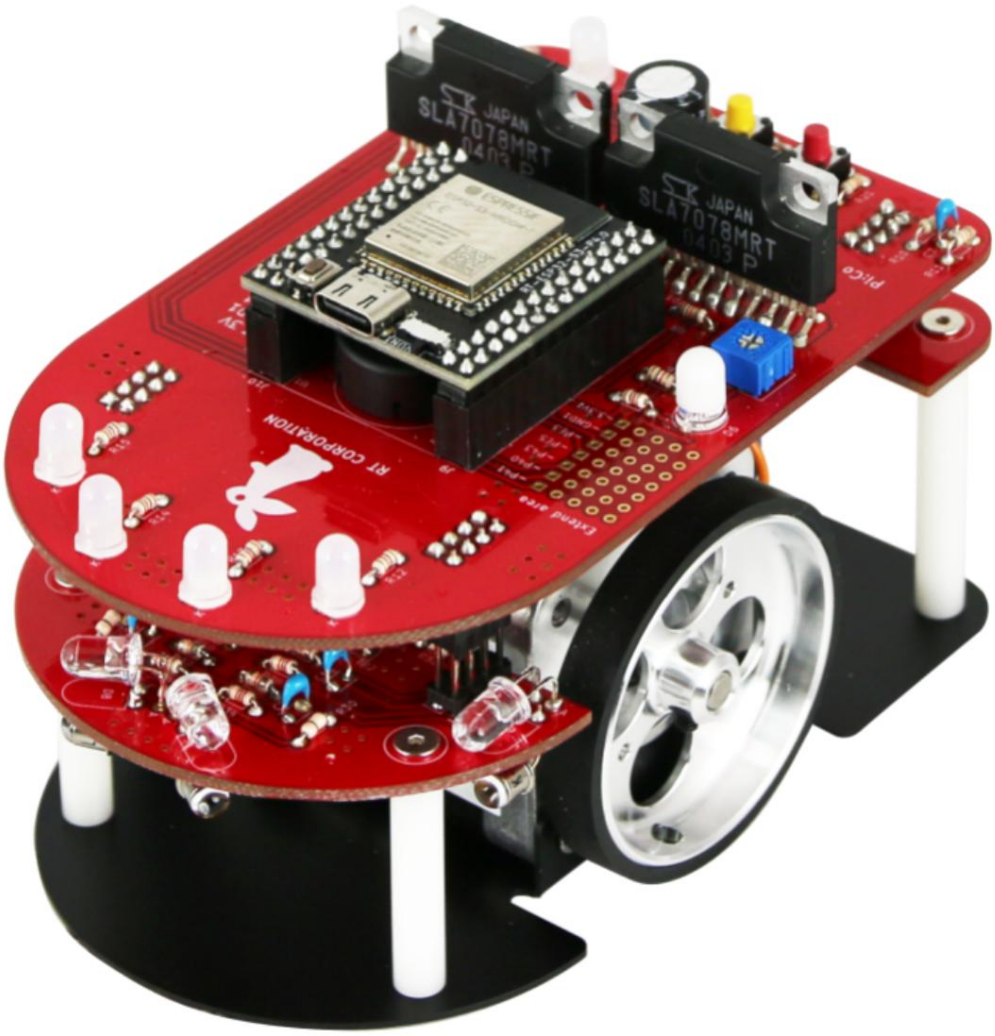
Pi:Co Classic3

Getting Started Guide



Version 1.0 RT Co., Ltd.

RT CORPORATION

table of contents

Before Use

Thank you for purchasing our Pi:Co Classic3 (hereinafter referred to as "this product"). Please be sure to read this manual before using this product.

Product Precautions

- If you are using the robot for the first time, we recommend that you work with someone with experience.

- We take every precaution with regard to product quality, inspection and shipping, but in the unlikely event that the product you receive is defective, damaged (including damage to the product itself during shipping), or missing accessories, please contact our sales support (sales@rt-net.jp) within 7 days of receiving the product . We will deal with the issue free of charge by replacing the part or the product itself, or by shipping the missing items. Please note that we cannot provide free support if more than 8 days have passed since the product was received.

- The specifications and appearance of this product, as well as the data and information published on our website, may change without notice due to improvements in quality and technological advances. Due to improvements, the product, data, and information may differ from those at the time of purchase, but please understand and acknowledge that we cannot accept exchanges, refunds, returns, or modifications based on such changes.

- Due to the nature of the manufacturing process, this product may have scratches on its frame or parts. These scratches do not affect the operation of the product and are therefore not covered by the warranty.

- This manual is intended for customers who already have knowledge of compilation methods and software operation techniques in Windows, Linux, and macOS environments. Therefore, it does not include explanations on the basic use of Windows, Linux, and macOS.

- The information contained in this document is subject to change without notice.
  Please refer to our website for more information.

- The company names, product names, and other proper nouns used in this document are either registered trademarks or trademarks of the respective companies. The TM and (R) marks are omitted in the text.

Safety Guidelines

Warning Labeling

mark	Mark definition
⚠ 危険	This symbol indicates "Danger". Mishandling may result in death or serious injury, and may also cause serious damage to property, such as fire, and is of high urgency.
⚠ 注意	This symbol indicates caution regarding matters that may result in minor injury or physical damage if not handled correctly.

Hazards and how to respond

	Danger content (action, phenomenon)	Mark How to respond	
During work	Metal objects come into contact with the product body when the product is in operation or being handled.	⚠ 危険	When using this product, make sure there are no metal objects around. Also, remove any metal rings or necklaces when operating the product.
	Operate this product with wet hands.	⚠ 危険	Operating the device with wet hands may cause a short circuit. If your hands are wet, wipe them with a towel before operating the device.
	Insert the battery balance terminal into the gap in the board.	⚠ 危険	Do not insert the balanced terminal of the battery into the gap of the circuit board, as this may cause a short circuit. If the balanced terminal is obstructing your work, secure it in place with masking tape.
	Operate this product while it is charged with static electricity.	⚠ 注意	This product uses semiconductors, which are sensitive to static electricity. Touch a metal desk or door to discharge static electricity before operating the product.
	Turn on the power switch and connect the battery	⚠ 注意	Turn the power switch OFF before connecting the battery.
	Continue using the battery without charging it.	⚠ 注意	When using a 3-cell Li-Po battery, please charge it before the battery voltage drops below 11V.
	Continue to look directly at the light from the wall sensor LED.	⚠ 注意	Do not look directly at the LED light for the wall sensor as it may damage your eyes.

	Hands, fingers, etc. are pinched in moving parts	⚠ 注意	Keep hands and fingers away from the moving area of the product when it is turned on.
During assembly	Insert and remove the connectors of each board with the battery connected.	⚠ 危険	Turn off the power switch of this product and remove the battery before inserting or removing the connectors of each board.
	Touch the tip of the soldering iron	⚠ 危険	Do not touch the tip of the soldering tool as it will become very hot during soldering. Also, be sure to use a dedicated soldering tool stand during soldering.
	Leaving a hot soldering iron for a long period of time	⚠ 危険	If you will not be soldering for an extended period of time, be sure to turn off the power to the soldering iron to prevent fires caused by contact with surrounding objects.
	The cable is clamped between parts such as connectors, screws, and spacers.	⚠ 注意	Wire the cable so that it will not be pinched between any of the components. Never use a cable that is damaged. Pay particular attention to the power and ground wires.

Explanation of each manual

This is the manual for this product. The manual is divided into four files.

Pi:Co Classic3 Getting Started Guide

This manual contains information about precautions for using this product, its components, and how to use it, and can be used as a quick reference. Please read this manual first when using this product.

Pi:Co Classic3 Assembly Manual

This manual explains how to assemble this product. It includes instructions on how to solder the board and how to assemble each component. Please refer to this manual when assembling this product.

Arduino development environment construction manual

This manual explains how to set up the environment for developing software for this product. It describes how to install Arduino IDE and how to write programs to this product. Please refer to this manual when building an environment for developing this product.

Pi:Co Classic3 Software Manual (Arduino Edition)

This manual explains the sample program that comes with this product. It explains how to make the LED light up, how to operate the motor, and how to actually run through a maze. Please refer to this manual when running the sample program.

Product Specifications

This product has the following specifications:

Product specifications list

project	specification
Product Name	Pi:Co Classic3 Micromouse Learning Kit (ESP32 version)
Model number	RT-PC003-ESP32
size	120×73×80 (mm)
weight	520g (including battery)
Input power (rated)	Battery power supply: 11.1V AC adapter power supply: 12V 5A
Included battery	3 cell 11.1V 1000mAh
Battery charging function	none
CPU Module	Espressif Systems ESP32-S3-WROOM-1-N16R8 • Operating frequency: 240MHz • ROM : 384kB • SRAM : 512kB • SPI Flash : 16MB • PSRAM : 8MB • Wi-Fi: 802.11 b/g/n • Bluetooth LE : Buletooth 5
Programming method USB communication	• Interface: USB Type-C
Programmable Input Interface	• Button x3 • Wall sensor (visible light LED and phototransistor) x4
Programmable Output Interface	• LED (red) x4 • 2-color LED (red/blue) x1 • Buzzer x1 • Stepping motor x2
Input Interface	• Sketch execution mode switch x1 • Reset button x1 • Buzzer volume adjustment volume x1
Output Interface	• Power LED x1

Contents List

This product set includes the following items:

Number Item		quantity
1	Assembly kit (with battery)	1
2	Download cards for each manual	1
3	USB Type-A to Type-C Cable	1

①組み立てキット

②ダウンロードカード

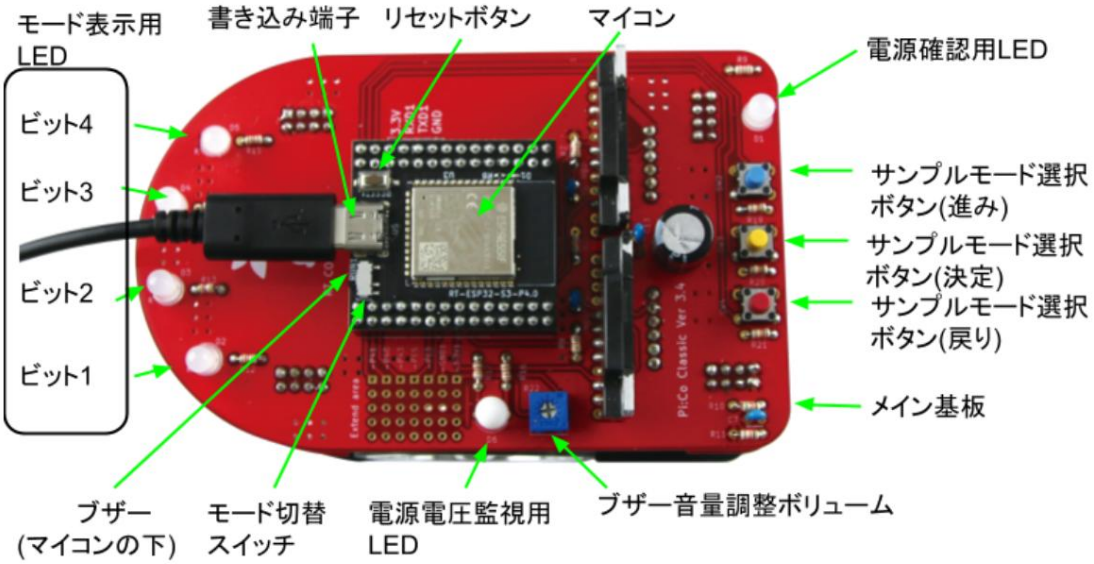
③USB Type-A - Type-C
ケーブル

Names and usage of each part

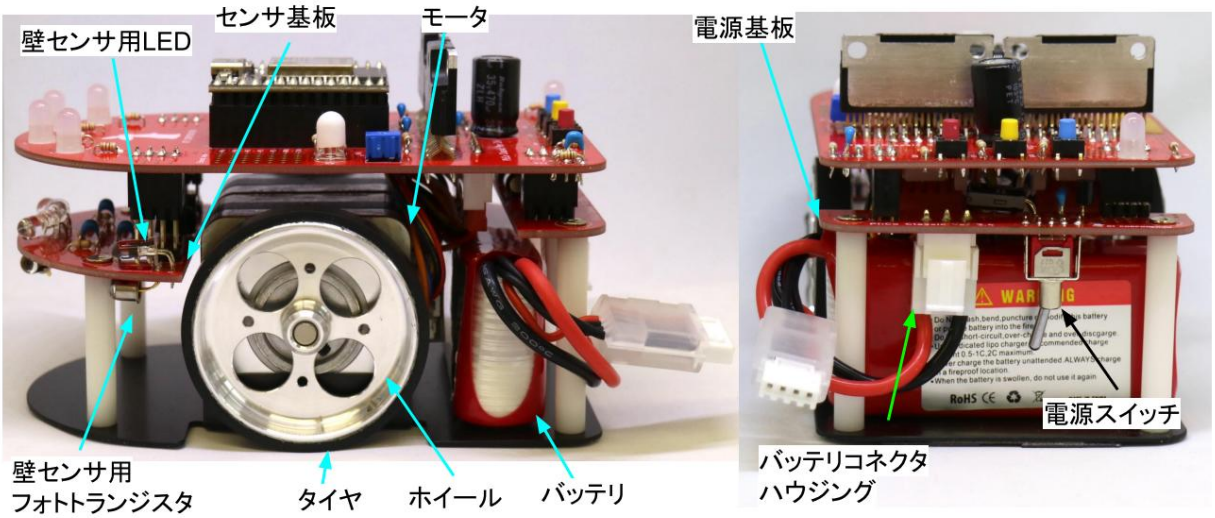
This section explains the names and usage of each part of this product.

Names of each part

The names of each part of this product are as shown in the figure below.



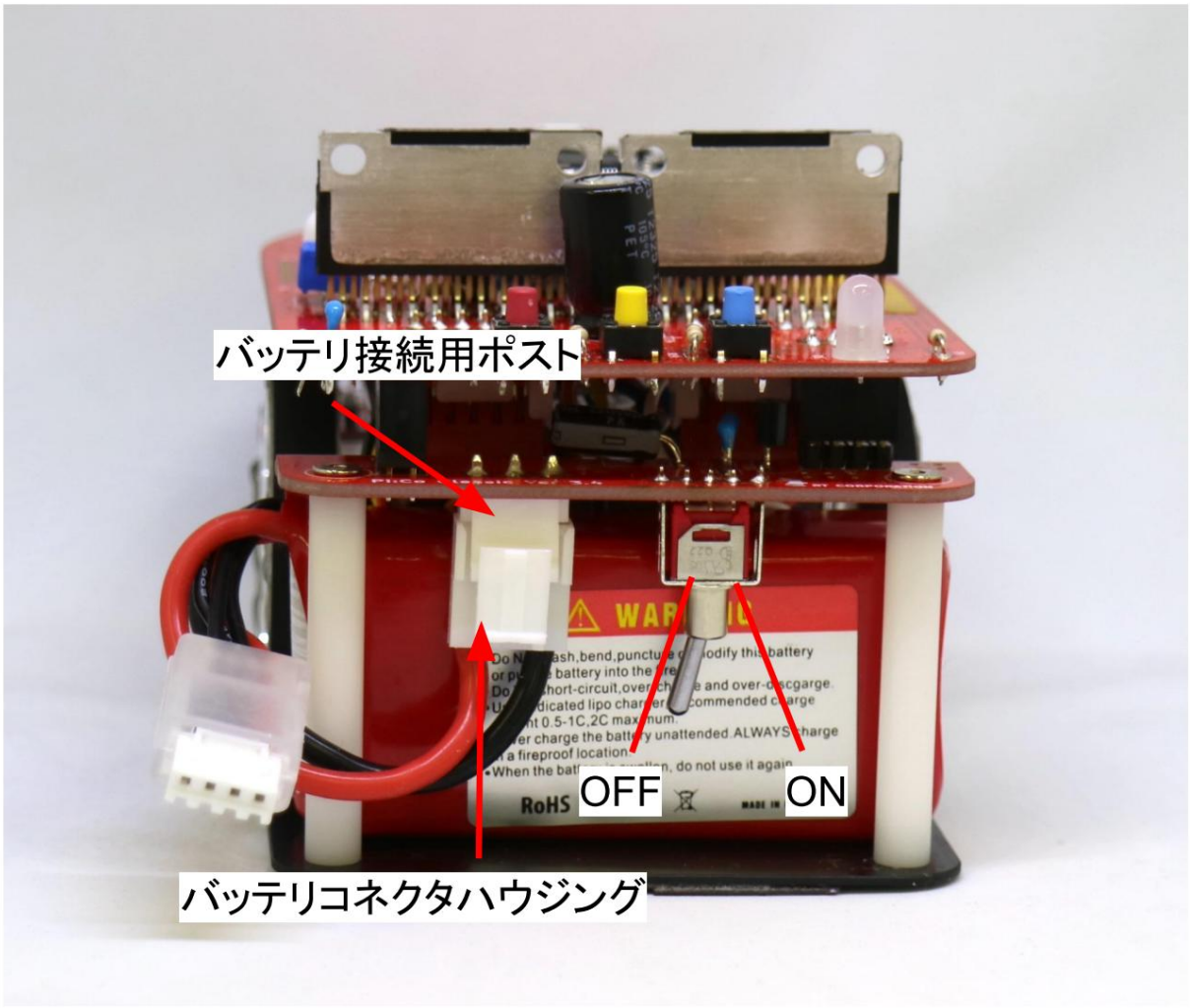
Top view of the product



Side view of this product

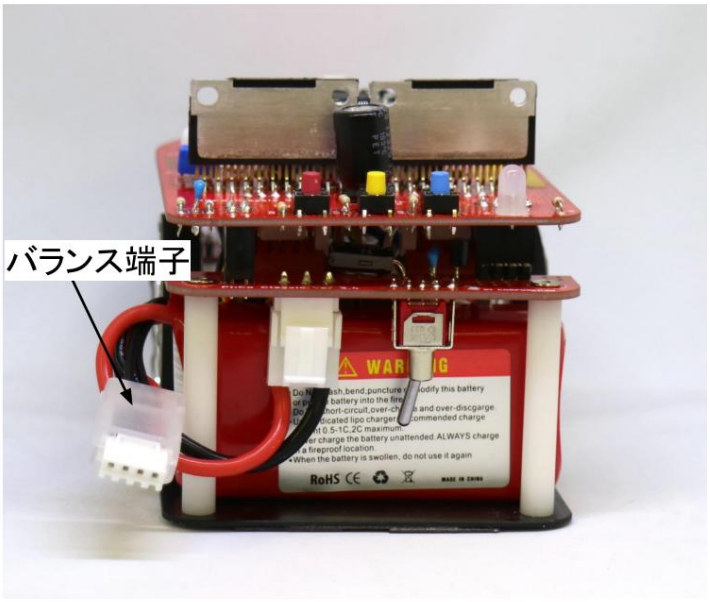
Power Switch

This switch turns the power of this product on and off. As shown in the figure below, tilt it to the left to turn it off, and tilt it to the right to turn it on. Operate the power switch after connecting the battery. In addition, when connecting the battery, turn the power switch off to prevent unexpected electricity being applied.



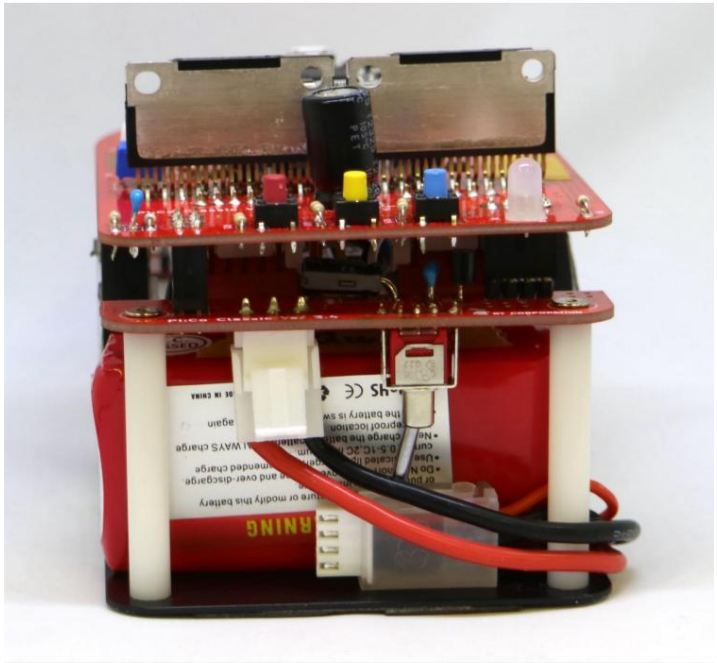
Battery

Insert the battery between the support on the power board and the tire.
When connecting the balance terminal to the reconnection post, make sure the power switch is OFF . Also, be careful not to put the balance terminal of the battery between the main board and the motor, as this may cause a short circuit.



With the battery installed (part 1)

If you want to insert the balanced terminal inside the product, install it as shown in the figure below. may make it difficult to operate the power switch.



With the battery installed (part 2)

Charging the Battery

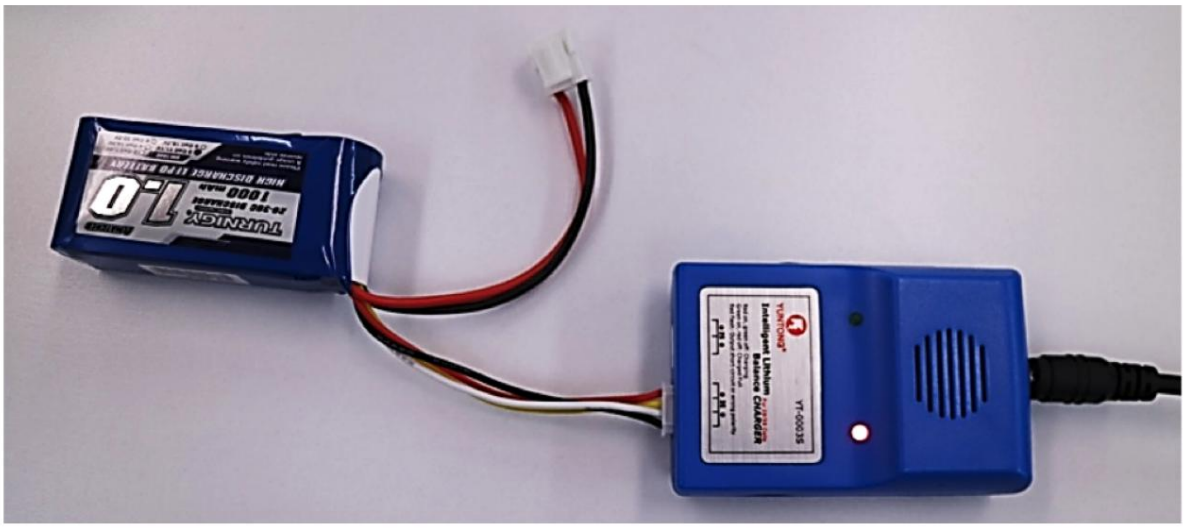
Please charge the battery using a dedicated charger such as the 12V5A robot charger set sold by our company . The robot charger set
consists of the LiPo charger LBC-010 and an AC adapter (12V5A).
This article describes how to charge the battery using a LiPo charger and an AC adapter. When charging,
remove the battery from this product.
Connect the LiPo charger and AC adapter as shown below. If a DC conversion plug is included,
Insert it between the LiPo charger and the AC adapter.

Connecting the charger and AC adapter

Connect the battery and charger to the balance terminal as shown in the figure below. Be careful not to mistake the orientation of the connector.

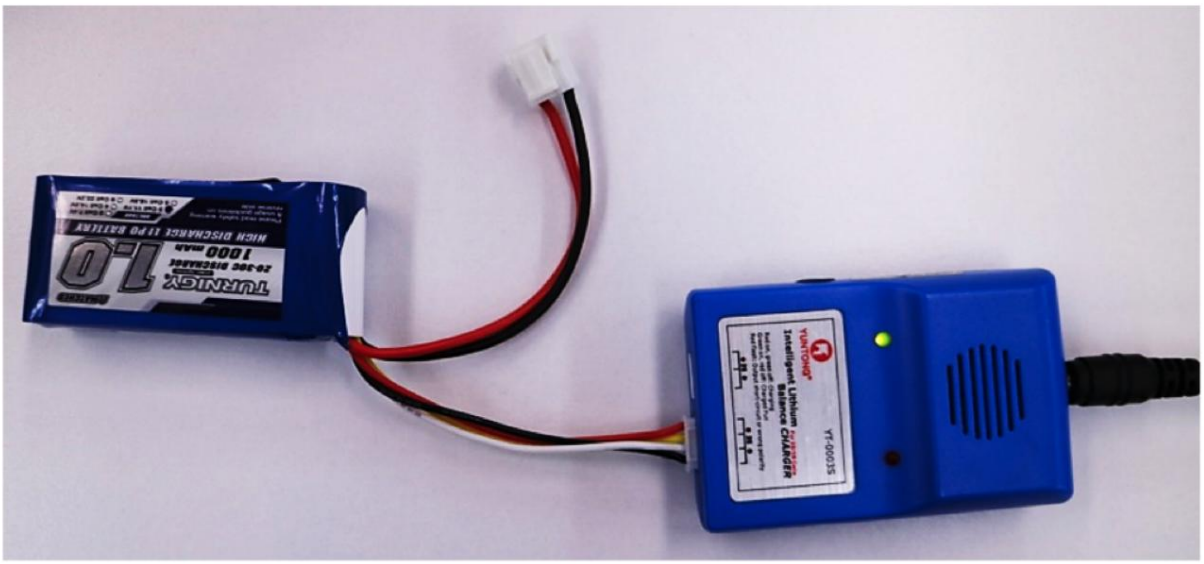
Battery and charger connection

Charging will begin when you plug the AC adapter into a power outlet. The red LED will light up while charging.



Charging in progress

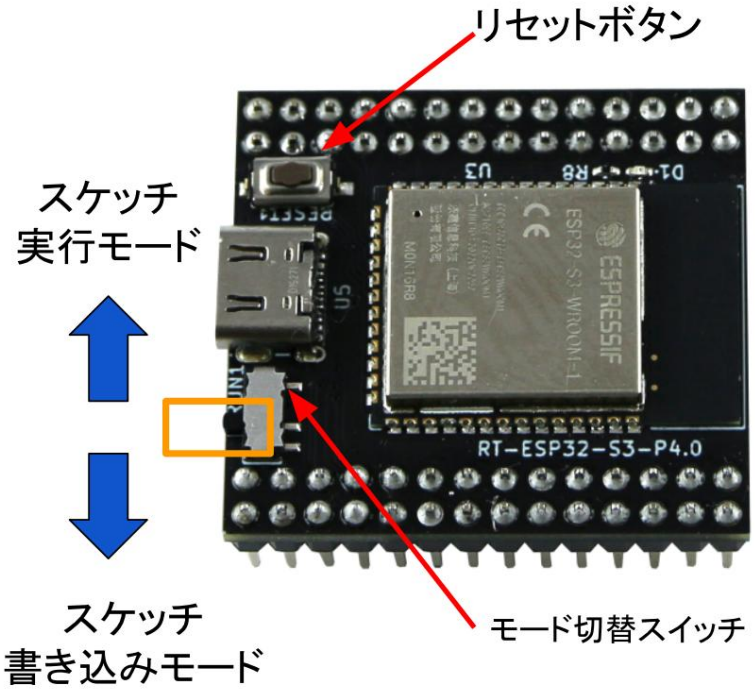
When charging is complete, the green LED will turn on. Once this is done, unplug the AC adapter from the outlet and then remove the battery from the charger.



When charging is complete

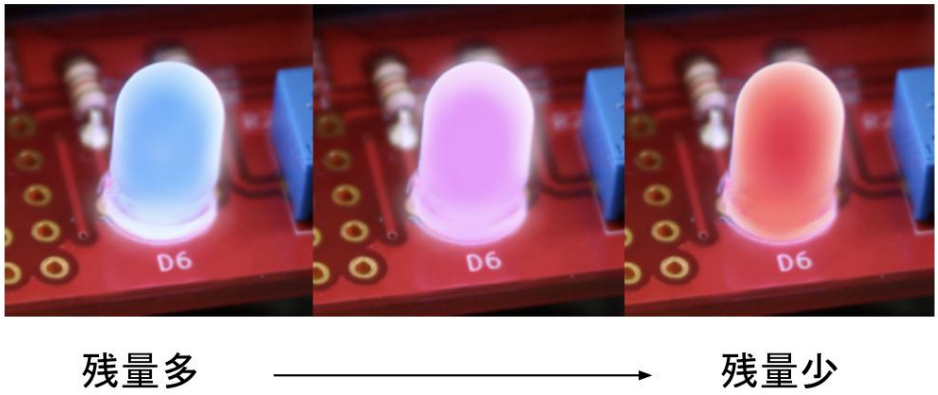
Mode Switch

This switch switches between a mode for writing a built program to a microcontroller and a mode for executing the written program. Basically, by switching to sketch execution mode, you can write and execute programs using the Arduino IDE. However, if you are unable to write due to a program problem, you will need to switch to sketch writing mode. After switching the mode switch to sketch writing mode, you can switch modes by turning the power OFF and then ON, or by pressing the reset button.



Power supply voltage monitoring LED

This is a two-color LED to check the power supply voltage of this product. It can emit a combination of red and light blue. In the sample program, the color changes depending on the battery voltage.
When charging, the light blue light appears, and as the voltage drops it turns red.



Power supply confirmation LED

This LED is used to check whether the power of this product is on. It lights up when the power switch is on and power is being supplied to the microcontroller. It is off when the power switch is off.

Wall sensor LED

This LED is used to measure the presence and distance of walls. It emits red light toward the wall in front and on the left and right. Please be careful not to look directly at the ultra-bright LED.

Phototransistor for wall sensor

This phototransistor is used to measure the presence and distance of a wall. After the wall sensor LED emits light, it receives the light reflected by the wall. The light intensity is then converted to digital to measure the presence and distance of a wall.

wheel

Transmits the motor's power to the tires.

tire

A rubber tire that is attached to a wheel.

Buzzer and buzzer volume adjustment

This is a buzzer whose pitch (frequency) can be changed by program.

Turning clockwise increases the volume and turning counterclockwise decreases the volume.

Writing a sample program

This section provides a simple explanation of how to write a program to a microcontroller using the Arduino IDE. For detailed instructions on how to set up the environment and how to write a program, please refer to the Arduino Development Environment Setup Manual .

1. Open the sample program uROS_STEP8_micromouse sketch in the Arduino IDE. 2. Connect this product to a PC with a USB cable. 3. Turn on the product. 4. Before writing the sketch, make sure that the port, board, and other settings are correct.

5. Click to write the sketch

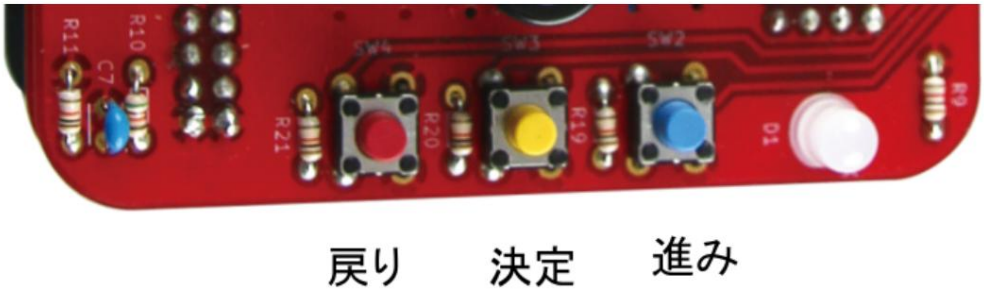
This completes writing the program to the microcontroller.

Sample mode selection button and driving mode

In the sample program uROS_STEP8_micormouse, you can switch driving modes by operating the sample mode selection button. Each mode is assigned

a number, and you can select the mode by pressing the blue and red buttons. Pressing the blue button will advance the mode number by one, and pressing the red button will decrease the number by one. Once you have selected the mode, press the yellow button to execute it.

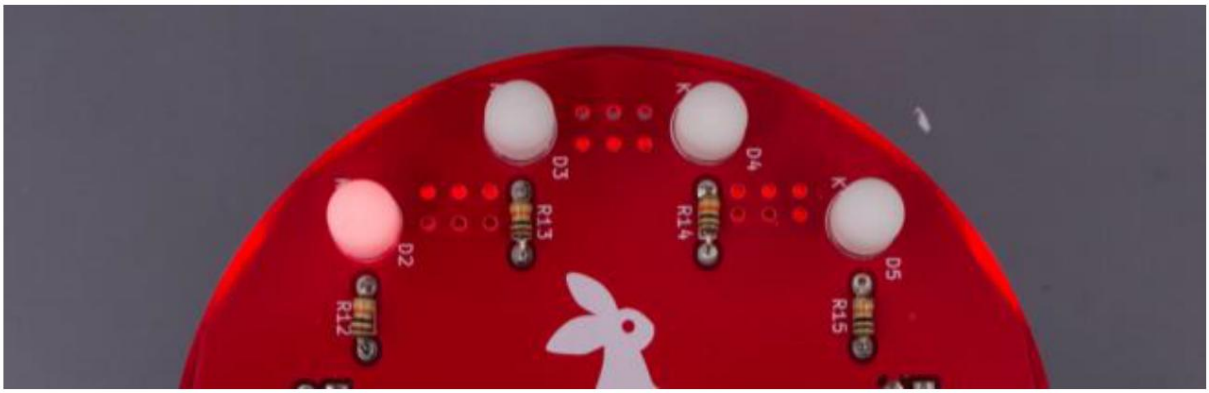
There are two modes: driving mode and adjustment mode. Driving mode is 1 to 15, adjustment mode is 1 It is set from to 7.



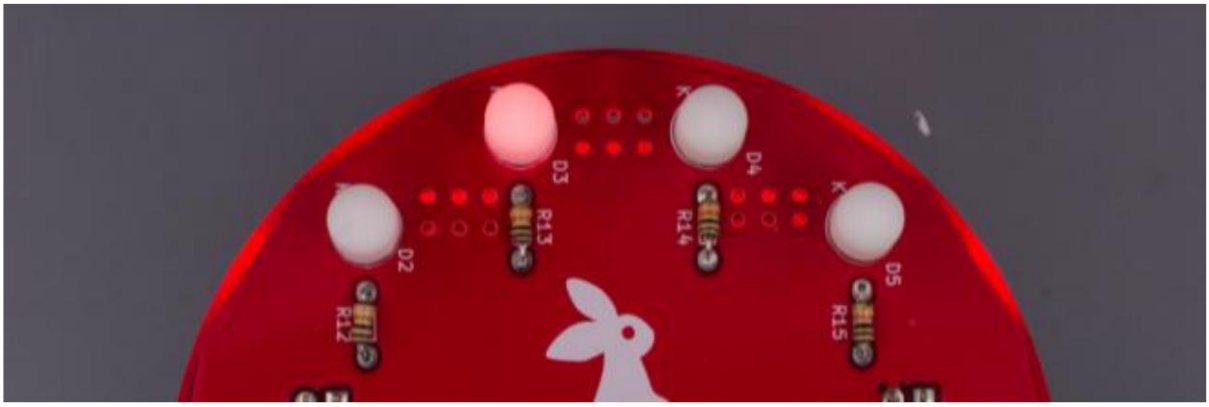
Sample mode selection button

Driving Mode

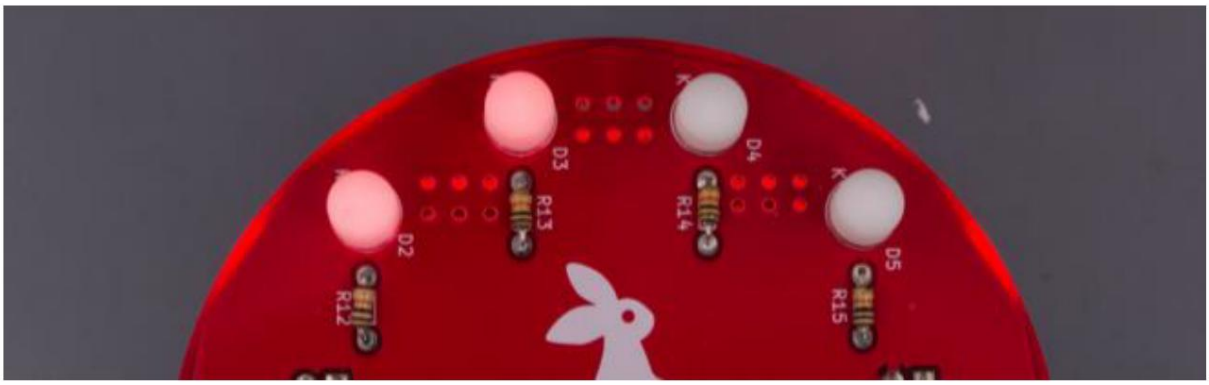
Driving mode 1: Executes the left method, which is one of the maze exploration methods. Since it does not recognize the goal, it will continue to move until it is stopped by turning off the power or resetting it.



Running mode 2: Executes the footstep method, which is one of the maze exploration methods. After reaching the goal, it continues exploring and returns to the starting point.

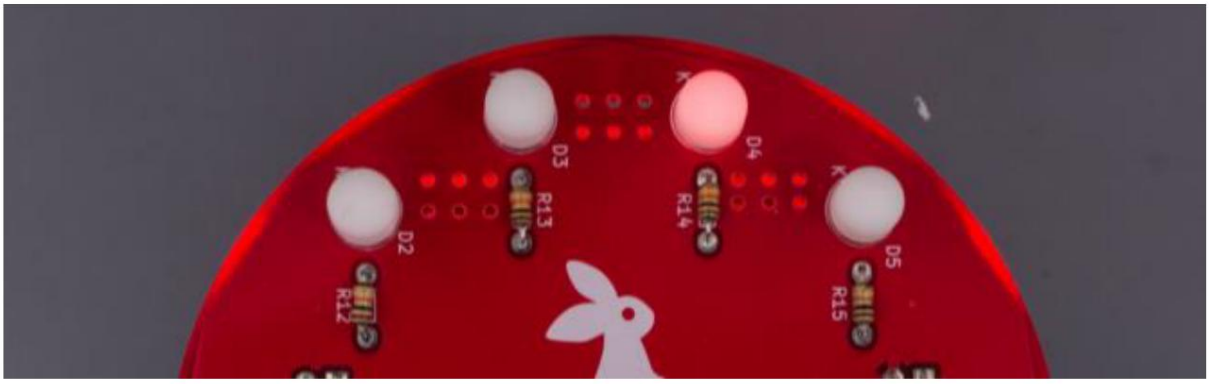


Driving mode 3: Executes the shortest route driving. Using the explored maze information, the robot drives from the starting point to the goal point using the shortest number of blocks.

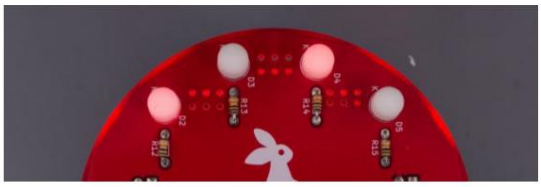


Driving modes 4 to 14 are not set, so you can freely
You can add content. Here, we will only show the LED lighting in the diagram.

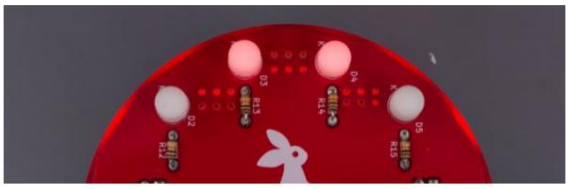
Driving mode 4



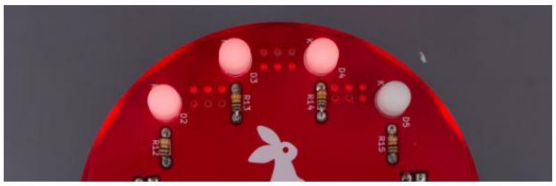
Driving mode 5



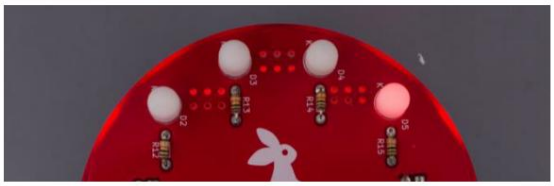
Driving mode 6



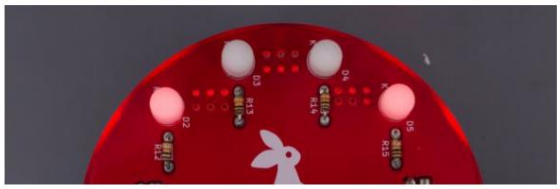
Driving mode 7



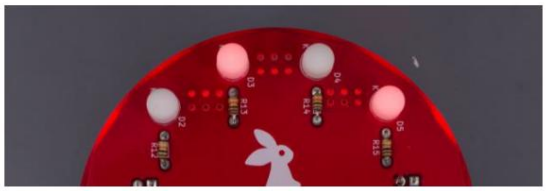
Driving mode 8



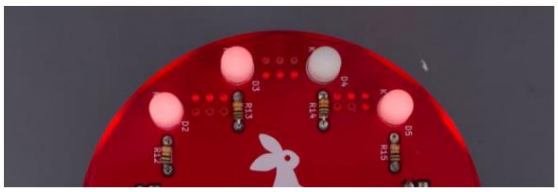
Driving mode 9



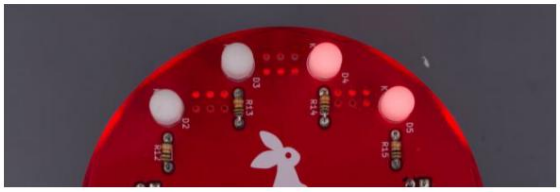
Driving mode 10



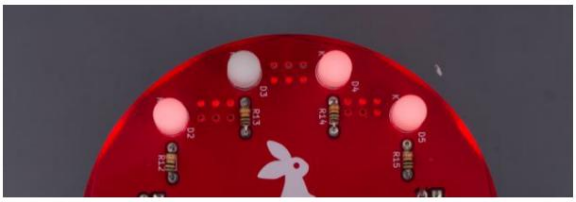
Driving mode 11



Driving mode 12

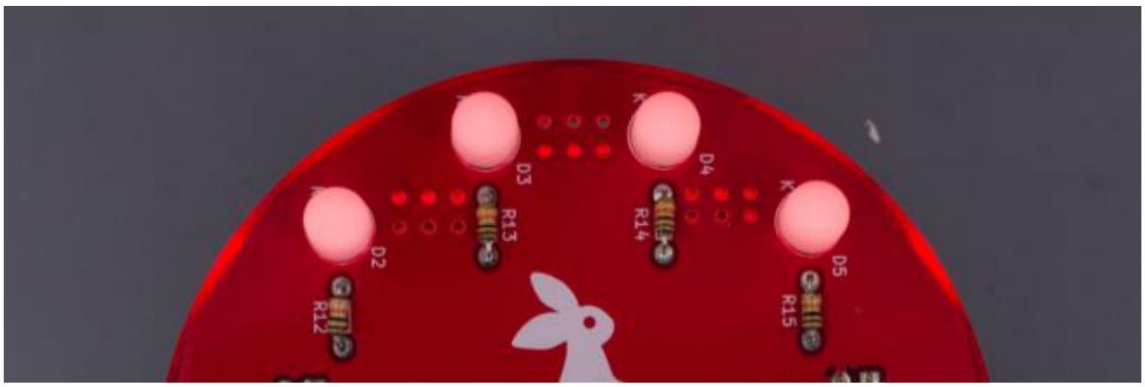


Driving mode 13



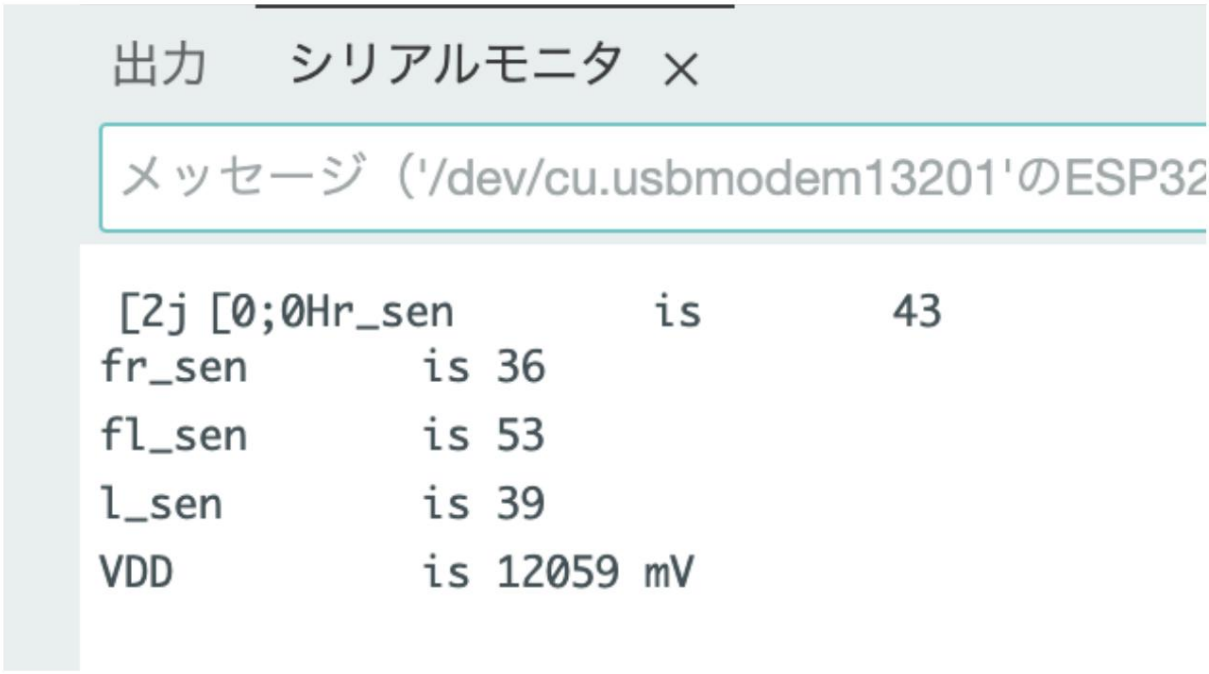
Driving mode 14

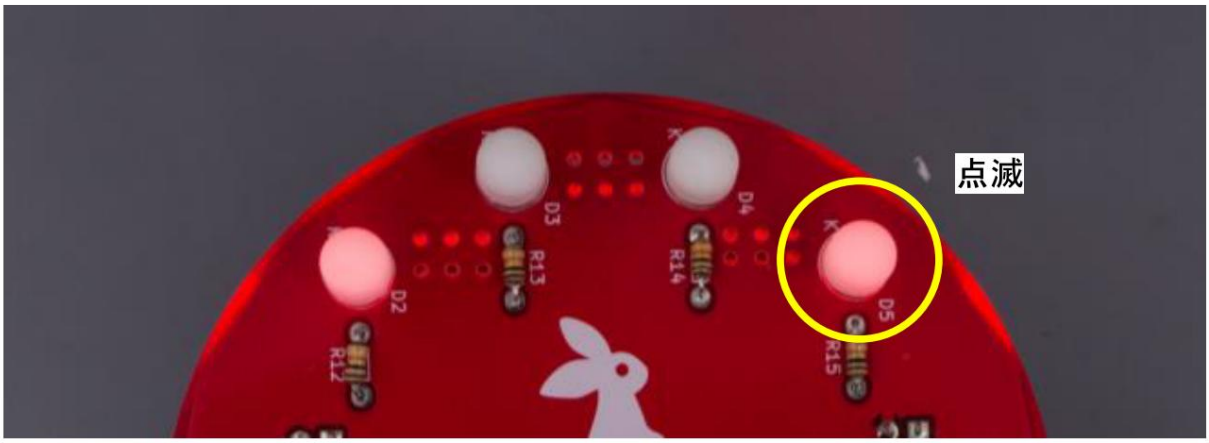
Driving mode 15: When executed, it will transition to adjustment mode.



Adjustment Mode

Tuning mode 1: Display the wall sensor value on the serial monitor of Arduino IDE.

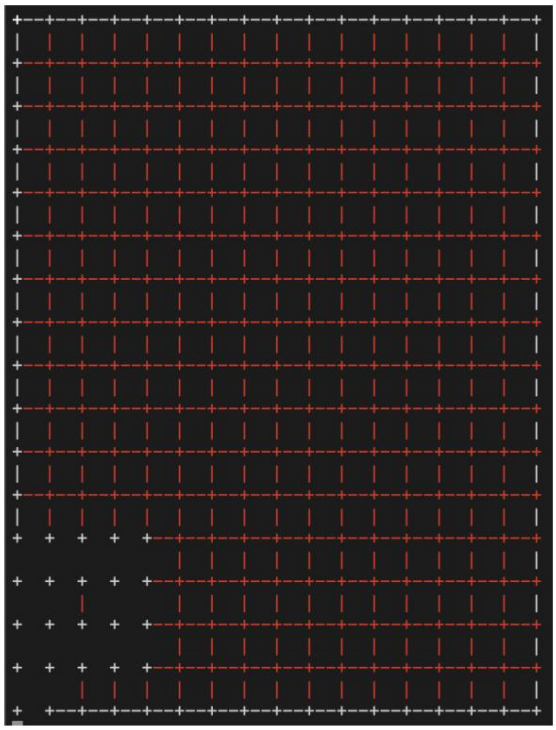




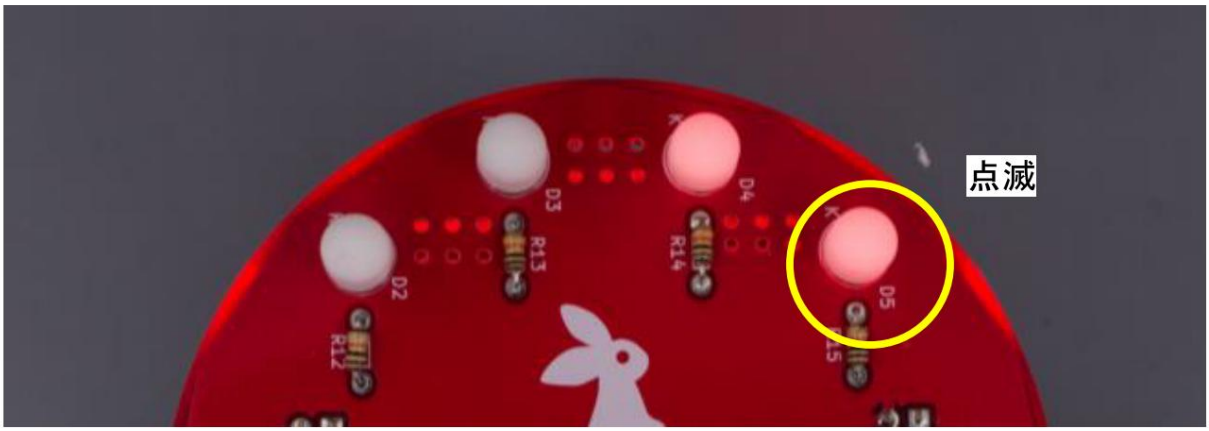
Calibration mode 2: Drive in a straight line through the 9 sections of the maze.

Adjustment mode 3: Turn right 8 times.

Adjustment mode 4: Displays information about the mazes that have been explored. Because it uses escape sequences, it must be displayed on a terminal screen such as TeraTerm.

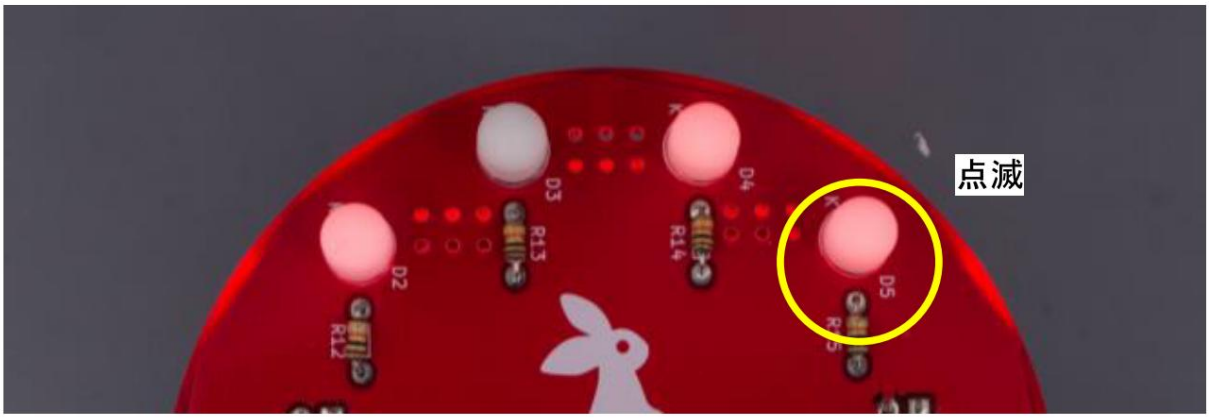


Show maze information

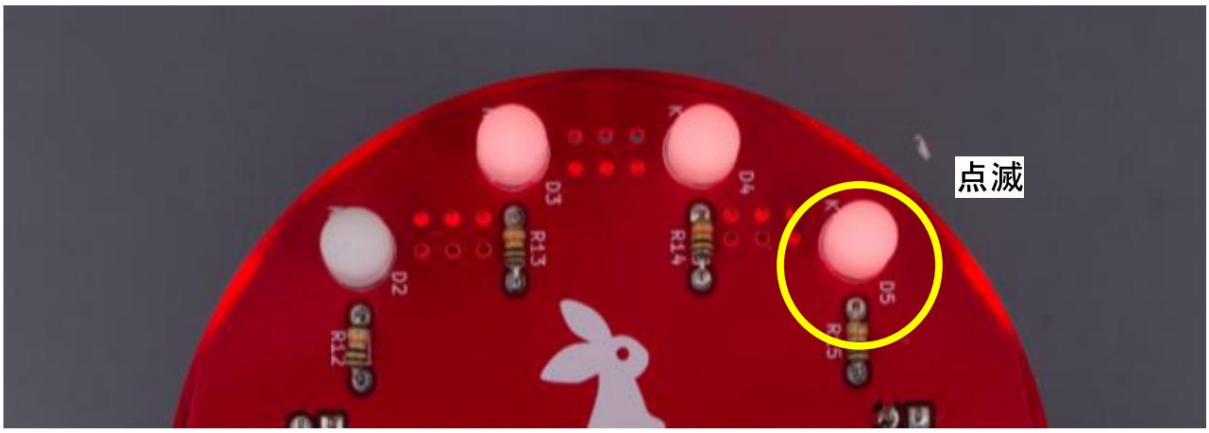


Adjustment mode 5 and adjustment mode 6 do not have predefined execution contents, so you can add your own contents. Here, only the LED lighting is shown in the diagram.

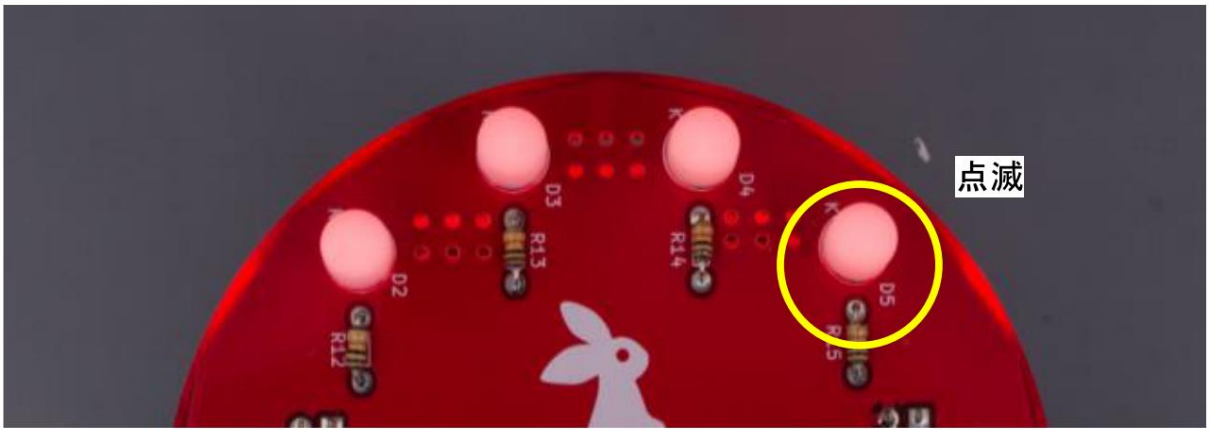
Adjustment mode 5



Adjustment Mode 6



Adjustment mode 7: When executed, it will transition to driving mode 15.



Product warranty

Warranty Details

If a malfunction or defect occurs in the product purchased by the customer due to a cause attributable to the design or manufacturing of RT Corporation (hereinafter referred to as "our company"), we will repair it free of charge within the warranty period and conditions shown below.

Guarantor's name, address and telephone number

The warranty provider is as stated in the "Inquiries" section of this document. The hours of operation for repairs, etc. shall be as stated in the "Inquiries" section.

Warranty period

The warranty period is 12 months from the date of delivery of this product.

If this occurs, the warranty will be terminated.

Warranty Application

1. This warranty applies to products sold and used in Japan. Products installed or moved overseas are not covered by this warranty.

2. This warranty applies only to the main body of this product.
   Accessories are not covered by this warranty.

3. This warranty does not cover any malfunction, defect, breakage, loss or damage (personal or property damage, indirect damage, special damage, lost profits, etc.) to anything other than the product itself caused by a malfunction or defect in the main unit.

4. This warranty applies to standard products. Special specifications and custom specifications, including special notes, are not covered by the warranty.

Warranty Exclusions

The warranty will not apply if any of the following conditions apply:

1. Breakdown or malfunction caused by failure to follow procedures, precautions, safety matters, confirmation items, operating methods, etc., specified in the product manual, labels attached to the device, and instruction manuals (hereinafter referred to as "Manuals, etc.").

2. Breakdowns or malfunctions caused by operating the product under conditions other than those described in the manual, etc.

3. Breakdowns or malfunctions caused by use that exceeds the limits or range of the specifications (weight capacity, operating speed, etc.) described in the manual (including modification of the program or main unit by the customer).

4. Deterioration, breakdowns and malfunctions due to aging

5. Breakdown or malfunction caused by natural disasters

6. Breakdown or malfunction caused by accidents such as condensation, abnormal voltage, collision, tipping over, dropping, pollution, etc.

7. Breakdown or malfunction caused by repair or maintenance performed by anyone other than our company or a contractor designated by our company

8. Any malfunction or defect caused by reasons beyond the control of our company other than those listed above.

Warranty details

If during the warranty period this product breaks down or develops a malfunction while being used normally in accordance with the manual etc. and you notify us of this, we will take any of the following measures at our discretion.

(a) Free repairs We
will repair or replace parts of the product sent to us by the customer and restore it to normal condition.
Repairs will be carried out by our company or a contractor commissioned by our company. The cost of parts, etc. will be borne by our company. Please note that we may not be able to return parts or parts of the main unit replaced for repairs.

(a) Free replacement of this product
If we determine that the product sent by you cannot be repaired, we will replace it with an equivalent product. Please note that in this case, we may not be able to return all or part of the product. We will cover the shipping costs for sending the equivalent product to you.

(c) Refunds
If we determine that we are unable to provide the free repair stipulated in (a) or free replacement stipulated in (b), we will refund up to the purchase price of the Product. Bank transfer fees, etc., incurred when making the refund will be borne by us.

Customer's expenses

The following costs shall be borne by the customer:

1. Regarding the free repairs stipulated in the preceding paragraph (A), packaging and shipping costs when the customer sends the product before repair to us. The customer must pack the product in a way that can withstand transportation.

2. Regarding the free replacement stipulated in the preceding paragraph (a), the packaging and shipping costs when the customer sends the original product to be replaced to us. The customer must use a packaging method that can withstand transportation.

3. Repair/replacement service fees and shipping charges for return of the product if it is found to fall under the items excluded from the warranty or if it is found not to be a malfunction or defect. If our inspection and investigation reveals that the product falls under the items excluded from the warranty, we will inform the customer and confirm whether repairs are necessary. If the customer replies that repairs are necessary, we will carry out repairs at the repair/replacement service fee separately agreed upon with the customer. Please note that the shipping charges for return of the product in the cases specified in this section shall be borne by the customer.

Procedures for receiving the warranty

In order to promptly identify the cause of the breakdown or malfunction and perform repairs, etc., we ask that you provide the following information: Please note that the repair period will be approximately two weeks from the date of arrival of the product, but it may take longer depending on the nature of the malfunction.

1. Submit a document that clearly describes the conditions of use in as much detail as possible.
2. Submit a document that clearly describes the malfunction situation in as much detail as possible.

inquiry

For inquiries about this product, please contact the following:
For more information, please see our website.

RT Corporation
Suehiro Building 3F, 3-9-2 Sotokanda, Chiyoda-ku,
Tokyo 101-0021

URL https://rt-net.jp/

TEL 03-6666-2566

E-mail support@rt-net.jp (Technical Support)

sales@rt-net.jp (Sales Support)

Reception hours: Weekdays 11:00-18:00 (closed on weekends, holidays, summer, and New Year holidays)

Revision History

Issue date **(YY/MM/DD)**	Version number	Revision details
24/07/03	1.0	New Creation

Intellectual Property Rights/Copyright