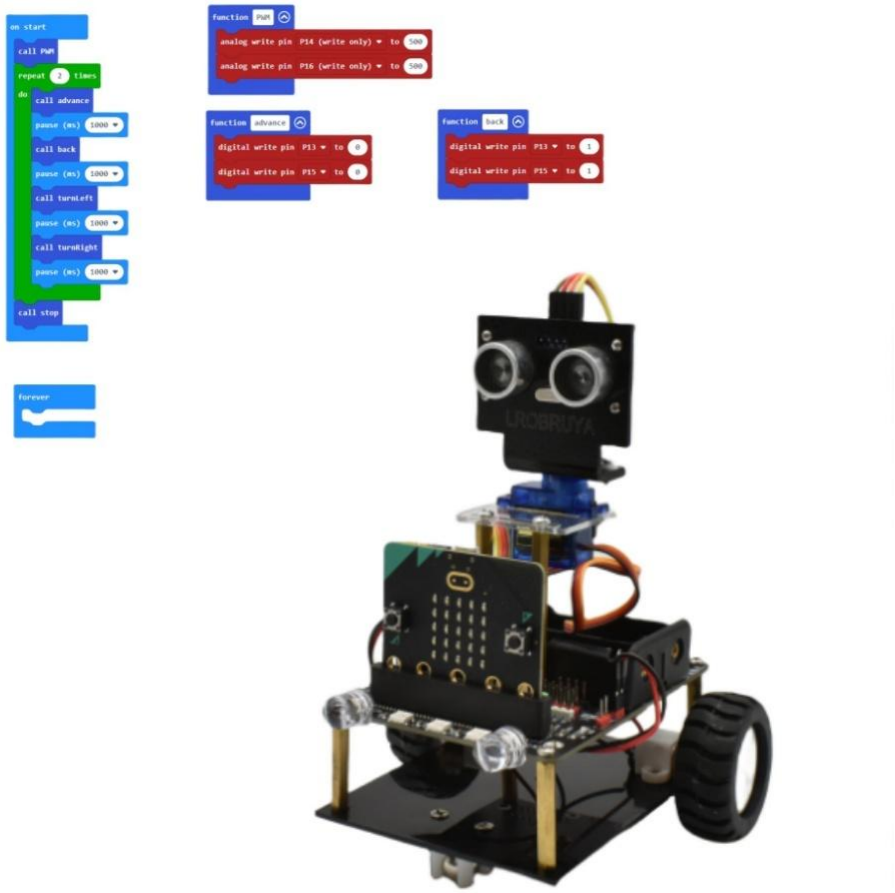
LROBRUYA

Micro bit Smart Robot Car Kit


on start
call PWM
repeat 2 times
do
call advance
pause (ms) 1000
call back
pause (ms) 1000
call turnLeft
pause (ms) 1000
call turnRight
pause (ms) 1000
call stop
forever
function PWM
analog write pin P14 (write only) to 500
analog write pin P16 (write only) to 500
function advance
digital write pin P13 to 0
digital write pin P15 to 0
function back
digital write pin P13 to 1
digital write pin P15 to 1

Content

Preface

Company Profile

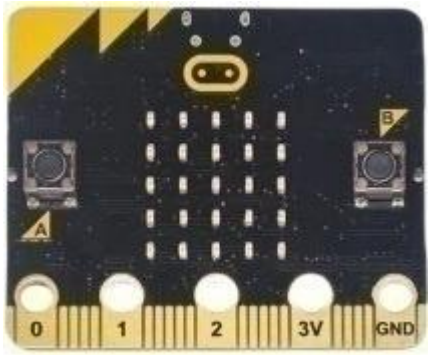
Founded in 2014, Shenzhen Lonten Technology Co., Ltd. focuses on the design, research production of Electronics Module for robotics related products. Consisting of professional researchers and skilled engineers, our R&D team constantly strives for creative function and excellent user experience. The 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.

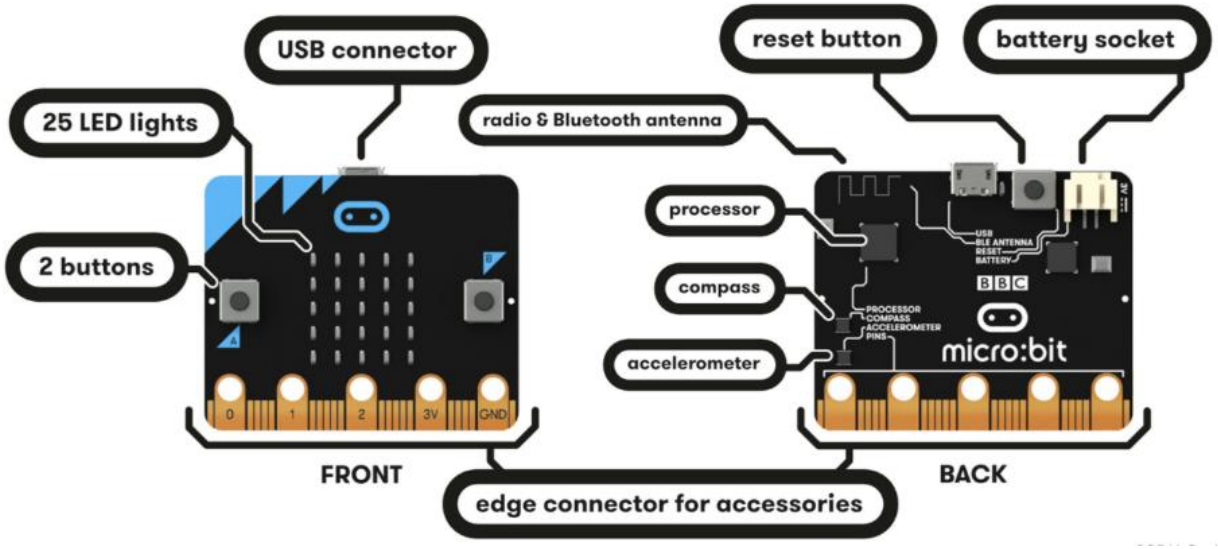
Micro:bit

This chapter is the Start Point in the journey to build and explore Micro:bit electronic projects.



The BBC micro:bit is a pocket-size, programmable micro-computer that can be used for all sorts of cool creations, from robots to musical instruments the possibilities are infinite.

For more contents, please refer to: https://microbit.org/guide/



Your micro:bit has the following physical features:

- 25 individual programmable LEDs
- 2 programmable buttons
- Physical connection pins

- Light and temperature sensors
- Motion sensors (accelerometer and compass)
- Wireless Communication, via Radio and Bluetooth
- USB interface

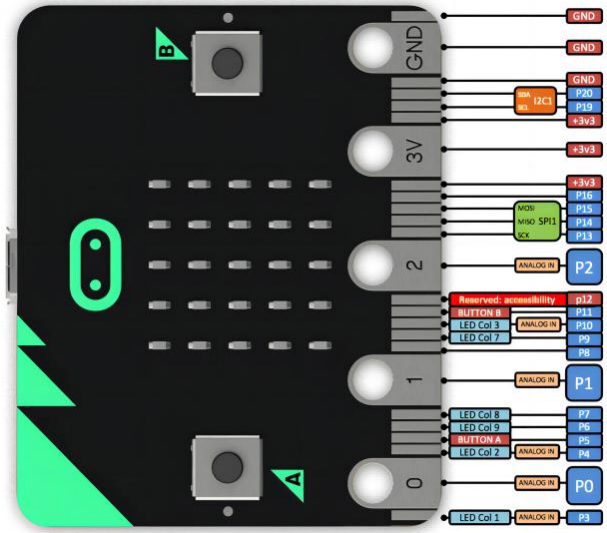
For more details, please refer to: https://microbit.org/guide/features/

It is not required for beginners to master this section, but a brief understanding is necessary. However, if you want to be a developer, hardware information will be very helpful. Detailed hardware information about micro:bit can be found here: https://tech.microbit.org/hardware/

First, get to know the micro:bit GPIO.

GPIO

GPIO, namely General Purpose Input/output Pins, is an important part of micro:bit for connecting external devices. All sensors and devices on Rover communicate with each other through micro:bit GPIO. The following is the GPIO serial number and function diagram of micro:bit:



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Introduction to Driver Board Functions

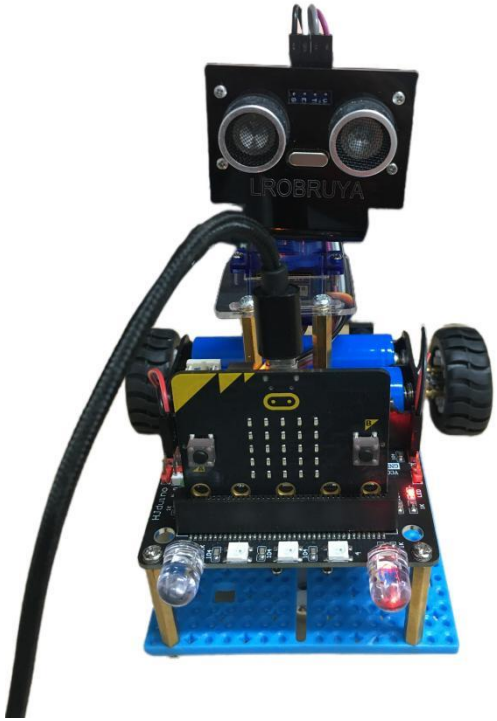
Hardware and Feature

Driver Board is shown as below:

Integrated with 2 driver chips, capable of connecting 4 motors in parallel to form a 2WD car, 4WD car, integrated sensor interface, RGB interface, LED headlights, two 18650 battery sockets.

How to connect?

Attention:Install in the direction shown in the diagram. If installed in the wrong direction, it may burn out the motherboard.



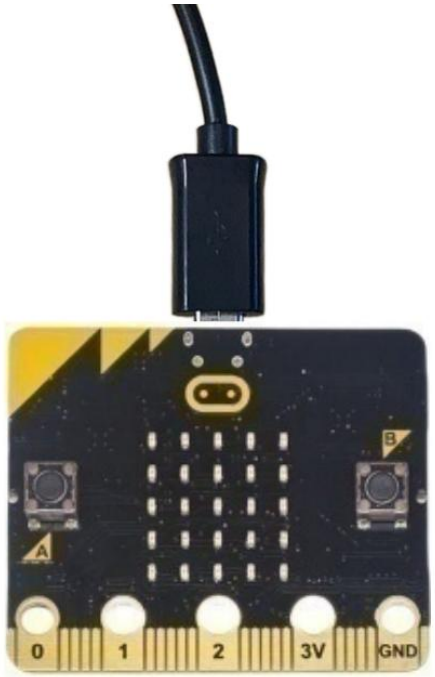
Code & Programming

Quick Start

This section describes how to write programs for micro:bit and how to download them to micro:bit. There are very detailed tutorials on the official website. You can refer to: https://microbit.org/guide/quick/

Step 1: Connecting Micro:bit

Connect the micro:bit to your computer via a micro USB cable. Macs, PCs, Chromebooks and Linux systems (including Raspberry Pi) are all supported.



Step 2: Write Program

Visit https://makecode.microbit.org/Then click "New Project" and start programming.

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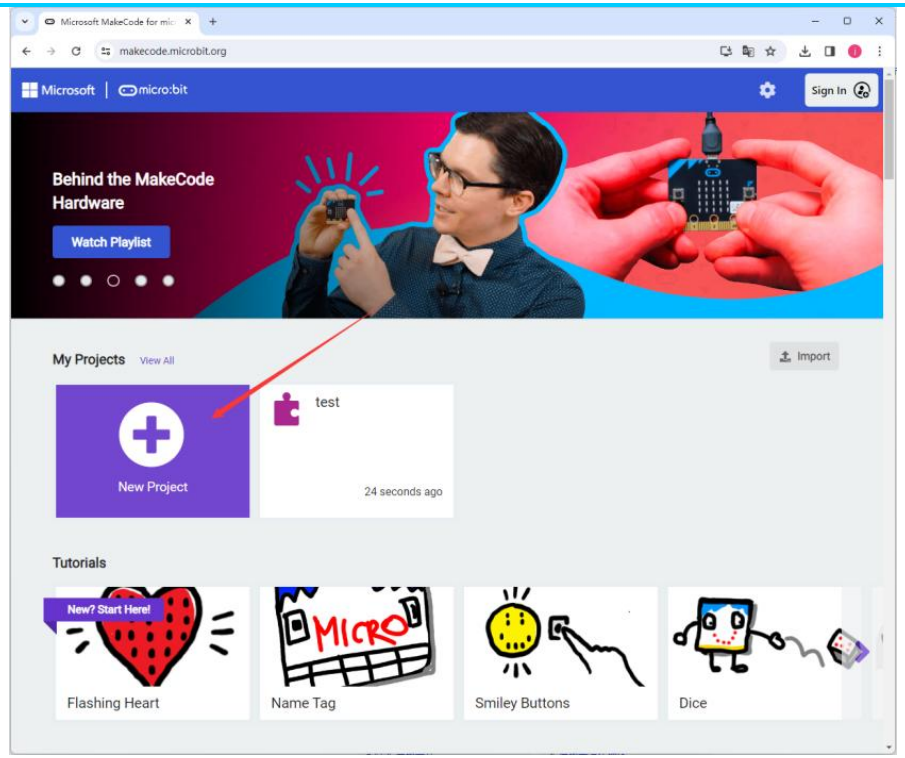
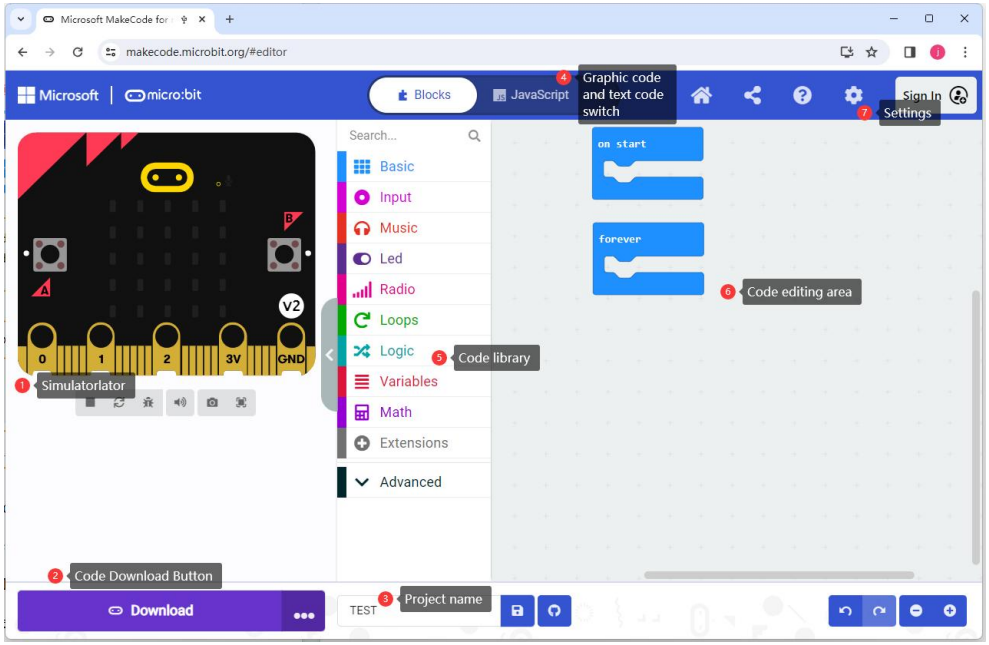
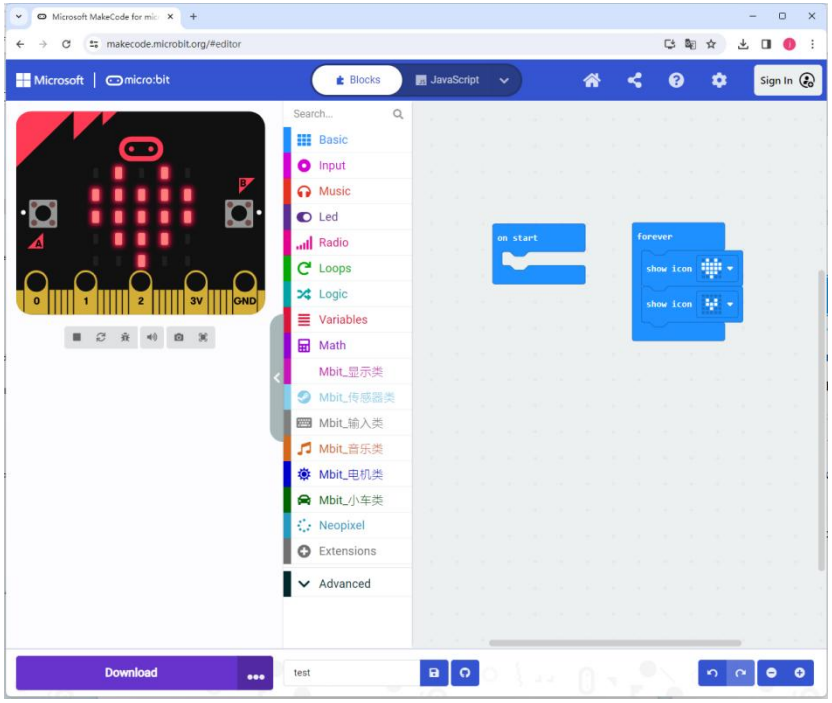

Microsoft MakeCode for mic
makecode.microbit.org
Microsoft | micro:bit
Sign In
Behind the MakeCode Hardware
Watch Playlist
My Projects
View All
Import
New Project
test
24 seconds ago
Tutorials
New? Start Here!
Flashing Heart
Name Tag
Smiley Buttons
Dice

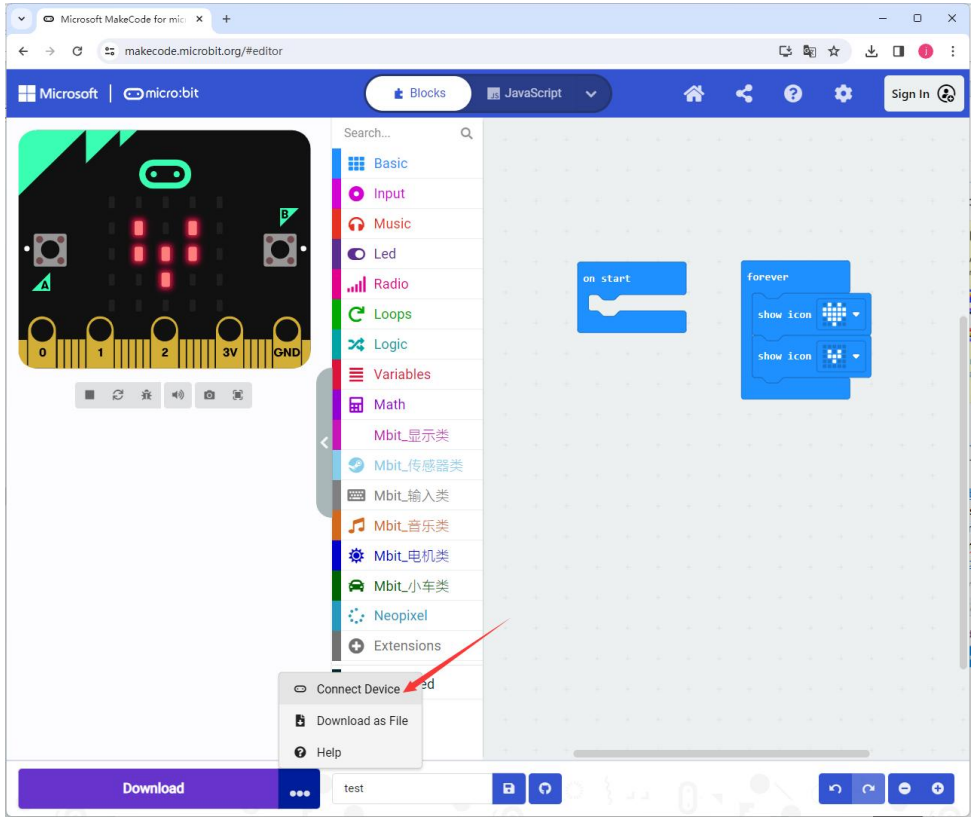


Write your first micro:bit code. For example, drag and drop some blocks and try your program on the Simulator in the MakeCode Editor, like in the image below that shows how to program a Flashing Heart.

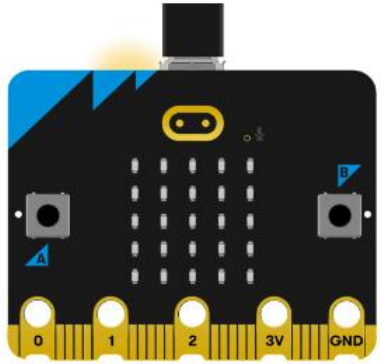
MakeCode will be further introduced in next section.



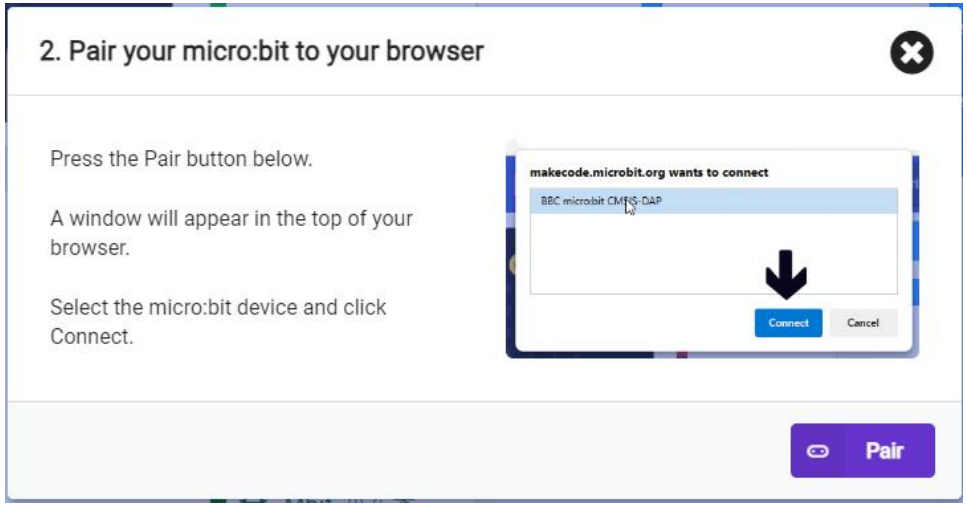
Then continue to click “Connect Device” button.


makecode.microbit.org/#editor
Microsoft
micro:bit
Blocks
JavaScript
Sign In
Search...
Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
Mbit_显示类
Mbit_传感器类
Mbit_输入类
Mbit_音乐类
Mbit_电机类
Mbit_小车类
Neopixel
Extensions
on start
forever
show icon
show icon
Connect Device
Download as File
Help
Download
test

1. Connect your micro:bit to your computer



Next

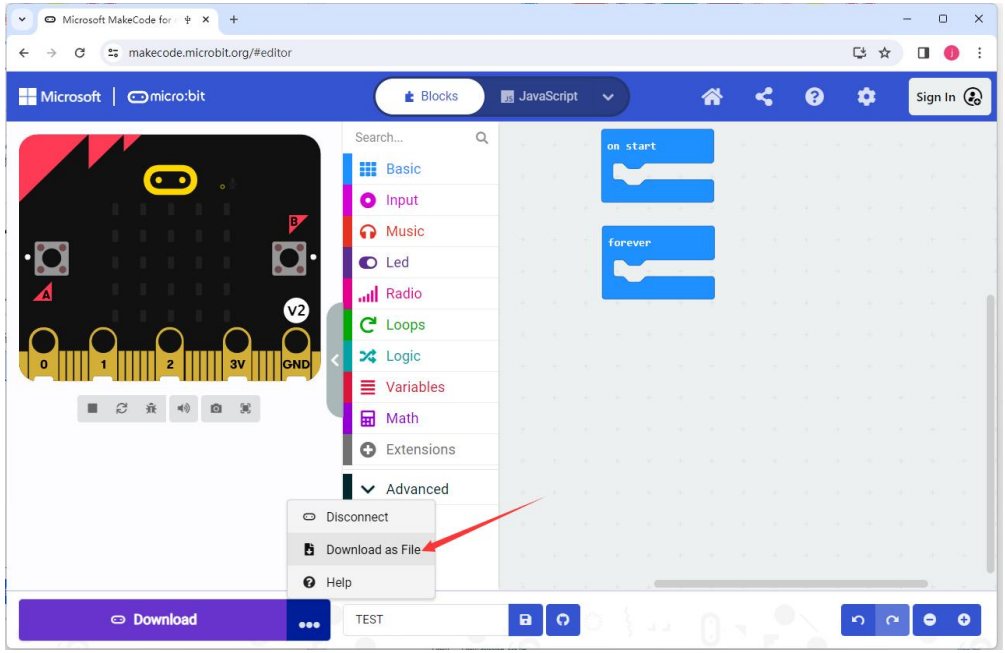

2. Pair your micro:bit to your browser
Press the Pair button below.
A window will appear in the top of your browser.
Select the micro:bit device and click Connect.
makecode.microbit.org wants to connect
BBC microbit CMSIS-DAP
Connect
Cancel
Pair

Step 3: Flashing Code to your Micro:bit

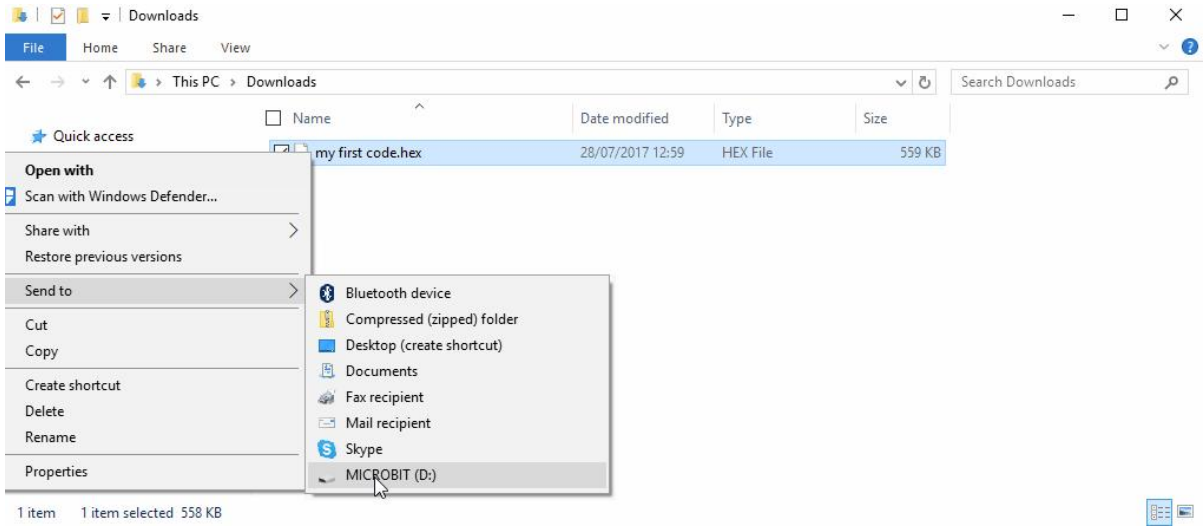
The process of transferring the .HEX file to the BBC micro:bit is called flashing.

If you write program using Windows 10 App, you just need to click the “Download” button, then the program will be downloaded directly to micro:bit without any other actions.

If you write program using browser, please follow steps below:



Click the Download as File button in the editor. This will download a '.hex' file, which is a compact format of your program that your micro:bit can read. Once the hex file has been downloaded, copy it to your micro:bit just like copying a file to a USB drive. On Windows you can right click and choose "Send to→MICROBIT."



Step 4: Run the Program

The micro:bit will pause and the yellow LED on the back of the micro:bit will blink while your code is flashed. Once that's finished the code will run automatically! The micro:bit can only run one program at a time - every time you drag-and-drop a hex file onto the device over USB it will erase the current program and replace it with the new one.

Warning

The MICROBIT drive will automatically eject and reconnect each time you program it, but your hex file will be gone. The micro:bit can only receive hex files and won't store anything else!

Import Code

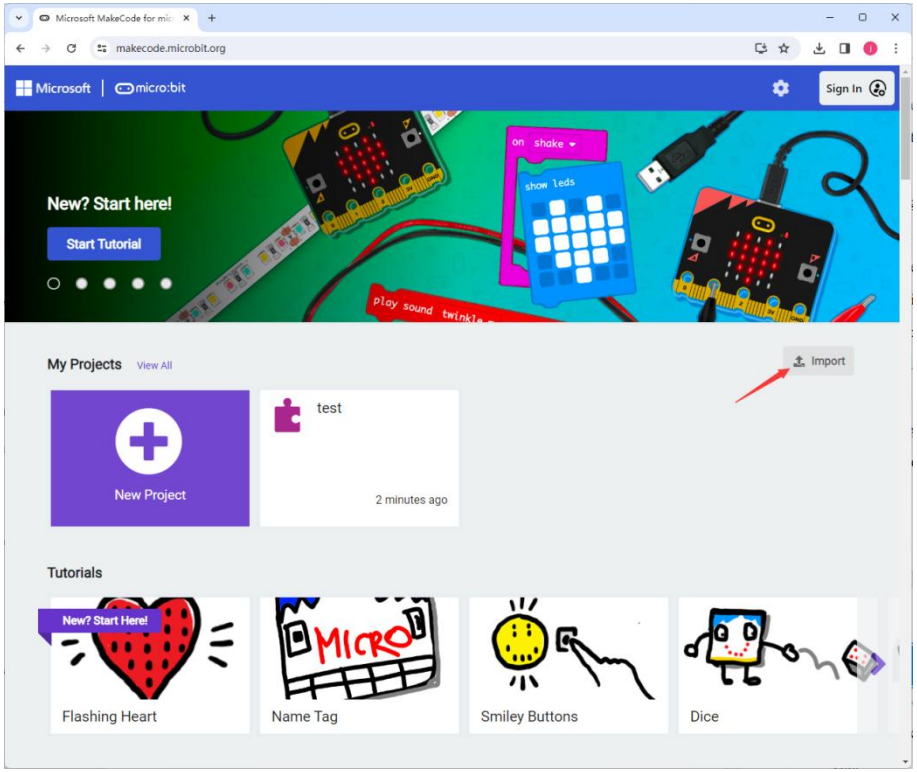
We provide hex file (project files) for each project, which contains all the contents of the project and can be imported directly. You can also complete the code of project manually. If you choose to complete the code by dragging code block, you may need to add necessary extensions.

As for simple projects, it is recommended to complete the project by dragging code block.

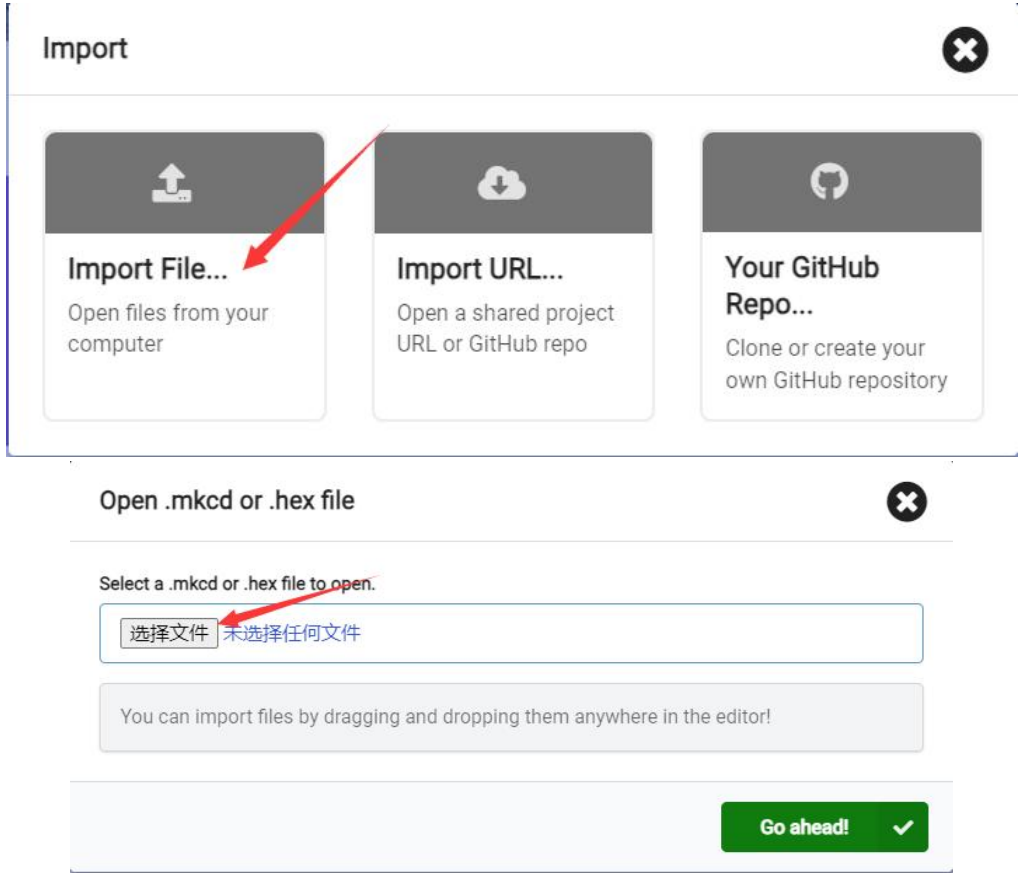
As for complicated projects, it is recommended to complete the project by importing Hex code file.

Next, we will take “Heartbeat” project as an example to introduce how to load code. Open web version of makecode.

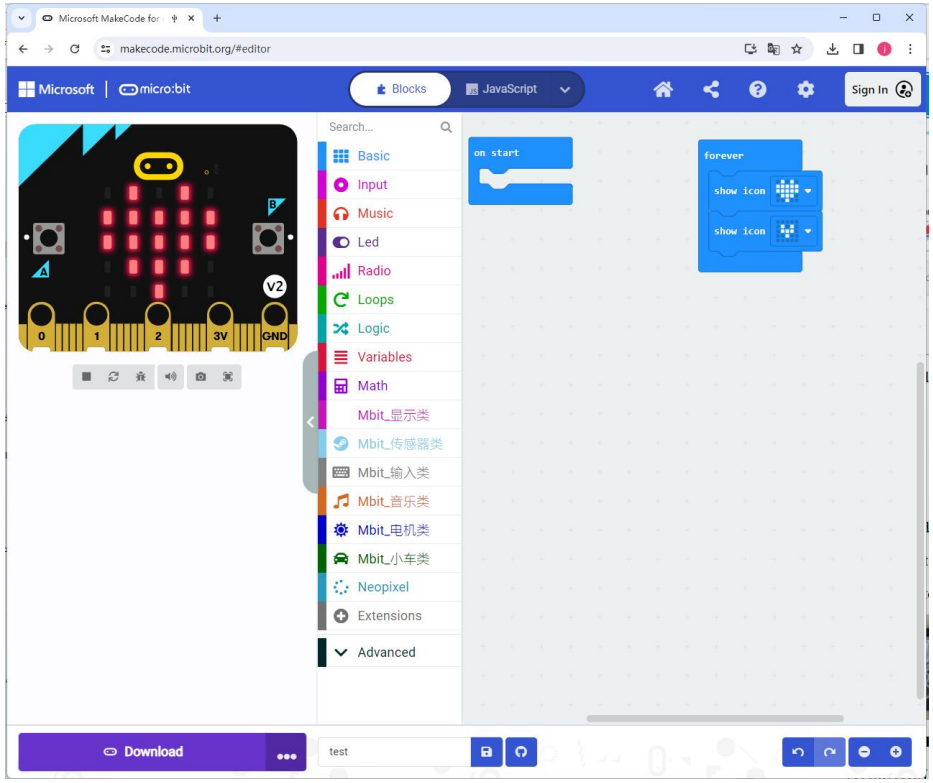
Click “Import” button on the right of HOME page.



In the pop-up dialog box, click "Import File".



A few seconds later, the project is loaded successfully.



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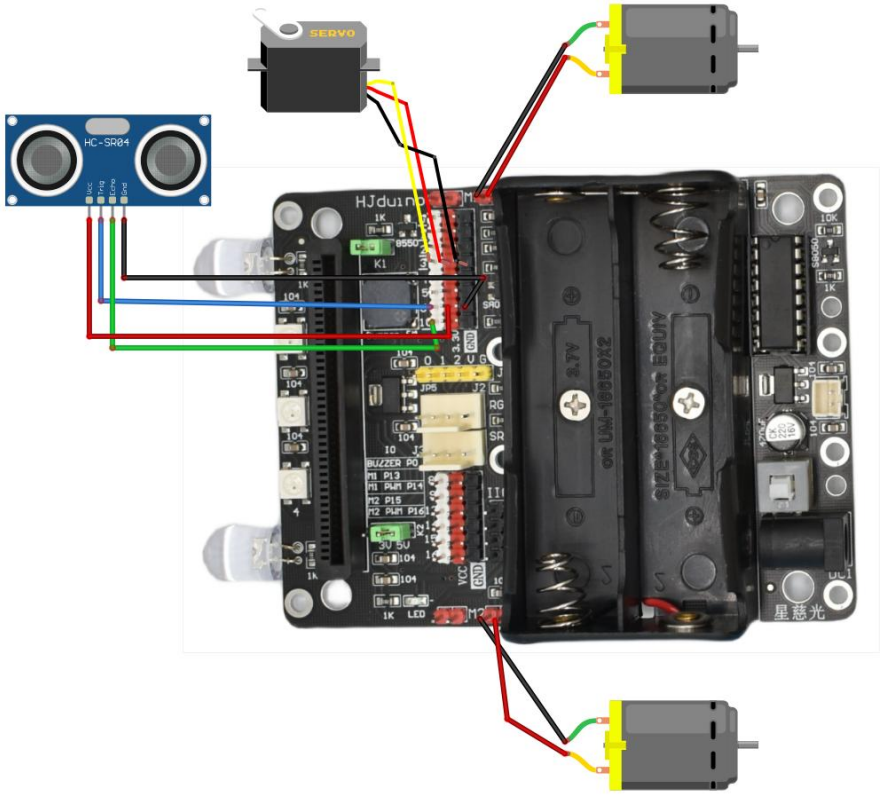
Wiring diagram



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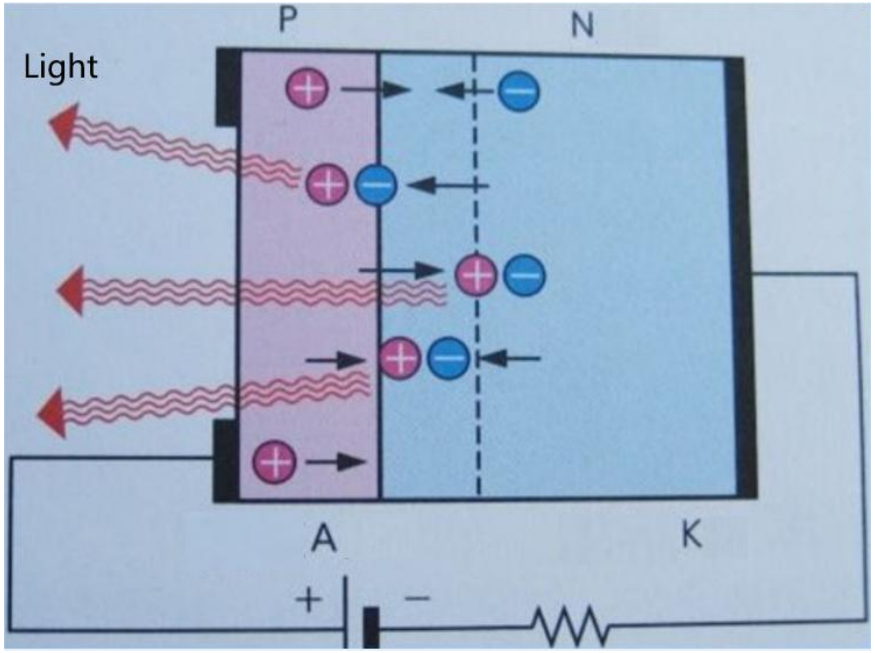
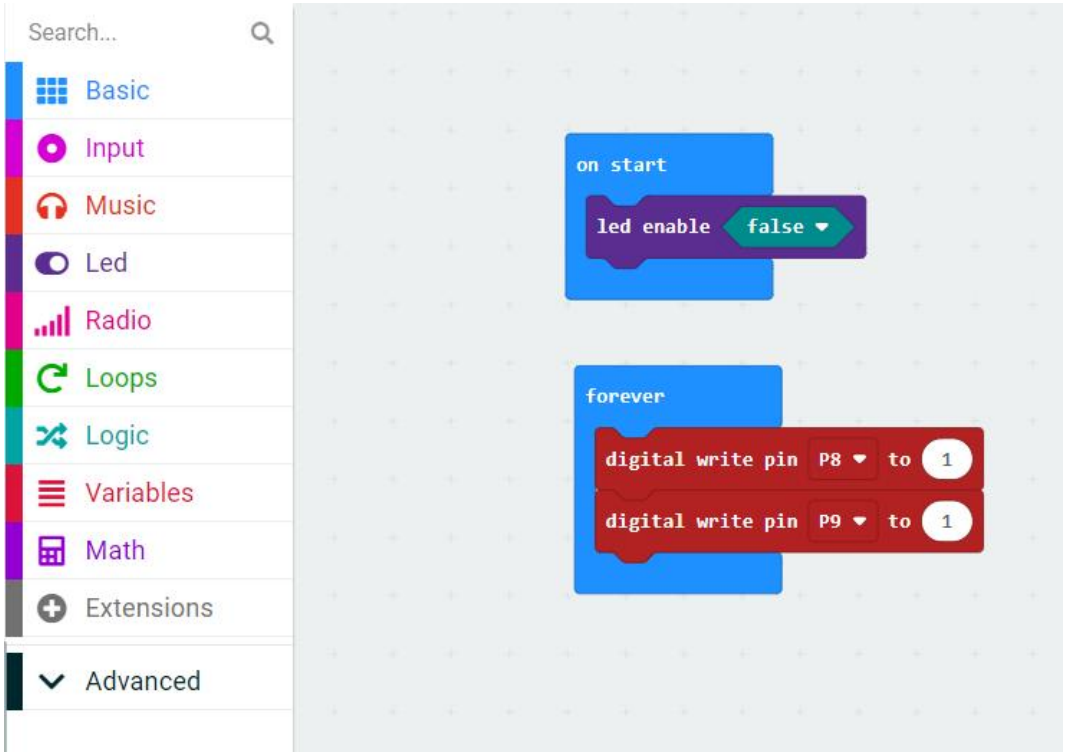
Lesson 1 Light two leds

LED light wiring diagram

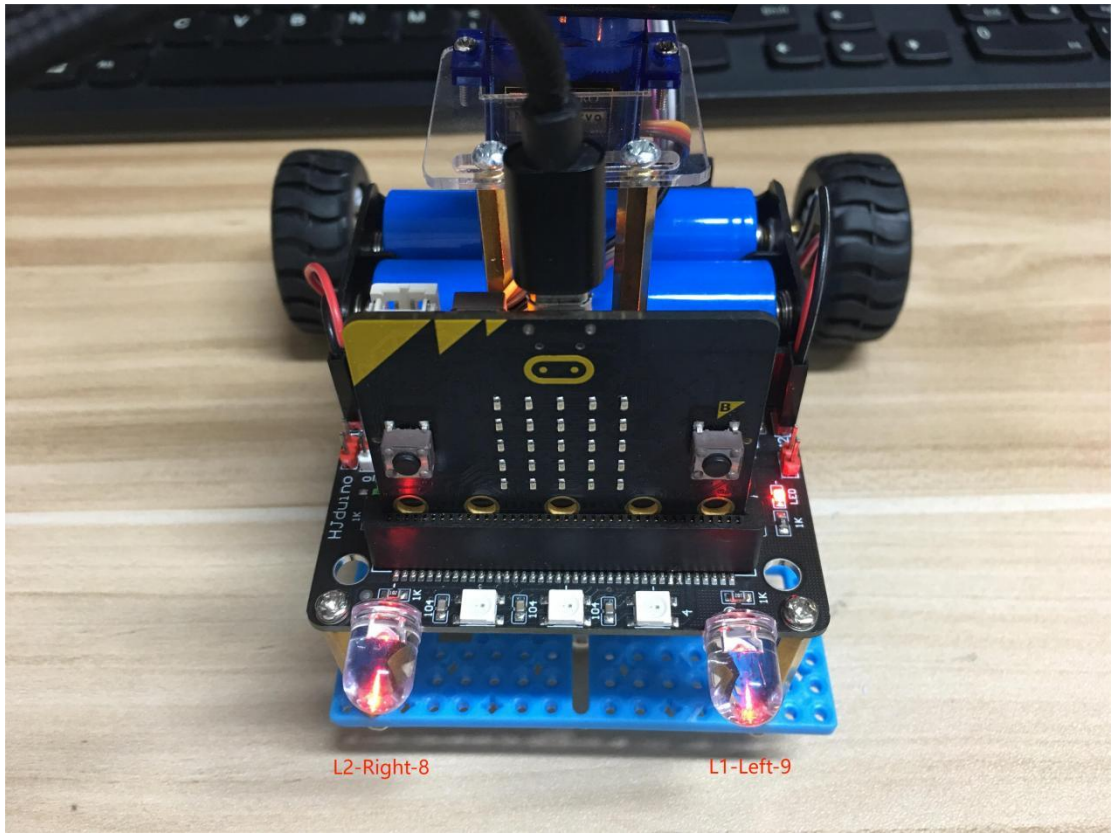


It can be seen from the figure that high level light is programmed.

Code block


Search...
Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
Extensions
Advanced
on start
led enable false
forever
digital write pin P8 to 1
digital write pin P9 to 1

Experimental demonstration

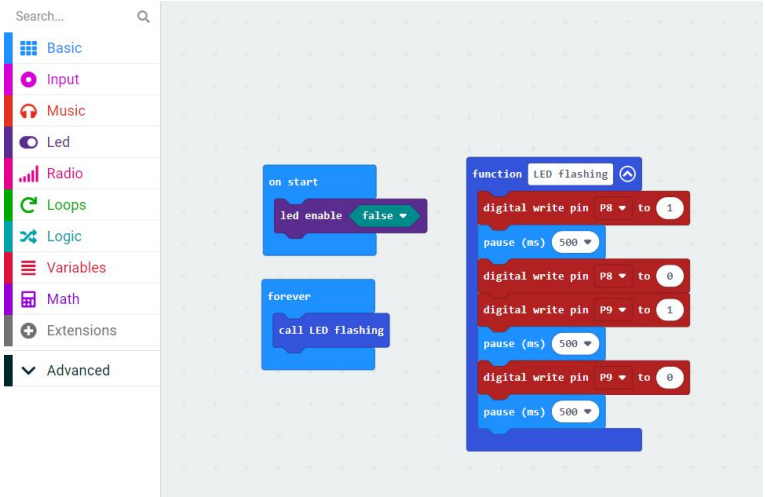


Lesson 2 LED light flashing

LED light flashing

Through the learning of the first lesson, we know that the LED is lit at a high level, then the LED is extinguished for a low level, and the LED flicker can be realized by programming to alternately light off.

Code block

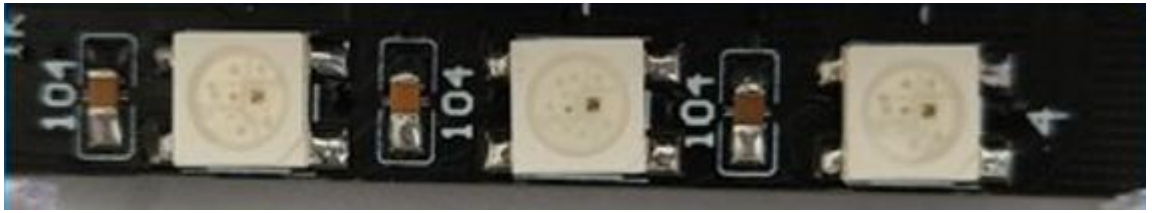


Lesson 3 RGB colored light strip

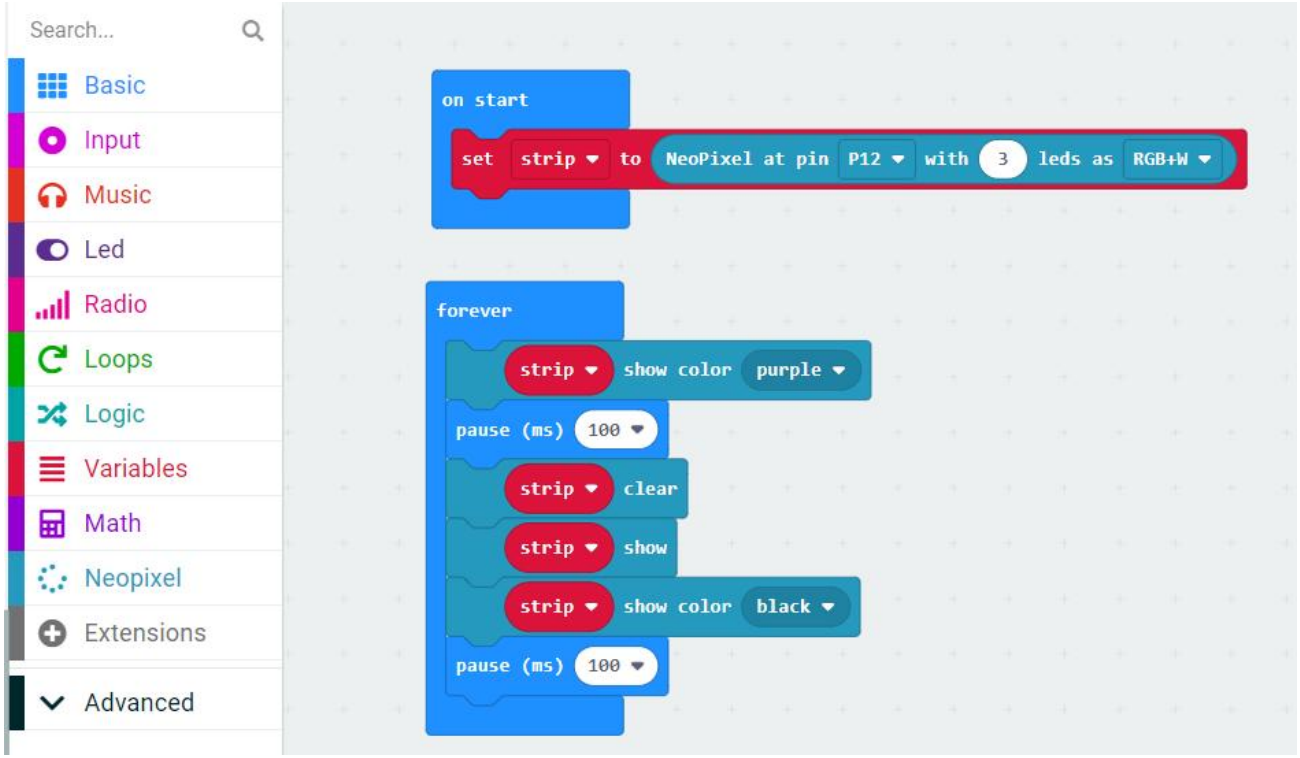
RGB color light

3 RGB color lights are set on the driver board, which is controlled by pin 12 IO port single bus.

Each RGB has a control chip inside, which means that each RGB lamp can be programmed to independently control the brightness and single color, color change effect it wants to display.



Code block

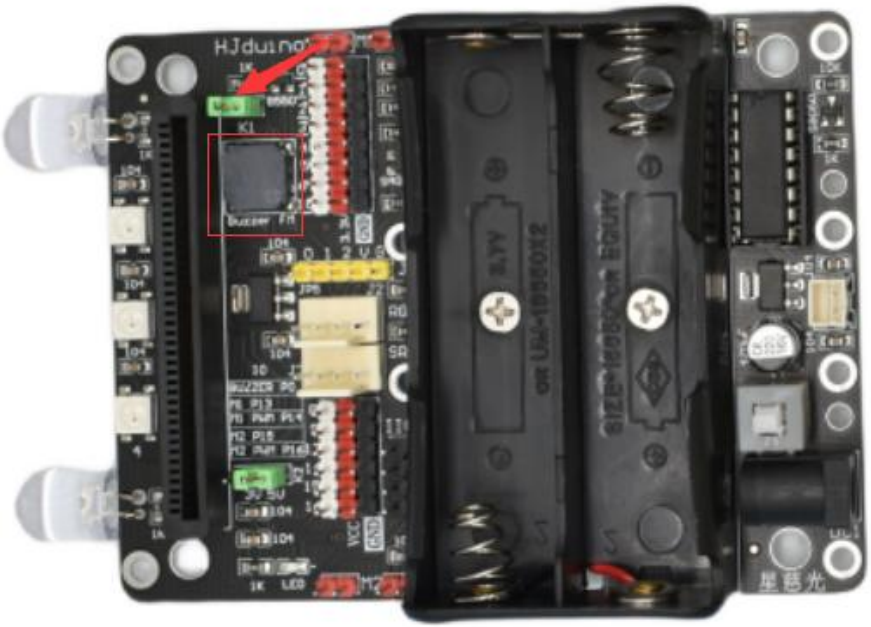

Search...
Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
Neopixel
Extensions
Advanced
on start
set strip to NeoPixel at pin P12 with 3 leds as RGB+W
forever
strip show color purple
pause (ms) 100
strip clear
strip show
strip show color black
pause (ms) 100

Lesson 4 The buzzer sounds

Buzzer

Buzzer is an integrated structure of electronic sound device, using DC voltage power supply, widely used in computer, printer, copier, alarm, electronic toys and other electronic products as a sound device. Buzzers are mainly divided into two types: piezoelectric buzzers and electromagnetic buzzers. The buzzer is represented in the circuit by the letter "H" or "HA" (the old standard used "FM", "ZZG", "LB", "JD", etc.).

Attention:The buzzer requires K1 jumper cap gating, and the K1 can be removed when the buzzer is not used.



Code block

The buzzer on the driver board is connected to port P0 and integrates a passive buzzer that requires a PWM control signal to drive the sound.

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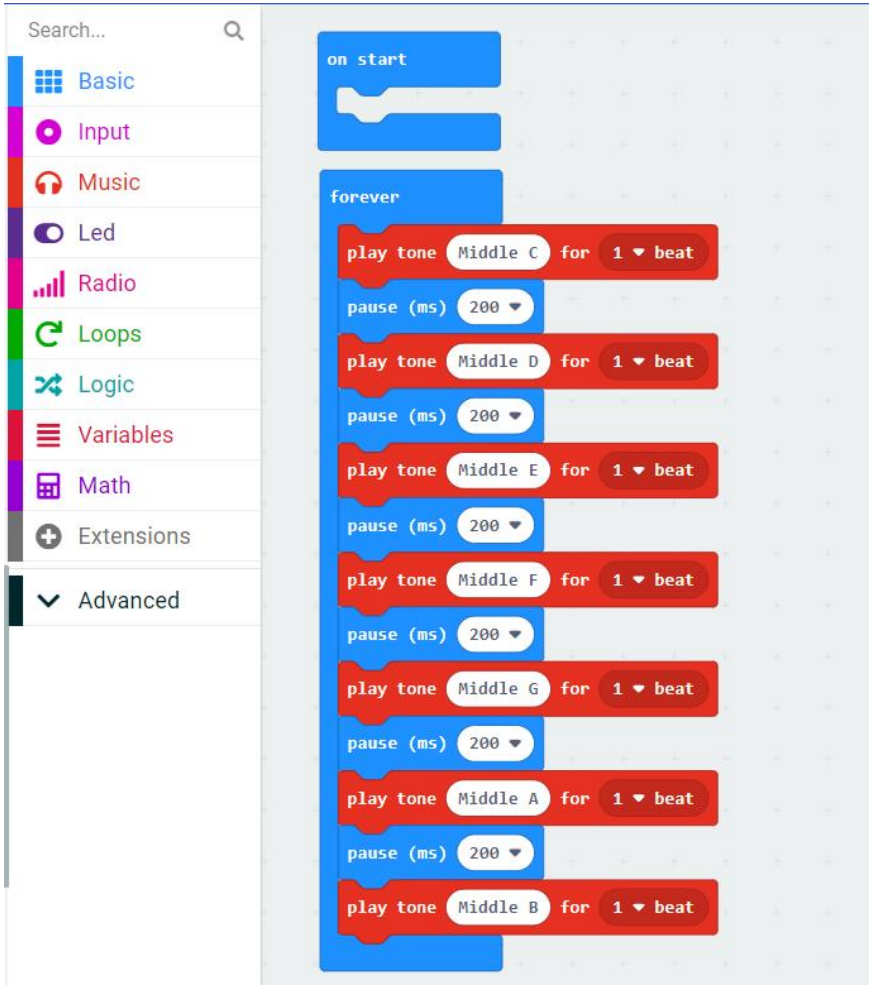
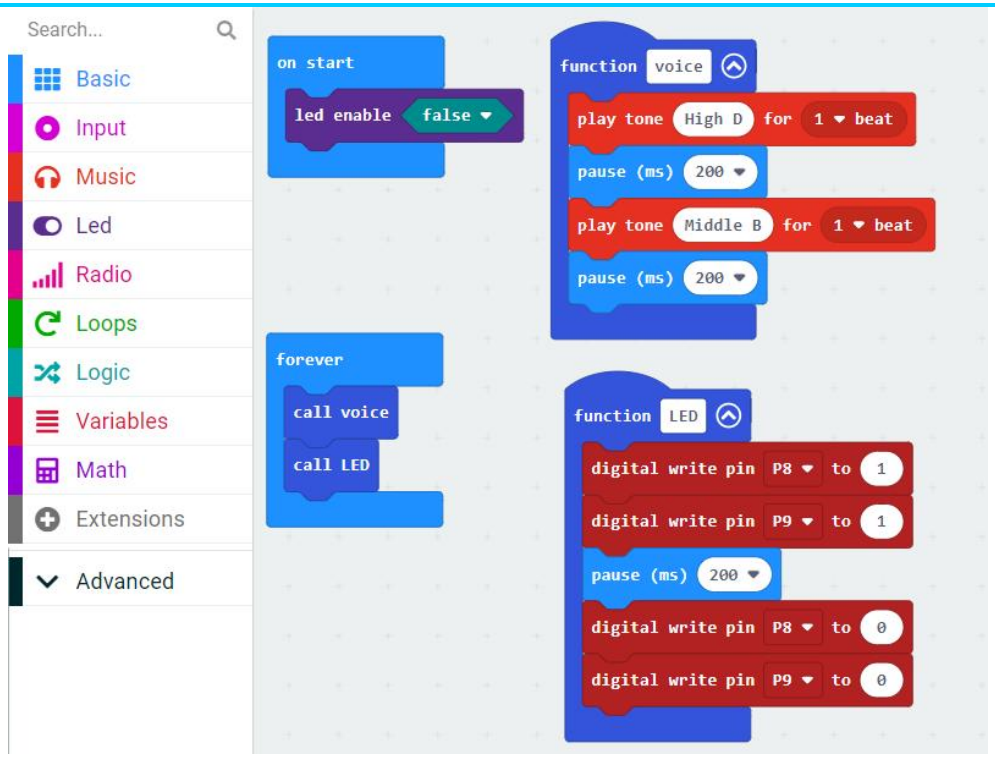

Search...
Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
Extensions
Advanced
on start
forever
play tone Middle C for 1 beat
pause (ms) 200
play tone Middle D for 1 beat
pause (ms) 200
play tone Middle E for 1 beat
pause (ms) 200
play tone Middle F for 1 beat
pause (ms) 200
play tone Middle G for 1 beat
pause (ms) 200
play tone Middle A for 1 beat
pause (ms) 200
play tone Middle B for 1 beat

Lesson 5 Sound light alarm

Introduction

Through the previous study, we have already known the control of buzzer and LED light. This lesson realizes the experiment of sound and light alarm by combining the previous lessons.

Code block


Search...
Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
Extensions
Advanced
on start
led enable false
forever
call voice
call LED
function voice
play tone High D for 1 beat
pause (ms) 200
play tone Middle B for 1 beat
pause (ms) 200
function LED
digital write pin P8 to 1
digital write pin P9 to 1
pause (ms) 200
digital write pin P8 to 0
digital write pin P9 to 0

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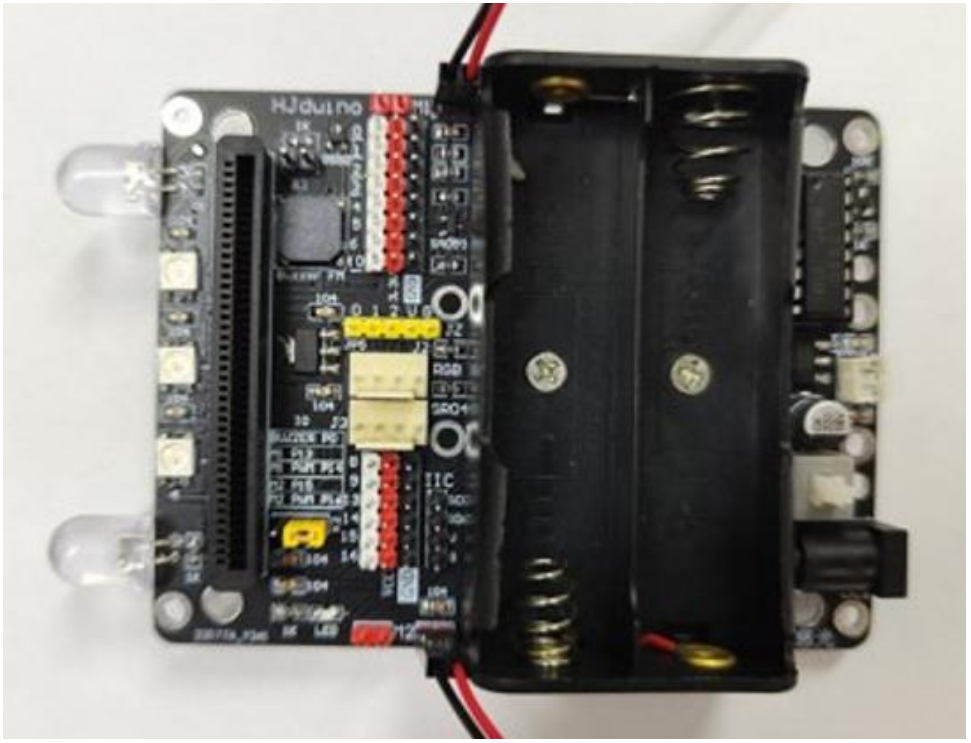
Lesson 6 Car automatic driving

Connection mode



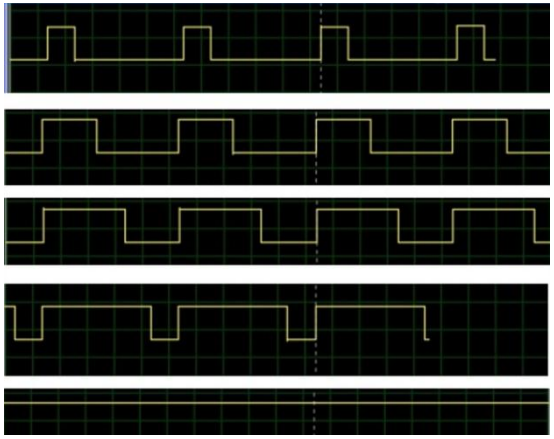
PWM speed regulation

Motor interface IO

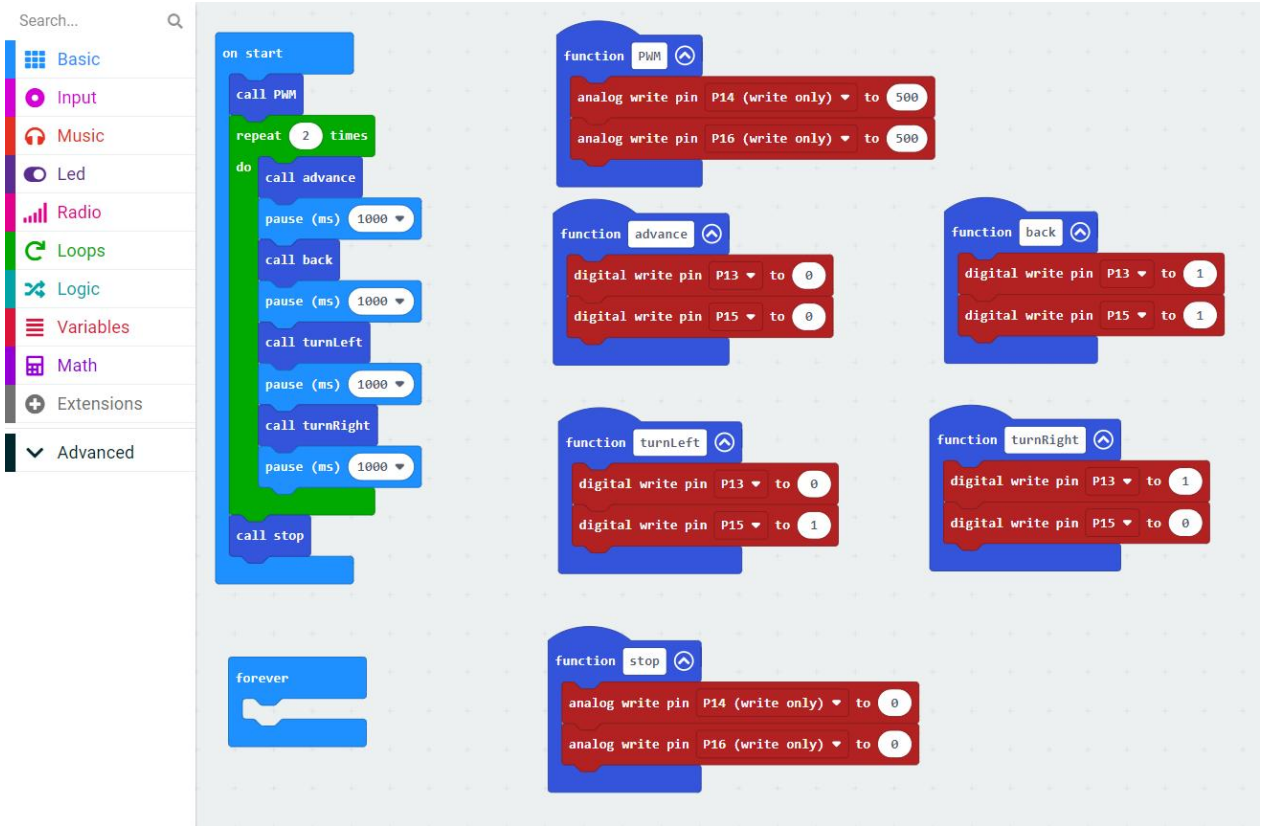
M1	P13
M1 PWM	P14
M2	P15
M2 PWM	P16

Set the pin output PWM value.

For the speed adjustment of the motor, we use the pulse width modulation (PWM) method, when controlling the motor, the power supply is not continuously supplied to the motor, but provides electrical energy in the form of square wave pulses at a specific frequency. Square wave signals with different duty ratios can speed regulate the motor, because the motor is actually a large inductor, which has the ability to hinder the input current and voltage mutation, so the pulse input signal is evenly distributed to the action time, so that, Changing the duty cycle of the square wave input on the enabling end ENA and ENB changes the voltage applied to both ends of the motor and thus changes the speed.



Code block


Search...
Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
Extensions
Advanced
on start
call PWM
repeat 2 times
do
call advance
pause (ms) 1000
call back
pause (ms) 1000
call turnLeft
pause (ms) 1000
call turnRight
pause (ms) 1000
call stop
forever
function PWM
analog write pin P14 (write only) to 500
analog write pin P16 (write only) to 500
function advance
digital write pin P13 to 0
digital write pin P15 to 0
function back
digital write pin P13 to 1
digital write pin P15 to 1
function turnLeft
digital write pin P13 to 0
digital write pin P15 to 1
function turnRight
digital write pin P13 to 1
digital write pin P15 to 0
function stop
analog write pin P14 (write only) to 0
analog write pin P16 (write only) to 0

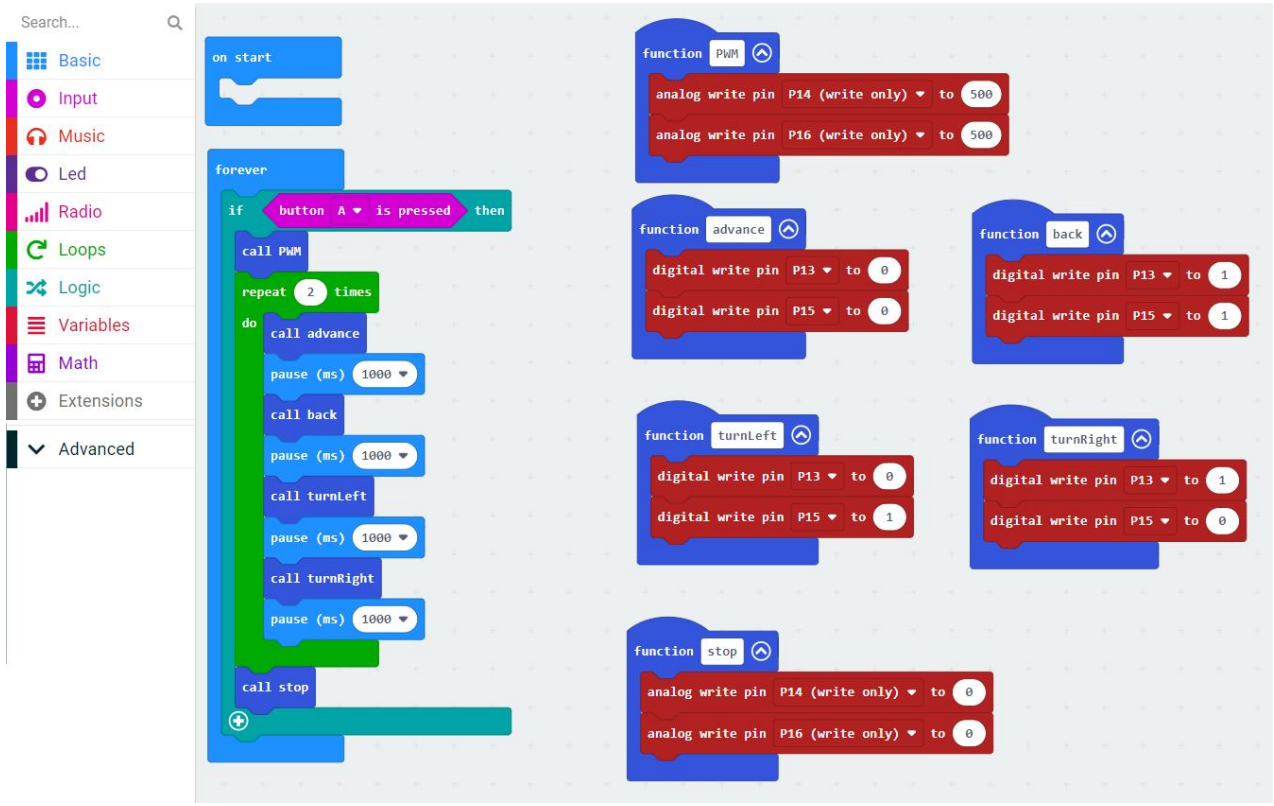
Lesson 7 Push start car

Introduction

When driving, the driver should start the car, and then refuel, the car is driven and the direction is controlled. Add a start button on the smart car to realize that after pressing the case, the car will start to drive.

Code block

Add the key start code to the car free driving program code.

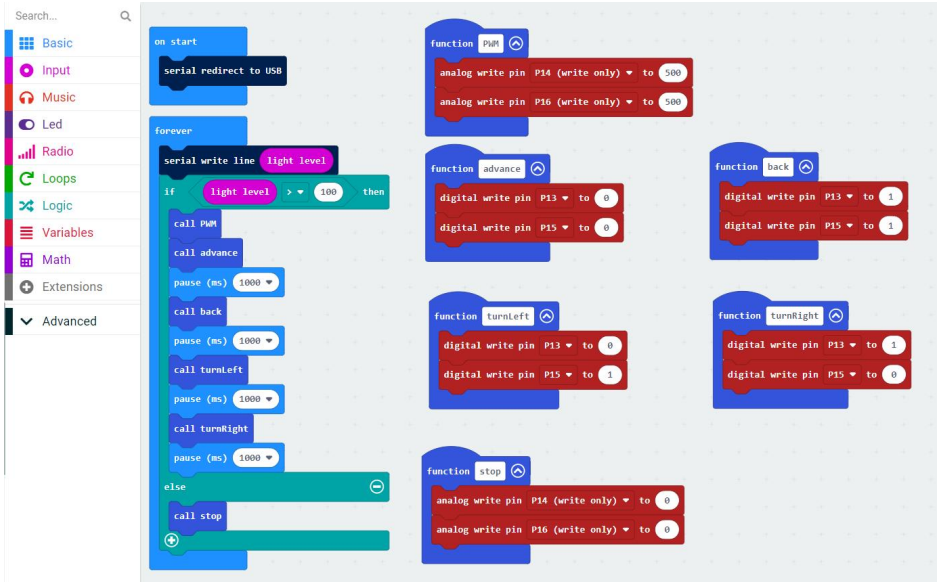

Search...
Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
Extensions
Advanced
on start
forever
if button A is pressed then
call PWM
repeat 2 times
do
call advance
pause (ms) 1000
call back
pause (ms) 1000
call turnLeft
pause (ms) 1000
call turnRight
pause (ms) 1000
call stop
function PWM
analog write pin P14 (write only) to 500
analog write pin P16 (write only) to 500
function advance
digital write pin P13 to 0
digital write pin P15 to 0
function back
digital write pin P13 to 1
digital write pin P15 to 1
function turnLeft
digital write pin P13 to 0
digital write pin P15 to 1
function turnRight
digital write pin P13 to 1
digital write pin P15 to 0
function stop
analog write pin P14 (write only) to 0
analog write pin P16 (write only) to 0

Lesson 8 Light controlled car

Introduction

Light control code is added on the basis of free line code of car.

Code block



Lesson 9 Ultrasonic LED ranging display

Introduction

Ultrasonic wave is a mechanical wave with a very short wavelength, generally less than 2cm in air. It must rely on a medium to propagate and cannot exist in a vacuum (such as space). It spreads farther in water than in air, and can be used for cleaning, crushing, sterilization and so on. It has many applications in medicine and industry.

In terms of intelligent control, it is used for distance measurement and obstacle avoidance of intelligent car robot.

Connect

Vcc --> 3.3V

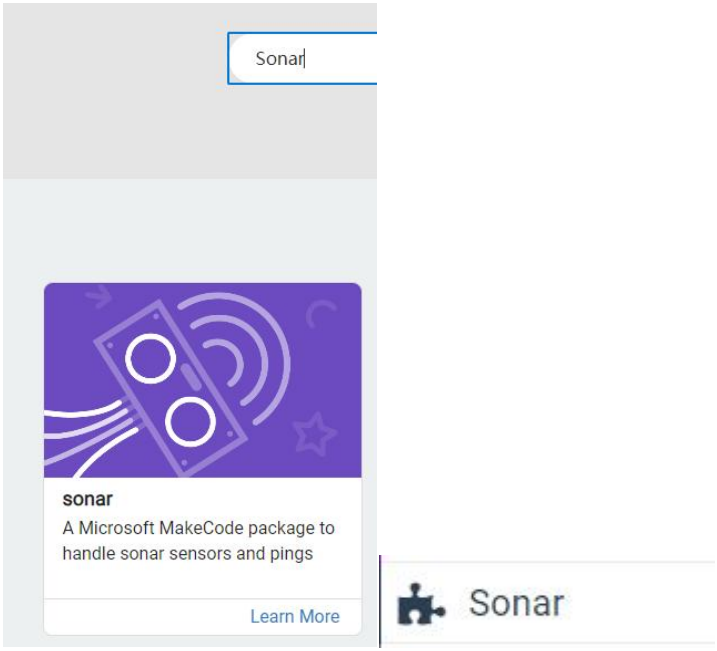
Trag --> 6

Echo --> 10

Gnd --> Gnd

Code block

Need to add Sonar ultrasonic module to programming software.




on start
forever
show number
ping trig P6
echo P10
unit cm

Lesson 10 Ultrasonic ranging serial port display

Introduction

Same as in lesson 9, except here it's using a serial port.

Connect

Vcc --> 3.3V

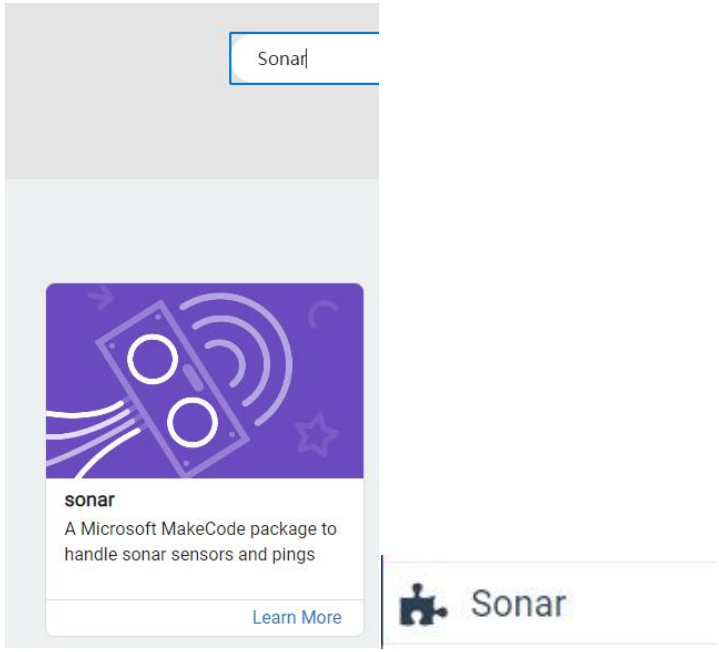
Trag --> 6

Echo --> 10

Gnd --> Gnd

Code block

Need to add Sonar ultrasonic module to programming software.


Sonar
sonar
A Microsoft MakeCode package to handle sonar sensors and pings
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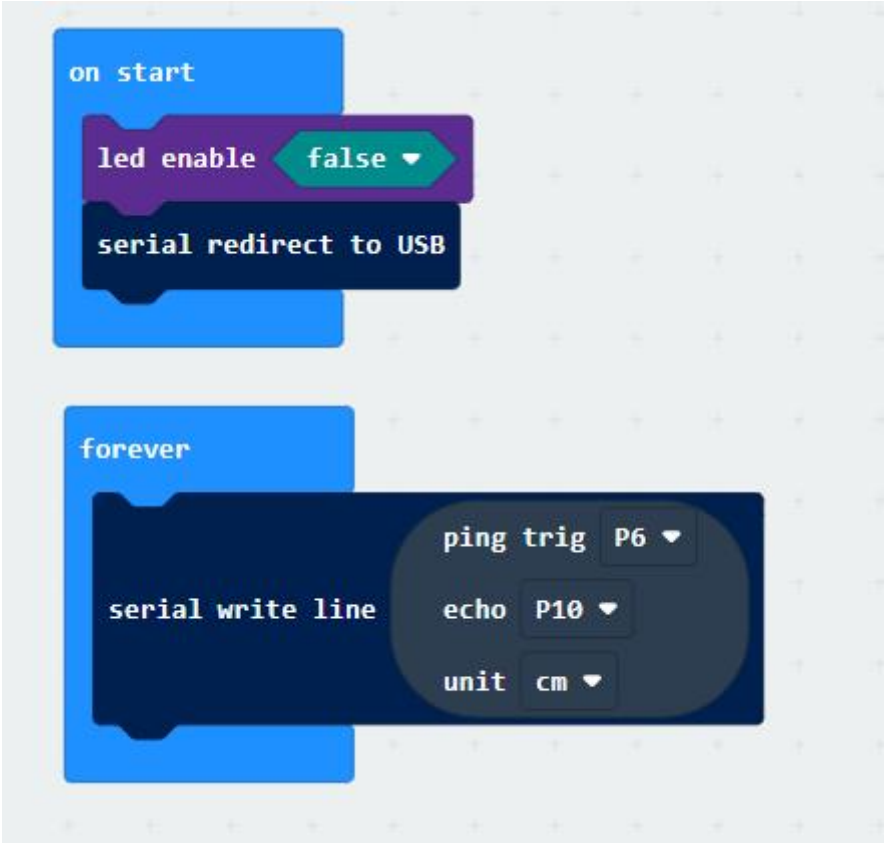

on start
led enable
false
serial redirect to USB
forever
serial write line
ping trig
P6
echo
P10
unit
cm

Lesson 11 Ultrasonic magic hand

Introduction

When the ultrasonic detection distance is greater than 20cm, the car moves forward, and when the ultrasonic detection distance is less than 20cm, the car moves backward.

Connect

Vcc --> 3.3V

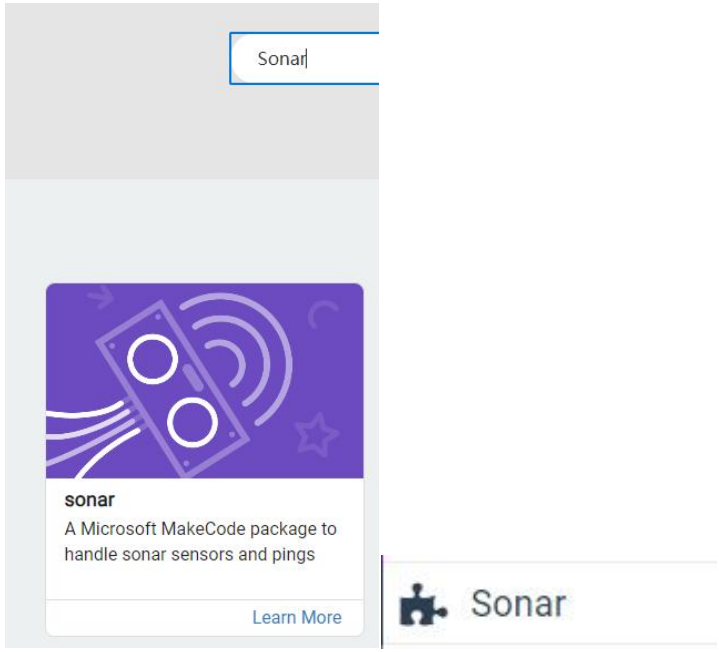
Trag --> 6

Echo --> 10

Gnd --> Gnd

Code block

Need to add Sonar ultrasonic module to programming software.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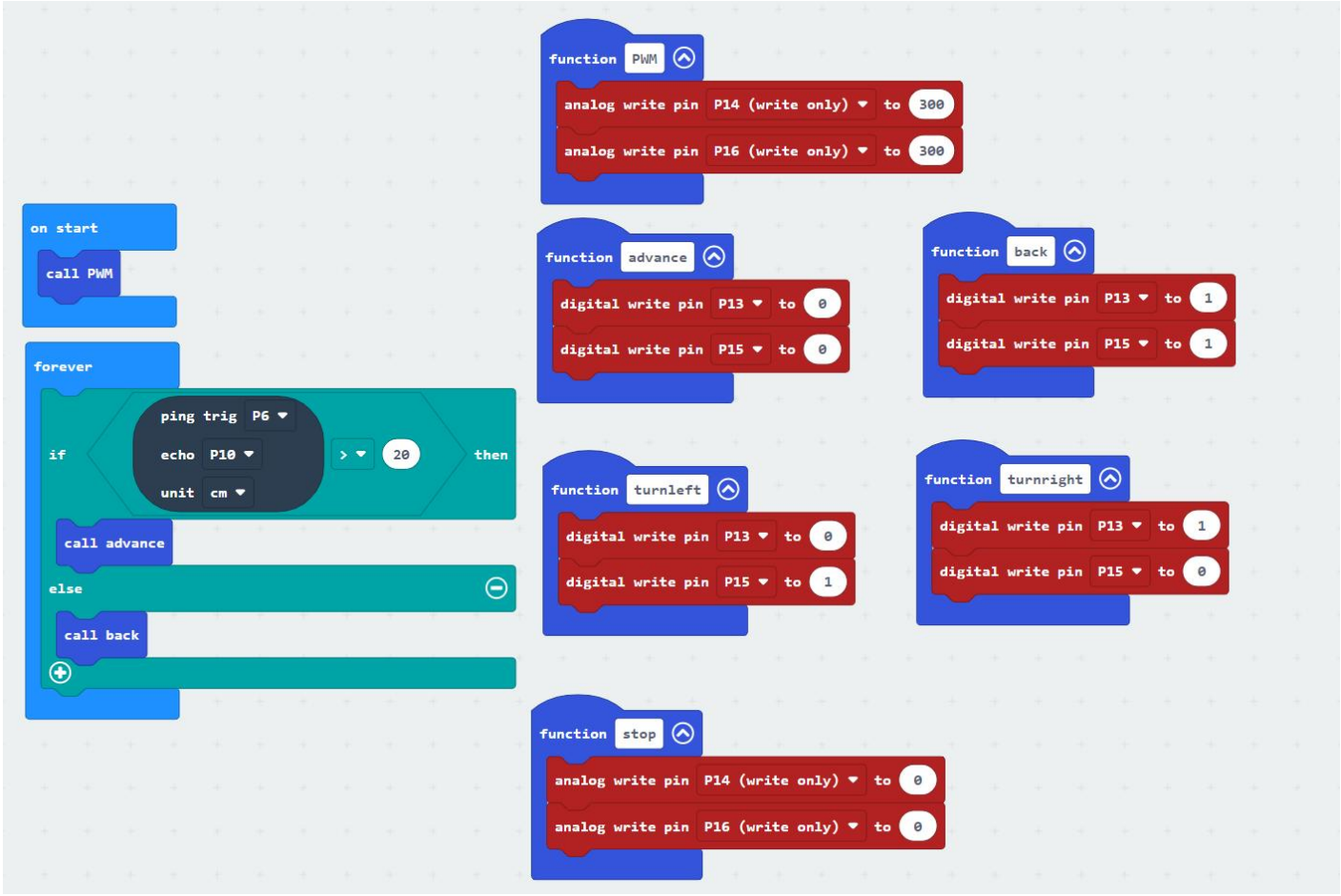
LROBRUYA


on start
call PWM
forever
if
ping trig P6
echo P10
unit cm
> 20
then
call advance
else
call back
function PWM
analog write pin P14 (write only) to 300
analog write pin P16 (write only) to 300
function advance
digital write pin P13 to 0
digital write pin P15 to 0
function back
digital write pin P13 to 1
digital write pin P15 to 1
function turnleft
digital write pin P13 to 0
digital write pin P15 to 1
function turnright
digital write pin P13 to 1
digital write pin P15 to 0
function stop
analog write pin P14 (write only) to 0
analog write pin P16 (write only) to 0

Lesson 12 Ultrasonic obstacle avoidance car

Introduction

When there is no obstacle in front of the robot car, the tank keeps walking straight. When the distance of the obstacle in front of the robot car is less than 20cm, the robot car stops, then detects whether there is an obstacle in the left front and right front, and then turns in the opposite direction.

Connect

Ultrasonic

Vcc --> 3.3V

Trag --> 6

Echo --> 10

Gnd --> Gnd

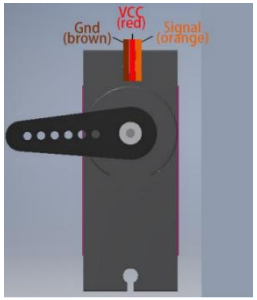
Servo

Gnd --> Gnd

Vcc --> 3.3V

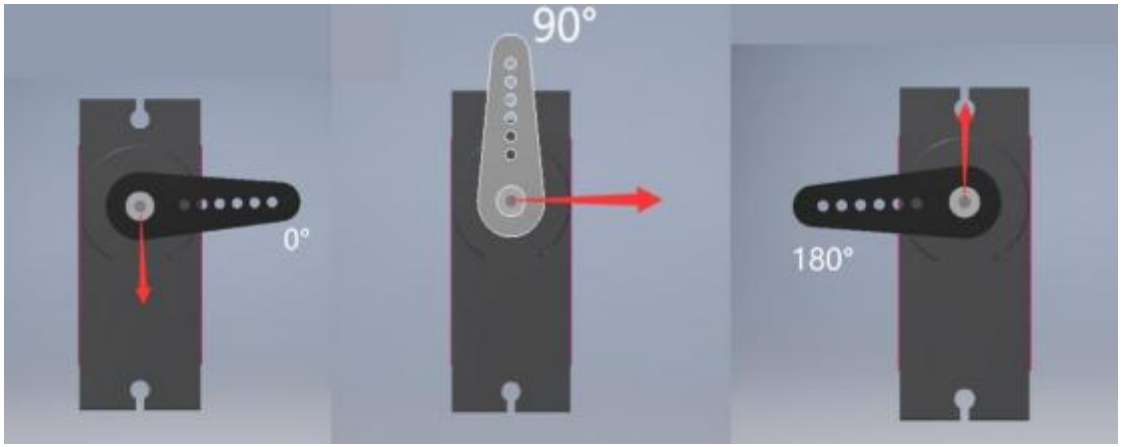
signal --> 5

What is a servo motor



Servo motors are great devices that can turn to a specified position.

Usually, they have a servo arm that can turn 180 degrees. Using the Arduino, we can tell a servo to go to a specified position and it will go there. As simple as that!



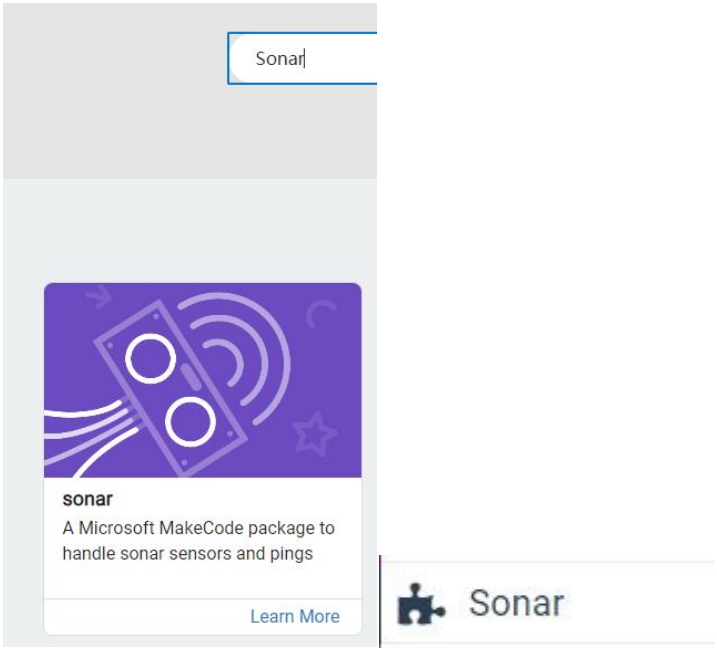
Servo motors were first used in the Remote Control (RC) world, usually to control the steering of RC cars or the flaps on a RC plane. With time, they found their uses in robotics, automation, and of course, the Arduino world.

There are two ways to control a servomotor with Arduino. One is to use a common digital sensor port of Arduino to produce square wave with different duty cycle to simulate PWM signal and use that signal to control the positioning of the motor. Another way is to directly use the Servo function of the Arduino to control the motor.

The Arduino drive capacity is limited. So if you need to control more than one motor, you will need external power.

Code block

Need to add Sonar ultrasonic module to programming software.



LROBRUYA


on start
serial redirect to USB
servo write pin P3 to 90
function checkdistance
set distance to
ping trig P6
echo P10
unit cm
function advance analog wr...
function back analog write...
function Detect_obstacle_distance
servo write pin P3 to 180
repeat 3 times
do
call checkdistance
set DL to distance
pause (ms) 100
servo write pin P3 to 20
repeat 3 times
do
call checkdistance
set DR to distance
pause (ms) 100
function turnleft analog w...
function turnright analog ...
function stop analog write...
forever
call checkdistance
set DM to distance
serial write line DM
if DM < 20 then
call stop
pause (ms) 1000
call Detect_obstacle_distance
if DL < 20 or DR < 20 then
if DL > DR then
servo write pin P3 to 90
call turnleft
pause (ms) 1000
call advance
else
servo write pin P3 to 90
call turnright
pause (ms) 1000
call advance
if DL < 5 or DR < 5 then
servo write pin P3 to 90
call back
pause (ms) 1000
call stop
else
servo write pin P3 to 90
call advance
pause (ms) 1000