WHALESBOT

WhalesBot Eagle 1003

User Guide V1.0

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Chapter 1 Product Introduction

Ⅰ. Introduction

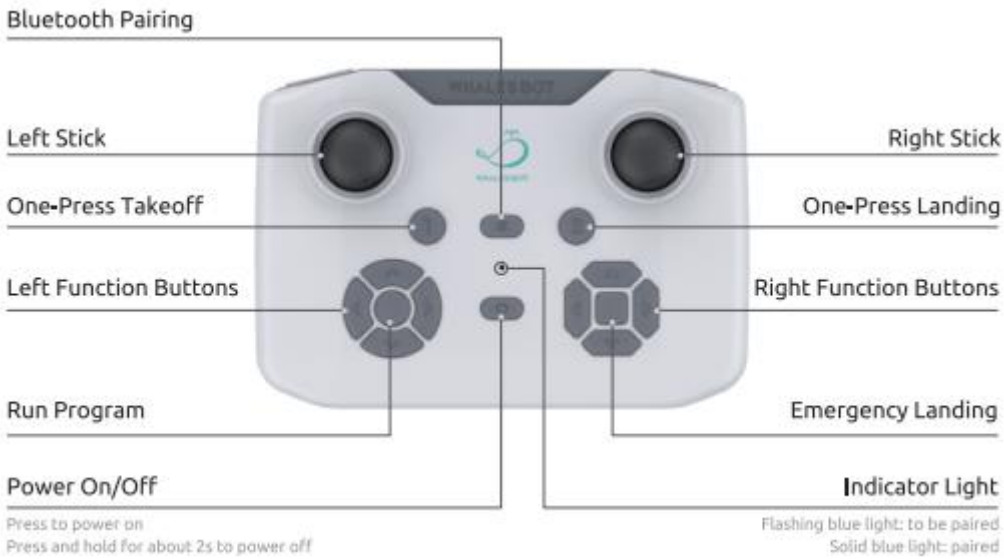
Eagle 1003 is the latest programmable drone provided by WhalesBot. The drone has the flight control system, laser sensor, optical flow sensor, gyroscope sensor, air pressure sensor and other sensors. It can stably hover and fly, and recognize AprilTags. The drone can be connected to a dot-matrix display, RGB LED, digital tube, electromagnet, servo motor and other actuators, as well as an external ultrasonic sensor, temperature and humidity sensor, infrared sensor, ambient light sensor, flame sensor, gesture recognition sensor, human infrared sensor and other sensors. The drone can fly through remote controlling or programming. The maximum flight duration is about 10 minutes.

The drone has a runaway protection function that automatically stops motors in accidental collision. The drone is also equipped with propeller guards for higher safety.

Ⅱ. Remote control and drone

1. Remote control

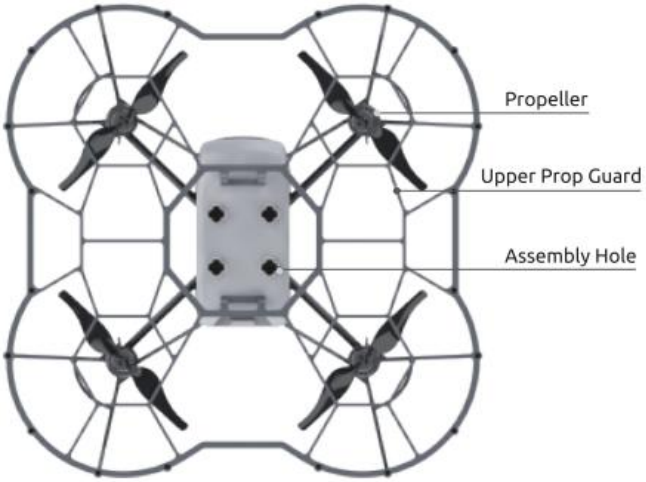
After the remote control is paired with the drone via Bluetooth, the drone can be controlled remotely.

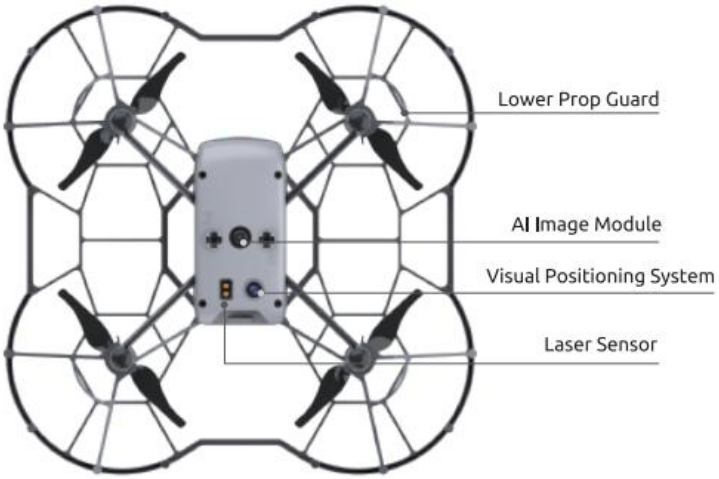


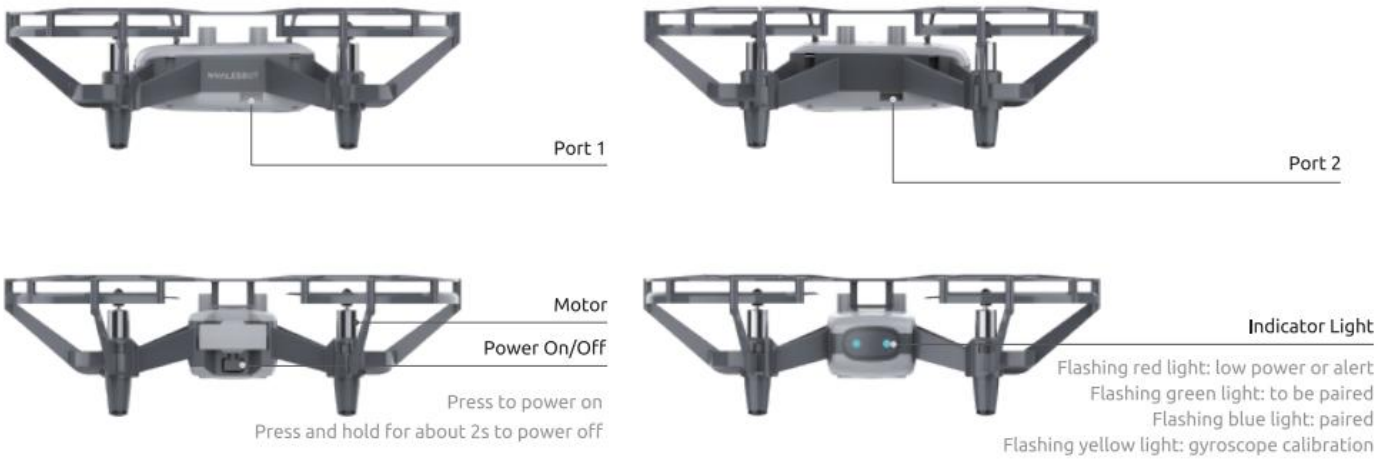
2. Drone

2.1 Main parts

A drone has the following parts: a flight control system, a communications system, a positioning system, and a battery unit.







2.2 Propeller guards

The propeller guards are used to reduce the damage caused by a collision between the propellers and a person or object.

Installation

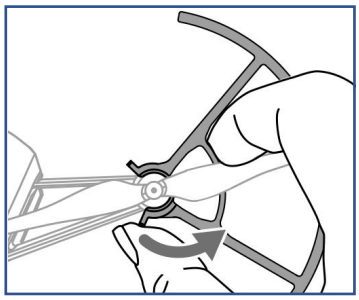
Press the propeller guard inward and you will hear a "click" sound. Make sure that the groove of the propeller guard firmly sticks to the base of the propeller motor.

① ② ③

After the lower prop guards are installed successfully, insert the upper prop guard with the corresponding holes and press it firmly until it is fully secured.

Removal

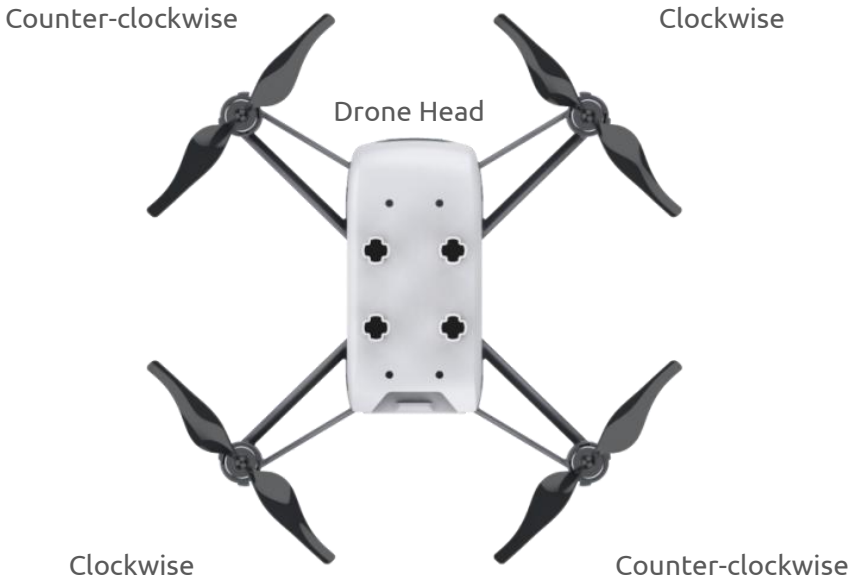
Remove the upper prop guard first, and then the lower prop guards. When removing the lower prop guard, hold the propeller and pull the prop guard outward.



Do not use excessive force when removing the prop guards. Otherwise, you may damage the drone or get your finger cut.

2.3 Propellers

The drone uses 75 mm propellers that rotate clockwise or counterclockwise.

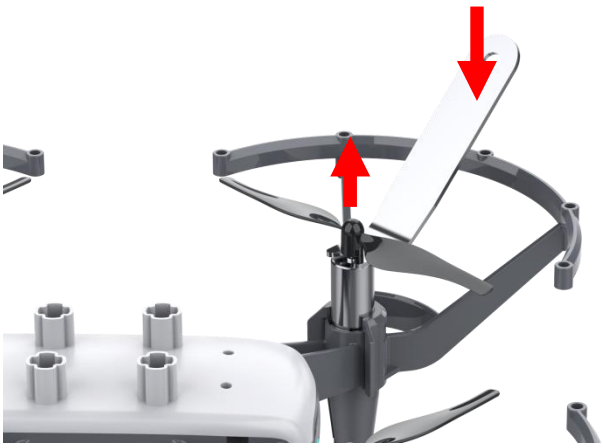


Installation

With the drone head as the front, the clockwise-rotated propeller is installed on the right front and left rear bases of the propeller motors, and the counterclockwise-rotated propeller is installed on the left front and right rear bases of the propeller motors (see the figure above). When installing, press firmly to ensure that the gap can fit only the propeller wrench.

Removal

Insert one end of the propeller wrench into the gap between the propeller and the propeller motor base. Then, push the other end of the wrench downward to remove the propeller.



Note:

- ✧ Please use a a propeller wrench to remove propellers. Do not remove it directly by hand. Otherwise, it will damage propeller motors or cut your fingers.
- ✧ Do not get close to rotating propellers and propeller motors to avoid cuts.
- ✧ Please use standard propellers. Do not use different types of propellers at the same time.
- ✧ Please check if the propellers are properly installed and fastened before each flight.
- ✧ Make sure that each propeller is in good condition before each flight. If it is aged, damaged, or deformed, please replace it before flying.

2.4 Battery

The drone is powered by a 1100mAh/3.8V battery with overcharge and discharge protection. The maximum flight duration is approximately 10 minutes, so be sure to fully charge the flight battery before using it.

Installation

Install the battery. Make sure that the battery is oriented in the correct direction, as shown in the following figure. To remove the battery, take the battery out from the opposite direction.

Charging

Use the standard Type-C cable, connect the lithium battery and your own USB charger (5V) to charge the lithium battery. The charging duration is about 40 minutes.

Red Light: Charging

Green Light: Full Charge

Please use an FCC/CE-compliant USB charger.

After the flight, the battery will be in a high temperature. We recommend that you do not charge the battery until the battery temperature go normal.

The rechargeable temperature range of the battery is 5°C to 40°C, and the ideal temperature for charging is 22°C to 28°C. Charging at the ideal temperature can significantly extend the battery lifespan.

If you need to purchase additional lithium batteries, make sure that you purchase and use batteries of standard specifications. Otherwise, the batteries may cause damage to the drone or cause safety issues.

Chapter 2 Quick Start

Ⅰ. Bluetooth pairing and remote control

1. Bluetooth pairing

① Press the buttons to turn on the drone and the remote control.

② Put the remote control close to the drone, and press and hold the Bluetooth pairing button of the remote control.

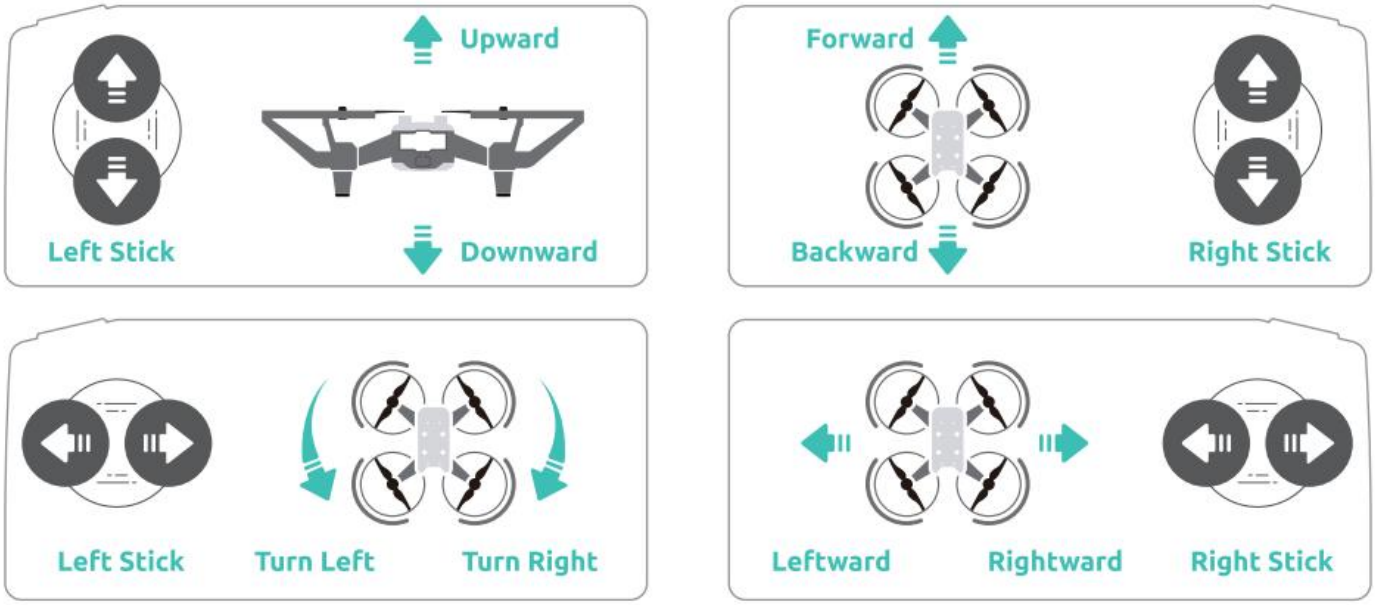
③ When the blue light of the drone flashes and the remote control's blue light is steadily on, the pairing is successful.

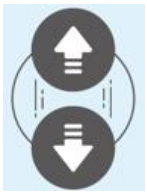
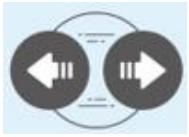
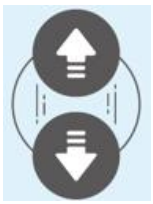
2. Remote-controlled flight

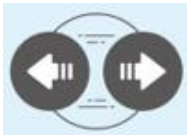
① Unlock: Pull the sticks inward simultaneously as shown in the following figure. At this time, the propellers rotate at a low speed, which indicates that the drone has been unlocked successfully.

② Takeoff and landing: Press the "1" button of the remote control or push the left stick forward, and the drone takes off. Press the "2" button of the remote control or pull the left stick backward, and the drone will land.

③ Control: After the takeoff, the sticks can be used to control the drone. The left stick can control the upward/leftward movement or rotation, and the right stick can control the flight direction.



Stick	Operation
Left stick 	The throttle stick controls the drone's height. If you push the stick forward, the drone moves upwards. If you pull the stick backward, the drone moves downwards. If the stick is in its neutral position, the drone's height remains unchanged.
Left stick 	The yaw stick adjusts the drone's direction. If you push the stick leftwards, the drone rotates counterclockwise. If you push it rightwards, the drone flies clockwise. If the stick is in its neutral position, the drone does not rotate. The stick's movement degree influences the rotation speed. A wider movement increases the rotation speed.
Right stick 	The pitch stick controls the forward and backward movement. If you push the stick forward, the drone tilts and flies forwards. If you pull it backwards, the drone tilts and files backwards. If the stick is in its neutral position, the drone does not tilt. The stick's movement degree determines the tilt angle and consequently, the speed of flight. A wider movement results in a steeper tilt and quicker flight.

Right stick 	The roll stick controls the leftward and rightward movement. If you push the stick leftwards, the drone tilts and flies leftwards. If you push the stick rightwards, the drone tilts and flies rightwards. If the stick is in its neutral position, the drone does not tilt. The stick's movement degree determines the tilt angle and consequently, the speed of flight. A wider movement results in a steeper tilt and quicker flight.

In an emergency situation, press and hold the “emergency landing” button for two seconds to immediately stop the drone's flight and landing.

Ⅱ. Flight environment requirements and procedure

1. Flight environment requirements

Do not fly under bad weather conditions, such as windy, snowy, rainy, lighting, and foggy weather.

During the flight, make sure that the drone stays within your view and away from obstacles, people, water, etc.

Do not fly with a sharp change in height (for example, from a high floor of a building to the outdoor ground). Otherwise, the positioning function may go abnormal and some safety issues may occur.

Battery performance is affected by air density and ambient temperature. If the drone flies at an

altitude of above 1,000 meters, the performance of the battery and power system will be affected due to environmental factors, and will consequently affect flight performance. Please fly with caution.

The drones shall not be used in the event of fire, explosion, lightning strike, storm, flood, earthquake, sandstorm and other disasters.

Do not fly near electromagnetic interference sources. Sources of electromagnetic interference include WIFI hotspots, routers, Bluetooth devices, high-voltage wires, high-voltage transmission stations, mobile phone base stations and battery broadcast towers. If the drone flies in these areas, the wireless transmission performance of the drone may be interfered. If the interference source is too strong, the drone will not be able to fly normally.

Please comply with local laws and regulations when using the drone. This helps prevent possible injury or loss.

2. Basic flight procedure

After the drone and remote control are turned on and connected via Bluetooth, put the drone on a flat open ground. Please stand at the back of the drone and face the tail of the drone.

Pull the two sticks of the remote control inward simultaneously to unlock the drone.

Press the "1" button of the remote control to fly the drone.

Use the sticks to control the drone’s flight.

When the drone needs to land, press the "2" button to make the drone slowly descend and land on the ground.

After the drone lands, press and hold the power buttons of the drone and the remote control for about two seconds to power them off.

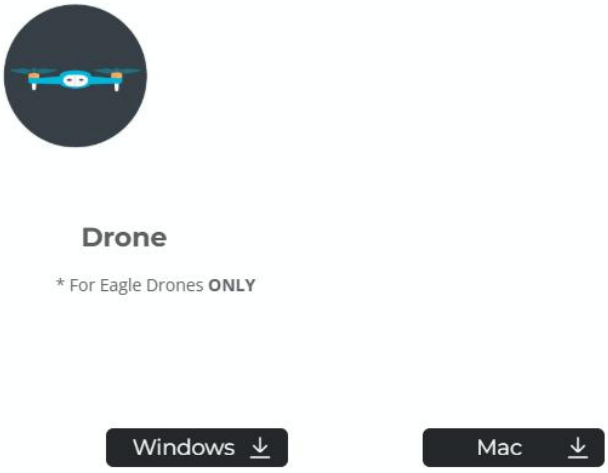
Chapter 3 Software Introduction

Ⅰ. Software download and installation

1. Software download link

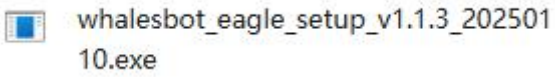
https://www.whalesbot.ai/resources/educators

Software name: Drone



2. Download the package

Download the package that is supported by the system of your computer.



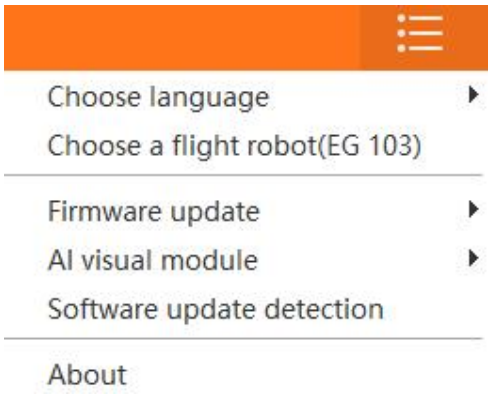
3. Run the package

Follow the installation prompts to install the software. The software only needs to be downloaded and installed only once, and a later version can be upgraded online. After the software is installed, a dialog box appears for you to install the driver. Click “Install” and the driver will be installed automatically. Click “OK” after the installation is complete. The driver needs to be installed only once when the software is first installed.

Ⅱ. Software settings

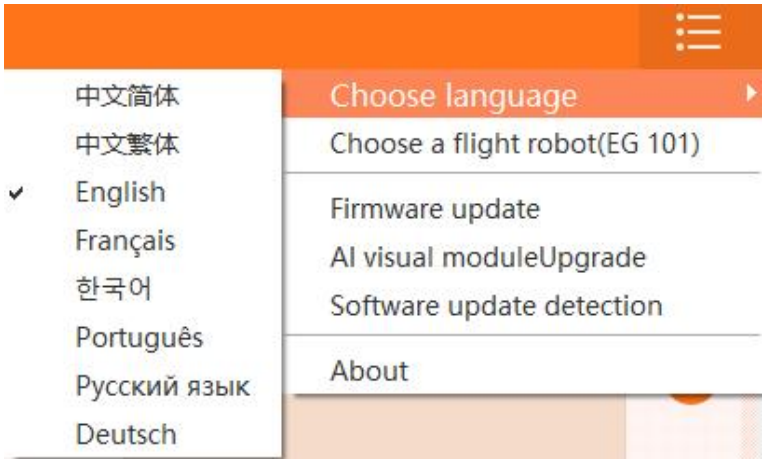
1. Double-click the desktop icon “  ” to run the software.

2. Open the software. In the upper-right corner of the software UI, you can click the "  " icon to configure the following settings: language, drone type, firmware upgrade, AI image module settings, software updates, and version information.



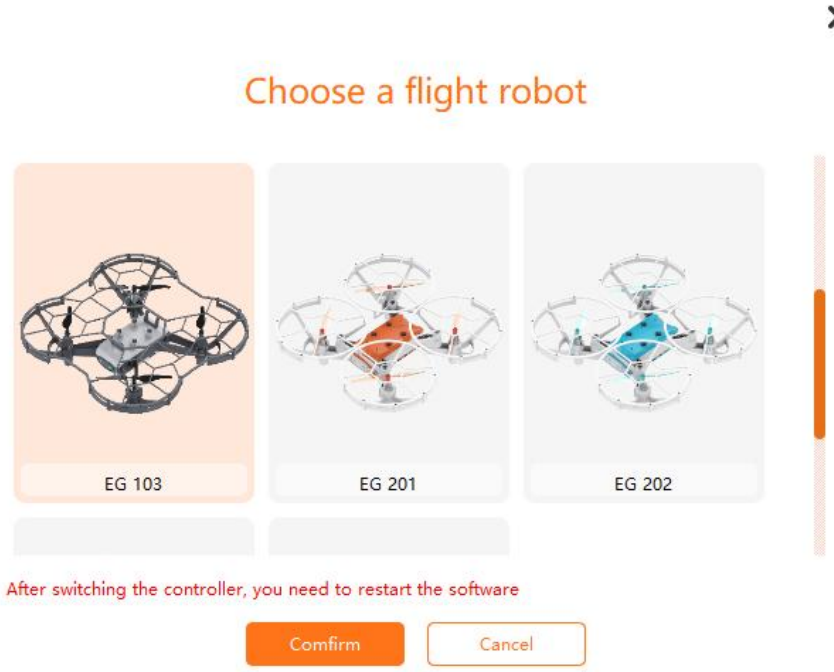
(1) Language

You can select one of the following eight languages to display on the software UI.



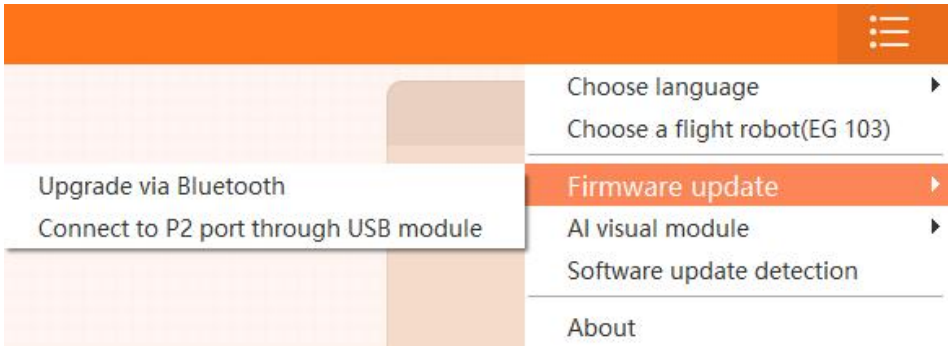
(2) Drone type

You can select the drone type as required. Before programming, make sure that you have selected the correct robot type. If you use Eagle 1003, select "EG 103".



(3) Firmware upgrade

WhalesBot periodically updates the controller system, so please update the firmware in a timely manner. Eagle 1003 offers two methods for firmware upgrades:



① Through Bluetooth pairing:

Step A: Pair the remote control with the drone through Bluetooth. Then, use a standard Type-C cable to connect the remote control to the laptop or computer where the software runs.

Step B: Click the " " icon in the top toolbar of the software. Then, click the " " icon in the upper-right corner, and choose "Firmware update" > "Upgrade via Bluetooth". Then, in the dialog box that appears, click the "Start upgrade" button in the middle. Wait for five to eight minutes until the upgrade succeeds.

② Through USB-to-serial adapter:

Step A: Take out the USB-to-serial adapter from the kit and connect it to the drone's Port P2. Then, use a Type-C cable to connect the USB-to-serial adapter to the laptop or computer.

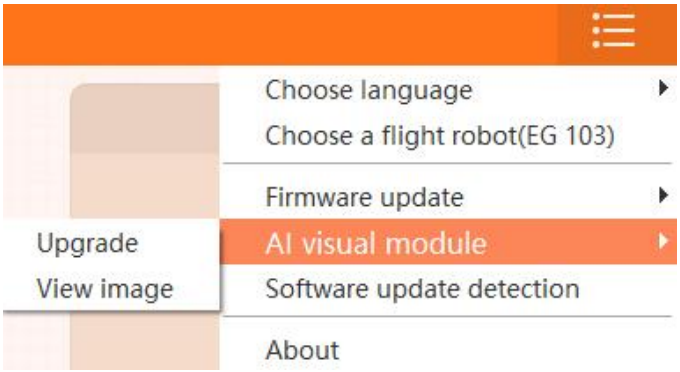
USB-to-serial adapter

Connection method

Step B: Repeat most of the operations in Step B of the previous method. When clicking the " " icon, choose "Firmware update" > "Connect to P2 port through USB module". After you click the "Start upgrade" button, wait for about ten minutes until the upgrade succeeds.

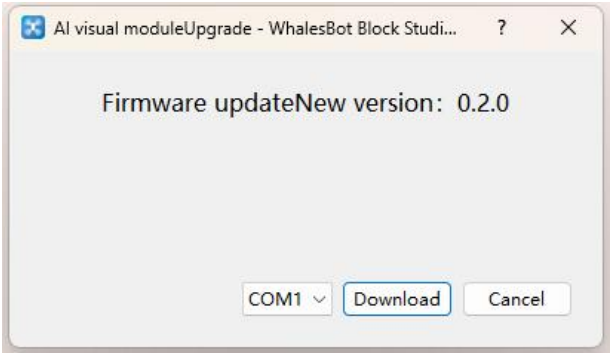
(4) AI image module

You can configure the following two settings for the AI image module:



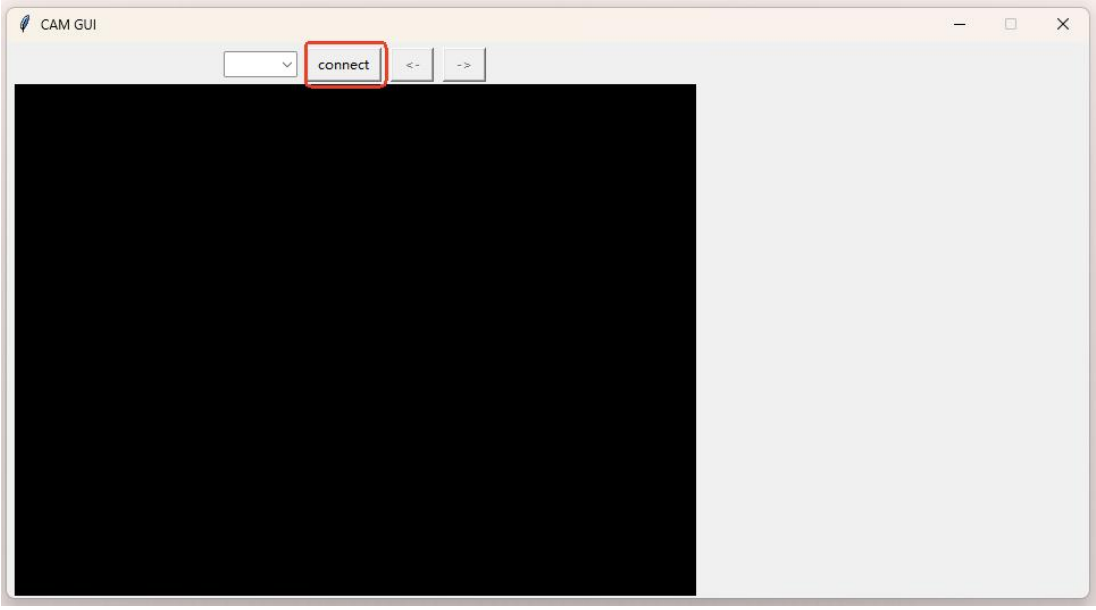
① Upgrade:

WhalesBot periodically upgrades the firmware of the AI image module. Be sure that you download and adopt the latest upgrade in a timely manner. To do so, choose "AI visual module" > "Upgrade". In the dialog box that appears, check if the correct COM interface is selected and click "Download".



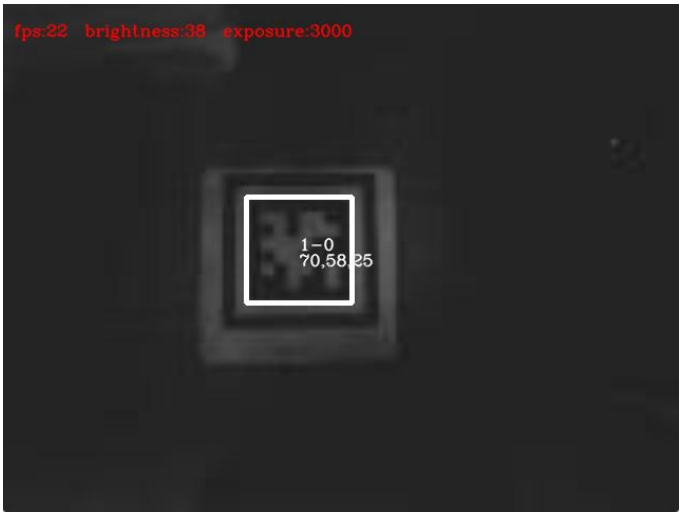
② View image:

Use a Type-C cable to connect the AI image module to the laptop or computer. Then, choose “AI visual module” > “View image”. The AI image module can store up to 10 photos.



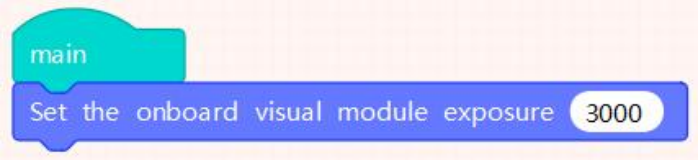
Note: You can click the camera icon “ ” at the lower part of the right menu bar. This feature is used to calibrate the AprilTag recognition feature for the AI image module.

(1) Disconnect the Type-C cable from the remote control (the remote control and drone remain connected). Then, connect the Type-C cable to the USB-to-serial adapter and click the camera icon “ ”. The following window will appear:



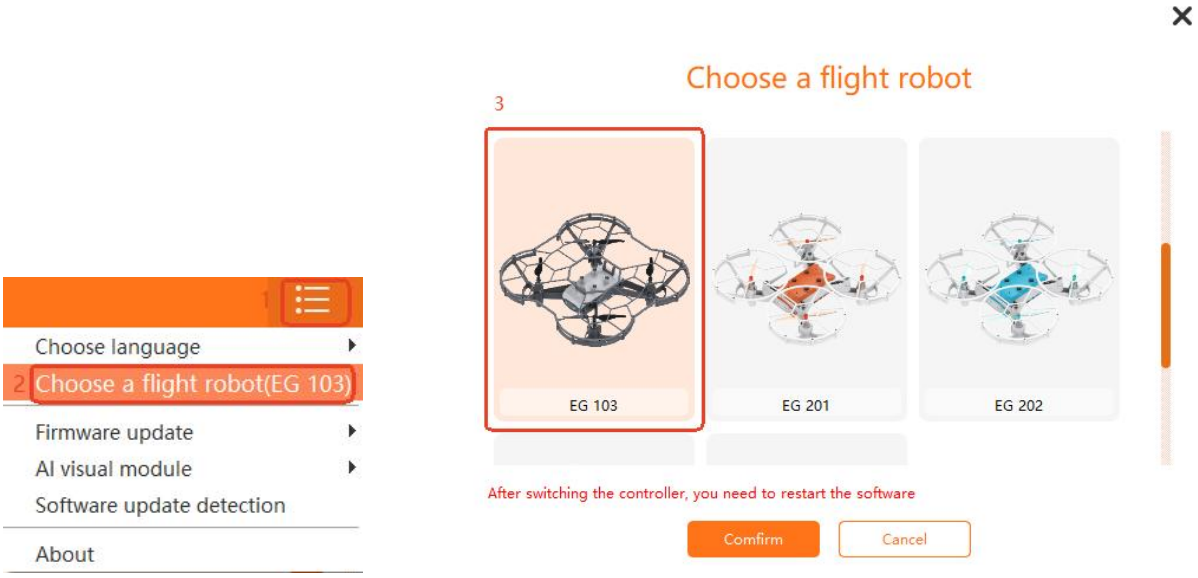
(2) The default exposure value is 1000. In the image above, the exposure value is 3000. You can adjust the exposure value using the “up” and “down” buttons on the left side of the remote control. The “up” button increases the value, while the “down” button reduces the value.

(3) When the window shows a steady white frame around the detected AprilTag without any blinking, it indicates that the current exposure value is well-suited for the environment and the AI image module can stably recognize AprilTags. Remember this exposure value. When programming the drone, you will need to enter this value, as shown in the following figure. In this example, the value is 3000.



Ⅲ. Pair drone with remote control

1. Double-click the “ ” icon on the desktop to run the software.
2. In the upper-right corner of the UI, click “ ”, select the drone type, and then click “Confirm”.

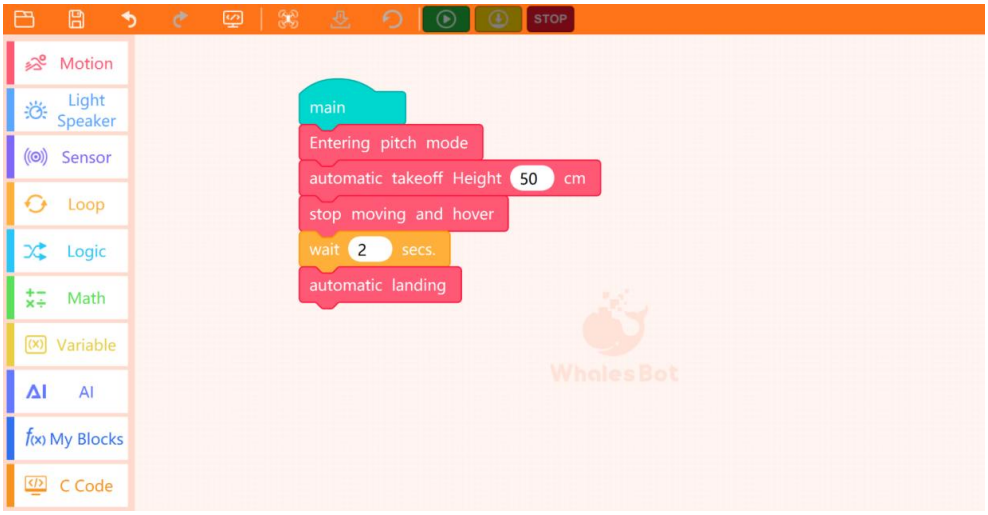


3. Pair the remote control and the drone. Then, use a Type-C cable to connect the remote control to your computer or laptop.

4. Click the “ ” icon to connect to the drone.

Ⅳ. Edit and download program

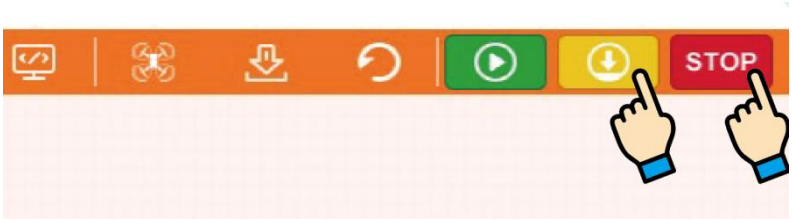
1. Edit the program for the drone. You can drag the required code blocks to the canvas and put them under the “main” block.



2. After you edit the program, click the “ ” icon to download the program.

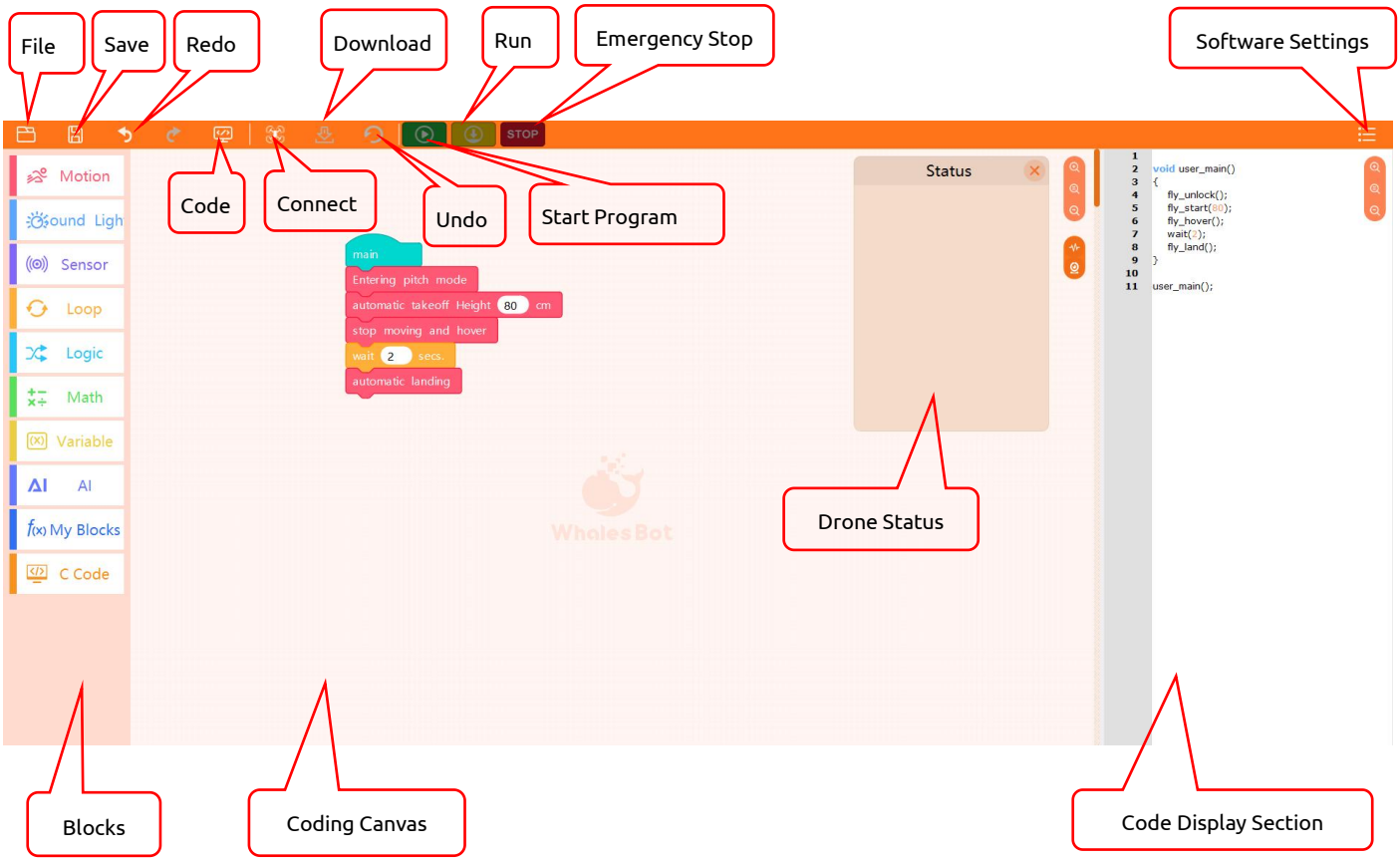
3. After the program is downloaded, click the “Run” icon in the UI or press the “Program Execution” button on the remote control to run the program.

4. If you need to stop the flight, click the “ ” or “ STOP ” icon in the UI or press the “One-press Landing” or “Emergency Landing” button on the remote control.



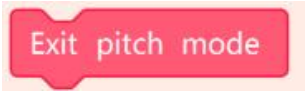
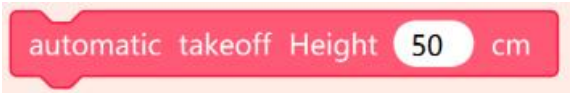
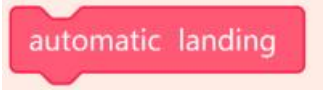
Ⅴ. UI introduction

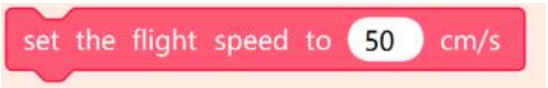
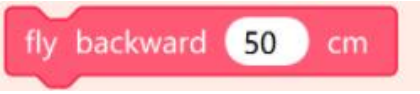
As shown below, code block categories are on the left, the coding canvas is in the middle, and the text-based program is displayed on the right. The text-based program is not displayed by default, and whether it is displayed is controlled through the “Code” icon in the top toolbar. The code displayed in the rightmost column is automatically generated and cannot be changed. If you need to change it, you can click the “Code” icon and switch to the C coding page or Python coding page.

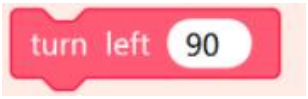
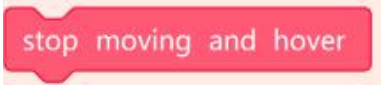


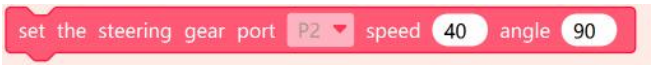
Ⅵ. Code blocks

1. Motion blocks

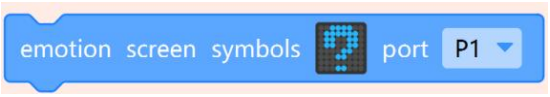
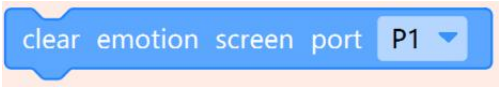
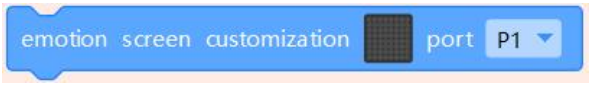
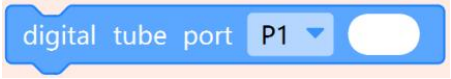
Block	Snapshot	Description
Entering pitch mode		The drone enters the flight mode. This block is put after the “main” code block, and is necessary for initiating takeoff.
Exit pitch mode		The drone exists the flight mode.
Takeoff		The flight height upon takeoff. This block must be put after the “entering pitch mode” code block. Otherwise, the drone cannot take off.
Takeoff settings		Configures the flight height, speed, and X-axis and Y-axis offset values upon takeoff.
Landing		The propeller motors decelerate for a smooth landing.

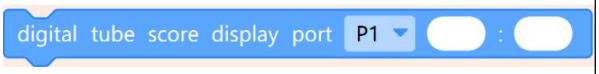
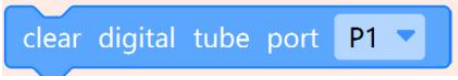
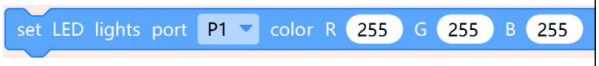
Landing settings		Configures the flight speed and X-axis and Y-axis offset values while landing.
Flight speed		Configures the flight speed.
Obtain current speed		Obtains the current flight speed.
Rise		Configures the distance for rising.
Down		Configures the distance for descending.
Forward		Configures the distance for forward movement.
Backward		Configures the distance for backward movement.
Leftward		Configures the distance for leftward movement.
Rightward		Configures the distance for rightward movement.

Turn left		Configures the speed for left rotation.
Turn right		Configures the speed for right rotation.
Speed and direction		Configures the flight speed and direction.
Distance and speed		Configures the movement distance and speed in three directions.
Stick settings		Configures the movement speed through sticks. Pitch: forward/backward speed. Roll: leftward/rightward speed. Throttle: climb/descent speed. Yaw: rotation speed.
Hover		The drone hovers.
Hover height		The drone hovers at a specific height.
Emergency stop		The propellers stop and an emergency landing is started.

Servo motor settings		Configures the speed and angle of the servo motor.

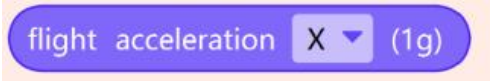
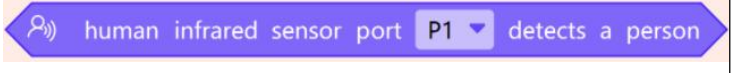
2. Sound and light-related blocks

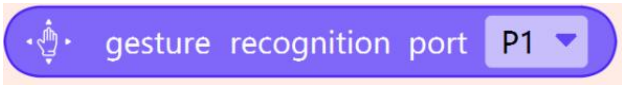
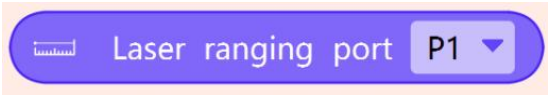
Block	Snapshot	Output device	Description
Debug		Laptop/computer screen	Displays the data to configure.
Emotion screen symbols		Dot-matrix display	Displays a pattern on a dot-matrix display.
Clear emotion screen		Dot-matrix display	Turns off the dot-matrix display.
Emotion screen customization		Dot-matrix display	Displays a custom pattern on the dot-matrix display.
Digital tube		Digital tube	Displays an integer on the digital tube. The integer can contain up to four digits.

Digital tube score display		Digital tube	Displays the scores of two teams on the digital tube. Each side displays a two-digit number.
Clear digital tube		Digital tube	Clears the content on the digital tube.
Set LED lights		RGB LED	Configures RGB values to specify the LED light colors at a specific port.
Drone light settings		Drone light	Configures the color of light on the drone head.
Electro-magnet		Electro-magnet	Specifies whether the electromagnets at specific ports attract or repel.

3. Sensor-related blocks

Block	Snapshot	Description
Flight altitude		Detects flight height.
Built-in laser ranging		Uses the built-in laser sensor to measure distance.

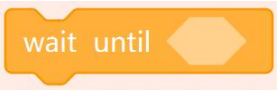
Battery voltage		Checks the current battery voltage.
Motherboard temperature		Detects the current temperature of the motherboard.
Pitch/roll/yaw angle		Detects the current pitch/roll/yaw angle.
Angular velocity		Detects the current angular velocity.
Acceleration		Detects the current acceleration.
Optical flow		Detects the value of the optical flow sensor.
Infrared ranging		Measures the distance between the drone and an obstacle using IR light.
Infrared obstacle detection		Detects whether an obstacle exists using IR light.
Infrared human detection		Detects whether there is a human using IR light.

Analog input		The value of an analog input from a specific port.
Ultrasonic distance		Uses ultrasonic waves to measure distance.
Ambient light		Detects ambient light.
Temperature		Detects temperature.
Humidity		Detects humidity.
Flame		Detects flames.
Gesture recognition		Detects hand gestures.
Laser ranging		Uses the external laser sensor to measure distances.
Laser height		Enables or disables laser-based height assessment.
Remote control button		Detects whether a button on the remote control is pressed or whether a

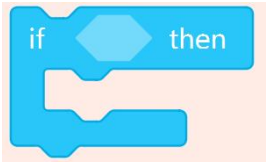
		stick on the remote control is pushed or pulled.
Current timer value		Stores the program time (the time that has passed since the program started) in a variable.
Reset timer		Resets the timer to zero.

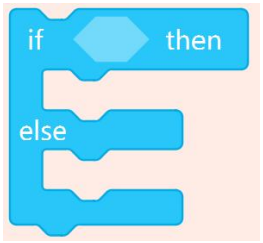
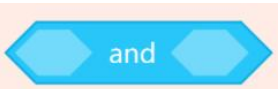
4. Loop blocks

Block	Snapshot	Description
Repeat forever		Equivalent to the while(1) loop in C programming, which indicates continuous execution of the contained statements indefinitely.
Repeat specific times		Equivalent to the for loop in C programming, which allows you to determine the iteration times through parameters or variables. In each iteration, the loop's body is executed.
If ... repeat		Equivalent to the while(0) loop in C programming, which allows you specify the condition to trigger an iteration. The condition can contain some parameters or variables. Each time the condition is met, the statement

		nested under this code block is executed.
Repeat until		Equivalent to the while(!(condition)) loop in C programming, which allows you to employ variables, sensor settings, or parameters to influence the loop's execution. The loop continues unless the condition is met.
Break		Equivalent to the break statement in C programming, which is used within loops. The loops end when the program control reaches the break statement.
Wait specific seconds		Specifies the duration (in seconds) during which the previous code block takes effect.
Wait until		Equivalent to the while(condition) loop in C programming. If the condition is met, the subsequent coding block is executed. If not, the previous coding block is executed.

5. Conditional and logical blocks

Block	Snapshot	Description
If ... then...		Equivalent to the if(condition) statement in C programming, which allows you to set a condition. If the condition is met, the code block following the if condition is run. If not, the subsequent coding block is executed.

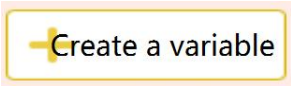
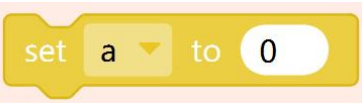
If ... then... else ...		Equivalent to the if(condition) ... else ... statement in C programming. If the condition is met, the code following the if clause is run. If not, the code following the else clause is run.
<		Performs a “less than” comparison between two parameters, variables, or conditions.
>		Performs a “greater than” comparison between two parameters, variables, or conditions.
=		Evaluates equality between two parameters, variables, or conditions.
Not equal		Assesses inequality between two parameters, variables, or conditions.
And		Applies a logical AND to two conditions. If both conditions are true, the outcome is true. If one or more conditions are false, the outcome is false.
Or		Applies a logical OR to two conditions. If one or more conditions are true, the outcome is true. If both conditions are false, the outcome is false.
Not		The negation, which indicates the inverse of the original condition. If the specified condition is not met, the outcome of this block is true.

6. Mathematical blocks

Block	Snapshot	Description
+		Adds together parameter values or variable values that are entered.
–		Subtracts parameter values or variable values that are entered.
×		Multiplies parameter values or variable values that are entered.
÷		Divides parameter values or variable values.
Pick random		Generates a random number within a specific range. The values that are entered specify the range. The values can be from 0 to 999999.
Calculate remainder		Calculates the remainder after dividing the user-specified parameters or referenced variables.
Round		Rounds off a parameter value or variable value that is entered.
Mathematical function		Applies a mathematical function to a parameter value or variable value that is entered.

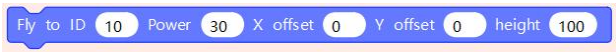
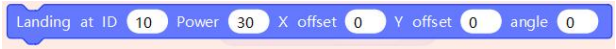
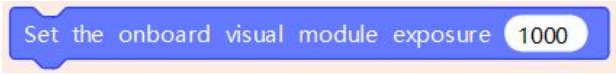
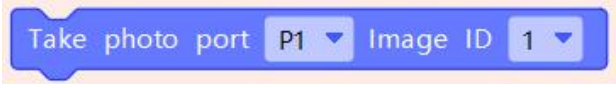
7. Variable blocks

A variable is a named location that stores a value. A variable usually has specific characteristics.

Block	Snapshot	Description
Create a variable		Creates and names a variable.
Set variable value		Stores a parameter value or a value returned by a sensor into a variable.
Increase variable value		Increases a variable value.

8. AI-related blocks

Block	Snapshot	Description
QR code recognition		Recognizes an AprilTag of a specific ID. The recognition can succeed only if the drone is 50 cm to 150 cm away from the AprilTag.
QR code map mode		Identifies and helps adjust the number of AprilTags in each row and the distance between two AprilTags. This block must be used before the drone starts identifying AprilTags.

Fly to ID		Specifies the motor power, flight height, and X-axis and Y-axis offset values to fly towards an AprilTag of a specific ID.
Hover on ID		Specifies the duration, the flight angle, and the X-axis and Y-axis offset values to hover above an AprilTag of a specific ID.
Landing at ID		Specifies the motor power, flight angle, and X-axis and Y-axis offset values to land on an AprilTag of a specific ID.
Set onboard visual module exposure		Specifies the exposure value for the AI image module to clearly sense ambient light.
Take photo port		Takes images through an AI image module connected to a specific port.

9. Customized code blocks

In a program, some of the code blocks may be exactly the same or the main program may be too long. In this case, in order to simplify the program, you can customize a subprogram to contain and simplify the duplicate code blocks.

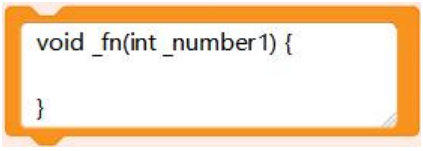
When you run the program, the program control goes to the subprogram by invoking the

subprogram. After the subprogram is run, the control returns to the main program and subsequent code blocks.

Block	Snapshot	Description
Subprogram		The name of the subprogram. Put this block to where the duplicate or lengthy code blocks initially are, in order to replace these code blocks.
Define subprogram		Defines the subprogram. Put this code block aside from the main program, and then put the duplicate or lengthy code blocks you want to replace under this code block.

10. C code

You can use the “C Code” block to write code in C language.



Chapter 4 Coding Examples

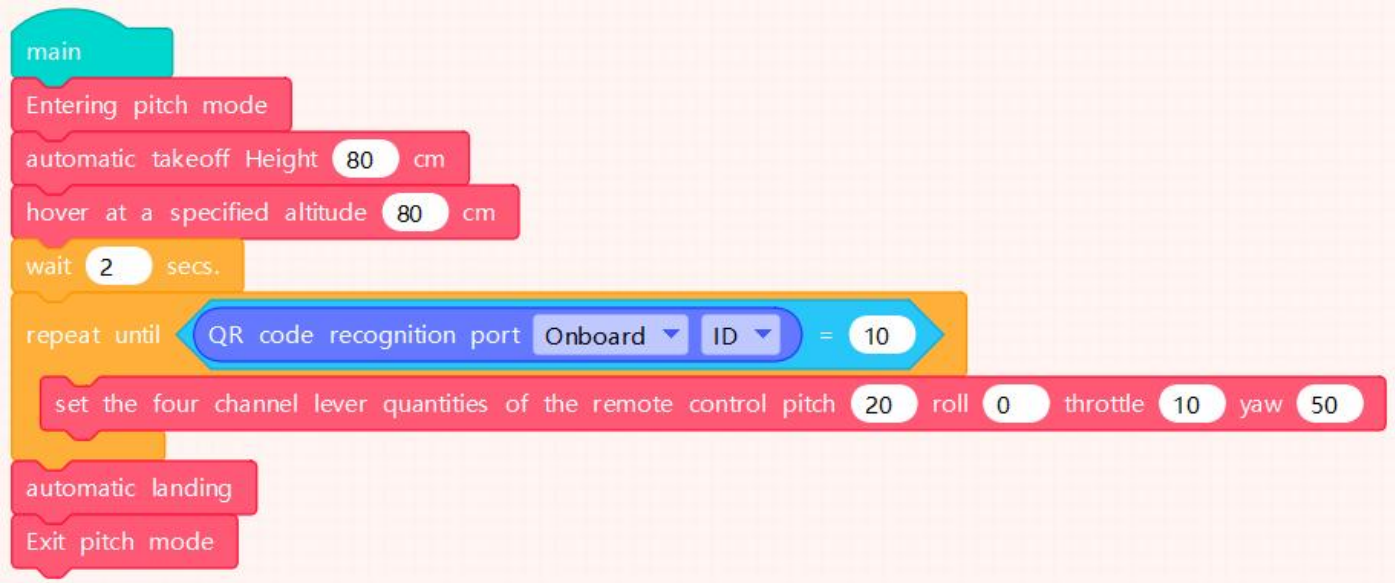
Ⅰ. Takeoff and landing

Put the drone on the open ground, stand at the back of the drone and face the drone tail, and then download and run the program. The drone takes off to a height of 80 cm from the ground, hovers for about 2 seconds and then rises 50 cm at a speed of 20 cm/s. Then, the drone advances 50 cm, and hovers in the air for 5 seconds before landing. Sample program:

Ⅱ. Use of sensors and actuators

1. AI image module

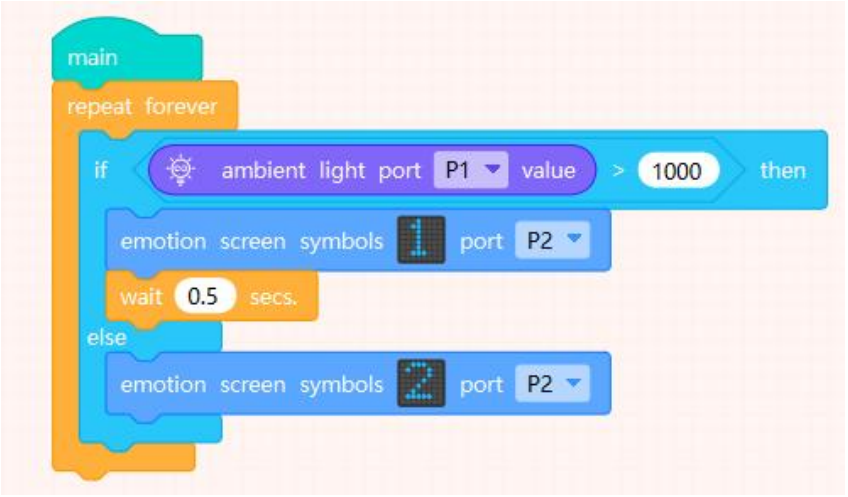
The built-in AI image module can recognize AprilTags to obtain the drone's current coordinates and angles. In this use case, the drone takes off to a height of 80 cm from the ground, hovers 2 seconds, and then flies as coded. When the drone detects the AprilTag whose ID is 10, it lands onto the ground. Sample program:



2. Ambient light sensor and dot-matrix display

The ambient light sensor detects the intensity of ambient light, and is often used for interactive projects with light-based effects. It can connect to the drone's P1 or P2 port.

Connect an ambient light sensor to P1 and a dot-matrix display to P2 through 6-pin cables. In this use case, the ambient light sensor detects the light intensity of the surroundings. If the light intensity exceeds 1000, the dot-matrix display shows "1". Otherwise, it shows "2". Sample program:

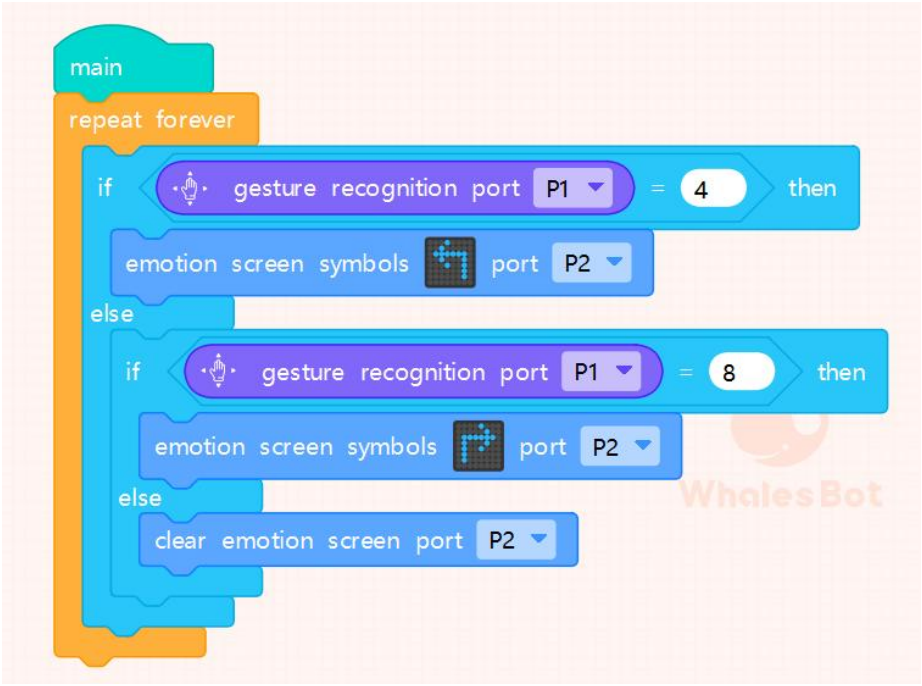


3. Gesture sensor and dot-matrix display

A gesture sensor can recognizes up to nine gestures: up, down, left, right, forward, backward, clockwise, counterclockwise, and wave. It can be used in scenarios like gesture-based remote controlling, robot interaction, and gesture gaming. It can connect to the P1 or P2 port.

Return value	Gesture	Return value	Gesture
0	None	16	Forward
1	Up	32	Backward
2	Down	64	Clockwise
4	Left	128	Counterclockwise
8	Right	256	Wave

Connect the gesture sensor to P1 and the dot-matrix display to P2 through 6-pin cables. In this use case, if you swipe your hand from left to right, the dot-matrix display shows the “Turn Right” sign. If you swipe your hand from right to left, the dot-matrix display shows the “Turn Left” sign. Sample program:



4. Infrared sensor

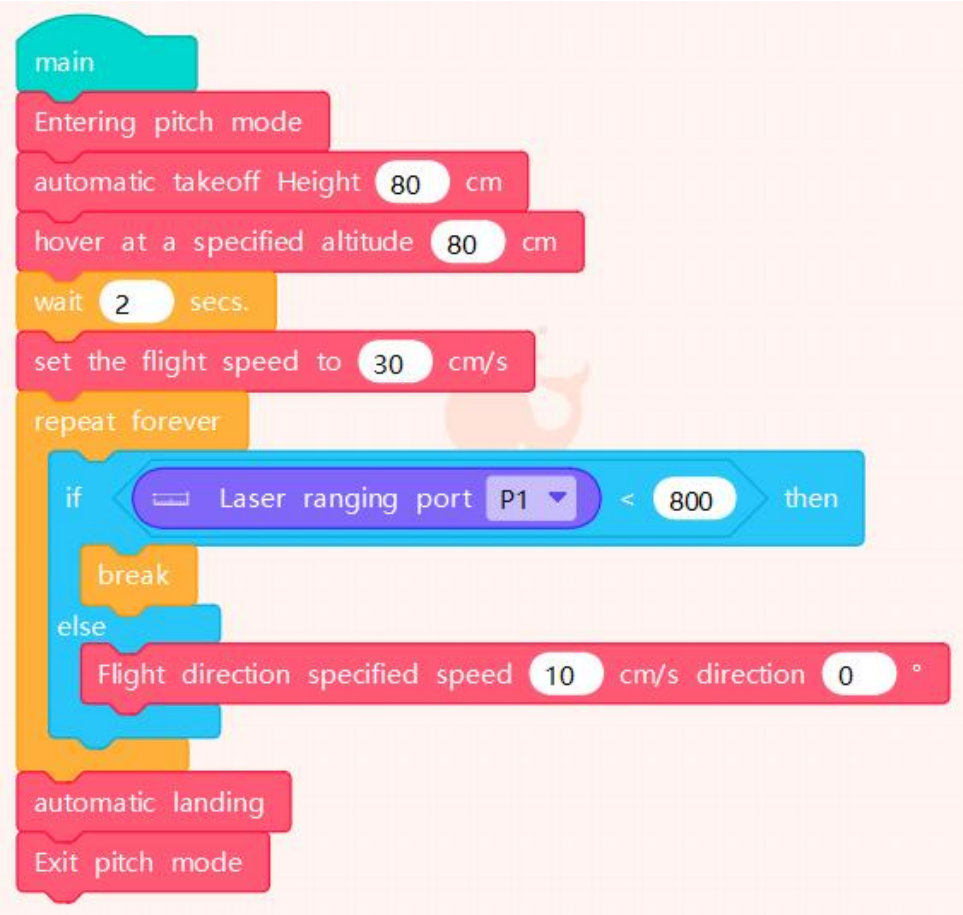
The infrared sensor is an analog input module that transmits and receives infrared light. It measures distances from 8 to 80 cm through light reflection from a surface (the supported distance range varies if the surface color is not white). It can be connected to the P1 or P2 port of the drone.

Connect the infrared sensor to the P1 port through a 6-pin cable. In this use case, the drone performs the following operations: The drone takes off. If it detects an obstacle ahead, it lands. If not, it continues to fly forward. Sample program:

5. Laser ranging sensor

The laser ranging sensor measures a distance of 30-1200 mm, and is accurate to millimeters. It is often used in scenarios like high-precision distance ranging, distance-based triggering, and obstacle detection. It can connect to the drone's P1 or P2 port.

Connect the laser ranging sensor to P1 through a 6-pin cable. In this use case, the drone performs the following operations: The drone takes off. If an obstacle is detected less than 800 mm away in the front, the drone stops moving and lands. Otherwise, the drone keeps flying forward. Sample program:

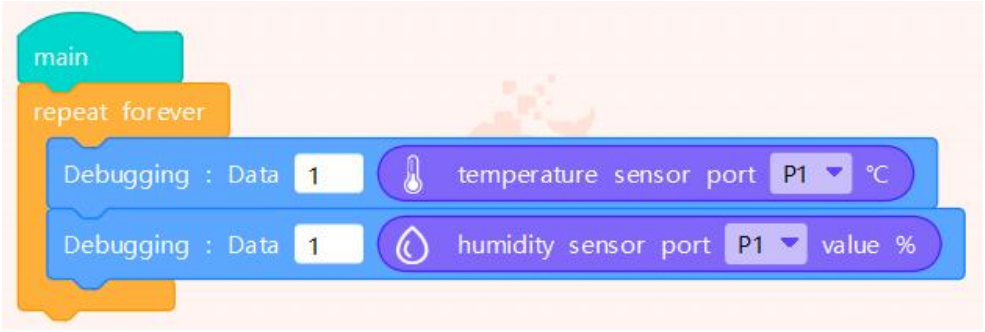


6. Temperature and humidity sensor

The temperature and humidity sensor detects temperature and humidity. It can measure relative humidity from 0 to 100% and temperatures from -40°C to 125°C. It is commonly used in projects related to temperature and humidity, and can connect to the P1 or P2 port of the drone.

Connect the temperature and humidity sensor to P1 through a 6-pin cable. In this use case, the drone monitors and displays the temperature and humidity in real time. The detected data results are displayed as "Debugging 1" and "Debugging 2" in the upper right corner of the

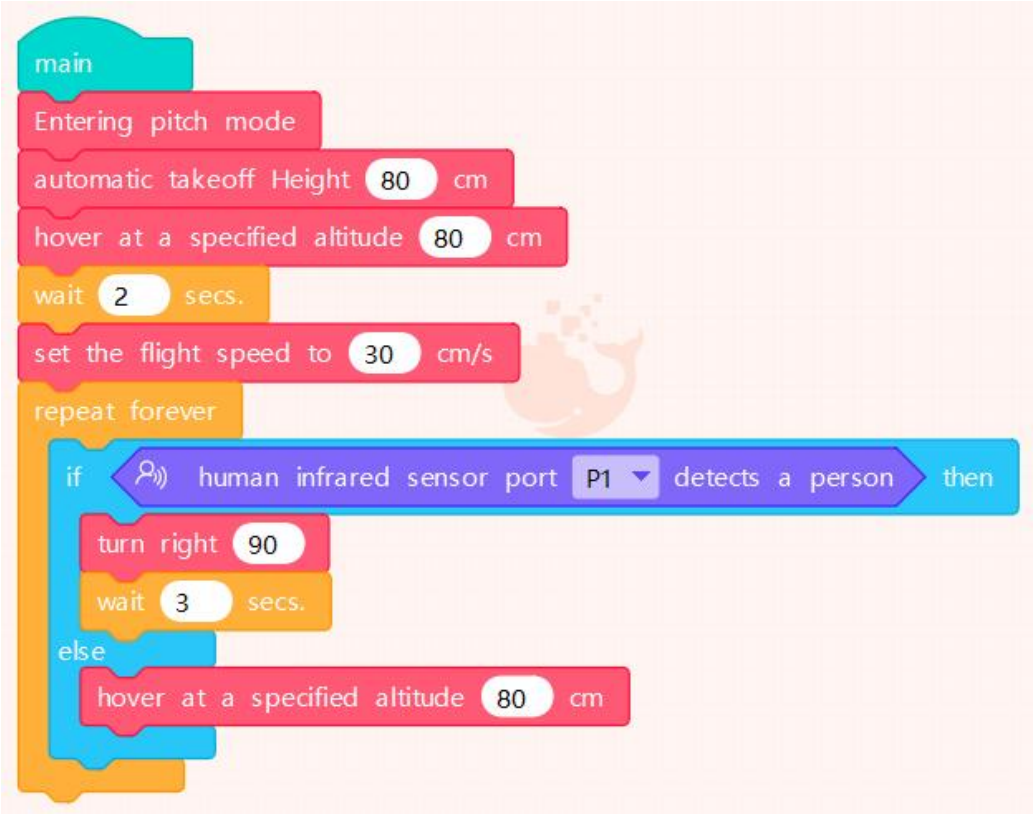
coding software. Sample program:



7. Human infrared sensor

The human infrared sensor, also known as a pyroelectric infrared sensor, detects infrared radiation emitted by humans or animals and outputs an electrical signal. It can be applied in various situations that require detecting moving bodies. It can be connected to P1 or P2.

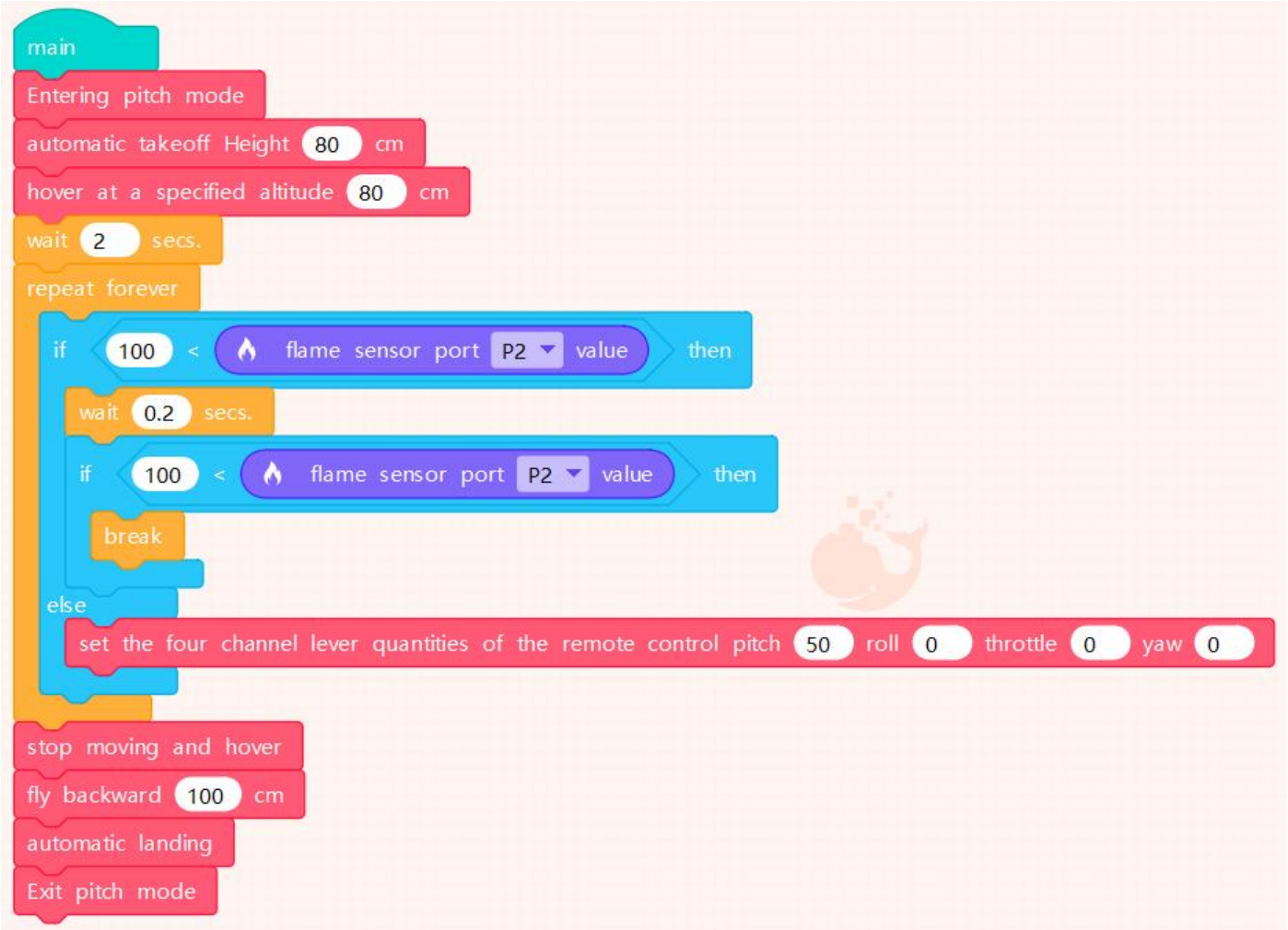
Connect the sensor to the P1 port through a 6-pin cable. In this use case, the drone performs the following operations: After the drone takes off to a height of 80 cm from the ground, it hovers and stops moving. When a human signal is detected, the drone rotates 90 degrees to the right. Sample program:



8. Flame sensor

The flame sensor is an analog input module that can detect fire sources, but it is not fire-resistant itself, so a safe distance from fire sources should be maintained during use. It can be connected to the P1 or P2 port of the drone.

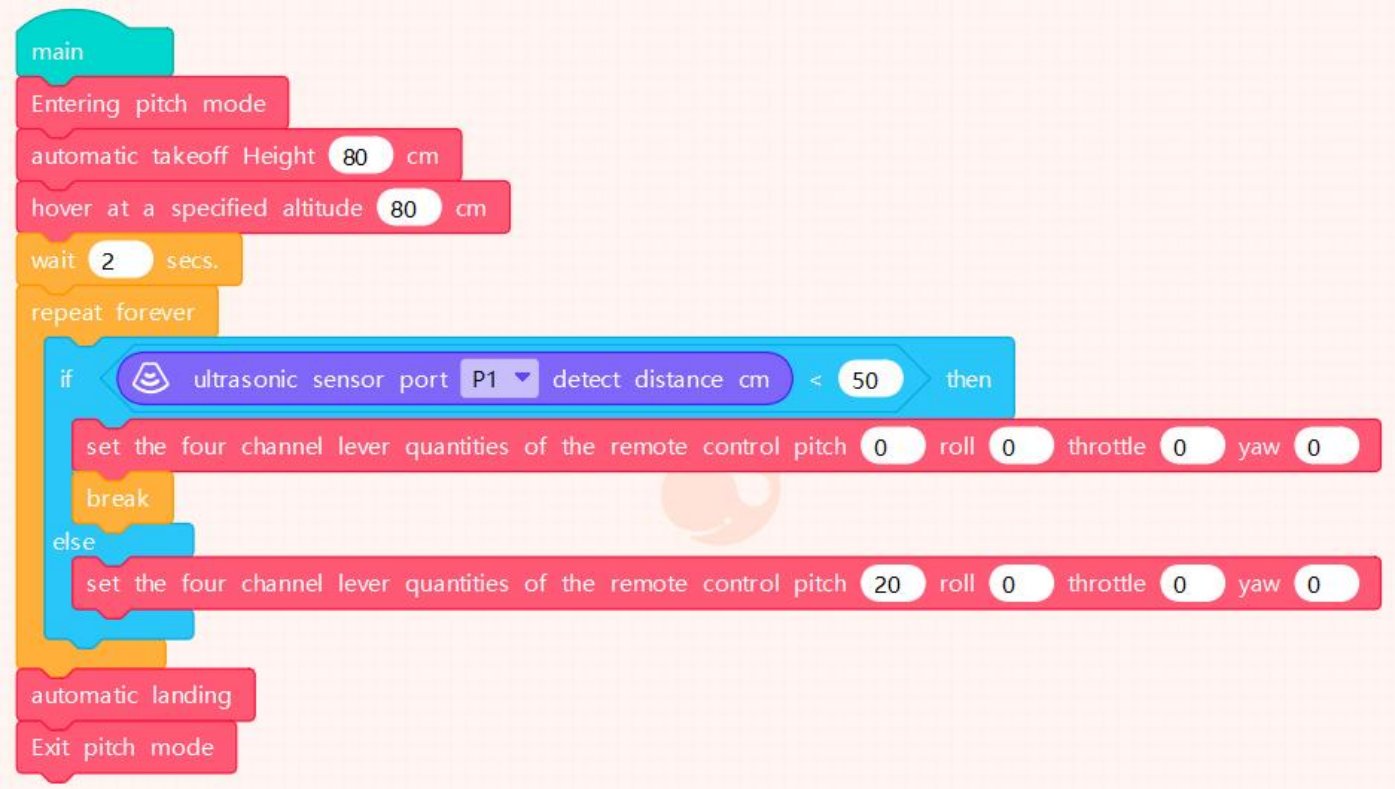
Connect the flame sensor to the P2 port of the drone using a 6-pin cable. In this use case, the drone performs the following operations: The drone takes off to a height of 80 cm, hovers 2 seconds, and then moves forward. If the flame sensor returns a value greater than 100, the drone flies back 100 cm, and then lands. Sample program:



9. Ultrasonic sensor

The ultrasonic sensor uses ultrasonic waves to calculate distance based on the time when the emitted ultrasonic wave is sent and the time when its echo is received. It can measure distances from 5 cm to 300 cm and is accurate to centimeters. It is commonly used in obstacle detection, and can be connected to the P1 or P2 port of the drone.

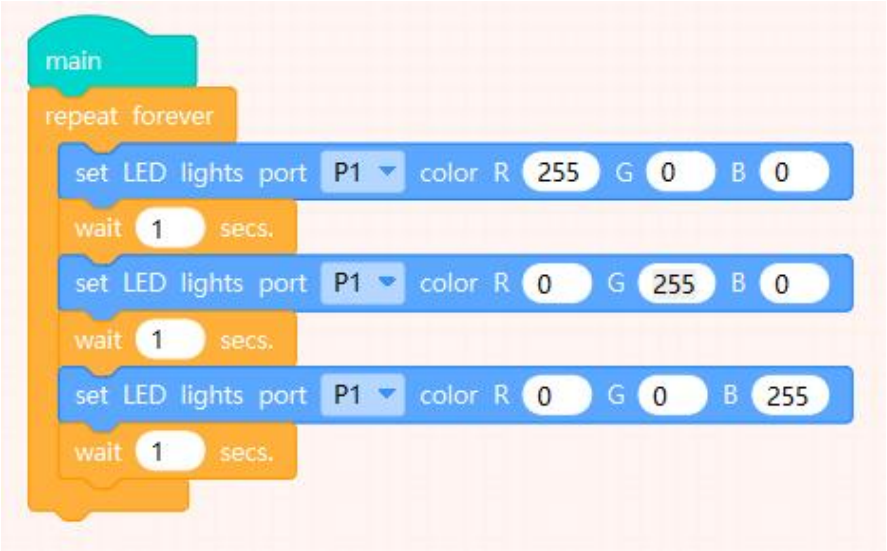
Connect the ultrasonic sensor to the P1 port of the drone using a 6-pin cable. In this use case, the drone performs the following operations: After the drone takes off to a height of 80 cm, it hovers 2 seconds. Then, it flies forward until it detects an obstacle 50 cm away. After it detects the obstacle, it stops moving and lands. Sample program:



10. RGB LED

The RGB LED mixes red, green, and blue lights to emit lights of all colors. It can be connected to the P1 or P2 port of the drone. Connect the RGB LED to the P1 port of the drone using a 6-pin cable. In this use case, the RGB LED glows red for 1 second, then glows green for 1 second, then

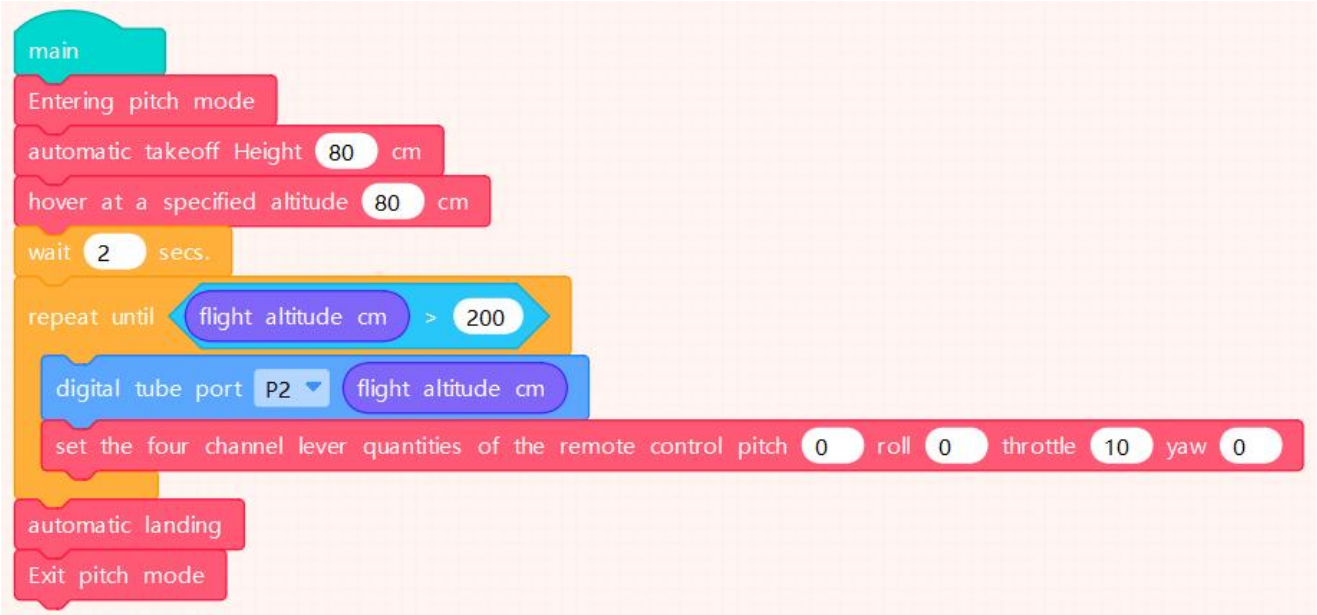
glows blue for another second, and then cycles back to red, continuously. Sample program:



11. Digital tube

The digital tube can display numeric values in numeric display mode or competition score mode. It can connect to the P1 or P2 port of the drone.

Connect the digital tube to P2 through a 6-pin cable. In this use case, the drone performs the following operations: The drone takes off to a height of 80 cm, hovers 2 seconds, and then ascends slowly while displaying the height on the digital tube. When the height exceeds 200 cm, the drone lands. Sample program:



Precautions

Ⅰ. Precautions on batteries and charging

1. The drone is powered by a lithium battery of 3.8V and 1100mAh.

2. The battery can be charged only under adult supervision and by using methods or devices provided or required by WhalesBot.

3. Keep the drone away from water, fire, dampness, or areas with high temperatures to prevent malfunction or safety risks.

4. Make sure that the drone is fully charged before it is idle.

5. Use the recommended adaptor (5V, 1A) to charge the battery.

6. Operate the drone at the ambient temperature of 0℃ to 40℃.

7. If the battery cannot be charged or has issues like deformation or excessive heating, stop charging the battery and contact the after-sales personnel of WhalesBot. Do not disassemble the battery by yourself.

II. Care and maintenance

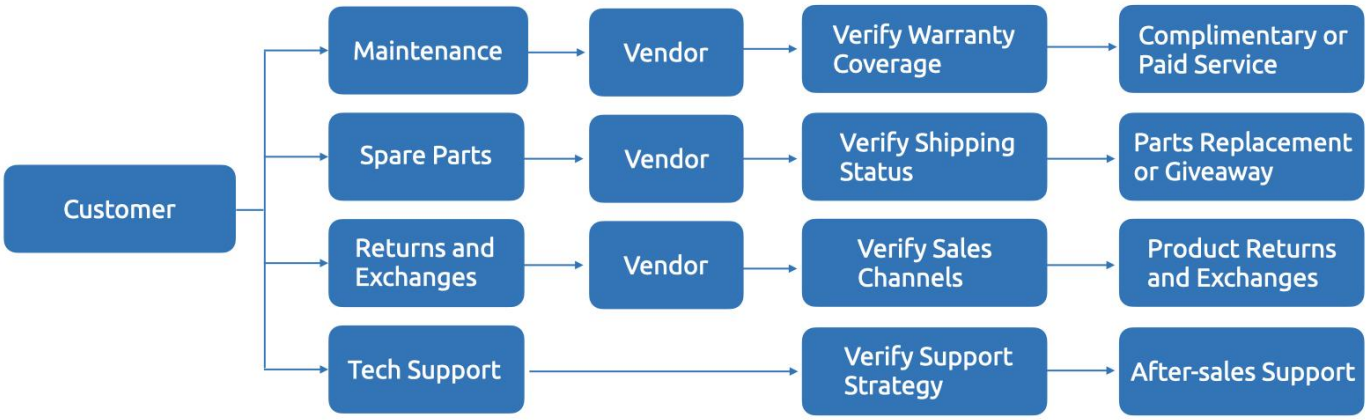
1. The remote control has a large number of delicate circuits. Put it in a cool and dry environment when it is not used for an extended period.

2. Before you clean the drone, power off the drone and disconnect it from external power sources. Wipe the drone with a dry cloth or an alcohol wipe of less than 75% concentration.

3. We recommend that you keep the components of the drone by category for efficient reuse.

After-sales Service Policy

Ⅰ. After-sales service procedure



1. If you request repairs, replacements, and returns, contact your vendor to initiate your request. If you cannot contact your vendor, contact WhalesBot and provide a valid proof of purchase such as a receipt, invoice, or contract.

2. If the vendor cannot resolve your requests, contact the personnel of WhalesBot.

3. You can contact the personnel of WhalesBot by submitting a ticket on the following web page or sending emails to the following email address:

Web page: https://www.whalesbot.ai/contact

Email: service@whalesbot.com

II. Warranty period

Component type	Warranty period	Description
Motors	6 months	Include motors and servos.
Rechargeable batteries	6 months	Independent, removable, and rechargeable batteries.
Electronics	12 months	Exclude motors and rechargeable batteries.
Cables and circuits	12 months	Include USB cables, motor cables, and servo cables.
Precision transmission components	6 months	Include gearboxes and lead screws.
Plastic components	None	Free replenishment for missing plastic components within seven days after purchase.
Tools and print materials	None	Include screwdrivers, screws, maps, adhesive tapes, and manuals or user guides.

1. If you are unsure about the warranty status of an item, consult your vendor or our after-sales personnel, or send the item to our technicians for assessment.

2. The warranty starts from the purchase date. If you have a dispute over the warranty period, contact us and present a valid invoice or contract.

3. If the warranty start date is not explicit, it is considered 30 days after the date marked on the product, such as the date in the product code, ticket code, or the date silk-screened on the packaging.

For more information about the terms of WhalesBot, visit: https://www.whalesbot.ai/terms

About WhalesBot

WhalesBot stands at the intersection of innovation and education, dedicated to empowering the next generation with the wonders of robotics and AI. With over 20 years of experience in STEM education, we provide comprehensive robotics solutions for young minds aged 3 to 22. Our mission is to make learning engaging and accessible, fostering creativity, critical thinking, and technological fluency in students worldwide. WhalesBot is not just about robots; it's about building the future for young inventors.

FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.