Tinybit Pro autopilot

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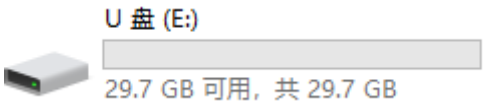
1. Learning objectives

In this course, we mainly learn how to let Tiny:bit Pro complete the recognition of different road signs while using the line tracking sensor to track the line.

2.Preparation for class

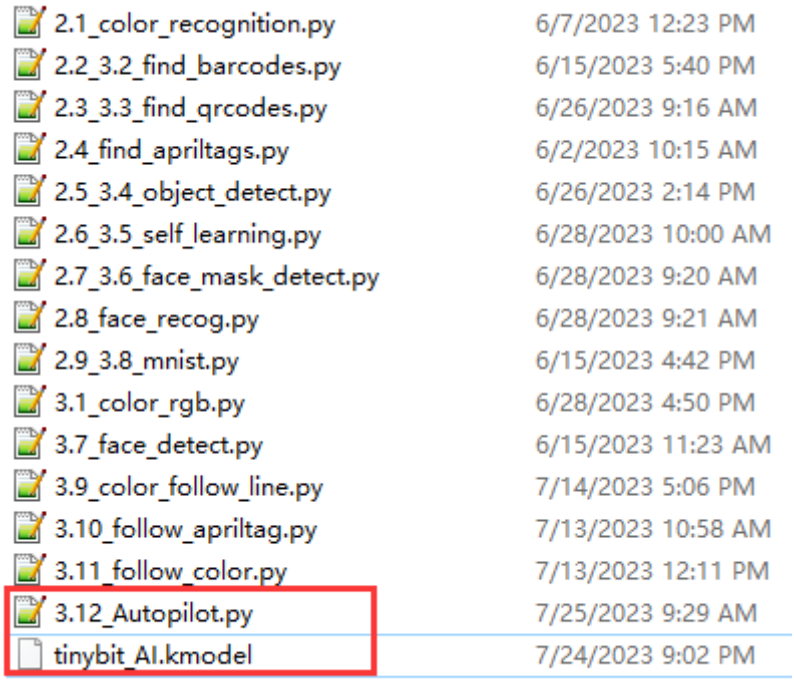
1. Remove the TF card from the k210 vision module and insert it into the card reader.

2. Plug the card reader into the computer, and wait for the computer to recognize the USB disk.



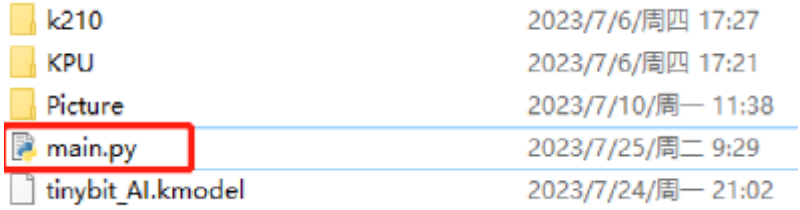
3. Then, enter the TF card. You will see following content.

4. Go to the k210 folder, find the **3.12_Autopilot.py** file and **tinybit_AI.kmodel** file from the folder and copy it to the root directory.



5. Delete the original main.py file.

Then, re-name the **3.12_Autopilot.py** file as the main file.



6. After re-name, pull out the card reader, remove the TF card and insert it back into the k210 vision module.

3.Programming Methods

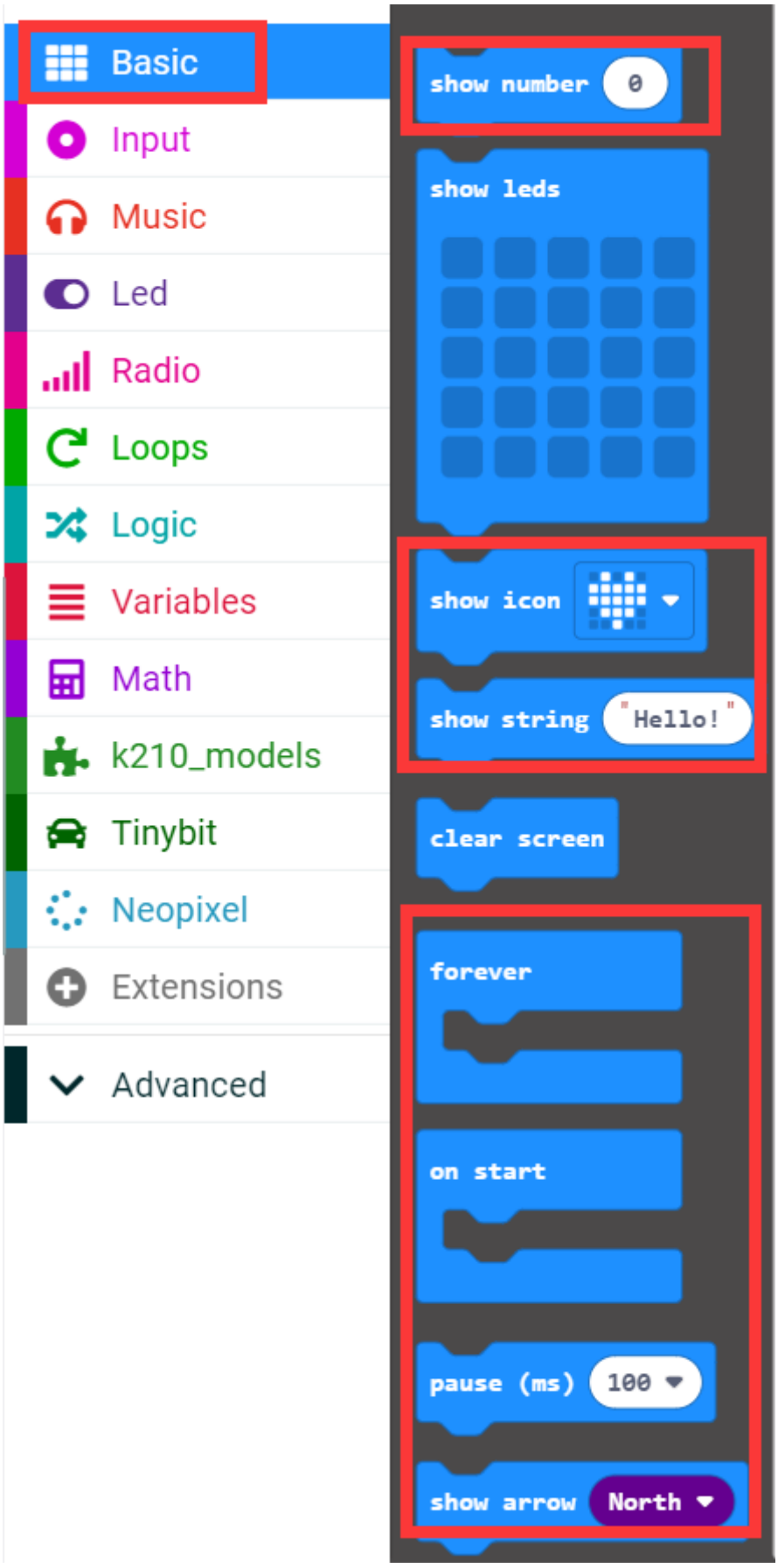
Online programming: first copy this URL https://makecode.microbit. and enter the online programming interface.

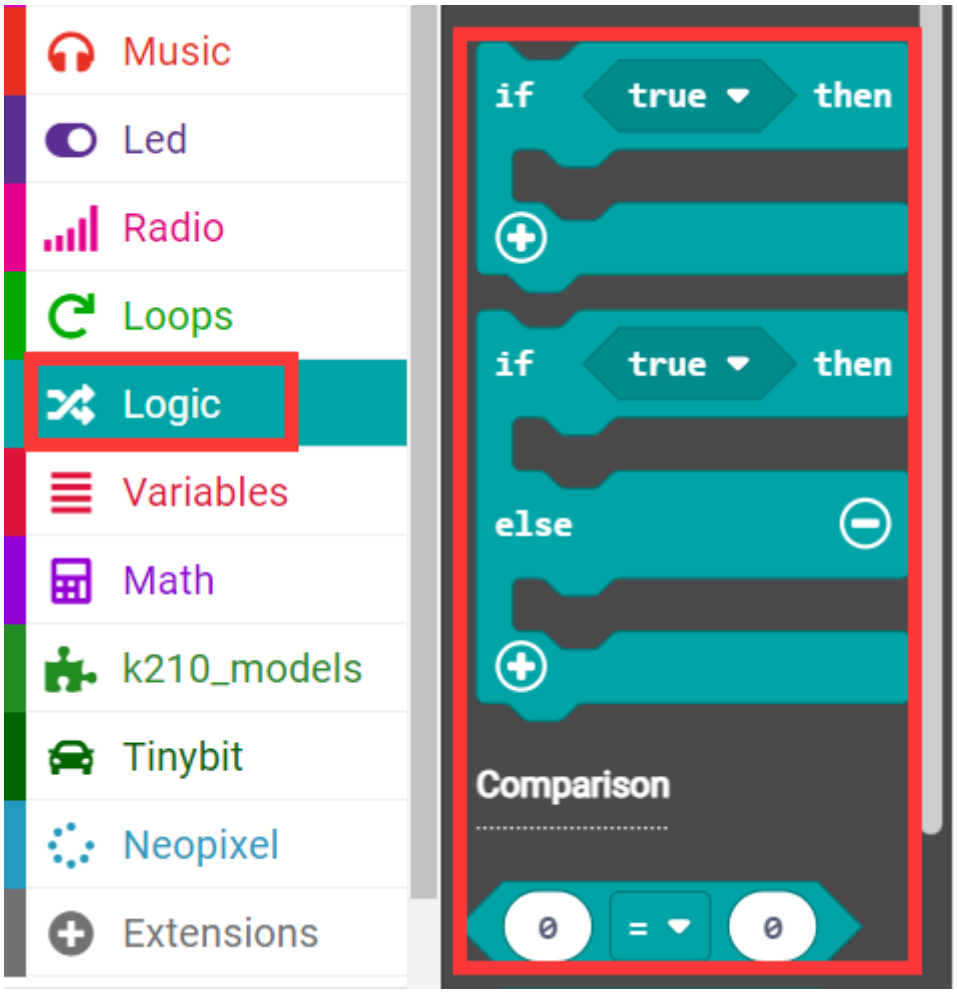
Click Extension, copy the package URL: https://github.com/YahboomTechnology/K210-Module.git to the input field, click Confirm to add package,

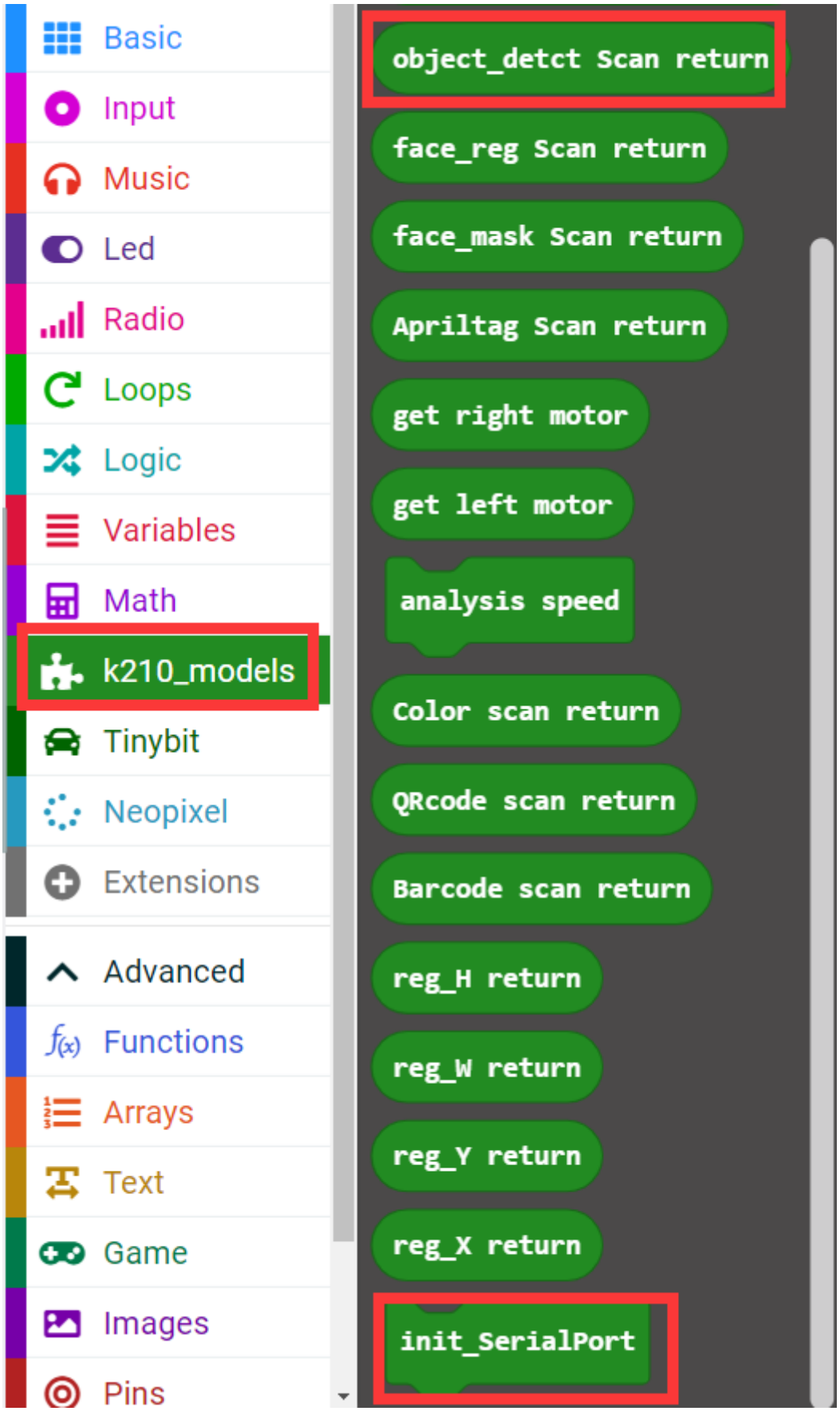
Click Extension again, copy the package URL: https://github.com/YahboomTechnology/Tiny-bitLib to the input field, click Confirm to add the package.

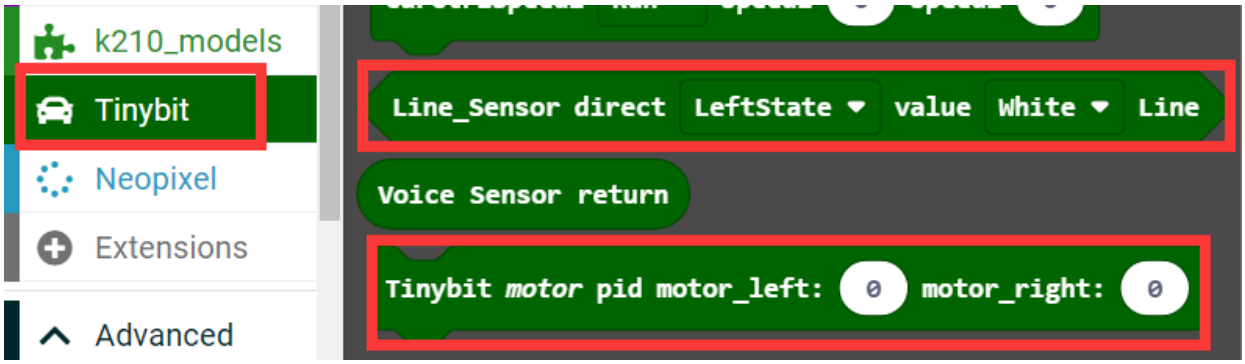
Finally you can use the K210 Vision Module package and Tinybit's building blocks.

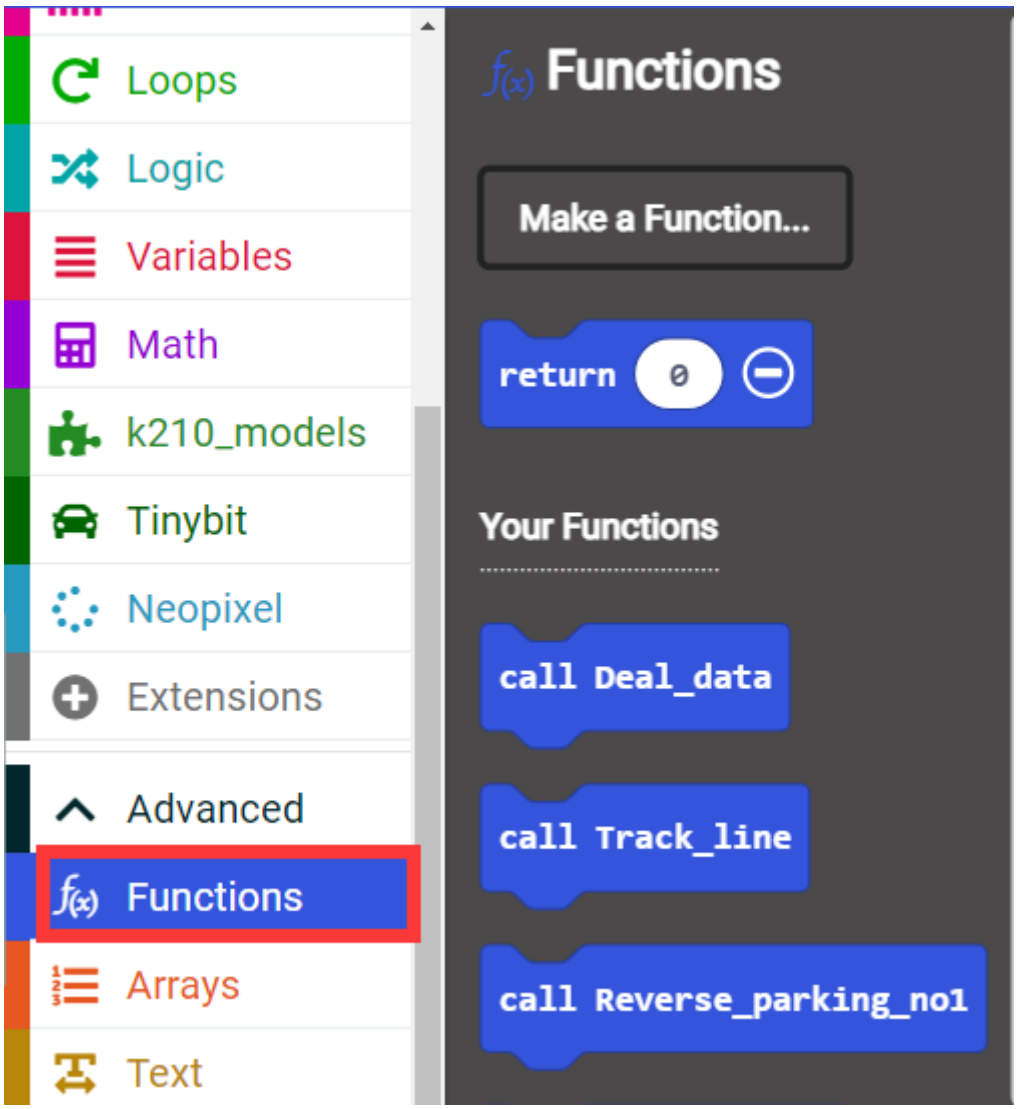
4.Blocks


Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
k210_models
Tinybit
Neopixel
Extensions
Advanced
show number 0
show leds
show icon
show string "Hello!"
clear screen
forever
on start
pause (ms) 100
show arrow North


Music
Led
Radio
Loops
Logic
Variables
Math
k210_models
Tinybit
Neopixel
Extensions
if true then
if true then
else
Comparison
0 = 0


Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
k210_models
Tinybit
Neopixel
Extensions
Advanced
Functions
Arrays
Text
Game
Images
Pins
object_detct Scan return
face_reg Scan return
face_mask Scan return
Apriltag Scan return
get right motor
get left motor
analysis speed
Color scan return
QRcode scan return
Barcode scan return
reg_H return
reg_W return
reg_Y return
reg_X return
init_SerialPort

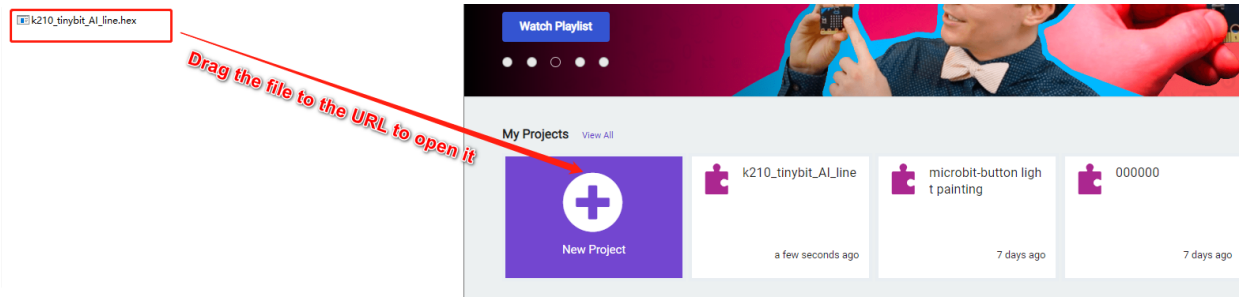


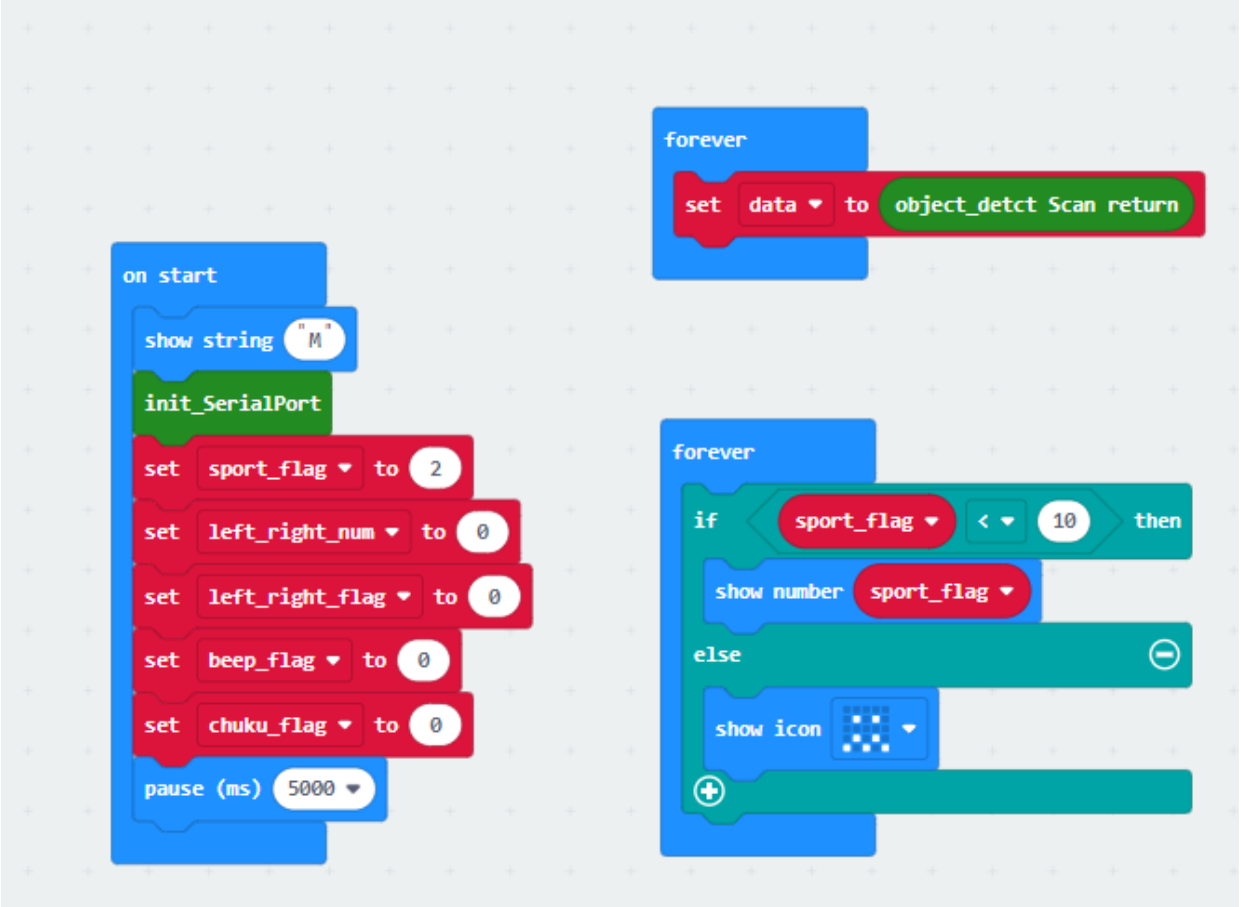


5. Some important source code analysis

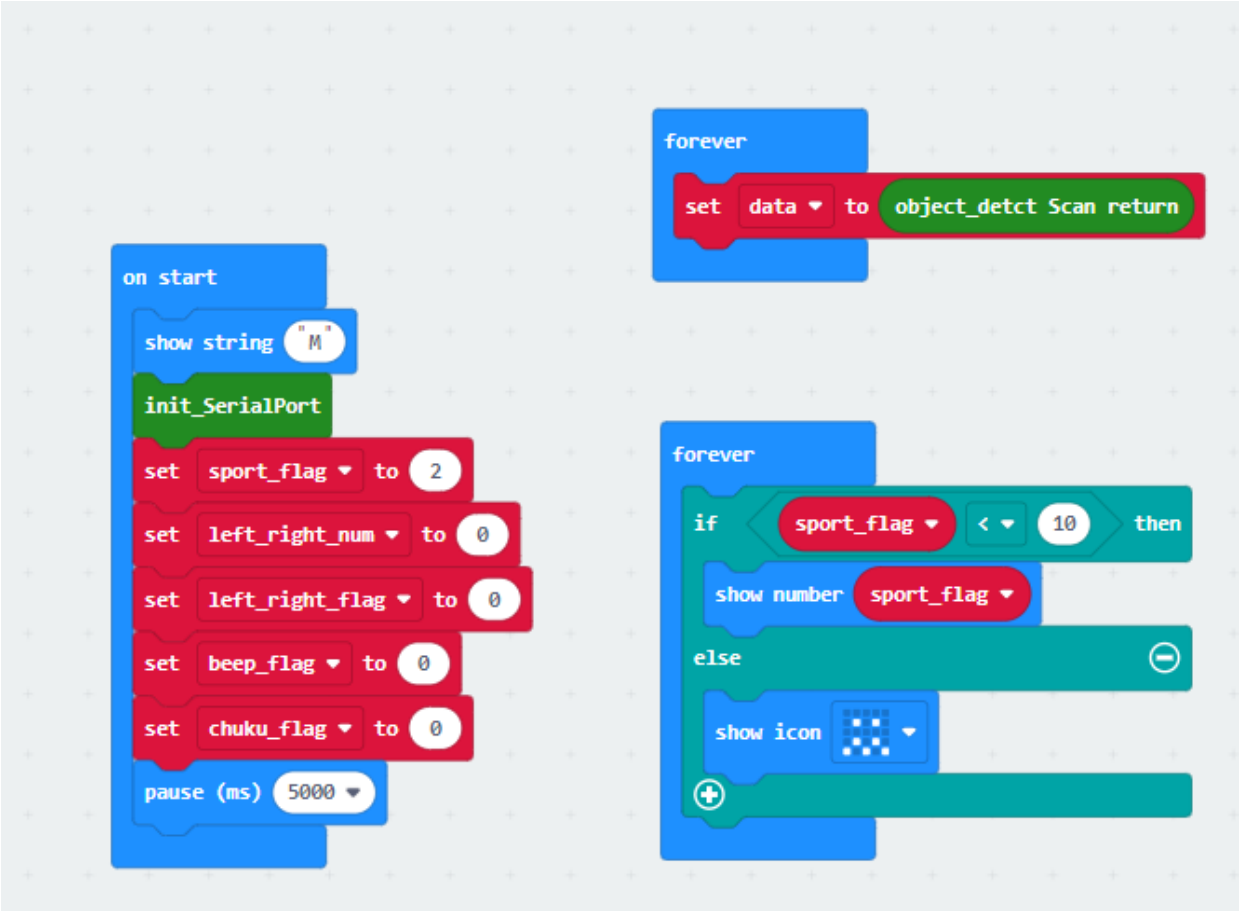
5.1 Open the source code

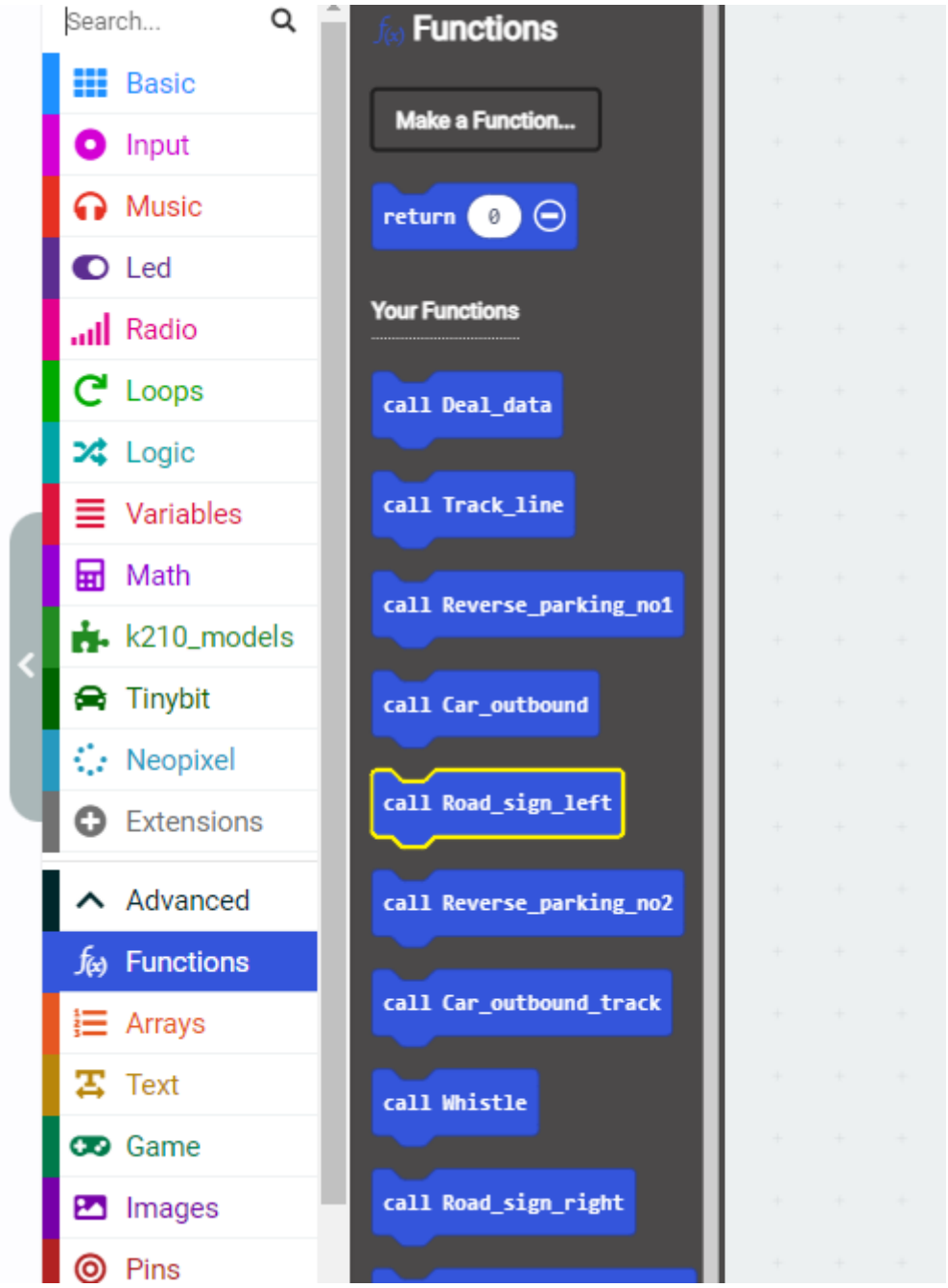
This tutorial only shows a small part of the source code, not all the source code. If you want to see all the source code of this tutorial, first open the makecode offline software or an online programming website. Take the online programming website as an example.





5.2 Partial source code analysis


on start
show string "M"
init_SerialPort
set sport_flag to 2
set left_right_num to 0
set left_right_flag to 0
set beep_flag to 0
set chuku_flag to 0
pause (ms) 5000
forever
set data to object_detct Scan return
forever
if sport_flag < 10 then
show number sport_flag
else
show icon

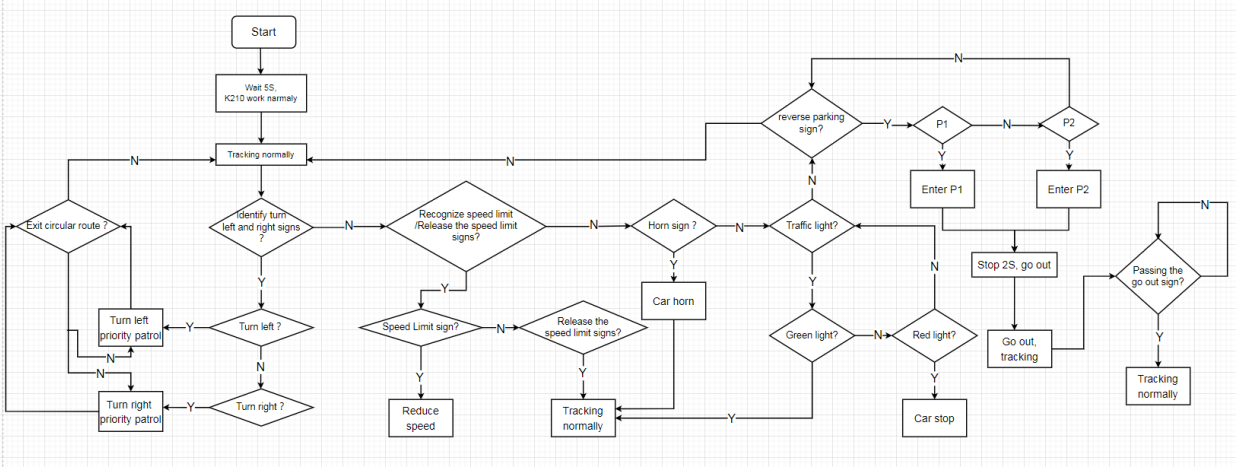


Function Analysis

- Deal_data: Analyze the data of different road signs recognized by k210
- Track_line: normal line patrol movement, if no road signs are recognized, this function is usually called for movement
- Reverse_parking_no1: When the k210 recognizes the number 1, it drives the car back into the No. 1 parking lot
- Car_outbound: The storage is reversed successfully, stop for 2 seconds, then go out of the warehouse, and then carry out the process of patrolling the line after leaving the warehouse
- Road_sign_left: After the k210 recognizes the road sign of the left turn, it will perform the processing of the left turn priority line inspection

- Reverse_parking_no2: This is when the k210 recognizes the number 2, the car is driven back into the No. 2 parking lot
- Car_outbound_track: This is the processing of line inspection after leaving the warehouse, and it will return to normal line inspection after a period of time
- Road_sign_right: After the k210 recognizes the right-turn road sign, it will perform right-turn priority patrol processing
- Whistle: k210: recognize the horn icon, drive the car to whistle
- Road_sign_speedlimit: Recognize the speed limit sign, drive the car to enter the speed limit movement

The flow chart of this program, as shown below



6. Download code

Connect the Micro:bit board to the computer via microusb cable, the computer will pop up a USB stick.

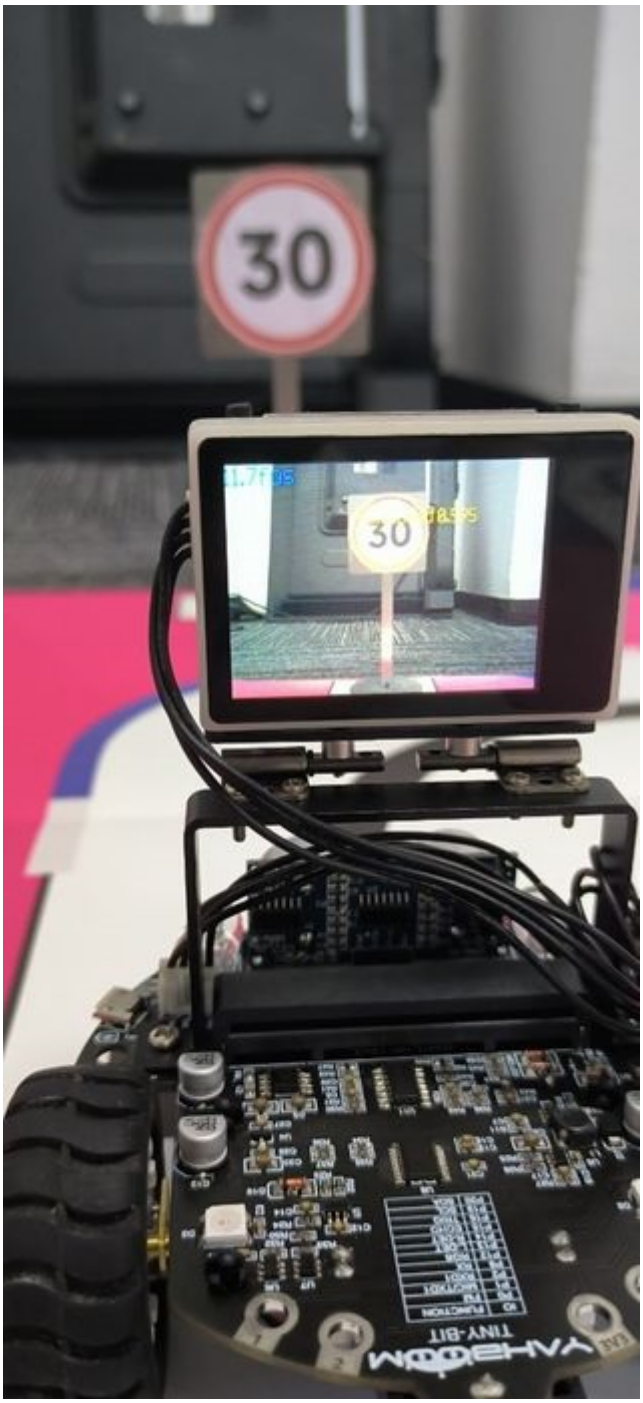
Then, select the **k210_Autopilot.hex** code and right click to send it to the Micro:bit U disk.

Wait until sending is complete and unplug the Micro:bit usb cable. Plug the Micro:bit board into the car.

7.Experimental phenomena

After starting the car, the car will move forward along the black line on the map. When the camera recognizes the road sign, the corresponding path planning movement will appear.

1. When the speed limit sign is recognized, the car will follow the line at a speed that does not exceed the speed limit sign.



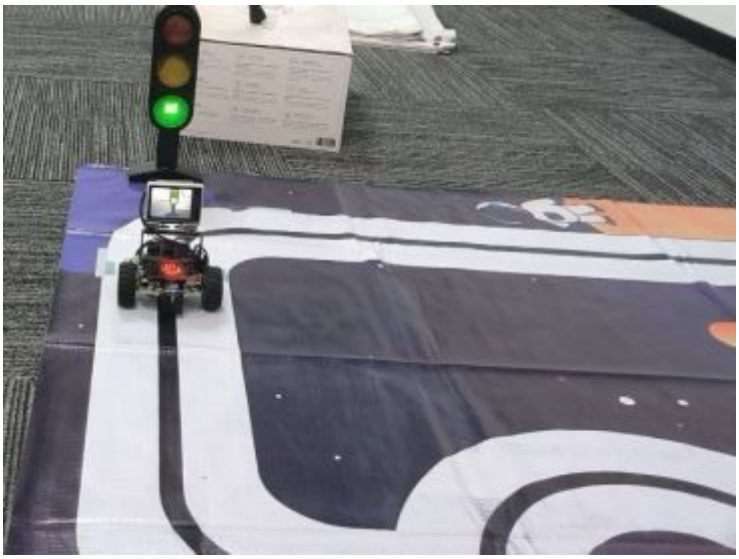
2. When the speed limit sign is recognized, the car will return to the normal line patrol movement.

3. When a turn left/right sign is recognized, the car will make a priority turn left/right tracking movement.

fps
right 0.798

4. When the honk is recognized, the car will whistle.

5. Recognize traffic lights, red lights will stop, green lights will continue to move forward.



6. Recognize parking No. 1 and parking No. 2.

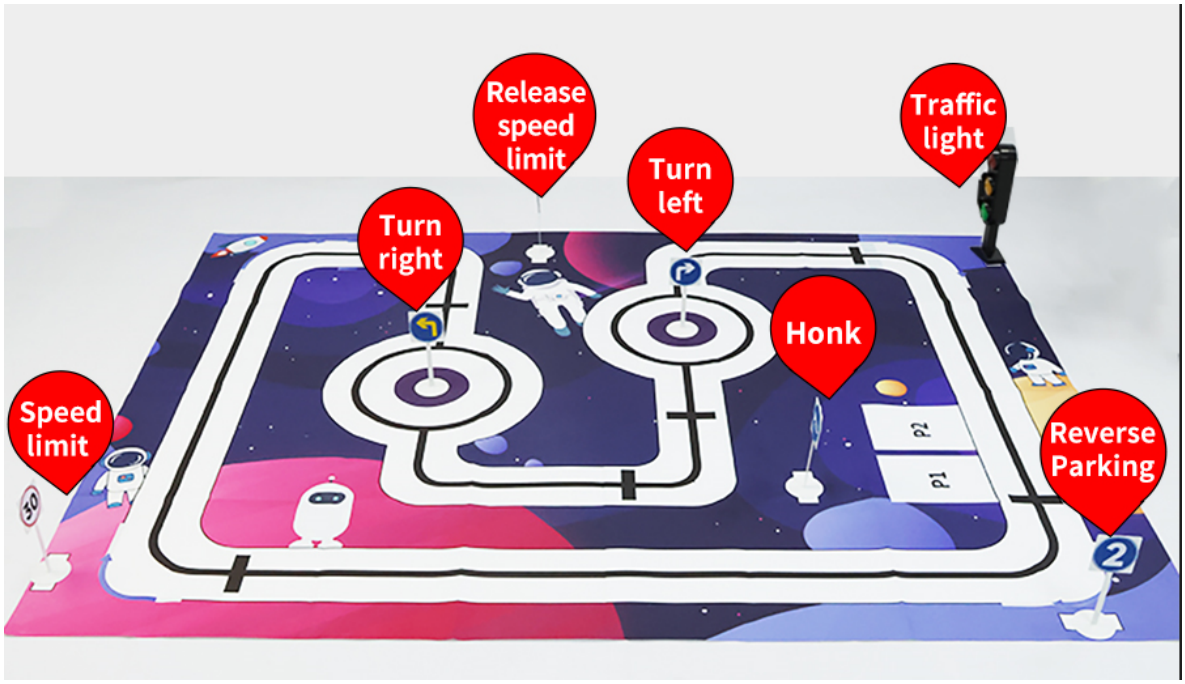
   When car recognizes parking No. 1, it will enter parking No. 1;

   When car recognizes parking No. 2, it will enter parking No. 2; after 2 seconds, the car will come out and continue to tracking.

1
11.6fps
1

8.Note

1. The location of the road sign on the map, as shown below.



2. Please make sure the battery is fully charged, otherwise it will not work normally
3. If the road signs cannot be recognized, you can adjust the bracket of the k210 or the distance of the road signs
4. You must use the road sign model provided by Yahboom, refer to the pictures in the road sign folder, other road signs cannot be recognized.
5. Under normal circumstances, the motor is very smooth. If the motor freezes and the resistance is large, these conditions indicate that the motor is broken.
6. The map must be kept clean without too many stains, otherwise it will affect the normal use
7. When tracking, the environment should not be too bright or too dark.