DOBOT

User Manual

Magician Sensor Kit

DOBOT

Shake Hands With The Future

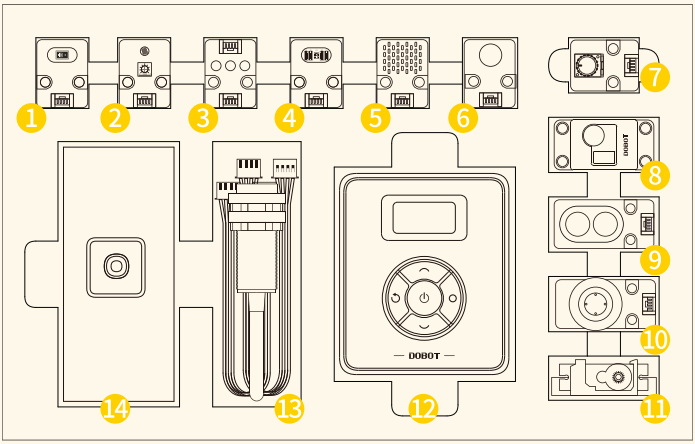
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Be sure to read the instructions carefully before using the products and use them correctly. Please keep the instructions properly for future reference.

Warning!

Do not put the sensors in water or fire for use and measurement. Do not place sensors close to high temperature fire source for a long time. Do not press them hard. Non-professionals do not open the shell of the electronic modules. Please keep them away from children under 3 years old to avoid any accidents.

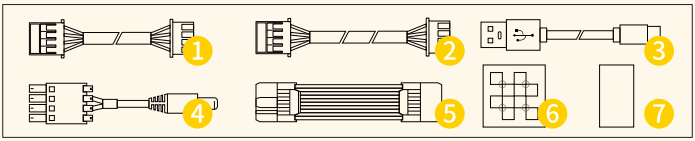
Magician Sensor Kit User Manual



Sensor kit diagram

Shipping List

01.Gesture Sensor*1	02.Light Sensor*1	03.LED Module*1	04.Color Sensor*1
05.Humiture Sensor*1	06. PIR Sensor*1	07. Knob Potentiometer*1	08.Sound Sensor*1
09.Dual Button*1	10. Joystick*1	11. Micro Servo*1	12. Magic Box *1
13. Photoelectric Switch (with bracket)*1		14. AI Camera Kit (with wire clamp)*1	



Accessory

01.General Sensor Wire*6	02.General Sensor Extension Wire*2		03.USB Cable*1
04.4PIN Power Cable*1	05.10PIN Communication Cable*1	06.Calibration Card*1	07.User Manual*1

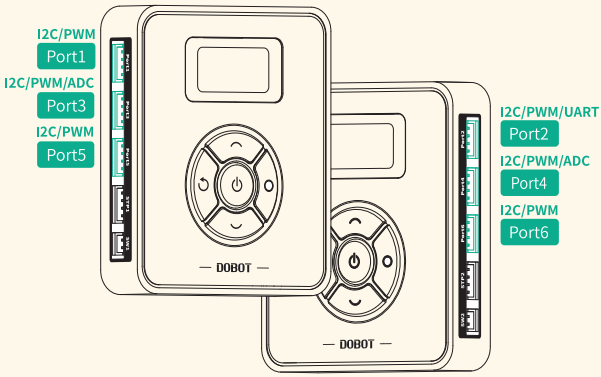
Instructions

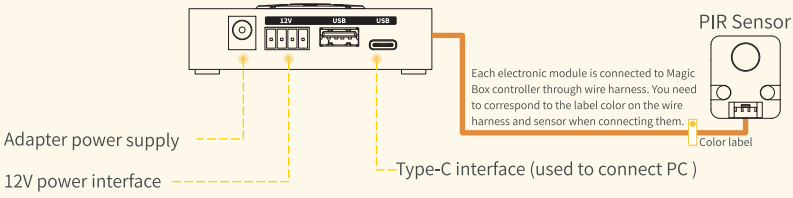
- The kit contains 12 electronic modules, which can be widely used in various engineering practice, AI and IoT projects.
- The product cable connection is simple. The shell contains Lego holes compatible with LEGO bolt blocks, which can help to realize creative ideas.
- It supports easy-to-use blockly programming and professional Python programming.
- It is matched with powerful Magic Box controller to seamlessly connect Dobot ecology.

Wire connection

The wire harness is used to connect the electronic module to Magic Box controller. The wire harness has a name and color label on it, which can match the color label on the

Sensor and Magic Box Interface





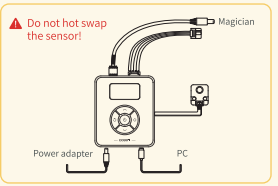
Connection diagram of sensor module and Magic Box

Types of interfaces are as follows:

No.	Module	Communication mode	Interface	Note
1	Light sensor Knob potentiometer Sound sensor	ADC	Port3/Port4	Analog input
2	Joystick Humiture sensor Gesture sensor Color sensor	I2C	Port1~ Port6	Digital input
3	Micro servo	PWM	Port3~ Port6	PWM input
4	LED module	Single-bus	Port1~ Port6	
5	PIR sensor Dual button Photoelectric switch	IO	Port1~ Port6	General IO

Connection and Programming

Step 1 Connect the sensor, **Magic Box**, data cable and computer before powering on.



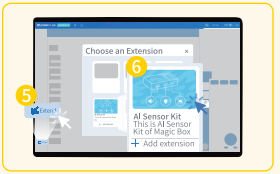
Step 2 Open DobotLab on your computer (Windows, Mac, etc.). Select **Magic Box**.



Step 3 Click To Connect Device. Select the corresponding COM port device and click **Connect**. Return to the editor when **Connected** is displayed.



Step 4 Click **Extend**. Choose **AI Sensor Kit**. Now you can start programming.



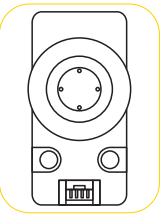
Parameters and Usage of Sensor Module

1.Joystick

Introduction

The working principle of the joystick is similar to that of general joystick gamepad. The X and Y axes correspond to two 10K potentiometers respectively. When the joystick moves, it generates corresponding analog signal and outputs the offset value. The Z-axis is a button application.

Connection mode: connect to any green port of Magic Box (Port1~Port6)
Communication mode: I2C
Wiring Cable: Universal Sensor Cable
X/Y output value: 10~250
Z output value: 0: release; 1: press
Voltage: 5V
Current: 50mA



Instructions

- Connect the sensor to Magic Box correctly.
- Select corresponding blocks in DobotLab. You can obtain real-time data for grabbing objects by joystick-controlled arm.
- Complete Blockly programming. You can debug online or upload scripts to Magic Box for offline operation.

2.Dual Button

Introduction

The dual-button module provides two physical keys in different colors for operation. The module determines the status of keys by detecting the high/low level of input pins of different keys.

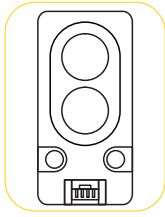
Connection mode: connect to any green port of Magic Box (Port1~Port6)

Communication mode:IO

Wiring Cable: Universal Sensor Cable

Voltage: 5V

Current: 50mA



Instructions

- Connect the sensor to the Magic Box correctly.
- Select corresponding blocks in DobotLab. You can obtain real-time data for switch control, etc.
- Complete Blockly programming. You can debug online or upload scripts to Magic Box for offline operation.

3. PIR Sensor

Introduction

PIR sensor is a body infrared sensor. It belongs to passive pyroelectric infrared detector. It works by detecting the infrared radiation emitted or reflected by the human body or objects. When detecting infrared, it outputs high level and carries out a time delay (during which the high level is maintained and repeated triggering is allowed) until the triggering signal disappears (restoring low level).

Note: There is a two-second delay after detection is triggered.

Connection mode: connect to any green port of Magic Box (Port1~Port6)

Communication mode: IO

Wiring Cable:Universal Sensor Cable

Detection distance: 150cm

Delay period: 2s

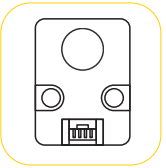
Induction range: < 100°

Static current:< 60uA

Operating temperature:-20 ~ 80°C

Voltage:5V

Current: 50mA



Instructions

- Connect the sensor to Magic Box correctly.
- Select corresponding blocks in DobotLab, which can be used in the automatic induction and interaction between the robot arm and human.
- Complete Blockly programming. You can debug online or upload scripts to Magic Box for offline operation

4.Gesture Sensor

Introduction

Gesture sensor is a 3D gesture recognition sensor using I2C communication interface. It supports eight types of gesture recognition by default, and the maximum gesture update frequency can reach 240Hz. It has certain anti-ambient light interference ability. With strong stability, fast recognition speed, high accuracy and low power consumption (working current: 2.2mA), it is suitable for a variety of applications, including non-contact remote control, robot interaction, human-machine interaction games, and gesture lighting control.

Connection mode:connect to any green port of Magic Box (Port1~Port6)

Communication mode:I2C

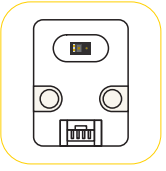
Wiring Cable: Universal Sensor Cable

Support gestures: up, down, left, right, forward, backward, clockwise, counterclockwise

Effective recognition distance: 5cm~15cm

Voltage: 5V

Current: 50mA



Instructions

- Select corresponding blocks in DobotLab, which can be used for non-contact arm

control and lighting interaction, etc.

- Complete Blockly programming. You can debug online or upload scripts to Magic Box for offline operation

5.Photoelect ric Sensor

Introduction

The photoelectric sensor is also called the photoelectric proximity switch.It detects the presence of the object through the connected circuit if there is an object shielding or reflecting the beam. The photoelectric sensor converts the input current into an optical signal on the transmitter, and the receiver detects the target object according to the intensity or presence of the received light. The L-shaped bracket made of aluminum alloy is used for fixing the photoelectric sensor so that the probe of the photoelectric sensor can be placed parallel to the table top.

Connection mode: connect to any green port of Magic Box (Port1 ~ Port6)

Communication mode:IO

Wiring Cable: Already attached

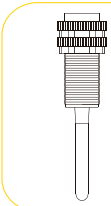
Value range: 0 (no shield), 1 (with shield)

Standard detection environment: sunlight less than 10000LX, incandescent lamp less than 3000LX

Object to be detected: transparent or opaque object

Operating temperature:-25°C ~ 55°C

Response time: <2ms



Instructions

- The package contains an optical sensor, including wires and an L-shaped bracket, which can be tightened using a black positioning ring for fine-tuning.
- The metal point behind the sensor is a regulator. You can use it to adjust the detection distance by rotating clockwise to increase the distance and counterclockwise to decrease the distance.

6.Sound Sensor

Introduction

The sound sensor is used to detect the sound intensity of the surroundings. The greater the sound intensity it receives, the stronger the output signal and the greater the return value is.

Connection mode: connect to any green port of Magic Box (Port3 or Port4)

Communication mode: ADC

Wiring Cable: Universal Sensor Cable

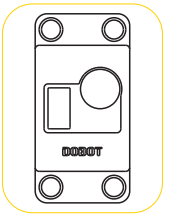
Value range: 0~1023

Sensitivity: (48dB ~ 52dB) @1kHz

Microphone impedance: 2.2k ohms

Microphone frequency: 16-20 kHz

SNR S/N: 54dB



Instructions

- Connect the sensor to Magic Box correctly.
- Select the corresponding blocks in DobotLab. Obtain the return value of external sound intensity output through the probe.
- Select the corresponding blocks in DobotLab. Obtain the return value of external sound intensity output through the probe.

Note: The played music will be interrupted when you set the volume. Do not press microphone hard.

7.Humiture Sensor

Introduction

The humiture sensor is used to detect temperature and humidity of current environment.

Connection mode: connect to any green port of Magic Box (Port1~Port6)

Communication mode: I2C

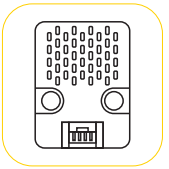
Wiring Cable: Universal Sensor Cable

Temperature range: 0~60°C/±1°C

Humidity range: 10~90% RH ± 5% RH

Voltage: 5V

Current: 50mA



Instructions

- Connect the sensor to Magic Box correctly.
- Select corresponding blocks in DobotLab. You can obtain real-time data collected by the sensor.
- Complete Blockly programming. You can debug online or upload scripts to Magic Box for offline operation.

8.Color Sensor

Introduction

The color sensor module is used to identify the color of the object and return a set of RGB values or color detection results.

Connection mode: connect to any green port of Magic Box (Port1 ~ Port6)

Communication mode: I2C

Wiring Cable: Universal Sensor Cable

Color detection result: 0: no color; 1: red; 2: green; 3: blue; 4: yellow; 5: black; 6: white

Color value RGB: 0~200 (a larger value indicates a darker color)

Voltage: 5V

Current: 50mA



Instructions

- Connect the sensor to Magic Box correctly.
- Select corresponding blocks in DobotLab. You can obtain real-time data and detection results.
- Complete Blockly programming. You can debug online or upload scripts to Magic Box for offline operation.

9.LED Module

Introduction

LED module contains three RGB LED lights, which can be controlled independently.

Connection mode: connect to any green port of Magic Box (Port1 ~ Port6)

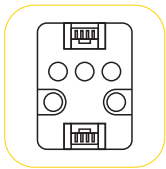
Communication mode: monobus

Wiring Cable: Universal Sensor Cable

RGB range: 0~255

Brightness range: 0~100%

Voltage: 5V



Instructions

- Connect the sensor to Magic Box. Select the correct port .
- Select corresponding blocks in DobotLab. You can control color and effect in real time.

10.Light Sensor

Introduction

The Light sensor contains photosensitive resistance. The resistance value decreases with the increase of the incident light intensity. Based on this, the change of its voltage is detected and the light intensity data is obtained through AD conversion.

Connection mode: connect to Magic Box green port (Port3 or Port4)

Communication mode: I2C

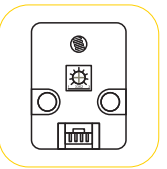
Wiring Cable: Universal Sensor Cable

Color detection result: 0: no color; 1: red; 2: green; 3: blue; 4: yellow; 5: black; 6: white

Color value RGB: 0~200 (a larger value indicates a darker color)

Voltage: 5V

Current: 50mA



Instructions

- The exposed position of components can collect external light intensity. It can be used in small projects related to light detection.
- Connect the sensor to Magic Box correctly.
- Select corresponding blocks in DobotLab, which can be used for acquiring data in real time.
- Complete Blockly programming. You can debug online or upload scripts to Magic Box for offline operation

11.Knob potentiometer

Introduction

Knob potentiometer is a resistance element with a maximum resistance of 10K and the resistance value can be adjusted by the knob rotation, It has three leads.

Output voltage: 0~2500mV

Connection mode: connect to Magic Box green port (Port3 or Port4)

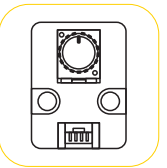
Communication mode: ADC

Wiring Cable: Universal Sensor Cable

Brightness return value: 0-407 (extreme fluctuation is normal)

Voltage: 5V

Current: 50mA



Instructions

- Connect the sensor to the Magic Box correctly.
- Use the knob to adjust the output variable. It can be used to adjust the brightness of the light or speed of the motor.

- Select corresponding blocks in DobotLab, which can be used for acquiring data in real time.
- Complete Blockly programming. You can debug online or upload scripts to Magic Box for offline operation.

12.Micro servo

Introduction

For micro servo, yellow refers to signal cable, brown refers to ground cable, and red refers to 5V, The servo can control 180°rotation of micro servo. When using the micro servo, pay attention to the supply current and voltage to prevent the servo from being burnt.

Connection mode: connect to Magic Box green port (Port3~Port6)

Communication mode: PWM

Wiring Cable: Universal Sensor Cable

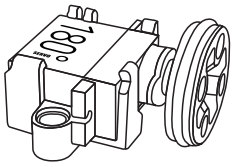
Servo speed: 0.1sec/60°/4.8V; 0.09sec/60°/6.0V

Torque: 1.6kg•cm/4.8V; 1.8kg•cm/6.0V

PWM frequency: 50Hz/0.5~2.5MS

Voltage: 4.8-6.0V

Non-load Current: 60mA



Instructions

- Micro servo contains supporting cross axle connector *4, servo disc *2.
- Select corresponding blocks in DobotLab to control the rotation angle of servo.
- Complete Blockly programming. You can debug online or upload scripts to Magic Box for offline operation.

13.Electronic module wiring calbe

Introduction

The wiring calbe should be paired and connected according to the color of the sticker. The green terminal of the wiring calbe should be connected to the green port of Magic Box controller, and the other end should be connected to the sensor.

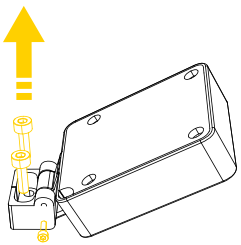
Wire instructions

- Type 1: universal sensor cable. Its sticker is yellow. It is suitable for short-distance application scenarios.
- Type 2: universal extension cable. Its sticker is yellow. It is suitable for long-distance application scenarios and convenient to expand application range.

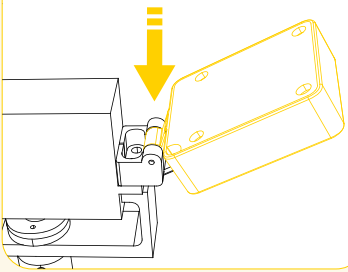
Usage of AI Camera Kit

I. Installation and connection of AI camera kit

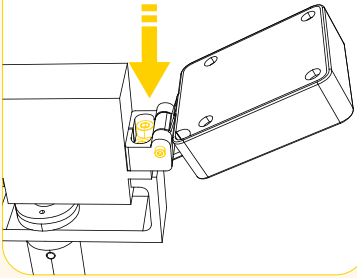
①Loosen the screws of the camera kit.



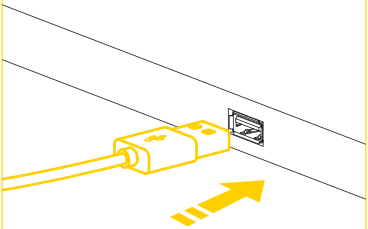
②Install the camera kit on the servo.



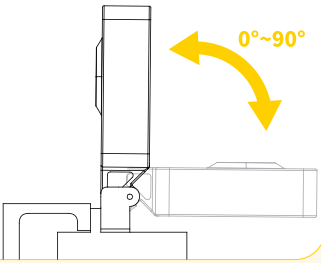
③Tighten the screws and fix the camera kit to the servo.



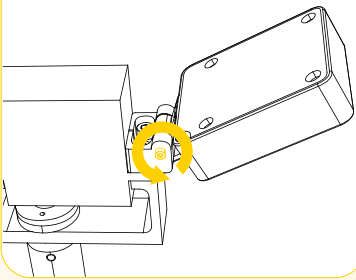
④Connect to your computer using the camera kit USB cable.



⑤Adjust angle of camera, the range is 0°~90°.



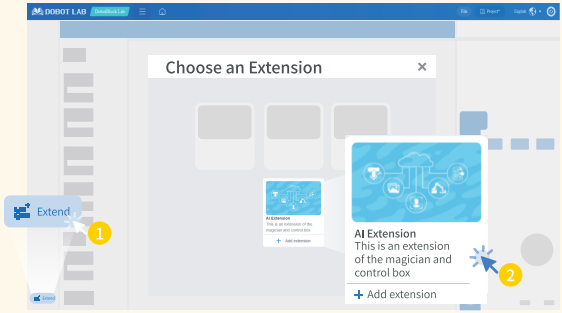
NOTICE: Loosen the screws before adjusting the camera angle.



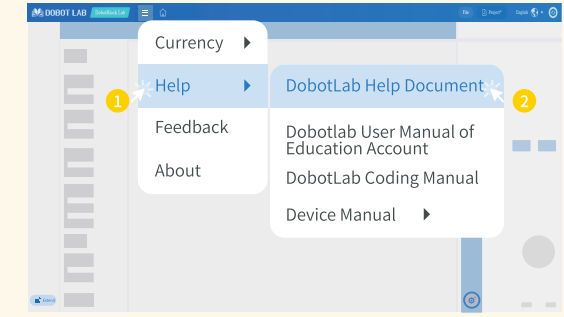
*Suggestion: Fix camera cable to Magician with a clip.

II. Usage of AI Camera Kit

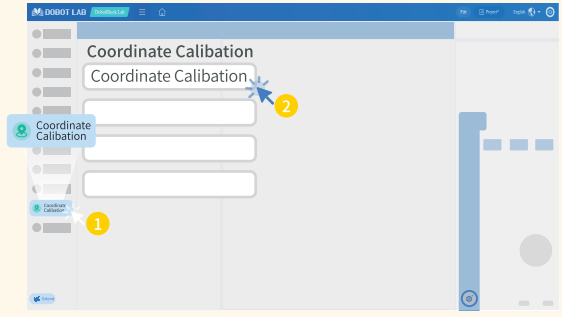
Click Extend after choosing Magic Box, and select **AI Extension**.
Now you can start programming.



For specific usage of AI camera kit, refer to DobotLab Help Document.



Note: You need to calibrate the coordinates the first time Magician grabs the object using camera. For details, refer to Coordinate Calibration function under Magician.



After-sales Service Terms

Warranty regulations

- The warranty period of machine body of this product shall be 1 year as of the date of receipt of this product by the user. Please confirm the integrity of the package at the time of signing for acceptance of the goods. Our company shall not be responsible for the problems caused by transportation.
- After opening the box, please check the items according to the shipping list. If the goods are found to be damaged or incomplete, please immediately contact the local agent or call the customer service hotline (400-800-7266) or contact us via email (support@dobot.cc).
- If a non-artificial performance failure occurs to the goods or accessories within 7 days (inclusive, calculated from the date of receipt of the goods) upon purchase of the goods, the user can contact the customer service personnel/department for confirmation. If the problem of the product cannot be solved, the user can apply for repair or replacement of the goods or accessories, and the seller shall bear the postage; any application for repair or replacement beyond this time limit shall be considered invalid.
- Consumables such as Cables shall not be covered by the warranty service.
- These rules shall not apply to imported products or accessories, which shall be covered by the original manufacturer' s warranty service.

⚠NOTICE: The freight for any replacement or return that meets the above conditions shall be borne by the local agent (or by DOBOT officially for mainland region), while the tariff at the destination which is required to be paid due to its policy shall be borne by the customer.

Free maintenance :

The free maintenance service shall be provided for the customer in the event of a non-artificial performance failure of the product that is during the warranty period and in compliance with the free maintenance clause.

To provide the free maintenance service, the following conditions shall be met:

- The product is normally operated within the specified warranty period and has shown a non-artificial performance failure.
- No failures caused by unauthorized maintenance, alteration, dismantling or installation, or other artificial reasons.
- The valid purchase certificate, receipt and the number thereof are provided.installation, or other artificial reasons.

The free product maintenance service shall not be provided under any of the following circumstances:

- Damage caused by unauthorized maintenance, alteration,disas-sembling, opening of the shell and other acts.

Damage caused by improper installation, use and operation that are not in accordance with the official instructions.

- Damage caused by reliability and compatibility problems due to simultaneous use of third-party parts that are not certified by our company.

Paid maintenance

- If any product failure is caused by the user or any other force majeure, the user may replace the accessory by himself or herself. We will make offers on accessories to the user as per the charge standards of DOBOT for after-sales maintenance. If the user accepts the offers, we will send the accessory to the user directly and give guidance on replacement after the user pays the related fees.
- When the product malfunctions and needs to be sent back to the local agent for maintenance, if the failure can be fixed according to judgment by the technician, the user shall be informed of the related maintenance fees in advance; if the user accepts the offer, after the user pays the related fees, the product will be sent back after being properly fixed and tested, with the freights borne by the user.
- The paid maintenance service shall be provided under any of the following circumstances.
- Failures or damages that occur beyond the valid warranty period of the product.
- Circumstances not covered by the free maintenance service (for details, see circumstances not covered by the free maintenance policy).

Special instructions

- These warranty terms apply to customers in Chinese Mainland who purchase products through our official website only, while other warranties and supports are provided by the local agent.
- If there is a problem that cannot be solved, please timely contact the official after-sales service department. We will analyze and solve your problem without delay.
- If there are other problems, please visit www.dobot.cc or contact the local agent.