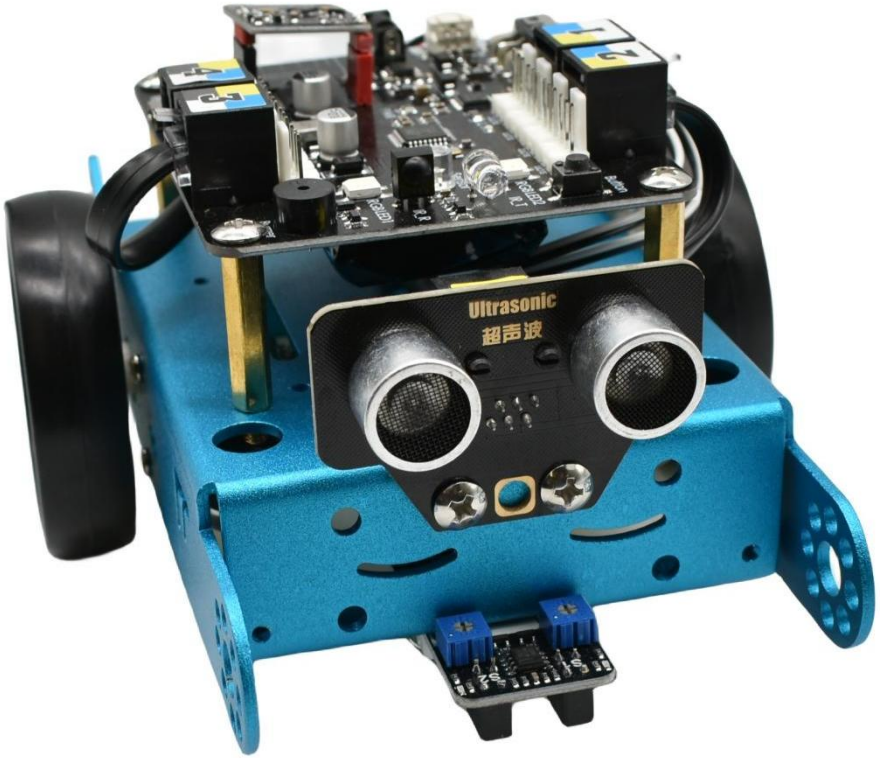
LROBRUYA

Lrobruya iBot Programming Education Robot Car


Ultrasonic
超声波

Content

Preface

Company Profile

Founded in 2014, Shenzhen Lonten Technology Co., Ltd. focuses on the design, research production of Electronics Module for robotics related products. Consisting of professional researchers and skilled engineers, our R&D team constantly strives for creative function and excellent user experience. The company's R&D investments on arduino kits raspberry pi kits, as well as 3D printer and robots that back up STEAM education.

Customer Service

Our self-owned factory is certificated with BSCI and SO, covering an area of 5,000 square meters, and achieving an annual production capacity of over 10,000 units. Our products are all certified to CE, FCC, and ROHS standards, have exported to more than 100 countries including, but not limited to France, the United States of America, Australia, Russia, the United Kingdom, Germany, Singapore, Egypt, and India, bringing technological innovation to all walks of life.

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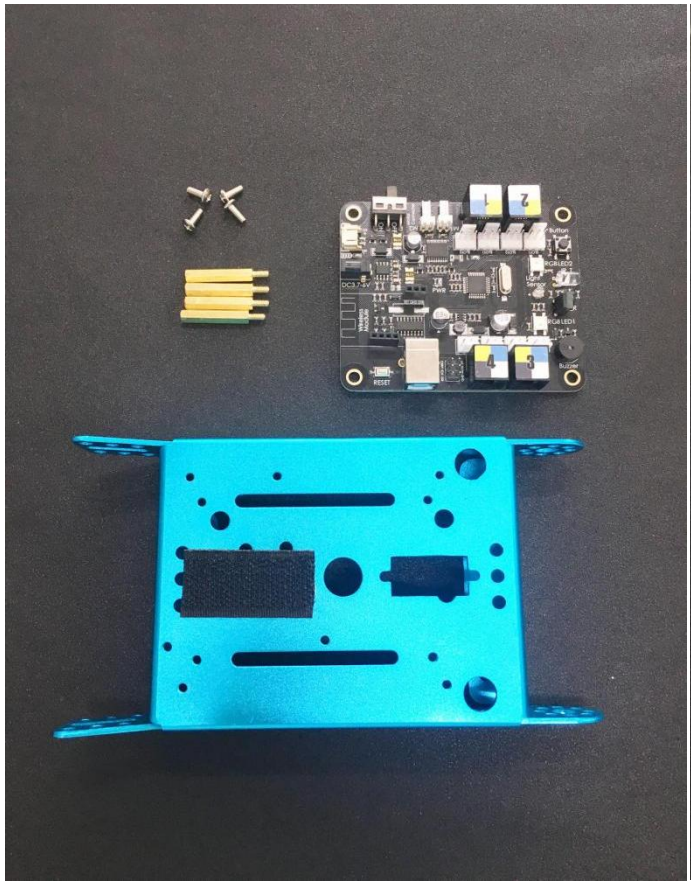
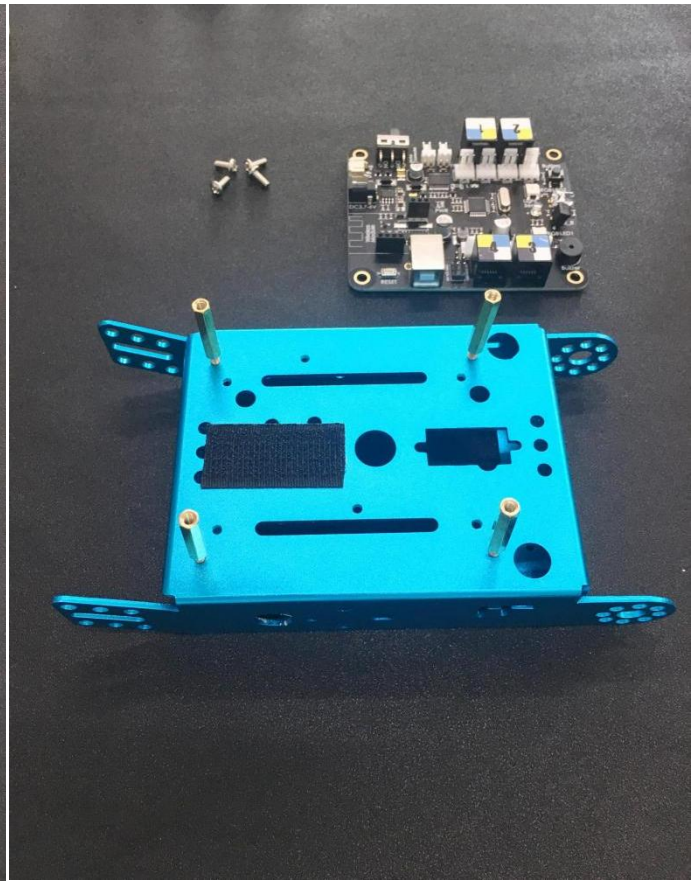
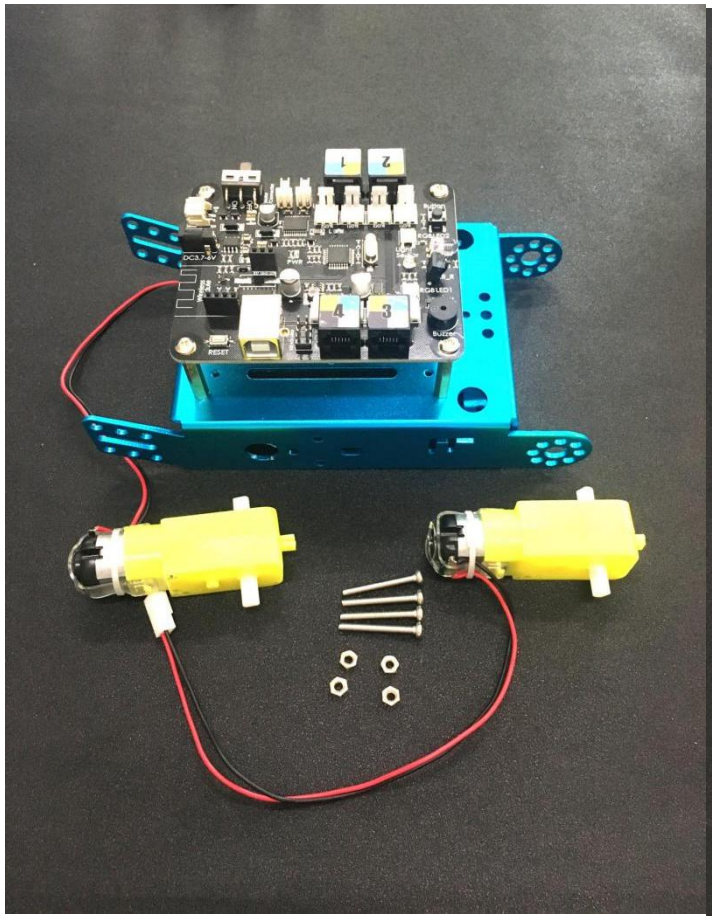
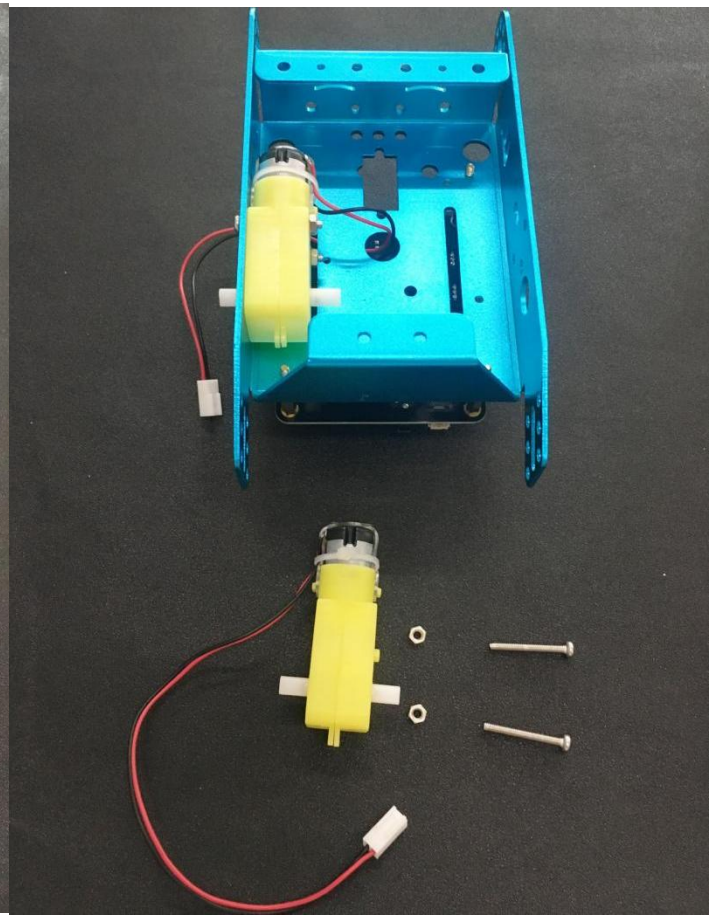
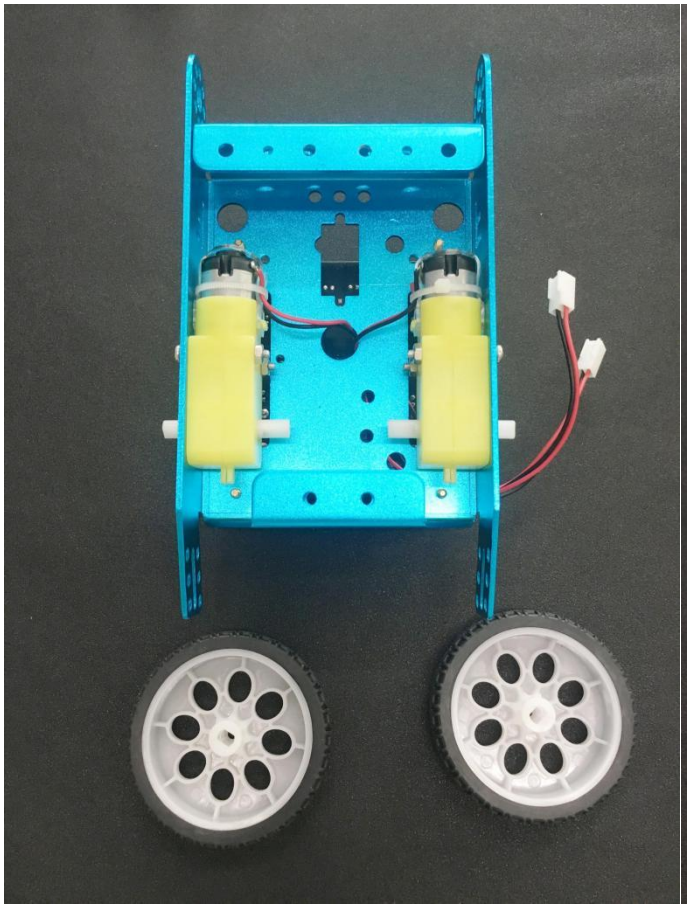
Lesson 1 Installation Method

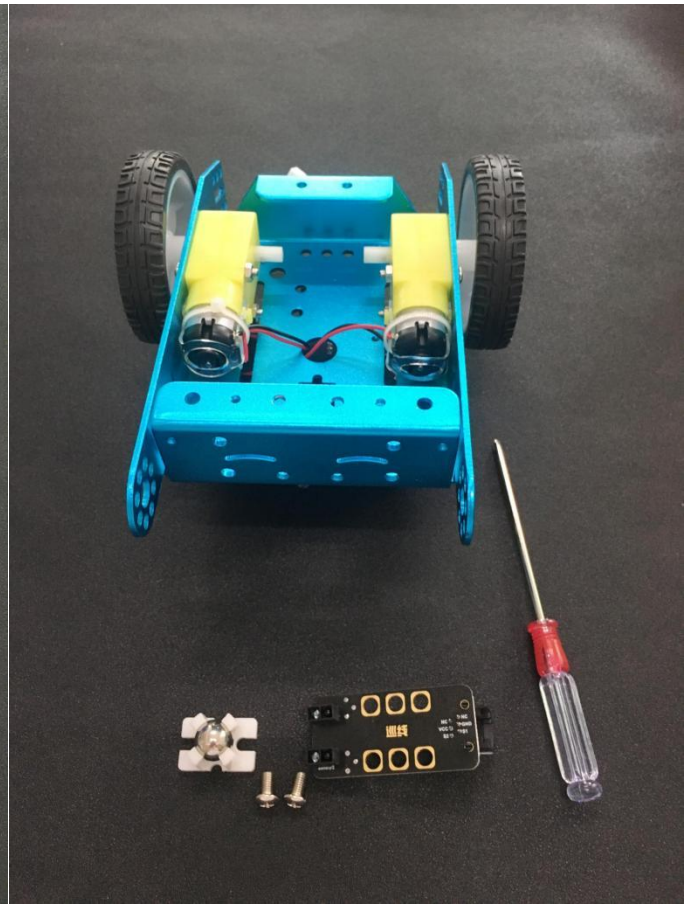


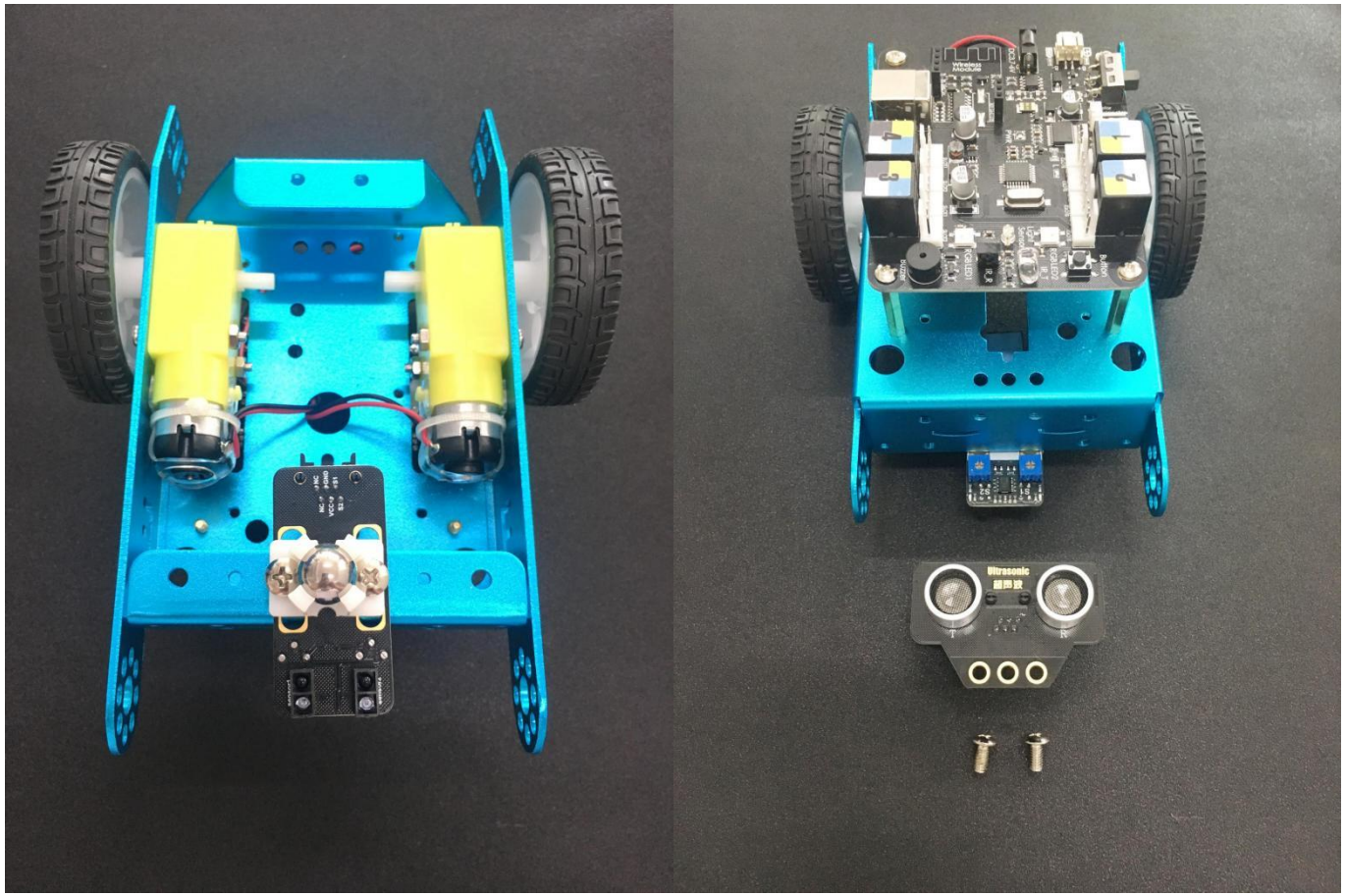








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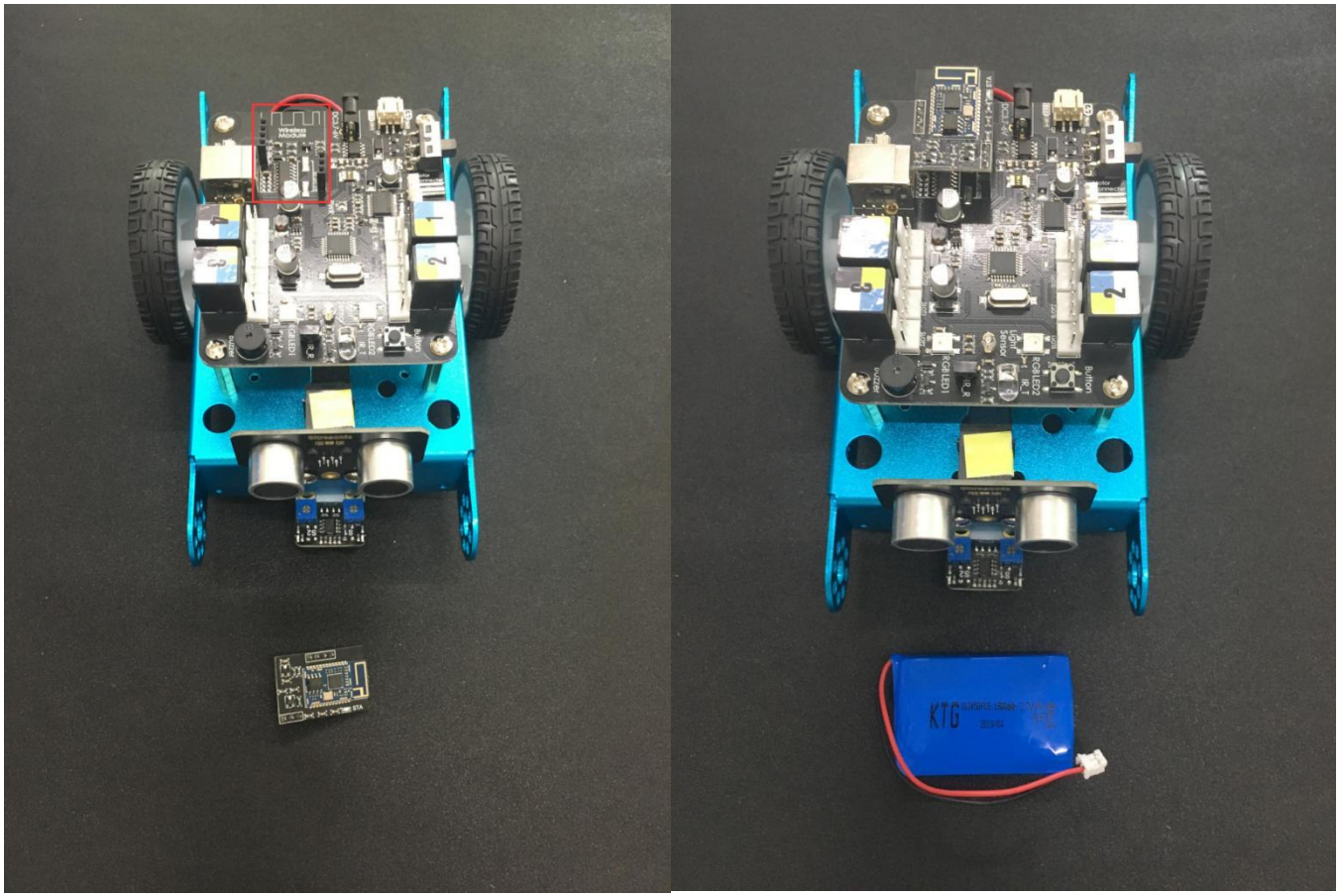
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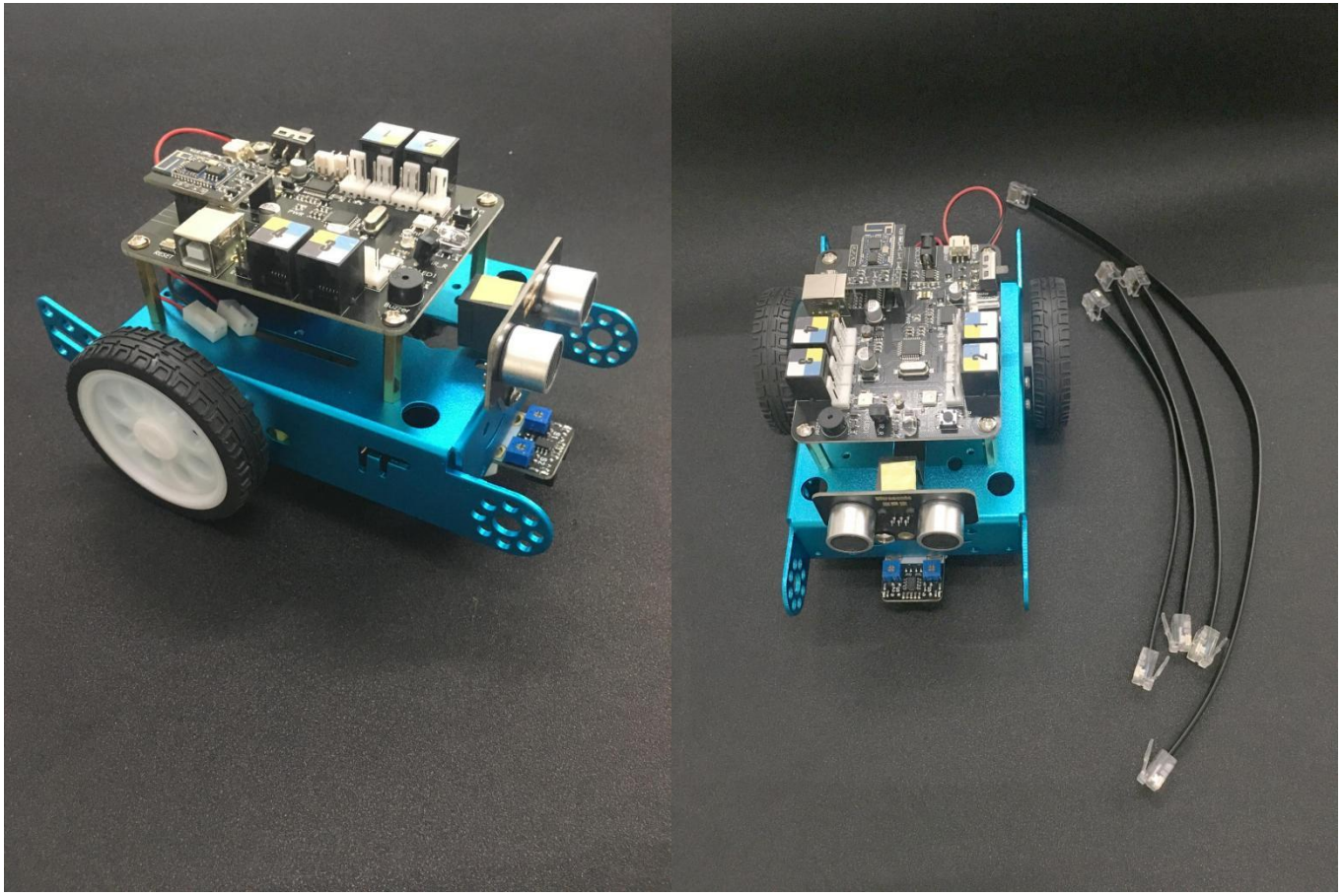

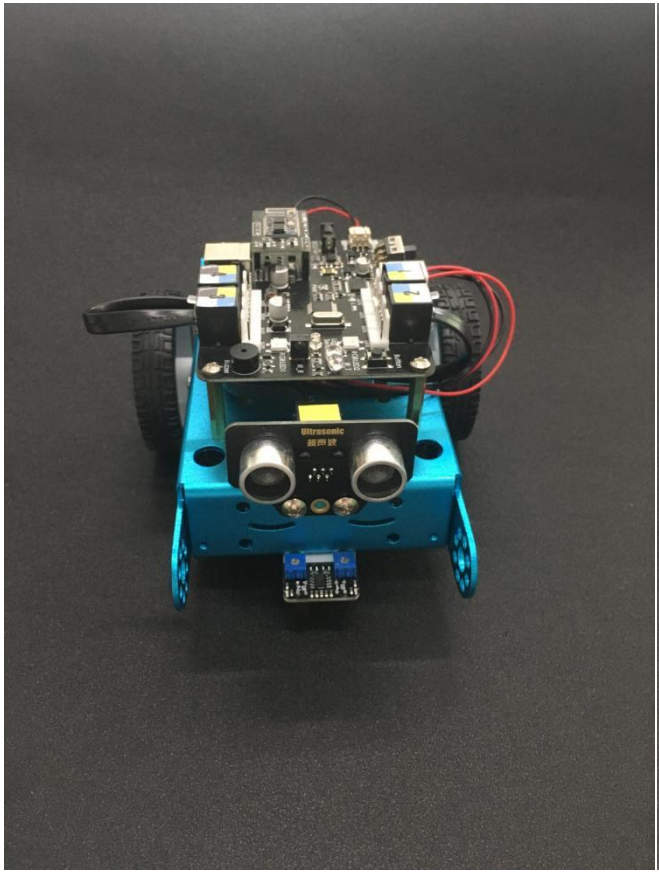
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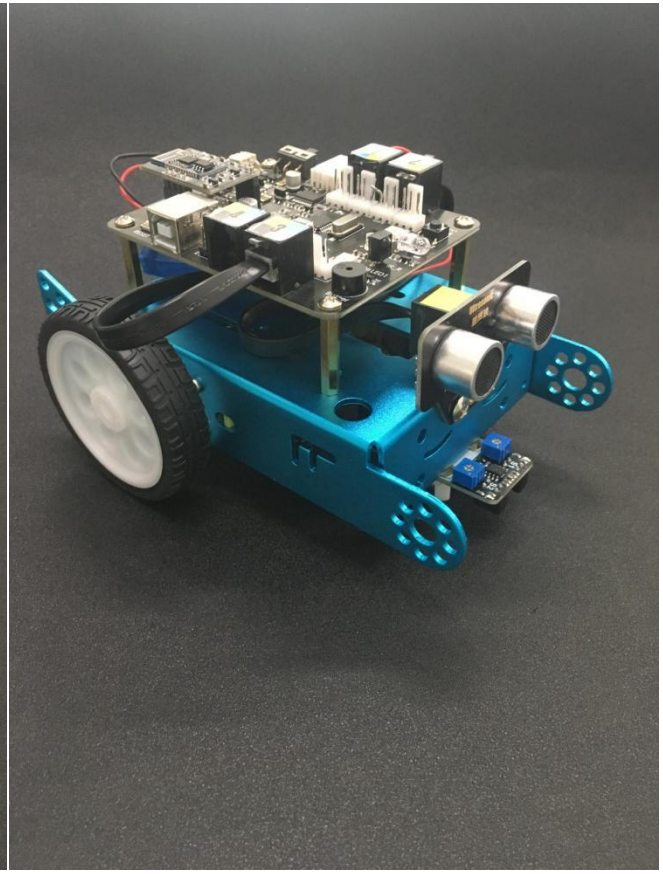
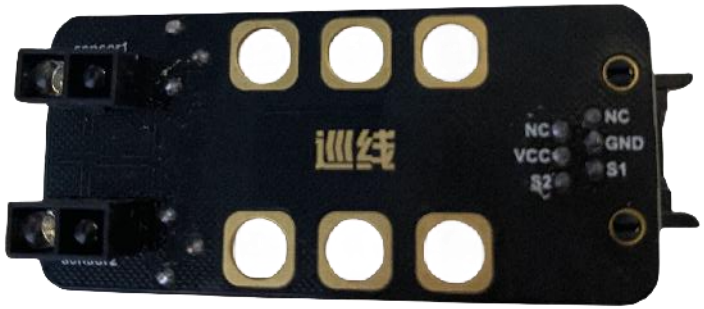
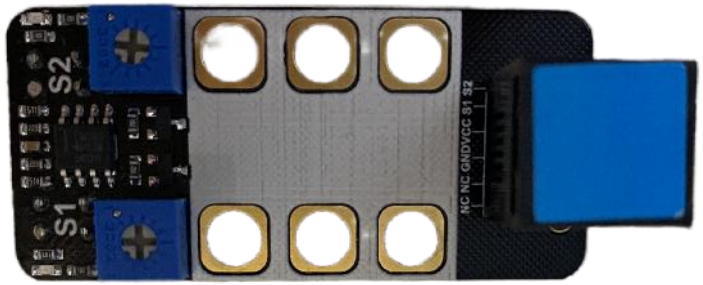


Lesson 2 Line Tracking Car

About this lesson:

The iBot robot kit contains a 2-way line following module. This module uses the RJ11 interface and has a potentiometer to adjust the sensitivity.The tracking sensor is actually an infrared sensor. The component used here is the TCRT5000 infrared tube.Its working principle is to use the different reflectivity of infrared light to the color, then convert the strength of the reflected signal into a current signal.





Component Introduction

The tracking sensor is actually an infrared sensor. The component used here is the TCRT5000 infrared tube. Its working principle is to use the different reflectivity of infrared light to the color, then convert the strength of the reflected signal into a current signal. During the process of detection, black is active at HIGH level, but white is active at LOW level. The detection height is 0-3 cm. By rotating the adjustable potentiometer on the sensor, it can adjust the detection sensitivity of the sensor.

Specification:

Operating Voltage: 3.3-5V (DC)

Interface: G(GND) V+(VCC) S(Signal)

Output Signal: Digital signal

Detection Height: 0-3 cm

Special note: before testing, turn the potentiometer on the sensor to adjust the detection sensitivity. When adjust the LED at the threshold between ON and OFF, the sensitivity is the best.

How does it work?

It uses the tracking sensor to detect the black track on the pavement, and detection signal will feed back to the iBot main board. Then iBot main board will analyze and judge the collected signals to control and drive the motor in time, thus can adjust the robot turning direction.That is why the iBot can automatically follow the black track, achieving the automatic line tracking function.

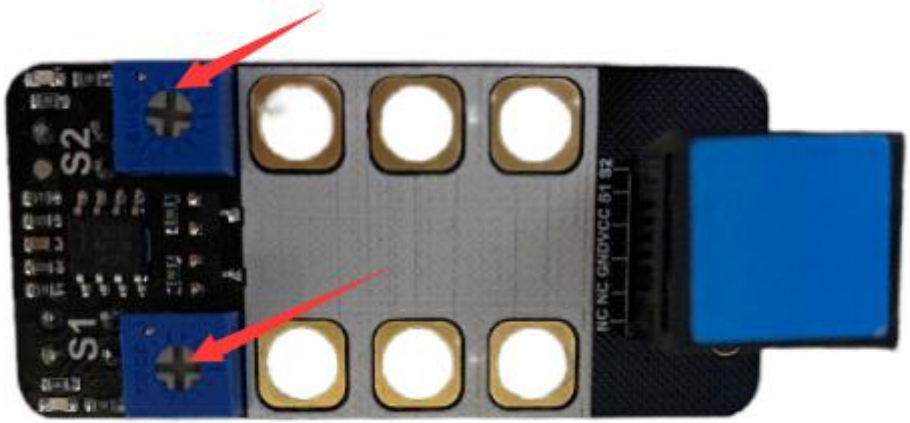
How to use the line following sensor

The adjustable resistance of our factory line-tracking sensor is the middle value by default, you can directly install and use it.This should be the best location.If you want to increase the forward speed of the line-tracking car, you may need to adjust the adjustable resistance to increase the sensitivity of the line-tracking sensor.

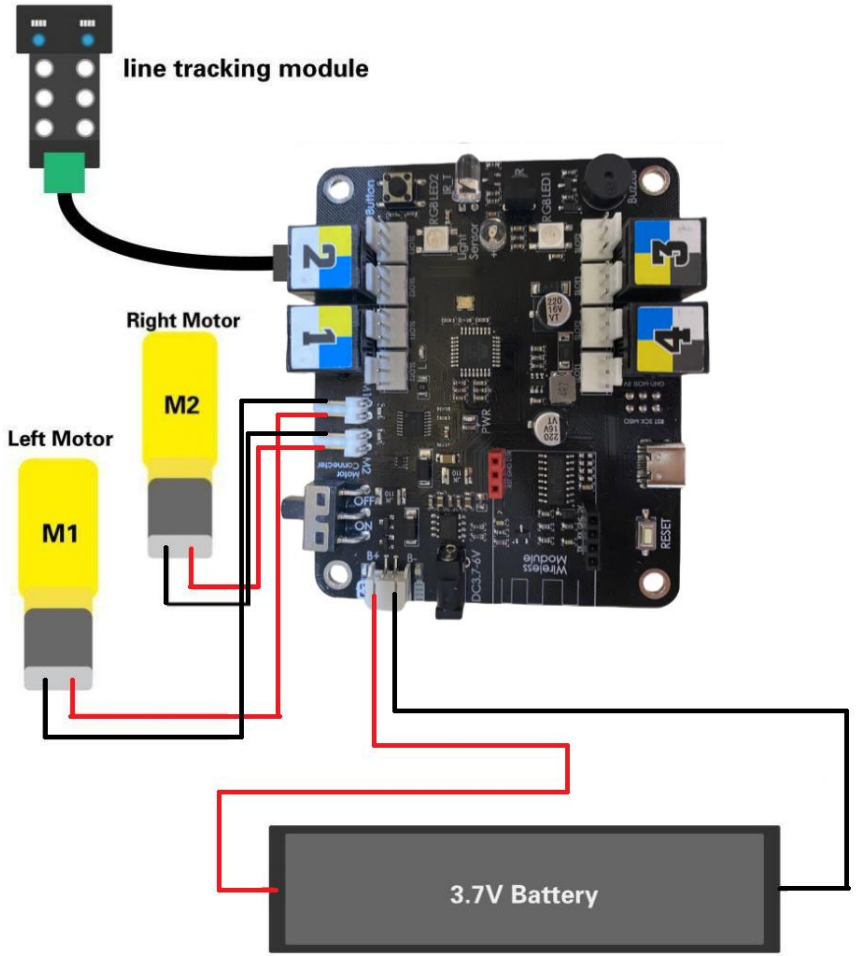
Adjustment method

Power on the 2-way tracking module. Put the white paper of the tracking map we have placed on the bottom of the module. If the 2 blue LEDs are off at the same time, the 2 blue LEDs on the black paper are on. This means that the module works

normally. If the above phenomenon is not found, adjust the potentiometer on the module until the module recognizes the white paper and the LED lights are off, and when the module recognizes the black paper, the LED lights are all on.



How to connect the circuit



Let's program

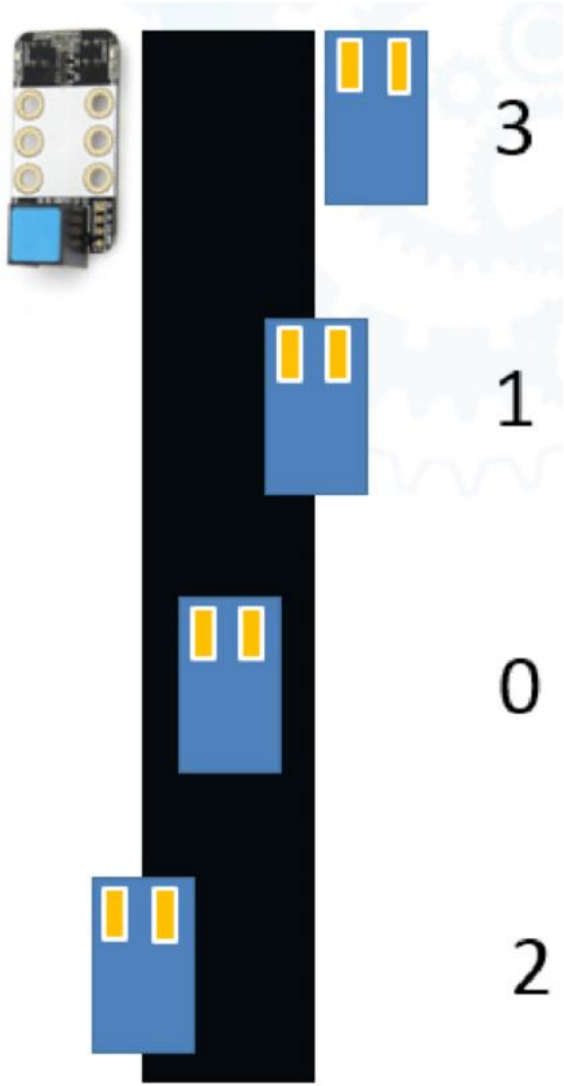
Wire it up well as the above diagram. Okay, let’s move on to write the test code. Think about the code logic. There are four kinds of tracking sensor’s states as follows:

(1) When both pairs of tubes are above the white line, return the value 3.

(2) When both pairs of collimators are above the black line, return the value 0.

(3) When the left collimator is above the black line and the right is on the white line, return 1.

(4) When the left collimator is above the white line and the right is on the black line, return 2.

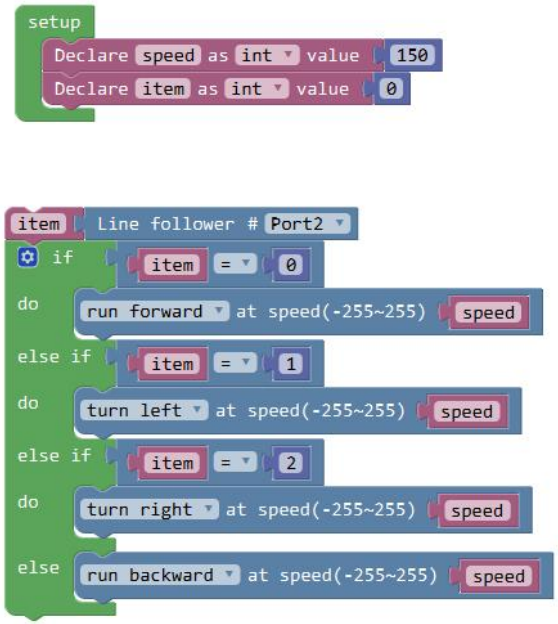

3
1
0
2

Based on the differences in these four values, make conditional judgments to patrol the line.

Open mixly software.Click “New” to add new project, then start your programming.

If you want to refer to the program we provide.OPEN the reference code for this lesson "**Line Tracking Robot.mix**" in the reference materials we provided.

Source Code



What will you see

Upload the test code to iBot control board, turn the POWER switch ON.The iBot robot will move forward along the black track.

Note:

1)The width of black track should be greater than the distance between the two tracking sensors.

2)Do not test the robot in the sun. If appear problems during the test process, try testing the robot in a rather dark environment.

3)The iBot's motor immediately started after the program was completed. If you place the iBot on a high table, you must be careful not to drop the iBot robot from the desktop. You can place the robot on a wide ground and wait for the program to upload, or hold the robot with your hand and wait for the program to upload.

Lesson 3 Ultrasonic Obstacle Avoidance Car

About this lesson:

In this lesson we will learn about ultrasonic sensors and use them to help iBot avoid obstacles.

What is an ultrasonic sensor

Ultrasonic sensor module HC-SR04 provides 2cm-400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit.

The basic principle of work:

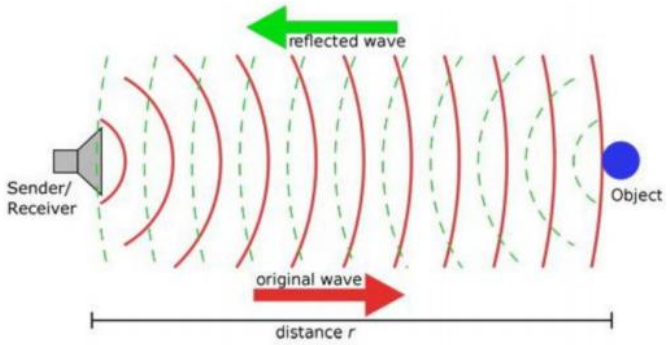
(1) Using IO trigger for at least 10us high level signal

(2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

(3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic tore turning.

Test distance = (high level time × velocity of sound (340m/s) /2

The Timing diagram is shown below. You only need to supply a short 10us pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the range in proportion .You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: us / 58 = centimeters or us / 148 =inch; or: the range = high level time * velocity (340M/S) / 2; we suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal.



How does it work?

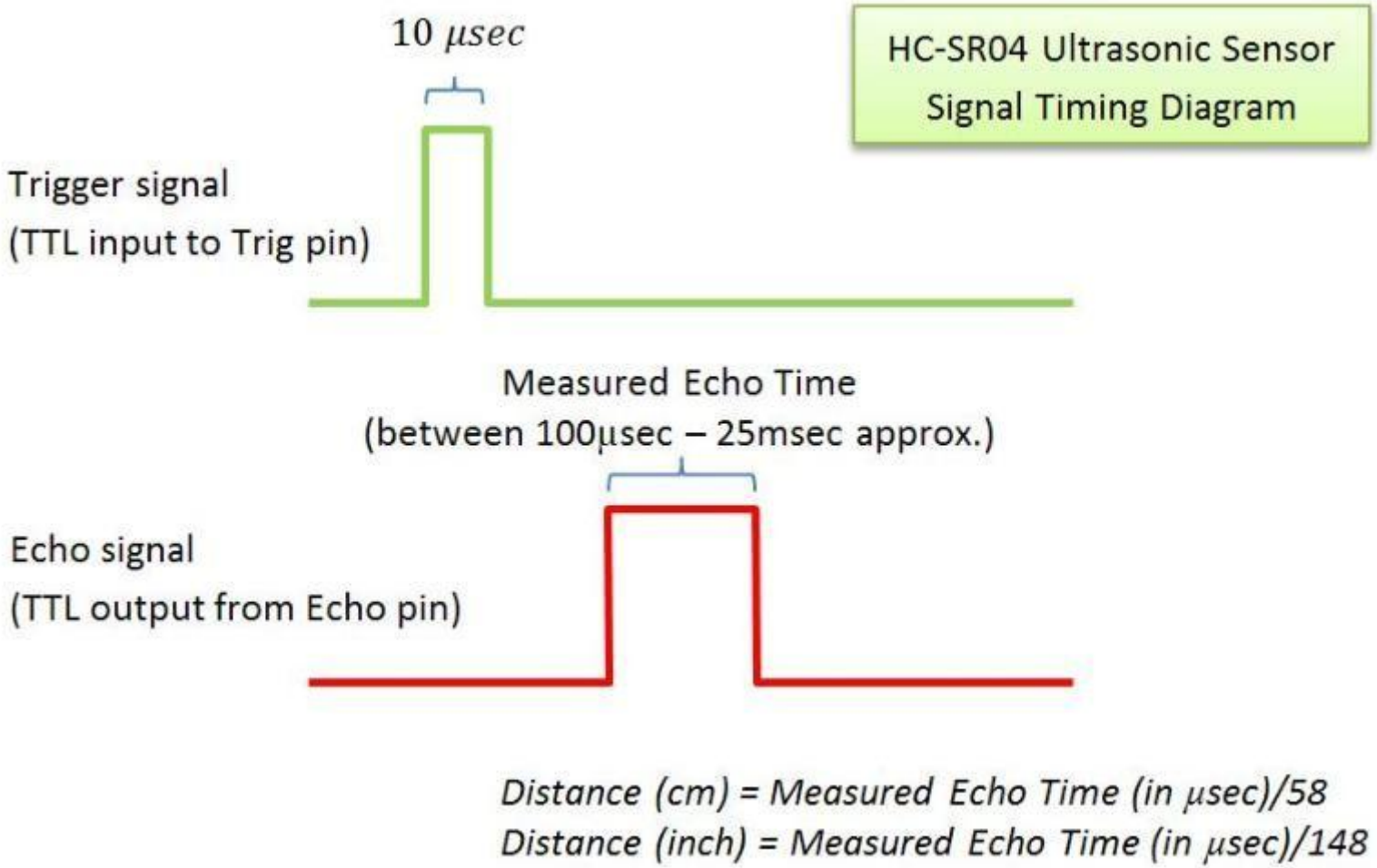
(1)Use IO trigger ranging, at least 10us HIGH level signal; that is, first pull the Trip Low, then give a HIGH level signal of 10us.

(2)The module automatically sends eight square waves of 40khz to automatically detect whether there is a signal return back;

(3)There is a signal return, through the IO output a High level, and the duration period of High level is the time of Ultrasonic wave from emission to return.

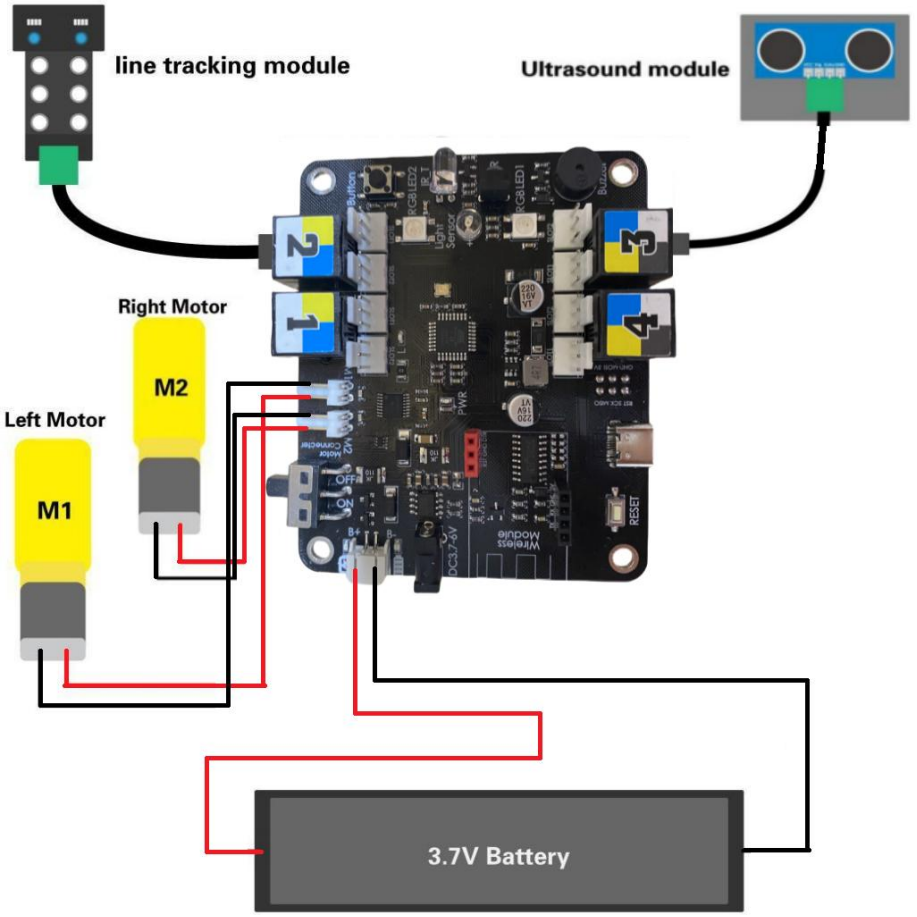
Test distance = (High level time * speed of sound (340M/S))/2;

Then you can get the formula: detection distance = (High level time/58) (cm);



Distance (cm) = Measured Echo Time (in μsec)/58
Distance (inch) = Measured Echo Time (in μsec)/148

Wiring diagram



Let's program

Wire it up well as the above diagram. Okay, let’s move on to write the test code. Think about the code logic.

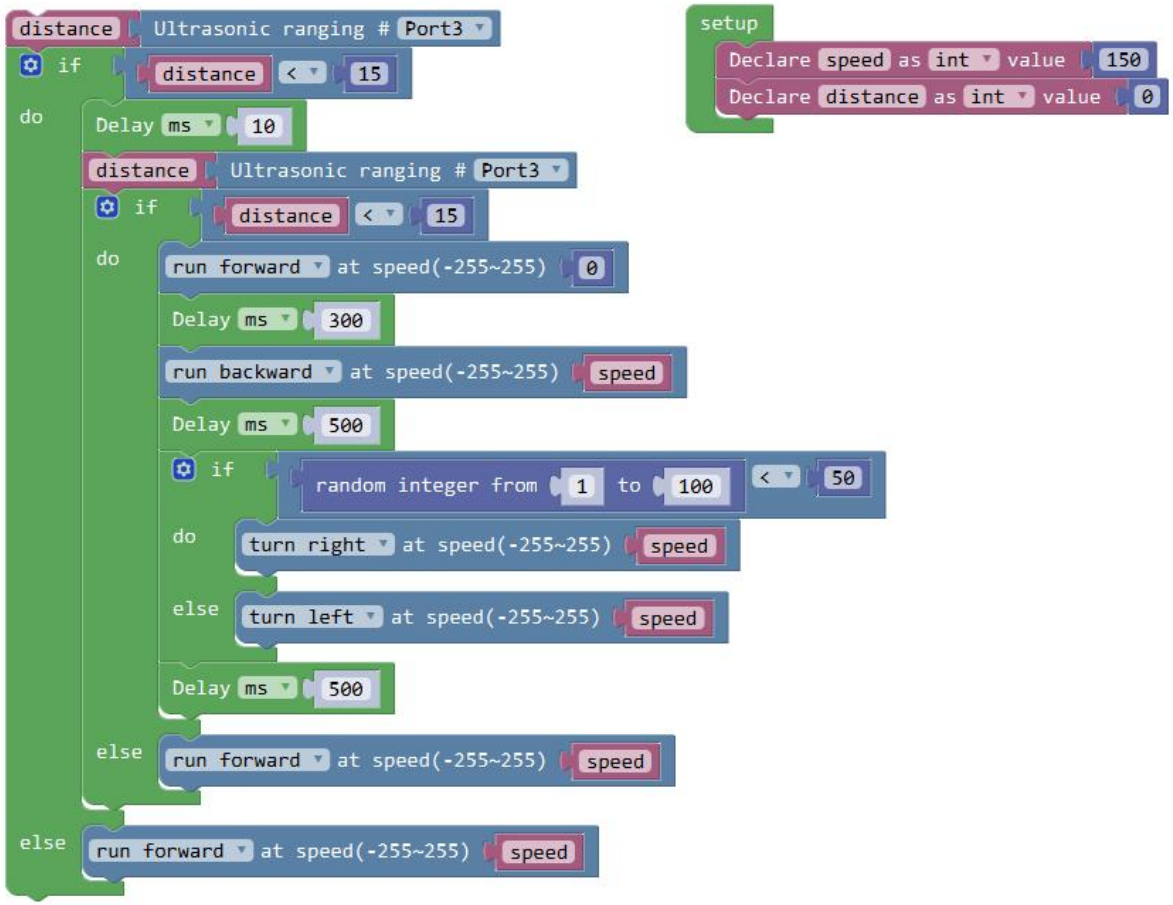
(1) If the ultrasonic ranging distance is less than 15cm, then delay by 10 milliseconds and measure again. Otherwise, move forward.

(2) If the distance measured again is less than 15cm, the car stops and retreats for 500 milliseconds, randomly turning left or right. If the distance measured is greater than 15cm, the car continues to move forward.

Open mixly software.Click “New” to add new project, then start your programming.

If you want to refer to the program we provide.OPEN the reference code for this lesson "**Ultrasonic Obstacle Avoidance Robot.mix**" in the reference materials we provided.

Source Code


distance Ultrasonic ranging # Port3
if distance < 15
do
Delay ms 10
distance Ultrasonic ranging # Port3
if distance < 15
do
run forward at speed(-255~255) 0
Delay ms 300
run backward at speed(-255~255) speed
Delay ms 500
if random integer from 1 to 100 < 50
do
turn right at speed(-255~255) speed
else
turn left at speed(-255~255) speed
Delay ms 500
else
run forward at speed(-255~255) speed
else
run forward at speed(-255~255) speed
setup
Declare speed as int value 150
Declare distance as int value 0

What will you see

Upload the test code to iBot control board, turn the POWER switch ON.

(1) When the measured distance is greater than or equal to 15cm, the micro: bit robot will move forward;

(2) If it is less than 15 cm, the robot will stop, move backward for 0.5 seconds and then randomly rotate left and right for 0.5 seconds.

(3) When the robot moves back away from the obstacle and the distance measured by the robot is greater than or equal to 15cm, the micro: bit robot moves forward;

repeat the cycle.

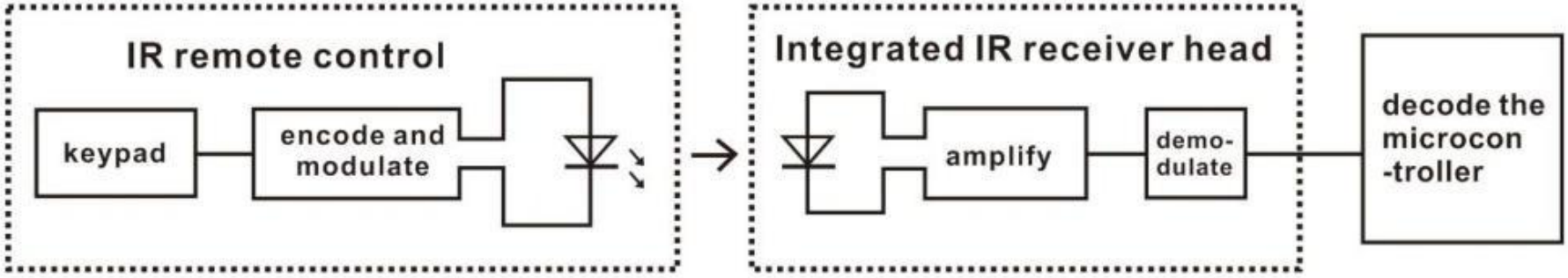
Lesson 4 Infrared Remote Control Car

About this lesson:

In this lesson, we will learn the infrared remote control, and use the infrared remote control to control the iBot go forward, backward, turn left, turn right.

What is an infrared remote control

There is no doubt that infrared remote control is commonly seen in our daily life. It's hard to imagine our world without it.An infrared remote control can be used to control a wide range of home appliances such as television, audio, video recorders and satellite signal receivers.Well, in the following let’s get a better understanding of the infrared remote control.Infrared remote control is composed of infrared transmitting and infrared receiving systems.That is, consist of an infrared remote control, an infrared receiver module and a microcontroller that can decode.You can refer to the figure below.



The 38K infrared carrier signal transmitted by an infrared remote controller is encoded by an encoding chip inside the remote controller. It is composed of a pilot code, user code, data code, and data inversion code.The time interval between pulses is used to distinguish whether it is a signal 0 or 1. (when the ratio of high level to low level is about 1:1, considered as signal 0.)

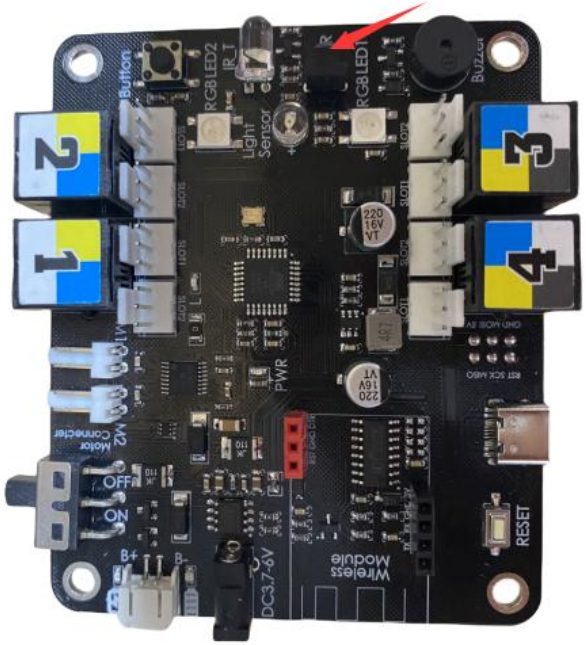
And the encoding is just well composed of signal 0 and 1.The user code of the same button on remote controller is unchanged. Using difference data distinguish the key pressed on the remote control. When press down a button on the remote control, it will send out an infrared carrier signal. And when infrared receiver receives that signal, its program will

decode the carrier signal, and through different data codes, thus can judge which key is pressed.The microcontroller is decoded by an received signal 0 or 1 to determine which key is pressed by the remote control.

What is an infrared receiver

The robot shield comes with infrared receiver module. It is mainly composed of an infrared receiving head. This device integrates with reception, amplification and demodulation.

Its internal IC has been demodulated, outputting Digital signal. Suitable for IR remote control and infrared data transmission.

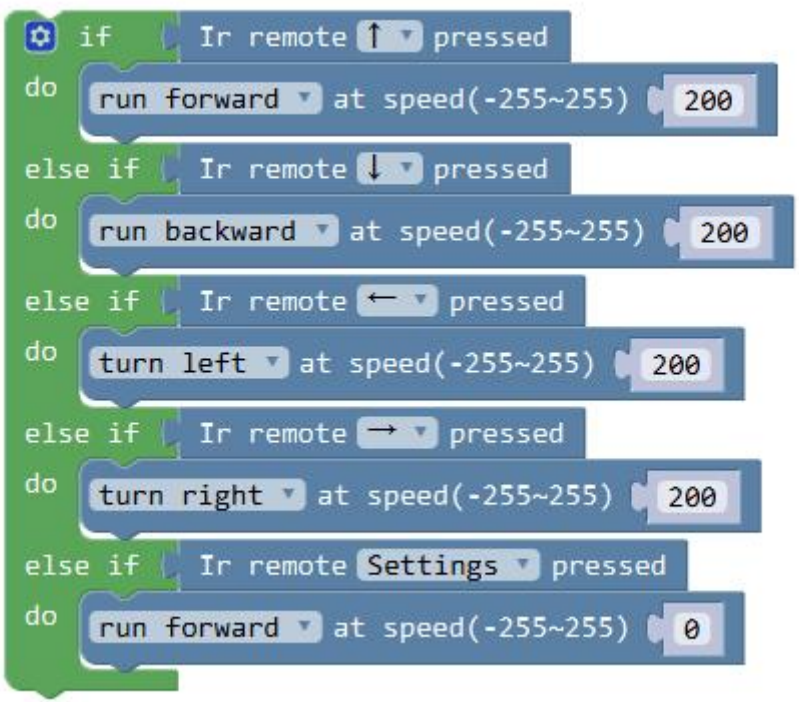


Let's program

Open mixly software.Click “New” to add new project, then start your programming.

If you want to refer to the program we provide.OPEN the reference code for this lesson "**Infrared Remote Control Robot.mix**" in the reference materials we provided.

Source Code


if Ir remote ↑ pressed
do run forward at speed(-255~255) 200
else if Ir remote ↓ pressed
do run backward at speed(-255~255) 200
else if Ir remote ← pressed
do turn left at speed(-255~255) 200
else if Ir remote → pressed
do turn right at speed(-255~255) 200
else if Ir remote Settings pressed
do run forward at speed(-255~255) 0

Lesson 5 Restore Factory Settings Source Program

About this lesson:

When you buy a new iBot robot, you don't need to write a program to use it. We have uploaded the firmware source program on the iBot control motherboard. The function of this source program is to include the three integrated functions of iBot. If you want to know how to use it, please see this lesson.

Open mixly software.Click "New" to add new project, then start your programming.

If you want to refer to the program we provide.OPEN the reference code for this lesson "**Restore Factory Settings Source Program.mix**" in the reference materials we provided.

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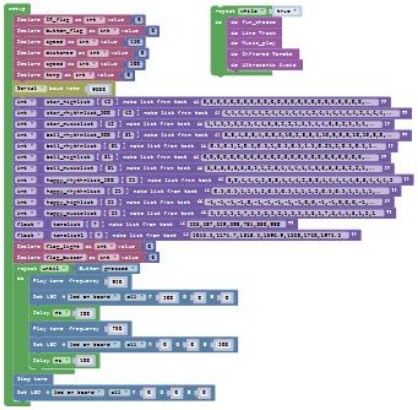
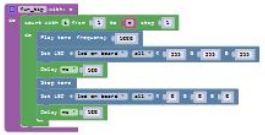
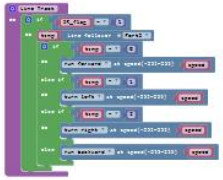
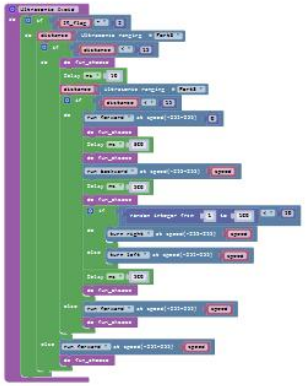
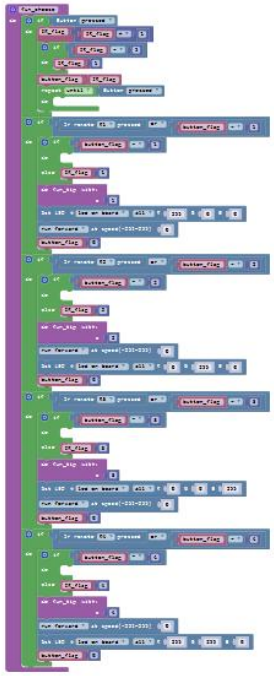


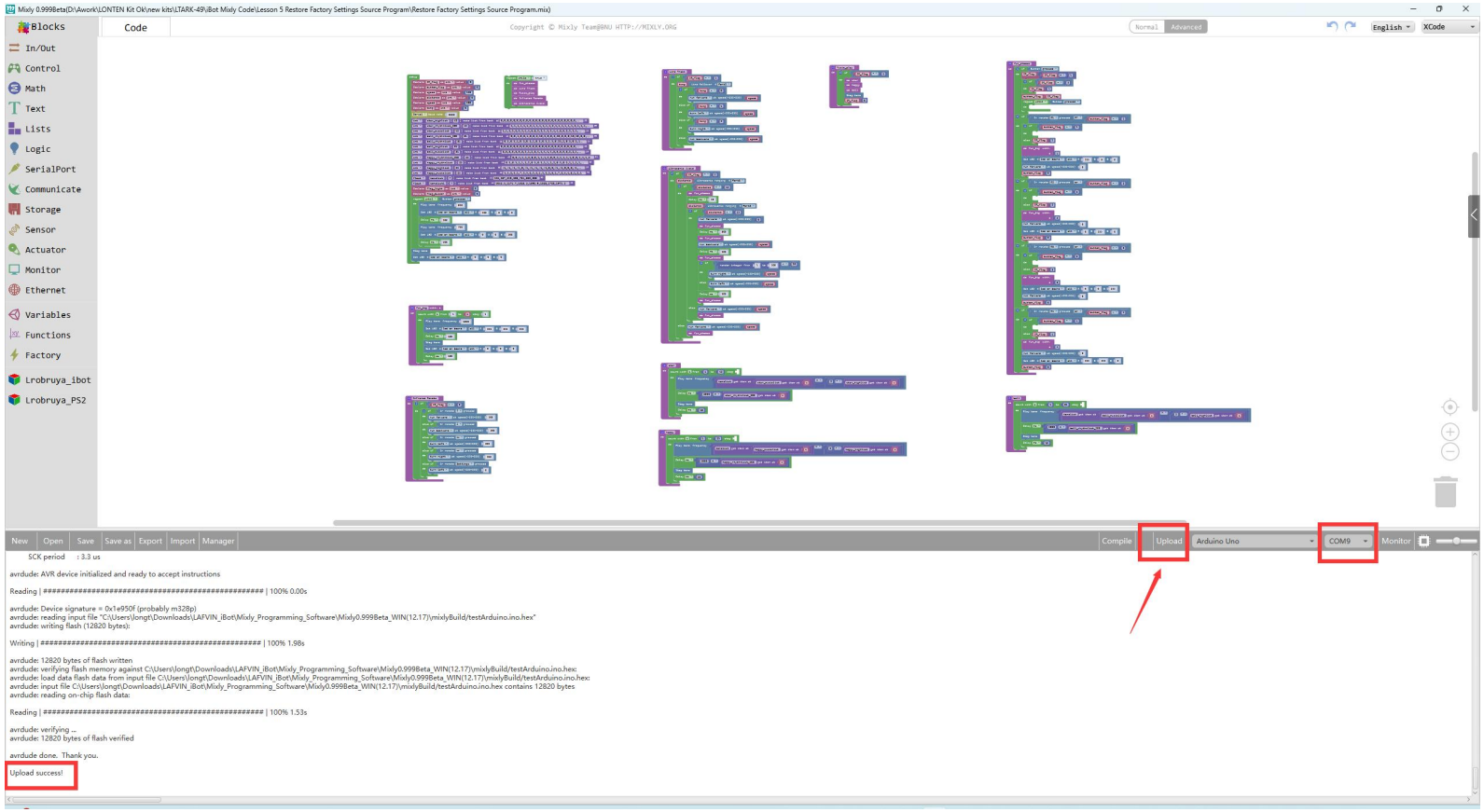






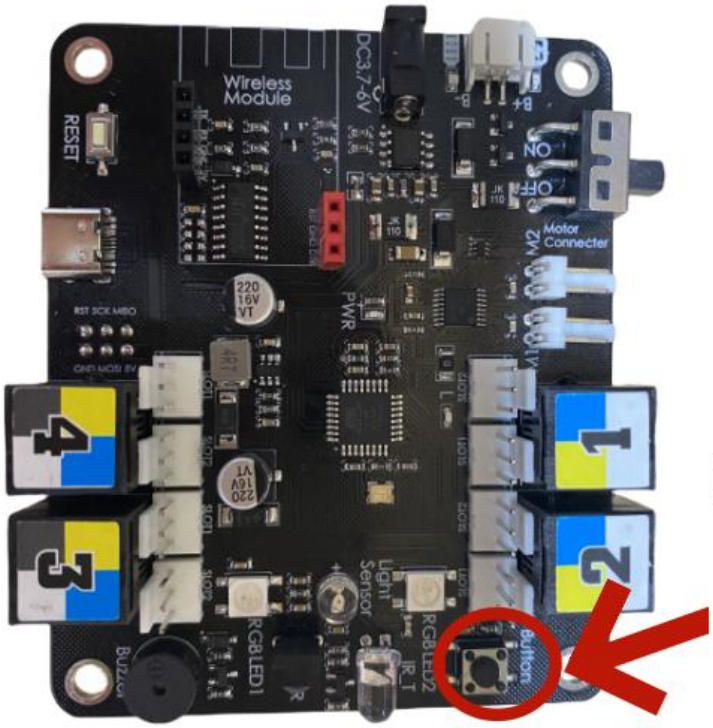


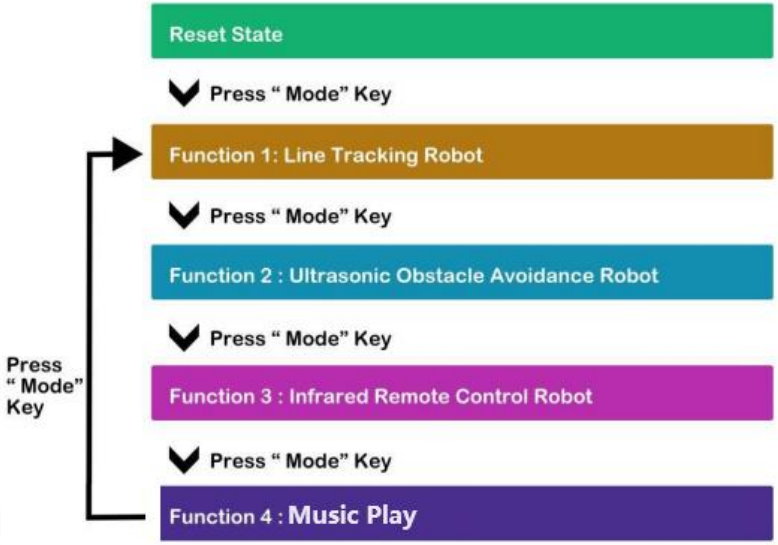
Select the correct serial port COM, motherboard model Arduino UNO, click "Upload" to wait for the upload to complete, and Upload success appears in the status dialog!



After successfully restoring factory settings source code. you will see the on-board LED flashing red and blue, and the buzzer will sound an alarm. This is the normal reset state (wait function selection).

You can use the on-board button "MODE" or the infrared remote control to switch functions.





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1 **Function: Line Tracking Robot**

2 **Function: Ultrasonic Obstacle Avoidance Robot**

3 **Function: Infrared Remote Control Robot**

4 **Function: Music Play**