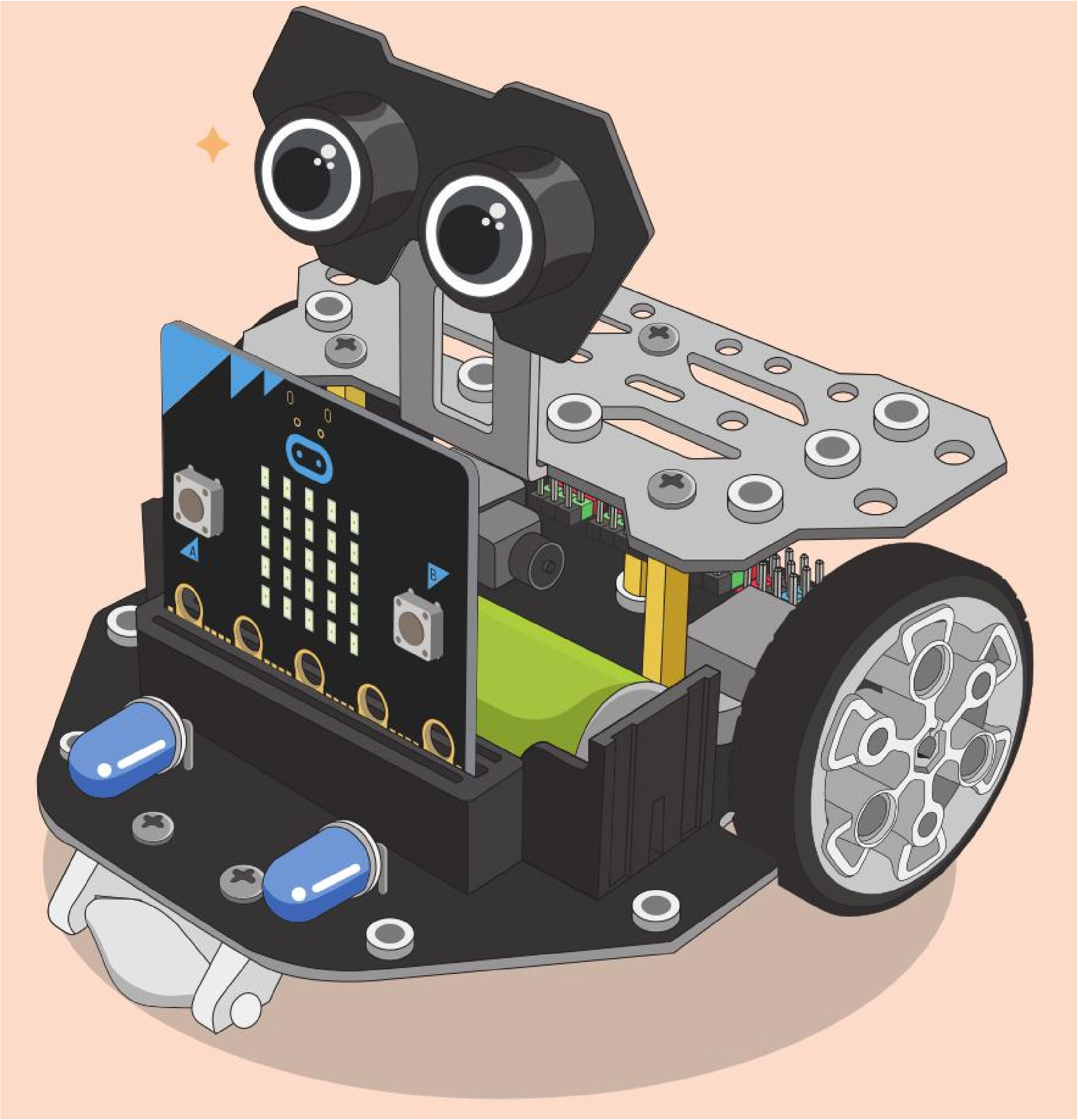
Getting Started with Maqueen Plus



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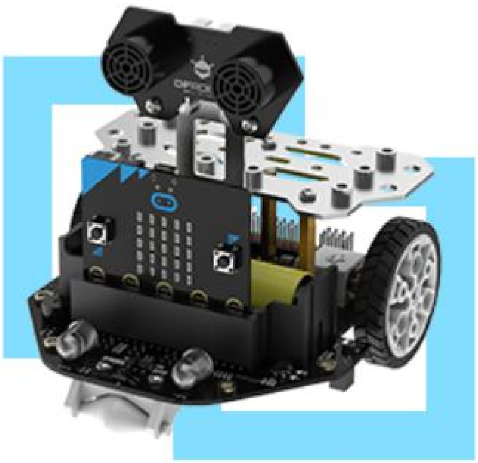
Content

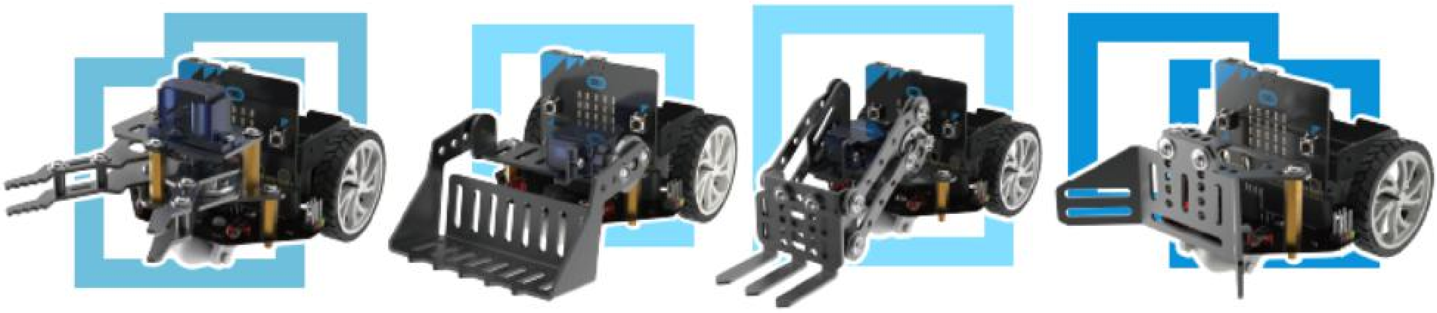
Chapter 1 Introduction to Maqueen Plus

Introduction

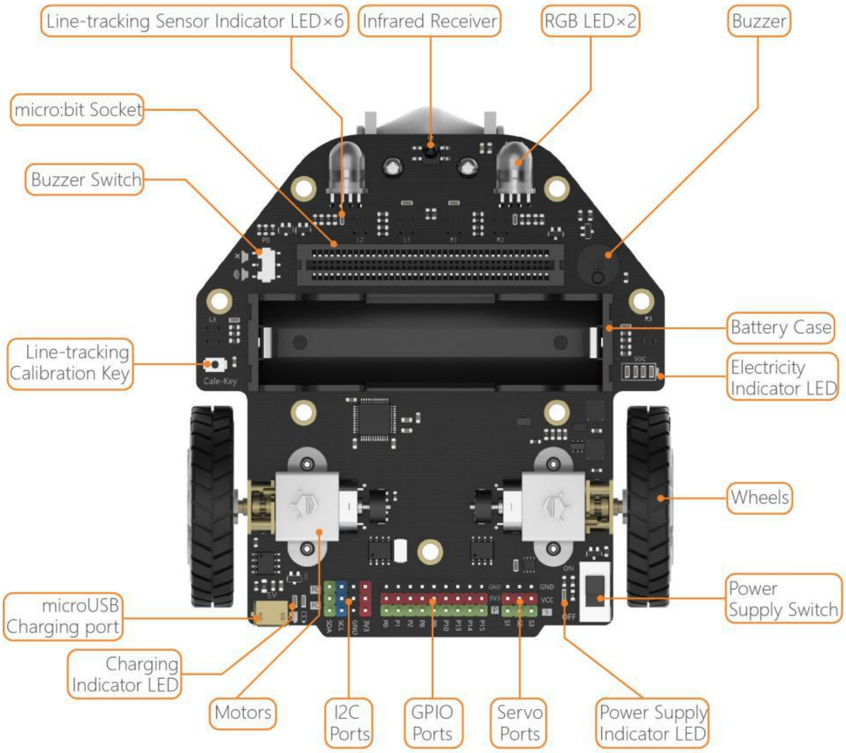
Micro:Maqueen launched by DFRobot is a series of educational robot products for primary and secondary school programming. It includes a cost-effective “Lite” version, a powerful “Plus” version and rich peripherals such as “Mechanic”. You can choose different versions and peripherals based on your needs.

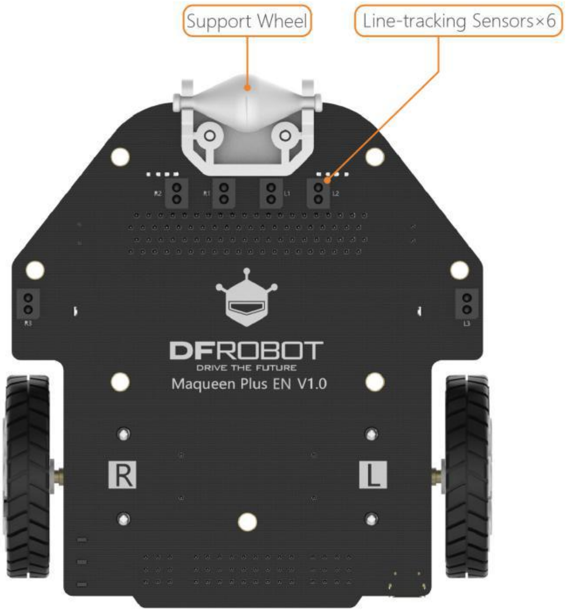
micro:Maqueen Lite


micro:Maqueen Plus


micro:Maqueen Mechanic

Overview


Line-tracking Sensor Indicator LED×6
Infrared Receiver
RGB LED×2
Buzzer
micro:bit Socket
Buzzer Switch
Line-tracking Calibration Key
Battery Case
Electricity Indicator LED
Wheels
Power Supply Switch
microUSB Charging port
Charging Indicator LED
Motors
I2C Ports
GPIO Ports
Servo Ports
Power Supply Indicator LED


Support Wheel
Line-tracking Sensors×6
DFROBOT
DRIVE THE FUTURE
Maqueen Plus EN V1.0
R
L

Specification

Power Supply：3.7V 18650 lithium battery

Charging Voltage: 5V

Charging Current: 900mA

Charging Time: about 4hours

Power Indicator: 4 LEDs

Motor Specification: N20 motor 260 R/M

Buzzer x1

RGB Light x2

GPIO Expansion Port: P0 P1 P2 P8 P12 P13 P14 P15 P16

I2C Port: x3

Servo Expansion Port: x3

Line-tracking Sensor x6

Line-tracking Sensor Output: digital +analog

Support Calibration for Line-tracking Sensor

IR Receiving Sensor x1

Ultrasonic Sensor: URM10

Top Metal Plate: x1

M3 Threaded Connections x12

Map Size: 50cmx50cm

Product Dimension: 107x100mm/4.21 x3.94”

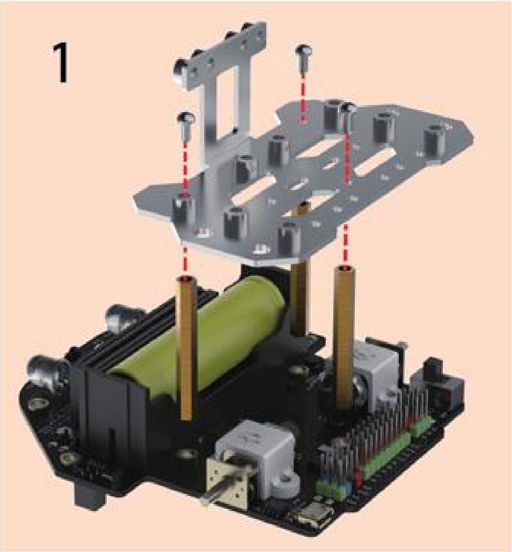
Maqueen Plus vs Maqueen Lite

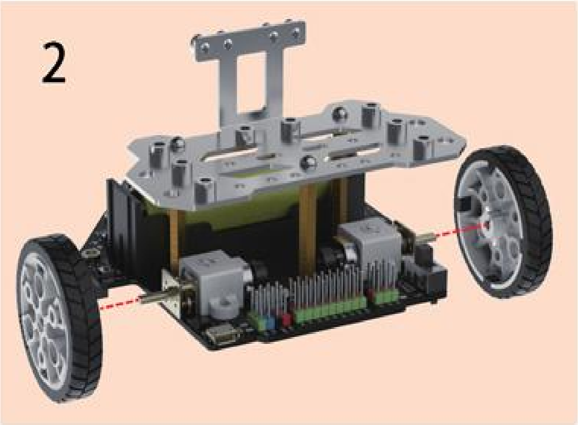
Name	Maqueen Lite	Maqueen Plus
Power Supply	3 AAA Batteries	18650 Li-ion battery （2300mA~2500mA）
Charging circuit	×	√
Power display	×	√
Encoder and PID control	×	√
Support for installing Huskylens AI camera	×	√
Support for line-tracking sensor calibration	√	√
Support for analog reading of line-tracking sensor	×	√
Number of line-tracking sensor	2	6
Number of IO expansion port	4	12
Number of servo port	2	3
Number of mechanic expansion thread	2	16
Motor rated rotation speed	133	260
LED color	Red LED	Large size RGB LED with 7colors
Ultrasonic Model	H-SR04	DFRobot high-quality URM10 ultrasonic sensor
Continuous usage time with Huskylens	30min	180min

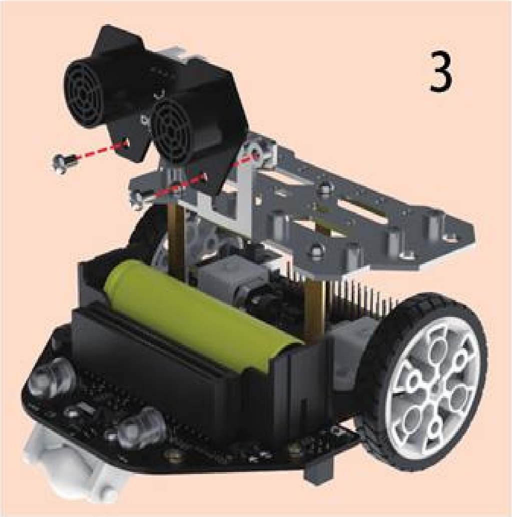
Standard continuous usage time	8h	24h
Come with line-tracking map	×	√
Onboard IR receiver and buzzer	√	√
Onboard WS2812 RGB LED	√	×

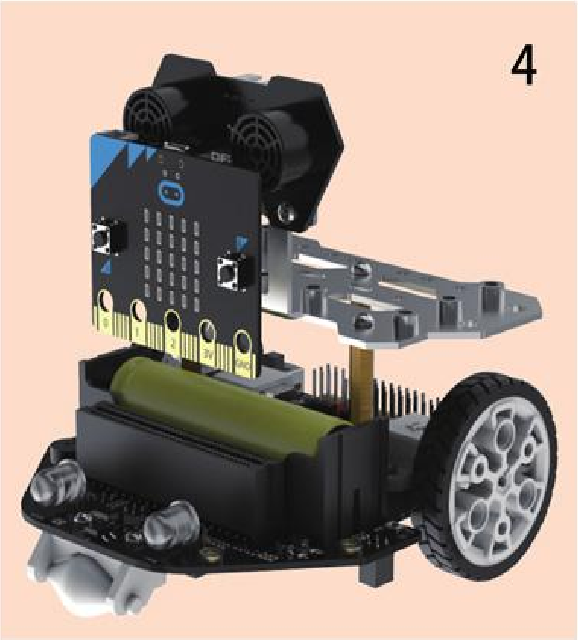
Assembly Guide

Note: power Maqueen Plus with18650 chargeable lithium battery. Pay attention to polarity when installing battery, and it is prohibited to short circuit the battery's positive and negative poles.





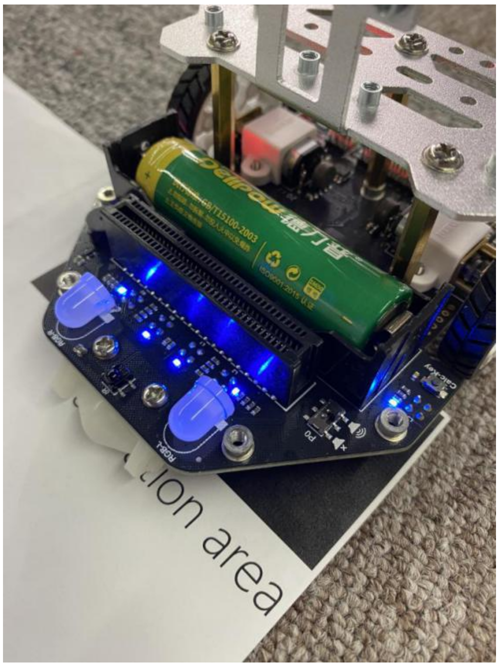




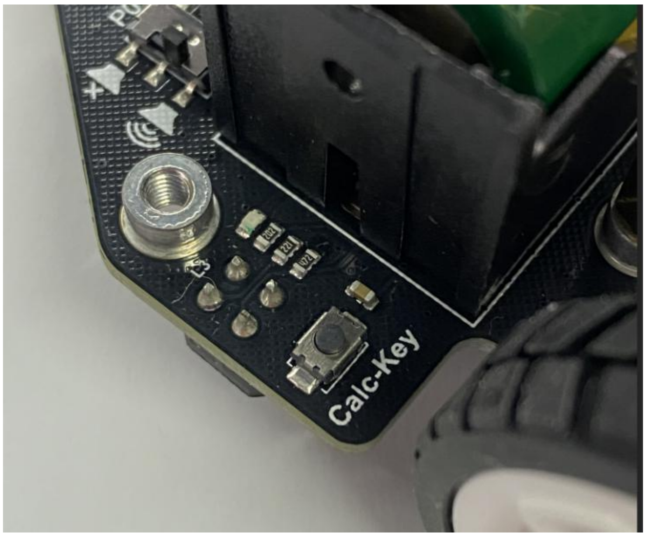
How to calibrate line-tracking sensor?

There are 6 line-tracking sensors on Maqueen Plus and each of them has an indicator. When a line-tracking sensor detects a black line, the corresponding indicator will light up. If you found that any line-tracking sensor is not sensitive to a black line, calibrate it as follows:

1. Put Maqueen Plus into the calibration area of the line-tracking map, turn on its power.



2. Press “Calc-key” for about 1 second, the 2 front large LEDs will flash in green. Release the key, then calibration is done.



If all the line-tracking sensor indicators turn on in the black area and turn off in the white area, the calibration is successful.

Note:

1. The internal chip will automatically save the calibration, so you do not need to calibrate it every time you use it.
2. Maqueen Plus has been factory calibrated, and it can be used directly normally.

Chapter 2 Programming Maqueen Plus on MakeCode

The basic usage of MakeCode will be omitted here. This chapter will mainly introduce the function of Maqueen Plus and how to program it on MakeCode.

MakeCode address and program library

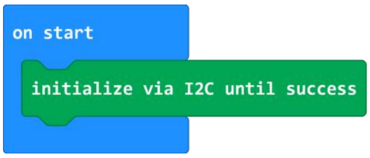
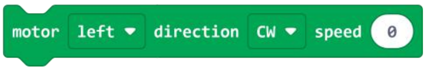
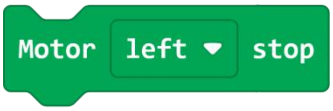
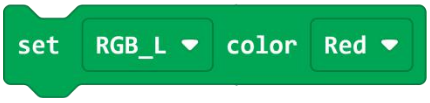
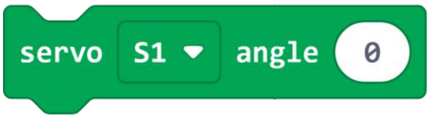
MakeCode programming platform address: https://makecode.microbit.org

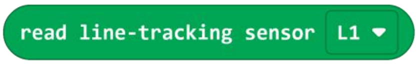
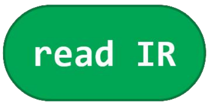
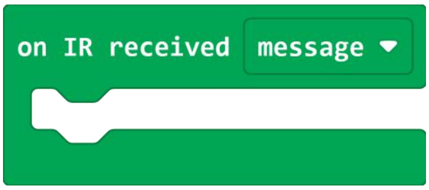
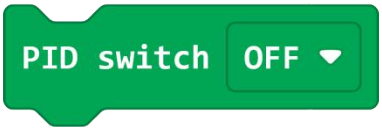
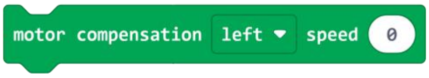
Maqueen Plus library: https://github.com/DFRobot/pxt-DFRobot-MaqueenPlus

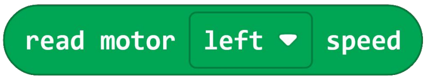
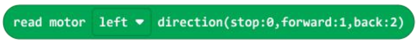
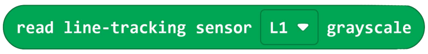
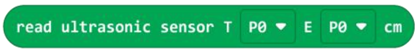
Huskylens AI Camera library: https://github.com/DFRobot/pxt-DFRobot_HuskyLens

OLED Screen library: https://github.com/DFRobot/pxt-OLEDV1

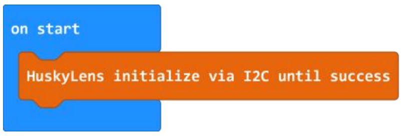
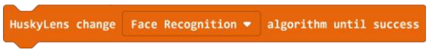
Maqueen Plus Functions

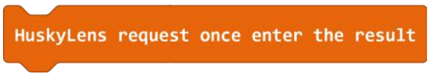
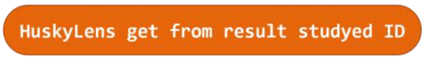
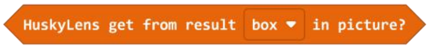
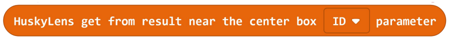
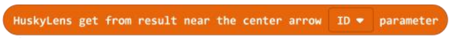
 on start initialize via I2C until success	**I2C Init** **Function:** a necessary block for initializing I2C communication. This block only needs to run once at the start of main program. If the communication fails, micro:bit LED matrix will display “× ” otherwise, it displays “√” .
 motor left ▾ direction CW ▾ speed 0	**Motor Control** **Function:** control the direction and speed of Maqueen Plus. **Motor:** left, right, all **Direction:** CW, CCW **Speed:** 0~255
 Motor left ▾ stop	**Motor Stop** **Function:** stop motor, same as adjusting motor speed to 0. **Motor:** left, right, all
 set RGB_L ▾ color Red ▾	**RGB LED Control** **Function:** control the two LEDs on Maqueen Plus. **LED:** RGB_L, RGB_R **Color:** red, green, blue, yellow, purple, cyan, white, turn off.
 servo S1 ▾ angle 0	**Servo Drive** **Function:** set the angle of servo connected to S1,S2, S3. **Port:** S1, S2, S3 **Angle:** 0~180° (Recommend not exceed 170°)

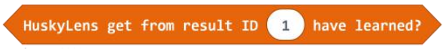
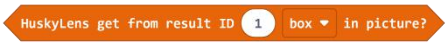
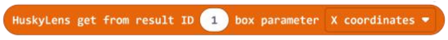
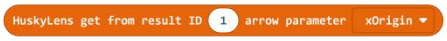
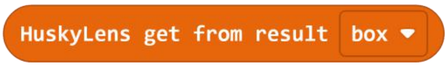
 read line-tracking sensor L1 ▼	**Read Line-tracking Sensor** **Function:** read the value of the six line-tracking sensors on Maqueen Plus. When a black line is detected, the line-tracking sensor indicator will be on, and the sensor outputs 1. Otherwise, the indicator turns off, output 0. **Sensor:** L1, L2, L3, R1, R2, R3 **Return:** black 1, white 0
 read IR	**Read the Received IR Value** **Function:** read the value received by onboard IR sensor. It uses the NEC IR protocol, and the returned value has been converted into decimal data type. **Return:** decimal integer(Read the last two digits of the hexadecimal key value of the remote control, and convert it into a decimal number.) **Protocol:** NEC
 on IR received message ▼	**On IR Received Block(Triggered by an event)** **Function:** when an IR data received, save it into the variable message, and run the codes inside this block. **Data Type:** decimal integer(Read the last two digits of the hexadecimal key value of the remote control, and convert it into a decimal number.) **Protocol:** NEC
 PID switch OFF ▼	**PID Switch** **Function:** set PID for motor driving. Turn on PID to adjust the speed and torque of the motor in real time. When PID is enabled, the motor offers accurate speed and large torque even at low speed. But there is about 50ms delay for PID adjustment, so it may not be suitable for high real-time control. **Can be set：** on, off
 motor compensation left ▼ speed 0	**Motor Speed Compensation** **Function:** adjust speed difference caused by driving roads, wheels and motor parameters in PID mode. **Motor:** left, right **Speed Range:** 0~255 (This value is not the actual speed, it corresponds to 0 ~ 1 revolution, and the maximum compensation value is 1 RPM)

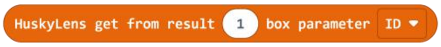
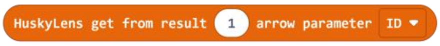
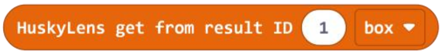
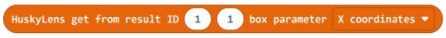
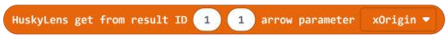
 read motor left ▾ speed	**Read Motor Actual Speed** **Function:** the hall sensor installed on the end part of Maqueen Plus that can detect motor speed in real-time. **Motor:** left, right **Return Value Range:** 0~255
 read motor left ▾ direction(stop:0,forward:1,back:2)	**Read Motor Direction** **Function:** the hall sensor installed on the end part of Maqueen Plus that can detect motor speed in real-time. **Motor:** left, right **Return Value Range:** 0 stop; 1 forward; 2 back
 read line-tracking sensor L1 ▾ grayscale	**Read Grayscale of Line-tracking Sensor** **Function:** detect the grayscale of a black line. Set different gray segments on a routine to make Maqueen Plus execute various instruction, like slowing down, stopping, etc. **Sensor:** L1 L2 L3 R1 R2 R3 **Return Value Range:** 0~4095
 read ultrasonic sensor T P0 ▾ E P0 ▾ cm	**Read Distance from Ultrasonic Sensor** **Function:** Maqueen Plus is equipped with URM10 ultrasonic sensor for detecting distance. It offers 5cm~300cm detection range , and 1cm~3cm error. It will be more accurate when detection distance is in 20cm~80cm. The return value will be 0 when over 300cm. **Option:** connect T and E of the sensor as the same with the software setting. **Detection Range:** 5cm~300cm

Huskylens AI Camera Block Description

 on start HuskyLens initialize via I2C until success	**I2C Init** **Function:** a necessary for initializing I2C communication protocol. This block only needs to run once at the start of main program. If the communication fails, the micro:bit Matrix will show "╳", otherwise, it displays " √" .
 HuskyLens change Face Recognition ▾ algorithm until success	**Functions Switch** **Function:** set the working mode of Huskylens. It only needs to run once at the start of main program most of time. The function selection should be the same as the hardware connection. There are 6 working modes: 1. Face Recognition

	2. Object Tracking 3. Object Recognition 4. Line Tracking 5. Color Recognition 6. Tag Recognition
 HuskyLens request once enter the result	**Request data once from Huskylens** **Function:** a necessary block for HuskyLens. It is usually used in a loop and can be called multiple times. Execute once to read data from Huskylens, such as value of X, Y or Z and ID data.
 HuskyLens get from result studyed ID	**Read total number of IDs that Huskylens have learned** **Function:** read the total number of objects Huskylens learned and use it as a variable, return data of unsigned integer.
 HuskyLens get from result box ▾ in picture?	**Judge if HuskyLens detected object and box or arrow appears on the screen** **Function:** a judgment statement to determine whether HuskyLens detects a object, there will be a box or arrow appearing on the screen if it detects. **Object detected, return:** true **Object not detected, return:** false **Option:** box, arrow
 HuskyLens get from result near the center box ID ▾ parameter	**Read the value of box near the centre of screen** **Function:** HuskyLens can detect multiple objects at the same time, and this block can be used to read the value of box near the centre of screen with providing several kinds of readings: **ID:** read the ID number of the box **X center:** read the x-axis of the centre point of box. **Y center:** read the y-axis of the centre point of box. **Width:** read the width of box in pixel. **Height:** read the height of box in pixel.
 HuskyLens get from result near the center arrow ID ▾ parameter	**Read the value of arrow near the centre of screen** **Function:** HuskyLens can detect multiple lines in Line-tracking mode, and this block can be used

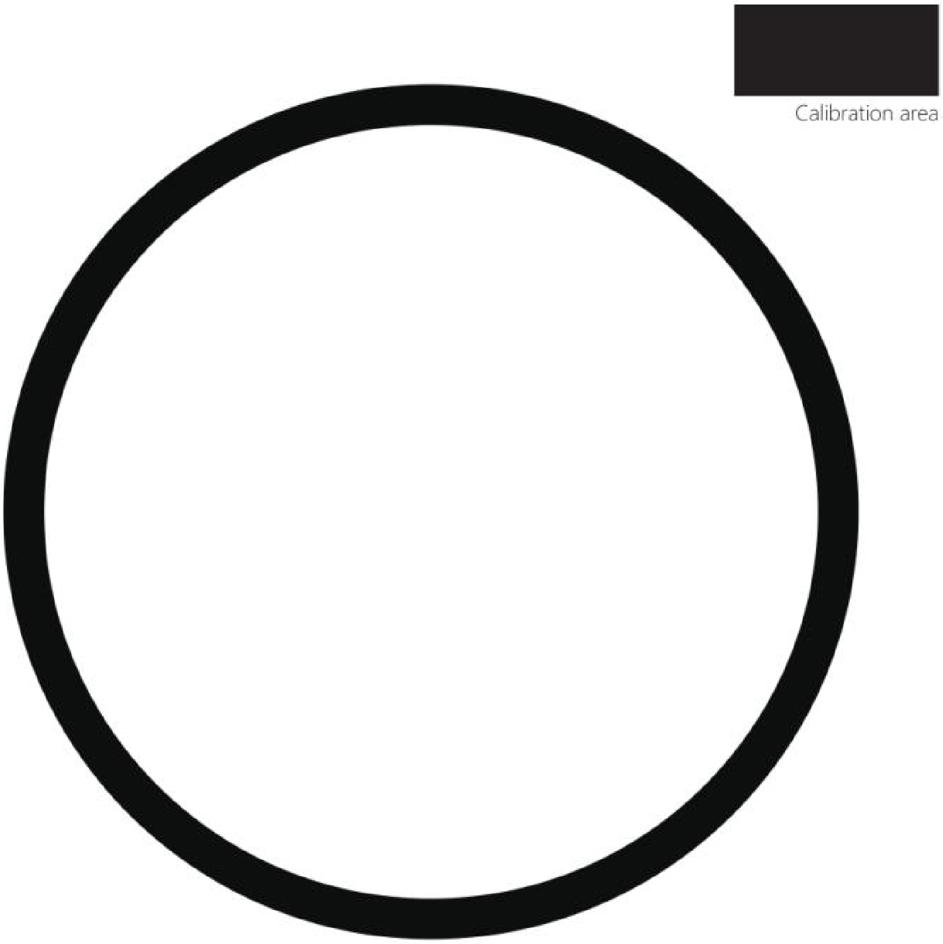
	to read the value of arrow near the centre of screen with providing several readings: **ID:** read the ID number of arrow **X Start:** read the X-axis of the starting point of arrow. **Y Start:** read the Y-axis of the starting point of arrow. **X End:** read the X-axis of the endpoint of arrow. **Y End:** read the Y-axis of the endpoint of arrow.
 HuskyLens get from result ID 1 have learned?	**Judge if the detected object has been learned** **Function:** determine whether an object has been learned when HuskyLens detected multiple objects so as to avoid causing chaos during data calling. **Object learned, return:** true **Object not learned, return:** false
 HuskyLens get from result ID 1 box in picture?	**Judge if a specific learned ID appears on the screen.** **Function:** HuskyLens can detect and learn multiple object IDs, and record them with ID numbers. This block is used to determine if a learned object ID appears on the screen. **Appeared in the screen, return:** true **Not appeared on the screen, return:** false
 HuskyLens get from result ID 1 box parameter X coordinates	**Read box parameter of a specific ID** **Function:** Huskylens can store different objects with ID numbers when it detected multiple objects. This block is used to read box parameter of a specific ID. **Parameter option:** X center, Y center, Width, Height (Unit: pixel)
 HuskyLens get from result ID 1 arrow parameter xOrigin	**Read arrow parameter of a specific ID** **Function:** Huskylens can store different objects with ID number when it detected multiple objects. This block is used to read arrow parameter of a specific ID. **Parameter option:** X start, Y start, X end, Y end (Unit: pixel)
 HuskyLens get from result box	**Read total number of recognized arrow or box on the screen** **Function:** read the total number of recognized objects on the screen, usually used in object recognition mode.

	Option: arrow, box
 HuskyLens get from result 1 box parameter ID ▾	**Read box parameter of a specific serial number on the screen.** **Function:** objects are recognized in order, and this block can be used to read box parameter of a specific serial number, for instance, read the box parameter of the second recognized object. **Option:** ID, X center, Y center, width, Height (Unit: pixel)
 HuskyLens get from result 1 arrow parameter ID ▾	**Read arrow parameter of a specific serial number on the screen** **Function:** objects are recognized in order, and this can be used to read arrow parameter of a specific serial number, for instance, read the arrow parameter of the second recognized object. **Option:** ID, X start, Y start, X end, Y end(Unit: pixel)
 HuskyLens get from result ID 1 box ▾	**Read total number of box or arrow of a specific ID on the screen** **Function:** read the total number of the recognized objects on the screen. For example, count how many cars are in the screen when it learned the car. **Option:** arrow, box
 HuskyLens get from result ID 1 1 box parameter X coordinates ▾	**Read box parameter of a specific serial number range on the screen** **Function:** objects are recognized in order, and this block can be used to box parameter of a specific serial number range, for instance, to read box parameter of the second to the fifth recognized objects. **Option:** ID, X center, Y center, width, height (Unit: pixel)
 HuskyLens get from result ID 1 1 arrow parameter xOrigin ▾	**Read arrow parameter of a specific serial number range on the screen** **Function:** objects are recognized in order, and this block can be used to arrow parameter of a specific serial number range, for instance, to read arrow parameter of the second to the fifth recognized objects. **Option:** ID, X start, Y start, X end, Y end (Unit: pixel)

Project 1: Line follower moving along a circle

1-1 Introduction

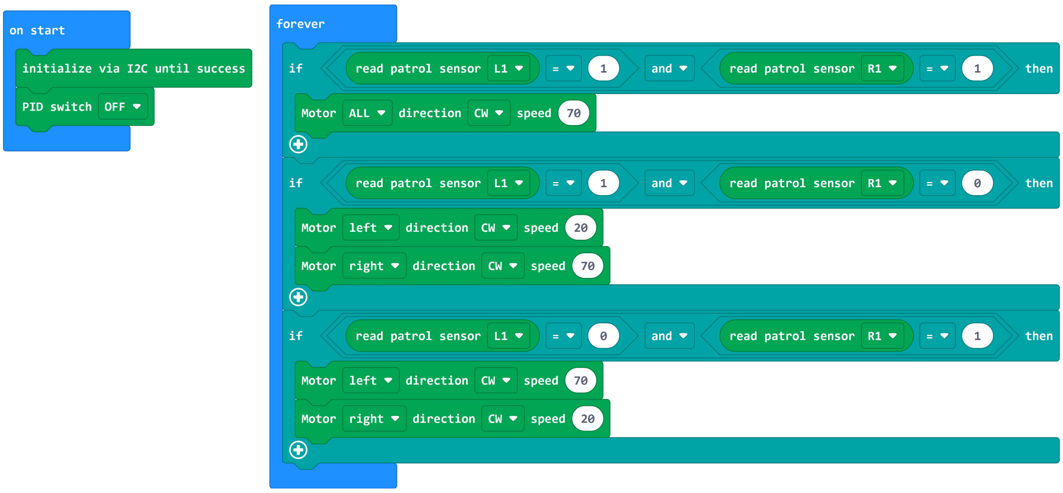
Turn Maqueen Plus into a line follower and program it to move along a circle.



1-2 Program Link

https://makecode.microbit.org/_Mz5aDj3dp92w

1-3 Example Code

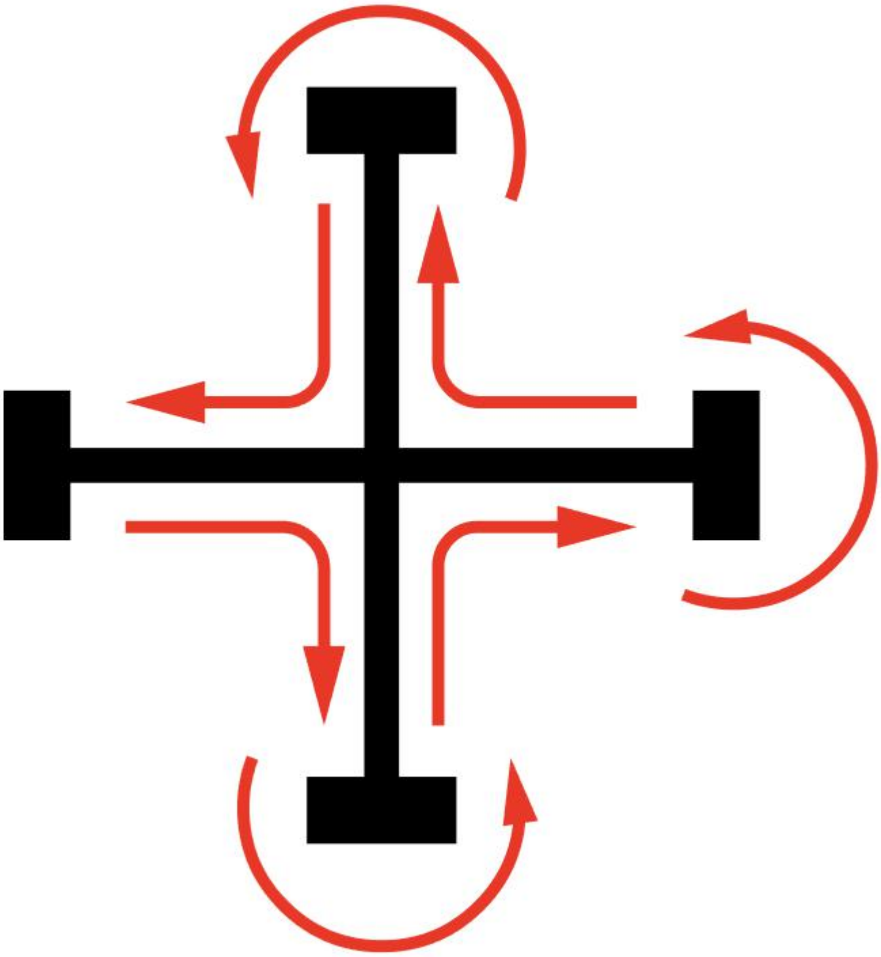


```
on start
    initialize via I2C until success
    PID switch OFF

forever
    if read patrol sensor L1 = 1 and read patrol sensor R1 = 1 then
        Motor ALL direction CW speed 70
    if read patrol sensor L1 = 1 and read patrol sensor R1 = 0 then
        Motor left direction CW speed 20
        Motor right direction CW speed 70
    if read patrol sensor L1 = 0 and read patrol sensor R1 = 1 then
        Motor left direction CW speed 70
        Motor right direction CW speed 20
```

Project 2: Line follower moving along a cross line

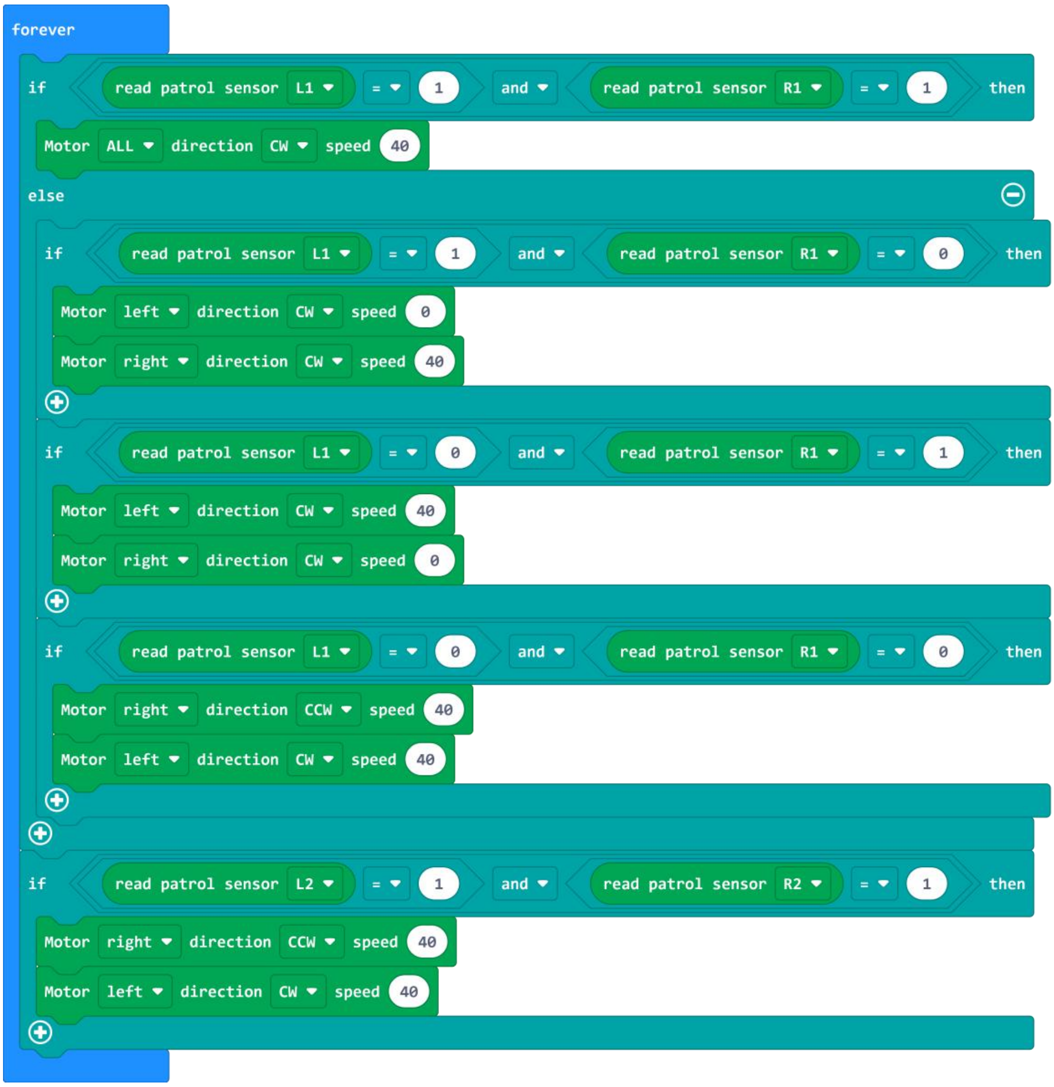
2-1. Introduction

Program Maqueen Plus drive along the cross line on the map. 4 line-tracking sensors will be used in this project.



2-2 Program Link: https://makecode.microbit.org/_Kfw1qqUXeVj4

2-3 Example Code:

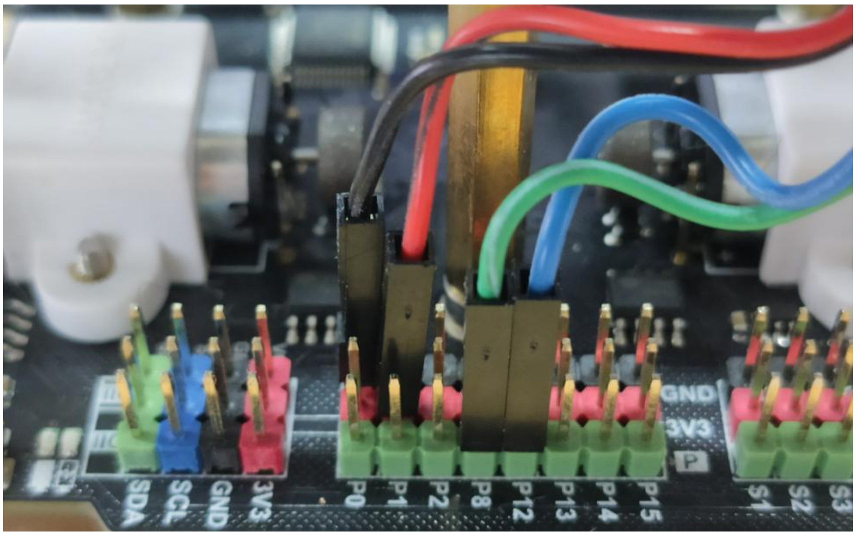


```
forever
  if  read patrol sensor L1 ▾  = ▾  1  and ▾  read patrol sensor R1 ▾  = ▾  1  then
    Motor ALL ▾ direction CW ▾ speed 40
  else
    if  read patrol sensor L1 ▾  = ▾  1  and ▾  read patrol sensor R1 ▾  = ▾  0  then
      Motor left ▾ direction CW ▾ speed 0
      Motor right ▾ direction CW ▾ speed 40
    ⊕
    if  read patrol sensor L1 ▾  = ▾  0  and ▾  read patrol sensor R1 ▾  = ▾  1  then
      Motor left ▾ direction CW ▾ speed 40
      Motor right ▾ direction CW ▾ speed 0
    ⊕
    if  read patrol sensor L1 ▾  = ▾  0  and ▾  read patrol sensor R1 ▾  = ▾  0  then
      Motor right ▾ direction CCW ▾ speed 40
      Motor left ▾ direction CW ▾ speed 40
    ⊕
  ⊕
  if  read patrol sensor L2 ▾  = ▾  1  and ▾  read patrol sensor R2 ▾  = ▾  1  then
    Motor right ▾ direction CCW ▾ speed 40
    Motor left ▾ direction CW ▾ speed 40
  ⊕
```

Project 3: Obstacle Avoidance Robot

3-1 Introduction

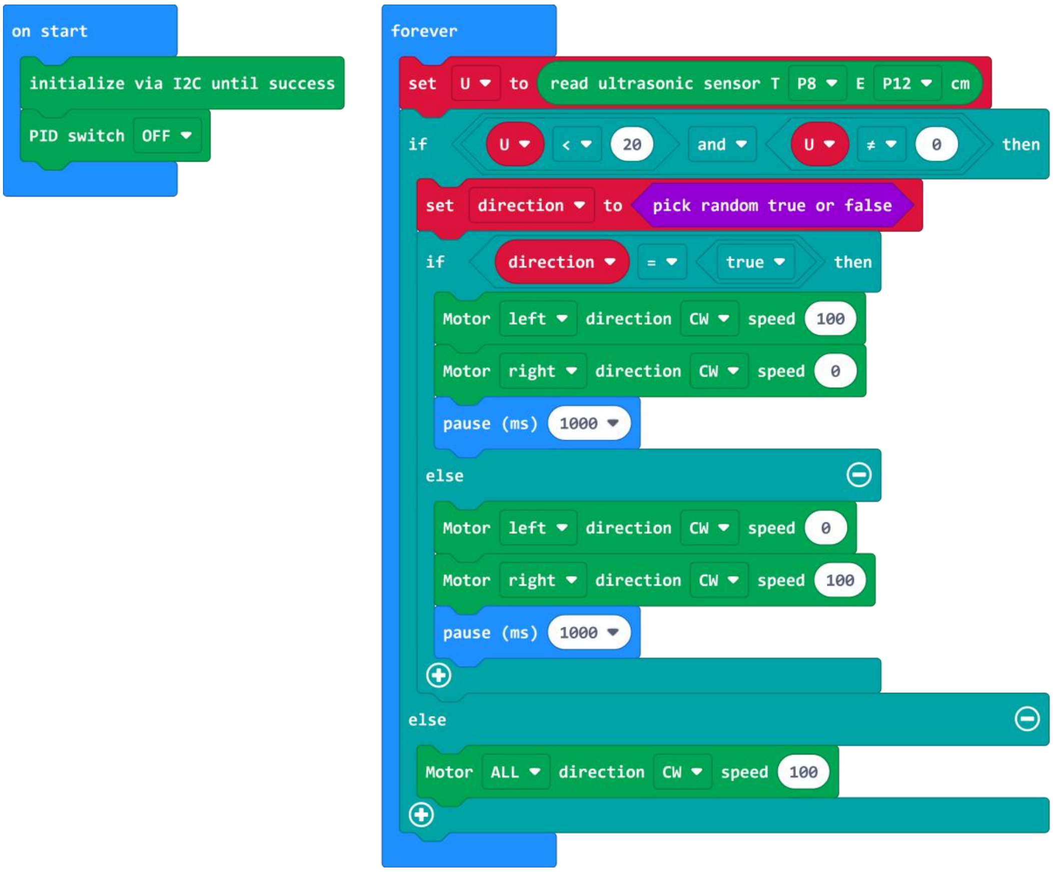
The ultrasonic sensor constantly detects the distance between the Maqueen Plus and obstacle ahead in moving, when the distance is smaller than 20cm, Maqueen Plus randomly turns left or right to avoid the obstacle. Connect the ultrasonic sensor to P8(green wire) and P12(blue wire), just corresponding to the port setting in the program. The red wire should be connected to a 3.3V port, and the black one to a GND port.



3-2 Program Link

https://makecode.microbit.org/_bD150m79X8w2

3-3 Example Code



```
on start
    initialize via I2C until success
    PID switch OFF

forever
    set U to read ultrasonic sensor T P8 E P12 cm
    if U < 20 and U ≠ 0 then
        set direction to pick random true or false
        if direction = true then
            Motor left direction CW speed 100
            Motor right direction CW speed 0
            pause (ms) 1000
        else
            Motor left direction CW speed 0
            Motor right direction CW speed 100
            pause (ms) 1000
    else
        Motor ALL direction CW speed 100
```

Project 4: IR-controlled Maqueen Plus

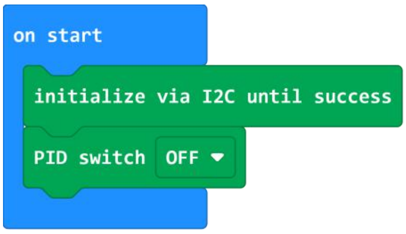
4-1 Introduction

Use the keys 2, 4, 6, 8 and 5 on the remote controller to operate Maqueen Plus.

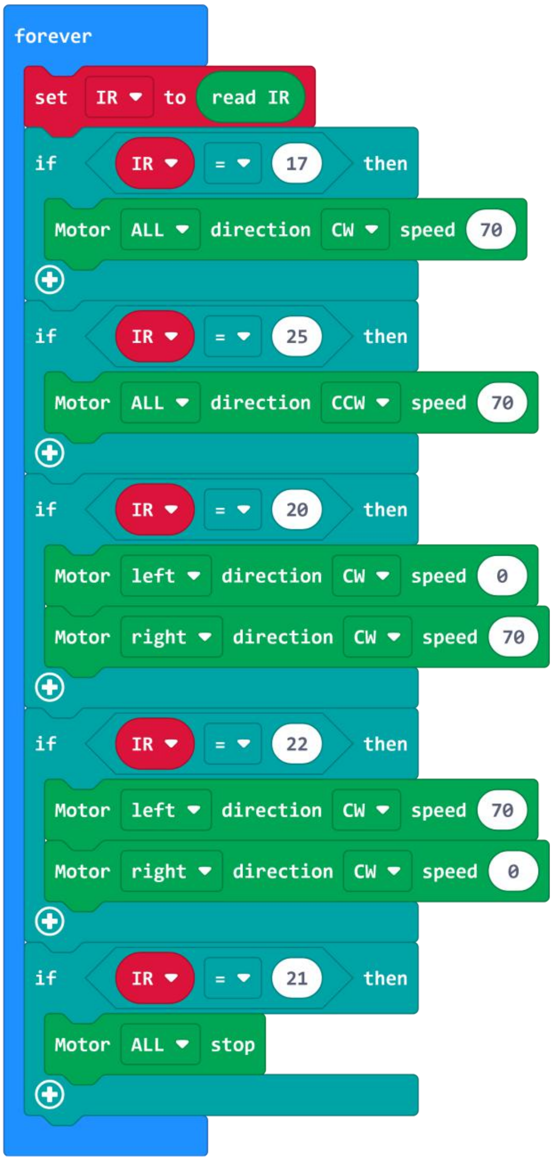
4-2 Program Link

https://makecode.microbit.org/_ccr5CCg62VbC

4-3 Example Code



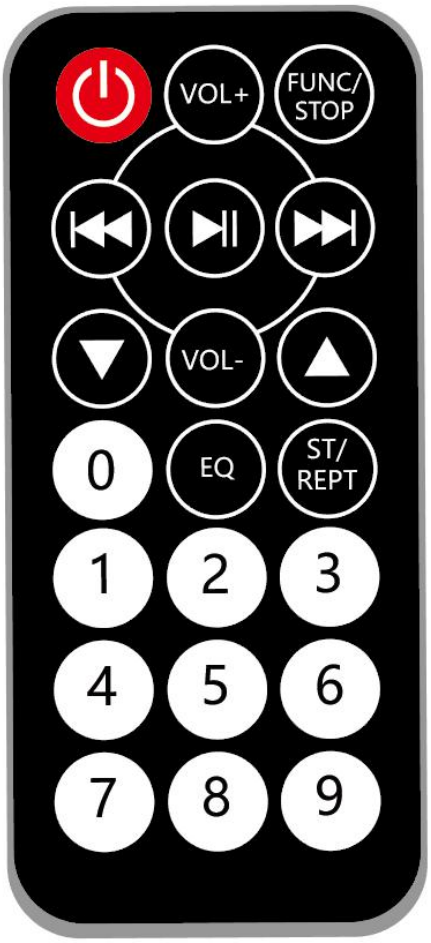
```
on start
    initialize via I2C until success
    PID switch OFF ▾
```



```
forever
    set IR ▾ to read IR
    if IR ▾ = ▾ 17 then
        Motor ALL ▾ direction CW ▾ speed 70
    ⊕
    if IR ▾ = ▾ 25 then
        Motor ALL ▾ direction CCW ▾ speed 70
    ⊕
    if IR ▾ = ▾ 20 then
        Motor left ▾ direction CW ▾ speed 0
        Motor right ▾ direction CW ▾ speed 70
    ⊕
    if IR ▾ = ▾ 22 then
        Motor left ▾ direction CW ▾ speed 70
        Motor right ▾ direction CW ▾ speed 0
    ⊕
    if IR ▾ = ▾ 21 then
        Motor ALL ▾ stop
    ⊕
```

4-4 Remote Controller Key Value List

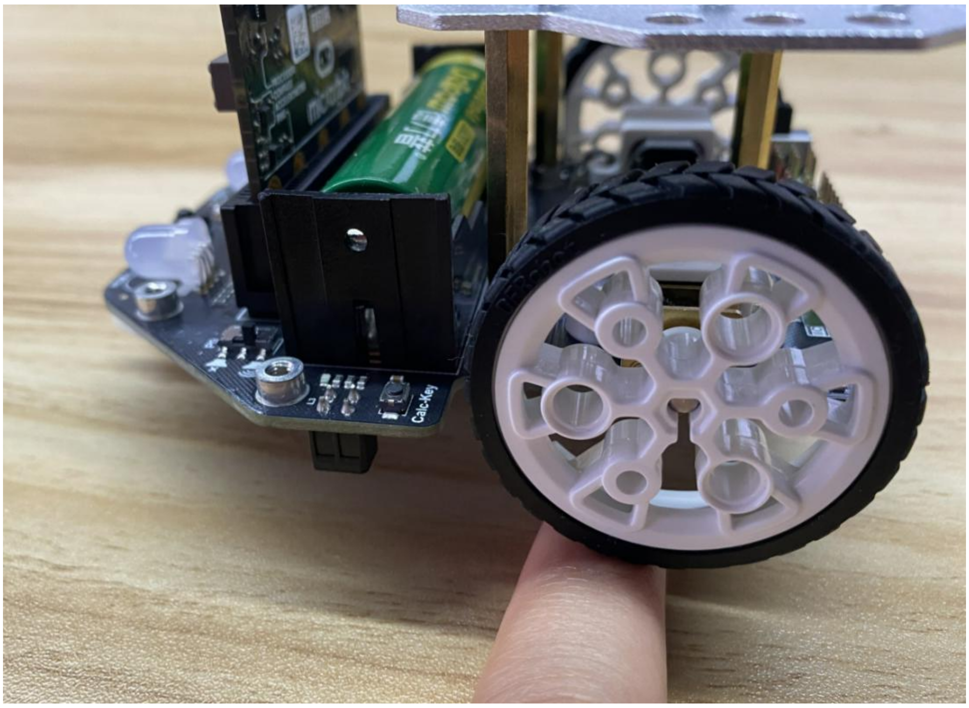
Key	Value(In hexadecimal)	Value(In decimal)
Red Key	0xff00	0
VOL+	0xfe01	1
FUNC/STOP	0xfd02	2
Left Arrow	0xfb04	4
Pause	0xfa05	5
Right Arrow	0xf906	6
Down Arrow	0xf708	8
VOL-	0xf609	9
Up Arrow	0xf50a	10
0	0xf30c	12
EQ	0xf20d	13
ST/REPT	0xf10e	14
1	0xef10	16
2	0xee11	17
3	0xed12	18
4	0xeb14	20
5	0xea15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



Project 5: PID Control for Maqueen Plus

5-1 Introduction

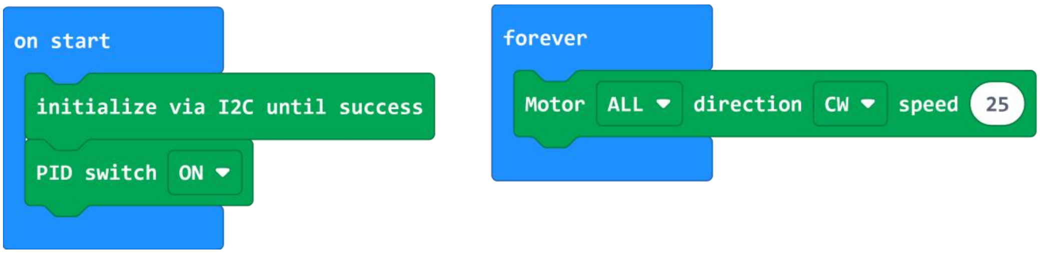
PID can accurately adjust the speed of the two motors and guarantee enough torque at different speeds. Maqueen Plus comes with an on-board encoder and PID control function, which can adjust the torque and speed of a motor in real-time. Download the program, and try letting Maqueen Plus climb across some small obstacles like finger, eraser, etc.



5-2 Program Link

https://makecode.microbit.org/_YxpKywbJxakH

5-3 Example Code

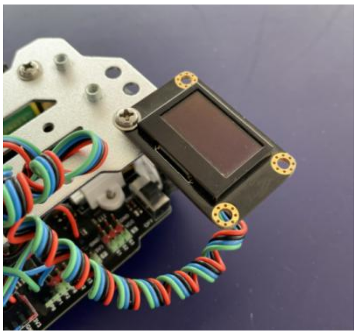


```
on start
    initialize via I2C until success
    PID switch ON

forever
    Motor ALL direction CW speed 25
```

Project 6: Speed up and Slow down

6-1 Introduction

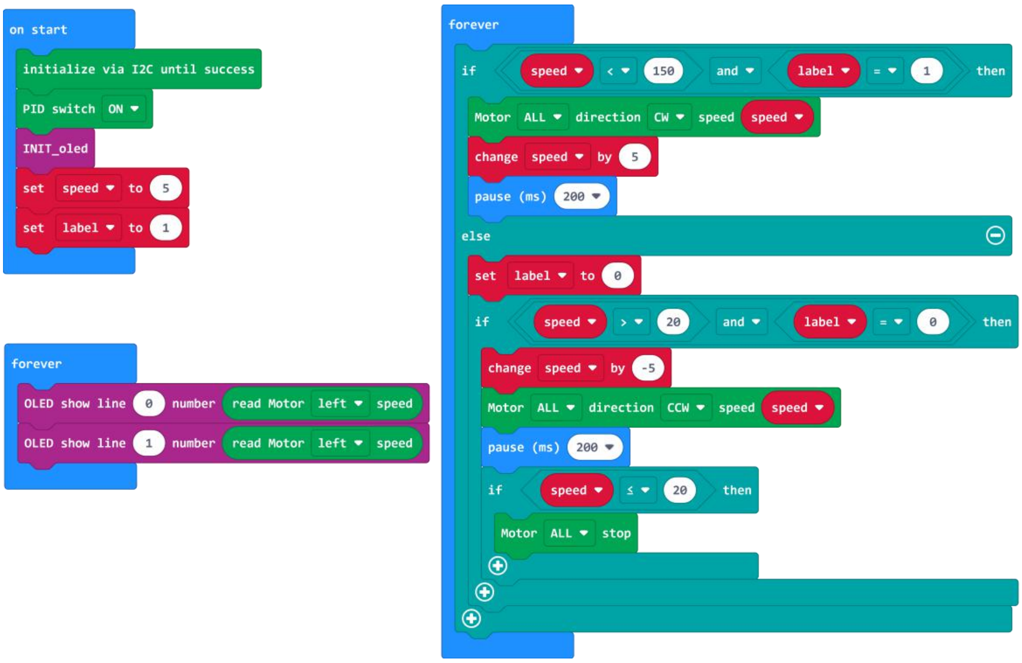
Maqueen Plus constantly goes faster until the speed reaches 150, then gradually slowing down. When its speed is small than 20, stop moving. Meanwhile, the current speed will be displayed on the OLED screen. Enable PID function to control the speed accurately.



6-2 Program Link

https://makecode.microbit.org/_6bDYxchJk9Lk

6-3 Example Code

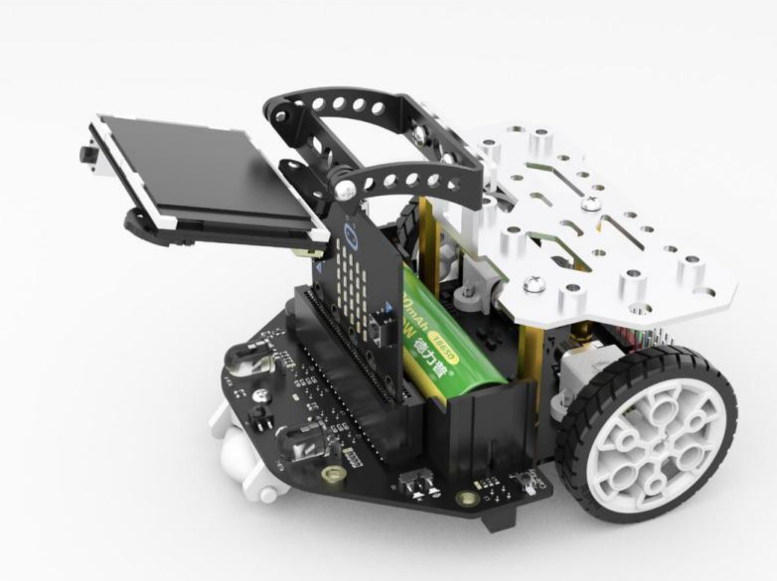


```
on start
    initialize via I2C until success
    PID switch ON
    INIT_oled
    set speed to 5
    set label to 1

forever
    OLED show line 0 number read Motor left speed
    OLED show line 1 number read Motor left speed

forever
    if speed < 150 and label = 1 then
        Motor ALL direction CW speed speed
        change speed by 5
        pause (ms) 200
    else
        set label to 0
        if speed > 20 and label = 0 then
            change speed by -5
            Motor ALL direction CCW speed speed
            pause (ms) 200
            if speed ≤ 20 then
                Motor ALL stop
```

Project 7: Huskylens AI Camera - Line Tracking

7-1 Introduction

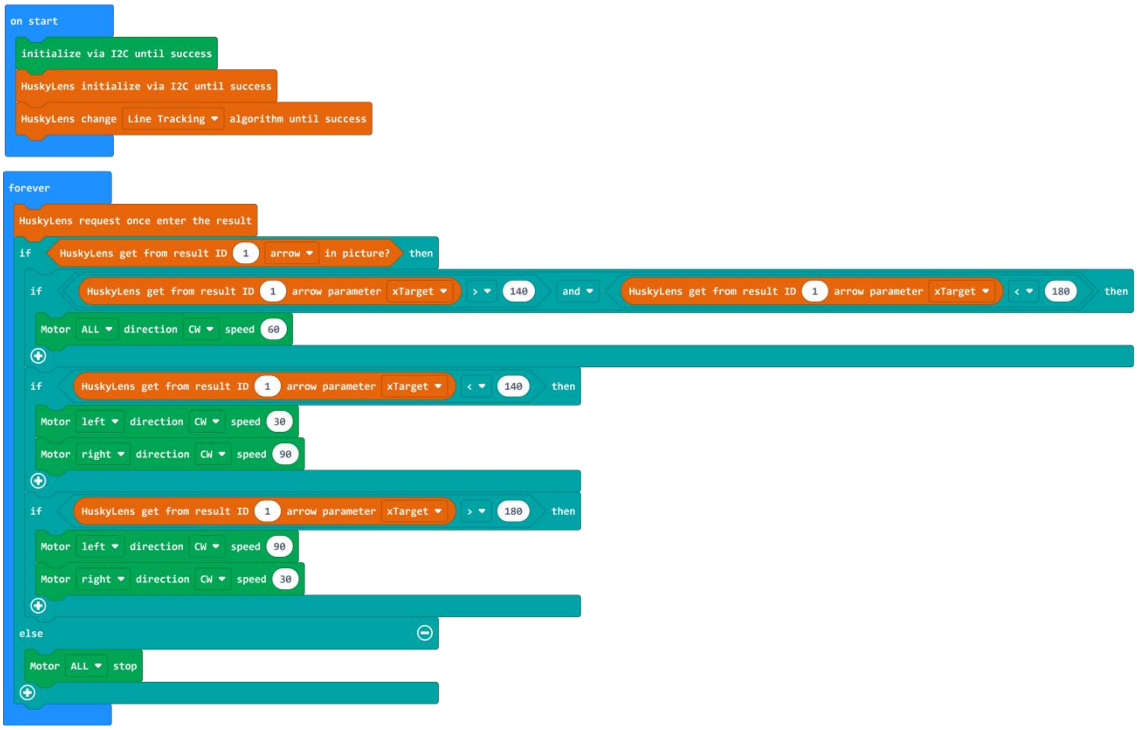
Let Maqueen Plus work with Huskylens camera. The camera recognizes the black line, then Maqueen Plus drives along that road. Download program into micro:bit, adjust the angle of the camera, put the Maqueen Plus on the line, and power on.



7-2 Program Link

https://makecode.microbit.org/_W5fdWb8xea15

7-3 Example Code



```
on start
    initialize via I2C until success
    HuskyLens initialize via I2C until success
    HuskyLens change Line Tracking ▾ algorithm until success

forever
    HuskyLens request once enter the result
    if HuskyLens get from result ID 1 arrow ▾ in picture? then
        if HuskyLens get from result ID 1 arrow parameter xTarget ▾ > ▾ 140 and ▾ HuskyLens get from result ID 1 arrow parameter xTarget ▾ < ▾ 180 then
            Motor ALL ▾ direction CW ▾ speed 60
        ⊕
        if HuskyLens get from result ID 1 arrow parameter xTarget ▾ < ▾ 140 then
            Motor left ▾ direction CW ▾ speed 30
            Motor right ▾ direction CW ▾ speed 90
        ⊕
        if HuskyLens get from result ID 1 arrow parameter xTarget ▾ > ▾ 180 then
            Motor left ▾ direction CW ▾ speed 90
            Motor right ▾ direction CW ▾ speed 30
        ⊕
    else ⊖
        Motor ALL ▾ stop
    ⊕
```

Project 8: Huskylens AI Camera - Tail After

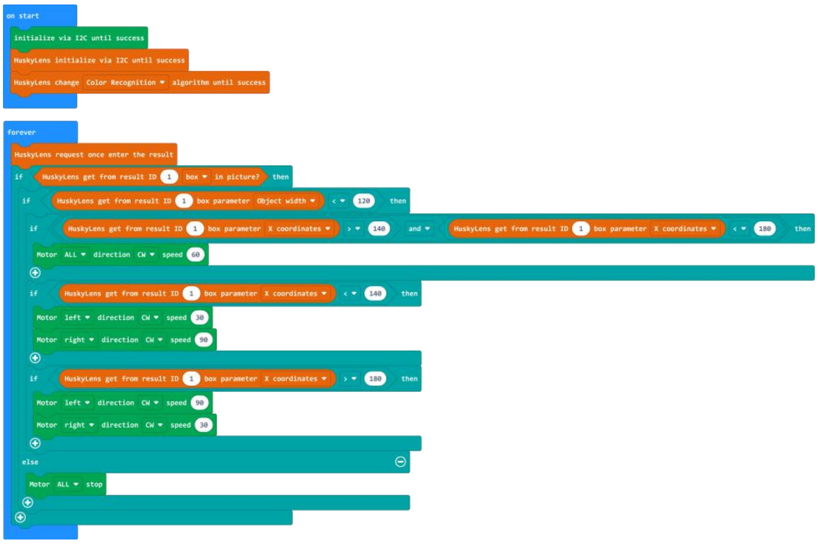
8-1 Introduction

Two Maqueen Plus cars will be used here. Let the first Maqueen car move forward freely, the second one tails after it using a Huskylens AI camera.

8-2 Program Link

https://makecode.microbit.org/_Y4ai3y2jvdEh

8-3 Example Code



```
on start
    initialize via I2C until success
    HuskyLens initialize via I2C until success
    HuskyLens change Color Recognition ▾ algorithm until success

forever
    HuskyLens request once enter the result
    if HuskyLens get from result ID 1 box ▾ in picture? then
        if HuskyLens get from result ID 1 box parameter Object width ▾ < ▾ 120 then
            if HuskyLens get from result ID 1 box parameter X coordinates ▾ > ▾ 140 and ▾ HuskyLens get from result ID 1 box parameter X coordinates ▾ < ▾ 180 then
                Motor ALL ▾ direction CW ▾ speed 60
            ⊕
            if HuskyLens get from result ID 1 box parameter X coordinates ▾ < ▾ 140 then
                Motor left ▾ direction CW ▾ speed 30
                Motor right ▾ direction CW ▾ speed 90
            ⊕
            if HuskyLens get from result ID 1 box parameter X coordinates ▾ > ▾ 180 then
                Motor left ▾ direction CW ▾ speed 90
                Motor right ▾ direction CW ▾ speed 30
            ⊕
        else ⊖
            Motor ALL ▾ stop
        ⊕
    ⊕
```

Project 9: Huskylens AI Camera - Passing a Traffic Light

9-1 Introduction

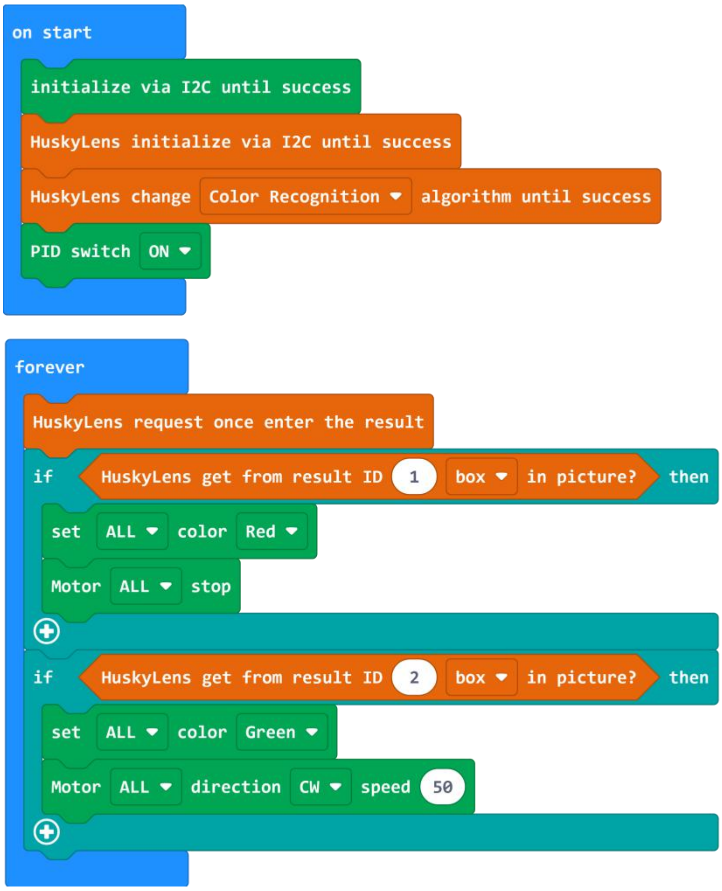
Let Huskylens AI learn red and green cards. When it recognizes the green card, the Maqueen Plus car moves forward. When the red card is recognized, the car stops. At the same time, the color recognized is displayed with the RGB LEDs on theMaqueen Plus.

Note: the surrounding environment should not be too complex in case causing misrecognitions.

9-2 Program Link

https://makecode.microbit.org/_e0Y86Pgc8gFg

9-3 Example Code



```
on start
    initialize via I2C until success
    HuskyLens initialize via I2C until success
    HuskyLens change Color Recognition ▾ algorithm until success
    PID switch ON ▾

forever
    HuskyLens request once enter the result
    if HuskyLens get from result ID 1 box ▾ in picture? then
        set ALL ▾ color Red ▾
        Motor ALL ▾ stop
    ⊕
    if HuskyLens get from result ID 2 box ▾ in picture? then
        set ALL ▾ color Green ▾
        Motor ALL ▾ direction CW ▾ speed 50
    ⊕
```

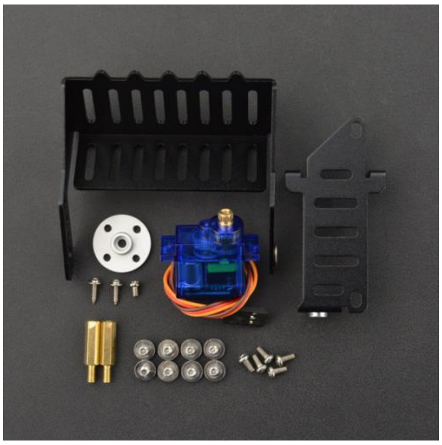
Project 10: Maqueen Mechanic - Loader

10-1 Introduction

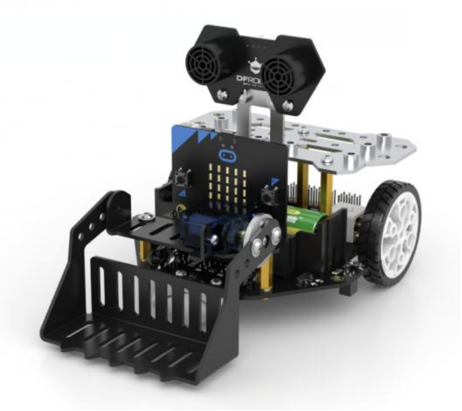
Try to install the Loader accessories on Maqueen Plus and use the remote control handle to operate it.

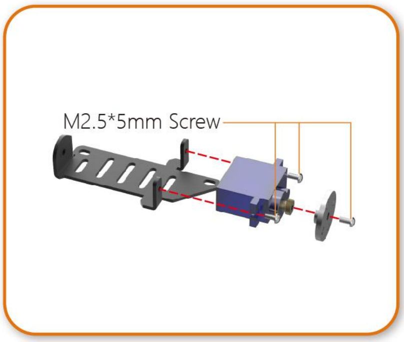
Necessary accessories: 1. Maqueen remote control handle 2. Maqueen loader accessories 3. Prepare one more micro:bit main board

As shown in the figure below:

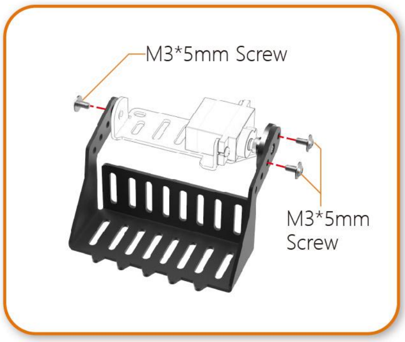


10-2 Assembly

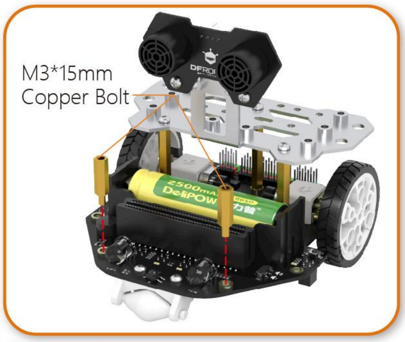




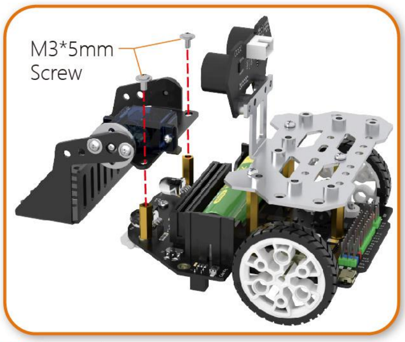
Step1



Step2



Step3



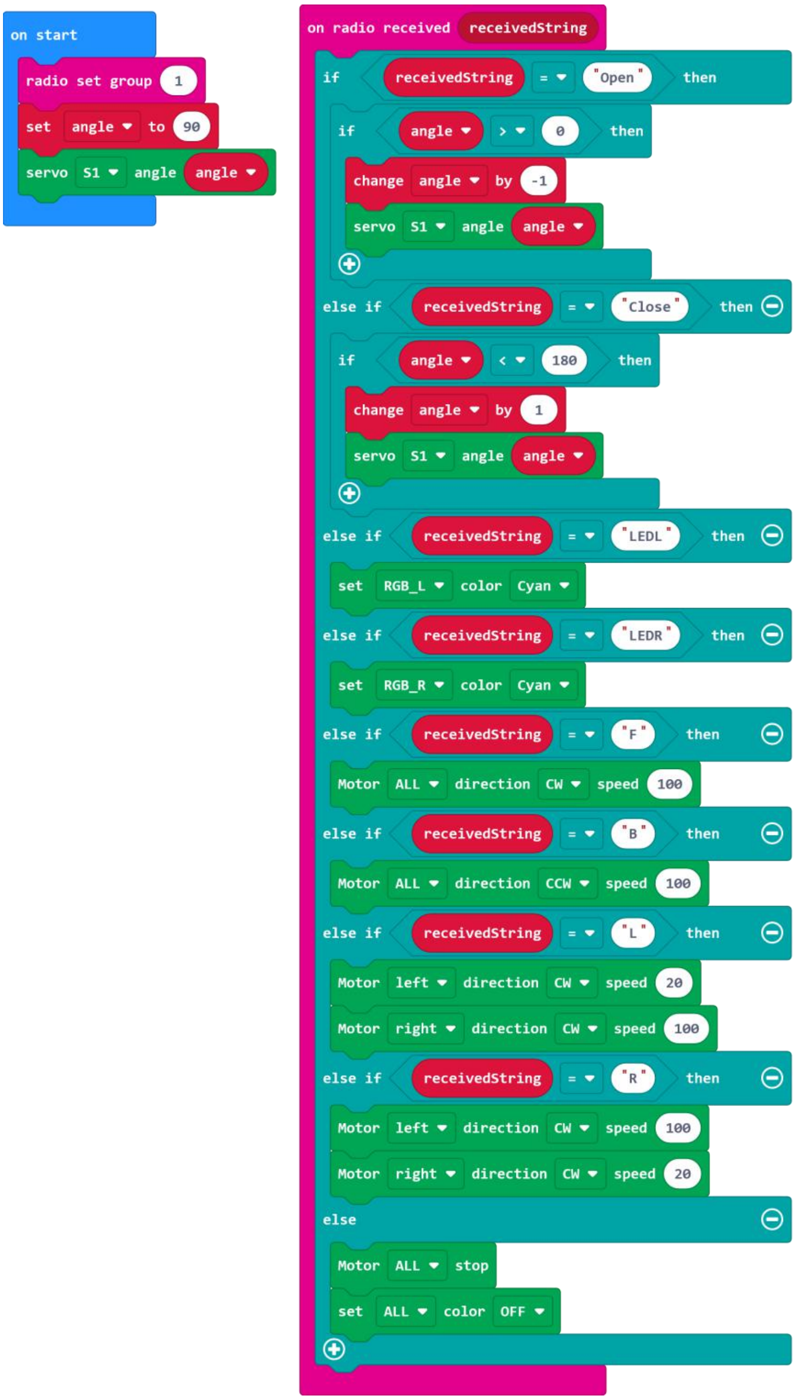
Step4

10-3 Program Link and Example Code

Set switch quantity for remote-control handle

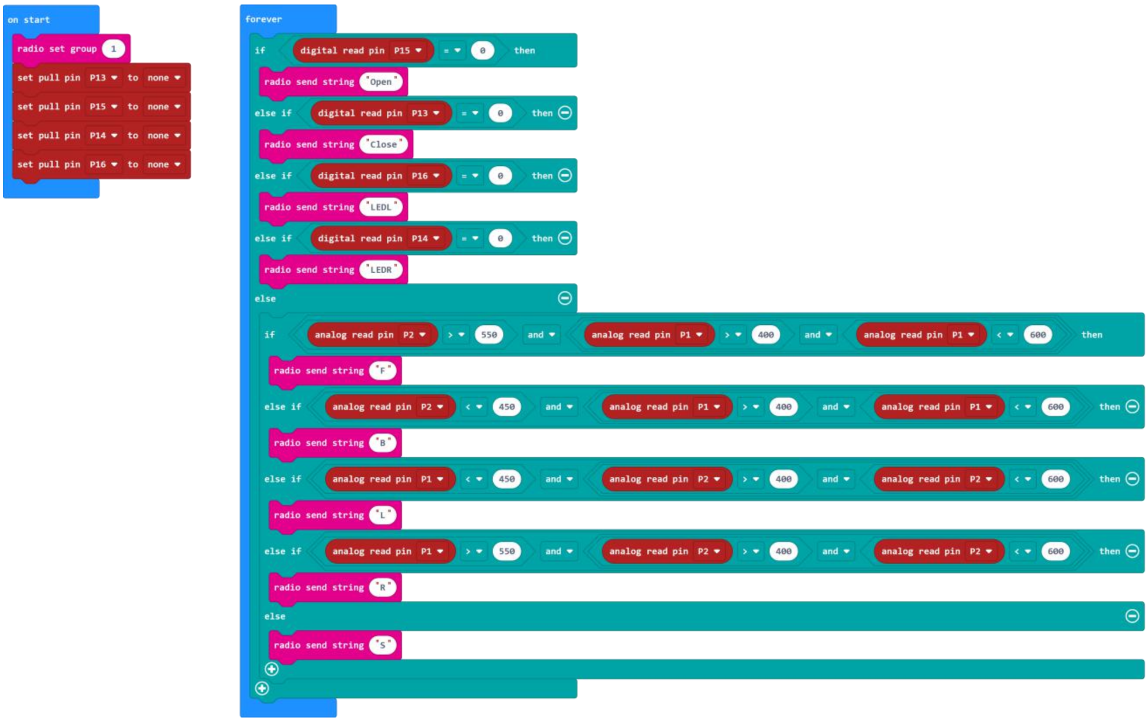
In this project, the handle is set as the switch quantity, which is used to control the car to move forward, backward, left turn and right. But it can't control the speed. The up and down buttons on the right of the handle control the movement of Maqueen loader, and the left and right buttons control the RGB LEDs to be on and off.

Programs for Maqueen Plus: https://makecode.microbit.org/_MyscR05Vc2tz



```
on start
    radio set group 1
    set angle to 90
    servo S1 angle angle

on radio received receivedString
    if receivedString = "Open" then
        if angle > 0 then
            change angle by -1
            servo S1 angle angle
    else if receivedString = "Close" then
        if angle < 180 then
            change angle by 1
            servo S1 angle angle
    else if receivedString = "LEDL" then
        set RGB_L color Cyan
    else if receivedString = "LEDR" then
        set RGB_R color Cyan
    else if receivedString = "F" then
        Motor ALL direction CW speed 100
    else if receivedString = "B" then
        Motor ALL direction CCW speed 100
    else if receivedString = "L" then
        Motor left direction CW speed 20
        Motor right direction CW speed 100
    else if receivedString = "R" then
        Motor left direction CW speed 100
        Motor right direction CW speed 20
    else
        Motor ALL stop
        set ALL color OFF
```

Program for Remote-control Handle:
https://makecode.microbit.org/_HRWfzpg02Mrv

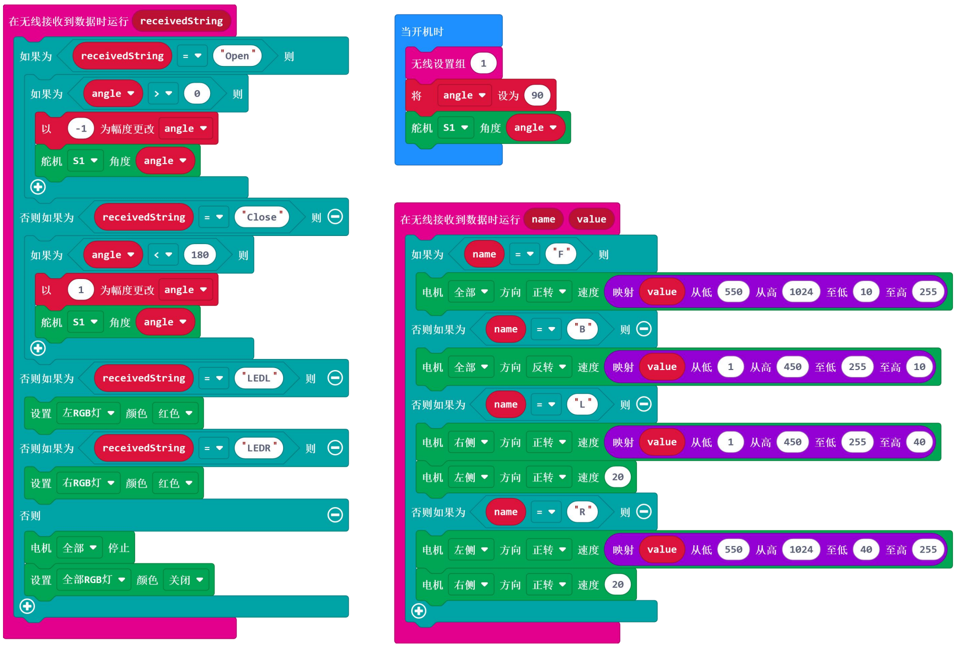


```
on start
    radio set group 1
    set pull pin P13 to none
    set pull pin P15 to none
    set pull pin P14 to none
    set pull pin P16 to none

forever
    if digital read pin P15 = 0 then
        radio send string "Open"
    else if digital read pin P13 = 0 then
        radio send string "Close"
    else if digital read pin P16 = 0 then
        radio send string "LEDL"
    else if digital read pin P14 = 0 then
        radio send string "LEDR"
    else
        if analog read pin P2 > 550 and analog read pin P1 > 400 and analog read pin P1 < 600 then
            radio send string "F"
        else if analog read pin P2 < 450 and analog read pin P1 > 400 and analog read pin P1 < 600 then
            radio send string "B"
        else if analog read pin P1 < 450 and analog read pin P2 > 400 and analog read pin P2 < 600 then
            radio send string "L"
        else if analog read pin P1 > 550 and analog read pin P2 > 400 and analog read pin P2 < 600 then
            radio send string "R"
        else
            radio send string "S"
```

Set analog quantity for remote-control handle

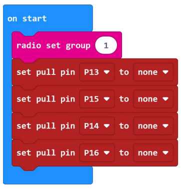
The remote-control handle is set as analog quantity, and then the speed and direction of Maqueen Plus can be controlled at the same time. The more the handle button is pressed, the faster Maqueen Plus will go. The up and down buttons on the right of the handle control the movement of Maqueen loader, and the left and right buttons control the RGB LEDs to be on and off.

Programs for Maqueen Plus: https://makecode.microbit.org/_daYbLRYaUTi7

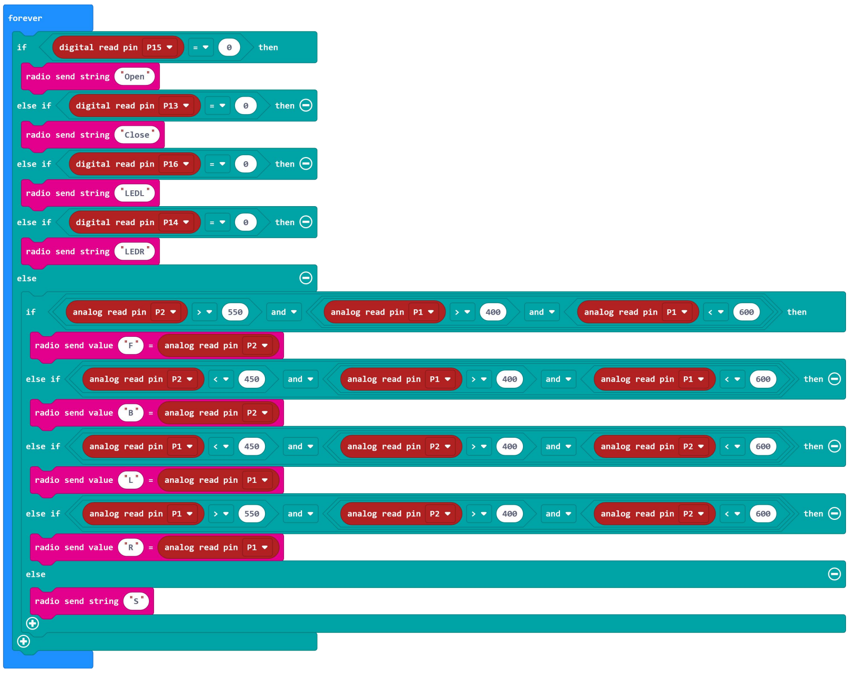


```
在无线接收到数据时运行 receivedString
    如果为 receivedString = "Open" 则
        如果为 angle > 0 则
            以 -1 为幅度更改 angle
            舵机 S1 角度 angle
    否则如果为 receivedString = "Close" 则
        如果为 angle < 180 则
            以 1 为幅度更改 angle
            舵机 S1 角度 angle
    否则如果为 receivedString = "LEDL" 则
        设置 左RGB灯 颜色 红色
    否则如果为 receivedString = "LEDR" 则
        设置 右RGB灯 颜色 红色
    否则
        电机 全部 停止
        设置 全部RGB灯 颜色 关闭

当开机时
    无线设置组 1
    将 angle 设为 90
    舵机 S1 角度 angle

在无线接收到数据时运行 name value
    如果为 name = "F" 则
        电机 全部 方向 正转 速度 映射 value 从低 550 从高 1024 至低 10 至高 255
    否则如果为 name = "B" 则
        电机 全部 方向 反转 速度 映射 value 从低 1 从高 450 至低 255 至高 10
    否则如果为 name = "L" 则
        电机 右侧 方向 正转 速度 映射 value 从低 1 从高 450 至低 255 至高 40
        电机 左侧 方向 正转 速度 20
    否则如果为 name = "R" 则
        电机 左侧 方向 正转 速度 映射 value 从低 550 从高 1024 至低 40 至高 255
        电机 右侧 方向 正转 速度 20
```

Program for Remote-control Handle:
https://makecode.microbit.org/_Wmxd6k2Era7z



```
on start
    radio set group 1
    set pull pin P13 to none
    set pull pin P15 to none
    set pull pin P14 to none
    set pull pin P16 to none
```



```
forever
    if digital read pin P15 = 0 then
        radio send string "Open"
    else if digital read pin P13 = 0 then
        radio send string "Close"
    else if digital read pin P16 = 0 then
        radio send string "LEDL"
    else if digital read pin P14 = 0 then
        radio send string "LEDR"
    else
        if analog read pin P2 > 550 and analog read pin P1 > 400 and analog read pin P1 < 600 then
            radio send value "F" = analog read pin P2
        else if analog read pin P2 < 450 and analog read pin P1 > 400 and analog read pin P1 < 600 then
            radio send value "B" = analog read pin P2
        else if analog read pin P1 < 450 and analog read pin P2 > 400 and analog read pin P2 < 600 then
            radio send value "L" = analog read pin P1
        else if analog read pin P1 > 550 and analog read pin P2 > 400 and analog read pin P2 < 600 then
            radio send value "R" = analog read pin P1
        else
            radio send string "S"
```