

AISTEAM

Programming of Things Internet of Things

User Guide

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Preface

AISTEAM is the fifth generation of educational robot developed by NASHENBOT, it is the artificial intelligence programming robot, which has the characteristics of "Programming of Things" and "Internet of Things", and it is a product line that combines artificial intelligence, robot and creator.

This handbook introduces the functions, specifications, software installation, function debugging, etc. of the AISTEAM product line, so that users can understand and use AISTEAM with convenience.

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Chapter 1 Core module parameter

This chapter introduces the core module functions included in the AISTEAM series products and their interface descriptions.

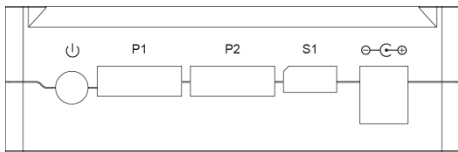
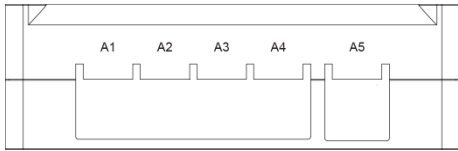
*Due to differences in product configuration, the modules introduced in this chapter are not included in all product models.

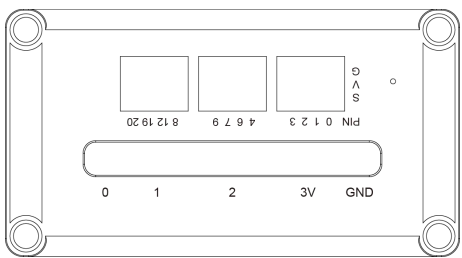
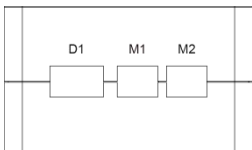
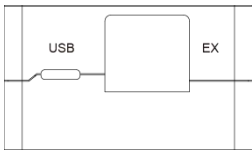
1. Controller



The controller adopts the ARM Cortex-M3 architecture, the main frequency is 72MHz, and the interface supports the fusion of rich sensor actuators on three platforms: artificial intelligence, robots, and makers; the shell is compatible with the LASY and LEGO build systems.

Interface function

Schematic diagram	Mark	Function
		Turn on: Press and hold the button for about 1 second in the off state; Shut down: Press and hold the button for about 1 second in the power-on state; Select program 1: short press once; Select program 2: short press twice; Select program 3: short press three times; Exit the program: short press once.
	P1~P2	Support 5V, 485 communication bus PH2.0-6pin interface AI vision module, 2.4G wireless transceiver module, voice recording and broadcasting module, 2.8-inch LCD display module, etc.
	S1	Support 7.4V output, steering gear bus communication, digital steering gear with Molex5264-2.5-3pin interface, etc.
		Power interface: rated to support 7.4V1A power supply.
	A1~A4	Support 5V output, IIC communication, I/O digital input and output, analog input, I/O module with RJ11-6pin interface, such as: Single-channel tracking, switch, temperature, humidity, sound intensity, photosensitive, gyroscope, Infrared barrier avoidance and other sensors; Actuators such as digital tubes, buzzers, full-color lights, fan motors, etc.
	A5	Support 5V output, IIC communication, I/O digital input and output, analog input and serial communication, I/O module with RJ11-6pin interface, such as: Integrated grayscale, bluetooth, wifi, etc.

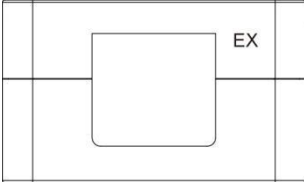
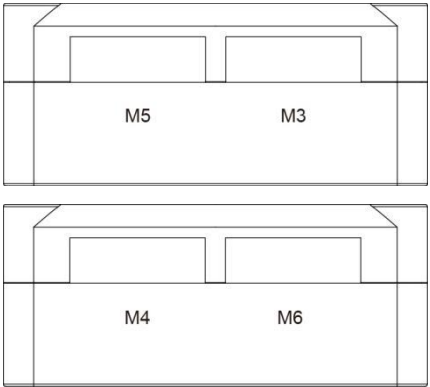
	0123VG ND	Support 3.3V power supply, SCSI-80pin interface Micro:bit (compatible with V1.5 and V2), AISTEAM expansion screen.
	PIN	Supports 3 groups of 4-pins, including G/V/S, and supports hundreds of maker sensors.
	D1	Support 5V output, PWM servo control, PWM servo (analog servo) with XH2.5-3pin interface.
	M1~M2	Support 7.4V output, speed control, open loop motor with XH2.5-2pin interface.
	USB	Support the standard USB Type-C interface data connect to computer, support the download of user program, update controller firmware, controller online debugging (real-time data) function.
	EX	Support 7.4V output, 485 bus communication and steering gear bus communication, motor expansion module with RJ50-10pin expansion interface, sensor expansion module.

2. Motor Expansion Module



The motor expansion module adopts the ARM Cortex-M3 architecture, the main frequency is 108MHz, and it supports ID customization (ID1~4, factory default ID1). A single module supports the expansion of 4 closed-loop motors. At the same time, when 4 sets of modules are connected in series, it supports the expansion of 16 closed-loop motors to run at the same time; the shell is compatible with LASY and LEGO build systems.

Interface function

	EX	Support 7.4V output, 485 bus communication and steering gear bus communication, motor expansion module with RJ50-10pin expansion interface, sensor expansion module.
	M3~6	Support 7.4V output, speed control, closed-loop motor with XH2.5-6pin interface.

3. Display Screen Module



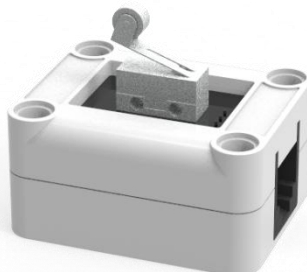
The expansion screen module uses a 0.96-inch low-power OLED module with a resolution of 128*64, a full-view display, and SPI communication; the exterior is equipped with a high-transmitting acrylic protection board; the back supports building blocks to expand and build.

4. Single-line Follower Sensor



The working voltage is 5v, the detection distance is 1~2cm, the interface type is digital output; the back supports building blocks to expand and build.

5. Touch Sensor



The working voltage is 5v, the detection distance is 1~2cm, the interface type is digital output; the back supports building blocks to expand and build.

6. Infrared Remote Control Module



Infrared remote control receiving module (left), Infrared remote control board (right)

Infrared remote control receiving: working voltage 5v, receiving range 0~1000cm, interface type digital output; infrared remote control: working voltage 3v, remote control range 0~1000cm, infrared carrier frequency 38kHz, programmable keys have at least 15 ones; the back supports building blocks expansion and construction.

7. Sound Sensor



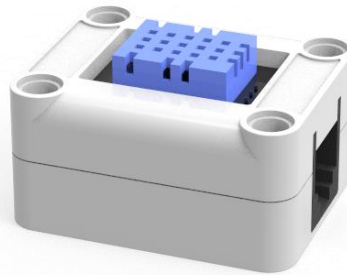
The working voltage is 5v, the detection range is 20~90dB, the interface type is analog output; the back supports building blocks to expand and build.

8. Light Sensor



The working voltage is 5v, the detection range is 0-600LUX, 45°, the interface type is analog output; the back supports building blocks to expand and build.

9. Temperature and Humidity Sensor



Temperature detection mode: the working voltage is 5v, the detection range is $0\sim 50^{\circ}\text{C}\pm 1^{\circ}\text{C}$, the detection method is air contact, the interface type is digital output;

Humidity detection mode: the working voltage is 5v, the detection range is $20\sim 90\%\pm 5\%$, the detection method is air contact, the interface type is digital output; the back supports building blocks to expand and build.

10. Infrared Sensor

V1 version:



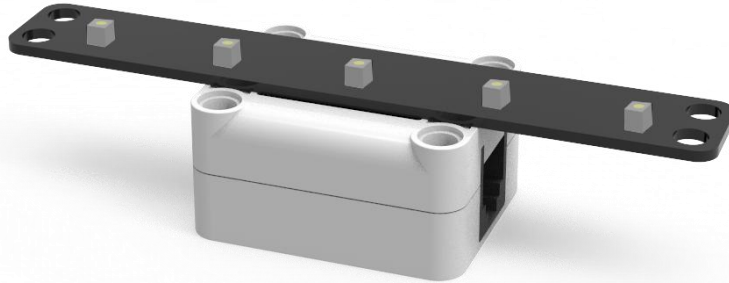
V2 version:



The working voltage is 5v, the detection range is 5-20cm, the detection accuracy is $\pm 2\text{cm}$ (white surface reflection), the interface type is analog output; the back supports building blocks to expand and build.

11. Integrated 5-Grayscale Sensor

Version 1:

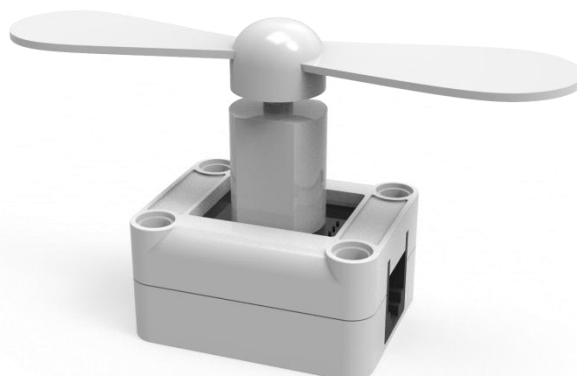


Version 2:



The working voltage is 5v, the detection range is 0.8~1.6cm, the interface type is analog output; 5 channels can be integrated to return values independently; it comes with 5 visible light sources for anti-interference; the back supports building blocks to expand and build.

12. Fan Module



The working voltage is 5v, the no-load current is 45mA, and the no-load speed is 2550RPM±15%; the blades are soft and anti-cut; the back supports building blocks to expand and build.

13. Lights



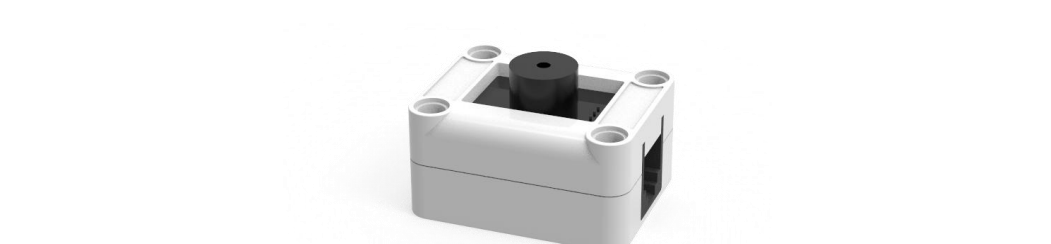
The working voltage is 5v, the colors are red, yellow, and green, and the light-emitting angle is 180°; the back supports building blocks to expand and build.

14. Full Color Light



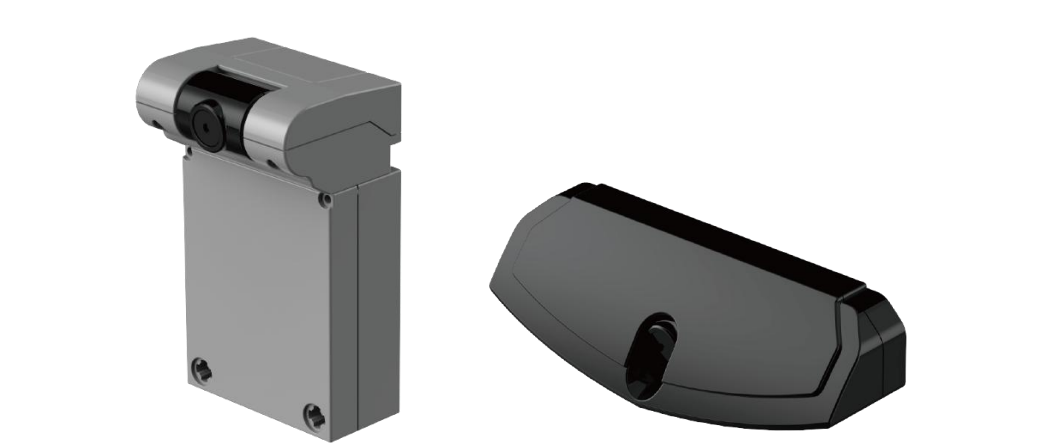
The working voltage is 5v, the color range is RGB0~255, and the light-emitting angle is 120°; the back supports building blocks to expand and build.

15. Buzzer Module



The working voltage is 5v, the output sound pressure is $\geq 83\text{dB}$, the interface type is digital/analog output; the back supports building blocks to expand and build.

16. Vision Module

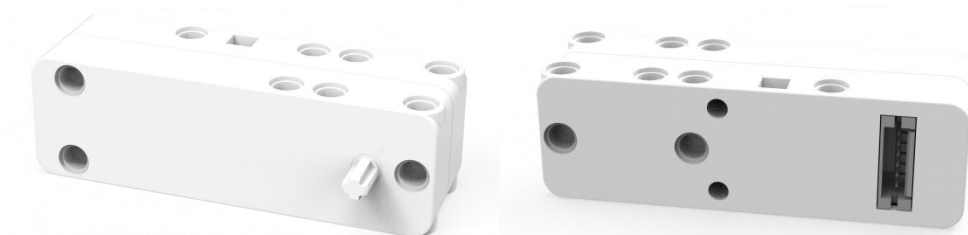


Roof vision (left), front vision (right)

The working voltage is 5v, the viewing angle is 72°, the maximum resolution is 320*240, the maximum code rate is 30Mbps, it not only supports AprilTag code recognition, face detection, multi-color blocks (up to 4 at the same time) recognition and tracking, visual custom data (up to 5 groups), but also supports PYTHON algorithm design, supports data-to-graphic visualization; the structure supports pitch angle adjustment, roof vision supports height adjustment; vehicle front vision supports bus serialization; module housing supports building blocks to expand and build.

It can realize rich AI vision applications, such as LAB threshold debugging, template matching, visual line inspection, and visual ranging.

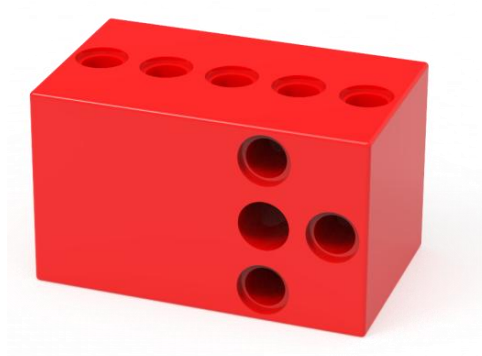
17. Encoder Motor Module



Interface: 6pin, working voltage: 7.4V, rated speed: 75RPM $\pm$ 10%, reduction ratio: 1:120, no-load current: 50mA, control mode: PWM speed closed loop; shell is compatible with LASY and LEGO build system.

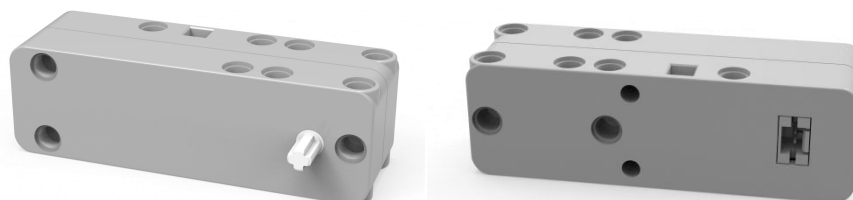
18. Ordinary Motor

V1 version:



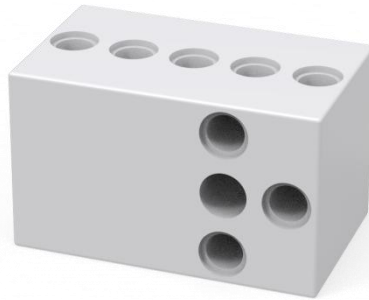
The interface is 2pin, with its own connection line, the working voltage is 7.4V, the rated speed is 200RPM $\pm$ 10%, the reduction ratio is 1:120, the no-load current is 50mA; the shell is compatible with the LEGO construction system.

V2 version:



The interface is 2pin, the working voltage is 7.4V, the rated speed is 75RPM $\pm$ 10%, the reduction ratio is 1:120, and the no-load current is 50mA; the shell is compatible with LASY and LEGO construction systems.

19. Servo Motor



The working voltage is 5V, the torque is 1.5kgf.cm, the angle range is 0~180°, and the speed is 0.12 seconds/60°; the shell is compatible with the LEGO construction system.

20. Digital Steering Gear Module



The working voltage is 7.4V, the torque is 8kgf.cm, the angle range is $\pm 120^\circ$, and the speed is 0.1 second/60°; it supports the series connection of the servo bus; the shell is compatible with the LEGO construction system.

21. Expansion Module



It support expansion such as robot bus serial screen, serial voice recording and broadcasting

module, it also supports servo bus serial robot arm and supports flame detection, three-axis gyroscope, three-digit digital tube, etc.; AISTEAM will continue to expand the very rich electronic modules .

22. Lithium Battery Module



The output voltage is 7.4V, the rated capacity is 1100mAh, the maximum discharge rate is 3C; the rated charging voltage is 8.4V, the rated charging current is 1A; the input and output ports are DC5.5, supporting multiple batteries in parallel; the shell is compatible with the LASY and LEGO building systems.

When the battery is low, you need to use a dedicated 8.4V1A charger to charge. When the indicator light on the charger is red, it means it is charging, and when the battery is fully charged, it turns green.

***Precautions for the use of batteries and chargers:**

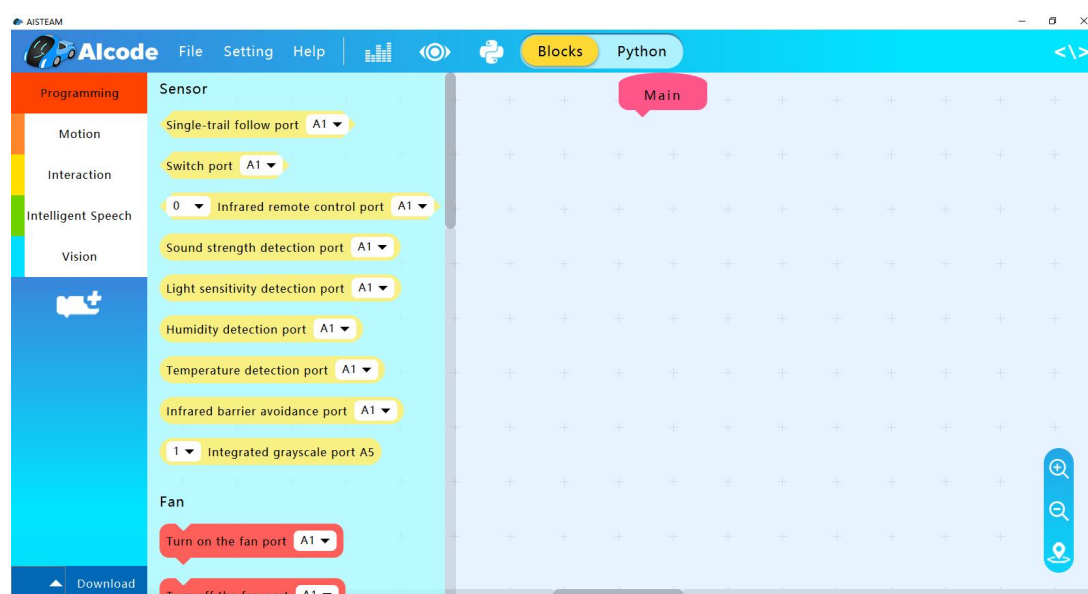
1. If the product is not used for a long time, the device should be completely shut down after fully charged;
2. After charging is completed, please unplug the charging cable to avoid damage to the overcharged battery and possible dangers;
3. Check whether the wires, plugs, shells and other parts are damaged regularly. If you find any damage, please stop using it until the repair is complete.
4. Do not use other types of batteries and chargers that are not specified by the company;
5. Avoid liquid flowing into the controller and lithium battery, so as not to cause the short circuit of battery power supply and power terminal;
6. When the battery is not powered on or cannot be charged, it can only be replaced by the service providers authorized by NASHENBOT or NASHENBOT;
7. Batteries must be recycled or disposed of separately from household waste;
8. It is strictly forbidden to use the appliance while charging.

Chapter 2 Operation Guide

This chapter introduces the download and installation of programming software AIcond and AISTEAM instructions.

*Due to the continuous update and iteration of the software version, the functions introduced in this chapter are not included in all versions.

Name	Release time	Version
AIcond	June 16, 2021	V2.1.1 beta1
AIcond	August 13, 2021	V2.1.1 beta5



1. Introduction

AIcond's next-generation AI programming platform, which includes artificial intelligence graphical programming and Python, not only can quickly complete simple, concise code programs, but can also write complex logic algorithms.

Programming with AIcond can realize basic functions such as motion control, human-computer interaction, and advanced functions such as intelligent vision, which can really start the AI programming journey.

2. Download, update, and request

Visit www.nashenbot.com, get the latest programming software, and install it as prompted.

You can connect the controller to your computer, using a standard USB Type-C cable, and the software supports writing user programs, updating controller firmware, and controller distribution.

Get more help with project samples, etc. with the help of "Help" function in the software.

Operating system requirements: Only Windows 7 or above is supported.

Hardware requirements: the memory is not less than 2GB, the processor is not less than 1.5GHz, the screen resolution is not less than 1024x600.

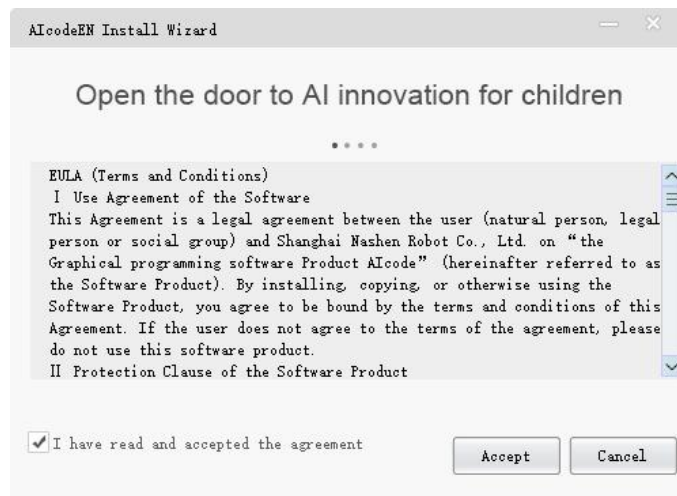
3. Install

Prerequisite: The AIcone package has been obtained.

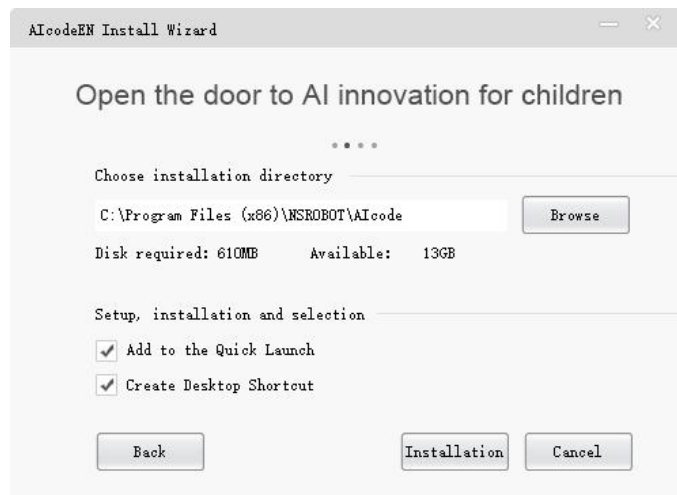
Operation steps:

Step 1: Unzip the acquired AIcone package.

Step 2: Find and double-click on "AIconeSetup.exe" and read the User License Agreement carefully.



Step 3: Follow the prompts to start the installation.



Step 4: Wait for the installation to complete.

Note: This procedure, which may be intercepted multiple times by the computer security software, must "allow all operations" or will result in a failed software installation or loss of functionality; If Blocking, exit the installation, temporarily exit all protection software, and restart start step 1. For security reasons, download the package on the official website.

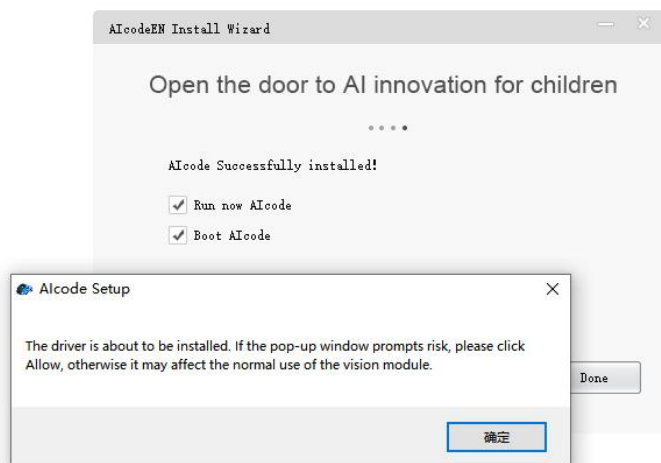


Step 5: Complete the installation



Step 6: Install the driver.

Note: This procedure, which may be intercepted multiple times by the computer security software, must "allow all operations" or will result in a failed software installation or loss of functionality; If Blocking, exit the installation, temporarily exit all protection software, and restart step 1. For security reasons, download the package on the official website.



Verify the installation

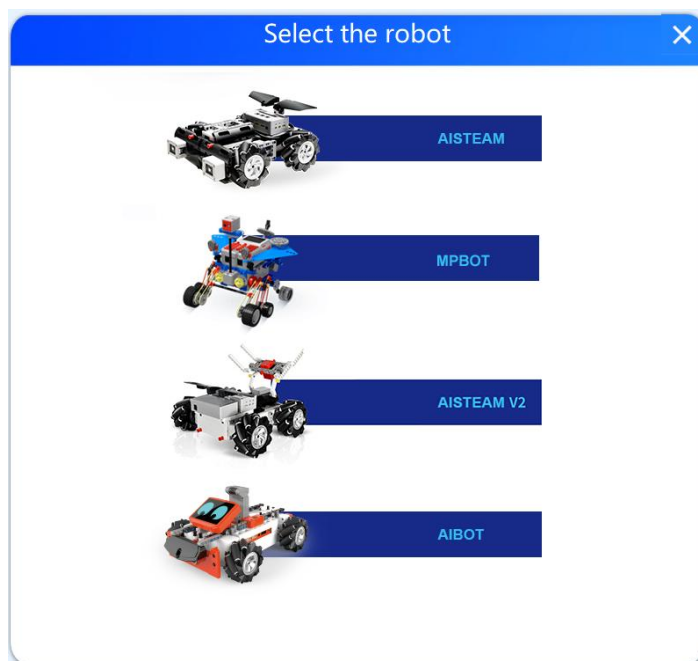
Step 1 The controller is plugged in.

Step 2 Press the button to turn on (status light on).

Step 3 Connect your computer and controller with a USB cable.

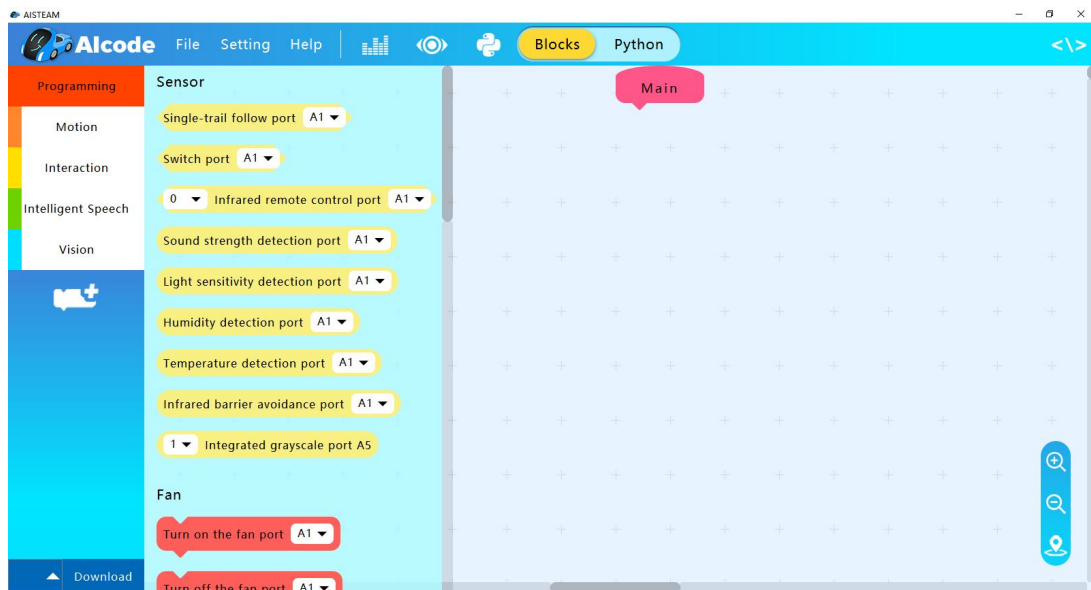


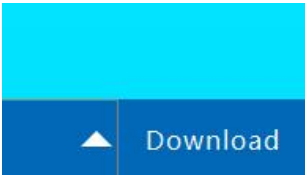
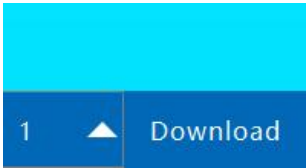
Step 4 Open the software and select the robot.



Note: Only the first time you run the software, you must select the robot family before you can switch between settings.

Step 5 Find the download area to see if the characters appear on the edge of the download button.



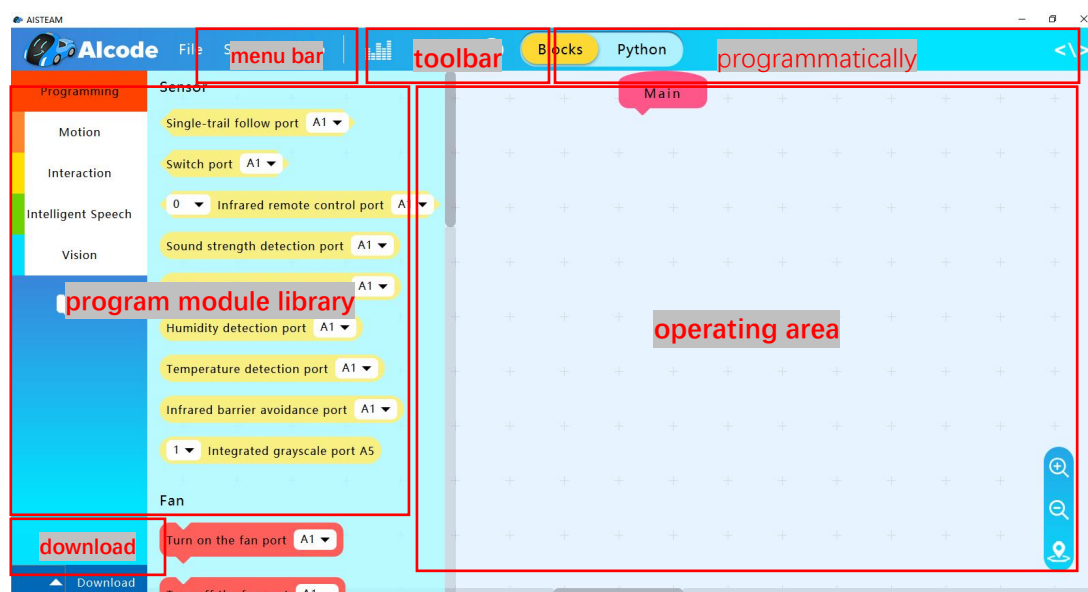
The controller is not connected	The controller is connected
	

Note: The download area does not display characters, indicating that the controller is not properly connected, you can try these steps accordingly:

- (1) Select the right robot;
- (2) Restart the controller
- (3) Re-plug the USB on the controller;
- (4) Change the USB interface on the computer;
- (5) Reload the software.

4. Get started

Menu bar



The shown above is the AlCode visual programming window, which is divided into menu bar, toolbar, programming method, program library, programming area and download area.

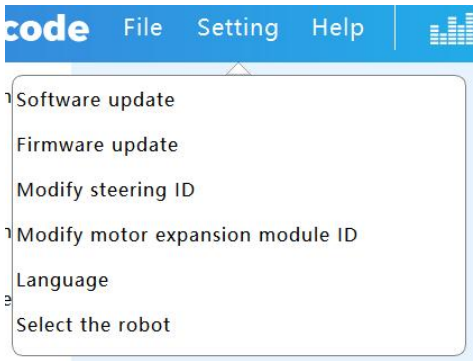
menu bar

1) File

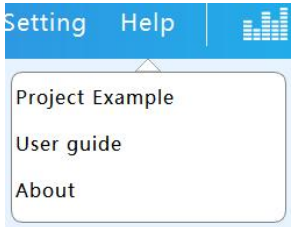
	New: Program Open: Program Save: Program Save as: Program Exit: Programm software
---	--

The program file format of the “new, saved and saved in other way” is .nsh; the opened files, supporting program file. nsh and media file .jpg, . pdf、. mp4; Here is a channel for quickly opening media files, but the media files are still opened as the default program for the computer operating system.

2) Setting

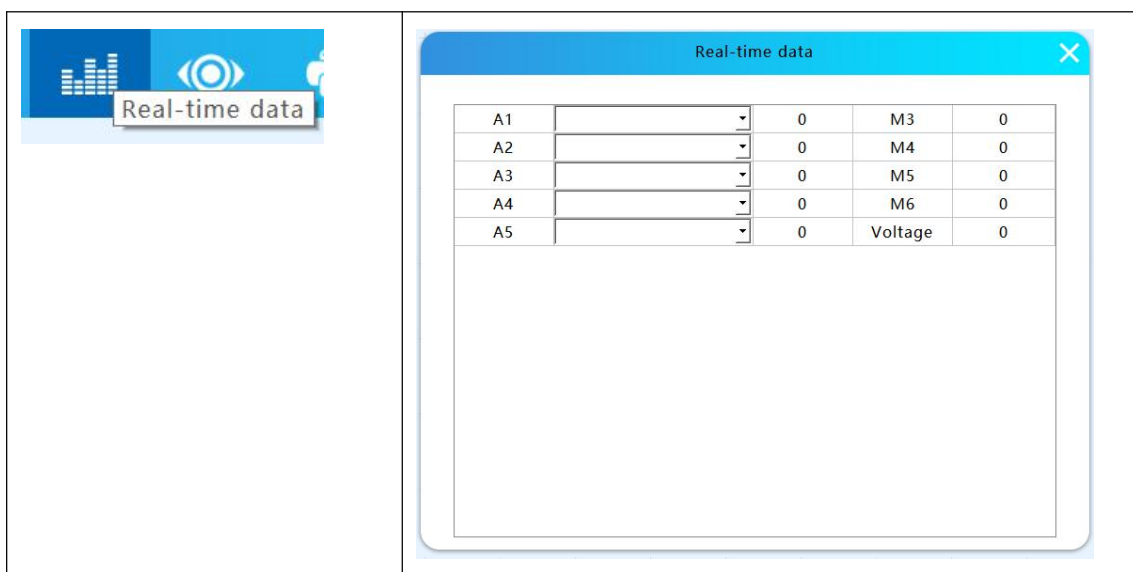
	Software update: When a computer's operating system is networked, programming software can detect if the server provides update support
	Firmware update: The programming software has built-in firmware that matches the current software version, and when the controller is connected, it can detect if the controller's firmware needs to be updated
	Modifying the rudder ID: Supports the modification of the rudder ID in series in controller S1; up to 16 IDs are supported
	Modifying the motor expansion module ID: Supports the modification of the expansion module ID, in series in controller EX; four IDs are currently supported
	Language: Support simplified Chinese and English, manual restart is effective.
	Select robot: support AIBOT, AISTEAM two series, automatic restart is effective

3) Help

	Project examples: Provides rich examples, including routines, demo videos, or building examples
	Instructions for use: Provide documentation of the product usage instructions
	About

Toolbar

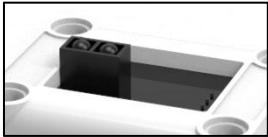
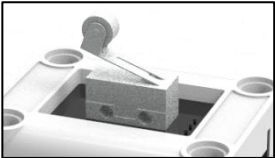
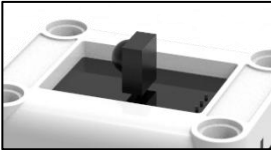
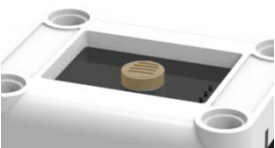
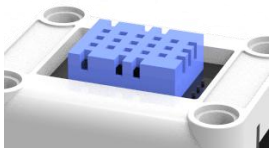
1) Real-time data

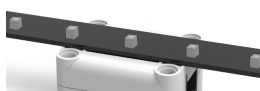
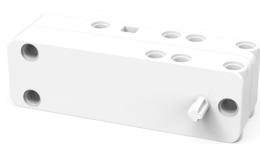


Real-time data is one of the most commonly used debugging tools, providing real-time data on controller from A1 to A5 ports, motor expansion module from M3 to M4 ports, and battery voltage.

<table border="1"> <tr><td>A1</td><td></td></tr> <tr><td>A2</td><td>Single-trail follow</td></tr> <tr><td>A3</td><td>Switch</td></tr> <tr><td>A4</td><td>Infrared remote control</td></tr> <tr><td>A5</td><td>Sound strength detection</td></tr> <tr><td></td><td>Light sensitivity detection</td></tr> <tr><td></td><td>Temperature detection</td></tr> <tr><td></td><td>Humidity detection</td></tr> <tr><td></td><td>Infrared barrier avoidance</td></tr> </table>	A1		A2	Single-trail follow	A3	Switch	A4	Infrared remote control	A5	Sound strength detection		Light sensitivity detection		Temperature detection		Humidity detection		Infrared barrier avoidance	The sensor modules that supported by A1 to 5: single track, collision switch, infrared remote control, Sound strength detection, Light sensitivity detection, temperature detection, humidity detection, infrared barrier avoidance		
A1																					
A2	Single-trail follow																				
A3	Switch																				
A4	Infrared remote control																				
A5	Sound strength detection																				
	Light sensitivity detection																				
	Temperature detection																				
	Humidity detection																				
	Infrared barrier avoidance																				
<table border="1"> <tr><td>A5</td><td></td></tr> <tr><td></td><td>Single-trail follow</td></tr> <tr><td></td><td>Switch</td></tr> <tr><td></td><td>Infrared remote control</td></tr> <tr><td></td><td>Sound strength detection</td></tr> <tr><td></td><td>Light sensitivity detection</td></tr> <tr><td></td><td>Temperature detection</td></tr> <tr><td></td><td>Humidity detection</td></tr> <tr><td></td><td>Infrared barrier avoidance</td></tr> <tr><td></td><td>Integrated grayscale</td></tr> </table>	A5			Single-trail follow		Switch		Infrared remote control		Sound strength detection		Light sensitivity detection		Temperature detection		Humidity detection		Infrared barrier avoidance		Integrated grayscale	The sensor module supported by A5 additionally: integrated grayscale
A5																					
	Single-trail follow																				
	Switch																				
	Infrared remote control																				
	Sound strength detection																				
	Light sensitivity detection																				
	Temperature detection																				
	Humidity detection																				
	Infrared barrier avoidance																				
	Integrated grayscale																				
<table border="1"> <tr><td>M3</td><td>0</td></tr> <tr><td>M4</td><td>0</td></tr> <tr><td>M5</td><td>0</td></tr> <tr><td>M6</td><td>0</td></tr> <tr><td>Voltage</td><td>0</td></tr> </table>	M3	0	M4	0	M5	0	M6	0	Voltage	0	M3 to M6 supports encoder motors										
M3	0																				
M4	0																				
M5	0																				
M6	0																				
Voltage	0																				

Reference table for the return value range of each sensor module:

Module name	Physical diagram	Return values	Notes
Single-line Follower Sensor		0 or 1	0 indicates that white (or lighter color) has been detected, and 1 indicates that black (or dark color or to the air) has been detected
Touch Sensor		0 or 1	0 indicates that the switch has not been pressed and the 1 indicates switch has been pressed
Infrared Remote Control Module		0 to 16	 0 to 9 indicates that the remote control board button from 0 to 9; 10 indicates * 11 indicates # 12 indicates ▲ 13 indicates ▼ 14 indicates ◀ 15 indicates ▶ 16 indicates OK
Sound Sensor		0-100%	The intensity is proportional
Light Sensor		0-100%	The intensity is proportional
Temperature Detection		0-85%	The intensity is proportional
Humidity		0-100°C	The intensity is proportional

Detection			
Infrared Sensor		0-4000	The higher the value, the farther away it is
Integrated 5-Grayscales Sensor		1:0-4000 2:0-4000 3:0-4000 4:0-4000 5:0-4000	The five channels return values independently, and the blacker the return value, the greater the detection
Encoder Motor		±999999	Limited by the number of digits displayed by the upper computer, theoretically infinite

2) The image threshold

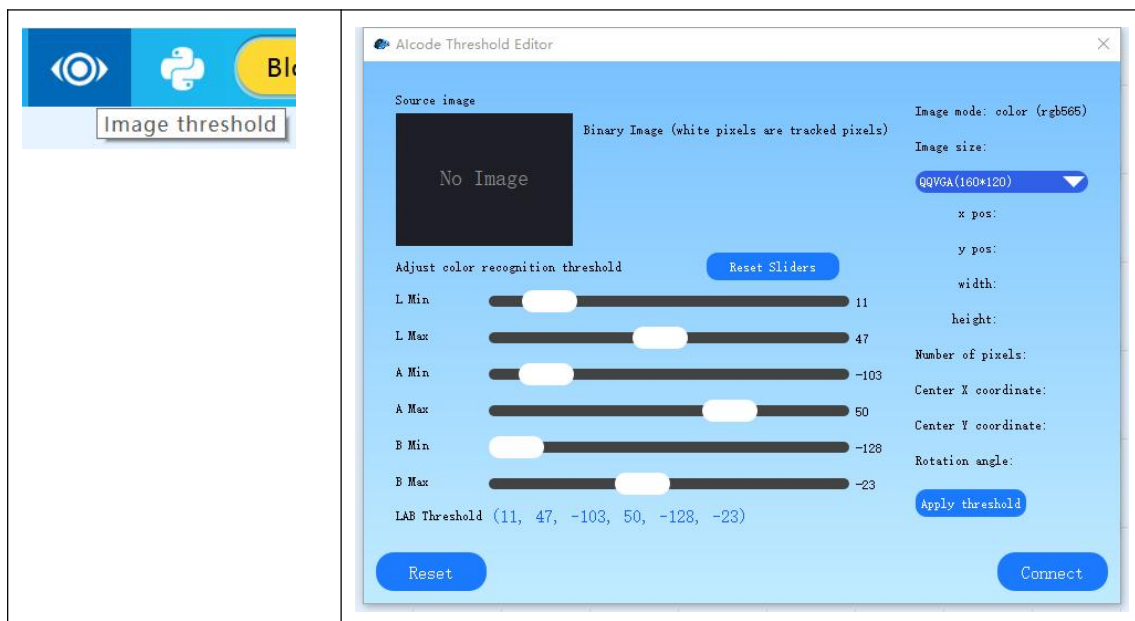


Image threshold is an easy-to-use AI vision module color recognition debugging tool, it can be used to detect the visual module's real-time picture. By adjusting the corresponding data, it can complete the identification of specific objects.

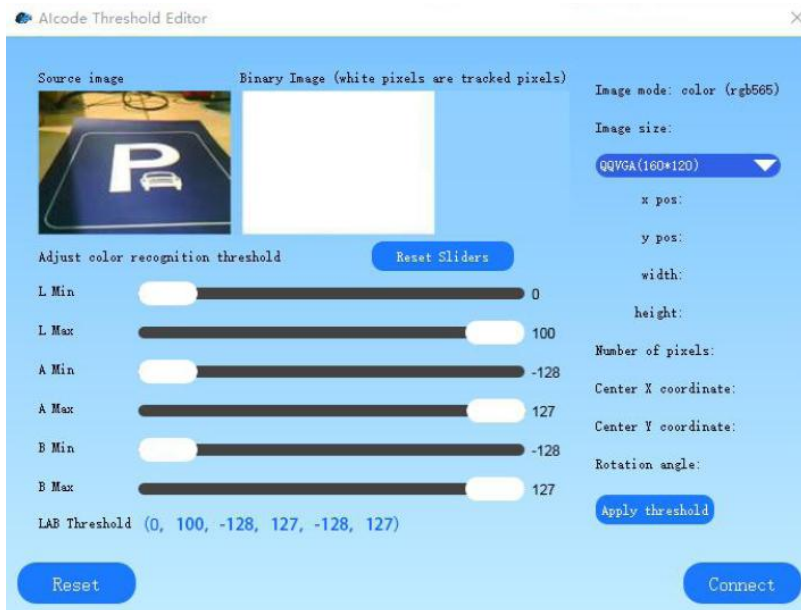
Example: Monitoring of parking signs

Step 1 Tiles the monitoring logo (drawing) on the desktop with a steady light, as shown below:

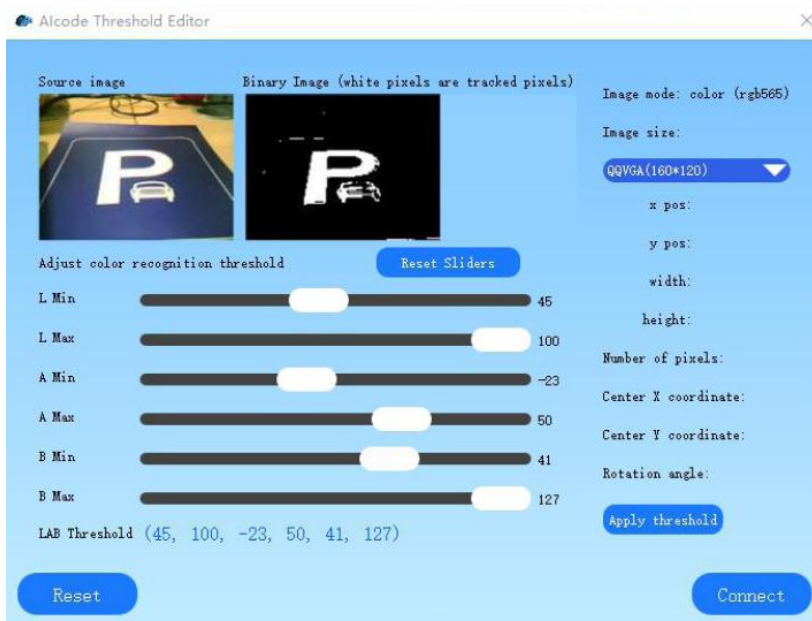


Step 2 Use a USB cable to connect the visual module directly to your computer.

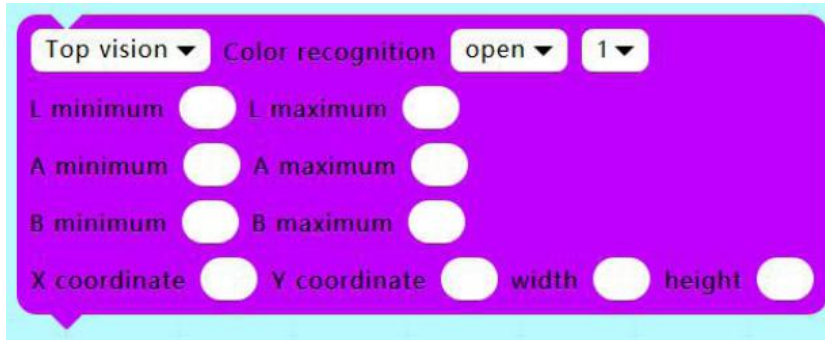
Step 3 Click on the connection to turn on the image real-time monitoring function, as shown below:



The visual module monitoring screen is displayed at the source image in the upper left corner of the threshold editor interface, as well as in the real-time monitoring of the image. By setting the appropriate parameters, the visual module can also monitor specific objects, and when the parameters shown in the following image have been adjusted, the visual module can identify the parking sign.



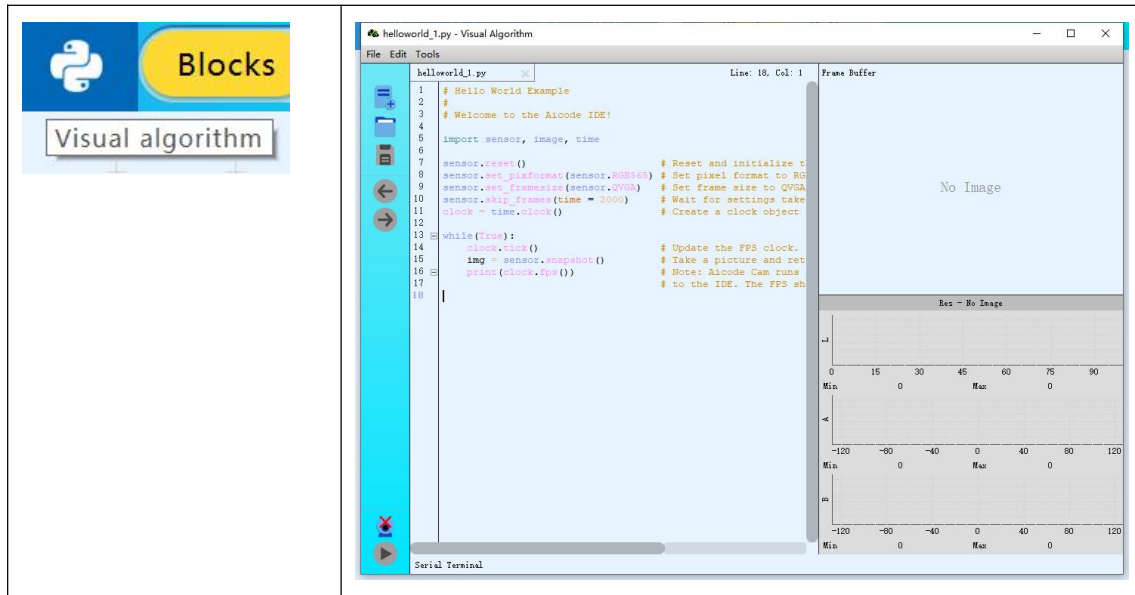
Getting the LAB threshold values can be directly placed in the color recognition in the following image.



Step 4 parameter adjustment and function

The screenshot shows the 'Alcode Threshold Editor' window. It has two main image displays: 'Source image' and 'Binary Image (white pixels are tracked pixels)'. Below these are sliders for 'Adjust color recognition threshold' with values for L Min, L Max, A Min, A Max, B Min, and B Max. A 'Reset Sliders' button is next to them. On the right, there are settings for 'Image mode: color (rgb565)', 'Image size: QVGA(160*120)', and various coordinates and angles. A 'LAB Threshold (45, 100, -23, 50, 41, 127)' is displayed. At the bottom, there are 'Reset' and 'Connect' buttons.	Source image: A real-time image monitored by the visual module Binary image: After adjusting the color to the tracking threshold, L maximum, L minimum, A maximum, A minimum, B maximum, B minimum, you can selectively monitor the object, and select the monitoring arrow shape in the figure on the right. Adjust the color recognition threshold Reset slider: initialize the slider value LAB threshold: Monitor the specific characteristics of an object after a combination of three primary colors Apply threshold: Displays image information corresponding to the current LAB threshold in real time, such as coordinate, width height Resuming factory settings: Visual module initialization, typically used when the visual module crashes Connection: real-time image monitoring for visual module and computer
---	--

3) Visual algorithms

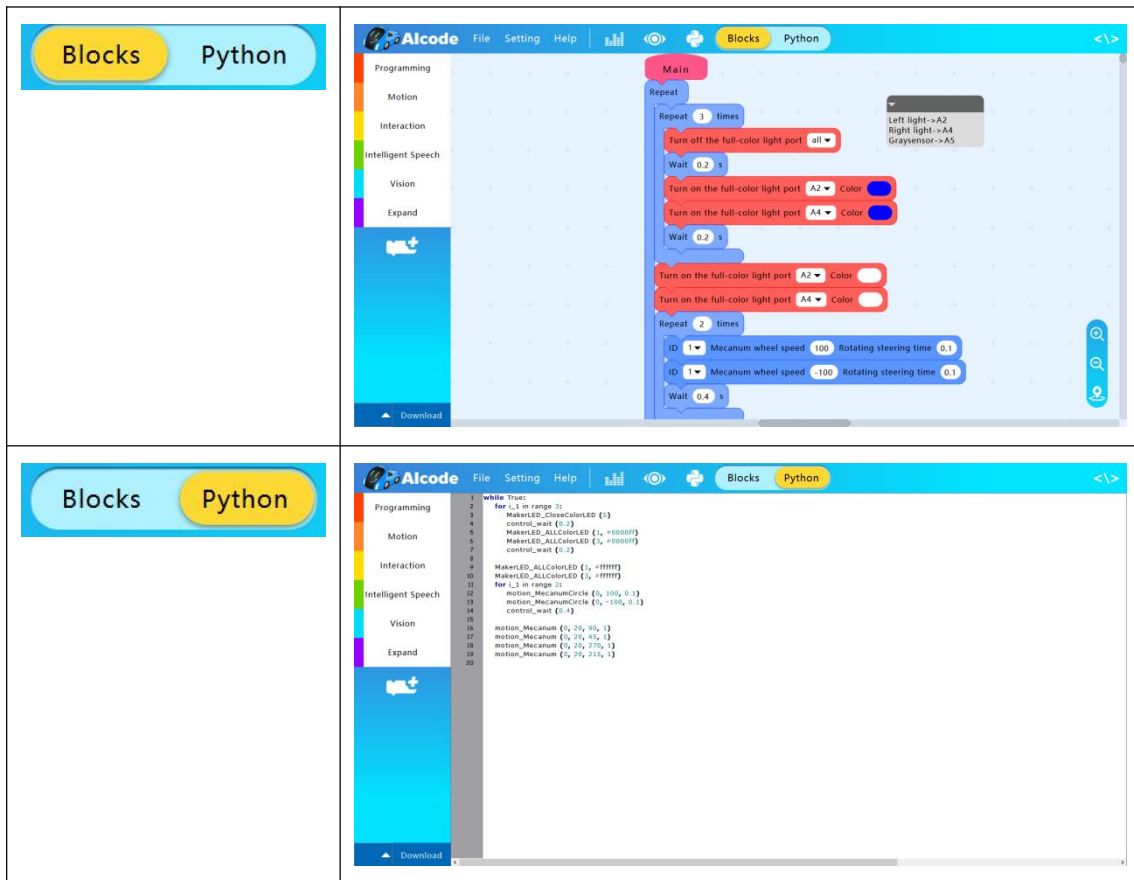


Visual algorithm is a powerful AI vision module visual algorithm editor, you can use Python code directly to design and edit the underlying algorithm of the visual module, with real-time image display and LAB threshold display tools.

Stay tuned for more detailed feature introductions and examples!

Programming

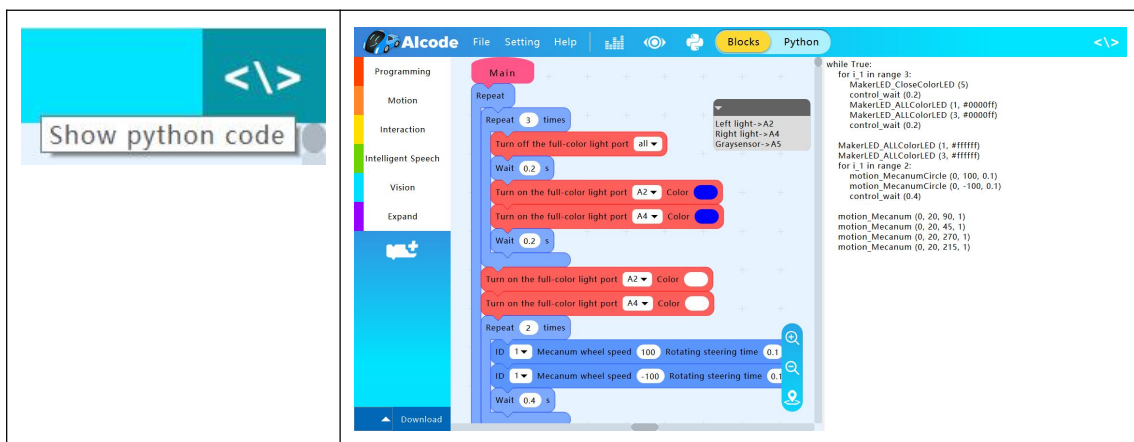
1) Modular programming and Python code programming



Modular programming is the use of graphics modules, through mouse-dragging and parameter typing, you can complete a wealth of programming; Python code programming is the use of Python code for complex programming.

When Python code is programmed, it also supports dragging program modules into a specified line of code to complete the need for rapid programming.

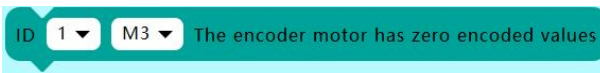
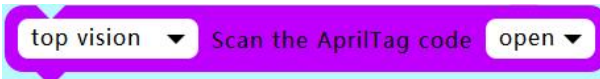
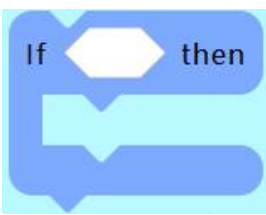
2) Display the Python code



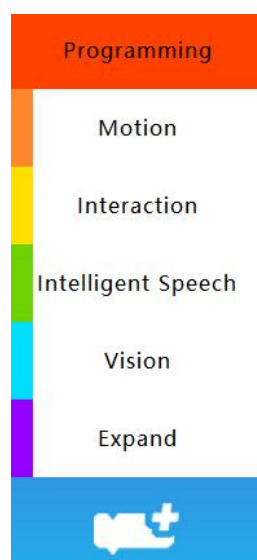
Showing python code is a very useful code-control feature when programming in modular; This is a great help to develop code programming interest and programming ability.

Program modules library

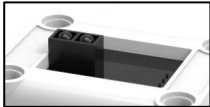
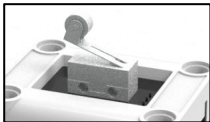
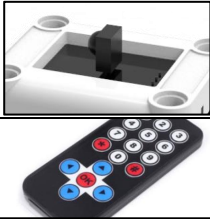
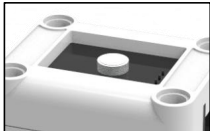
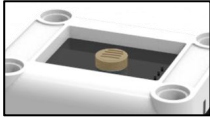
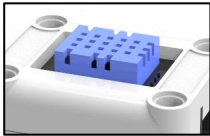
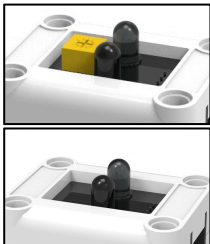
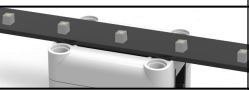
1) module type

module type	Type description	Module example
Setting class	Set parameters such as speed, angle, time, etc	
Execution class	Follow the instructions as described	
Information class	Return the information you get, such as text, values, lists, and other different types of data	
Model class	Returns the different data types that you get, such as variables, lists, and so on	
Boolean class	Based on the information obtained, return "True (1)" or "False (0)"	
Conditional	Execute the instructions based on whether the conditions are met	

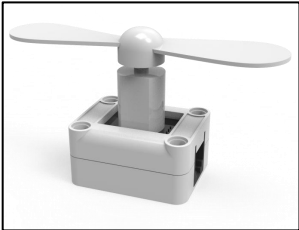
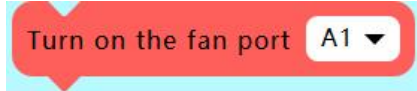
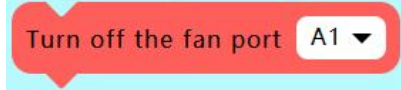
2) Intelligent programming



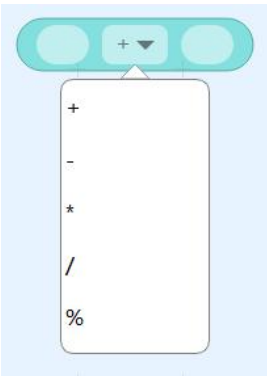
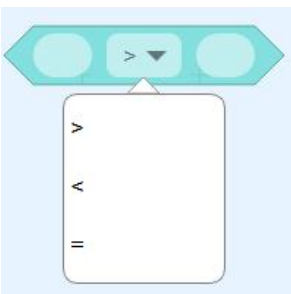
Perceive

Module name	Physical diagram	Module diagram
Single-line Follower Sensor		Single-trail follow port A1 ▼
Touch Sensor		Switch port A1 ▼
Infrared Remote Control Module		0 ▼ Infrared remote control port A1 ▼
Sound Sensor		Sound strength detection port A1 ▼
Light Sensor		Light sensitivity detection port A1 ▼
Temperature Detection		Temperature detection port A1 ▼
Humidity Detection		Humidity detection port A1 ▼
Infrared Sensor	 V1&V2	Infrared barrier avoidance port A1 ▼
Integrated 5-Grayscales Sensor		1 ▼ Integrated grayscale port A5

Fan

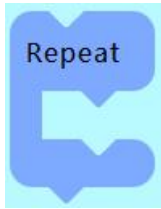
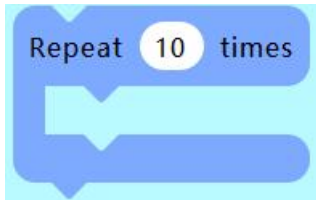
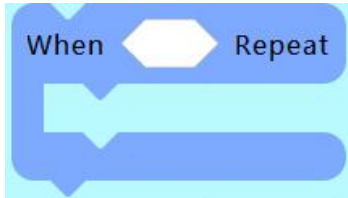
Module name	Physical diagram	Module diagram
Turn on the fan		
Turn off the fan		

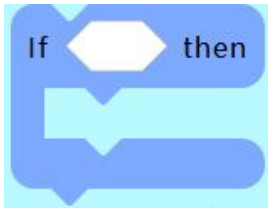
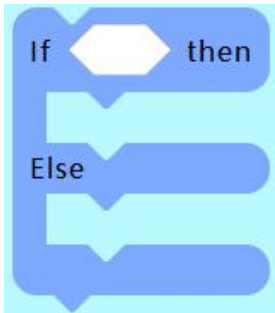
Operation

Module name	Module diagram	Notes
Arithmetic operations		The parameters filled in by the user or the variables referenced are operated on addition, subtraction, multiplication, division and surplus.
Relationship operations, logical operations		Relationship operations: The parameters filled in by the user or the referenced variables are used in relational operations that are greater than, less than, and equal to each other, usually in conjunction with conditional judgment
Random number		Define a variable of random number. The parameters are random number generation intervals, with values ranging from 0 to 99999
logic relationship: and		logic calculation: Use user-created parameters or referenced variables for "and" logical operations, usually in conjunction with conditional judgment. The "and" operation is

		true when both logical comparisons are true
logic relationship: or		logic calculation: Use user-created parameters or referenced variables for "or" logical operations, the "or" operation is the middle of two logical comparisons, and when fewer are true, the logic holds true

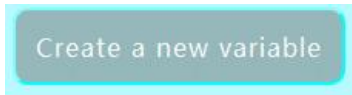
Control

Module name	Module diagram	Notes
Wait		The user keeps the current program state for a certain amount of time by setting the time in S (seconds), range: 0-99999.
Repeat execution		The while(true) statement in the C language, which means that the statement in the current loop body is repeated all the time
The number of re-executions		For statements in the C language, users can set the number of cycles by parameters or reference variables. The number of cycles represents the number of time when the statements in the current loop body are repeated, and the number of times' ranges are 0-99999.
Repeat execute the condition		The while statement in the C language allows the user to set variables, sensor readings, parameters to control the condition. If the condition meets the statement in the body of the execution loop, or the current loop body will jump out.

Conditional judgment		If (conditional) statement in C language, the user can set variables, sensor readings, parameters to control the condition.
Judgment of supporting conditions		If (condition) in C language... else... statement, the user can set variables, sensor readings, parameters to control the conditions. If the condition meets the requirement, the upper statement can be executed, or the lower statement is executed.
Wait until		The user can set variables, sensor readings, parameters to control the conditions. If the condition is not met, wait until the condition meets the skip-wait, and then execute the following statement
Jump out of the loop		Jump out of the current loop statement

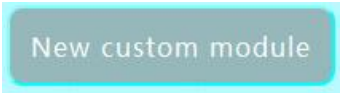
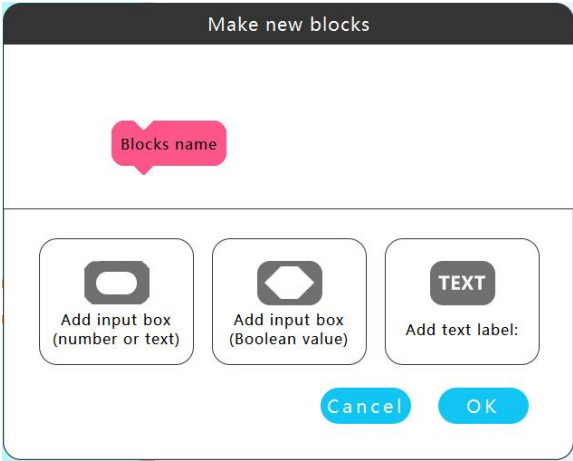
Variable

Variables are important concepts and functions in programming that can be used to store data information, For example, you can save a point-in-time sensor reading into a variable, which can then be called in a program, or to simplify the program with variables to achieve the countdown.

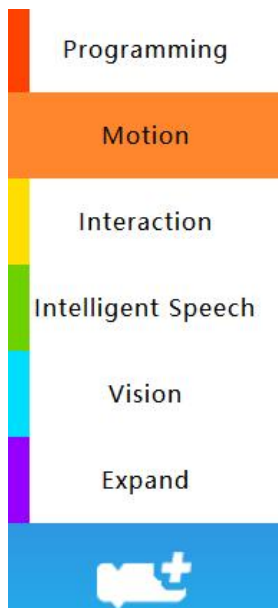
Module name	Module diagram	Notes
Create a new variable		Create a new variable that can be counted or assigned to the corresponding port sensor
Variable module Variable initialization Variables self-increase and subtract		Variables, which are typically used to store the detected values of sensors or constantly changing values Sets the initial value of the variable The variable increases the specified value each time

Customization

When the program becomes complex, we can take some of them out and put them in a building block of our own definition, so that we only need to call the block, which also does what we want. Defining blocks also makes it easier for us to understand the structure of the program and facilitate later debugging.

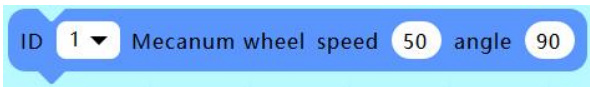
Module name	Module diagram	Notes
Make new building blocks		Create a new building block module
New building blocks set		Package programs with multiple instructions into a block of building blocks to simplify the structure and length of the main program. You can call subroutine of other programs through this building block, or you can modify the internal parameters of a subroutine by changing parameters or referencing variables

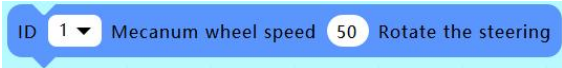
3) Motion control



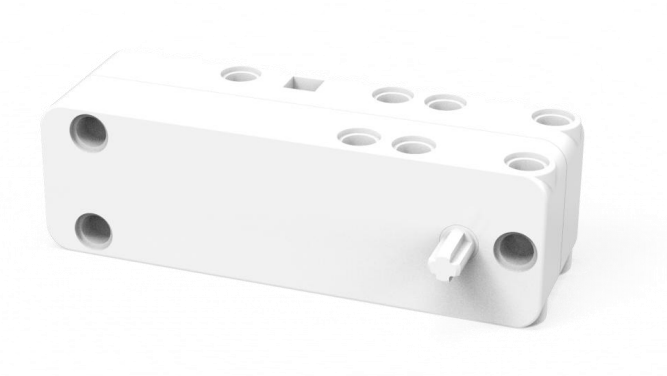
Mecanum Wheel

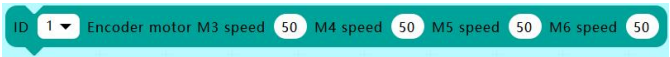
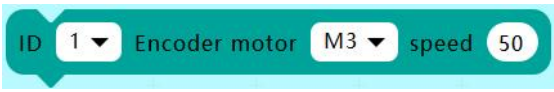
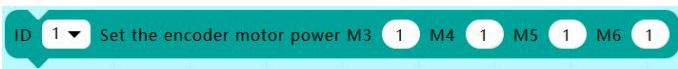


Module name	Module Diagram	Notes
Control the wheel chassis translation speed, angle, time		Speed range -100 to 100; Angle range 0 to 360; Time range ≥ 0
Control the wheel chassis translation speed, angle		

Control the wheel chassis rotation speed, angle, time		The speed range -100 to 0 is clockwise; The speed range 0 to 100 is counterclockwise; The time range ≥ 0
Control the wheel chassis rotation speed, angle		

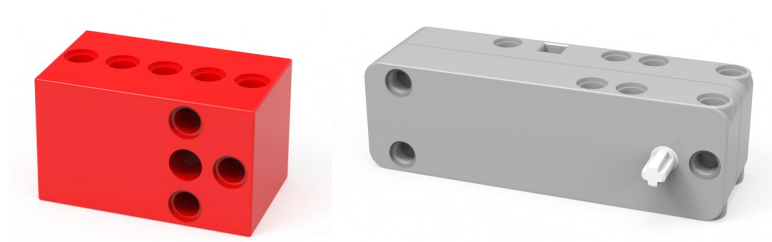
Encoder Motor



Module name	Module Diagram	Notes
Control the speed of the 4 encoder motors at the same time		Speed range -100 to 100; Time range ≥ 0
Control the speed of 1 encoder motor		
Control the speed and time of 1 encoder motor		
Control the speed of the 4 encoder motors at the same time		The power range -1.00 to 0 is reverse; The power range is 0 to 1.00 is positive

Stop the encoder motor		
The encoding value of the encoder motor is zeroed		
Get the encoding value of the encoder motor		

Ordinary motors

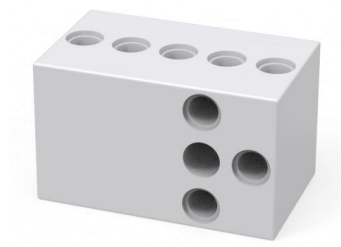


V1, V2 version is shared

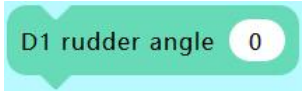
Module name	Module Diagram	Notes
M1 to 2 normal motor speed		Speed range -100 to 100; Time range ≥ 0
1 normal motor speed		
Speed and time of 1 normal motor		
Ordinary motor power of M1 to 2		The power range - from 1.00 to 0 is reverse; The power range from 0 to 1.00 is positive

Stop the ordinary motor		
-------------------------	---	--

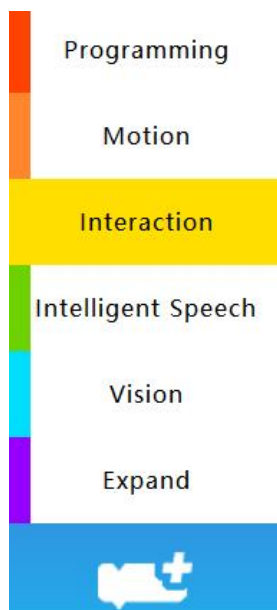
Servo Motor



D1 rudder (analog rudder, left) S1 rudder (digital rudder, right)

Module name	Module Diagram	Notes
D1 rudder angle		Angle range: 0~180°
S1 rudder angle		ID range 1~16 Angle range: 120~120

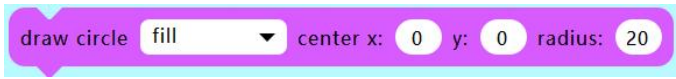
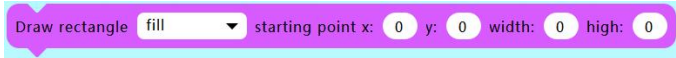
4) Human-computer interaction



Display



Module name	Module Diagram	Notes
Screen display	Screen display AISTEAM in 1 line	Display English numbers or variables; Line range 1~4; X wide range 0~128; Y height range 0~64
Clear screen display	Screen display Clear 1 line	
The screen is displayed to the coordinates	Screen display AISTEAM n coordinateX: 38 Y: 22 Preview	
The screen is all black or all white	The screen shows all black Clear the screen	
Screen rotation	The screen rotates to 180 degrees	
Draw points	Draw point x: 0 Y: 0	
Set the line width	Set the line width to 1	
Draw a line	Draw line start x1: 0 y1: 0 end x2: 0 y2: 0	

Draw a circle		
Draw a rectangle		

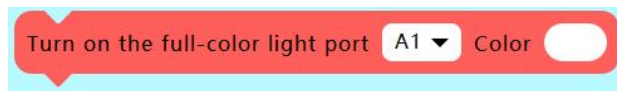
Lights



Module name	Module Diagram	Notes
Turn on the monochrome light		
Turn off the monochrome light		

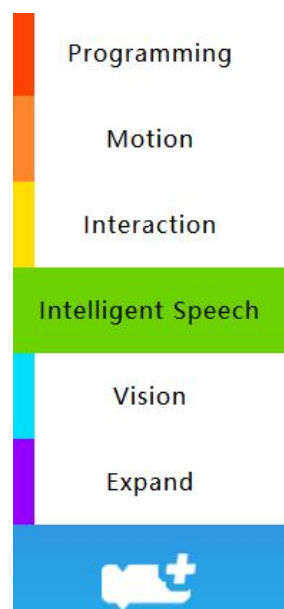
Full Color Light



Module name	Module Diagram	Notes
Turn on the monochrome light		Color range 

Turn off the monochrome light		
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5) Smart voice



Buzzer



Module name	Module Diagram	Notes
Turn on the buzzer		Notes C1 to 7; Beat 1/2, 1/4, 1/8, 1/16

6) Intelligent vision

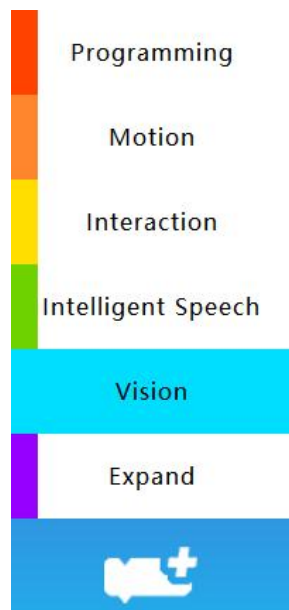
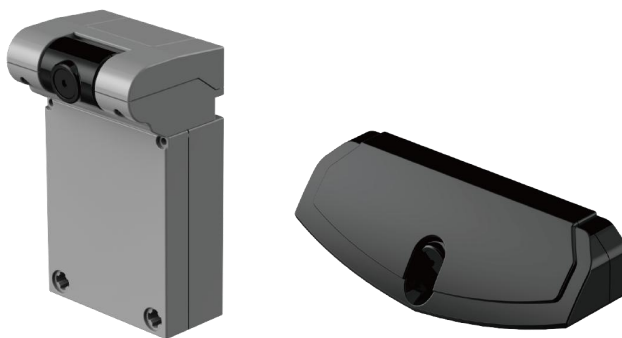
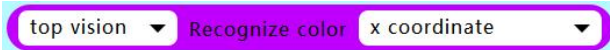
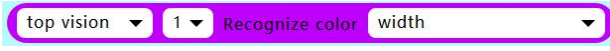
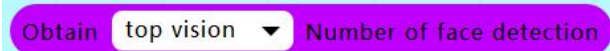
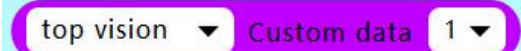


Image recognition

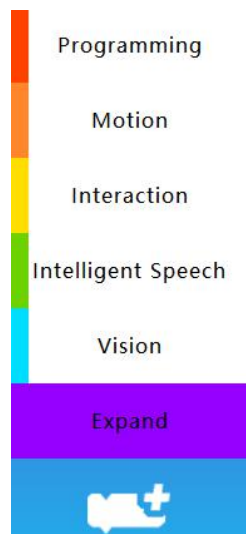


Top vision(left), front vision(right)

Module name	Module Diagram	Function
Identify tag codes		Visual module type: roof vision, head vision Identification function: on, off Set the threshold for visual recognition (LAB range) and area of interest data (x/y/W/H) Multi-color setting data ID: 1 to 4
Identify face detection		
Color recognition threshold (monochrome)		

Color recognition threshold (multi-color)	 top vision ▼ Color recognition open ▼ 1 ▼ L minimum 0 L maximum 100 A minimum -128 A maximum 127 B minimum -128 B maximum 127 X coordinate 0 Y coordinate 0 width 160 height 120	
Get color recognition (monochrome)	 top vision ▼ Recognize color x coordinate ▼	
Get color recognition (multi-color)	 top vision ▼ 1 ▼ Recognize color width ▼	
Get Tag recognition	 top vision ▼ The result of AprilTag code identification	
Get face recognition	 Obtain top vision ▼ Number of face detection	
Get customized data	 top vision ▼ Custom data 1 ▼	

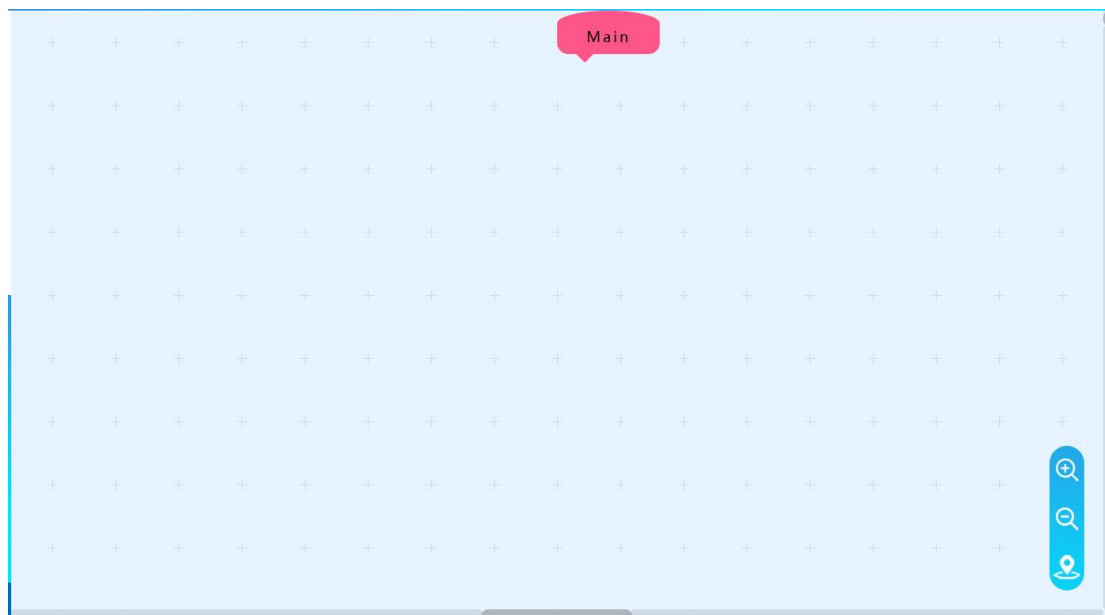
7) Expansion module



NASHENBOT EX

Module name	Physical diagram	Module diagram
Remote control handle		Remote control handle button L2 ▼ Pressed
Digital tube (3-bit)		Digital tube port A1 ▼ Show 1
Flame sensor		Flame Sensor port A1 ▼ has a flame
Gyroscope		Gyroscope Sensor Port A1 ▼ Acceleration x ▼
		Gyroscope Sensor Port A1 ▼ angular velocity x ▼
Audio recording		Record ▼ 1 ▼
Display (2.8 inch color)		1 ▼ Line display alphanumeric hello font color Background color

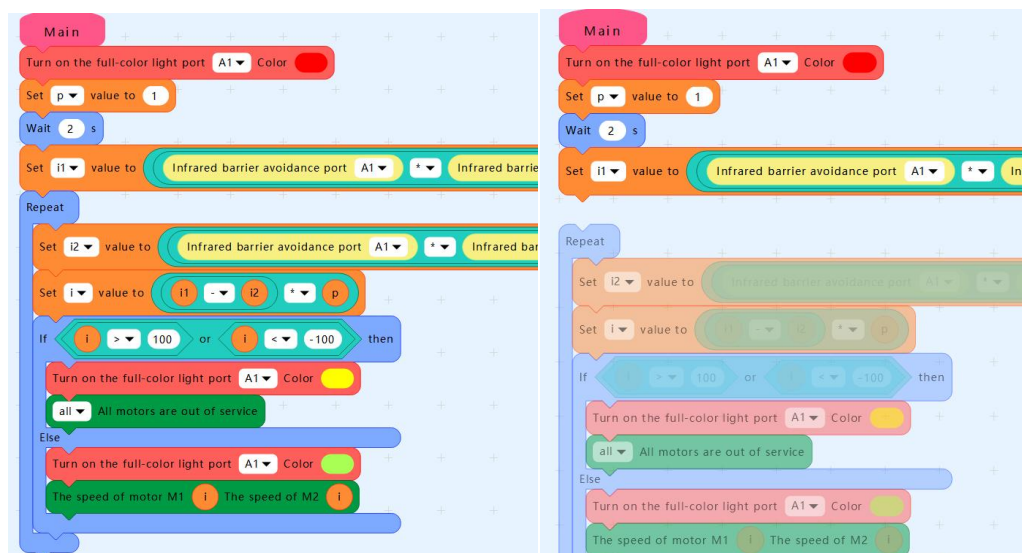
Programming area



1) Main program



The main program will be downloaded to the controller to execute, the program module that is not connected to the main program is invalid and does not work after downloading.



All program modules are valid and can be executed after downloading (left) after waiting 0.5 seconds for the program module to be invalid (right)

2) View tool



Zoom in, zoom out, and navigate to the main program view

3) Operating area



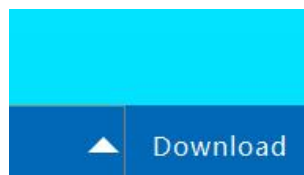
By dragging and dropping the connection of the program module, the module will prompt the snap connection status when it is near;

The program module parameters are set by keyboard input;

The right-click is include additional actions, such as copying, pasting, adding comments, disabling, etc.

Drag and drop blank space or drag scroll bar to move the view.

Download area



Click the arrow to select the program path to download to the controller;

Click "Download" to download the main program to the controller.