WhalesBot Eagle

User Guide V0.1

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Chapter 1 Product Introduction

Ⅰ. Introduction

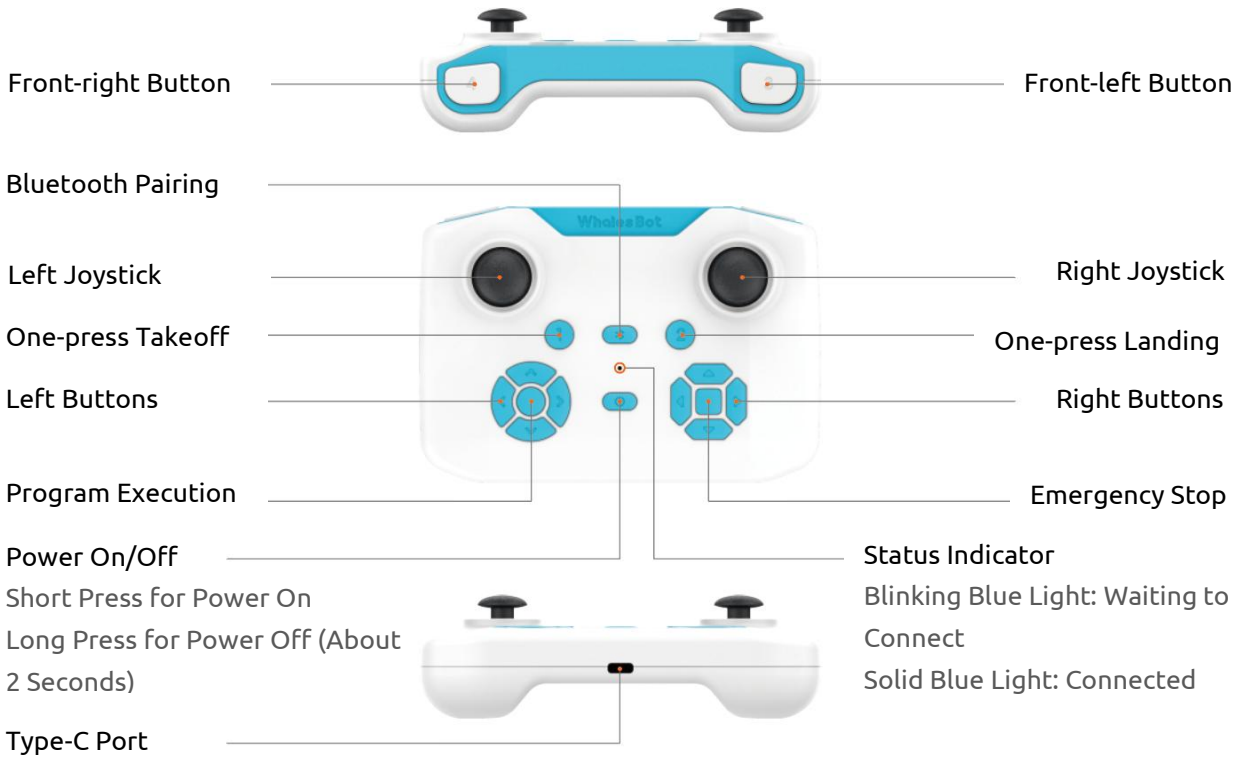
WhalesBot provides two types of drones: EG101 and EG102. The drones have the flight control system, laser sensor, optical flow sensor, gyroscope sensor, air pressure sensor and other sensors, and can stably hover and fly. The drones can be connected to the LED emotion screen, RGB LED, digital tube, electromagnet, servo motor and other actuators, as well as external ultrasonic, temperature and humidity, AI vision blocks, infrared, photosensitive, flame, gesture recognition, human infrared and other sensors. They can fly through remote controlling or programming. The maximum flight duration is about 10 minutes.

The WhalesBot drones have a runaway protection function that automatically stops the motor in accidental collision. The drones are also equipped with propeller protection covers for higher safety.

Ⅱ. Remote control and aircraft

1. Remote control

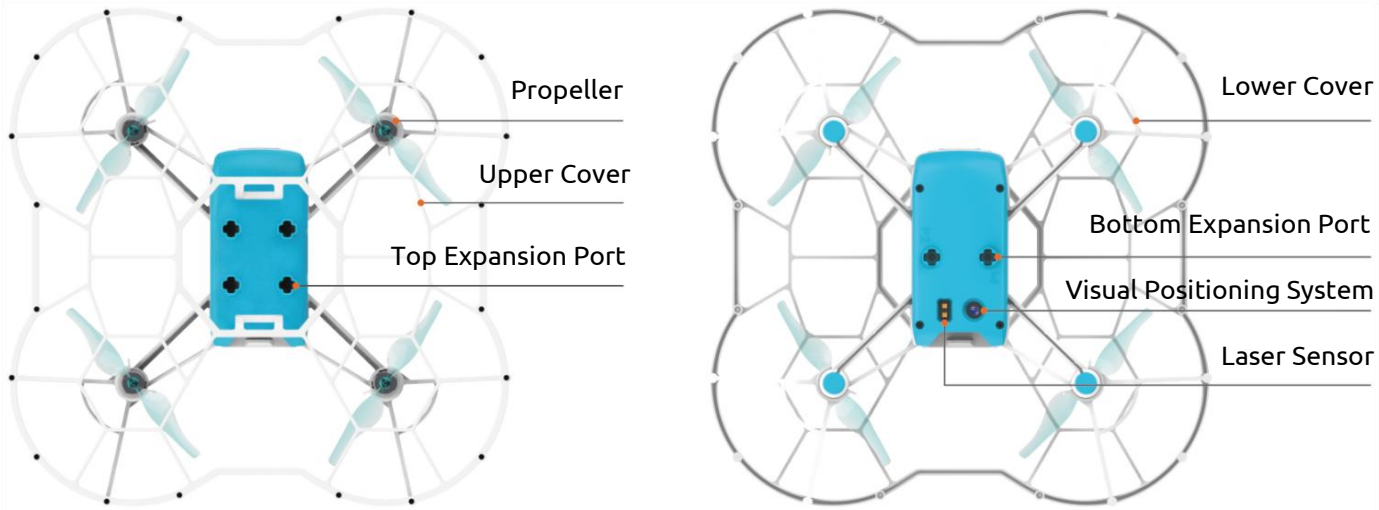
After the remote control is successfully connected to the Bluetooth of the aircraft, the aircraft can be controlled.

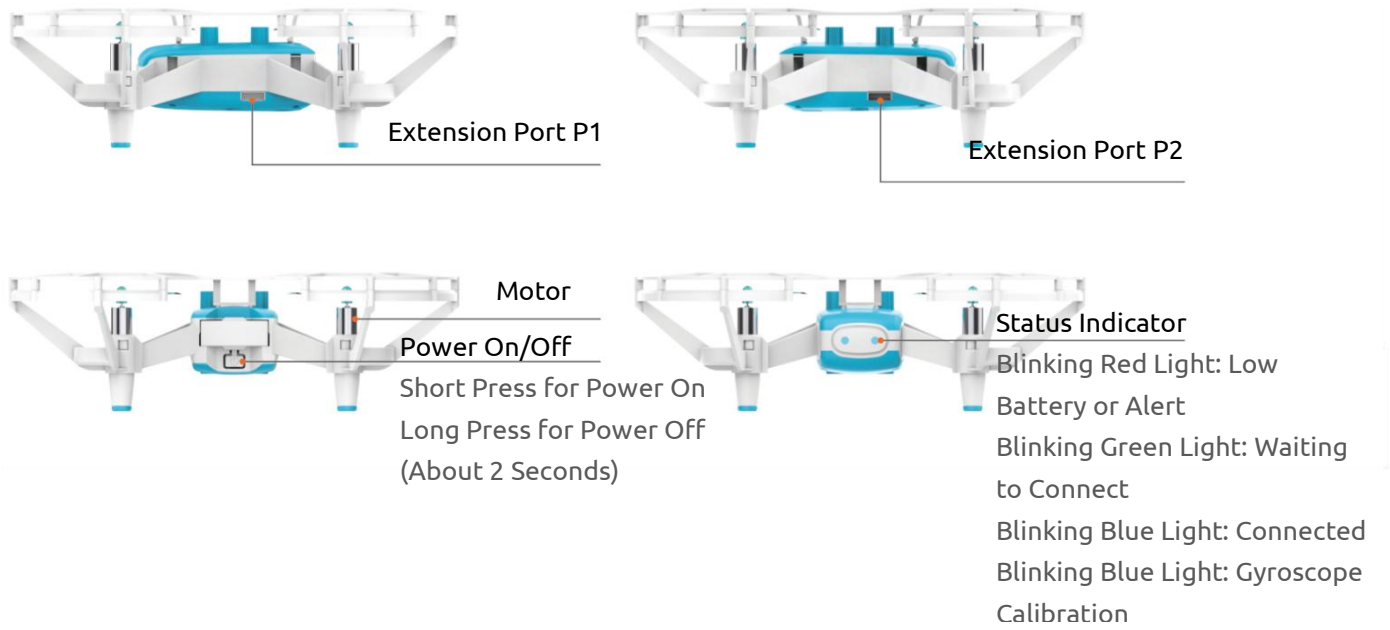


2. Aircraft

2.1 What is an aircraft

An aircraft consists of the following modules: a flight control system, a communications system, a positioning system, and a battery unit.



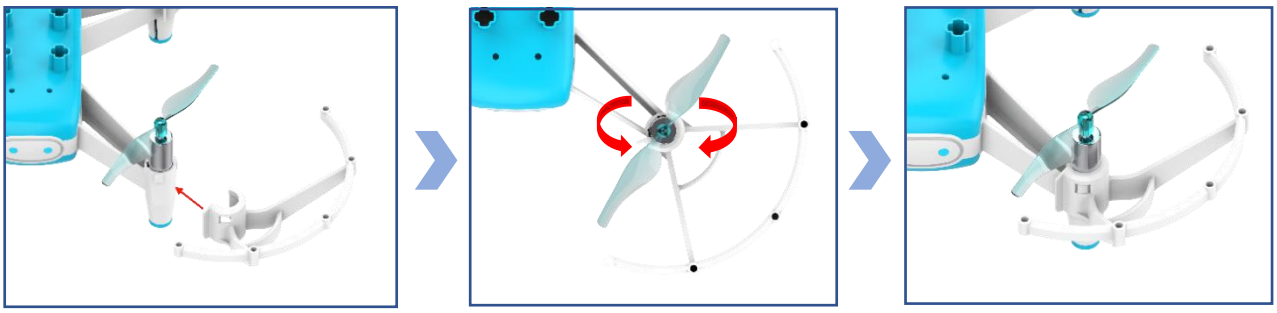


2.2 Installation and removal of protection cover

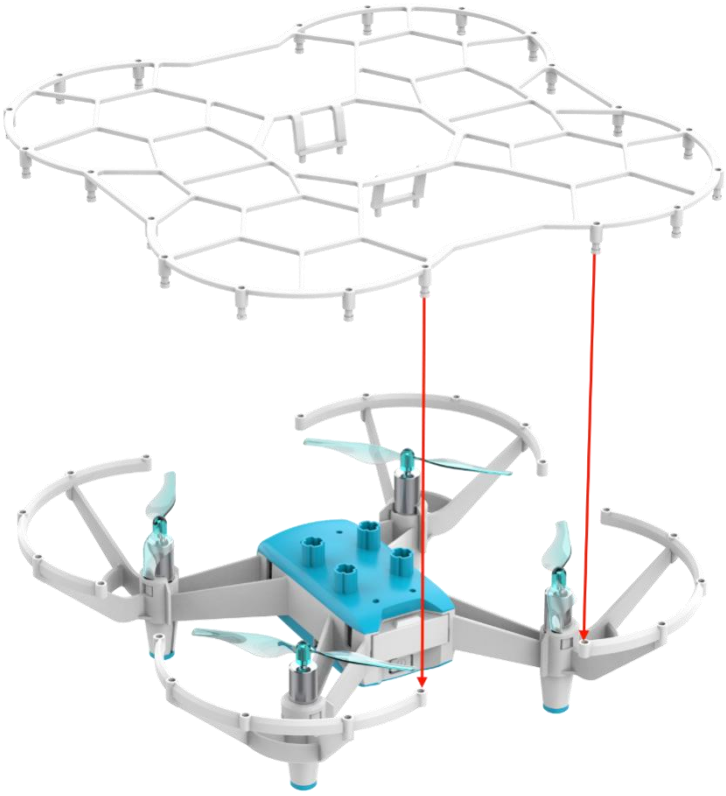
The protection cover is used to reduce the damage caused by a collision between the propeller and a person or object.

Installation

Press the installation position of both sides of the propeller protection cover inward and you will hear the sound of "click". Ensure that the groove of the protection cover firmly sticks to the projection of the tripod under the motor.

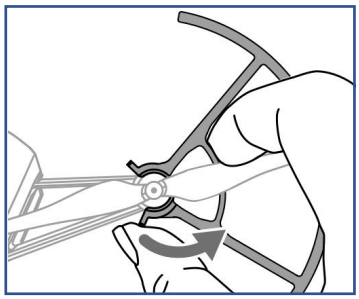


After the side propeller protection cover is installed successfully, align the upper cover with the hole, install and press it tightly.



Removal

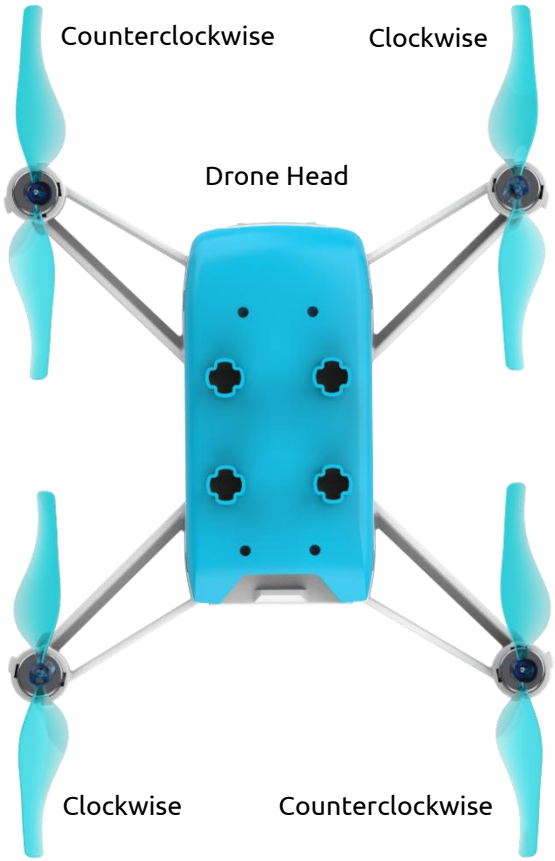
Remove the upper cover first, and then the side propeller protection cover. When removing the side propeller cover, hold the propeller and bend the cover outward.



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

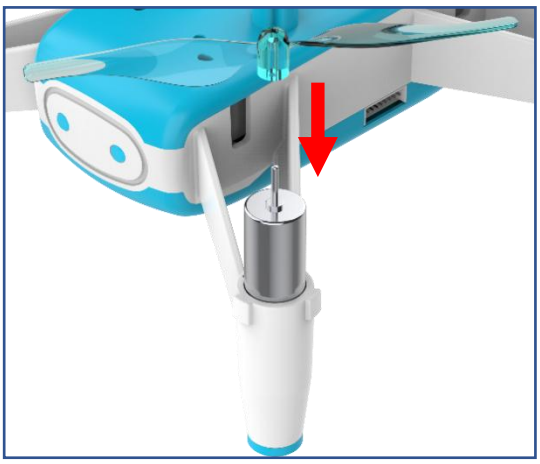
2.3 Propeller installation and removal

The aircraft uses 75mm quick-break propellers that rotate clockwise or counterclockwise.



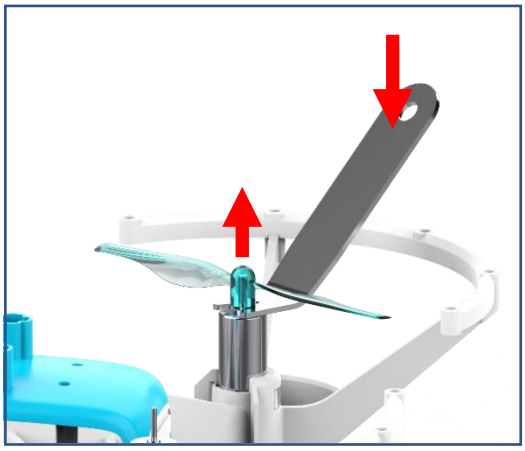
Installation

With the drone head as the front, the clockwise-rotated propeller is installed on the right front and left rear motor paddle seats, and the counterclockwise-rotated propeller is installed on the left front and right rear motor paddle seats (see the figure above). When installing, press firmly to ensure that the gap between the bottom of the cap and the motor can only contain the paddle removal tool.



Removal

Insert the removal tool into the gap between the bottom of the cap and the motor, hold the motor up to lift and then remove the propeller.



Note:

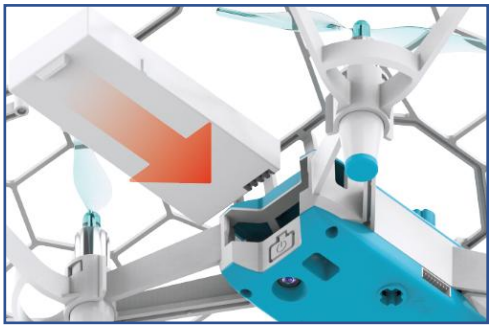
- ✧ Be sure to remove the propeller with a paddle removal tool. Do not remove it directly by hand. Otherwise, it will damage the motor or cut your finger.
- ✧ Do not get close to the rotating propeller and motor to avoid cuts.
- ✧ Please use standard propellers. Do not mix different types of propellers.
- ✧ Please check that the propeller is 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 installation and charging

The WhalesBot drone is powered by a battery with a capacity of 1100mAh, a voltage of 3.8V, and charge 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 right 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 charging interface 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 are in the normal range.

The rechargeable temperature range of the battery is 5°C to 40°C, and the ideal temperature range 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, do not purchase and use batteries other than the standard ones. Otherwise, the batteries may cause damage to the aircraft or safety accidents.

Chapter 2 Quick Start

Ⅰ. Bluetooth pairing and remote control use

1.Bluetooth pairing

① Short press the buttons to start the aircraft and remote control.

② Make the remote control close to the aircraft, and long press the Bluetooth button for the remote control.

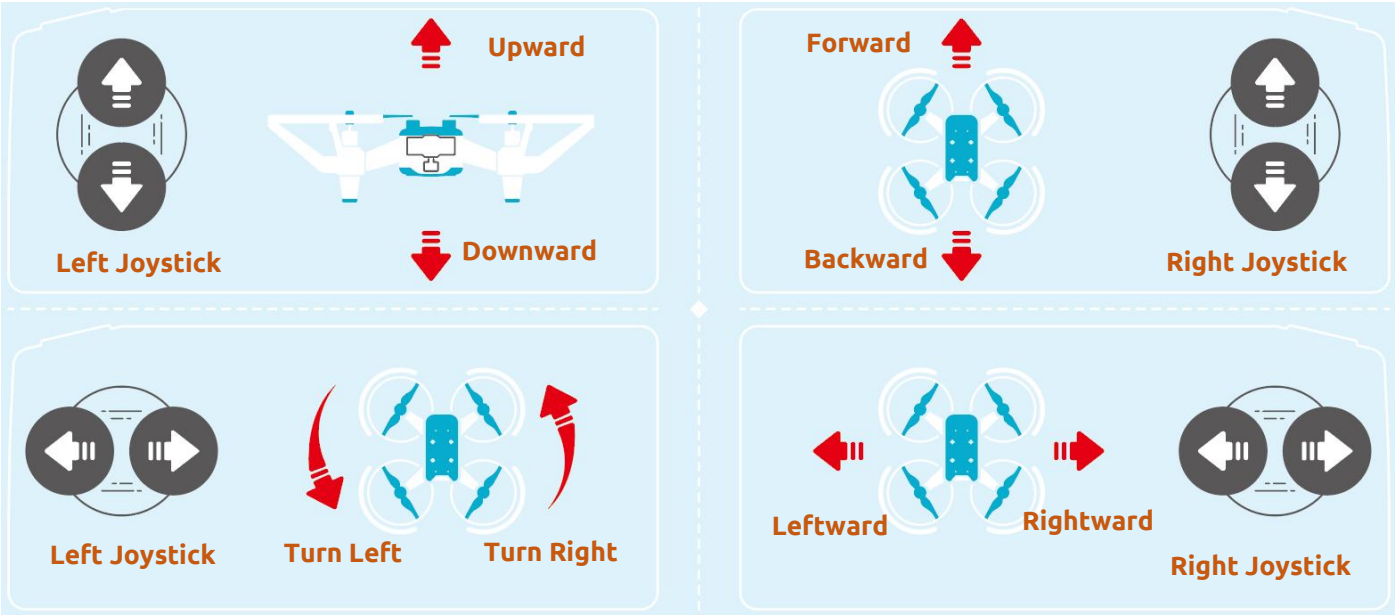
③ When the blue light of the aircraft flashes and the remote control's blue light is steadily on, the pairing is successful.

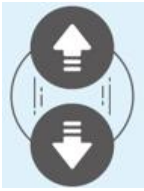
2. Remote-controlled flight

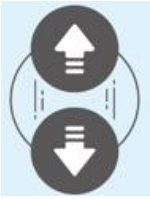
① Unlock: Move the joysticks in the “inner-eight” direction as shown in the following figure. At this time, the propeller rotates at a low speed, which indicates that the drone has been unlocked successfully.

② Takeoff and landing: Press the "1" button of the remote control, and the aircraft takes off. Press the "2" button of the remote control, and the aircraft will land.

③ Control: After the takeoff, the joystick can be used to control the drone. The left joystick can control the lifting and rotation of the aircraft, and the right joystick can control the flight direction.



Joystick	Operation
Left joystick 	The throttle joystick controls the drone's elevation. If you push the joystick upwards, the drone moves upwards. If you push the joystick downwards, the drone moves downwards. If the joystick is in its neutral position, the elevation remains unchanged.
Left joystick	The yaw joystick adjusts the drone's direction If you push the joystick leftwards, the drone rotates counterclockwise. If you push it rightwards, the drone flies clockwise. If the joystick is in its neutral position, the drone does not rotate. The joystick's movement directly influences the rotation speed. A wider movement increases the rotation speed.

Right joystick 	The pitch joystick manages the drone's forward and backward motion. If you push the joystick forward, the drone tilts and flies forwards. If you pull it backwards, the drone tilts and files backwards. If the joystick is in its neutral position, the drone does not tilt. The joystick's deflection degree determines the tilt angle and consequently, the speed of flight. A larger deflection results in a steeper tilt and quicker flight.
Right joystick	The roll joystick steers the drone sideways. If you push the joystick leftwards, the drone tilts and flies leftwards. If you push the joystick rightwards, the drone tilts and flies rightwards. If the joystick is in its neutral position, the drone does not tilt. The joystick's deflection degree determines the tilt angle and consequently, the speed of flight. A larger deflection results in a steeper tilt and quicker flight.

If there is an emergency, you can press the emergency stop button to land the drone.

Ⅱ. Flight environment requirements and basic flight procedures

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 large ground height difference (for example, from inside to outside of a floor). Otherwise, the positioning function is abnormal and the flight safety will be affected.

Battery performance is affected by air density and ambient temperature. When the aircraft is flying above 1000 meters, the performance of the battery and power system will be degraded due to environmental factors which will 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 flight site is not selected in accordance with the above provisions, 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 aircraft. This helps prevent possible injury or loss.

2.Basic flight procedure

After the aircraft and remote control are turned on and Bluetooth is connected, place them on a flat open ground with the user facing the tail of the aircraft.

At the same time, move the joysticks in the "inner eight" direction to unlock the aircraft.

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

The joystick controls the flight of the aircraft.

When it is necessary to descend, press the "2" button to make the aircraft slowly descend to the level ground.

After the aircraft is stopped, long press the power button of the aircraft and the remote control (about 2 seconds) to shut down them.

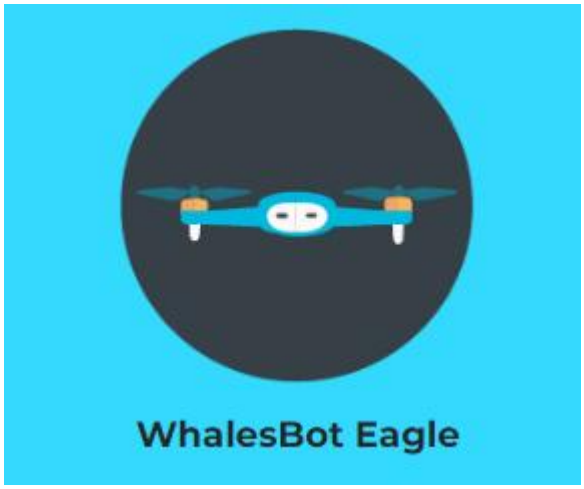
Chapter 3 Software Introduction

Ⅰ. Software download and installation

1. Software download link

https://www.whalesbot.ai/products/drone

Software name: WhalesBot Eagle



2. Download the package

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

Windows

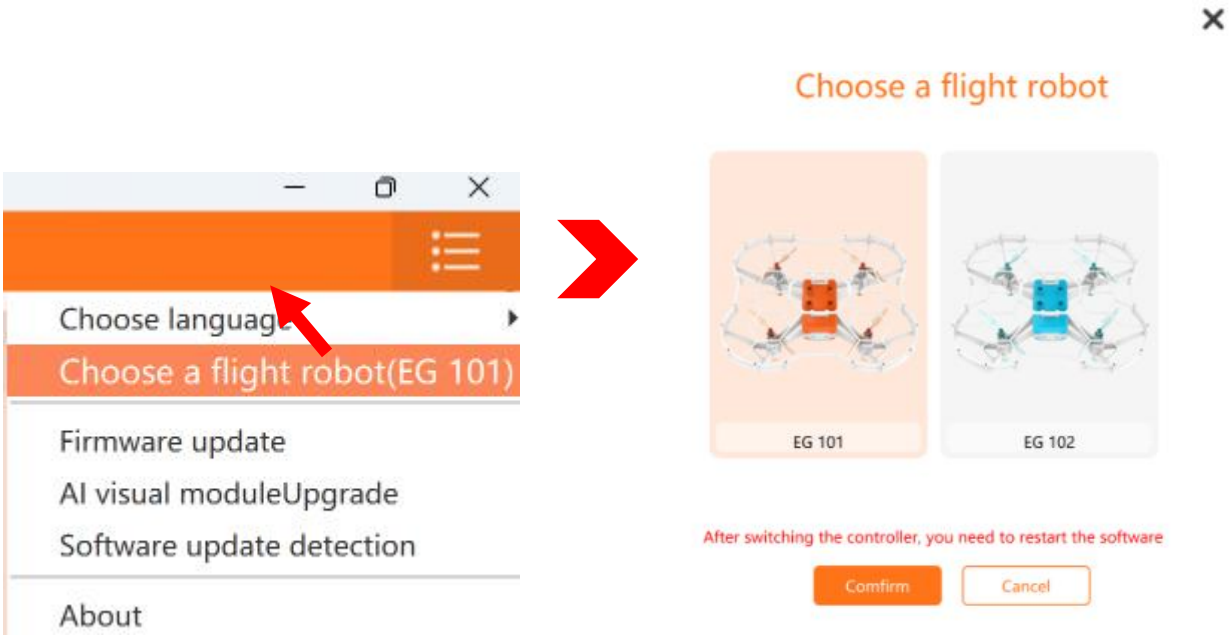
3. Run the package

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, the driver will be installed. 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. Pair the drone with the remote control

1. After the software is installed, 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”.

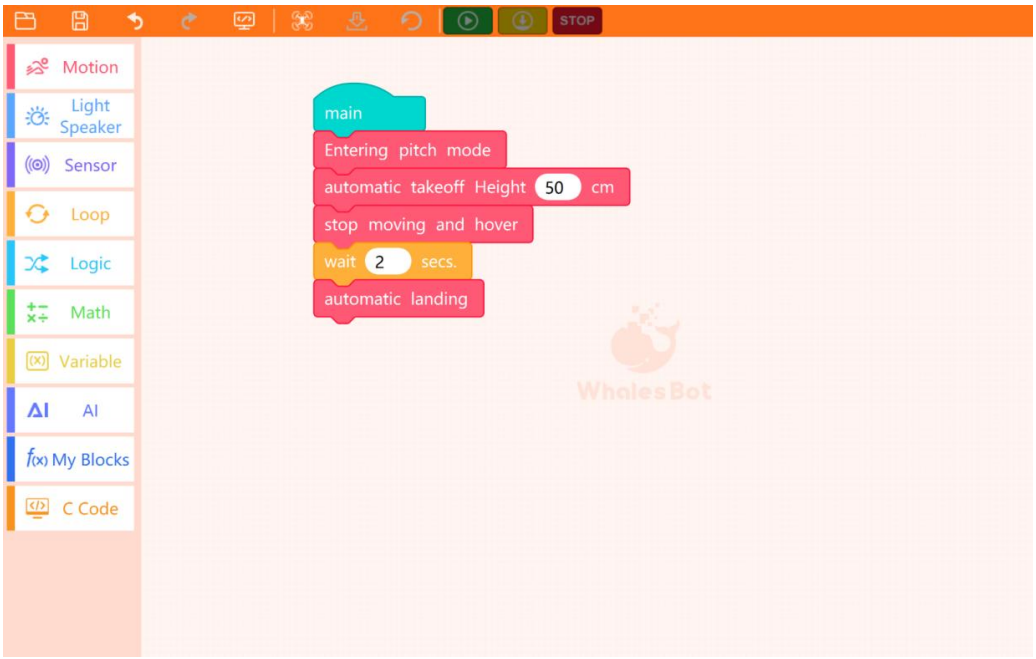


3. Use a Type-C cable to connect the remote control to your computer.

4. Click the icon to pair the remote control with your drone.

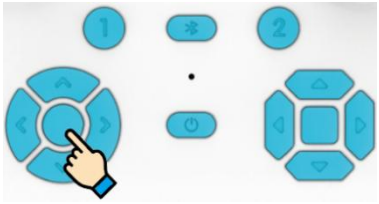
Ⅲ. Edit and download the program

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

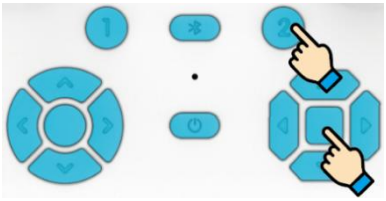


2. After you edit the program, click the icon to download the program.

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.

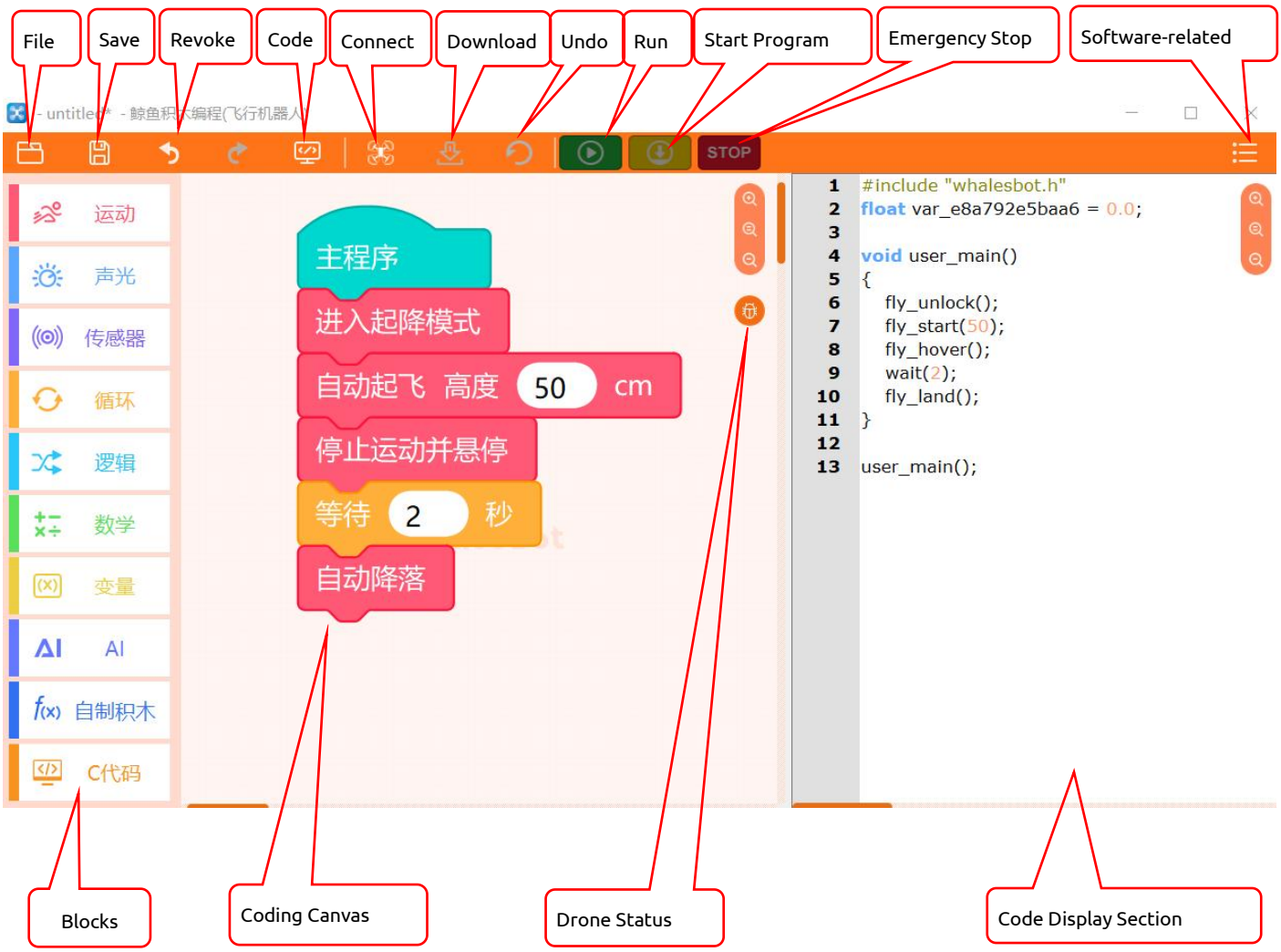


4. If you need to stop the fight, click the or icon in UI or press the “One-press Landing” or “Emergency Stop” button on the remote control.



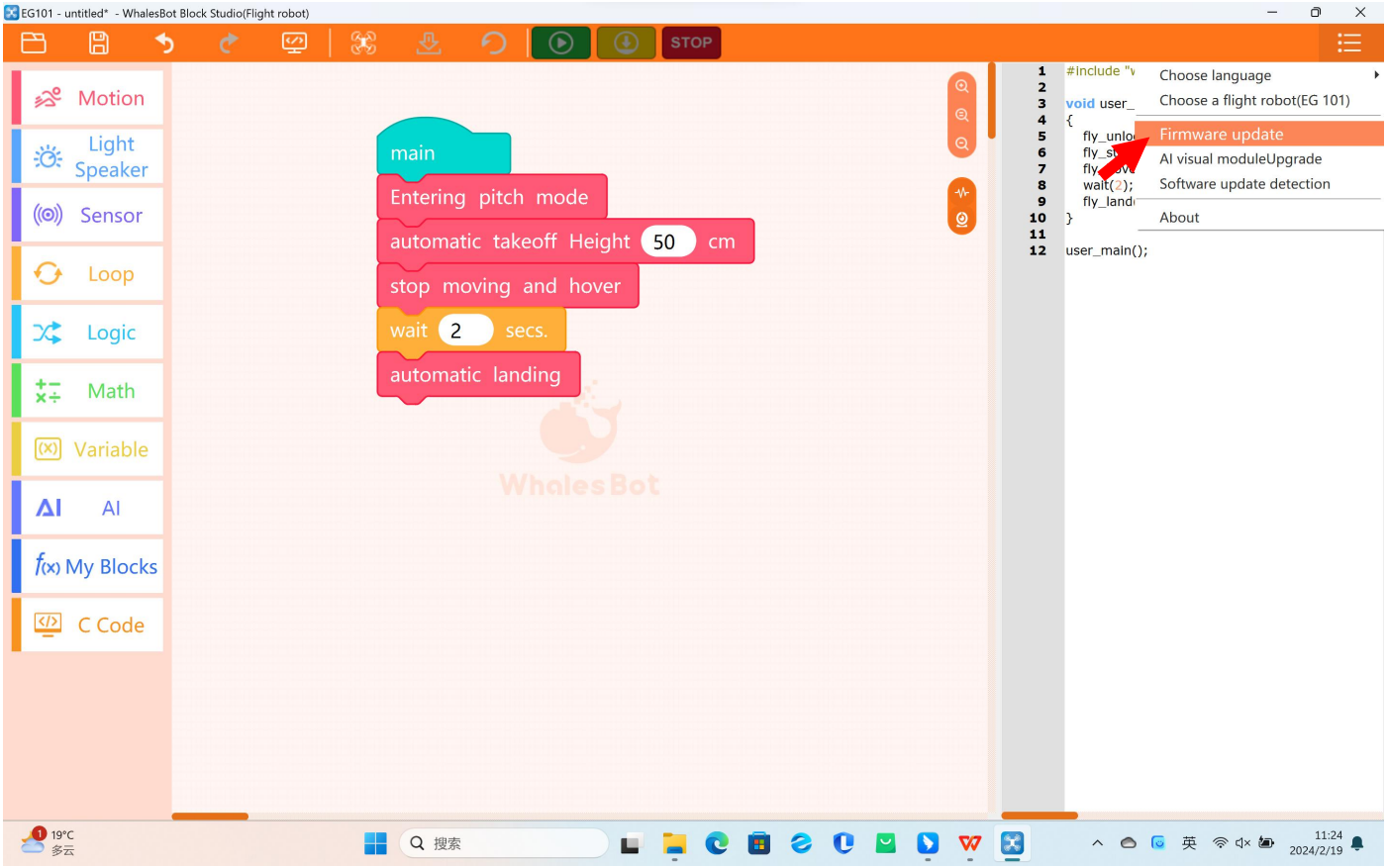
Ⅳ. UI introduction

As shown below, the module library is on the left, the program editing page is in the middle, and the C++ display area is on the right. This area is not displayed by default, and whether it is displayed is controlled through the code menu. The content displayed in this column is automatically generated by the module program and cannot be changed. If you need to change it, you can switch to the C ++ page to learn the C++ structure and read the parameters of each module.



Ⅴ. Firmware upgrade

We will update the remote control system from time to time. Please update the firmware in time. The remote control is paired with the aircraft Bluetooth, and the remote control is successfully connected to the computer through the data cable. Click the following icon in the upper right corner of the software to upgrade the firmware. This process takes about 5 minutes. Please ensure that the remote control and the aircraft are fully charged.



Ⅵ. Code blocks

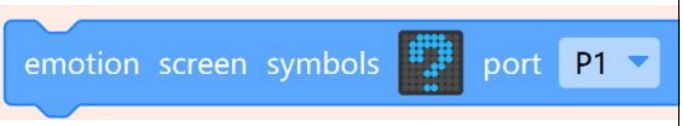
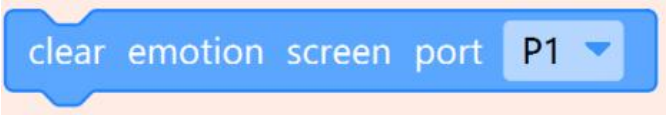
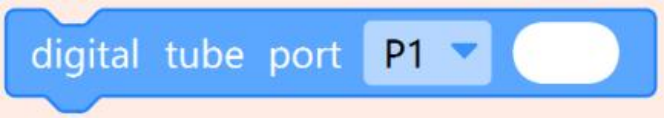
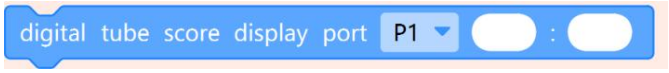
1. Motion blocks

Block	Snapshot	Description
Entering pitch mode	Entering pitch mode	The drone switches to the takeoff and landing mode. This block is put after the main program block. This block is necessary for initiating takeoff.
Exit pitch mode	Exit pitch mode	The drone exists the takeoff and landing mode.
Takeoff	automatic takeoff Height 50 cm	The flight altitude upon takeoff. This block is necessary after the drone enters the takeoff and landing mode. Otherwise, the drone cannot take off.
Landing	automatic landing	The propellers decelerate for a smooth touchdown.
Flight speed	set the flight speed to 50 cm/s	Configure the flight speed.

Obtain current speed	get setting speed	Obtain the current flight speed.
Rise	rise 50 cm	Configure the climb altitude.
Down	down 50 cm	Configure the descent altitude.
Forward	fly forward 50 cm	Configure the forward movement distance.
Backward	fly backward 50 cm	Configure the backward movement distance.
Leftward	fly left 50 cm	Configure the leftward movement distance.
Rightward	fly right 50 cm	Configure the rightward movement distance.
Turn left	turn left 90	Configure the counterclockwise rotation speed.
Turn right	turn right 90	Configure the clockwise rotation speed.
Speed and direction	fly in the specified direction speed 30 cm/s direction 0 °	Configure the flight speed and direction.

Distance and speed	flight designated distance x 50 cm y 50 cm z 50 cm speed 30 cm/s	Configure the movement distance and speed in three directions.
Joystick	set the four channel lever quantities of the remote control pitch 50 roll 50 throttle 50 yaw 50	Use joysticks to configure the movement speed. Pitch: forward/backward speed. Roll: leftward/rightward speed. Throttle: climb/descent speed. Yaw: rotation speed.
Hover	stop moving and hover	The drone hovers.
Emergency stop	emergency stop	The propellers stop and an emergency landing is started.
Set the steering gear	set the steering gear port P2 speed 40 angle 90	Configure the speed and positioning angle of the servo.

2. Sound and light-related blocks

Block	Snapshot	Output device	Description
Debug		Screen	Display the data to configure.
Emotion Screen		Emotion Screen	Display an emotional symbol on an emotion Screen (dot matrix screen).
Clear emotion screen		Emotion Screen	Turn off the emotion screen.
Digital tube		Digital tube	Display an integer on the digital tube. The integer can contain up to four digits.
Digital tube score display		Digital tube	Display the scores of two opposing teams on the digital tube. Each side displays a two-digit number.

Clear digital tube	clear digital tube port P1	Digital tube	Clear the content on the digital tube.
Set LED lights	set LED lights port P1 color R 255 G 255 B 255	RGB LED	Configure RGB values to specify the LED light colors at specific ports.
Electromagnet	electromagnet port P1 absorption	Electro-magnet	Configure the engagement and release of electromagnets at specific ports.

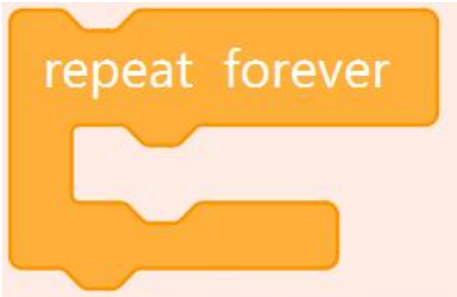
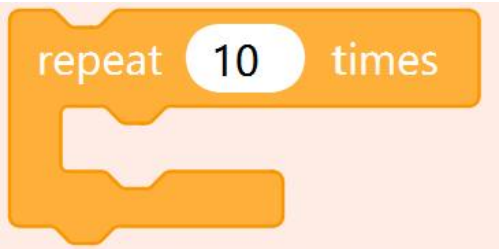
3. Sensor-related blocks

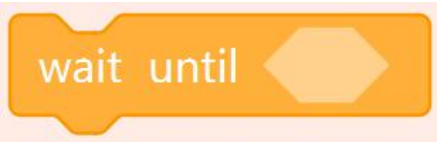
Block	Snapshot	Description
Flight altitude	flight altitude cm	Detect the flight altitude.
Laser measurement	laser ranging inside the fuselage cm	Use laser to measure the distance inside the drone.
Battery voltage	Battery voltage (V)	Check the current battery voltage.
Motherboard temperature	main board temperature (°)	Detect the current temperature of the

		motherboard.
Pitch angle	attitude angle pitch (°)	Detect the current pitch angle.
Angular velocity	flight angular velocity X cm/s	Detect the current angular velocity.
Acceleration	flight acceleration X (1g)	Detect the current acceleration.
Optical flow	optical flow X (cm)	Detect the value of the optical flow.
Infrared distance	infrared ranging sensor port P1 value	Detect the infrared distance of between the drone and an obstacle.
Infrared obstacle detection	infrared port P1 obstacles detected	Detect whether an obstacle exists.
Infrared human detection	human infrared sensor port P1 detects a person	Use the infrared sensor to detect whether there is a human.
Analog input	analog input port P1 value	The value of an analog input from a specific port.
Ultrasonic distance	ultrasonic sensor port P1 detect distance cm	Use ultrasonics to detect the distance.

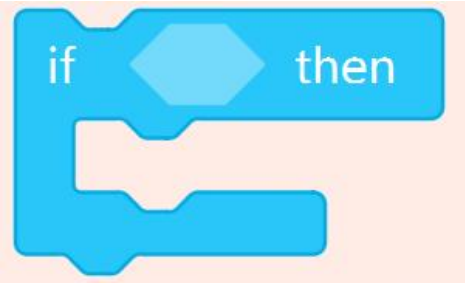
Ambient light	ambient light port P1 value	Detect ambient light.
Temperature	temperature sensor port P1 ℃	Detect temperature.
Humidity	humidity sensor port P1 value %	Detect humidity.
Flame	flame sensor port P1 value	Detect flames.
Gesture recognition	gesture recognition port P1	Detect hand gestures.
Laser distance	Laser ranging port P1	Use the laser sensor to detect distances.
Laser height	Laser height determination on	Enable or disable laser-based height assessment.
Remote control button	remote control button key value	Detect the settings specified by the buttons on the remote control.
Current timer value	current timer value	Store the current system runtime in a time variable
Reset timer	reset timer	Zero out the current system runtime.

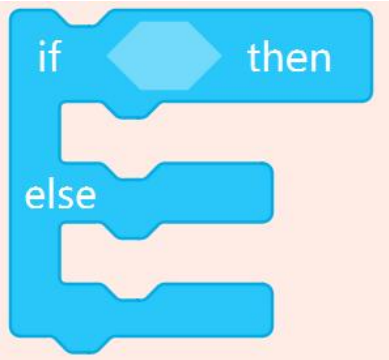
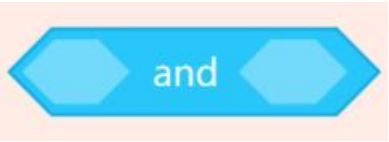
4. Loop blocks

Block	Snapshot	Description
Repeat forever		The while(1) loop in C programming, which indicates continuous execution of the contained statements indefinitely.
Repeat specific times		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.
Repeat until		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		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		You can preserve the execution state of the program for a specific duration by specifying a time delay.
Wait until		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

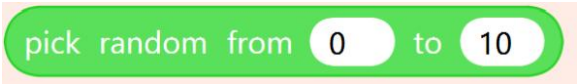
Block	Snapshot	Description
If ... then...		The if(condition) statement in C programming, which allows you to configure variables, sensors, or parameters to set the condition. If the condition is met, the code following the if

		condition is run. If not, the subsequent coding block is executed.
If ... then... else ...		The if(condition) ... else ... statement in C programming allows execution controlled by a condition. If the condition is met, the code following the if clause is run. If not, the code following the else clause is run.
<		Perform a “less than” comparison between two parameters, variables, or conditions.
>		Perform a “greater than” comparison between two parameters, variables, or conditions.
=		Evaluate equality between two parameters, variables, or conditions.
Not equal		Assess the inequality between two parameters, variables, or conditions.
And		Apply 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		Apply 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.

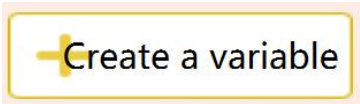
6. Mathematical blocks

Block	Snapshot	Description
+		Add together parameter values or variable values that are entered.
–		Subtract parameter values or variable values that are entered.
×		Multiply parameter values or variable values that are

		entered.
÷		Divide parameter values or variable values that are entered.
Pick random		Generate a random number within a specific range. The values that are entered specify the range. The values can be from 0 to 999999.
Round		Round off a parameter value or variable value that is entered.
Mathematical function		Apply a mathematical function to a parameter value or variable value that is entered.

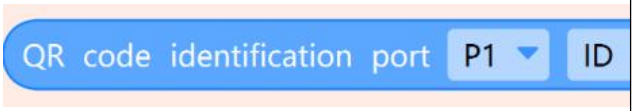
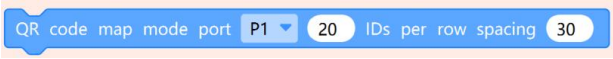
7. Variable blocks

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

Block	Snapshot	Description
Create a variable		Create and name a variable.
Set variable value		Store a parameter value or a value returned by a sensor into a variable.

Increase variable value		Increase a variable value.

8. AI-related blocks

Block	Snapshot	Description
QR code identification		Identify a QR code ID. The identification can succeed only if the drone is 50 cm to 150 cm away from the QR code.
QR code map mode		Identify and help adjust the number of QR codes in each row and the distance between two codes. This block must be used before identifying QR code IDs.
Fly to ID		Specify the motor power for the drone to fly towards the QR code of a specific ID.
Hover on ID		Specify the duration during which the drone hovers over the QR code of a specific ID.

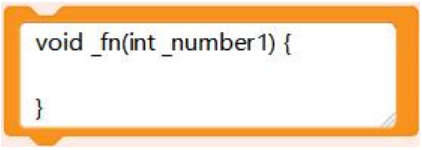
9. Customized code blocks

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 following instructions. 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 under the blocks to execute following the main program.
Configure subprogram		Configure the subprogram. Put the blocks whose execution procedure needs to be simplified under this block.

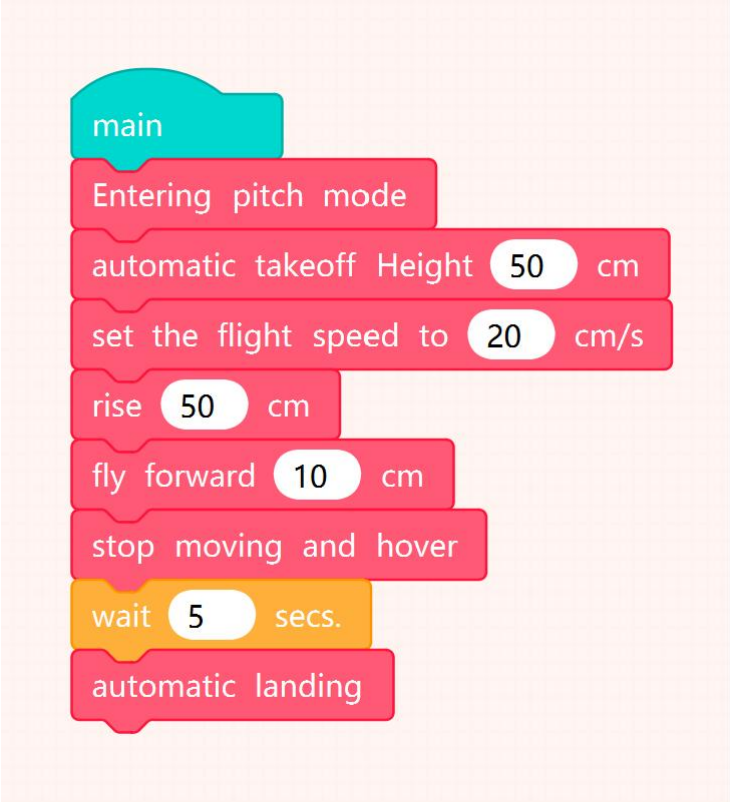
10. C programming

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



Chapter 4 Programming Examples

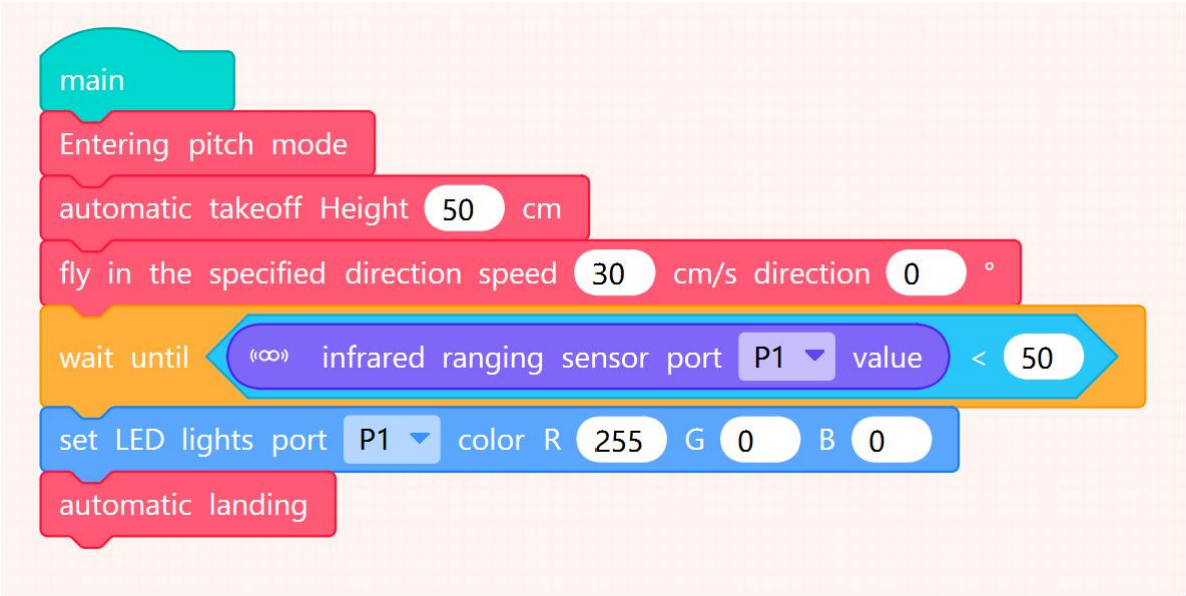
Ⅰ. Takeoff and landing



Put the drone on the open ground, face the drone tail, and then download and run the program to achieve the following effects:

The drone take offs to a height of 50 cm from the ground, and then rises 20 cm at a speed of 20 cm/s. Then, the drone advances 10 cm, and hovers in the air for five seconds before landing.

Ⅱ. External sensors and output devices

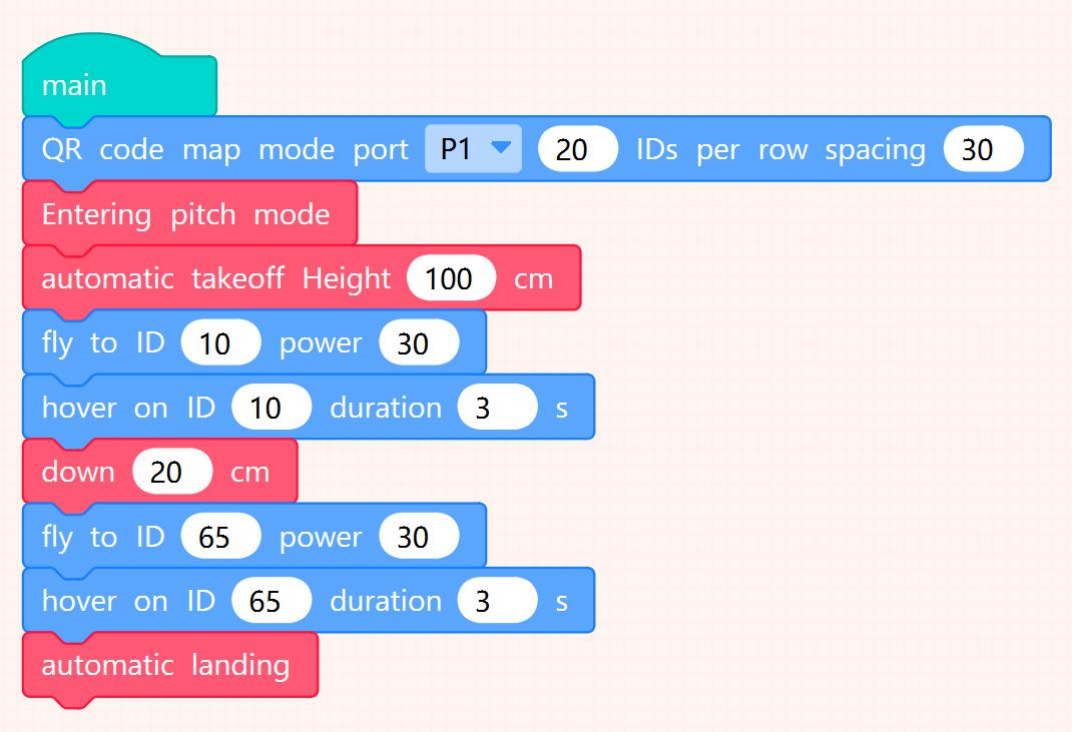


Connect the infrared sensor to port P2 and the RGB LED to port P1. The program is shown in the figure above.

Note: The port that you specify for the block of the infrared sensor must be the actual port of the infrared sensor, which is also the case for the block of the RGB LED. Put the drone on the open ground, face the drone tail, and then download and run the program to achieve the following effects:

The drone takes off to 50 cm above the ground. It flies forward at a speed of 30 cm/s until the infrared sensor detects an obstacle 50 cm ahead. At this time, the RGB LED lights up red and the drone lands.

Ⅲ. AI vision blocks



Connect the AI vision blocks to port P1. The program is shown in the figure above.

Put the drone on the open ground, face the drone tail, and then download and run the program to achieve the following effects:

The drone takes off to the height of 100 cm, and flies to ID 10 at the motor power of 30. Then, the drone hovers over ID 10 for three seconds and descends 20 cm. After that, the drone flies towards ID 65, hovers above ID 65 for three seconds, and then lands.

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

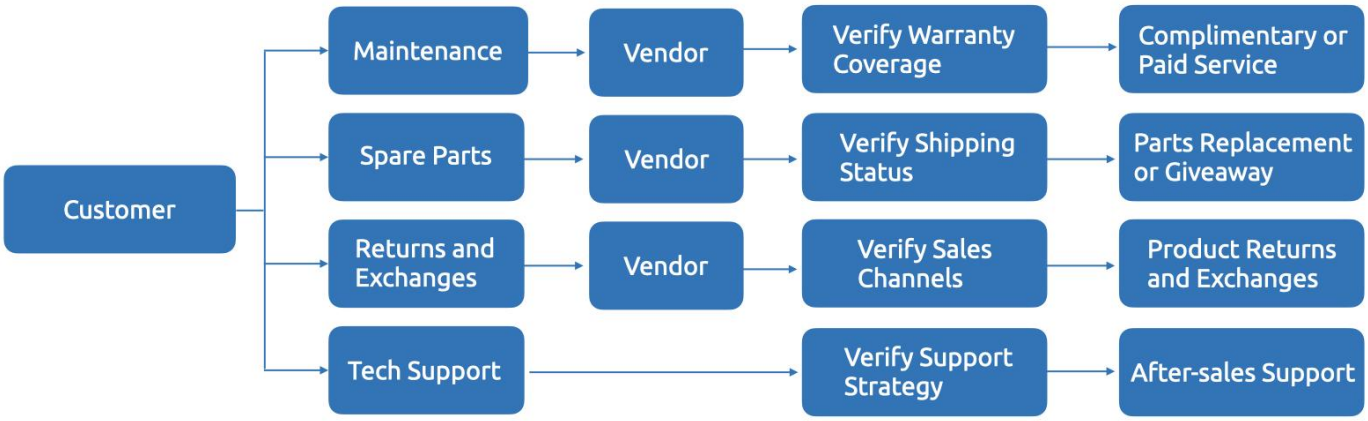
1. The remote control has a large number of delicate circuits. Put it in a cool and dry environment when it is idle.

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 whose concentration is less than 75%.

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, one young inventor at a time.

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.