# WhalesBot Eagle

# User Guide V1.2

# CONTENTS

# Chapter 1 Product Introduction

## Ⅰ. Introduction

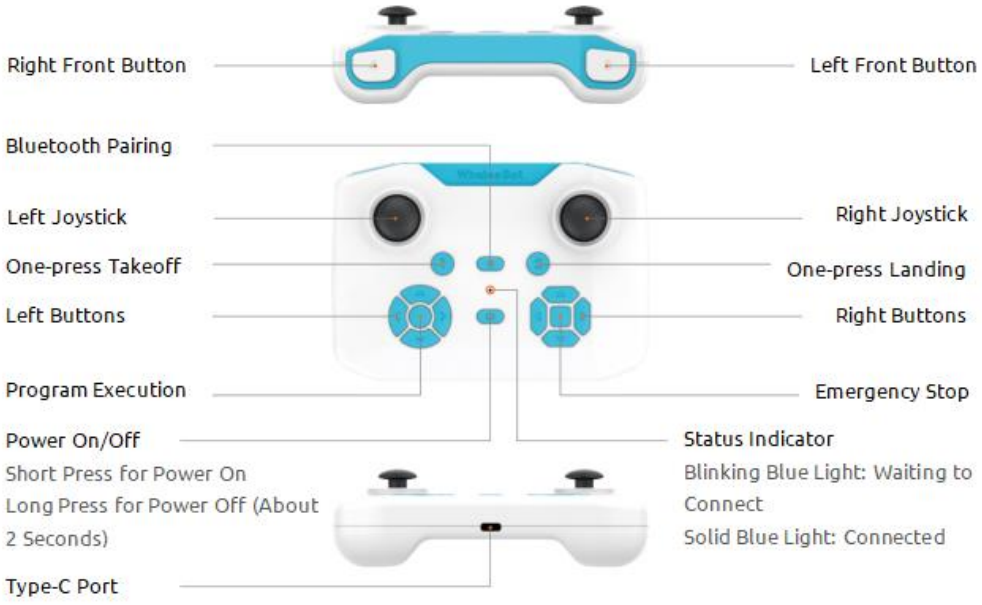
WhalesBot provides two types of drones: EG101 and EG102. The drones have the flight control system, laser sensor, optical flow sensor, gyroscope sensor, air pressure sensor and other sensors, and can stably hover and fly. The drones can be connected to the LED emotion screen, RGB LED, digital tube, electromagnet, 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 covers for higher safety.

## Ⅱ. Remote control and aircraft

### 1. Remote control

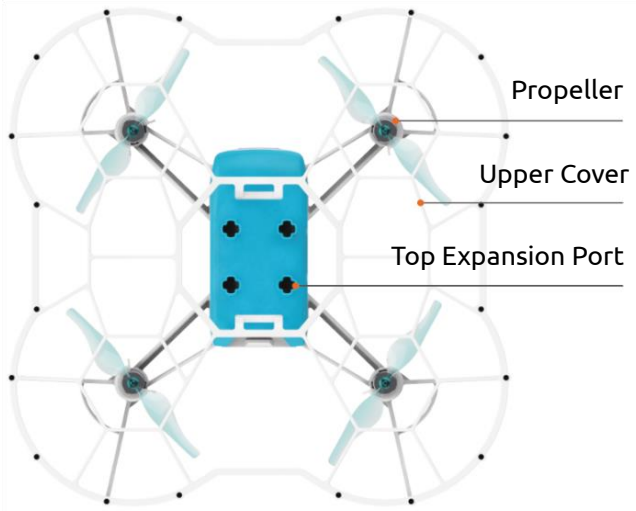
After the remote control is connected to the drone via Bluetooth, the drone can be controlled.

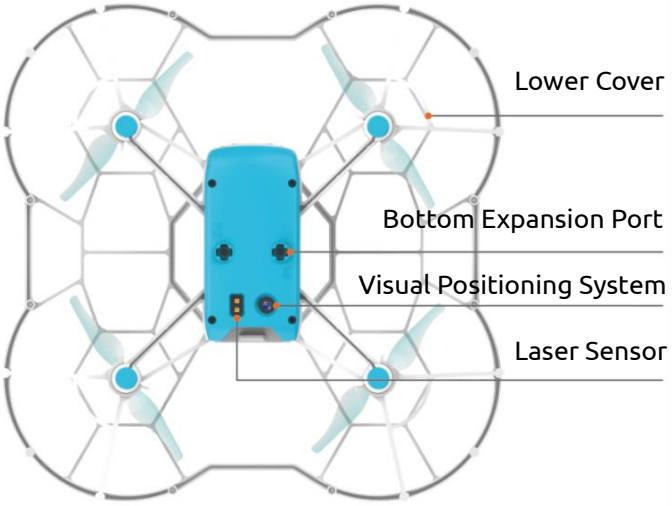


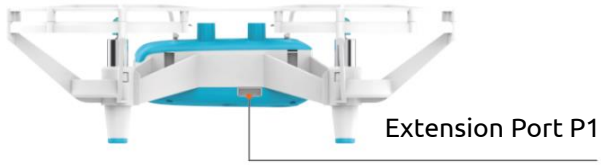
## 2. Aircraft

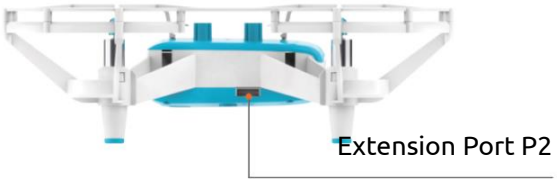
### 2.1 What is an aircraft

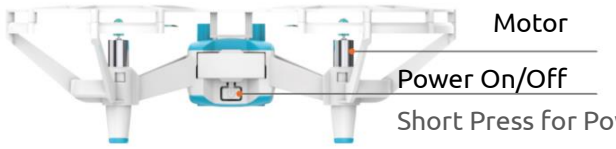
An aircraft consists of the following modules: a flight control system, a communications system, a positioning system, and a battery unit.



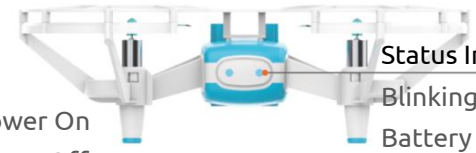




Short Press for Power On
Long Press for Power Off
(About 2 Seconds)



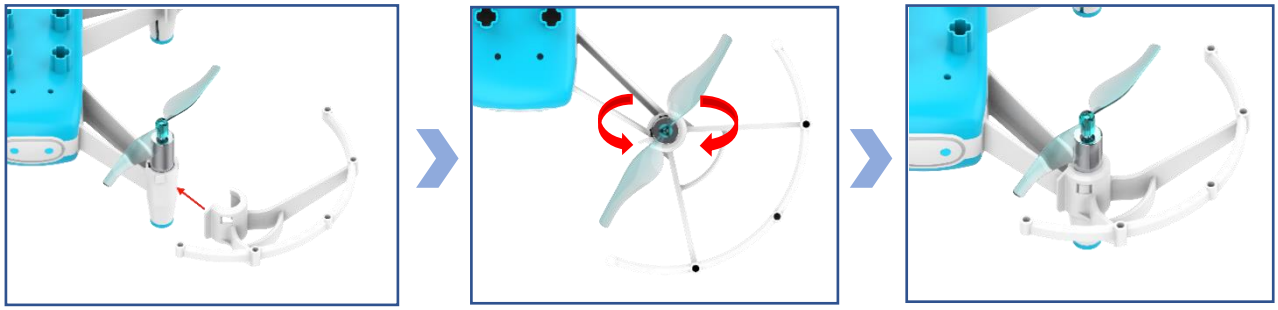

Blinking Red Light: Low Battery or Alert
Blinking Green Light: Waiting to Connect
Blinking Blue Light: Connected
Blinking Blue Light: Gyroscope Calibration

## 2.2 Installation and removal of protection cover

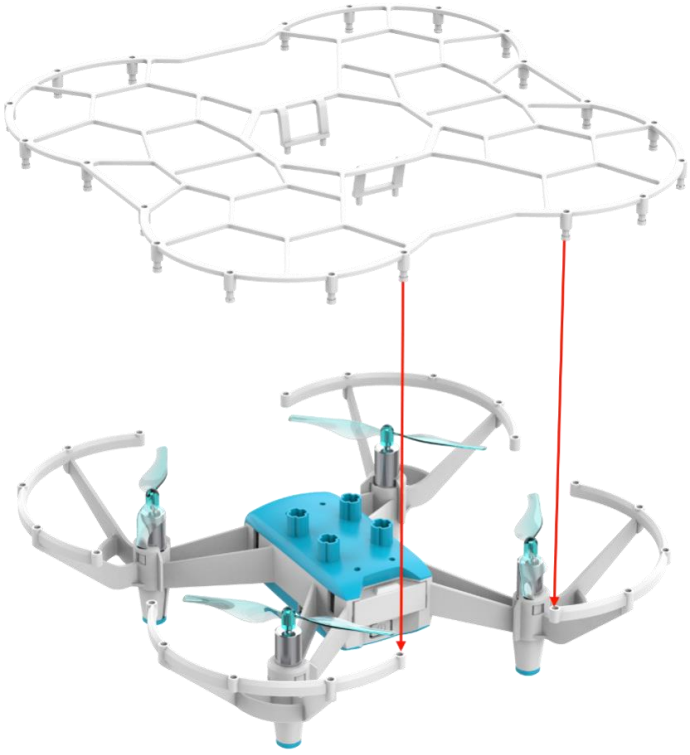
The protection cover is used to reduce the damage caused by a collision between the propeller and a person or object.

**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.

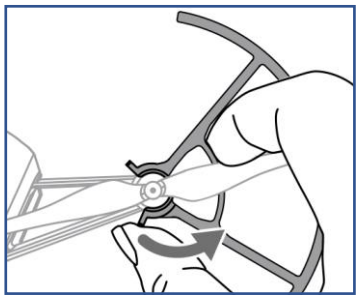


After the side propeller protection cover is installed successfully, align the upper cover with the hole, install and press it tightly.



**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.



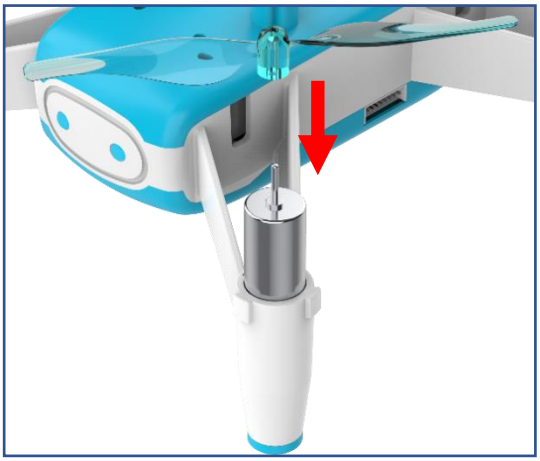
Do not use excessive force when removing the propeller cover. Otherwise, you may damage the drone or get your finger cut.

## 2.3 Propeller installation and removal

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

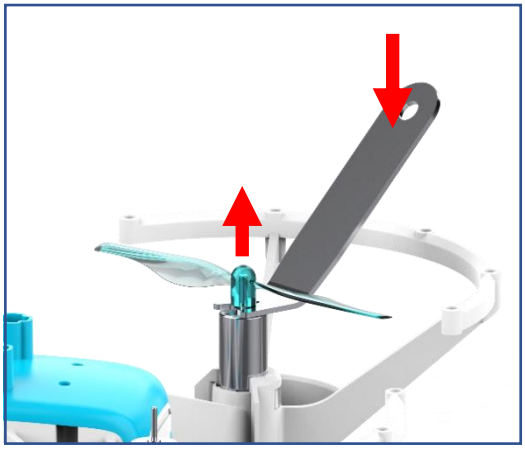
**Installation**

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.

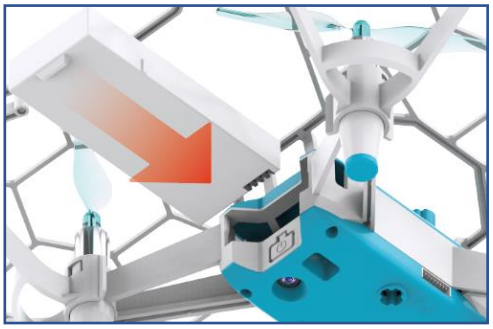
- ✧ Do not get close to the rotating propeller and motor to avoid cuts.
- ✧ Please use standard propellers. Do not mix different types of propellers.
- ✧ Please check that the propeller is properly installed and fastened before each flight.
- ✧ Make sure that each propeller is in good condition before 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

### 1.Bluetooth pairing

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

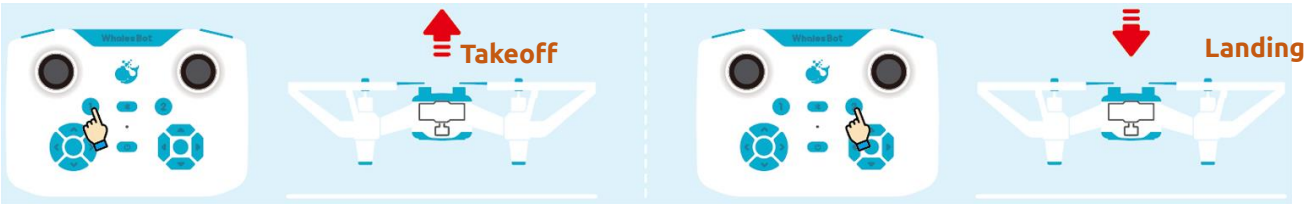
② Make the remote control close to the aircraft, and long press the Bluetooth button for the remote control.

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

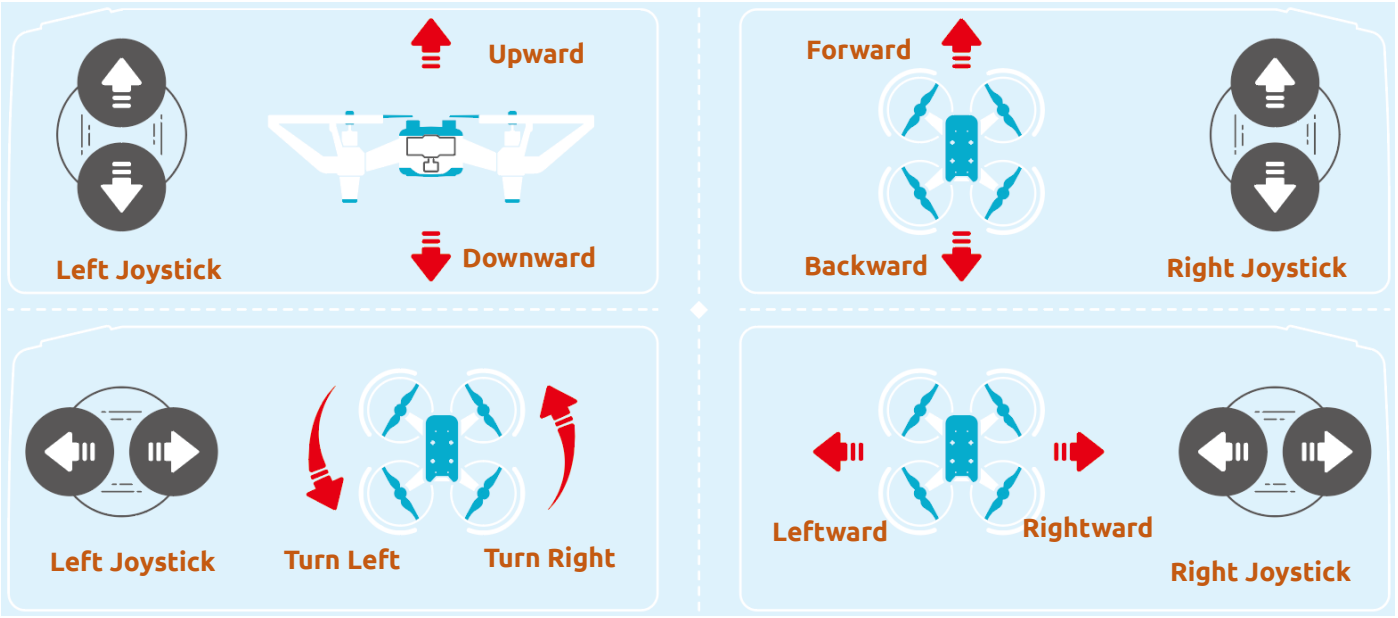
## 2. Remote-controlled flight

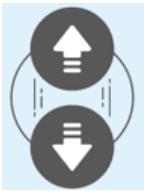
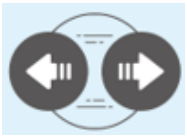
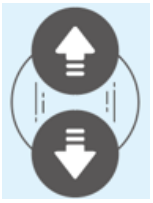
① Unlock: Move the joysticks in the “inner-eight” direction as shown in the following figure. At this time, the propeller rotates at a low speed, which indicates that the drone has been unlocked successfully.

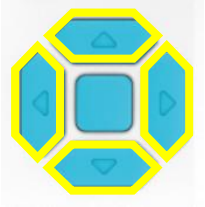

② Takeoff and landing: Press the "1" button of the remote control, and the aircraft takes off. Press the "2" button of the remote control, and the aircraft will land.




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.<br>If you push the joystick upwards, the drone moves upwards. If you push the joystick downwards, the drone moves downwards.<br>If the joystick is in its neutral position, the elevation remains unchanged. |
| Left joystick  | The yaw joystick adjusts the drone's direction<br>If you push the joystick leftwards, the drone rotates counterclockwise. If you push it rightwards, the drone flies clockwise.<br>If the joystick is in its neutral position, the drone does not rotate.<br>The joystick's movement directly influences the rotation speed. A wider movement increases the rotation speed. |
| Right joystick  | The pitch joystick manages the forward and backward motion.<br>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.<br>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<br><br>joystick<br><br>  | The roll joystick steers the drone sideways.<br><br>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.<br><br>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 front button<br><br>  | After the drone takes off, press the right front button to increase the speed of its forward, backward, left, and right movements. |
| Left front button<br><br>  | After the drone takes off, press the left front button to disable the laser-based altitude hold function. (If you enable this function, the drone maintains a minimum flight altitude of 30 cm from the ground.) |
| Right buttons<br><br>  | While in flight, the four right buttons (front, back, left, right) let you roll the drone in those respective directions. |
| Emergency stop button<br><br>  | In an emergency situation, press the emergency stop button to immediately stop the drone's flight and land. |

Note: The other buttons have no assigned functions in remote control mode.

### 3. Basic flight procedure

After the aircraft and remote control are turned on and connected via Bluetooth, put 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.

Use the joystick to control 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.

## Ⅱ. 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 may be 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.

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

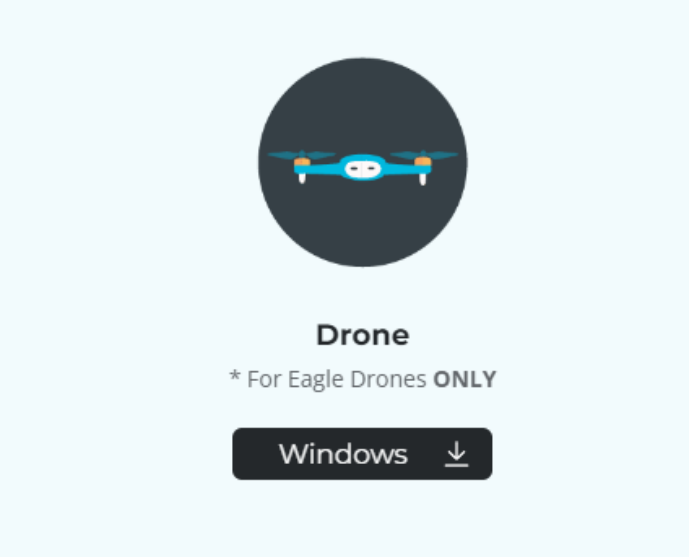
# Chapter 3 Software Introduction

## 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.

whalesbot_eagle

Windows

### 3. Run the package

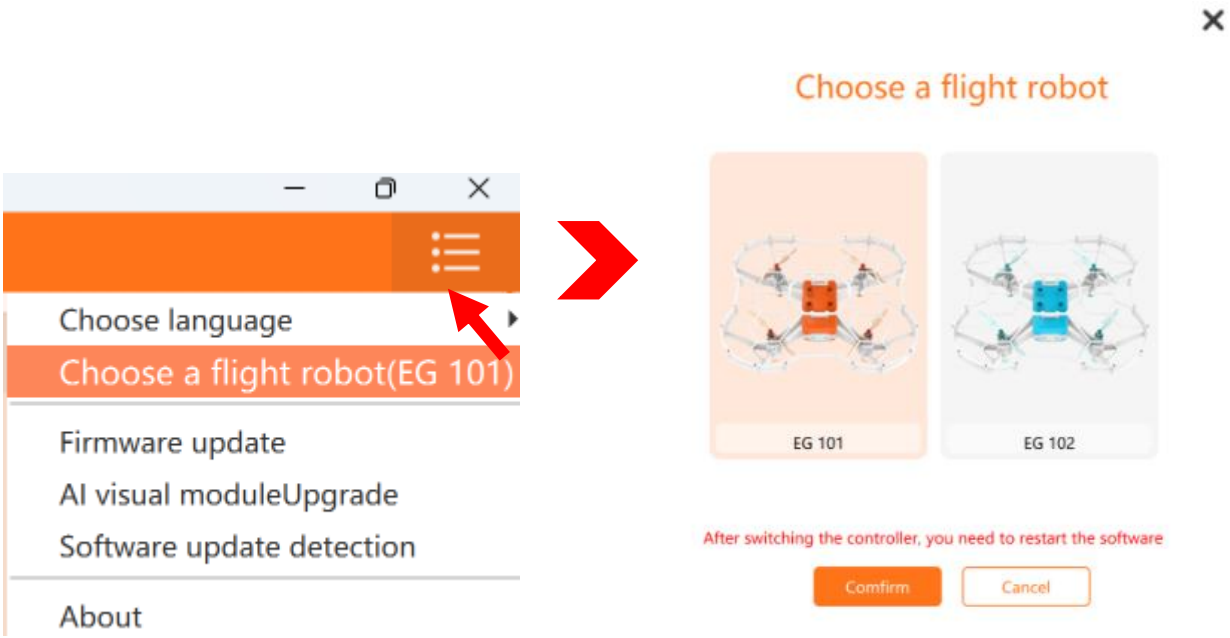
Follow the installation prompts to install the software. The software only needs to be downloaded and installed only once, and a later version can be upgraded online. After the

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”.

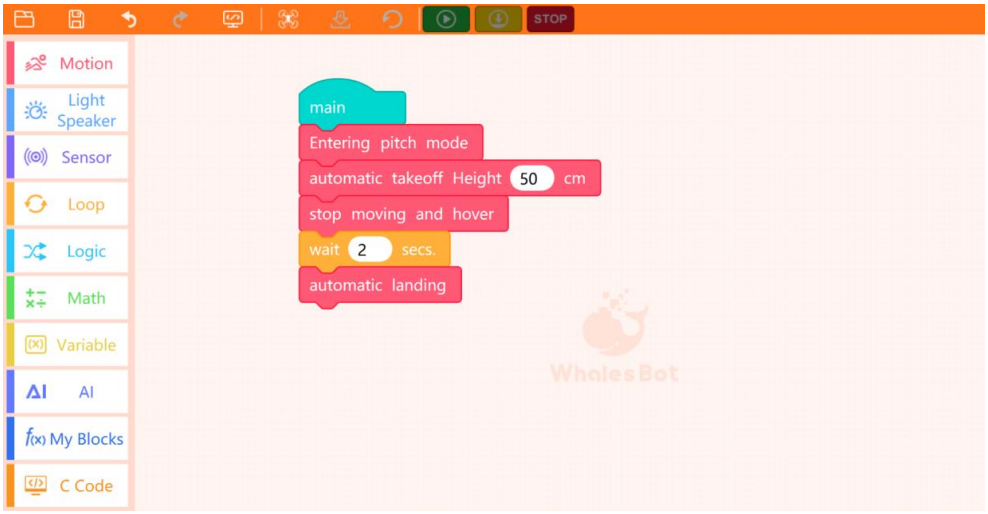


3. Use a Type-C cable to connect the remote control to your computer.

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

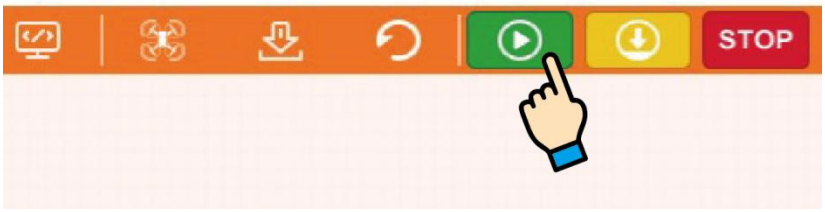

## Ⅲ. Edit and download the program

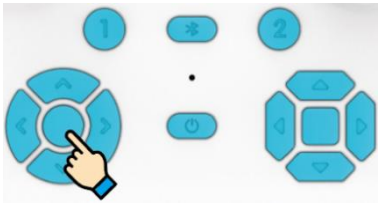
1. Edit the program for the drone. You can drag the required code blocks to the canvas and put them under the “main” block.



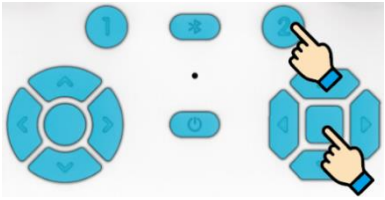
2. After you edit the program, click the  icon to download the program.


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.



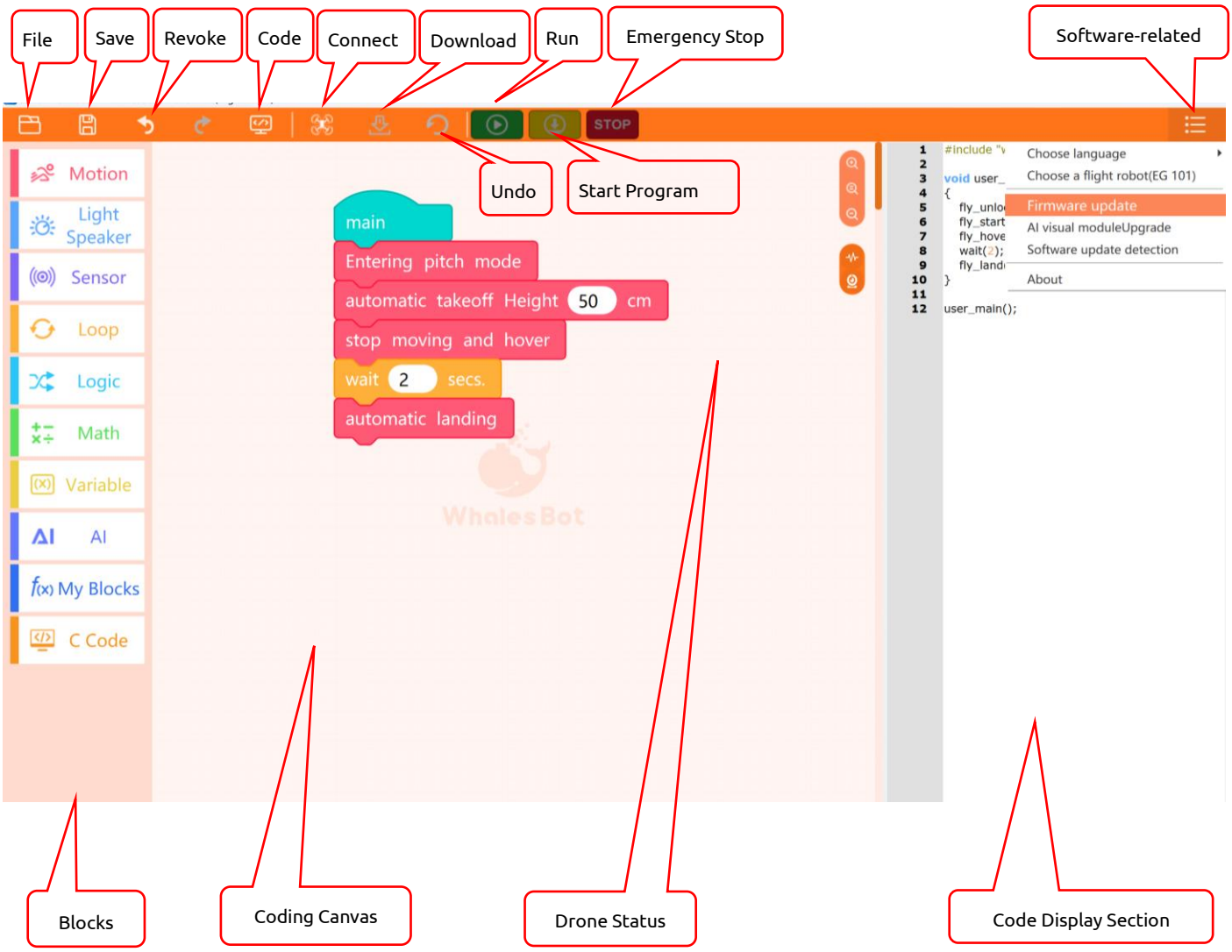



4. If you need to stop the fight, click the  or  icon in UI or press the “One-press Landing” or “Emergency Stop” button on the remote control.

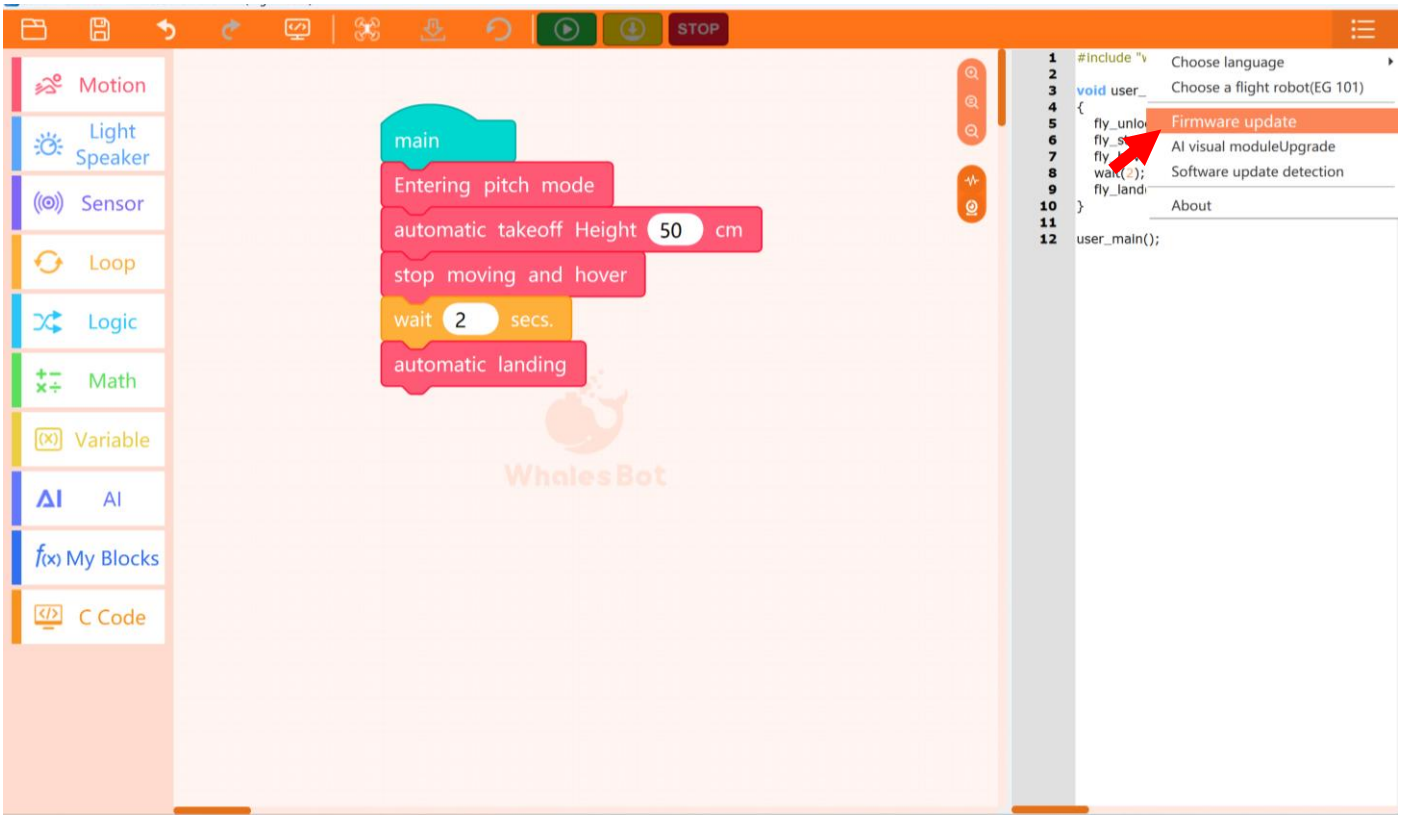
# IV. UI introduction

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.



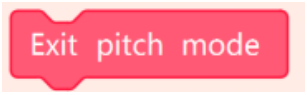
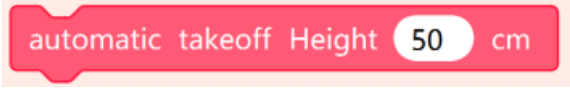
# V. Firmware upgrade

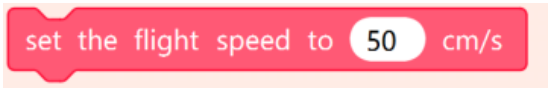
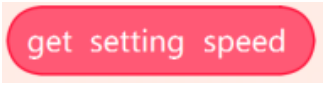
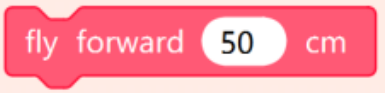
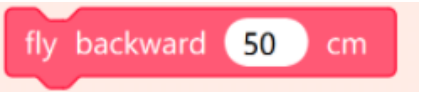
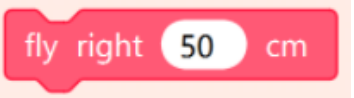
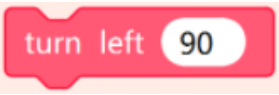
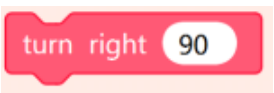
We will update the remote controlling system from time to time. Please update the firmware in time. The remote control is paired with the aircraft Bluetooth, and the remote control is successfully connected to the computer through the data cable. Click the following icon in the upper right corner of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

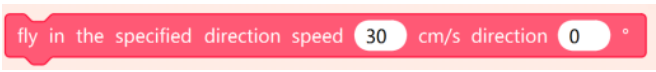
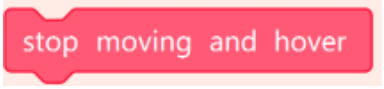
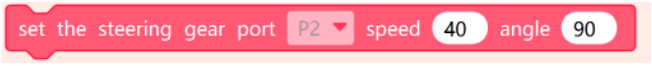


# VI. Code blocks

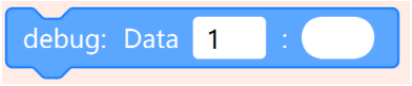
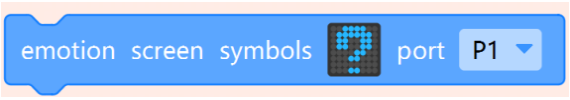
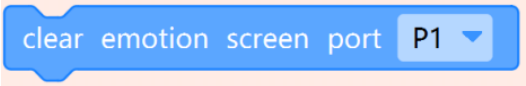
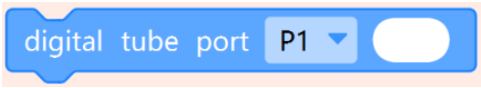
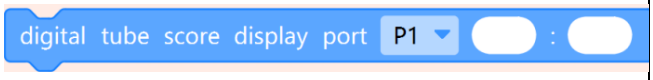
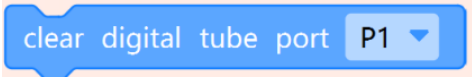
## 1. Motion blocks

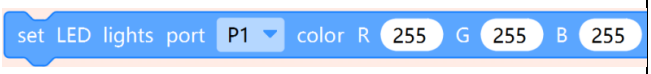
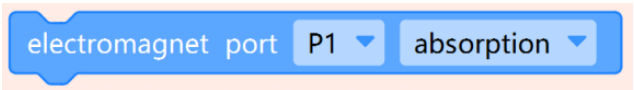
| Block | Snapshot | Description |
|---|---|---|
| Entering pitch mode |  | The drone switches to the takeoff and landing mode. This block is put after the main program block. This block is necessary for initiating takeoff. |
| Exit pitch mode |  | The drone exists the takeoff and landing mode. |
| Takeoff |  | 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 |  | The propellers decelerate for a smooth touchdown. |

| | | |
|---|---|---|
| Flight speed |  | Configure the flight speed. |
| Obtain current speed |  | Obtain the current flight speed. |
| Rise |  | Configure the climb altitude. |
| Down |  | Configure the descent altitude. |
| Forward |  | Configure the forward movement distance. |
| Backward |  | Configure the backward movement distance. |
| Leftward |  | Configure the leftward movement distance. |
| Rightward |  | Configure the rightward movement distance. |
| Turn left |  | Configure the counterclockwise rotation speed. |
| Turn right |  | Configure the clockwise rotation speed. |

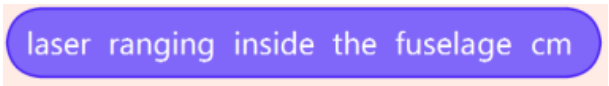
| | | |
|---|---|---|
| Speed and direction |  | Configure the flight speed and direction. |
| Distance and speed |  | Configure the movement distance and speed in three directions. |
| Joystick |  | Use joysticks to configure the movement speed. Pitch: forward/backward speed. Roll: leftward/rightward speed. Throttle: climb/descent speed. Yaw: rotation speed. |
| Hover |  | The drone hovers. |
| Emergency stop |  | The propellers stop and an emergency landing is started. |
| Set the steering gear |  | Configure the speed and positioning angle of the servo. |

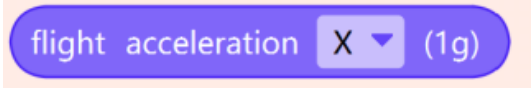
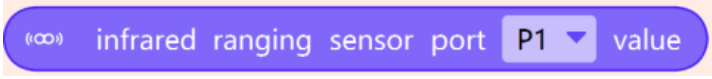
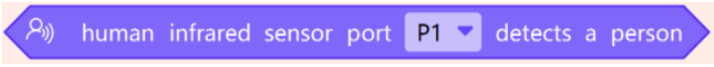
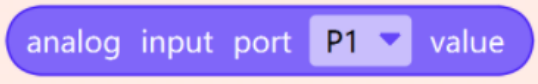
## 2. Sound and light-related blocks

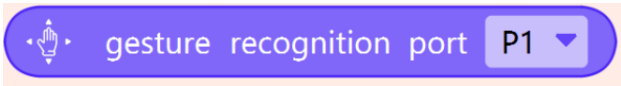
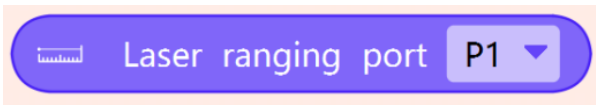
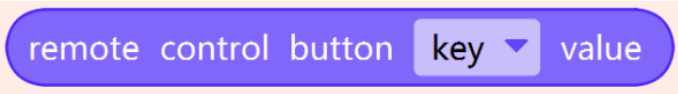
| Block | Snapshot | Output device | Description |
|---|---|---|---|
| Debug |  | Screen | Display the data to configure. |
| Emotion Screen |  | Emotion Screen | Display an emotional symbol on an emotion Screen (dot matrix screen). |
| Clear emotion screen |  | Emotion Screen | Turn off the emotion 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 digits |  | Digital tube | Clear the content on the digital tube. |

| | | | |
|---|---|---|---|
| Set LED lights |  | RGB LED | Configure RGB values to specify the LED light colors at specific ports. |
| Electromagnet |  | Electro-magnet | Configure the engagement and release of electromagnets at specific ports. |

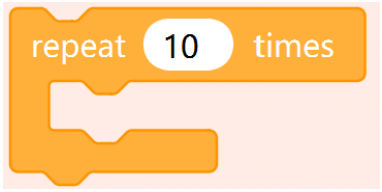
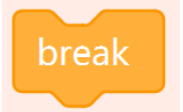
## 3. Sensor-related blocks

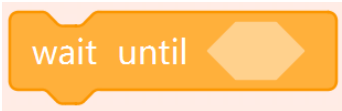
| Block | Snapshot | Description |
|---|---|---|
| Flight altitude |  | Detect the flight altitude. |
| Laser measurement |  | Use laser to measure the distance inside the drone. |
| Battery voltage |  | Check the current battery voltage. |
| Motherboard temperature |  | Detect the current temperature of the motherboard. |
| Pitch angle |  | Detect the current pitch angle. |

| | | |
|---|---|---|
| Angular velocity |  | Detect the current angular velocity. |
| Acceleration |  | Detect the current acceleration. |
| Optical flow |  | Detect the value of the optical flow. |
| Infrared distance |  | Detect the infrared distance of between the drone and an obstacle. |
| Infrared obstacle detection |  | Detect whether an obstacle exists. |
| Infrared human detection |  | Use the infrared sensor to detect whether there is a human. |
| Analog input |  | The value of an analog input from a specific port. |
| Ultrasonic distance |  | Use ultrasonics to detect the distance. |
| Ambient light |  | Detect ambient light. |
| Temperature |  | Detect temperature. |

| | | |
|---|---|---|
| Humidity |  | Detect humidity. |
| Flame |  | Detect flames. |
| Gesture recognition |  | Detect hand gestures. |
| Laser distance |  | Use the laser sensor to detect distances. |
| Laser height |  | Enable or disable laser-based height assessment. |
| Remote control button |  | Detect the settings specified by the buttons on the remote control. |
| Current timer value |  | Store the current system runtime in a time variable |
| Reset timer |  | Zero out the current system runtime. |

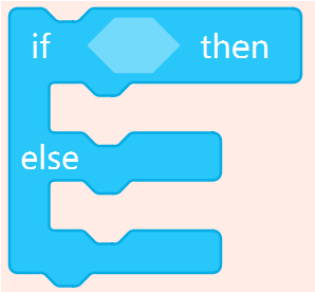
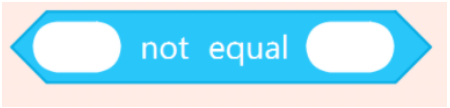
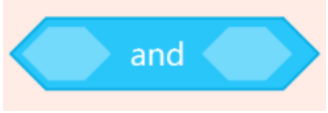
## 4. Loop blocks

| 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

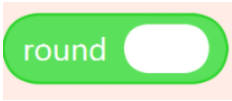
| Block | Snapshot | Description |
|---|---|---|
| If ... then... |  | The if(condition) statement in C programming, which allows you to configure variables, sensors, or parameters to set the condition. If the condition is met, the code following the if condition is run. If not, the subsequent coding 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. |

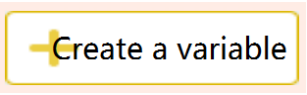
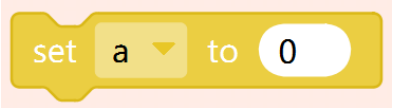
## 6. Mathematical blocks

| 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. |

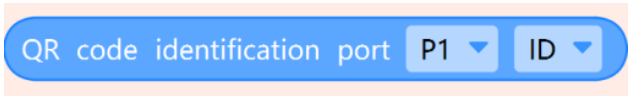
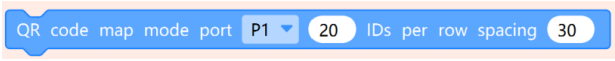
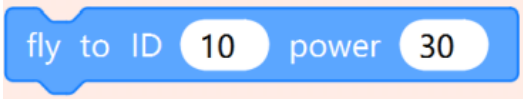
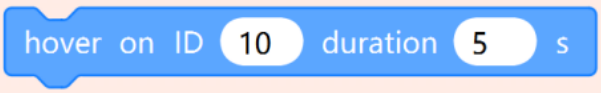
| | | |
|---|---|---|
| Pick random |  | Generate a random number within a specific range. The values that are entered specify the range. The values can be from 0 to 999999. |
| Round |  | Round off a parameter value or variable value that is entered. |
| Mathematical function |  | Apply a mathematical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

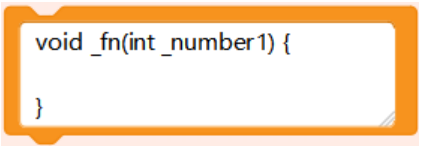
In a program, some of the code blocks may be exactly the same or the main program may be too long. In this case, in order to simplify the program, you can customize a subprogram to contain and simplify the duplicate code blocks.

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. |

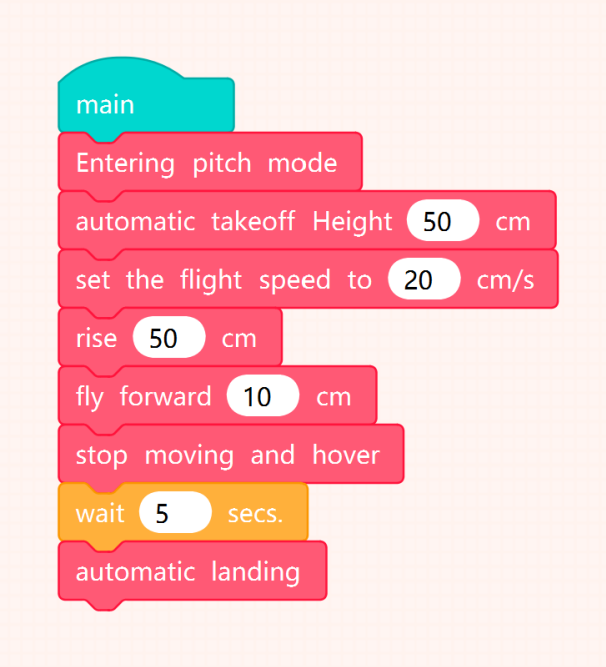
## 10. C programming

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. Run the program to produce the following result: The drone takes off 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.

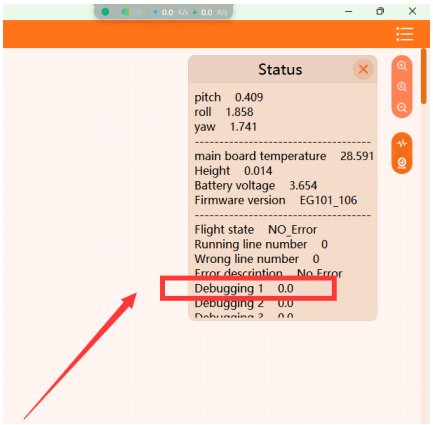
## Ⅱ. Use of sensors and actuators

### 1. Use the AI vision module

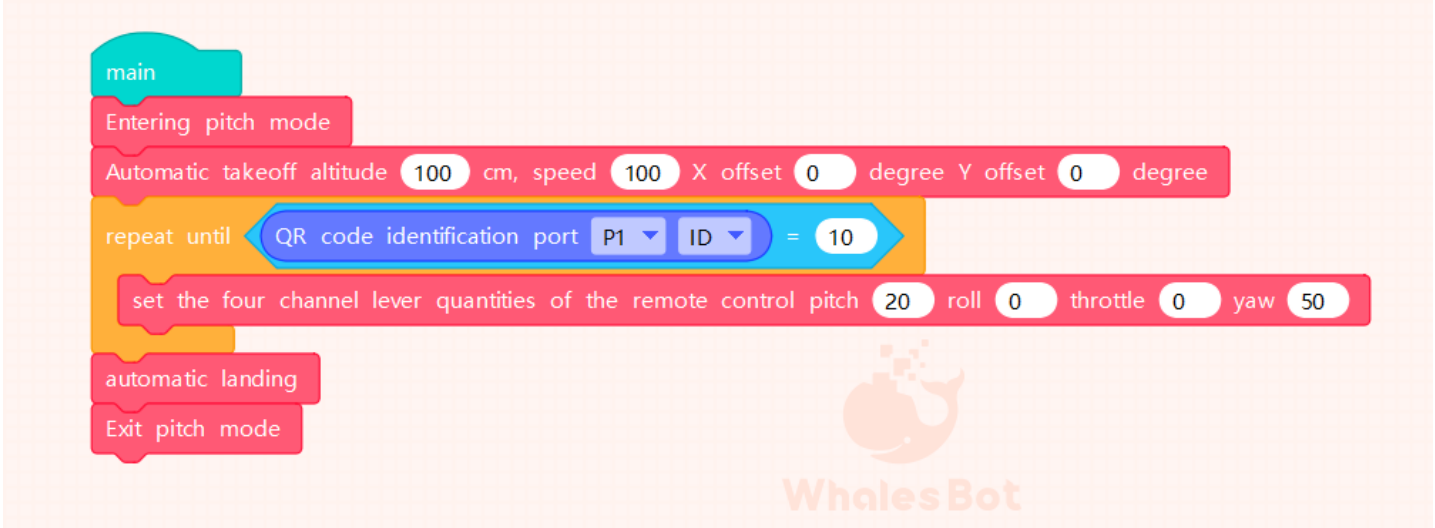
The AI vision module can recognize QR codes (AprilTags) to obtain the drone's current coordinates and angles. It can connect to the drone's P1 or P2 port.

Connect the AI vision module to the P1 port through a 6-pin connection wire.

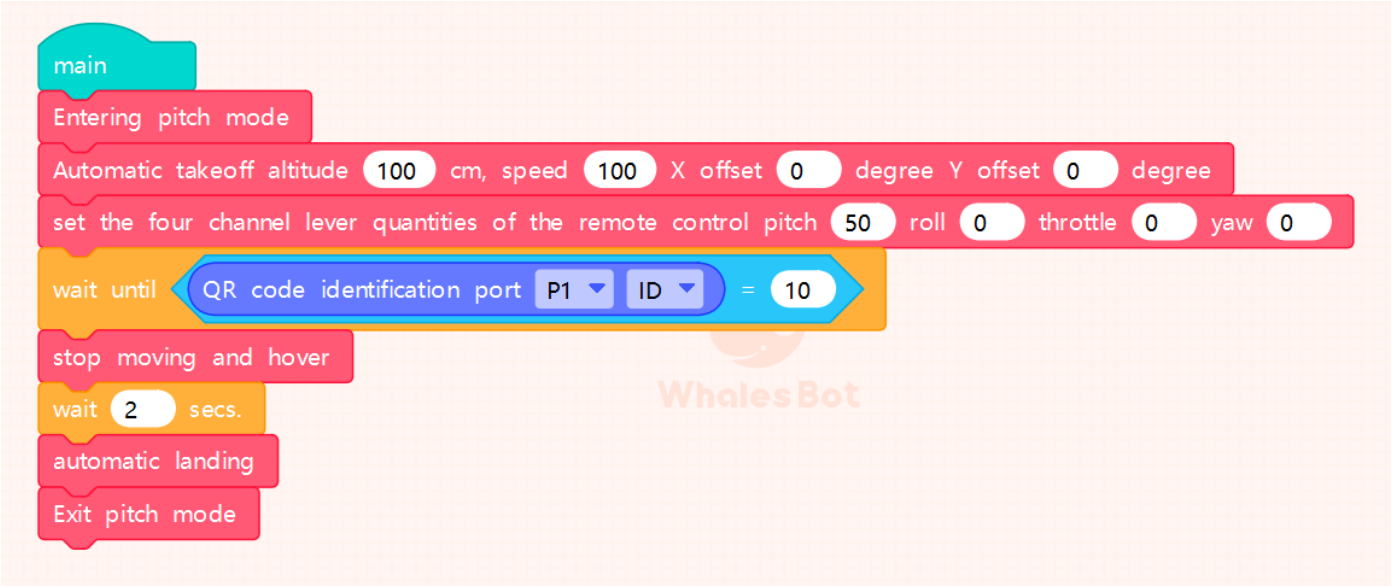
**Use case 1:** Check in real time whether the AI vision module can recognize the QR code ID. The detected data results will be displayed as "Debugging 1" in the upper right corner of the coding software. By comparing the detected ID value and the actual ID value, you can check whether the AI vision module works as expected. Sample program:


**Use case 2:** The drone takes off to a height of 100 cm and flies along an arc trajectory. When the AI vision module detects the QR code with the ID number 10, the drone lands. Sample program:



**Use case 3:** The drone takes off to a height of 100 cm, and then keeps flying forward until the AI vision module detects the QR code with ID number 10. The drone will immediately hover above the QR code for 2 seconds before landing. Sample program:

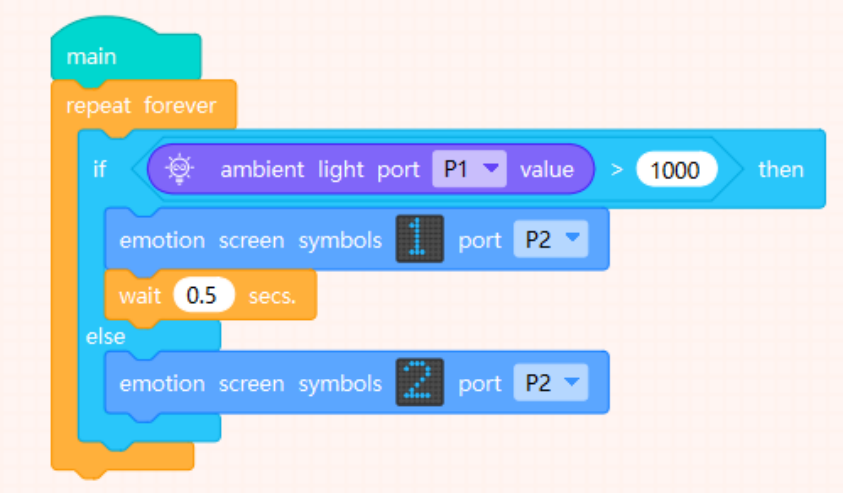



## 2. Use the light sensor and dot-matrix display

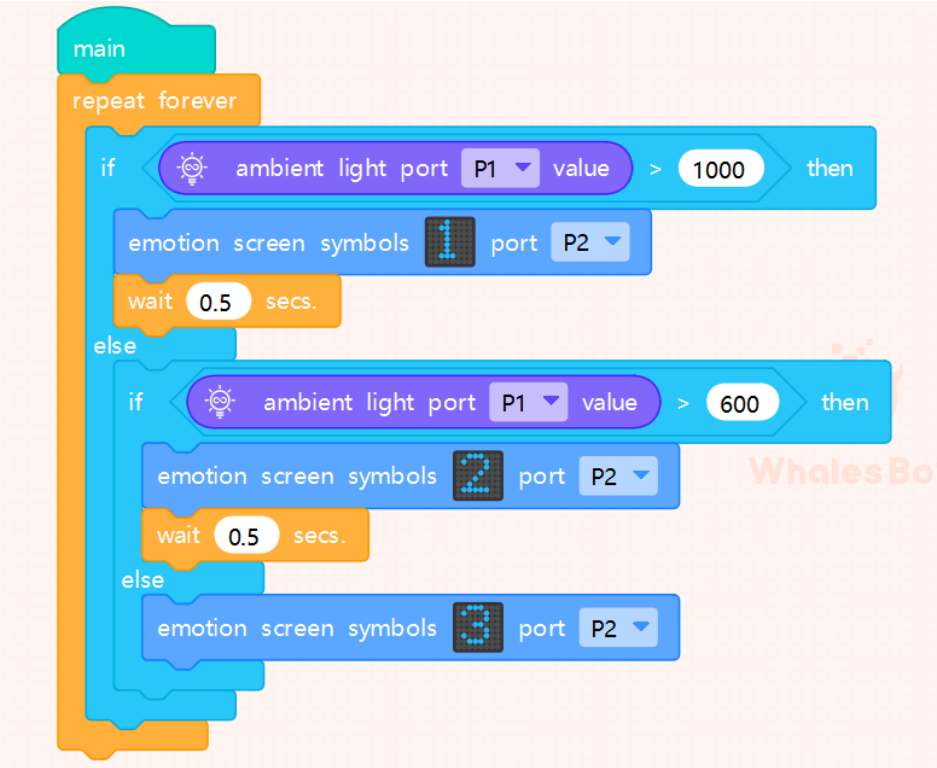
The light sensor detects the intensity of ambient light, and is often used for interactive projects with light-based effects. It can connect to the drone's P1 or P2 port.

Connect the light sensor to P1 and the dot-matrix display to P2 through 6-pin connection wires.

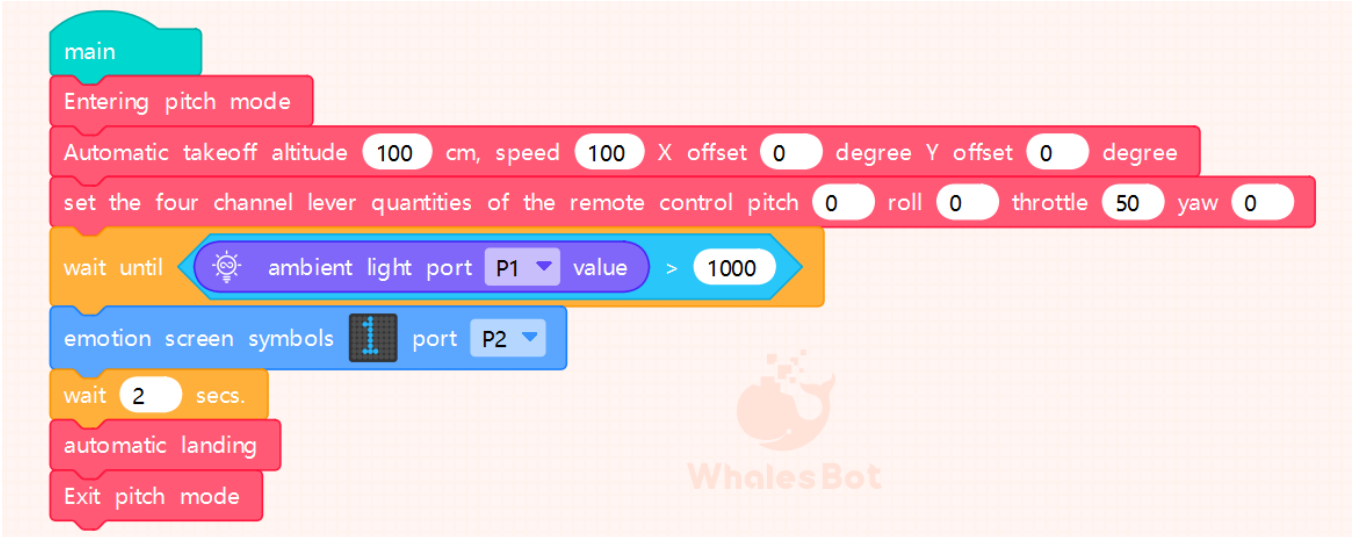
**Use case 1:** The light sensor detects the light intensity of the surroundings. If the light intensity is below 1000, the dot-matrix display shows "1". Otherwise, it shows "2". Sample program:



**Use case 2:** If the light intensity exceeds 1000, the dot-matrix display shows "1". If the light intensity is between 600 and 1000, it shows "2". If the light intensity is lower than 600, it shows "3". Sample program:




**Use case 3:** The drone takes off to a height of 100 cm, and keeps flying upward until the light sensor detects that the surrounding light intensity exceeds 1000. The dot-matrix display shows "1" 2 seconds, and then the drone lands. Sample program:



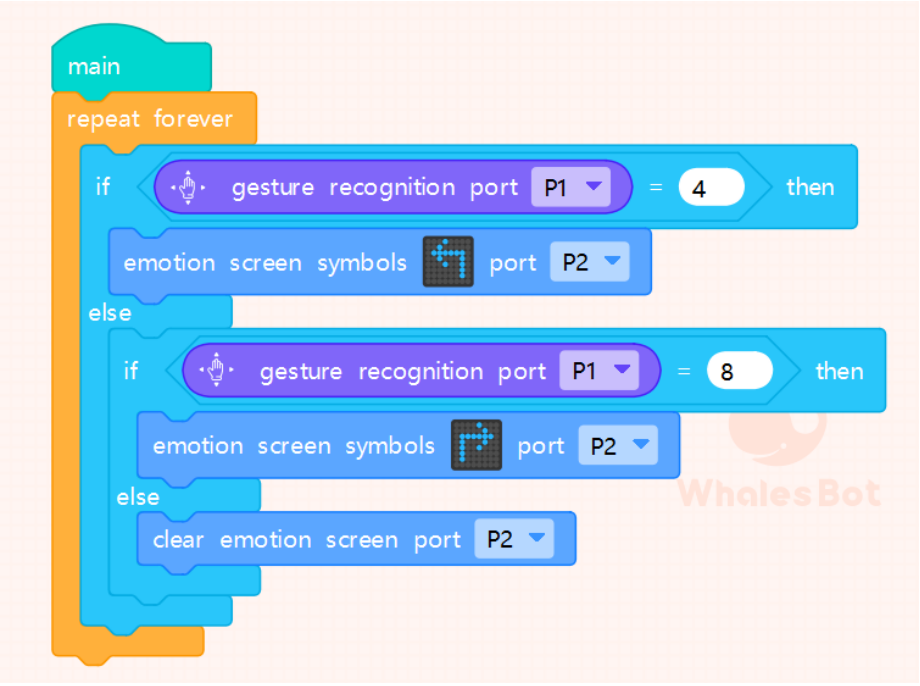
## 3. Use the gesture sensor and dot-matrix display

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

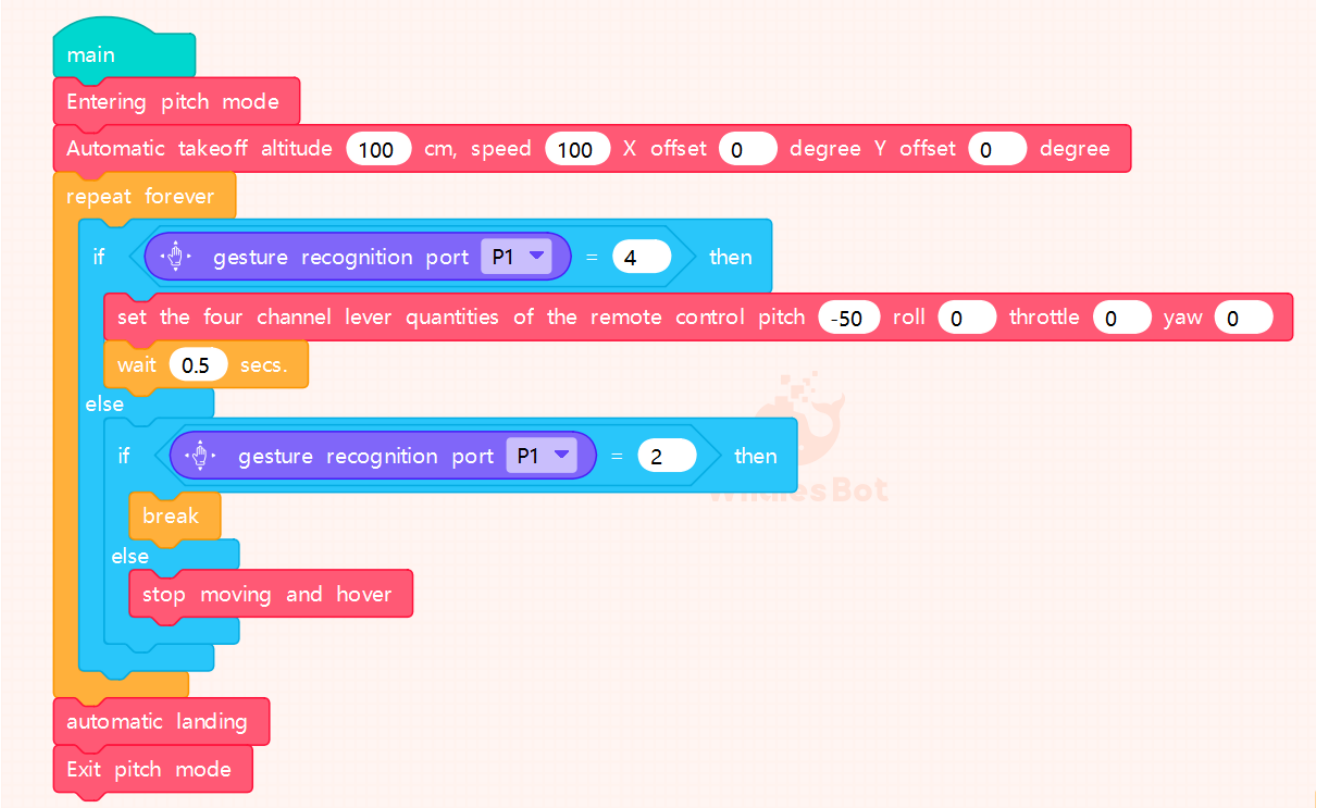
| Return value | Gesture | Return value | Gesture |
|---|---|---|---|
| 0 | None | 16 | Forward |
| 1 | Up | 32 | Backward |
| 2 | Down | 64 | Clockwise |
| 4 | Left | 128 | Counterclockwise |
| 8 | Right | 256 | Wave |

Connect the gesture sensor to P1 and the dot-matrix display to P2 through 6-pin wires.

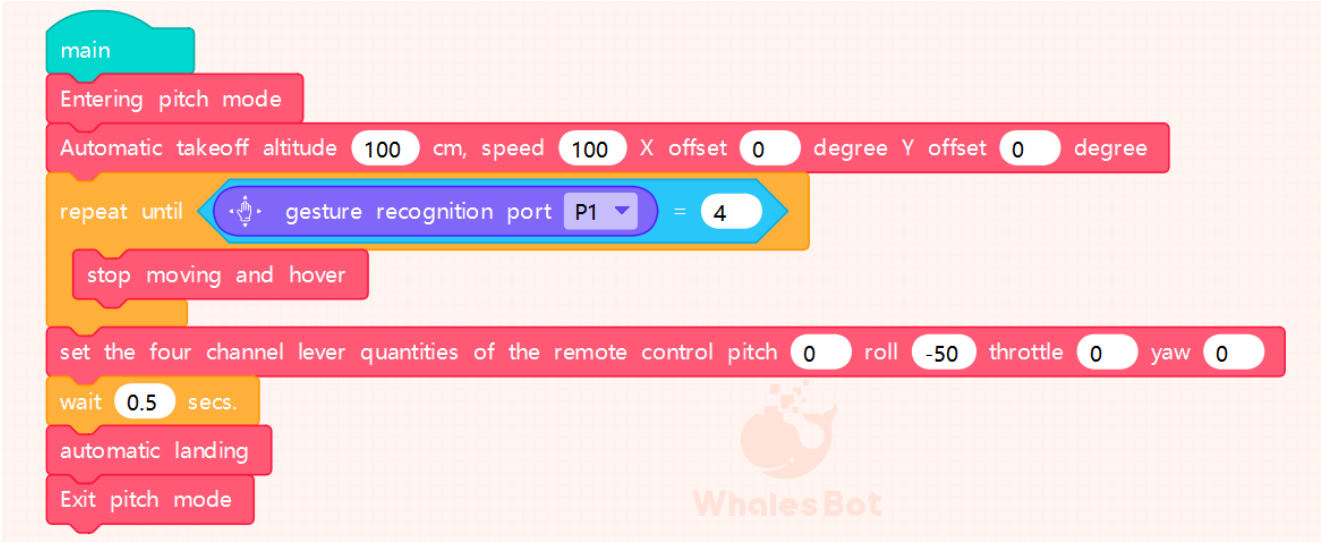
**Use case 1:** If you swipe your hand from left to right, the dot-matrix display shows the "Turn Right" sign. If you swipe your hand from right to left, the dot-matrix display shows the "Turn Left" sign. Sample program:



**Use case 2:** The drone takes off to a height of 100 cm. If you swipe your hand from right to left in front of the gesture sensor, the drone moves backward. If you swipe your hand downward, the drone lands. On other occasions, the drone keeps hovering. Sample program:




**Use case 3:** The drone takes off to a height of 100 cm and keeps hovering until the gesture sensor detects a leftward gesture. The drone moves leftward for 0.5 seconds and then lands. Sample program:

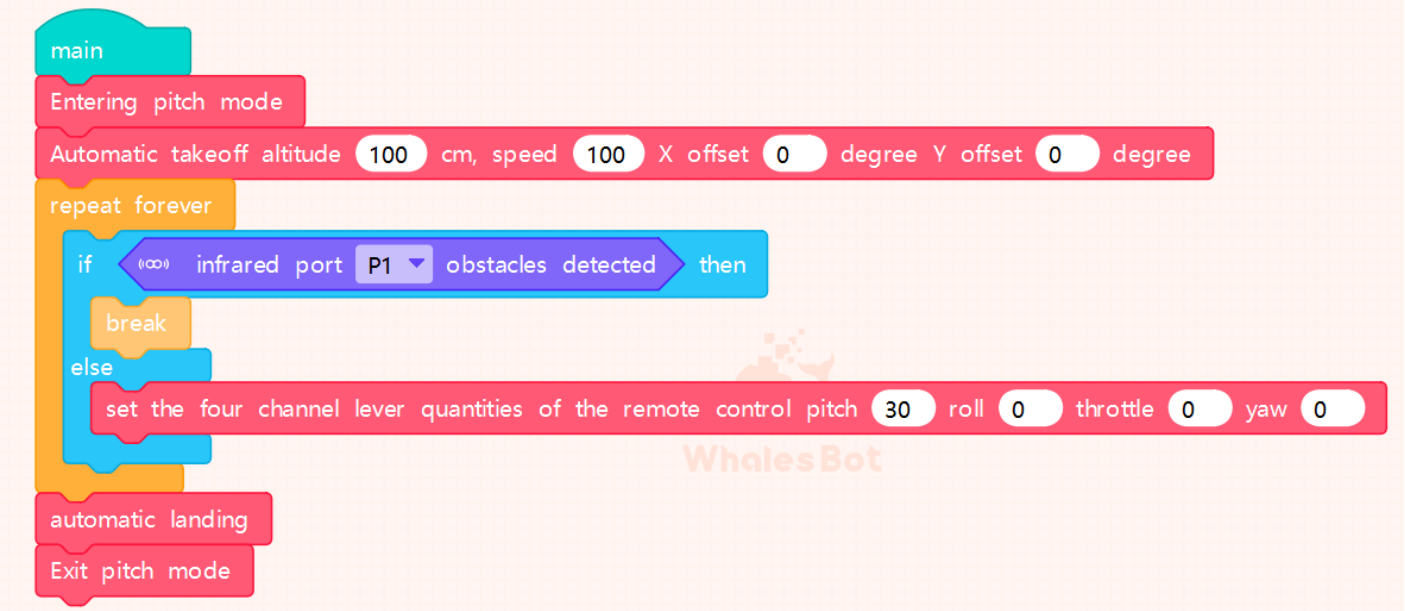


## 4. Use the infrared sensor

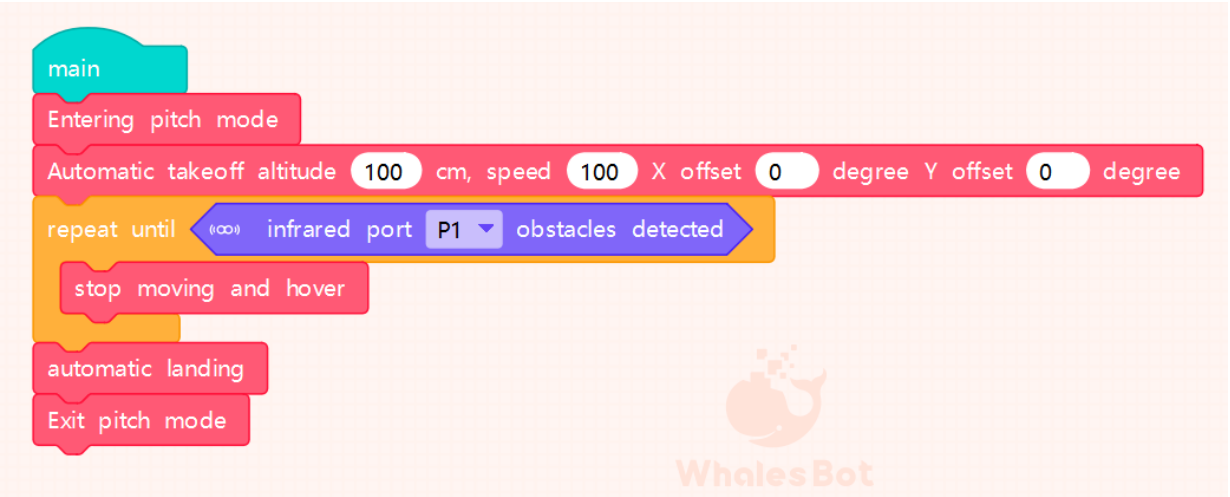
The infrared sensor is an analog input module that combines transmitting and receiving functions. It measures distances from 8 to 80 cm through light reflection from a surface. It can be connected to the P1 or P2 port of the drone.

Connect the infrared sensor to the P1 port through a 6-pin connection wire.

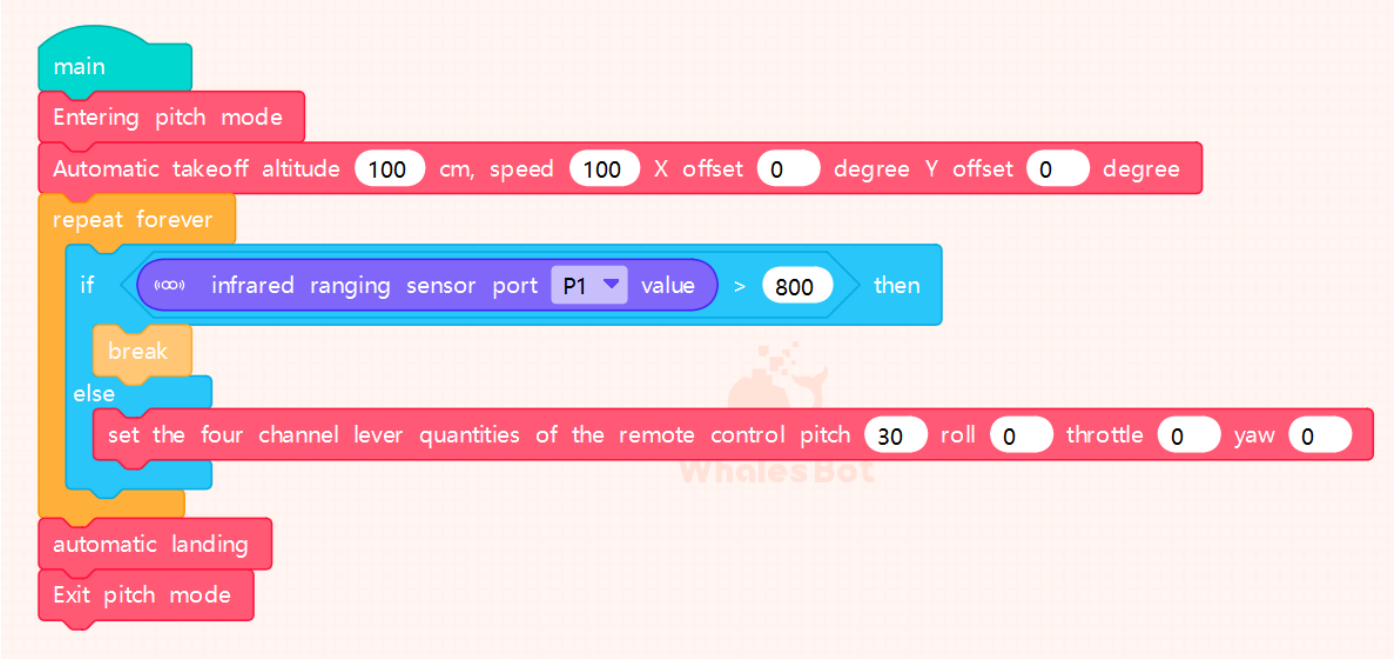
**Use case 1:** The drone takes off. If it detects an obstacle ahead, it lands. If not, it continues to fly forward. Sample program:




**Use case 2:** After the drone takes off, it hovers until it detects an obstacle approaching. Then, it automatically lands. Sample program:



**Use case 3:** The drone takes off. If it detects that obstacles are more than 800 mm away in the front, it lands. Otherwise, it continues to fly forward. Sample program:

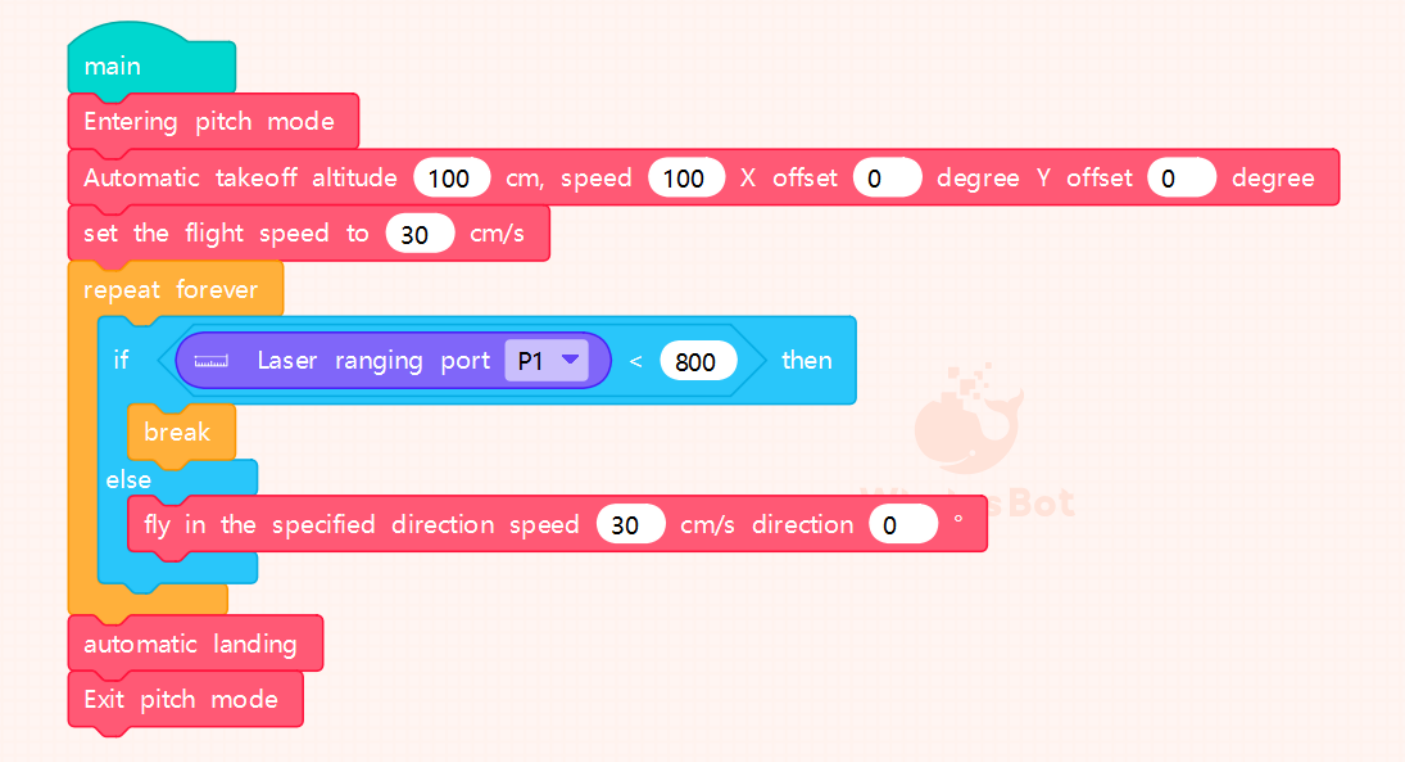



## 5. Use the laser ranging sensor

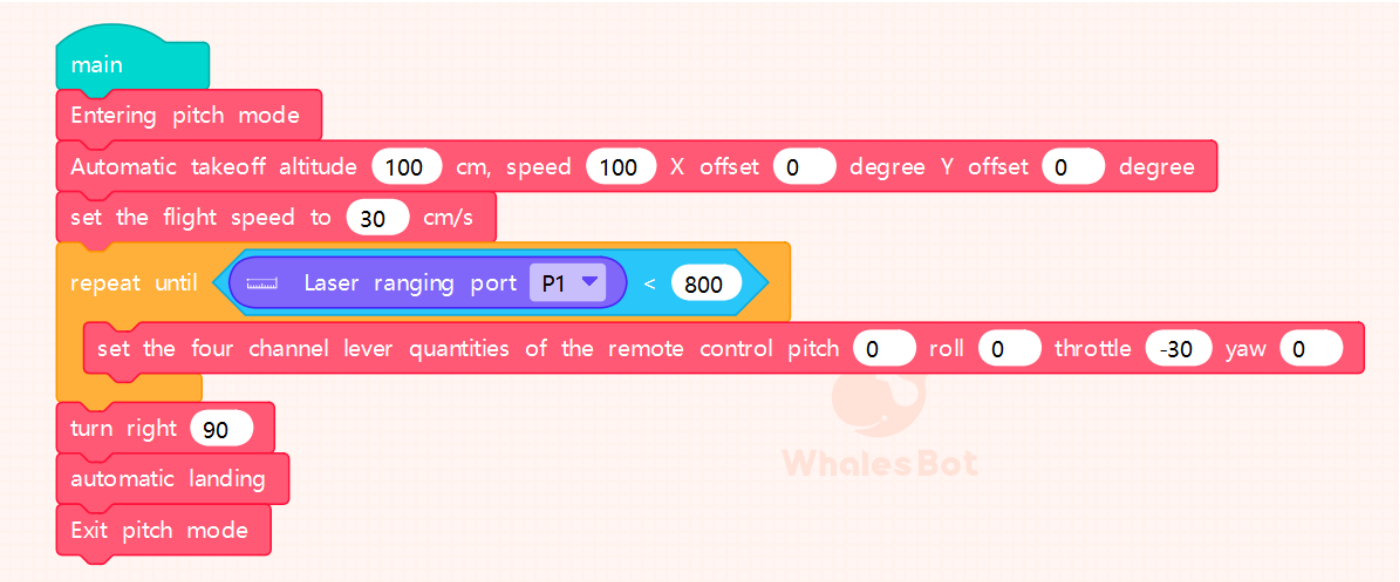
The laser ranging sensor precisely measures a distance of 30-1200 mm, and is accurate to millimeters. It is often used in scenarios like high-precision distance ranging, distance-based switch triggering, and robot obstacle detection. It can connect to the drone's P1 or P2 port.

Connect the laser ranging sensor to P1 through a 6-pin connection wire.

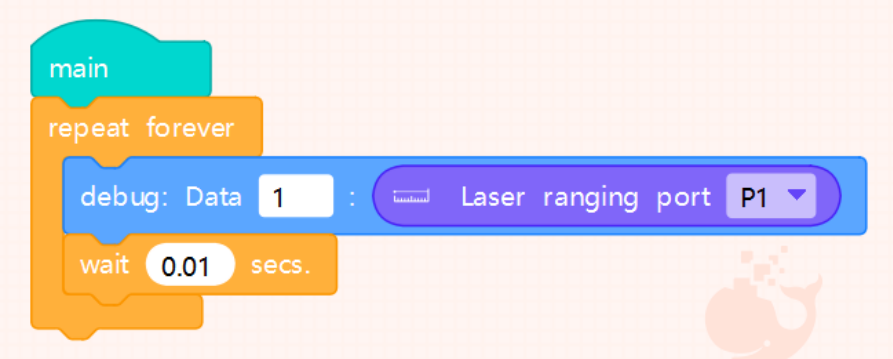
**Use case 1:** The drone takes off. If an obstacle is detected less than 800 mm away in the front, the drone stops moving and lands. Otherwise, the drone keeps flying forward. Sample program:




**User case 2:** After the drone takes off to a specific height, it descends until the distance from the ground is less than 800 mm. Then, the drone rotates 90 degrees to the right and lands automatically. Sample program:



**Use case 3:** The drone measures the distance between the ground and itself in real time, and the detected data is displayed as "Debugging 1" in the upper right corner of the coding software. Sample program:

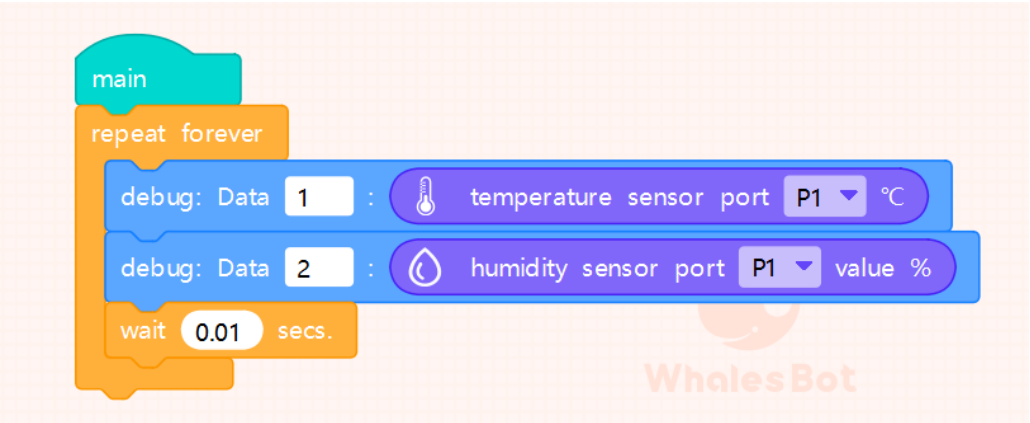



## 6. Use the temperature and humidity sensor

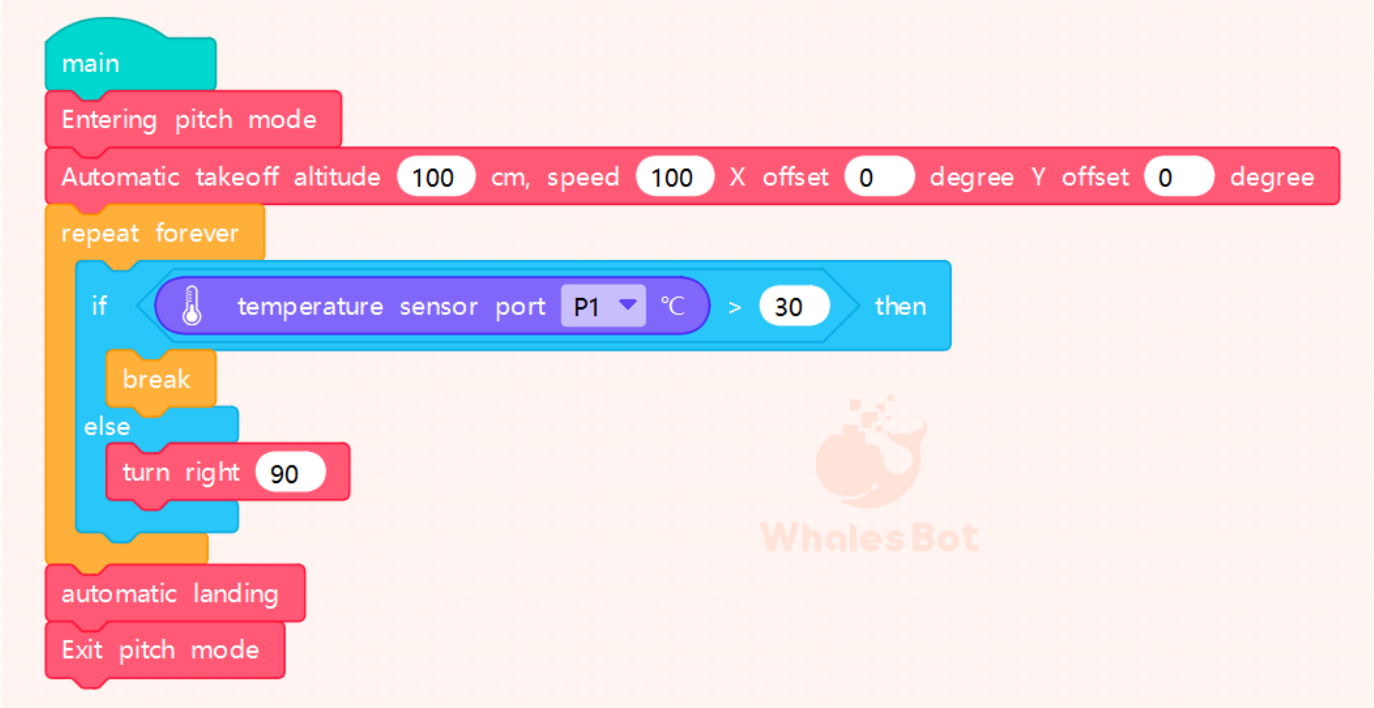
The temperature and humidity sensor detects temperature and humidity. It can measure relative humidity from 0 to 100% and temperatures from -40°C to 125°C. It is commonly used in projects related to temperature and humidity, and can connect to the P1 or P2 port of the drone.

Connect the temperature and humidity sensor to P1 through a 6-pin connection wire.

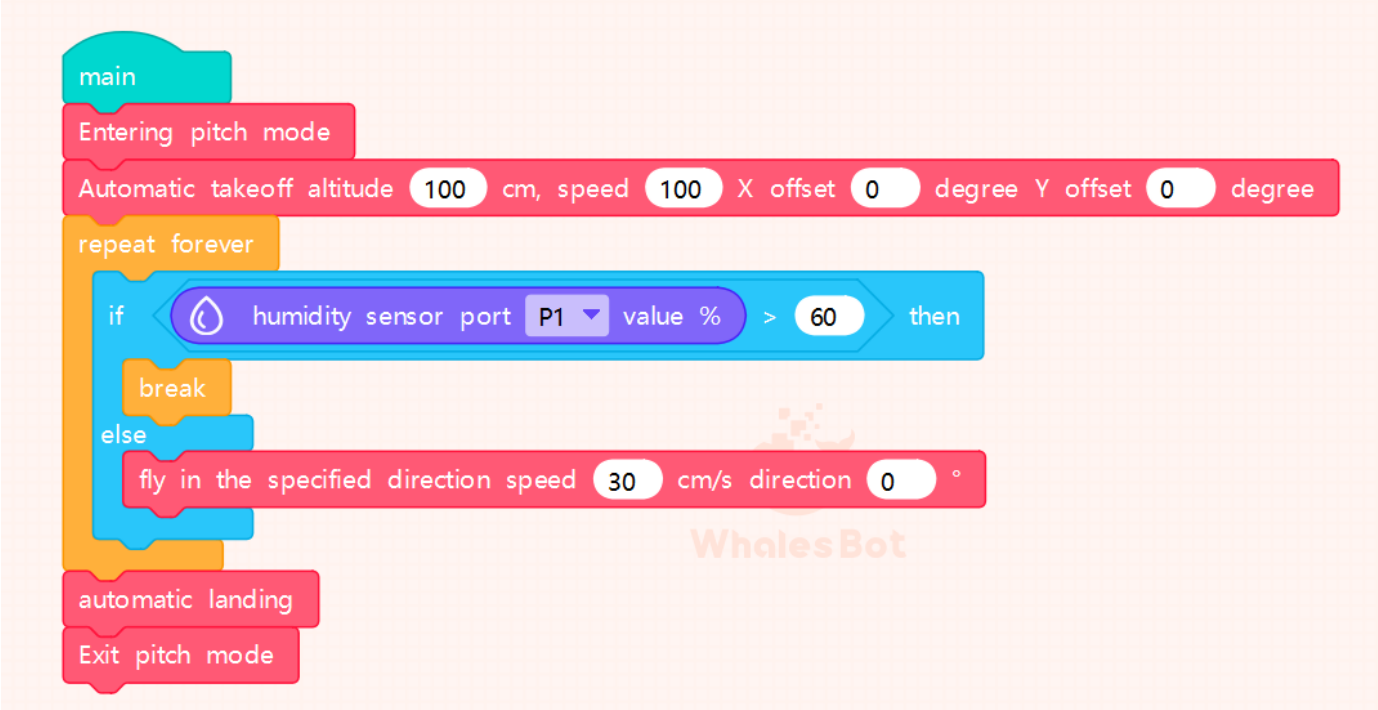
**Use case 1:** Monitor and display the temperature and humidity in real time. The detected data results are displayed as "Debugging 1" and "Debugging 2" in the upper right corner of the coding software. Sample program:



**Use case 2:** The drone takes off. It rotates 90 degrees to the right until the ambient temperature exceeds 30 °C, at which time the drone automatically lands. Sample program:




**Use case 3:** The drone takes off. It flies forward until the surrounding humidity exceeds 60%, at which time the drone automatically lands. Sample program:

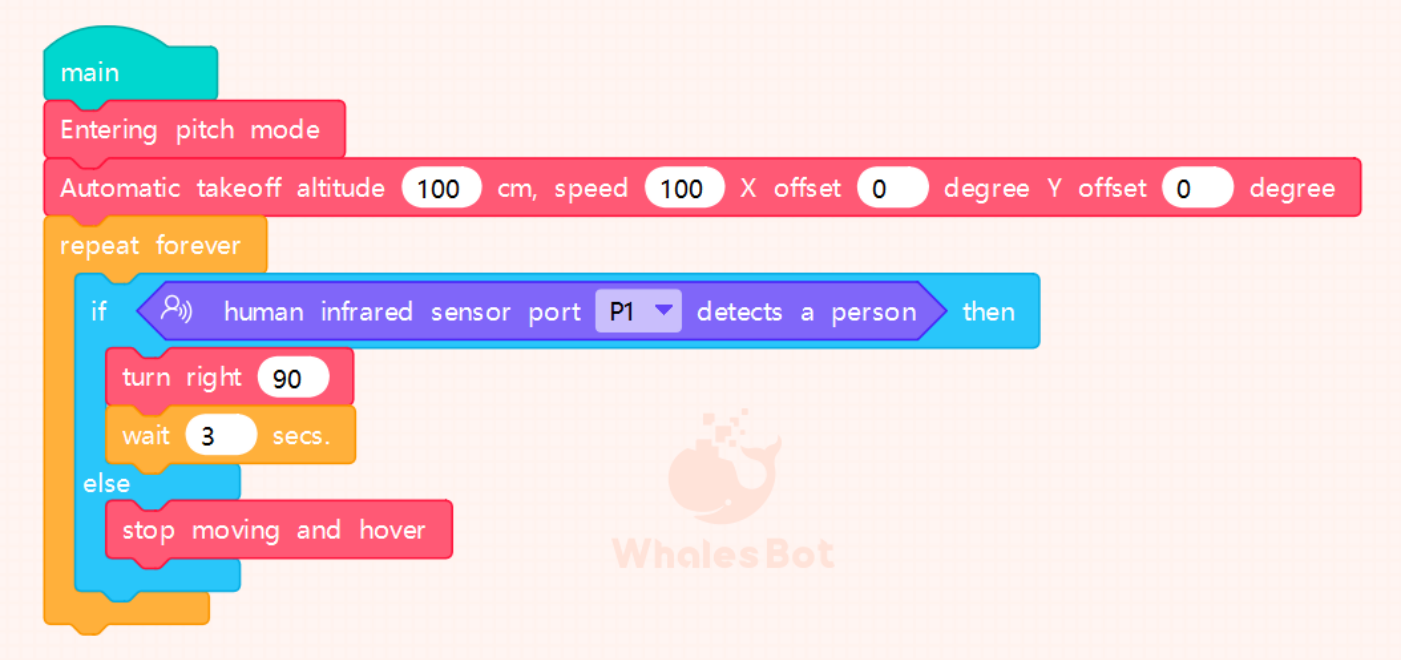


## 7. Use the human infrared sensor

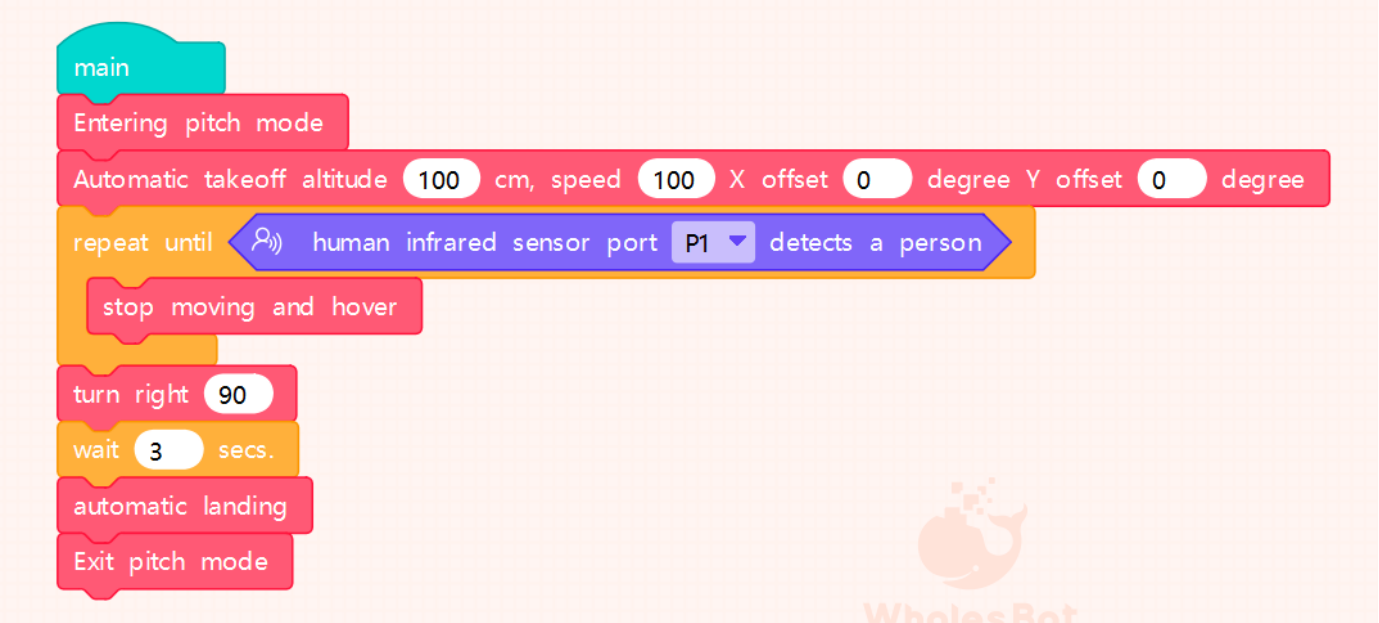
The human infrared sensor, also known as a pyroelectric infrared sensor, detects infrared radiation emitted by human or animal bodies and outputs an electrical signal. It can be applied in various situations that require detecting moving bodies. It can be connected to P1 or P2.

Connect the sensor to the P1 through a 6-pin wire.

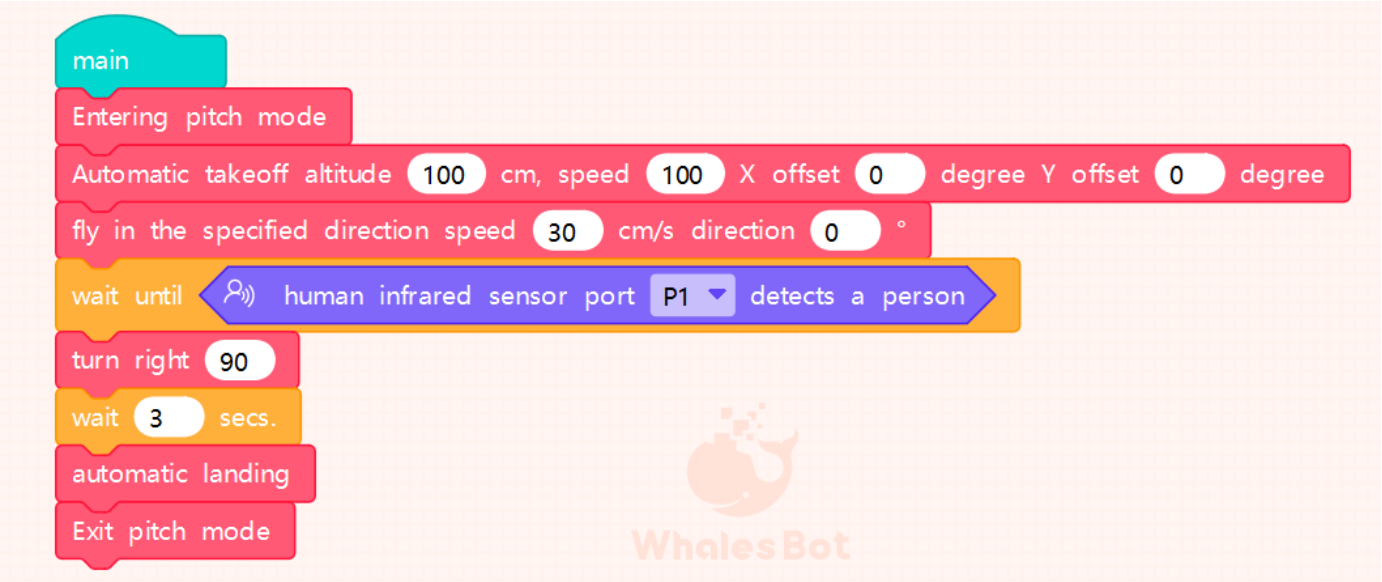
**Use case 1:** After the drone takes off to a specific height, it hovers and stops moving. When a human body signal is detected, the drone rotates 90 degrees to the right and waits for 3 seconds. Sample program:



**Use case 2:** After the drone takes off, it hovers until it detects a human signal. Then, the drone turns 90 degrees to the right, waits for 3 seconds, and finally lands. Sample program:




**Use case 3:** After the drone takes off, it flies forward until it detects a human signal. Then, the drone turns 90 degrees to the right, waits for 3 seconds, and finally lands. Sample program:

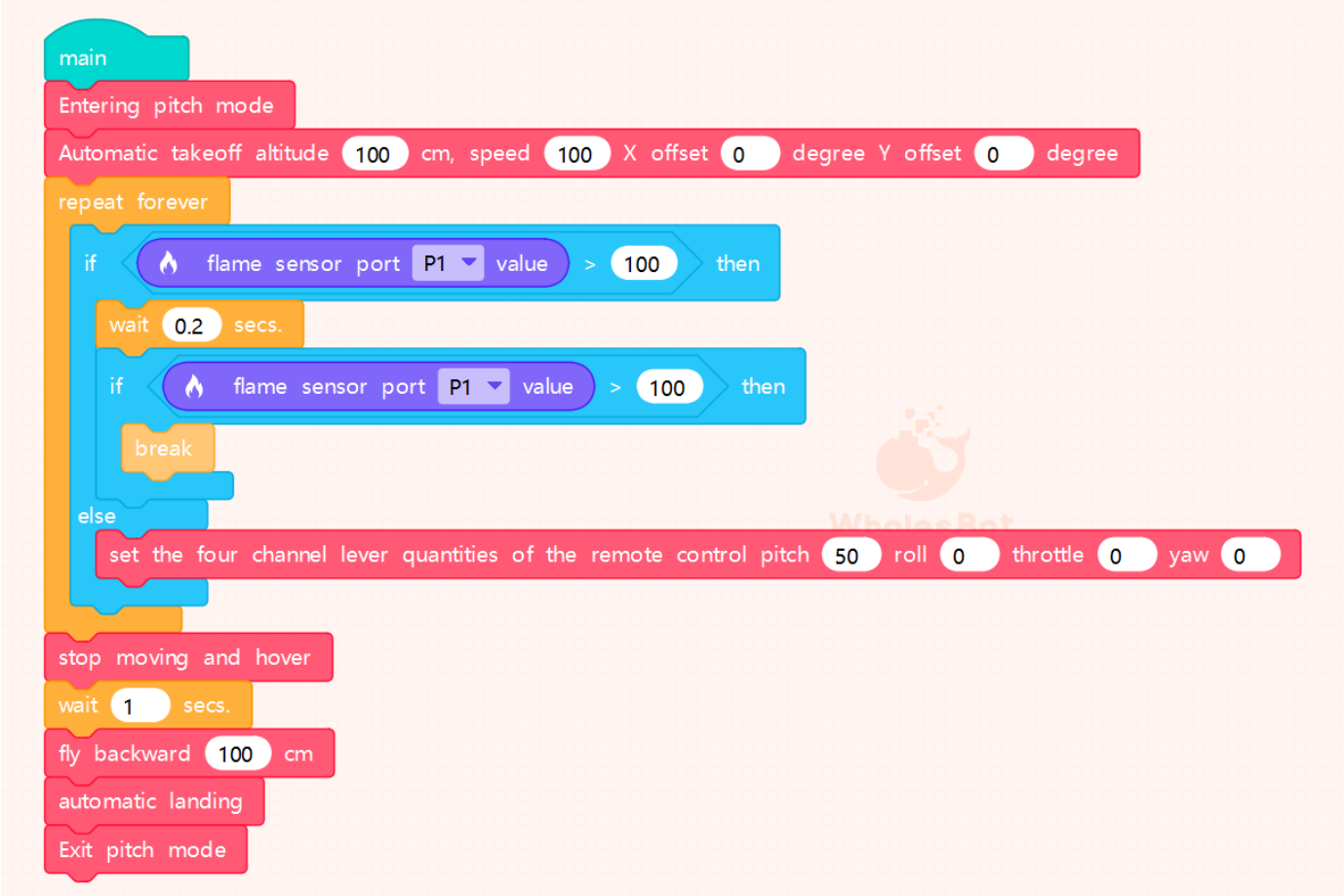


## 8. Use the flame sensor

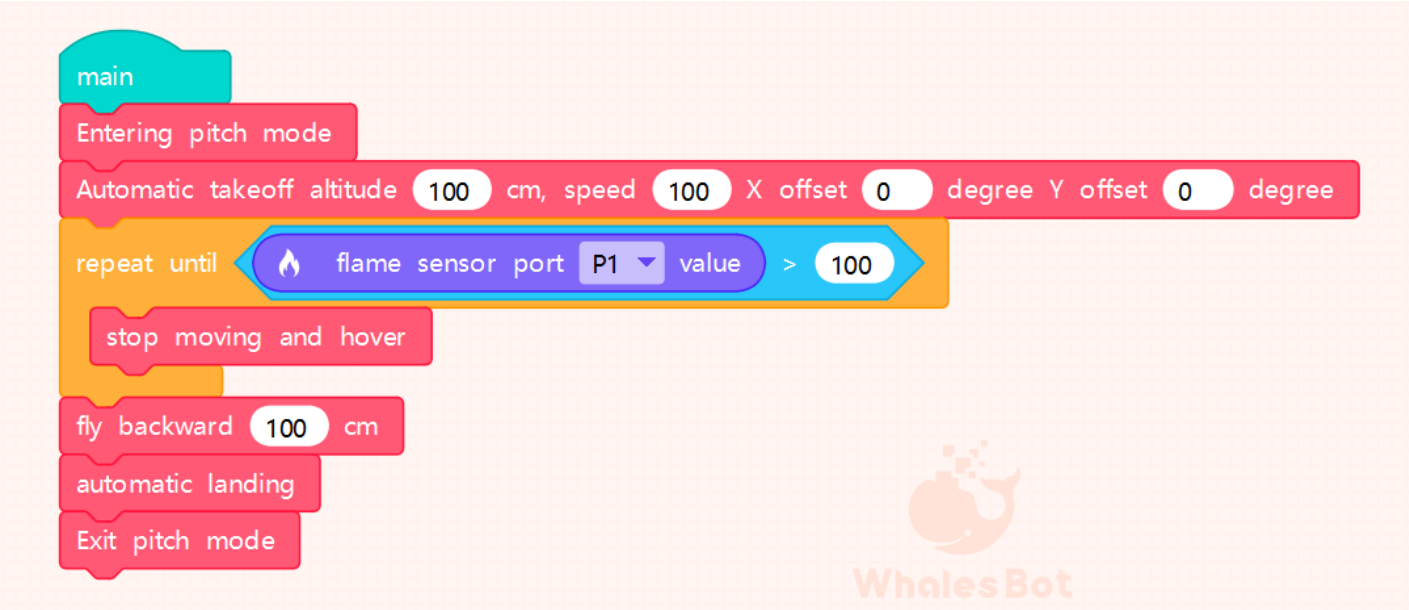
The flame sensor is an analog input module that can detect fire sources, but it is not fire-resistant itself, so a safe distance from fire sources should be maintained during use. It can be connected to the P1 or P2 port of the drone.

Connect the flame sensor to the P1 port of the drone using a 6-pin connection wire.

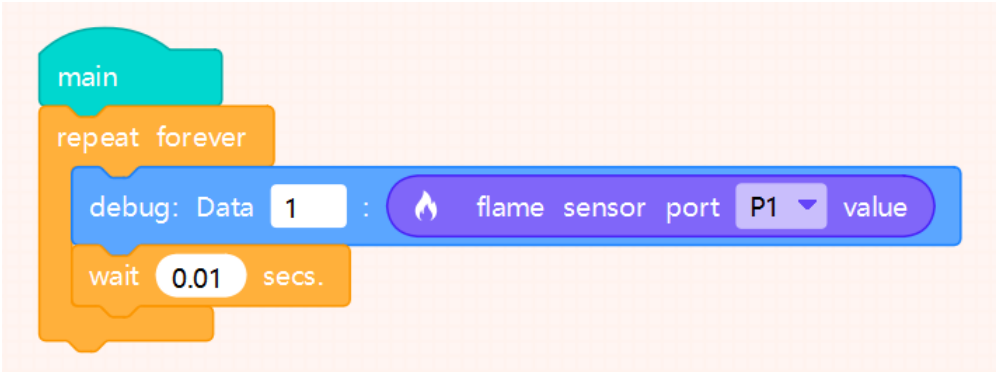
**Use case 1:** The drone takes off to a height of 100 cm and moves forward. If the flame sensor returns a value greater than 100, the drone hovers for 1 second, flies back 100 cm, and then lands. Sample program:



**Use case 2:** After the drone takes off, it hovers until the flame sensor returns a value greater than 100. Then, the drone flies back 100 cm and lands. Sample program:




**Use case 3:** Detect in real time whether there are flames in the surroundings. The detected data results will be displayed as "Debugging 1" in the upper right corner of the coding software. Sample program:

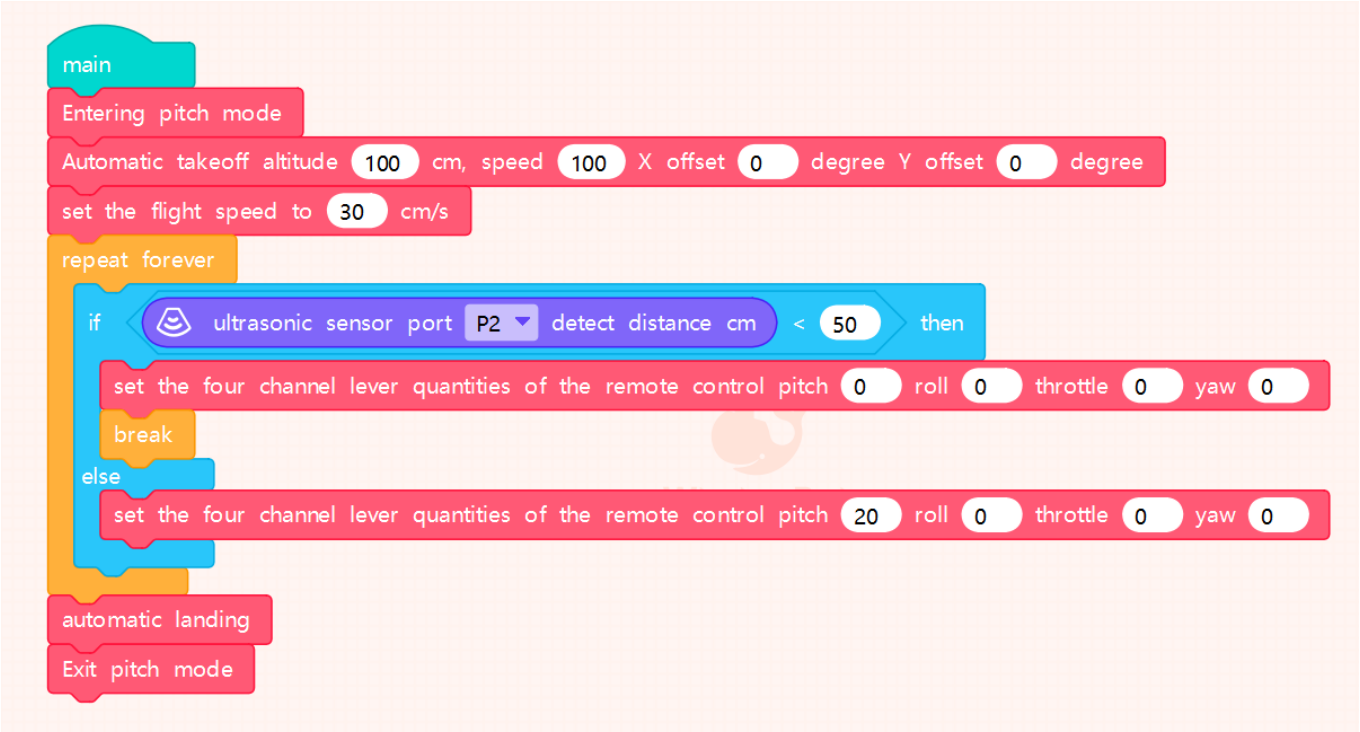



## 9. Use the ultrasonic sensor

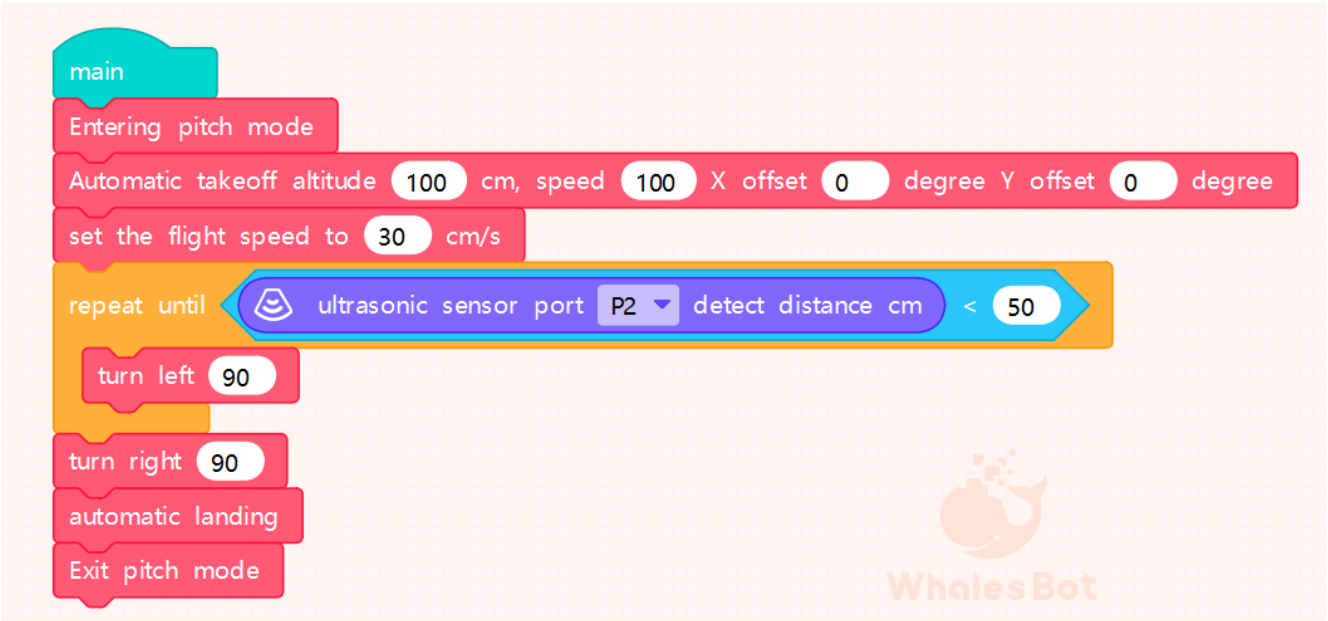
The ultrasonic sensor uses sonar to calculate distance based on the time when the emitted ultrasonic wave is sent and the time when its echo is received. It can measure distances from 5 cm to 300 cm and is accurate to centimeters. It is commonly used in drone obstacle detection, and can be connected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

Connect the ultrasonic sensor to the P2 port of the drone using a 6-pin connection wire.

**Use case 1:** After the drone takes off to a height of 100 cm, it flies forward until the ultrasonic sensor detects an obstacle 50 cm away. Then, it stops moving and lands. Sample program:




**Use case 2:** After the drone takes off to a specific height, it keeps rotating 90 degrees to the left until the ultrasonic sensor detects an obstacle less than 50 cm away. Then, the drone rotates 90 degrees to the right and lands. Sample program:



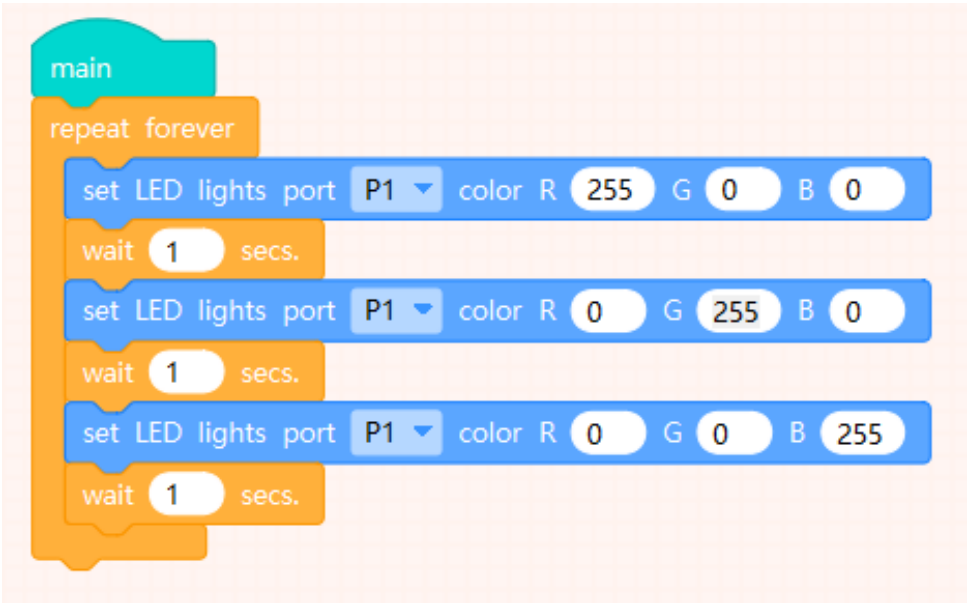
**Use case 3:** Detect the distance between the obstacle and the drone in real time. The detected data is displayed as "Debugging 1" in the upper right corner of the coding software. Sample program:


## 10. Use the RGB LED

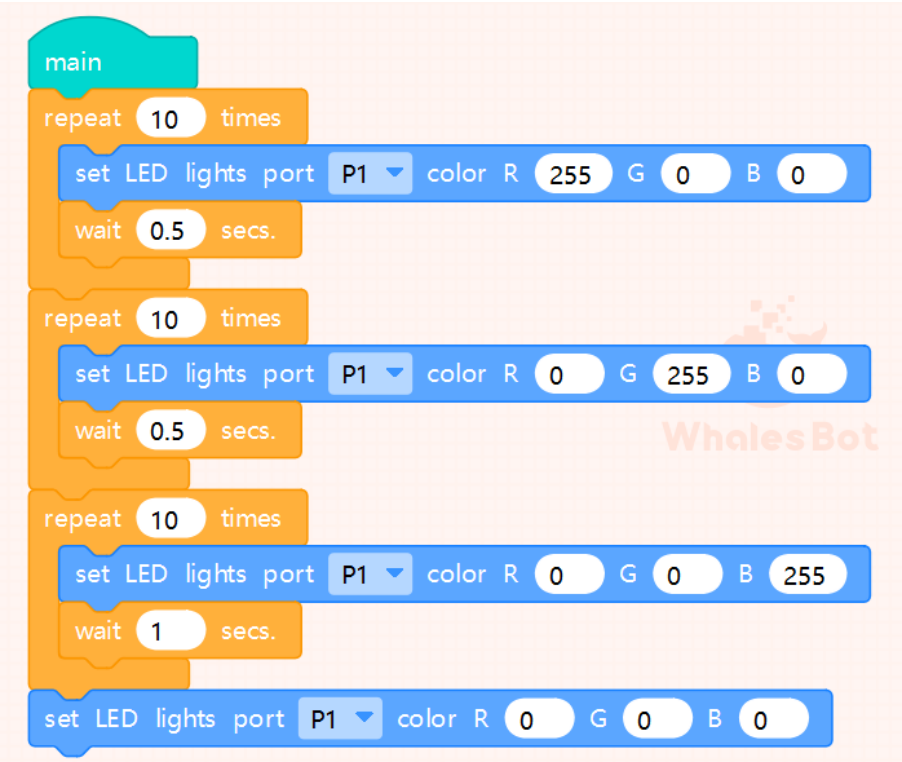
The RGB LED mixes red, green, and blue lights to emit lights of all colors. It can be connected to the P1 or P2 port of the drone.

Connect the RGB LED to the P1 port of the drone using a 6-pin cable.

**Use case 1:** 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:



**Use case 2:** The RGB LED glows red, green, and blue 10 times each, and finally turns black.



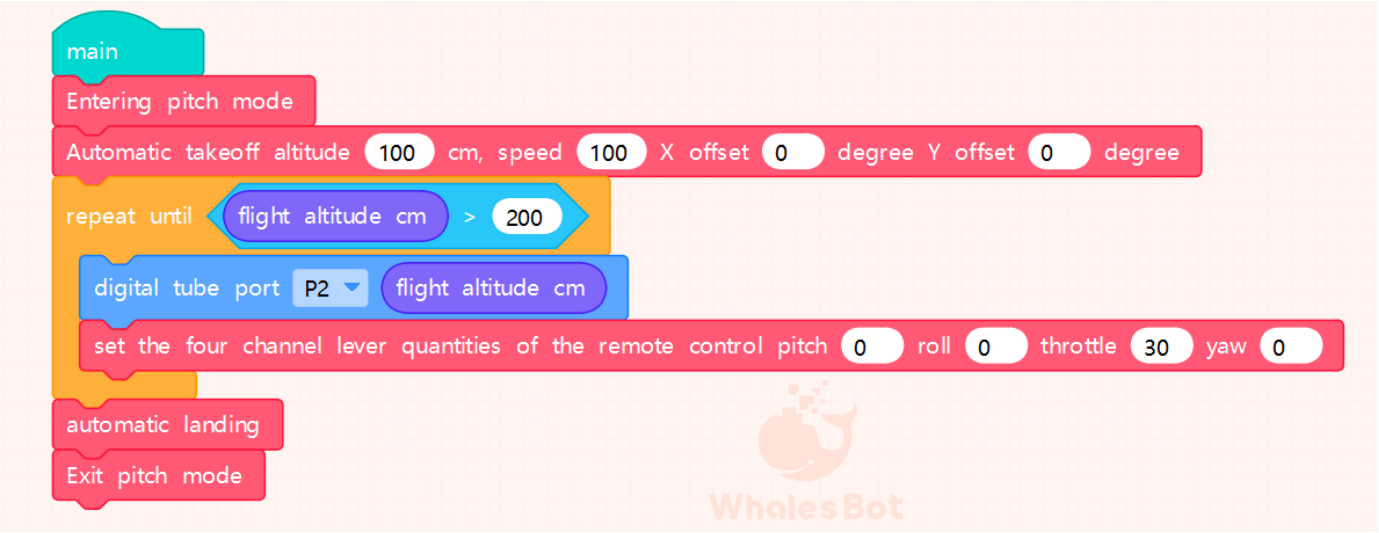

**Use case 3:** The RGB LED flashes red, orange, yellow, green, cyan, blue, and purple in sequence, with each light on for 1 second. Sample program:

## 11. Use the digital tube

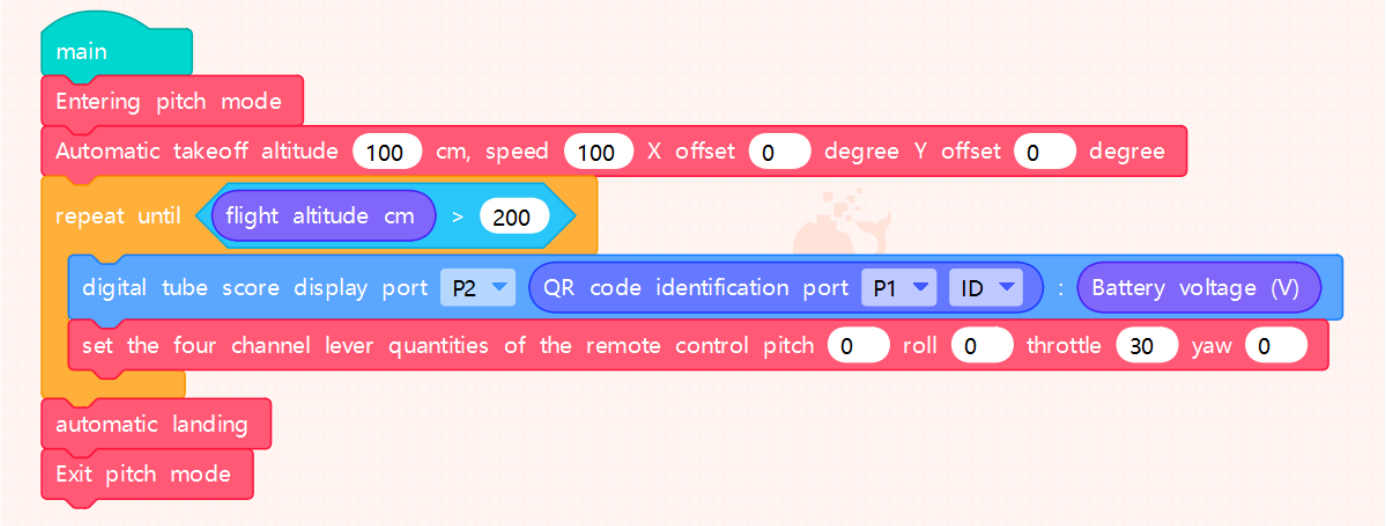
The digital tube can display numeric values in numeric display mode or competition score mode. It can connect to the P1 or P2 port of the drone.

Connect the digital tube to P2 through a 6-pin connection wire.

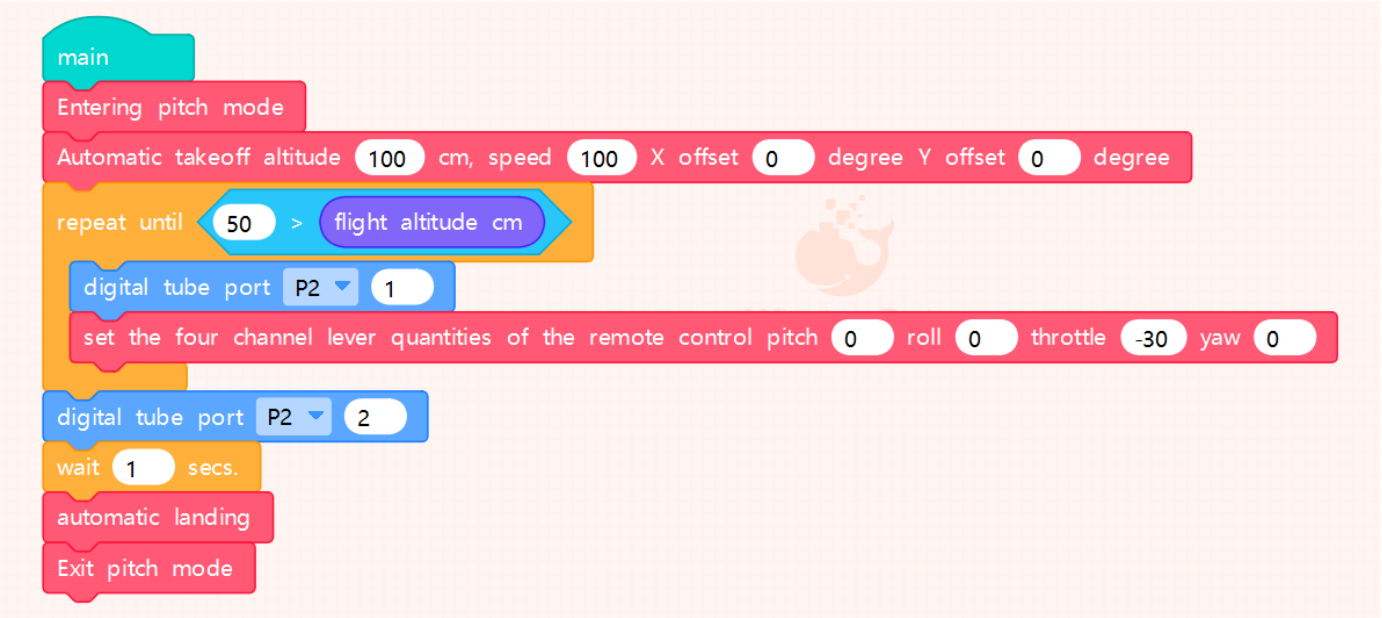
**Use case 1:** The drone takes off, and ascends slowly while displaying the height on the digital tube. When the height exceeds 200 cm, the drone lands. Sample program:




**Use case 2:** The drone takes off and then slowly rises. The digital tube displays two numbers, the first one represents the QR code ID, and the second one represents the battery voltage. When the height exceeds 200 cm, the drone lands. Sample program:



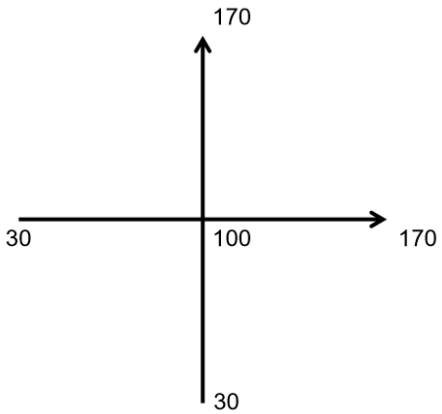
**Use case 3:** The drone takes off to a specific height and then slowly descends, and the digital tube displays "1". When the height is lower than 50 cm, the digital tube displays "2" and the drone lands. Sample program:




## 12. Use the remote control

Through coding, the drone can sense the operations on the buttons and joysticks of the remote control and interpret them as values. The following figure shows values of buttons and joysticks in a sample scenario.

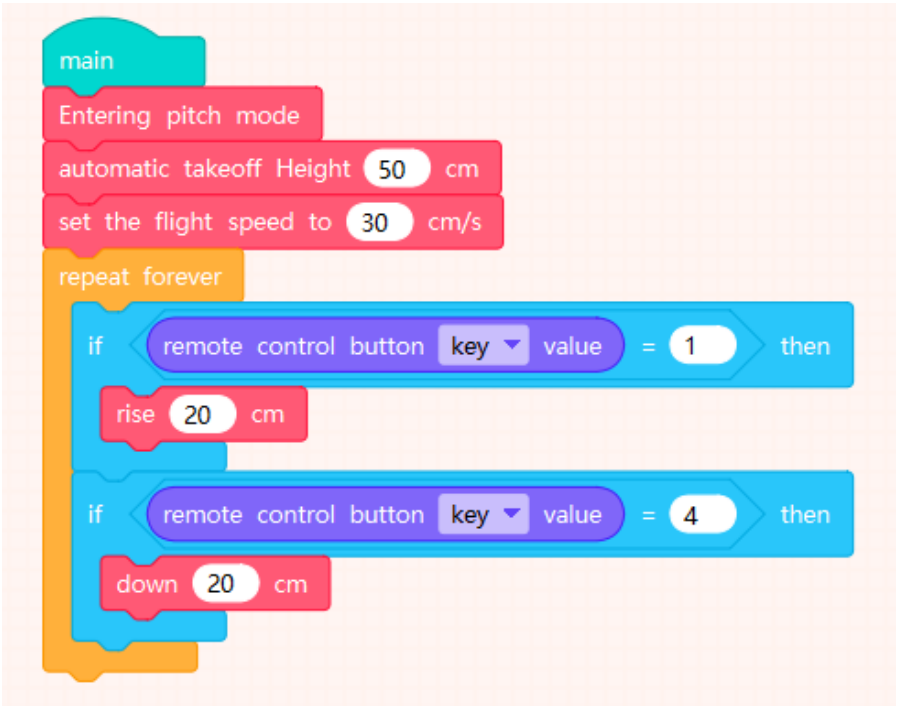

Button Values




Joystick Values

Connect the remote control to the drone via Bluetooth. Run the program to produce the

following result: After the drone takes off to a height of 50 cm, press the "  " button and the drone ascends by 20 cm. Press the "  " button and then the drone descends by 20 cm.



# 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

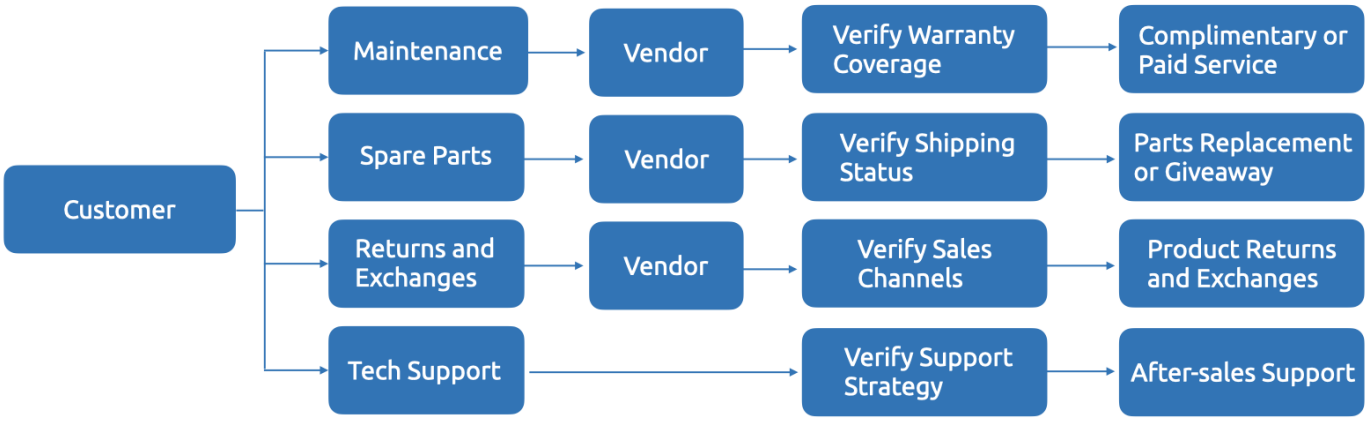
1. The remote control has a large number of delicate circuits. Put it in a cool and dry environment when it is idle.

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 for young inventors.