

MC4.0

CODING | ROBOTICS | AIOT



**MAKER
&CODER**
EXPLORE, INNOVATE, EXCEL



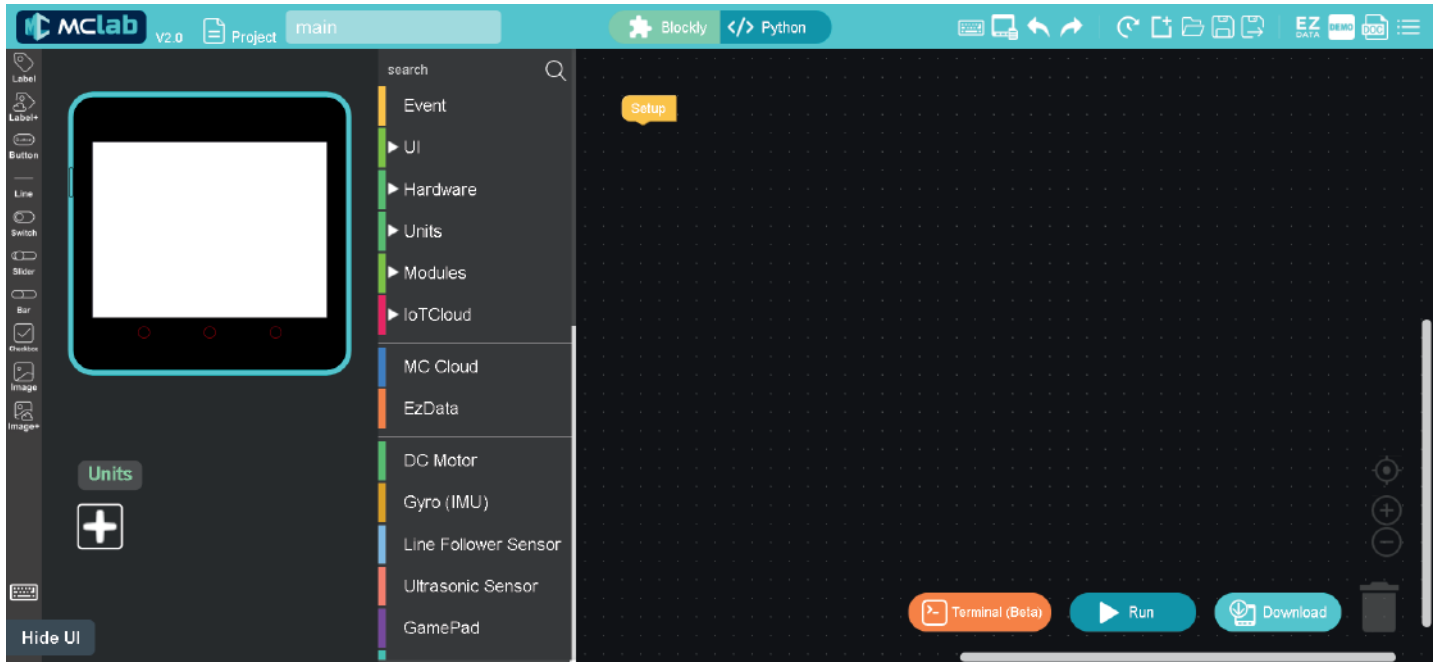
MC 4.0 Firmware User Guide for New Sensors



EMPOWERING THE NEXT
GENERATION OF
MAKERS AND CODERS

1. Introduction

This guide provides step-by-step instructions to update (flash) firmware on the MC4.0 Controller using a Windows computer.



Important Update: New Sensor Support

The latest firmware adds support for the following new I2C sensors:

- RGB Ultrasonic Sensor (I2C)
- 6-Way Color Line Follower (I2C)

These new sensors are supported only with the updated MCLab firmware mentioned in this guide.

When using the Ultrasonic Sensor or Line Follower section in the MCLab platform, both old and new sensors will function properly only if the correct firmware is installed.

Important Notes:

- If you flash the old firmware, the new sensors will NOT work.
- If you want to use the new sensors, you must flash the updated firmware provided in this guide.
- Every time firmware is flashed, ensure you are using the correct firmware version based on the sensor set being used.

Please follow each step carefully to ensure successful firmware installation.

2. System Requirements

Hardware Required

- MC4.0 Controller
- Type-C USB Data Cable (Must support data transfer)
- Windows PC or Laptop

Required Files

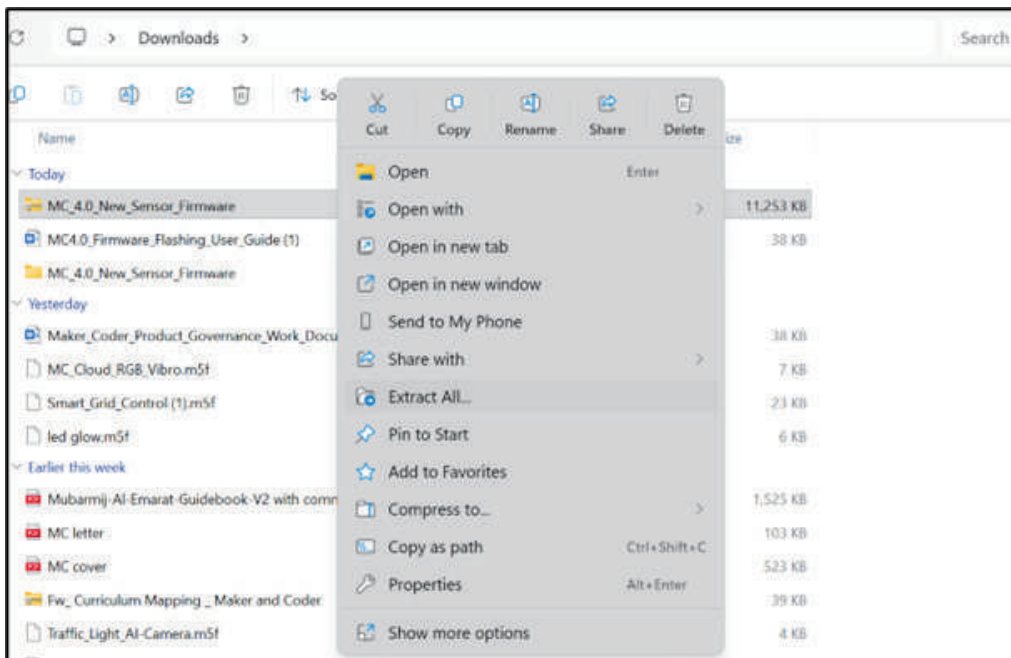
The required firmware package will be provided as a ZIP folder. Download the ZIP file from the official link provided to you.



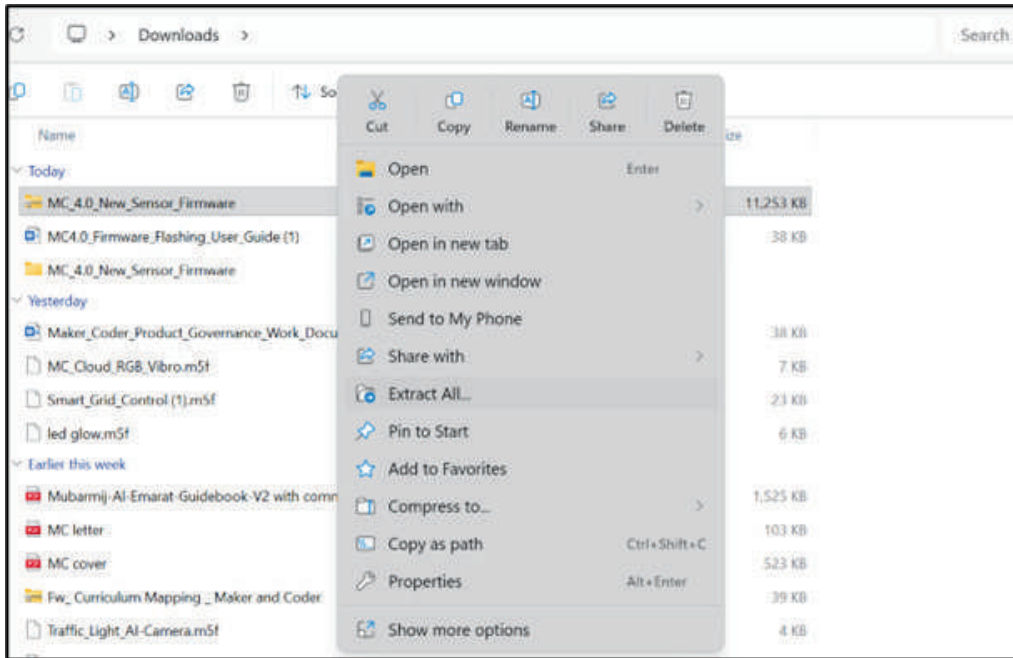
New Firmware

After downloading:

1. Right-click the ZIP file.

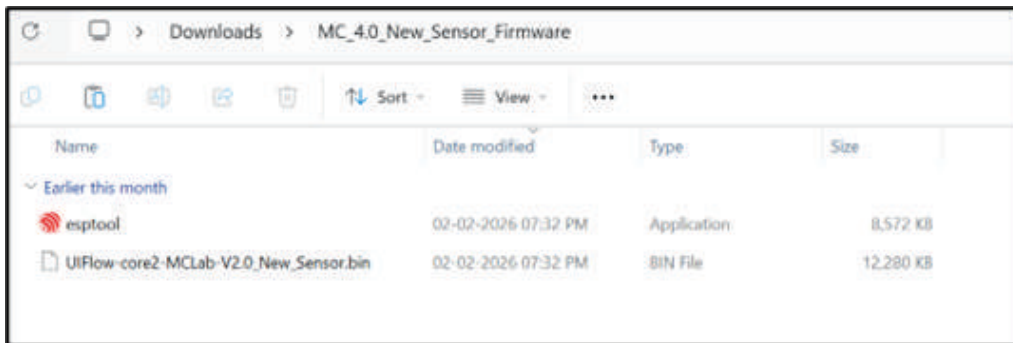


2. Click 'Extract All'.



3. Choose a location and click 'Extract'.

4. Open the extracted folder.



Inside the extracted folder, you should see:

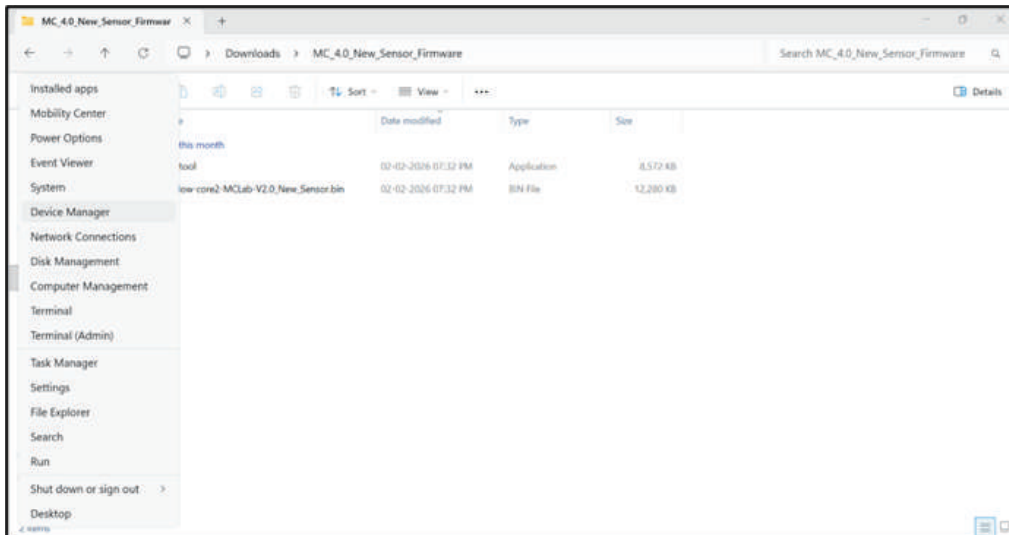
- esptool.exe
- UIFlow-core2-MCLab-V2.0_New_Sensor.bin

Important: Do not run the process directly from inside the ZIP file. Always extract it first.

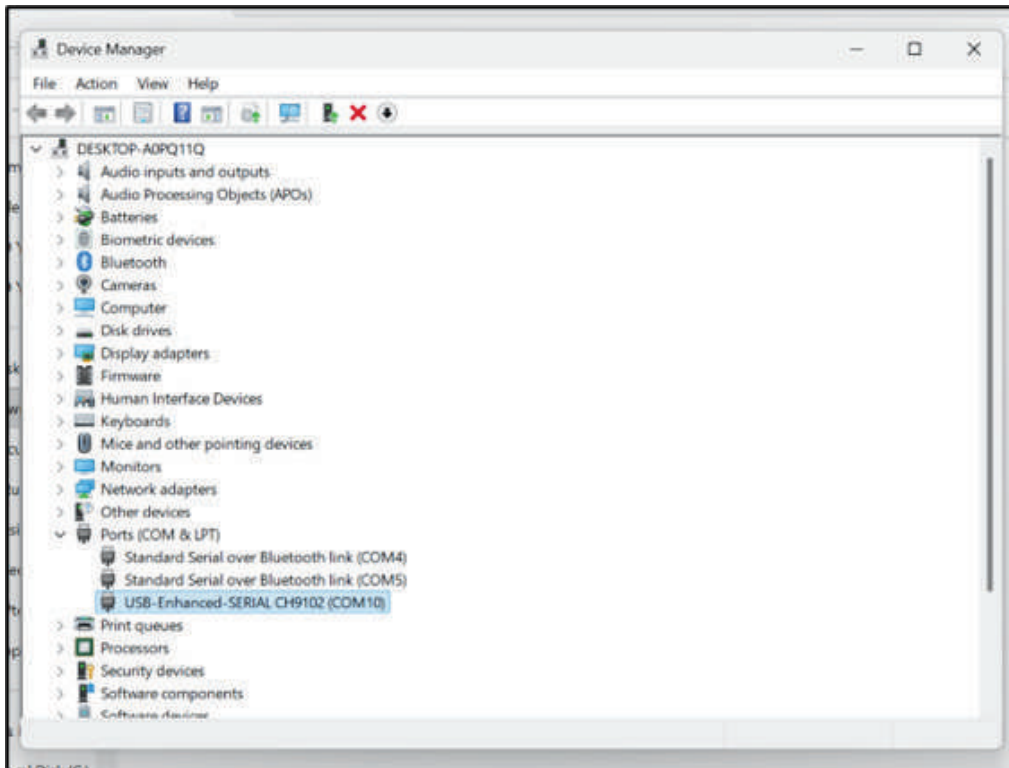
3. USB Driver Installation

Step 1: Connect the MC4.0 device using a Type-C cable.

Step 2: Open Device Manager (Windows Key + X → Device Manager).



Step 3: Expand 'Ports (COM & LPT)' and check the COM number.



You should see one of the following:

- *Silicon Labs CP210x USB to UART Bridge (COMx)*
- *USB-SERIAL CH340 (COMx)*

If no COM port appears, install one of the following drivers:

CP210x Driver Download:

<https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers>

CH340 Driver Download:

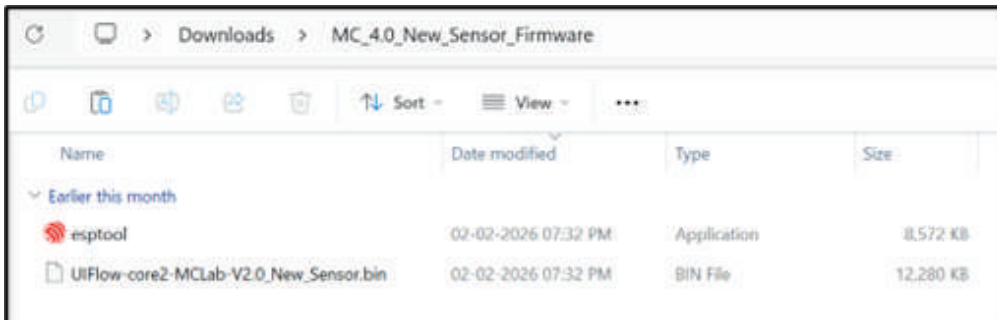
https://www.wch-ic.com/downloads/CH341SER_EXE.html

After installation:

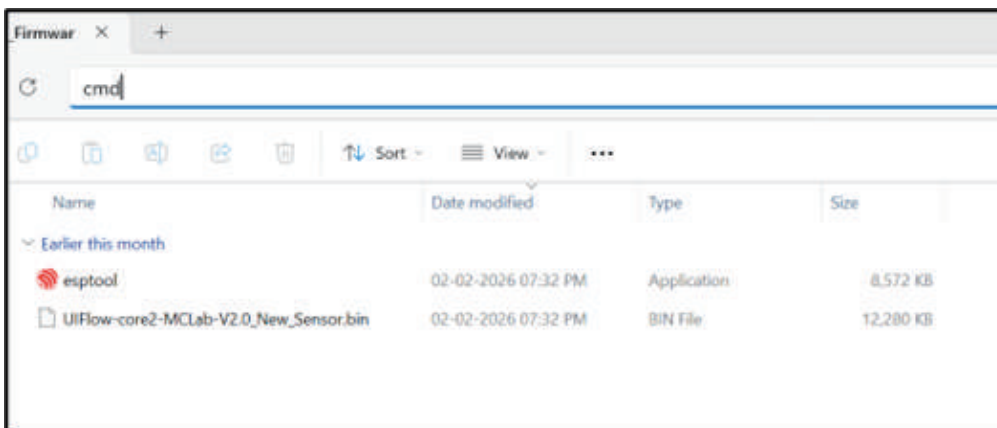
- Restart your computer.
- Reconnect the device.
- Check Device Manager again.

4. Firmware Flashing Procedure

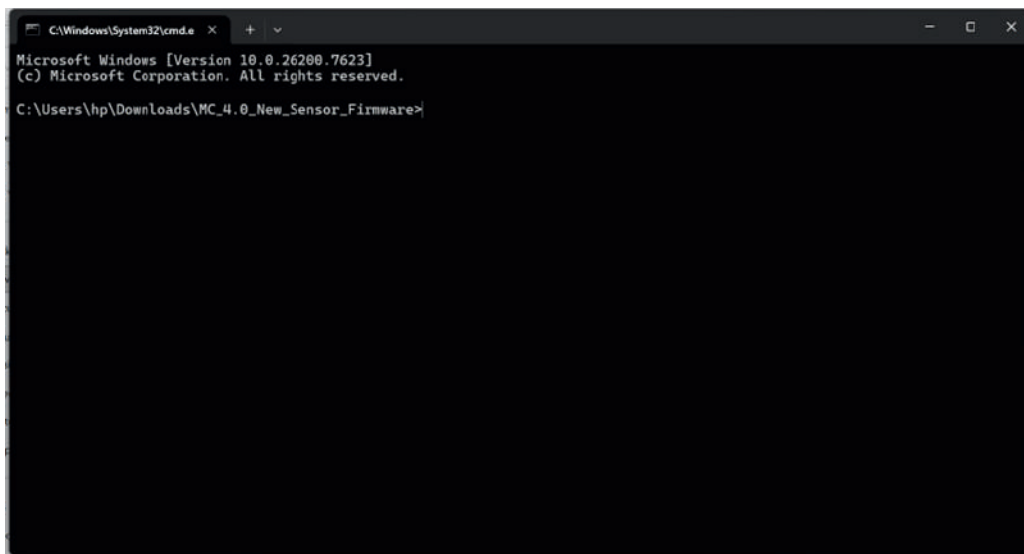
Step 1: Open the folder containing esptool.exe and the .bin file.



Step 2: Click the folder address bar, type 'cmd', and press Enter.



Step 3: Run the following command (replace COM5 with your COM port):

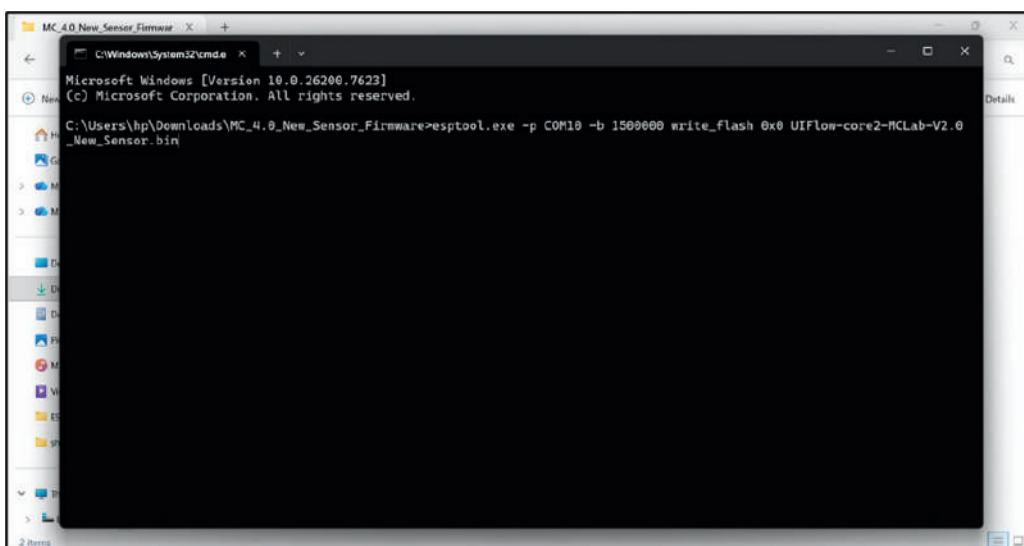


```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.26200.7623]
(c) Microsoft Corporation. All rights reserved.

C:\Users\hp\Downloads\MC_4.0_New_Sensor_Firmware>
```

Copy and Paste the command and check the COM Port.

esptool.exe -p COM5 -b 1500000 write_flash 0x0 UIFlow-core2-MCLab-V2.0_New_Sensor.bin



```
MC_4.0_New_Sensor_Firmware
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.26200.7623]
(c) Microsoft Corporation. All rights reserved.

C:\Users\hp\Downloads\MC_4.0_New_Sensor_Firmware>esptool.exe -p COM19 -b 1500000 write_flash 0x0 UIFlow-core2-MCLab-V2.0
_New_Sensor.bin
```

Press Enter to start flashing.

```
MC 4.0 New Sensor Firmware x +
C:\Windows\System32\cmd.exe x +
Microsoft Windows [Version 10.0.26200.7623]
(c) Microsoft Corporation. All rights reserved.

C:\Users\hp\Downloads\Mc_4.0_New_Sensor_Firmware>esptool.exe -p COM10 -b 1500000 write_flash 0x0 UIFlow-core2-MCLab-V2.0
_New_Sensor.bin
esptool.py v4.11.0
Serial port COM10
Connecting...
Detecting chip type... ESP32
Chip is ESP32-D0W0Q6-V3 (revision v3.1)
Features: WiFi, BT, Dual Core, 240MHz, VRef calibration in efuse, Coding Scheme None
Crystal is 40MHz
MAC: 3c:8a:1f:d7:c8:e0
Uploading stub...
Running stub...
Stub running...
Changing baud rate to 1500000
Changed.
Configuring flash size...
Flash will be erased from 0x00000000 to 0x00bfffff...
Compressed 12574720 bytes to 2999169...
Writing at 0x0006a7cd... (7 %)

```

5. Flashing Process

During flashing, you may see messages like:

- Connecting...
- Writing at 0x00000000...
- Hash verified.

If successful, you will see: Hard resetting via RTS pin...

```
C:\Windows\System32\cmd.exe x +
Microsoft Windows [Version 10.0.26200.7623]
(c) Microsoft Corporation. All rights reserved.

C:\Users\hp\Downloads\Mc_4.0_New_Sensor_Firmware>esptool.exe -p COM10 -b 1500000 write_flash 0x0 UIFlow-core2-MCLab-V2.0
_New_Sensor.bin
esptool.py v4.11.0
Serial port COM10
Connecting...
Detecting chip type... ESP32
Chip is ESP32-D0W0Q6-V3 (revision v3.1)
Features: WiFi, BT, Dual Core, 240MHz, VRef calibration in efuse, Coding Scheme None
Crystal is 40MHz
MAC: 3c:8a:1f:d7:c8:e0
Uploading stub...
Running stub...
Stub running...
Changing baud rate to 1500000
Changed.
Configuring flash size...
Flash will be erased from 0x00000000 to 0x00bfffff...
Compressed 12574720 bytes to 2999169...
Wrote 12574720 bytes (2999169 compressed) at 0x00000000 in 53.5 seconds (effective 1879.8 kbit/s)...
Hash of data verified.

Leaving...
Hard resetting via RTS pin...

C:\Users\hp\Downloads\Mc_4.0_New_Sensor_Firmware>

```

6. Troubleshooting

Failed to Connect Error Solution:

1. Press and hold the BOOT button on MC4.0.
2. Press Enter to run the command.
3. Release the BOOT button once flashing starts.

If COM port is not showing:

1. Check driver installation.
2. Try a different USB port.
3. Use a different data cable.
4. Close Arduino IDE or other serial software.

After Flashing

1. Disconnect the device.
2. Reconnect it.
3. The MC4.0 will boot with the new firmware.

7. I2C Sensor Wiring

The MC4.0 kit includes an ultrasonic I2C sensor and a 6-channel line-follower I2C sensor, that can be easily controlled using the block-based programming language. With the latest sensor update, multiple sensors can now be connected in series using a single port, significantly reducing port usage on the controller and allowing more efficient hardware expansion.

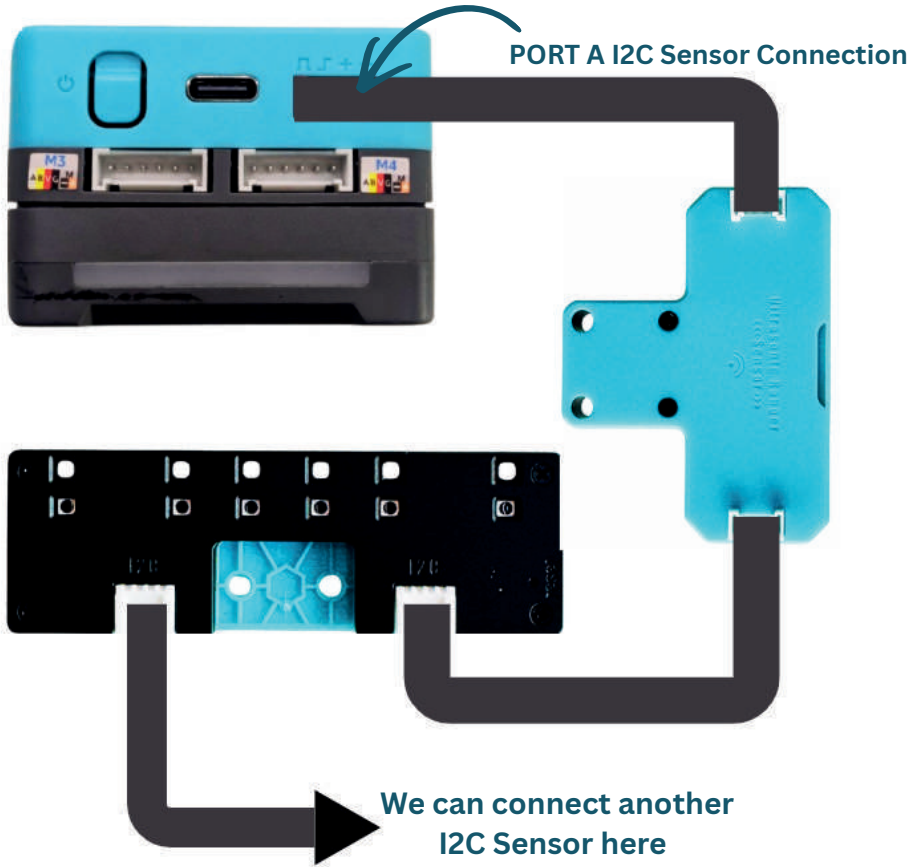
The ultrasonic sensor features RGB eyes that enable object detection and accurate distance measurement. The line-follower sensor identifies variations between dark and light surfaces, allowing the MC4.0 to follow paths, tracks, or predefined courses with precision.



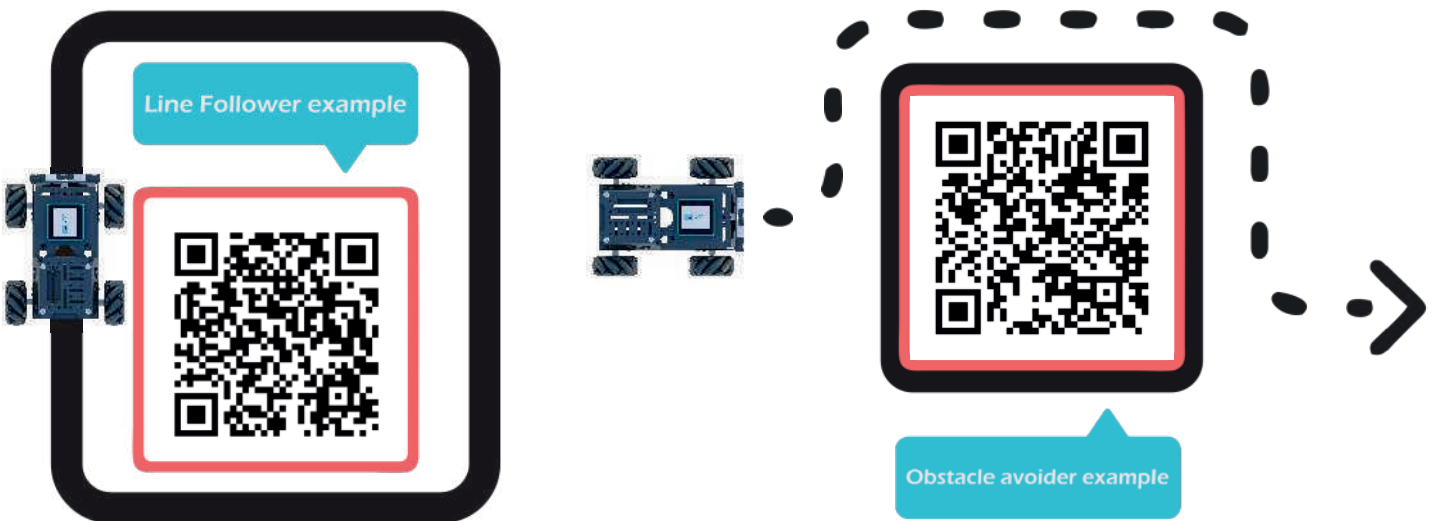
RGB Ultrasonic I2C Sensor



6-way-Color Line Follower I2C Sensor



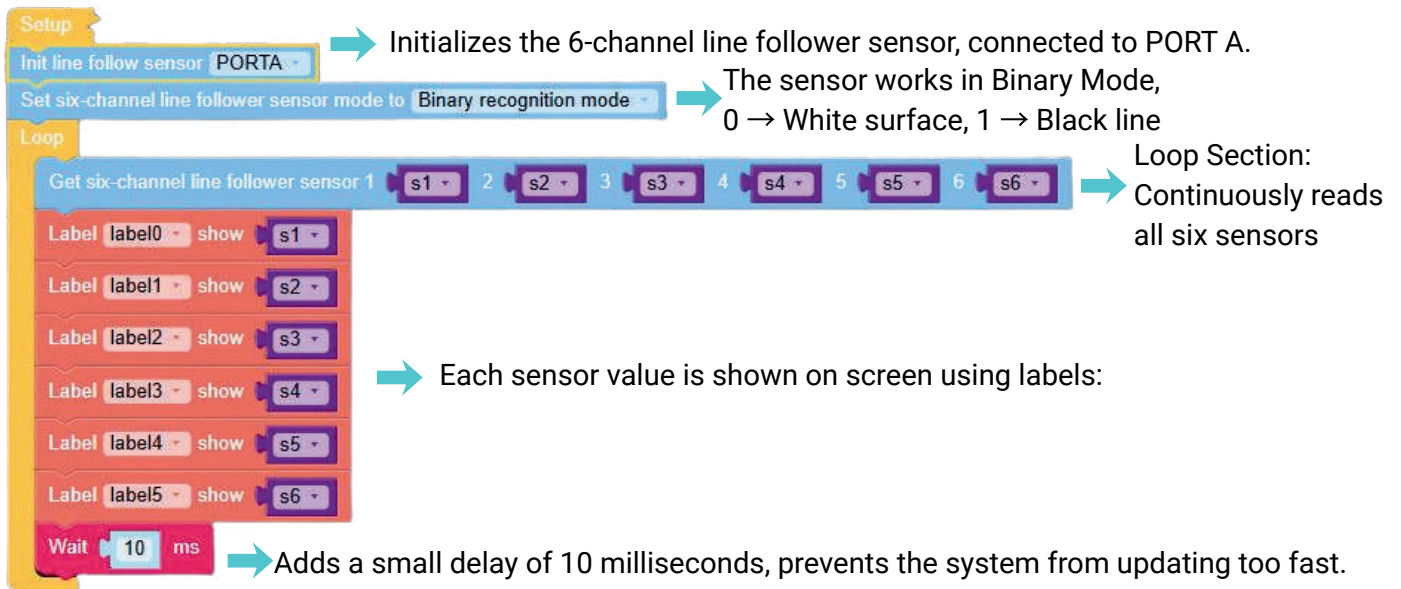
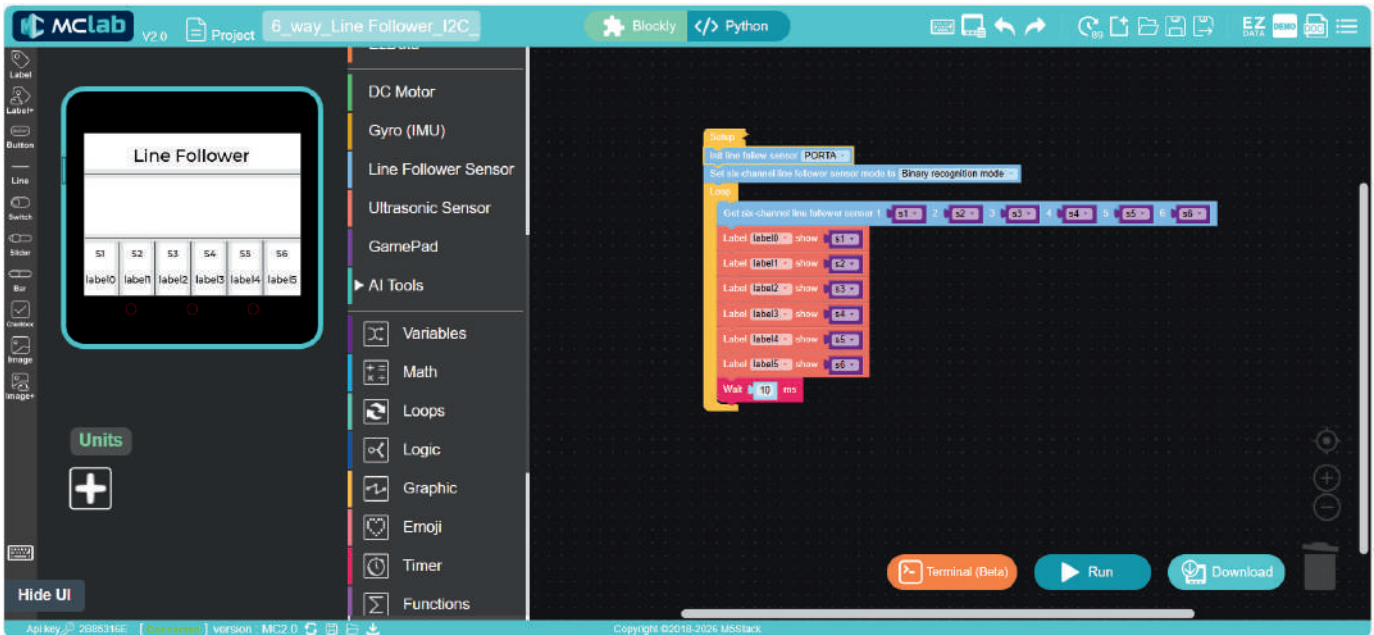
Let's try the examples of these two Sensors



8. I2C Sensor Program

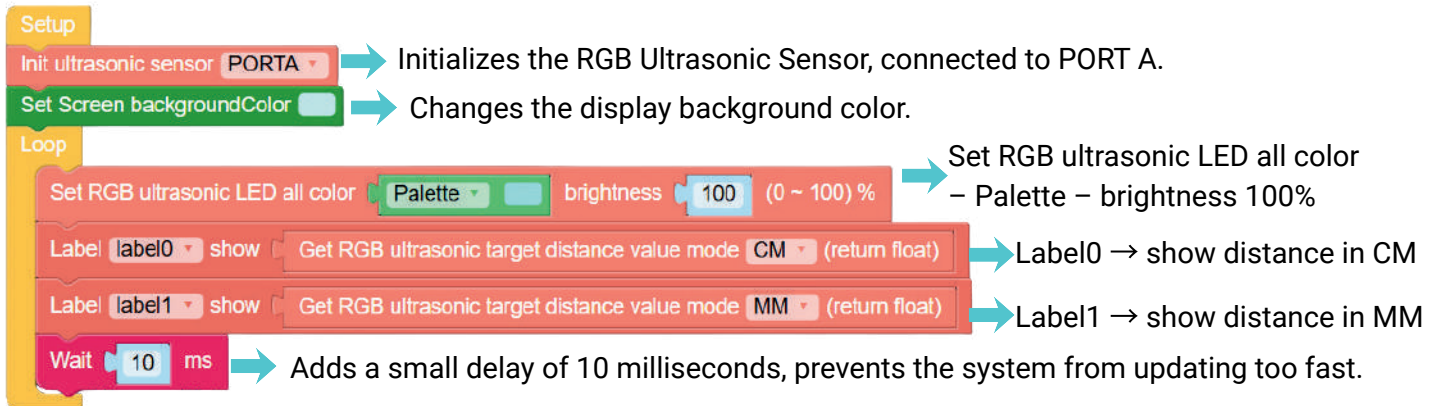
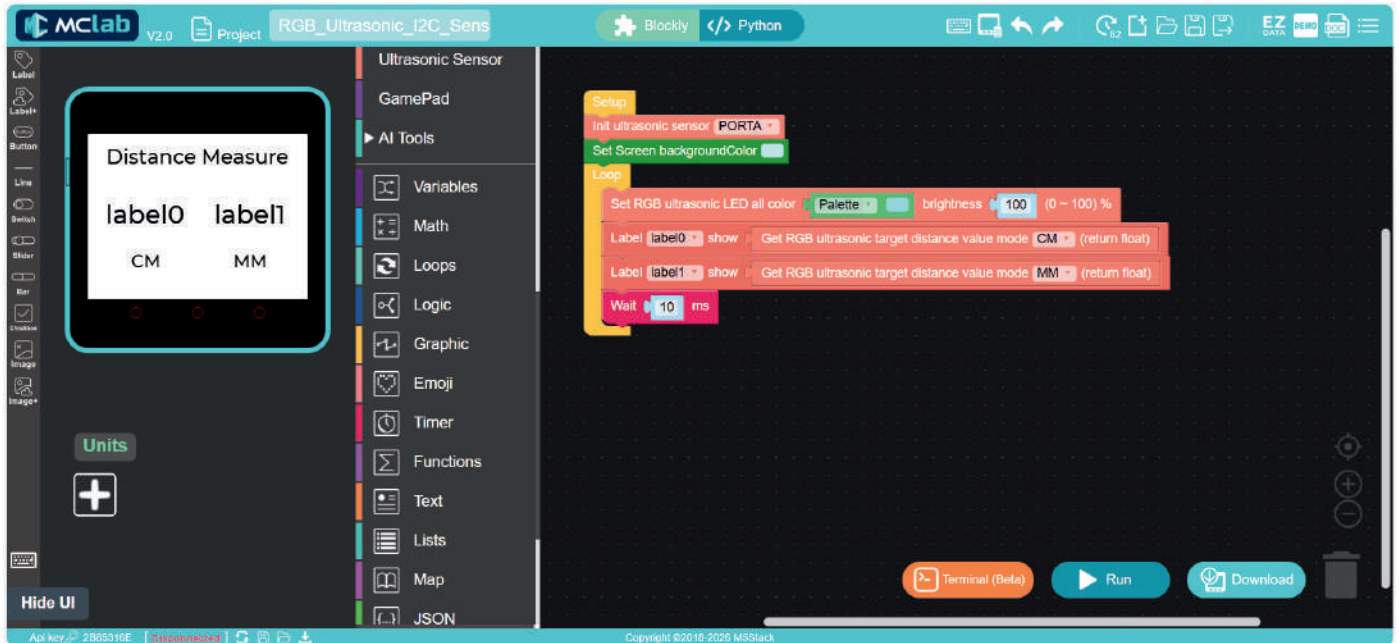
6-Way Color Line Follower (I2C) Program

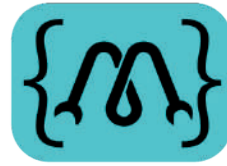
The following block program in MClab is used to read values from a 6-channel line follower sensor and display each sensor's output continuously.



RGB Ultrasonic Sensor (I2C) Program

The following program in MClab is used to measure distance using an RGB Ultrasonic sensor and display the values on the screen continuously.





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