

SKU:ROB0148-EN (<https://www.dfrobot.com/product-1783.html>)

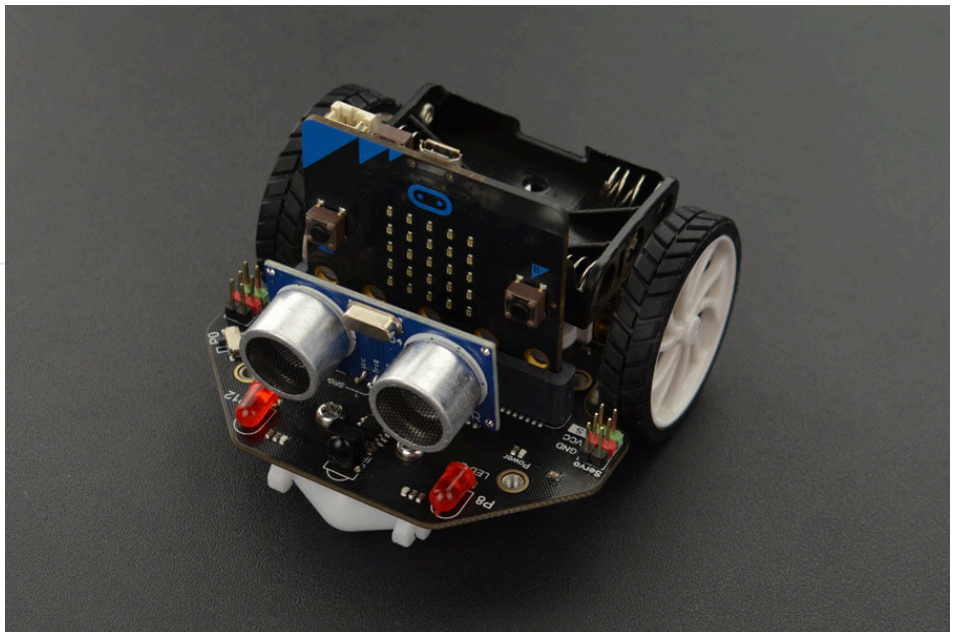
(<https://www.dfrobot.com/product-1783.html>)

1.Introduction

I am Maqueen

Maqueen is an easy-to-use micro:bit programming robot for STEAM education, which

inherits the playability and simple operation of micro:bit. With a mini body, play-and-play, it allows students to quickly learn graphical programming in an entertaining way while nurturing their interests in science and logical thinking.

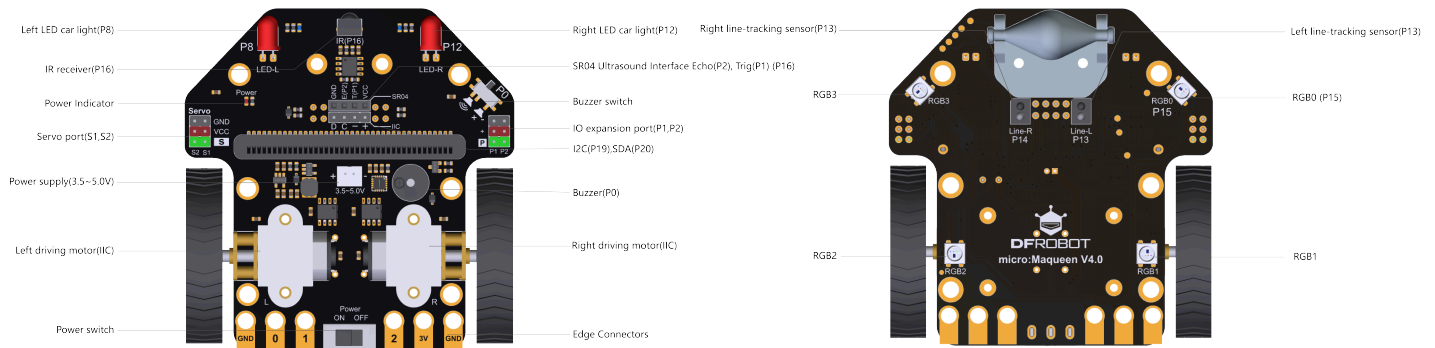


What are the features of Maqueen?

- Support for Makecode, will support Scratch and python later.
- Small size, flexible movement.
- All-metal miniature gear motor, good quality, strong driving force.
- Line patrol, ambient light, LED lights, ultrasonic interface, servo interface, buzzer, I2C interface, mechanical expansion screw hole, etc. ... full-featured, highly expandable.
- Exclusive customized POM bearing wheel, flexible and reliable, strong obstacle crossing ability.

- Easy to install, easy to use.

Function Diagram



Features


- Small in size, easy to assembly in 4 steps.
- Interactive projects with light, sound, motion.
- Contents: algorithm and programming, computing system.
- Combining with Maqueen Mechanic and GamePad to explore more possibilities.

Specification

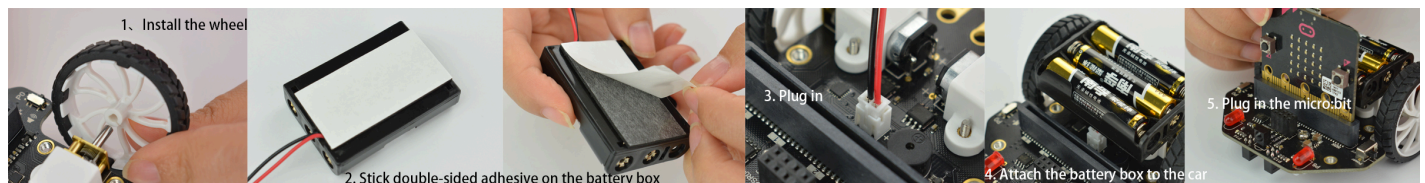
- Supply Voltage: 3.5V-5V DC (Three AAA batteries or 3.6V~3.7V lithium battery)
- Infrared Grayscale Sensor (High-low level) x 2
- Buzzer x 1
- Infrared Receiver (NEC decoder) x 1
- LED Lights (High-low level control) x 2
- RGB Ambient Light (16 million colors) x 4
- SR04, SR04P Ultrasonic Interface (5V) x 1
- IIC Interface (5V) x 1
- Servo Interface (S1 S2) x 2
- Gravity Extension Interfaces (P1, P2) x 2
- N20 All-metal Gear Motor x 2

- Motor Drive Mode: PWM motor drive
- Bracket and Protective Cover Extension M3 Screw Hole x 6
- Programming Method: Makecode graphical programming, Mind graphical programming (based on Scratch 3.0)
- Dimension: 81mm x 85 mm x 44mm/3.19 x 3.35 x 1.73in
- Weight: 75.55g

2.Product Configuration List

Image	List
	<p>Car Body x 1 (Motors and bearing wheel have been assembled before leaving factory)</p> <p>Wheel x 2</p> <p>Three AAA batteries Box x 1</p> <p>Double Sided Adhesive Tape x 1</p> <p>SR04 Ultrasonic x 1</p> <p>Quick start Guide x 1</p>

Product Installation



3. Introduction to Teaching Contents and Documents



This book provides a cost-efficient and fun way for primary and secondary school students to learn programming. The courses guide them to explore how to control a robot car Maqueen by coding, during which they will get to know the basics of robotics. Maqueen is a mini robot car intensively designed for STEAM education, small but powerful. It is developed based on the popular micro:bit board. Children can code Maqueen to play, learn and create so as to enhance their analytical and creative thinking skills, which is precisely what the original intention of STEAM education is. The programming software Mind+ is used in this book. Mind+ is a Scratch 3.0-based graphical programming platform that supports all kinds of open-source hardware such as Arduino and micro:bit. Drag and drop graphical code blocks to make programs, or use high-level programming languages like Python, C,

C++, etc. to code. Easy to experience the joy of creating. This book is composed of 20 teaching cases, including some classic games like Catching Apple, Cat and Mouse, etc, and projects related to life scenes like Obstacle Avoidance Maqueen,

Research and Rescue Maqueen. Each case is designed based on teaching practices. It aims to inspire all children to participate in programming and pave the path for them to further develop and create.

Refer to CSTA curriculum standard, the course catalog and field distribution are shown below:

Maqueen Lite Tutorial

Making Difficulty ★★ Programming Difficulty ★★

Catalog		Field	Field Distribution Chart
Beginner	Lesson 1 Preparation	Computing System	<p>Maqueen Lite Robot Tutorial for Beginners Maqueen Lite Robot Advanced Tutorial</p> <p>Computing Systems: 8 (Beginner), 6 (Advanced) Data and Analysis: 1 (Beginner), 1 (Advanced) Networks and the Internet: 3 (Beginner), 1 (Advanced) Impacts of Computing: 1 (Beginner), 1 (Advanced) Algorithms and Programming: 7 (Beginner), 10 (Advanced)</p>
	Lesson 2 Walking Maqueen	Algorithm & Programming	
	Lesson 3 Singer Maqueen		
	Lesson 4 Rhythm Maqueen		
	Lesson 5 Little Tagalong	Computing System Algorithm & Programming	
	Lesson 6 Streetcar		
	Lesson 7 Light Chaser	Computing System Algorithm & Programming Data Analysis	
	Lesson 8 Maqueen's Commander		
	Lesson 9 Motion-controlled Robot car	Computing System Algorithm & Programming Data Analysis Network & Internet	
	Lesson 10 Fly Chess		
	Lesson 11 Gamepad+Maqueen		
Advanced	Product Introduction	Computing System	
	Features and Functions		
	Installation Steps		
	Lesson 1 Pitch Cleaner	Algorithm & Programming	
	Lesson 2 Maqueen Football Cup	Computing System Algorithm & Programming	
	Lesson 3 Little Loader Expert		
	Lesson 4 Forklift Worker		
	Lesson 5 Railway Patroller		
	Lesson 6 Relay Race		
	Lesson 7 Sorting Manipulator	Computing System Algorithm & Programming Data Analysis	

Silly Maqueen Tutorial(Scratch 3.0-based)

FREE MIND+
The only thing and everything for kids to start hardware programming from scratch.

Game Map
There are 3 playing modes for Crazy Maqueen, and each mode includes missions with different levels. The further you advance, the harder it will be, challenge now!

DFROBOT DRIVE THE FUTURE

Game Levels:

- Light Chaser (Single Player Mode)
- Little Tagalong (Single Player Mode)
- Maqueen's Commander (Multiplayer Mode)
- Gamepad+Maqueen (Multiplayer Mode)
- Walking Maqueen (Single Player Mode)
- Rhythm Master (Single Player Mode)
- Streetcar (Single Player Mode)
- Drawer (Interactive Mode)
- Motion controlled Robot Car (Multiplayer Mode)
- Singer Maqueen (Single Player Mode)
- Little Math Expert (Interactive Mode)
- Dancer (Interactive Mode)
- Flying Chess (Multiplayer Mode)

Playing Modes:

- Single Player Mode (Yellow circle)
- Interactive Mode (Blue circle)
- Multiplayer Mode (Brown circle)

3.1 Documents

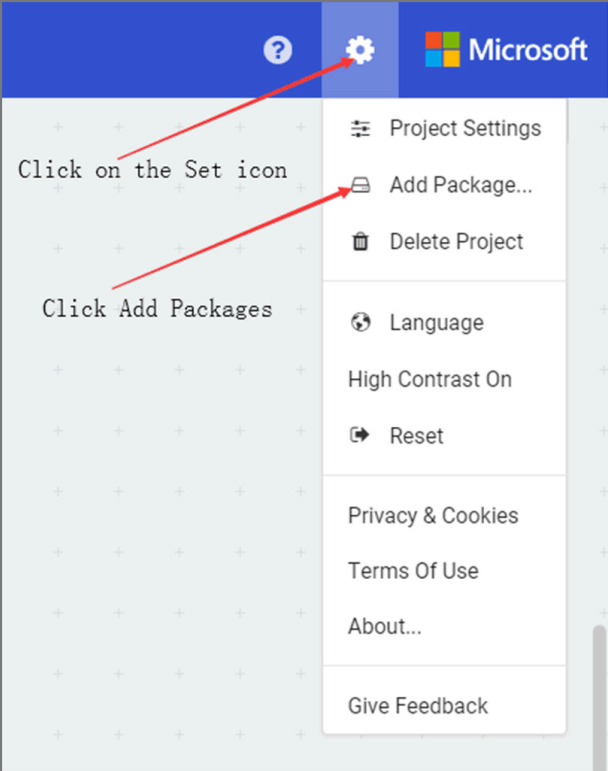
Click to view online tutorial	https://edu.dfrobot.com/course-661.html (https://edu.dfrobot.com/661.html)
Click to download the tutorial	<p>1.crazy maqueen -mindplus (https://github.com/liliang9693/mindplus/docs/raw/master/maqueen/Crazy%20Maqueen-Tutorial-20200615.pdf)</p> <p>2.silly maqueen -makecode And Maqueen & microbit Graphical Prog (https://github.com/DFRobot/Silly-Maqueen-Tutorial-Makecode)</p> <p>3.Maqueen Mechanic Getting Started Guide (MakeCode) -20200920 (https://dfimg.dfrobot.com/nobody/wiki/2e9268996cc5ce0251ac080c)</p>
More tutorial	click here (https://mindplus.dfrobot.com/maqueen)
Product pictures	ROB0148-EN Product pictures.rar (https://dfimg.dfrobot.com/nobody/wiki/43100f80a3c5d014d4dc2ce!)

4. Import the Makecode Graphical Library

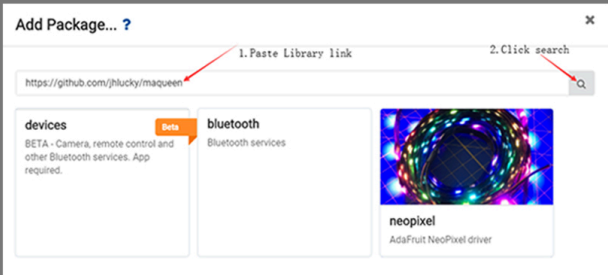
1. Click the link: makecode.microbit.org (<https://makecode.microbit.org/>), enter the makecode graphical online programming platform. (Note: Loading will be slow in the first time, please wait patiently)
2. Search the makecode extension for "dfrobot" and select "maqueen".
3. Paste web address in makecode extension: <https://github.com/DFRobot/pxt-maqueen> (<https://github.com/DFRobot/pxt-maqueen>)

4. Import the library by following the steps.

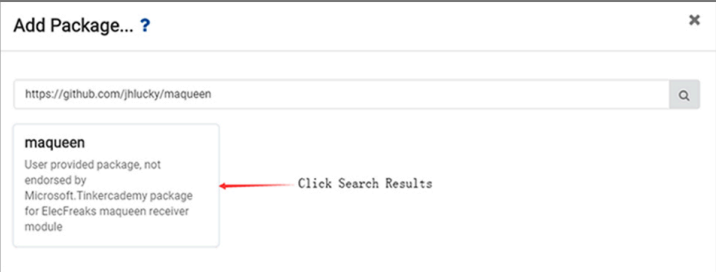
1. Click on the Set icon, then click Add Library.



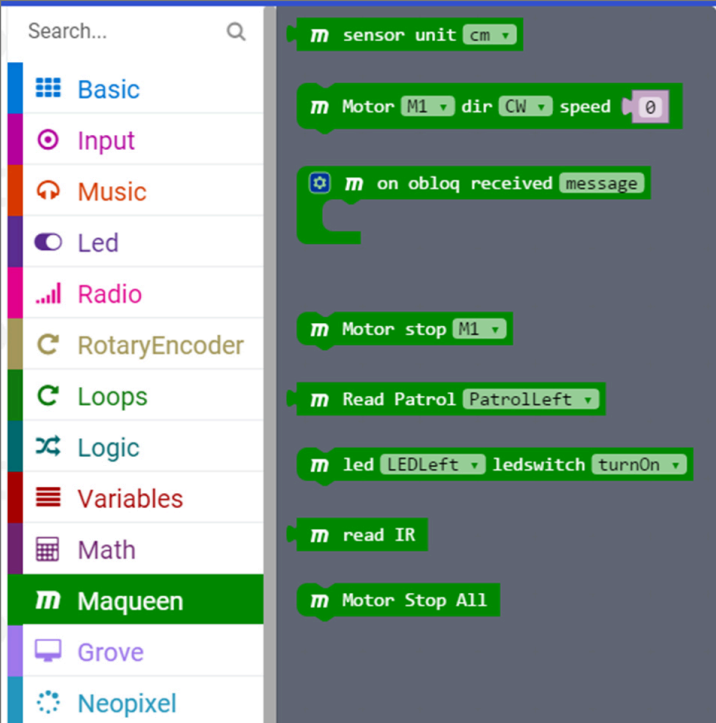
2. Paste Library link, click Search



3. Click Search Results





4. Import Complete



5. Makecode Programming Example

Motor Control

- Learning Target: Mastering the basic method of motor control.

	<p>Control Motor</p> <p>Motor: left, right, all Rotate Direction: forward, backward Speed: 0~255</p> <p>Function: control the Maqueen' s speed and movement (forward/backward, turn left/right, stop).</p>
	<p>Stop Motor</p> <p>Motor: left, right, all</p> <p>Function: stop the motor, similar to the function of setting motor speed to 0.</p>

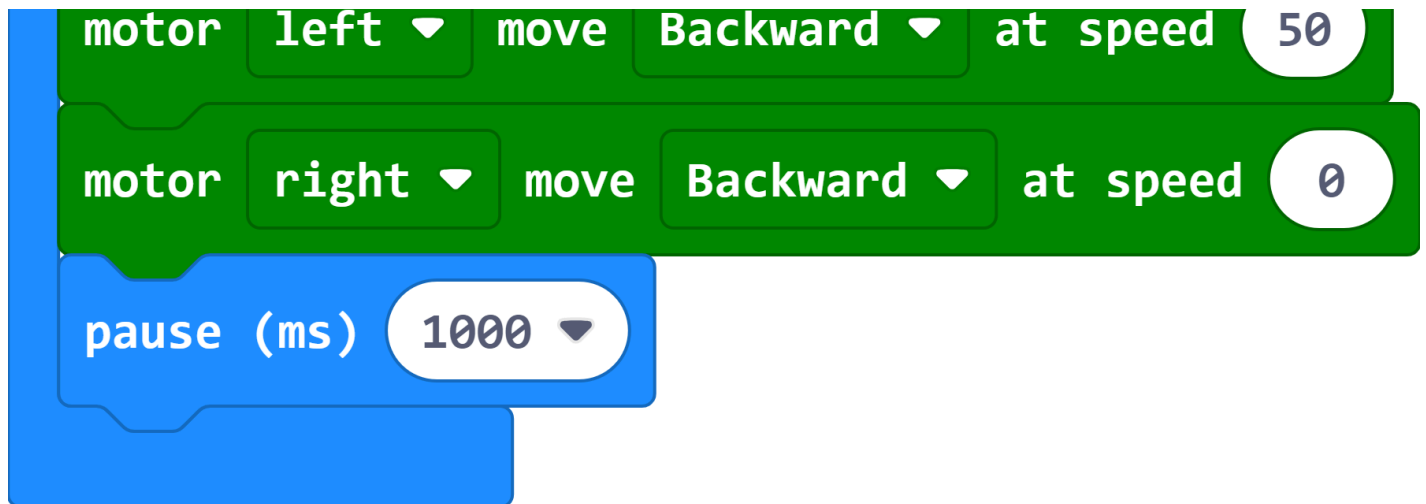
- Effect: Maqueen moves forward 1 second, turn left 1 second, turn right 1 second, move backward and turn right 1 second.



Makecode Program Link: https://makecode.microbit.org/_JrXaxVauDKww
 (https://makecode.microbit.org/_JrXaxVauDKww)

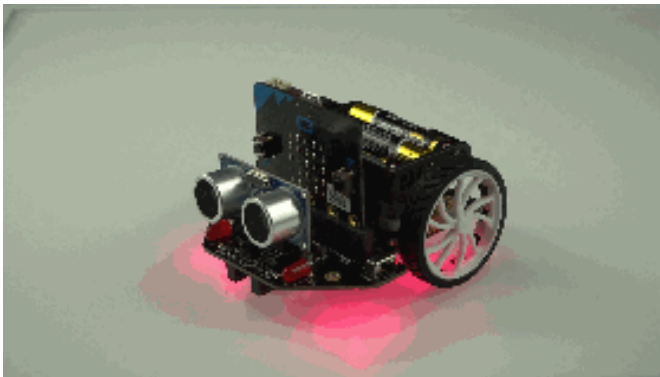
Screenshot of Makecode Graphical Program:

```
forever
  motor all move Forward at speed 50
  pause (ms) 1000
  motor left move Forward at speed 50
  motor right move Forward at speed 0
  pause (ms) 1000
  motor left move Forward at speed 0
  motor right move Forward at speed 50
  pause (ms) 1000
  motor all move Backward at speed 50
  pause (ms) 1000
```



RGB Breathing Ambient Light

- Learning Target: Learn the basic way of using ambient light.
- Effect: The RGB ambient light at the bottom of the Maqueen shows a variety of colors and presents a gradient effect.



- Load the LED strip library: click "Setting"->"Extension"-> "Neopixel".



ADAFRUIT NEOPIXEL DRIVER

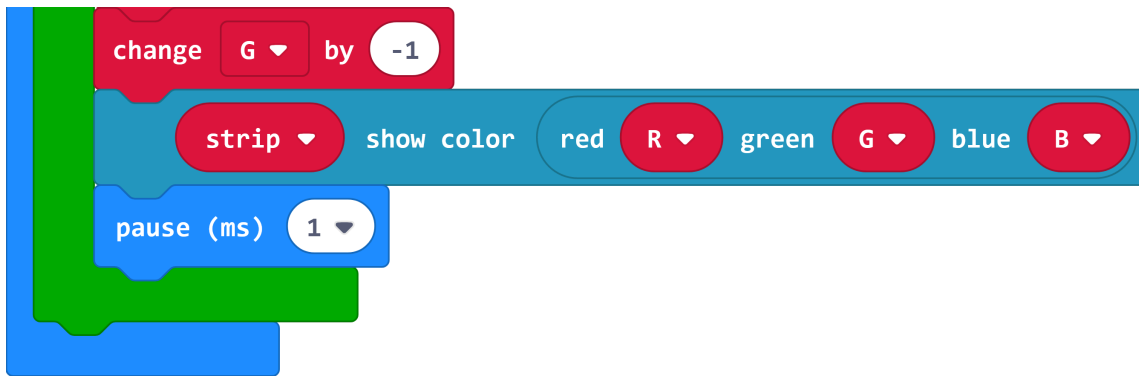
Makecode Program Link: https://makecode.microbit.org/_7t0HFXHesULM
(https://makecode.microbit.org/_7t0HFXHesULM)

Screenshot of Makecode Graphical Program:

```
on start
  set strip to NeoPixel at pin P15 with 4 leds as RGB (GRB format)


forever
  set R to 0
  set G to 0
  set B to 0
  repeat 255 times
    do
      change R by 1
      change B by -1
      strip show color red R green G blue B
      pause (ms) 1
  repeat 255 times
    do
      change G by 1
      change R by -1
      strip show color red R green G blue B
      pause (ms) 1
  repeat 255 times
    do
      change B by 1
```

The code is written in a Scratch-like block-based language. It starts with an "on start" block containing a "set strip to NeoPixel at pin P15 with 4 leds as RGB (GRB format)" block. Below this is a "forever" loop containing three "repeat 255 times" blocks. Each "repeat" block has a "do" block with several "change" and "strip show color" blocks, and a "pause (ms) 1" block. The first "repeat" block changes R by 1 and B by -1, then shows the color. The second "repeat" block changes G by 1 and R by -1, then shows the color. The third "repeat" block changes B by 1.

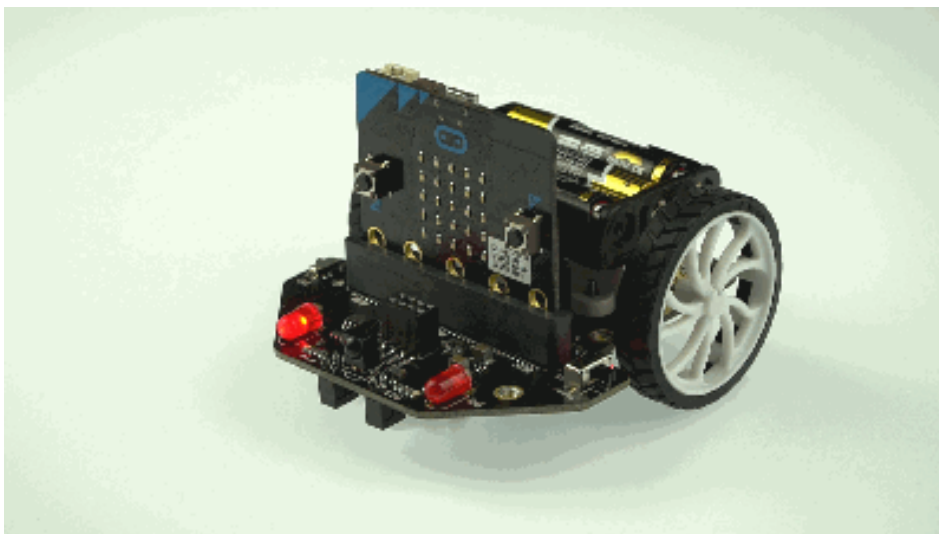


LED Light Flash

- Learning Target: Learn the using way of LED light and buzzer.

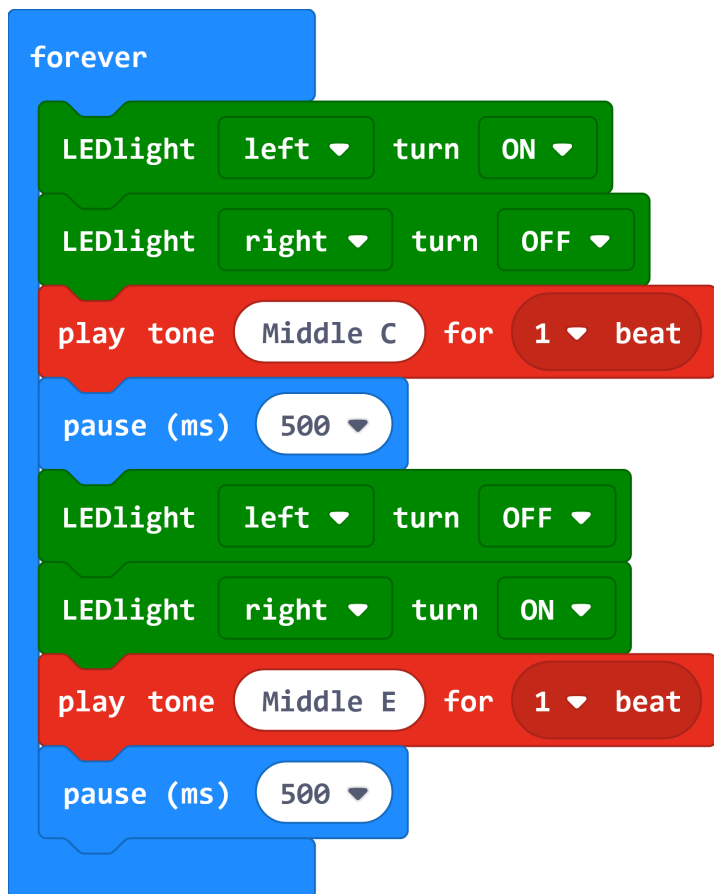
	<p>Control LED</p> <p>Motor: left, right</p> <p>Status: on, off</p> <p>Function: turn Maqueen' s 2 LEDs on/off.</p>
---	--

- Effect: The left and right LEDs flash alternately at an interval of 0.5 second. Meanwhile, the buzzer makes two different tones with the flashing frequency.



Makecode Program Link: https://makecode.microbit.org/_5AuHAMPPmD28
(https://makecode.microbit.org/_5AuHAMPPmD28)

Screenshot of Makecode Graphical Program:

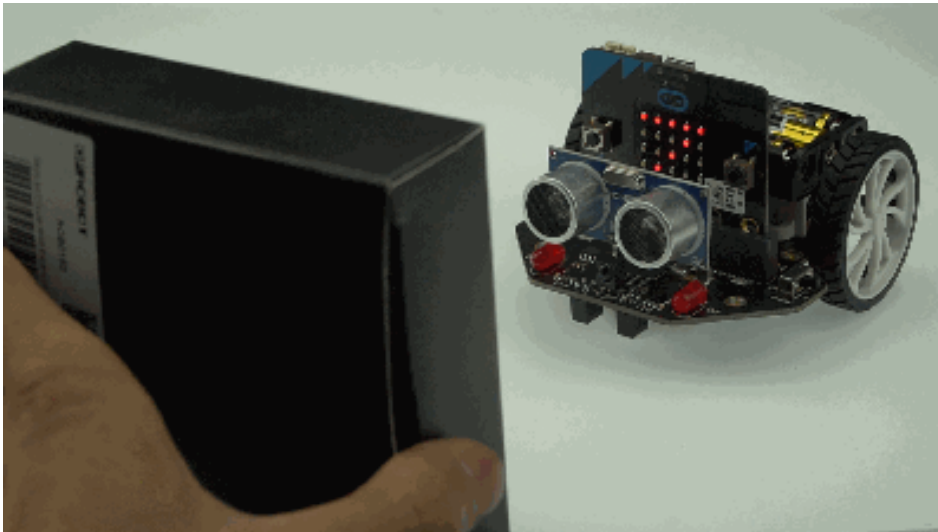


Read Ultrasonic Distance

- Learning Target: Learn to read the distance of ultrasound, so that later can be flexible use of these data.

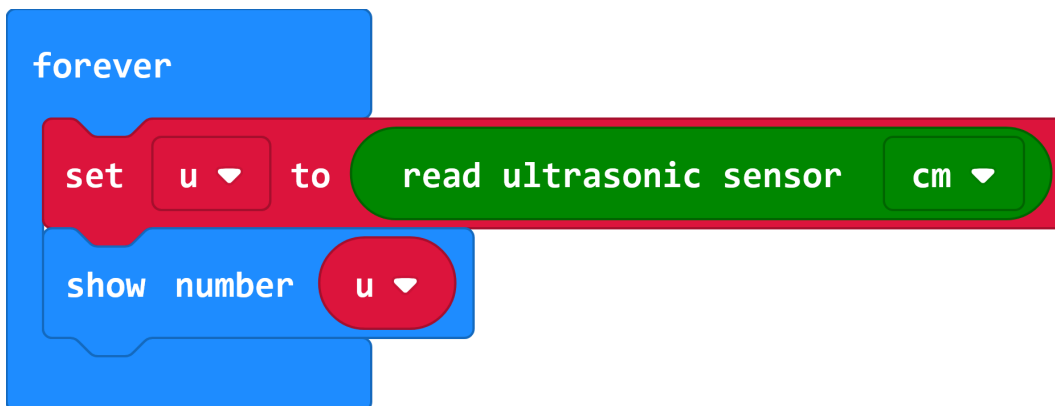
<pre> read ultrasonic sensor cm </pre>	<p>Read Ultrasonic Sensor</p> <p>Return Value: decimal integer</p> <p>Unit: cm</p> <p>Function: read the distance of the sensor and obstacle ahead. The sensor provides a 2~400cm detection range, and 1cm~3cm error. The output will be more accurate in 20cm~80cm. The return value will be 0 when exceeding 400cm.</p>
--	--

- Effect: Detect the distance between the sensor and obstacle ahead, and display the data on the LED Matrix (unit: cm).



Makecode Program Link: https://makecode.microbit.org/_F1aHEWVaHgs3
(https://makecode.microbit.org/_F1aHEWVaHgs3)


Screenshot of Makecode Graphical Program:



Read Infrared Key Assignments

- Learning Target: Learn to read the key assignments of infrared, so that later can be flexible use of these data.

	<p>Read IR-remote Controller Key Value Return Value: decimal integer (read the last two digits of the hexadecimal key value of the remote control and convert it to a decimal)</p>
--	---

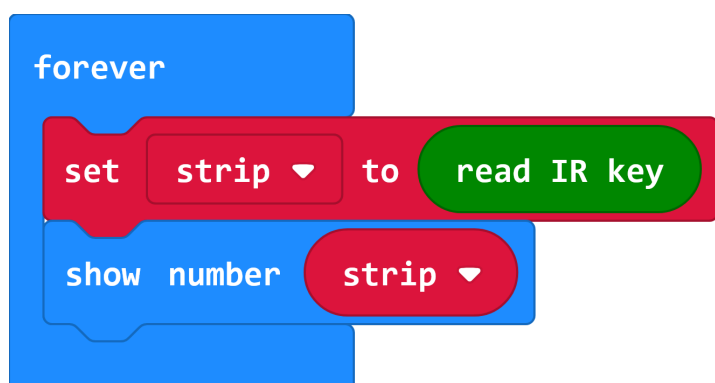
	number). Protocol Type: NEC
--	--------------------------------

- Effect: Press any key on the IR remote controller, the key value that corresponds to the pressed key will be displayed on the LED matrix (show the last two digits of key value in decimal).



Makecode Program Link: https://makecode.microbit.org/_UV9W1vRPP4tW
(https://makecode.microbit.org/_UV9W1vRPP4tW)

Screenshot of Makecode Graphical Program:



IR Remote Control and Its Key Assignments

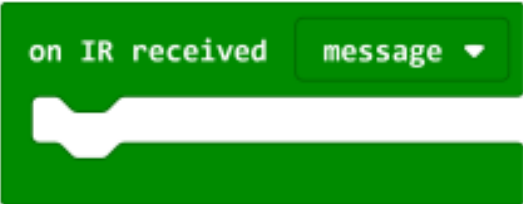
The key assignments in the following table are in hexadecimal. In this product, we read the last two digits of the key assignments and automatically convert them to decimal data.

Key	Value (In hexadecimal)	Value (In decimal)
Red Key	0xff00	0
VOL+	0xfe01	1
FUNC/STOP	0xfd02	2
Left Arrow	0xfb04	4
Pause	0xfa05	5
Right Arrow	0xf906	6
Down Arrow	0xf708	8
VOL-	0xf609	9
Up Arrow	0xf50a	10
0	0xf30c	12
EQ	0xf20d	13
ST/REPT	0xf10e	14
1	0xef10	16
2	0xee11	17
3	0xed12	18
4	0xeb14	20
5	0xea15	21
6	0xe916	22
7	0xe718	24
8	0xe619	25
9	0xe51a	26

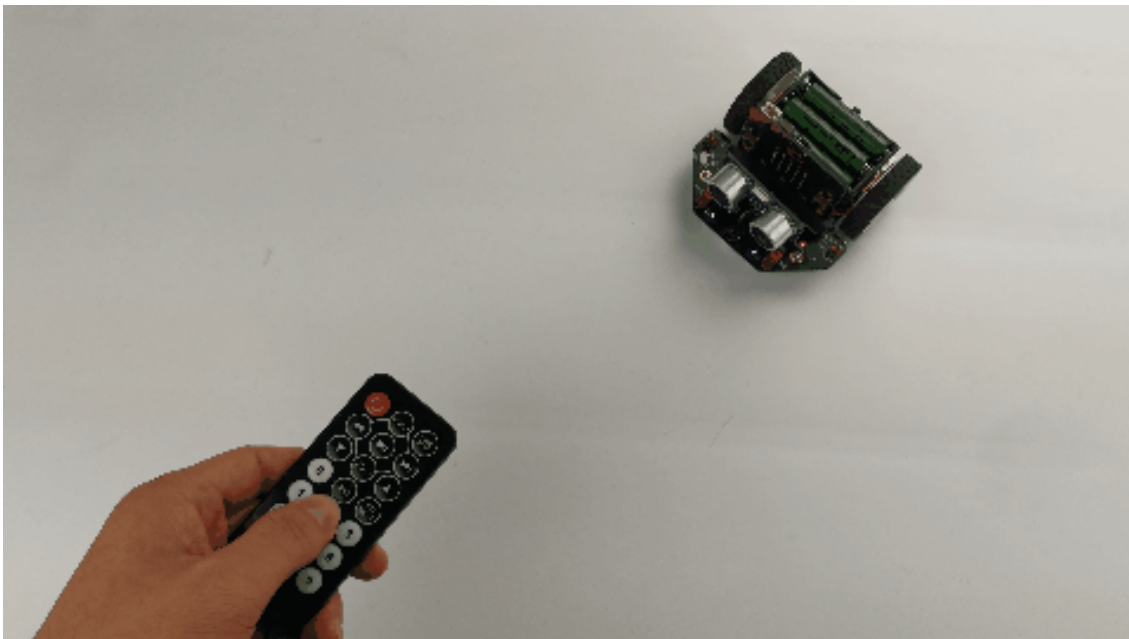


IR Remote Control

- Learning Target: Learn to use the IR remote control to command the car.

	<p>On IR Received (Event trigger block)</p> <p>Data Type: decimal integer (read the last two digits of the hexadecimal key value of the remote controller and convert it into a decimal number).</p> <p>Protocol Type: NEC</p> <p>Function: when there is IR data received, store the data into the variable "message" and execute all the codes inside this block.</p>
---	--

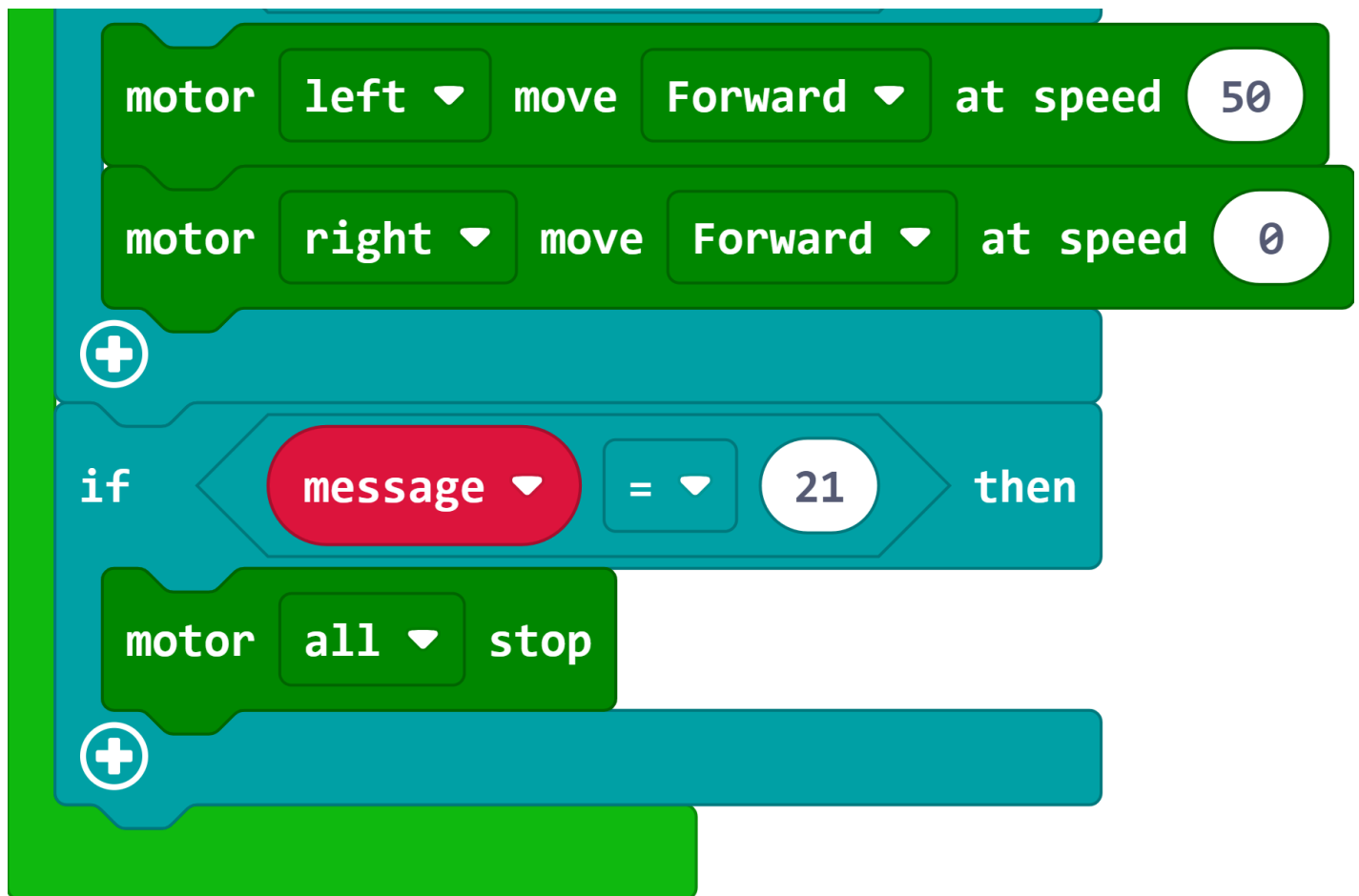
- Effect: Use the key 2, 8, 4, 6, and 5 on the IR remote controller to operate Maqueen.



Makecode Program Link: https://makecode.microbit.org/_bfuHRf53RdXM
 (https://makecode.microbit.org/_bfuHRf53RdXM)


Screenshot of Makecode Graphical Program:

```
on IR received message
  if message = 17 then
    motor all move Forward at speed 50
  +
  if message = 25 then
    motor all move Backward at speed 50
  +
  if message = 20 then
    motor left move Forward at speed 0
    motor right move Forward at speed 50
  +
  if message = 22 then
```



Read Line-tracking Sensor

- Learning Target: Learn to read the return value of Line-tracking sensor.

	<p>Read Line-tracking Sensor</p> <p>Sensor: left, right</p> <p>Return Value: 0, 1</p> <p>Function: read the value of line-tracking sensor on the bottom of Maqueen car.</p> <p>When detected a black line, Maqueen indicator turns off, the sensor outputs 0; When detected white color, the indicator turns on, and output 1.</p>
---	---

- Effect: when Maqueen's line-tracking sensor is put on the black line, the sensor outputs 0, and display 0 on the micro:bit LED matrix; if put on white area, output 1 and display 1 on the LED matrix.

Makecode Program Link: https://makecode.microbit.org/_38mPyj9Rq69q

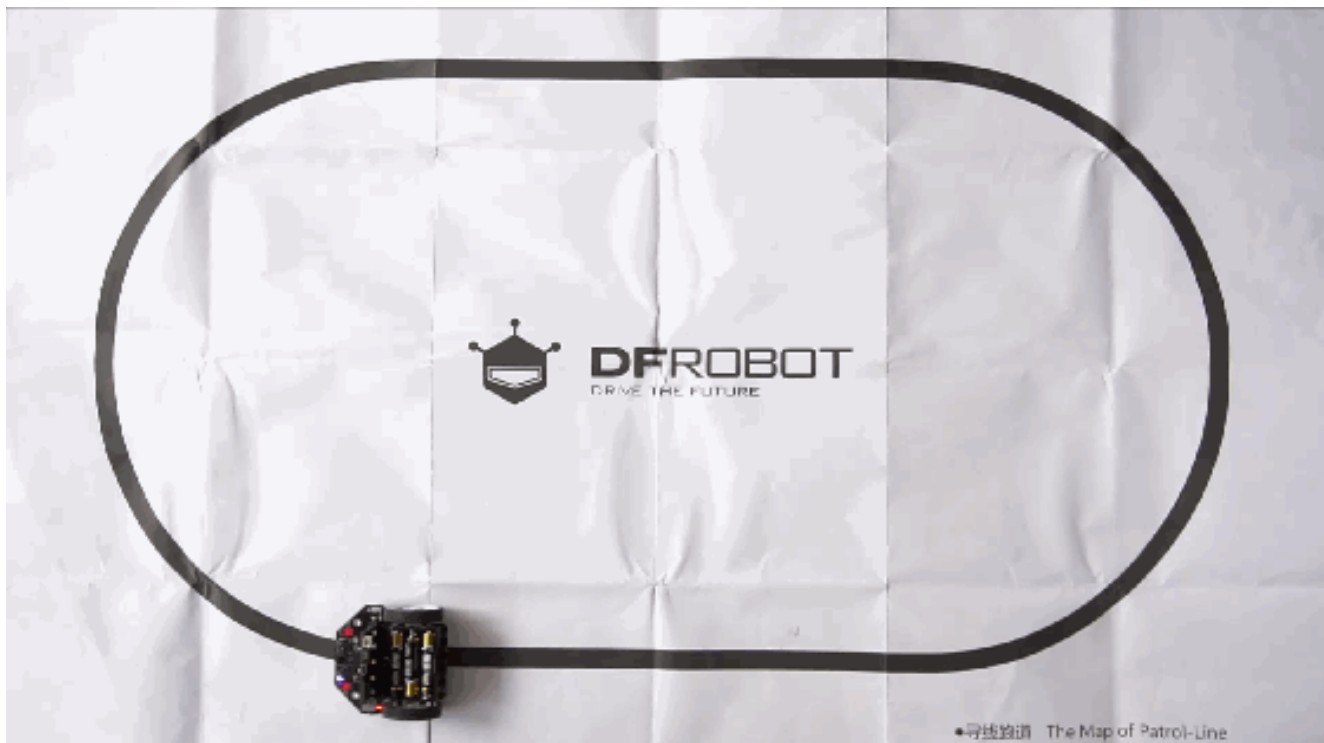
(https://makecode.microbit.org/_38mPyj9Rq69q)

Screenshot of Makecode Graphical Program:



Line-tracking

- Learning Target: Let the car run along the black line.
- Effect: Maqueen drives along the black line on the map. If you don't have a map, you can make one using black adhesive tape.



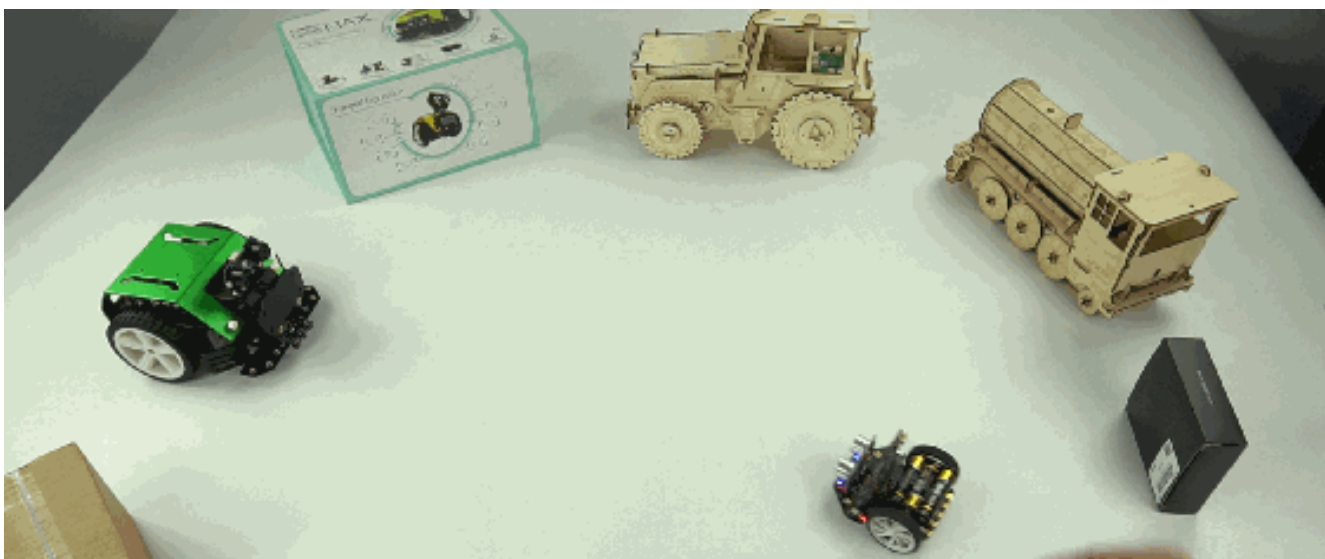
Makecode Program Link: https://makecode.microbit.org/_gMTcVi5KzY6X
(https://makecode.microbit.org/_gMTcVi5KzY6X)

Screenshot of Makecode Graphical Program:

```
forever
  if << read left line tracking sensor = 0 and read right line tracking sensor = 0 >> then
    motor all move Forward at speed 50
  else if << read left line tracking sensor = 1 and read right line tracking sensor = 0 >> then
    motor left move Forward at speed 50
    motor right move Forward at speed 15
  else if << read left line tracking sensor = 0 and read right line tracking sensor = 1 >> then
    motor left move Forward at speed 15
    motor right move Forward at speed 50
```

Ultrasonic Obstacle-avoiding

- Learning Target: Keep the car away from obstacles
- Effect: The ultrasonic sensor constantly detect the distance between the Maqueen and obstacle ahead, if it is smaller then 30cm, Maqueen randomly turns left or right to avoid the obstacle.
- Fittings: SR04 Ultrasonic Module x 1 or SR04-P Ultrasonic Module x 1





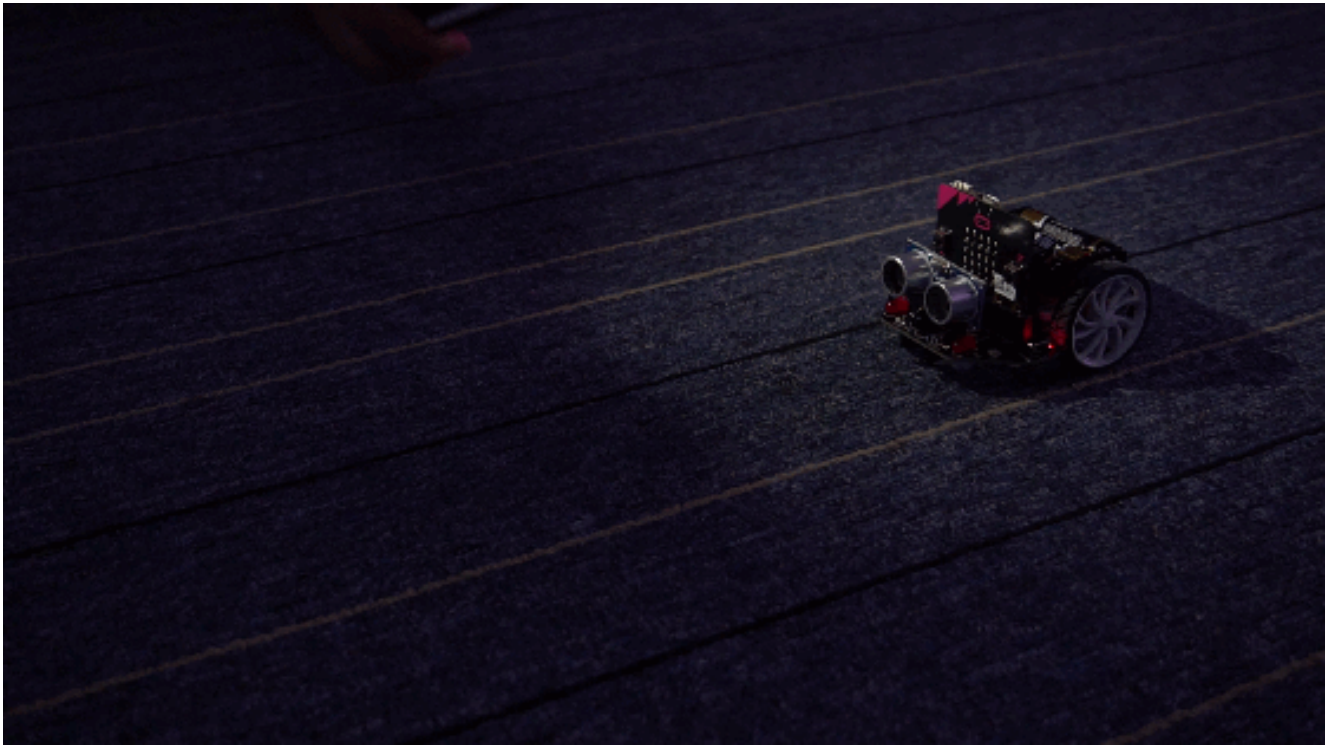
Makecode Program Link: https://makecode.microbit.org/_V0yFaqJ4EEkD
(https://makecode.microbit.org/_V0yFaqJ4EEkD)

Screenshot of Makecode Graphical Program:

```
forever
  if (read ultrasonic sensor cm > 30) and (read ultrasonic sensor cm != 0) then
    set strip to pick random true or false
    if strip = true then
      motor left move Forward at speed 50
      motor right move Forward at speed 0
      pause (ms) 800
    else if strip = false then
      motor left move Forward at speed 0
      motor right move Forward at speed 50
      pause (ms) 800
    else
      motor all move Forward at speed 50
```

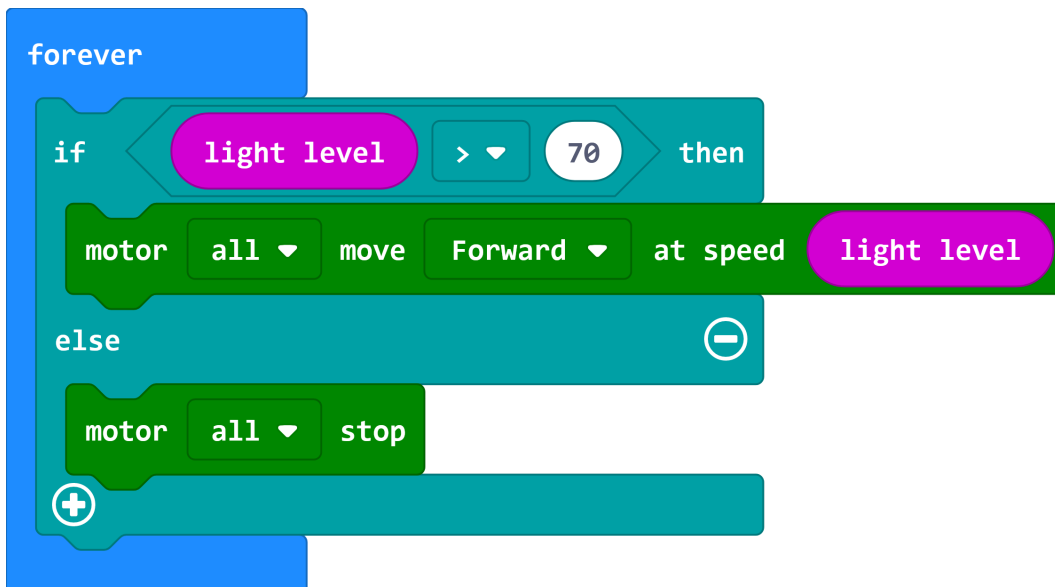
Light-operated Sprite

- Learning Target: Learn to let the car follow the light.
- Effect: As the flashlight illuminates the LEDs on Maqueen, the vehicle starts to move forward. The brighter the light is, the faster Maqueen moves.



Makecode Program Link: https://makecode.microbit.org/_UsUV6KDWvfcz
(https://makecode.microbit.org/_UsUV6KDWvfcz)

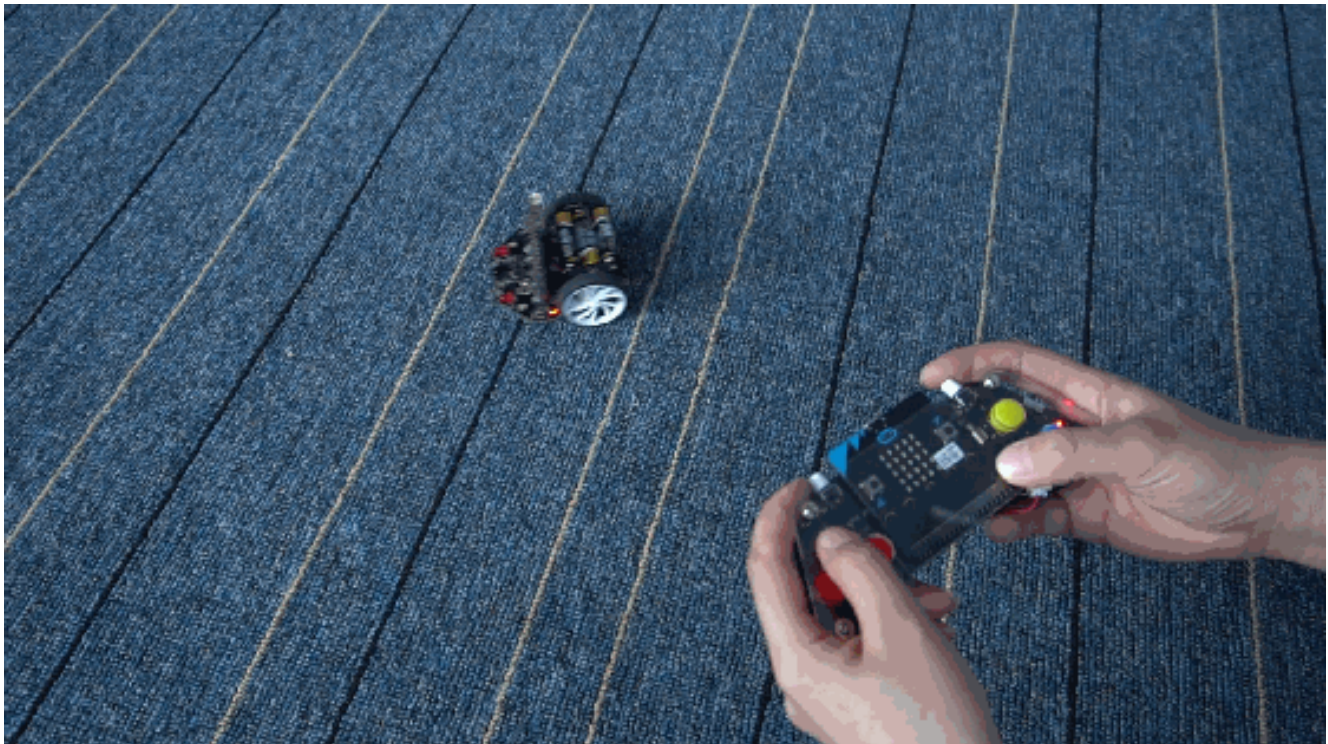
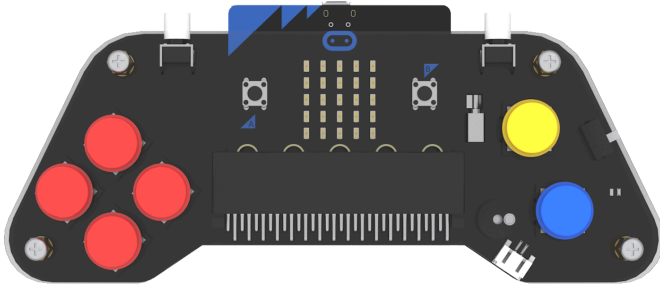
Screenshot of Makecode Graphical Program:



Wireless Remote Control

- Learning Target: Learn the way of using microbit wireless.
- Effect: Use the microbit gamePad to operate Maqueen. micro:bit Micro:bit Gamepad (<https://www.dfrobot.com/product-1711.html>)

Load the gamePad library: <https://github.com/DFRobot/pxt-gamePad>
(<https://github.com/DFRobot/pxt-gamePad>)



Screenshot of Makecode Graphical Program:

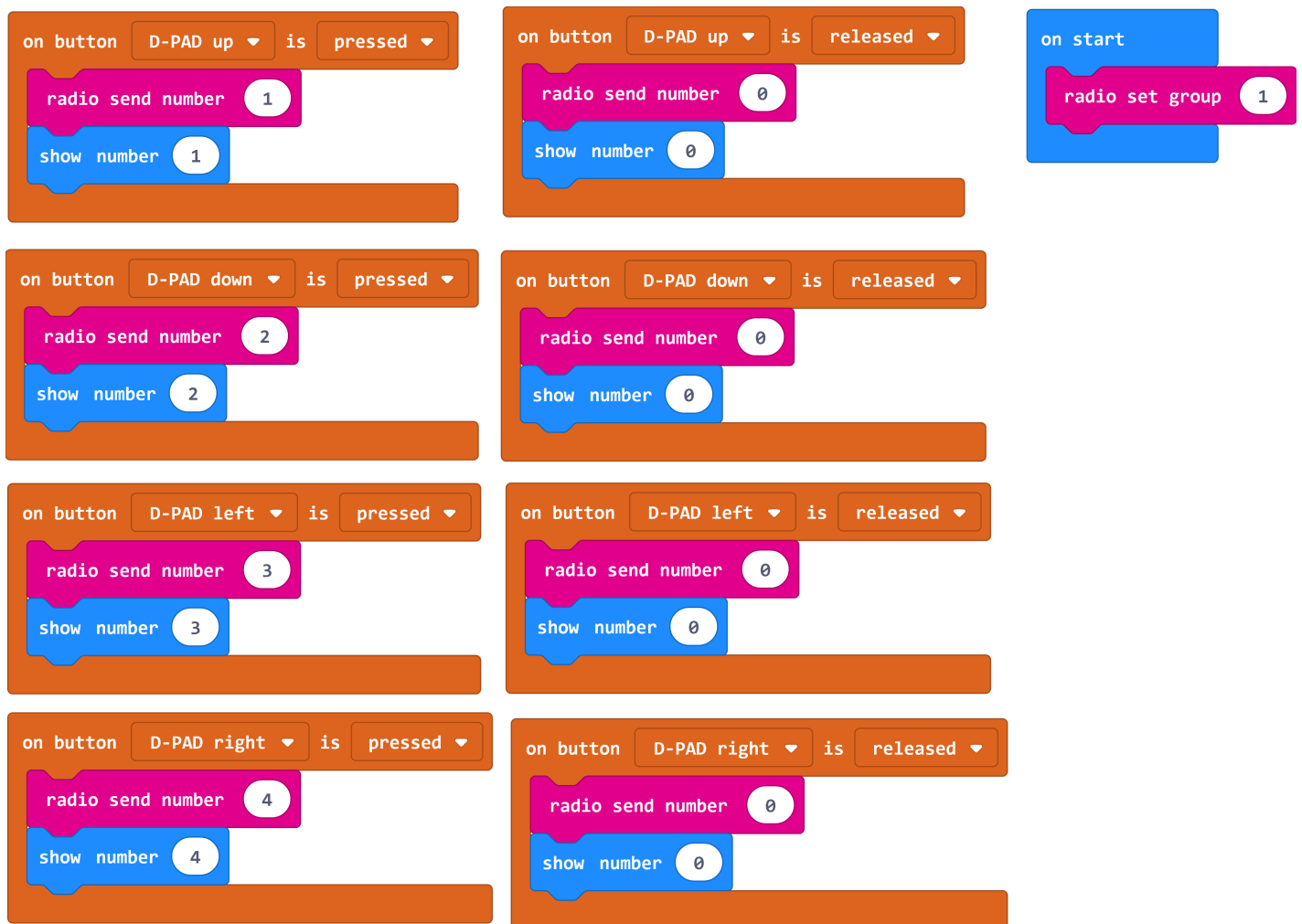
- Screenshot of Car's Makecode Graphical Program:

Program for Maqueen: https://makecode.microbit.org/_d4D02s0uX6da
(https://makecode.microbit.org/_d4D02s0uX6da)



- Screenshot of Gamepad's Makecode Graphical Program:

Program for gamePad: https://makecode.microbit.org/_49mJKYK4V8c0
 (https://makecode.microbit.org/ 49mJKYK4V8c0)



Driving Servo

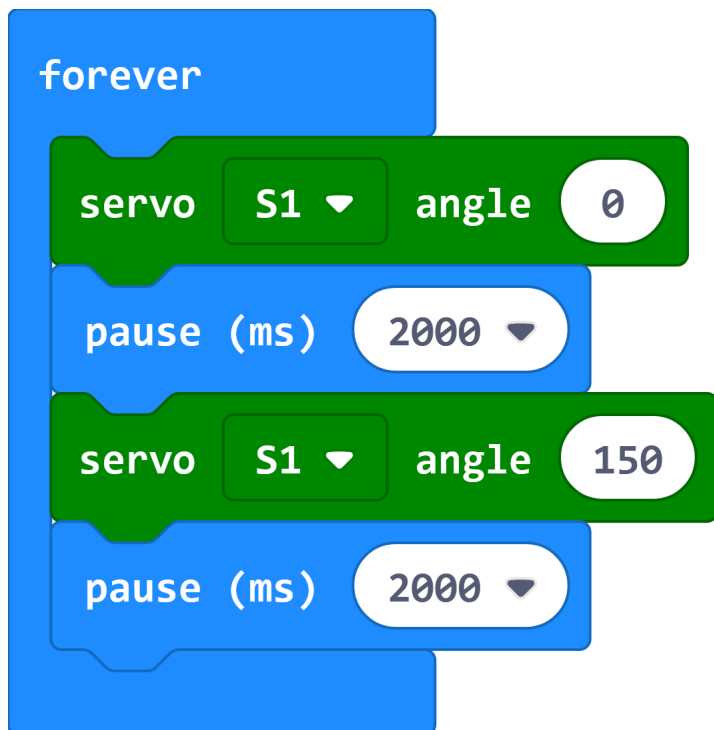
- Learning Target: Driving servo.

	<p>Control Servo Port: S1, S2 Angle: 0~180 degrees Function: control the rotation angle of the servo connected with port S1 or S2.</p>
--	--

- Effect: The servo repeatedly rotates from 0 to 150 degrees.

Makecode program link: https://makecode.microbit.org/_5Te7D33q3UoL
 (https://makecode.microbit.org/ 5Te7D33a3UoL)

Screenshot of Makecode graphical program:



Get Product Information

Program result: the product information is showed on the micro:bit LED panel.

- Display in Simplified Chinese: ROB0148-CN;
- Display in Traditional Chinese: ROB0148-TW;
- Display in English: ROB0148-EN;
- Display in Korean: ROB0148-KR;
- Display in Japanese: ROB148-JP.

Makecode Program link: https://makecode.microbit.org/_YAebP1f7pdsi
(https://makecode.microbit.org/_YAebP1f7pdsi)

Screenshot of the graphical program:





```
show string Get product information
```

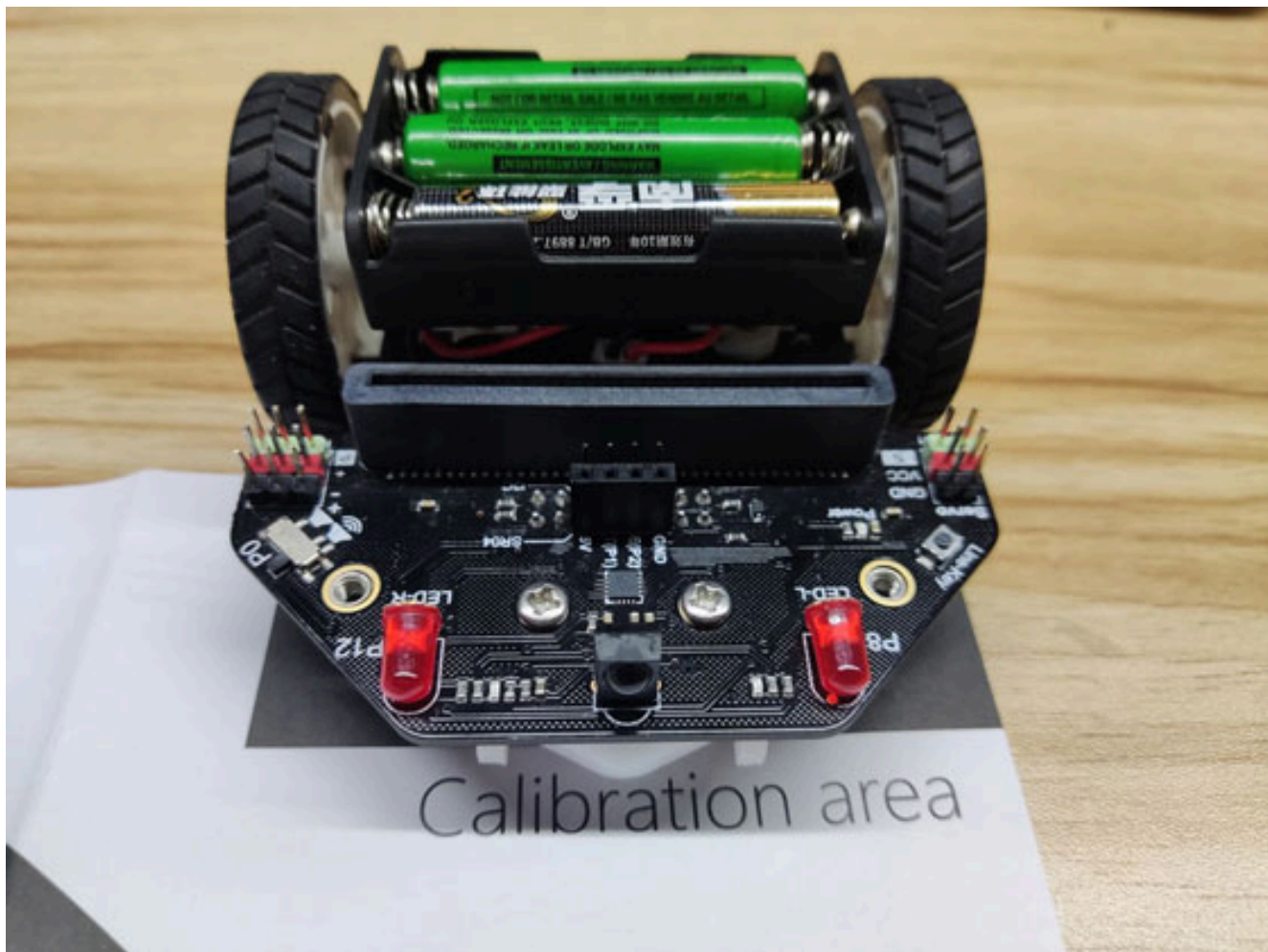
6. Line-tracking Sensor Calibration

The line-tracking sensor is factory calibrated, so there is no need for recalibration. Just like the reset button on digital products, the calibration button is not used in most cases. And improper calibration may cause the sensor error.

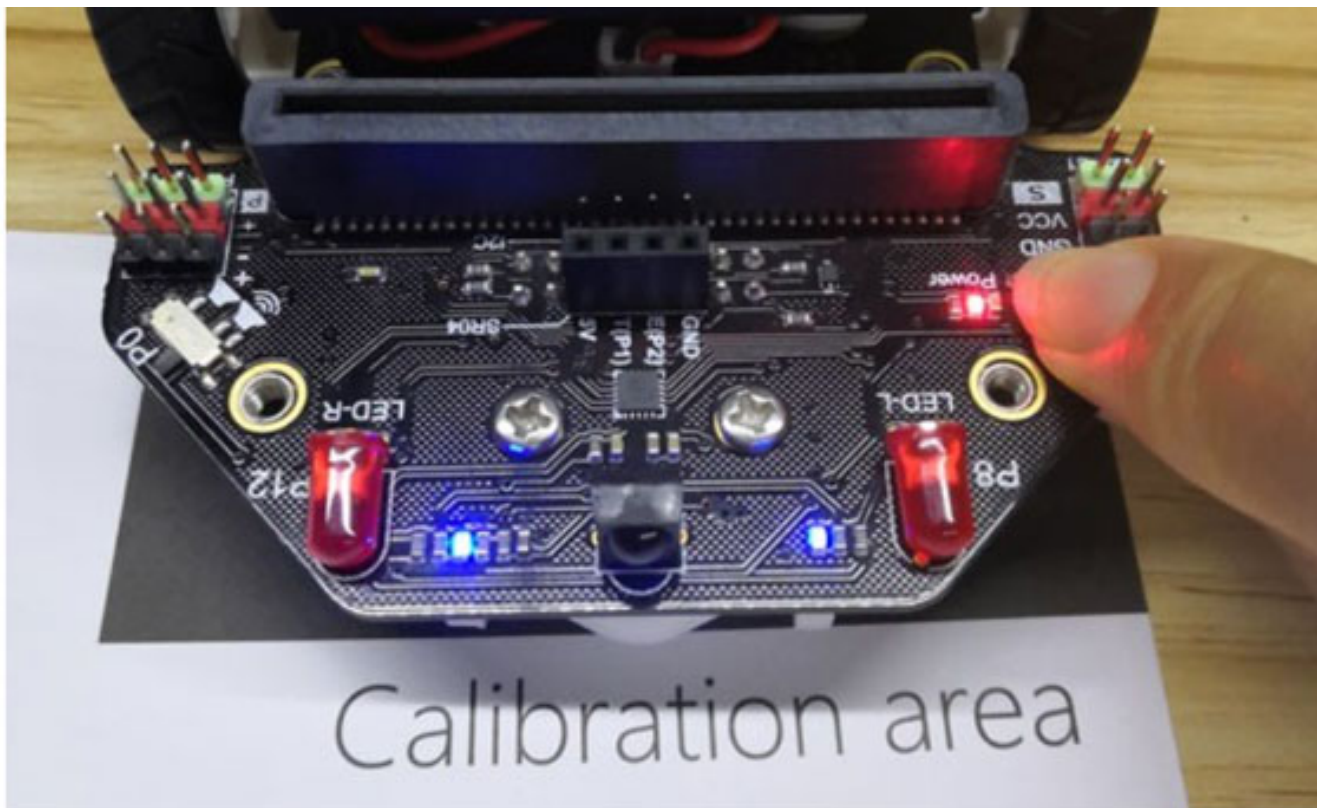
But you can try to calibrate it if the sensor can't recognize the black line as usual. The method is as follows:



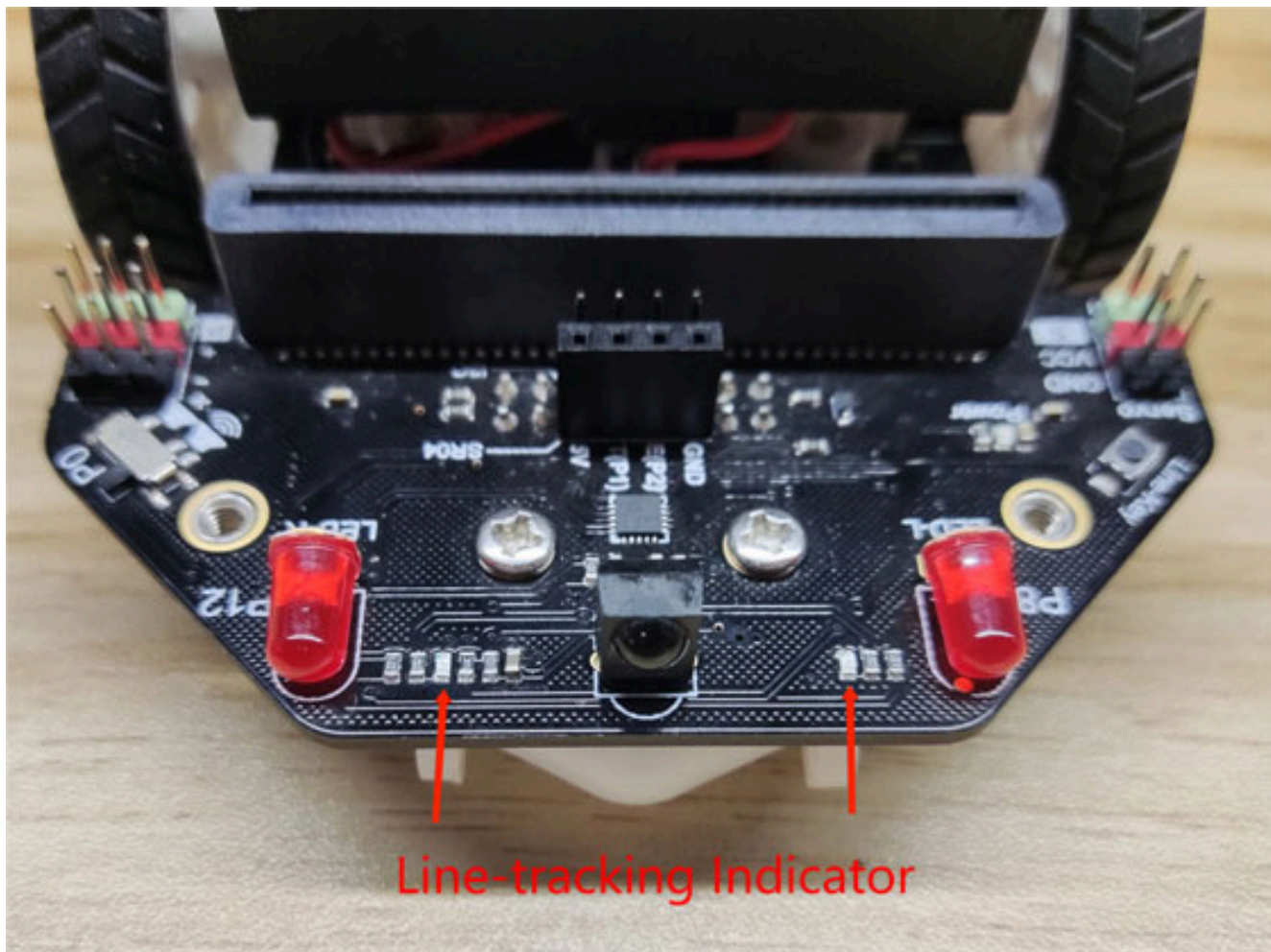
1. Place the car in the black area of the map that comes with the product, and make sure the left and right sides of the sensor are in the area, as shown in the picture below:



2. Press the calibration button for about 1s, and the two blue LED line-tracking indicators will flash. The calibration is completed after flashing.



3. Check the calibration result: after the calibration is completed, put the sensor in the white area, and the two line-tracking indicators will be on; put it in the black area, and they'll be off, which means the calibration is correct.



FAQ

1.Upload error? For uploading to the device, you need to switch the code window to the "Auto Generate" window.

2.In ultrasonic wave test, there is 0 value appearing? A constraint condition should be added for test barrier, that is, filter out the data when the distance is not 0 or less than 5. You can also add 100-millisecond delay to prevent multiple reflections.

3.After installing a battery in the car, the motor still can't be controlled to rotate by burning program while the power light is on? Perhaps the battery is dead, and it is recommended to replace it with a fully charged one. When the battery voltage is lower than 2V, the LED on the board and other functions can work normally, but the motor can't rotate due to insufficient power

motor can't rotate due to insufficient power.

For any questions, advice or cool ideas to share, please visit the **DFRobot Forum** (<https://www.dfrobot.com/forum/>). |

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