a tie in a single game, the team with the highest mission score wins.

Quantification Rules

Scoring Rules (Secondary)

Quantity of supplies to be delivered	Number of drains	Number of people trapped in the rescue	The number of obstacle blocks to be transported	Additional points	Score
x 5	x 5	x 5	x 5		

Single game score = mission score + extra points

Mission score = number of materials transported * 5 + number of drains * 5 + number of rescued trapped people * 5 + number of obstacle blocks carried * 5

Bonus points:

If the quantity of materials transported > the number of rescued trapped people, additional points = number of rescued trapped people * 10;

If the quantity of materials transported < = the number of trapped people rescued, then the extra points = the number of materials transported * 10.

At the end of the game, the team with the highest score in a single game wins. If there is a tie in a single game, the team with the highest mission score wins.

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CHAPTER

TWO.

Entry Instructions

CHAPTER

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Entry Instructions

Grouping rules

Player Abilities

1. Contestants need to be familiar with Arduino/ESP32/K210 open source hardware;
2. Contestants need to understand the basic principles and common sense of artificial intelligence and robotics

Grouping

1. The competition is divided into senior and secondary divisions;
2. Each team consists of 2 to 6 students, and each team has 1 mentor

Scene

1. Each participating team will compete at the corresponding venue according to the draw;
2. One hour before the game, the competition team arrives at the venue and draws lots for the competition venue and the order of participation

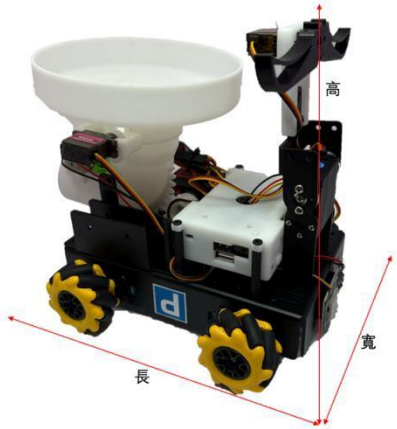
Entry Instructions

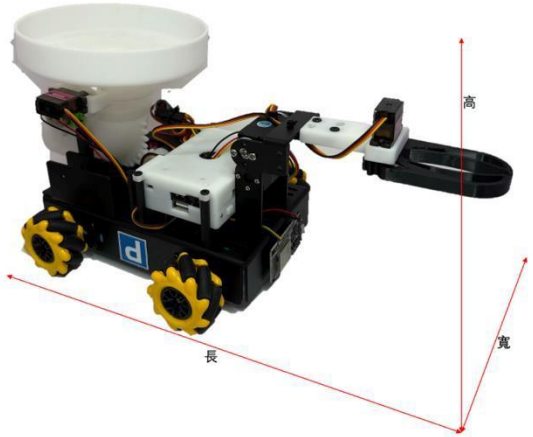
Equipment requirements

Each team is required to design 2 wheeled programmable robots (transporter and robotic vehicle), and each team can be equipped with a maximum of 1 spare robot, and all robots (including batteries) and other necessary debugging equipment must be brought by the participants.

Each robot can use up to 5 servo motors and 6 motors. Participating teams can use CocoRobo's online programming platform CocoBlockly Pi/X to design robot programs, and the robot can be controlled using a Bluetooth controller, while the transport vehicle cannot be controlled by any controller for automatic operation.

The participating teams independently design the participating robots, and the size limits of the robots are shown in the table below





Robot Type	Type	Length Limit	Width Limit	Height Limit
Transportation Robot	Min Contraction State	300	200	130
Transportation Robot	Max Contraction State	300	200	160
Mechanical Robot	Min Contraction State	220	200	250
Mechanical Robot	Max Contraction State	400	300	300

Entry Instructions

Disqualification

- It is not allowed to use the cars of other teams to compete, and if found, the two teams will be directly disqualified from the competition;
- During the competition, technical means shall not be used to interfere with the control signal of the participating teams, and once discovered, they will be ordered to withdraw from the competition;

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CHAPTER

P O W E R

THREE.

CHAPTER

Hardware introduction and use

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knowCocoPi

CocoPi

Equipped with an open-source Linux system, it can run a complete Python environment, suitable for Python learning, Linux learning, AI learning, and IoT learning, with powerful on-board hardware and online API resources.

AI

判别式

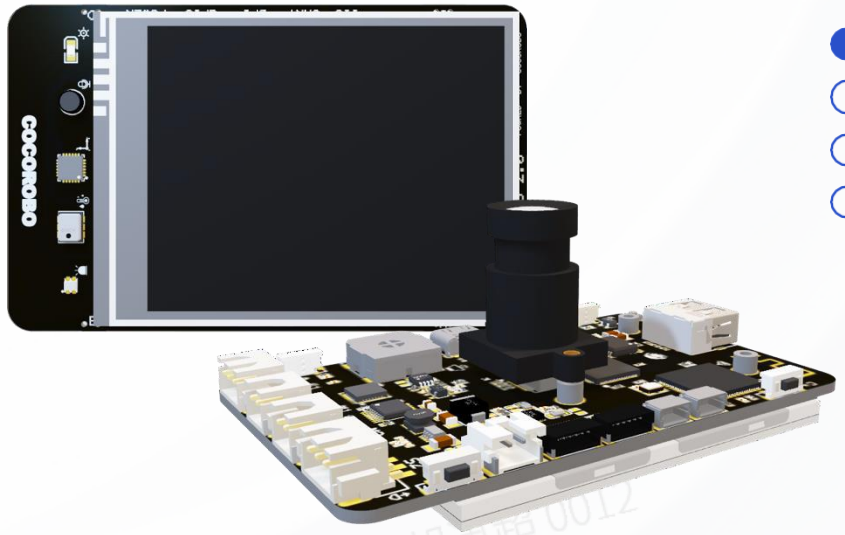
- Learn to reason
- Machine vision
- Speech recognition
- Phonological synthesis
- machine translation

生成式

- Literature Production
- Image description
- Voice conversations
- Speech Diagram
- Intelligence

IOT

- Cloud platform
- Sensing system
- Real-time video transmission
- Bluetooth communication
- Wi-Fi connection



Integration:
Functional integration

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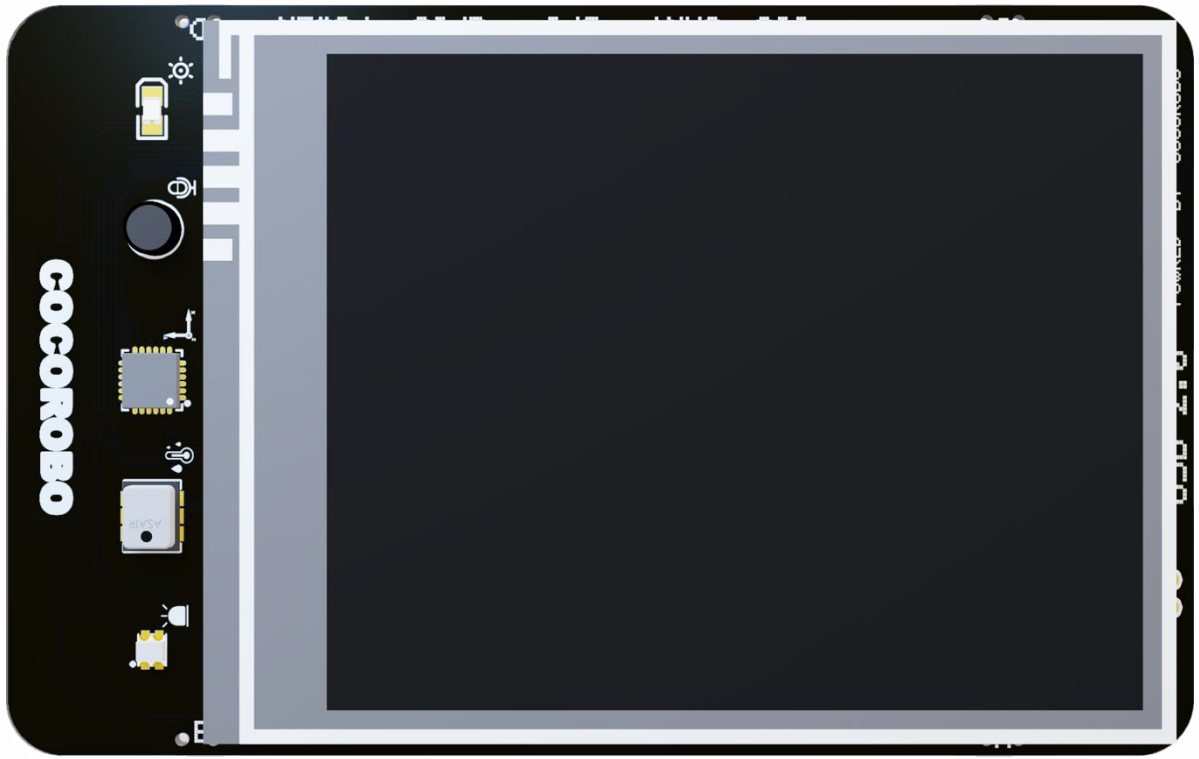
Light Sensor

Microphone

Motion Sensor

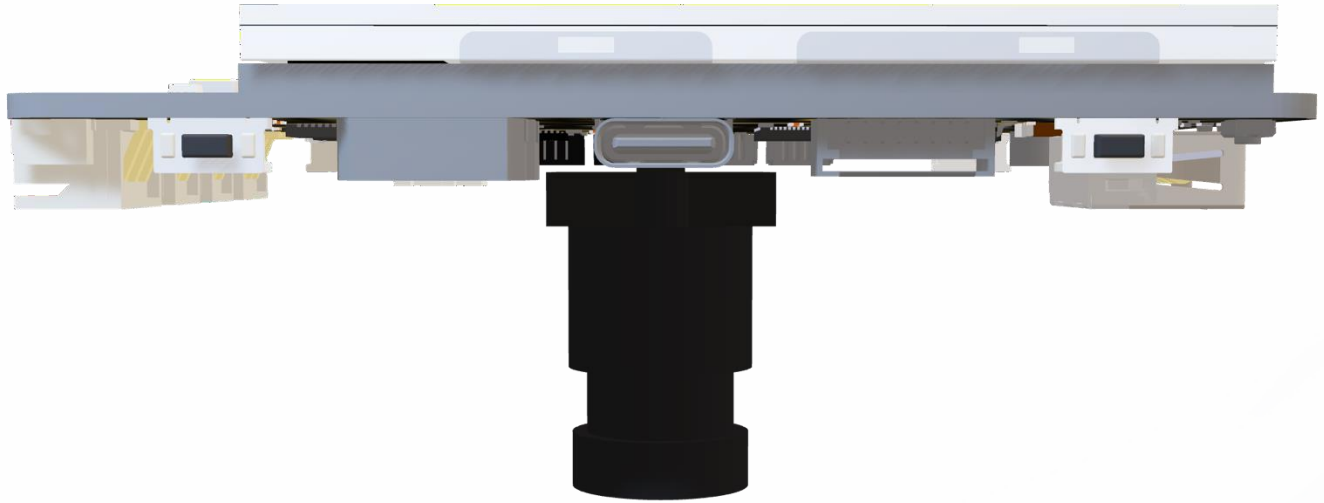
Humidity Sensor

RGB Light



Screen

B Key



A Key

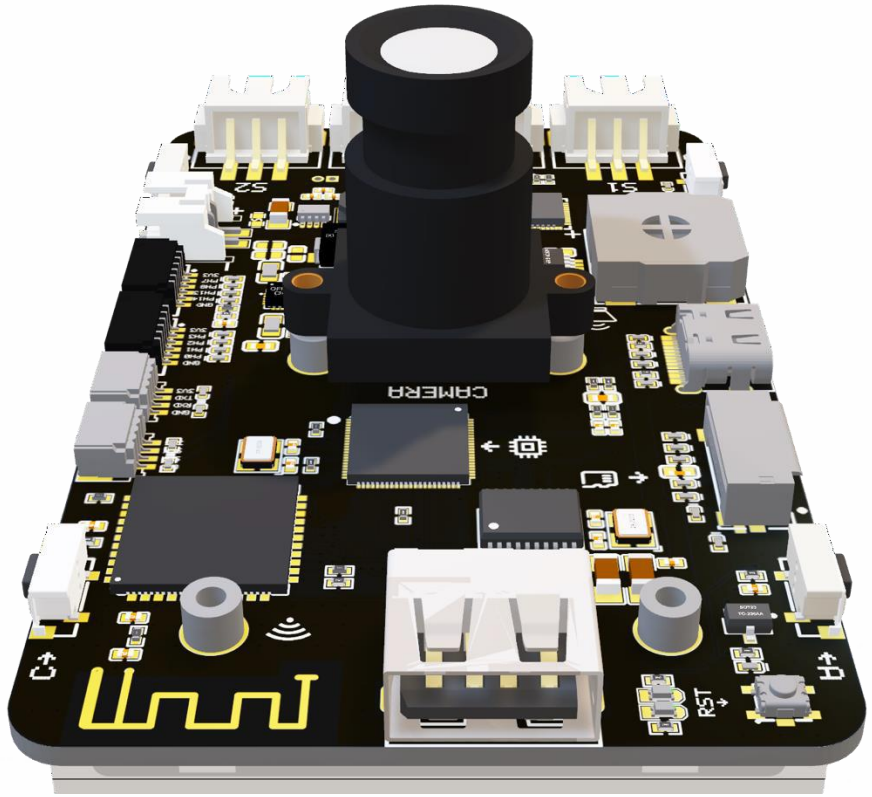
Type-C Interface

Camera

D Key

C Key

USB A Interface



Speaker

Micro SD Card Slot

Reset Button

LED Led

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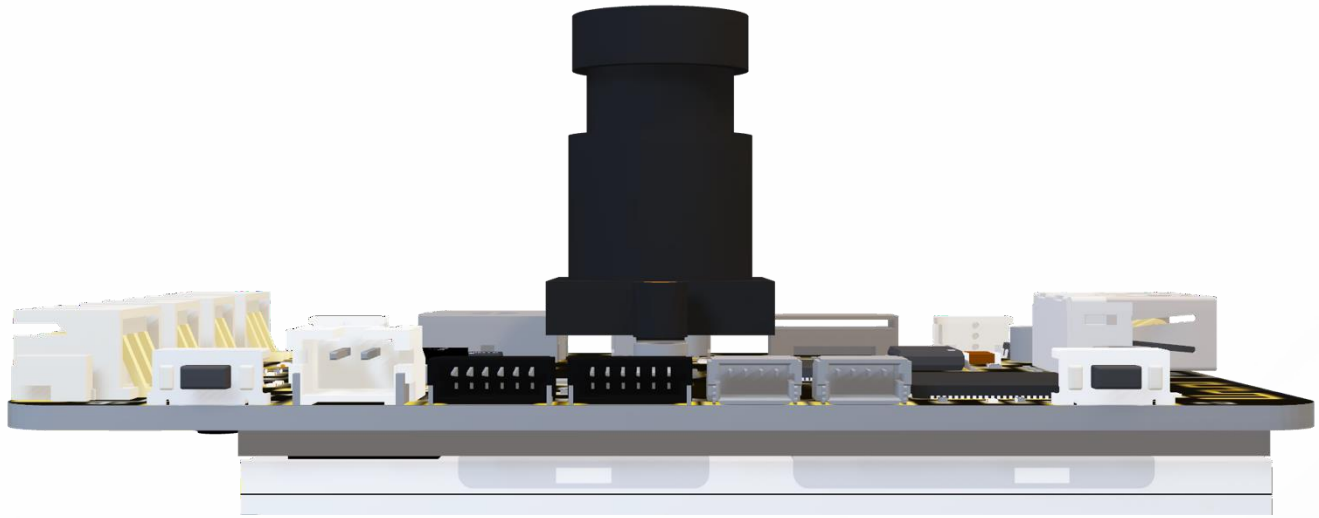
SPIComm interfaces

UARTSerial communication interface



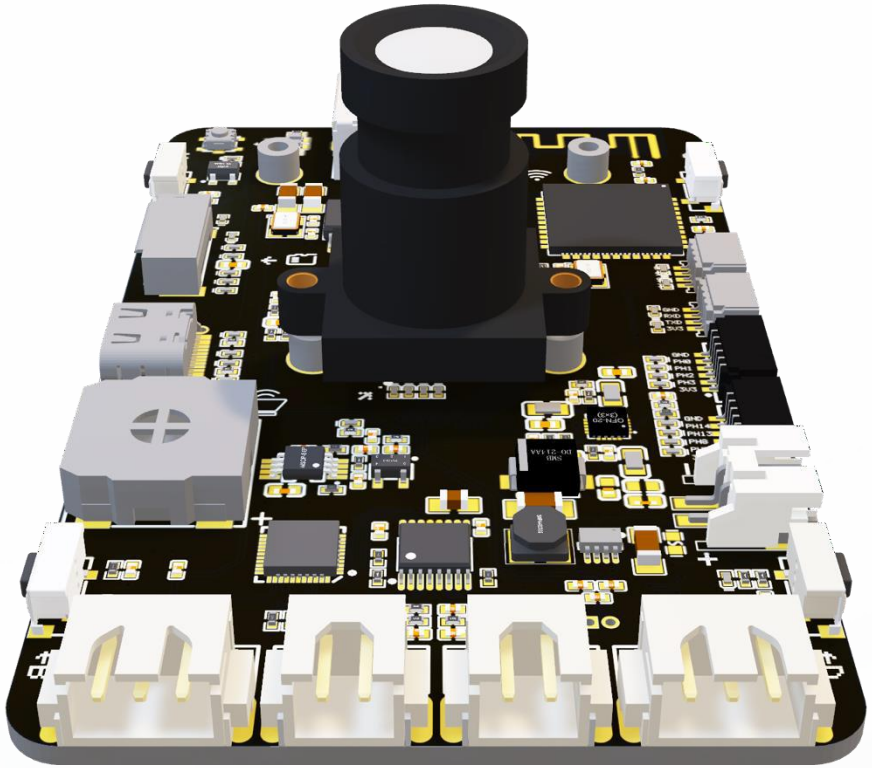
GPIO interface

Power Interface

IIC Comm interfaces

Motor Connector M1

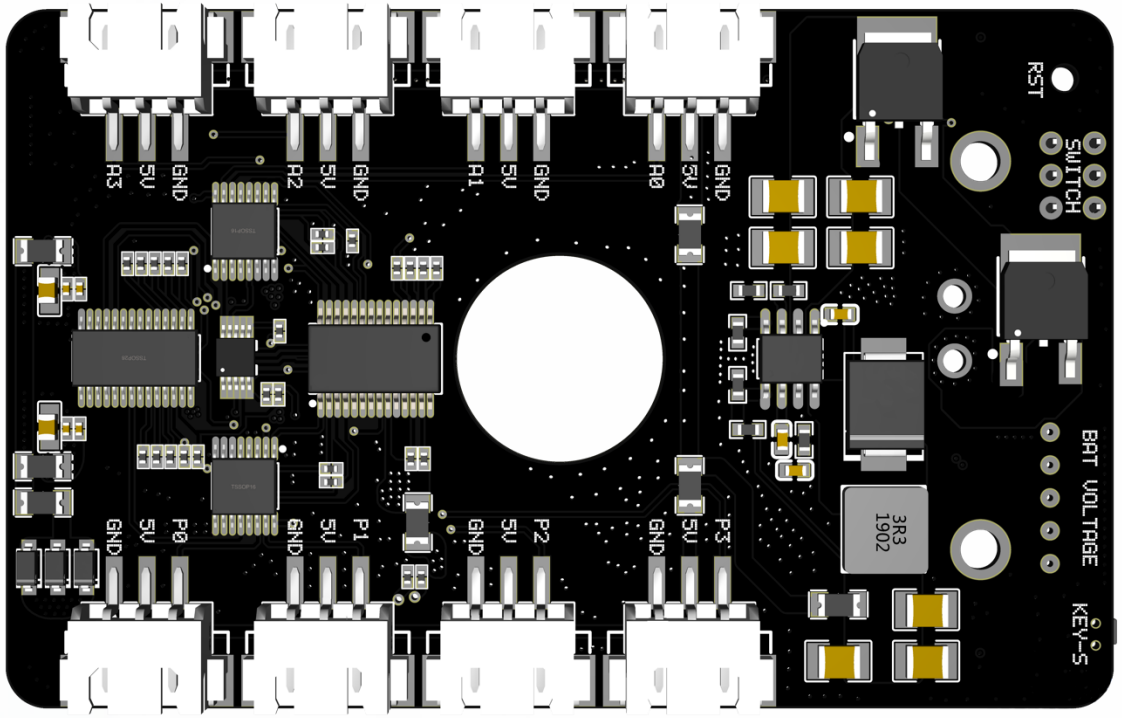
Motor Connector M2

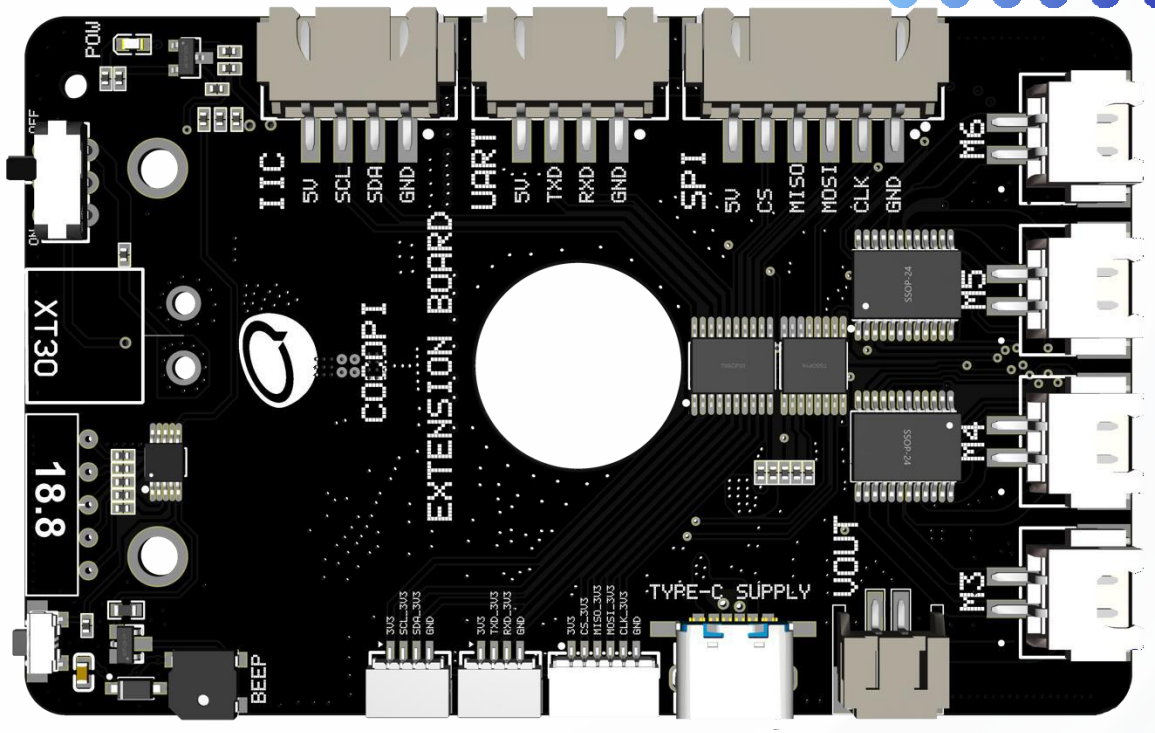


Servo Connector S1

Servo Connector S2

Know the IO Ports





The CocoPi shield can support the use of various sensors and actuators, enriching the application scenarios of CocoPi.

Know the IO Ports

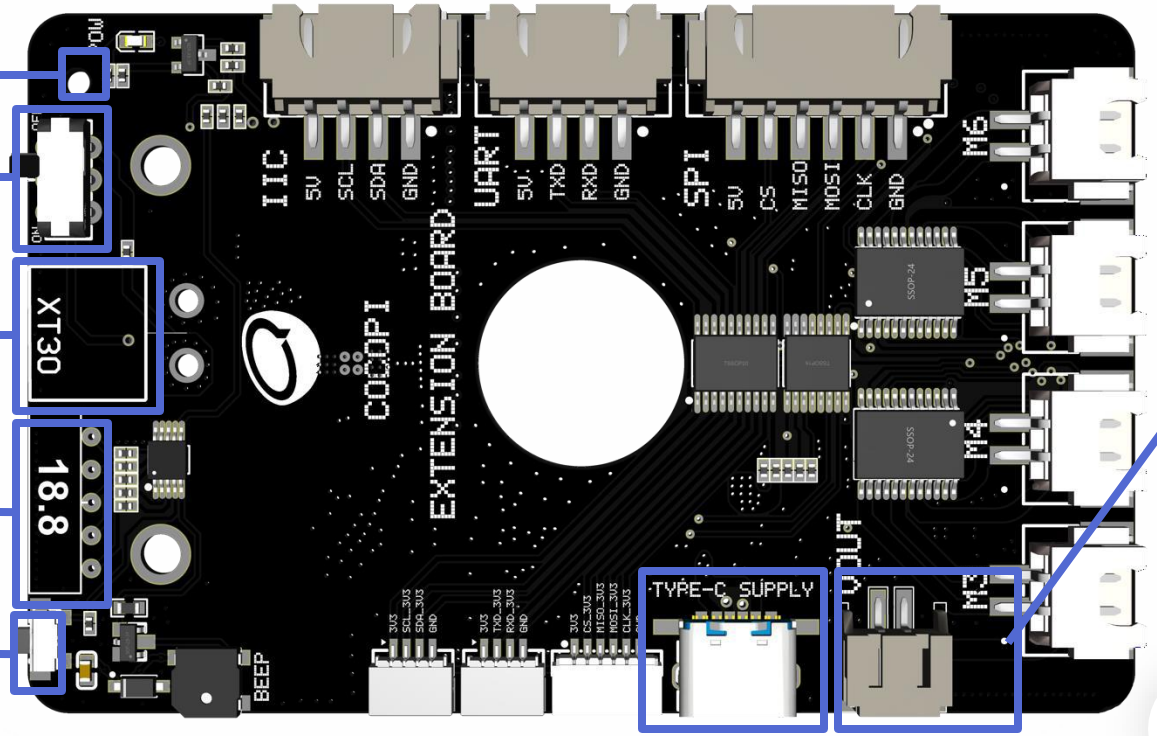
Restart button

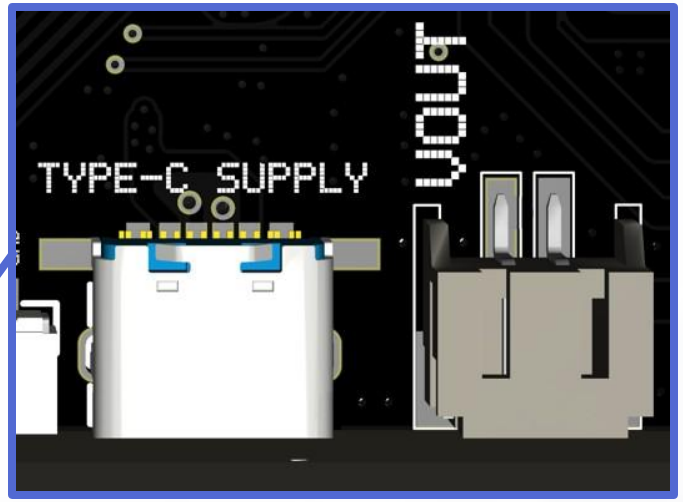
Power switch

Power input

Voltage value display

Voltage value Display switches

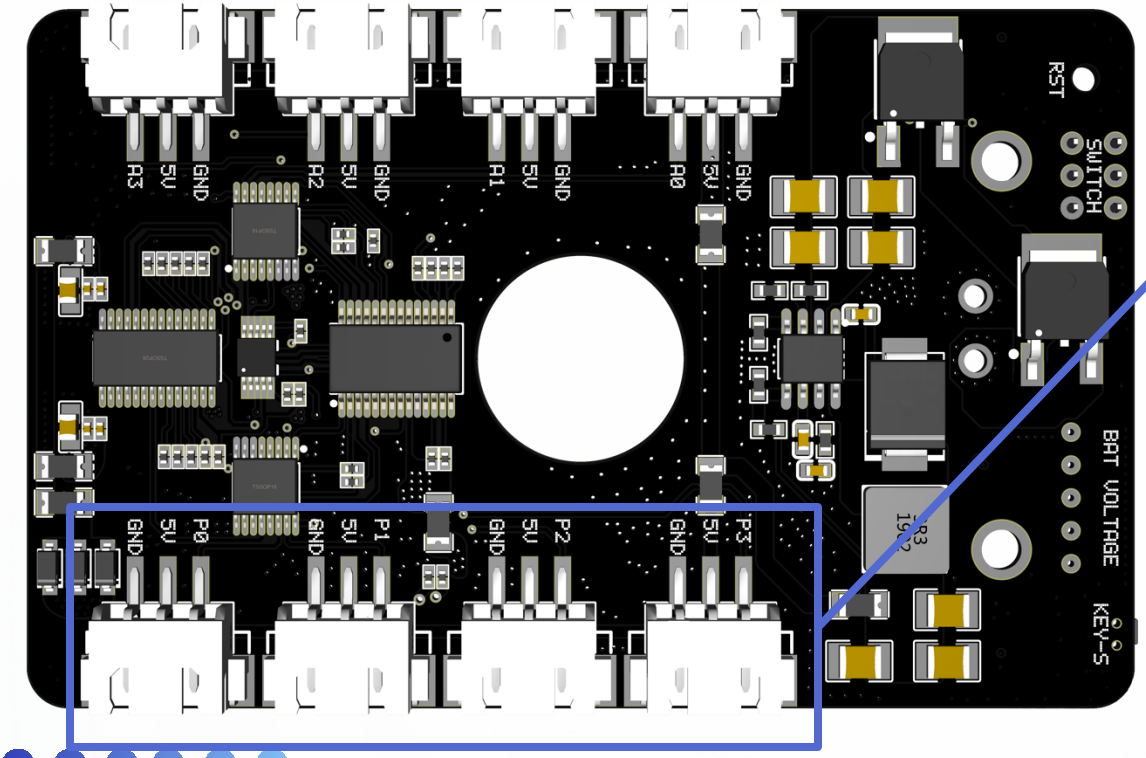


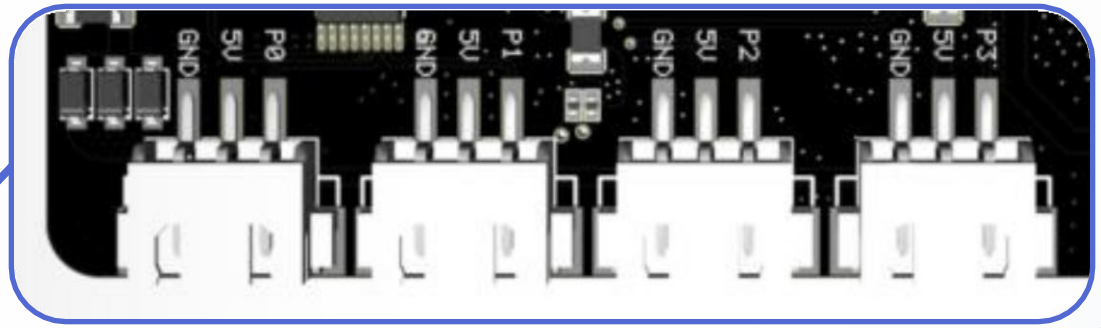


Type-c Interface

5V Power output

Know the IO Ports

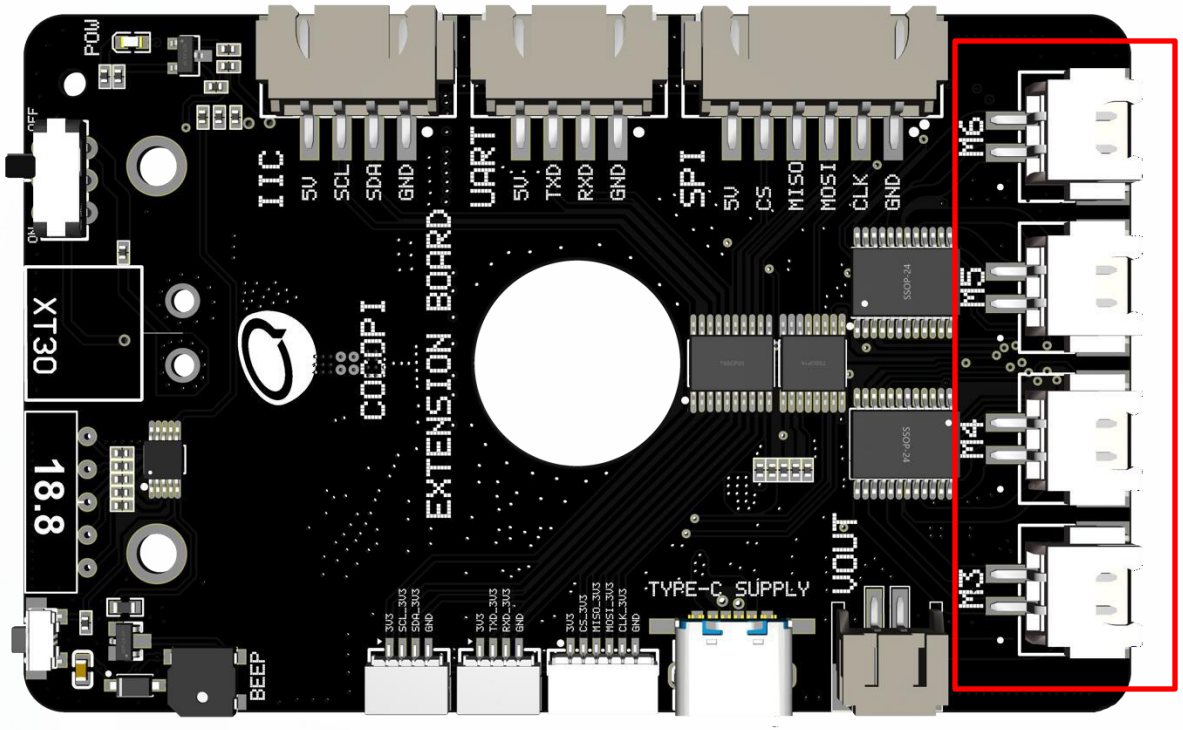




P0-P3 Digital Ports

- It supports access to four digital signal sensors
- It supports driving four servo motors
- When using the shield to connect to a servo motor, you need to turn on the power switch first

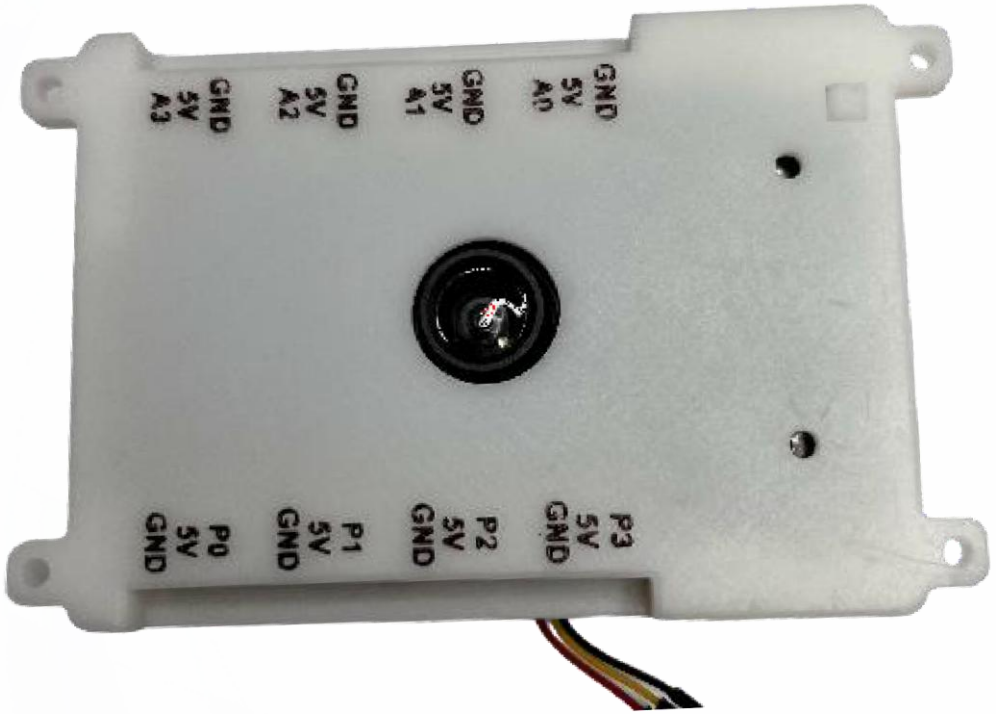
Know the IO Ports



M3-M4Motor Ports

- **When using the shield to connect the motor, you need to turn on the power switch first**

Know the IO Ports



A 3D printed housing is used to connect the CocoPi to the expansion board

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CHAPTER

P O W E R

Four.

Sample experience

CHAPTER

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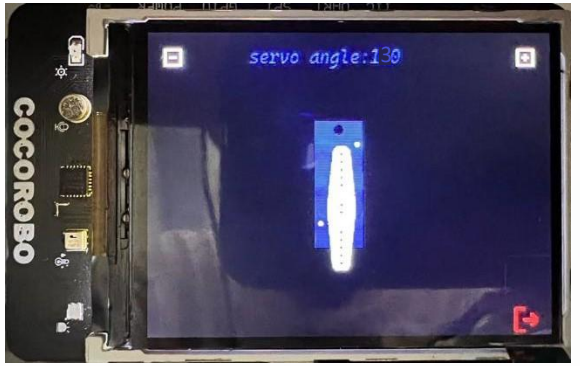
Menu display

- Press the A key to open the sample menu
- Press the B key to run the last program

Simulate a servo motor experience

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

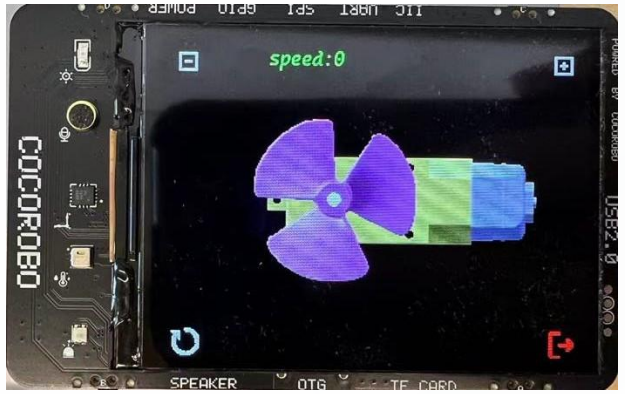


Press the C and D keys to adjust the angle

Simulate a motor experience

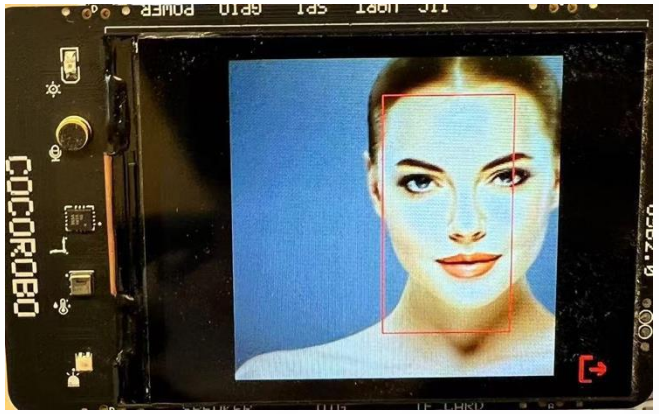
Press the A key to enter the sample menu

Press C to scroll down to Motor Control, then press B to run it



Press the C and D keys to adjust the speed

Face detection experience



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謝謝觀看

Robot Competition Scheme

cocorobo

JUST LEAVE PRESENTATION TO ORIGIN DEIGN