



MU Vision Sensor III Programming Guide

For MakeCode



V0.8.2

2019/07/10

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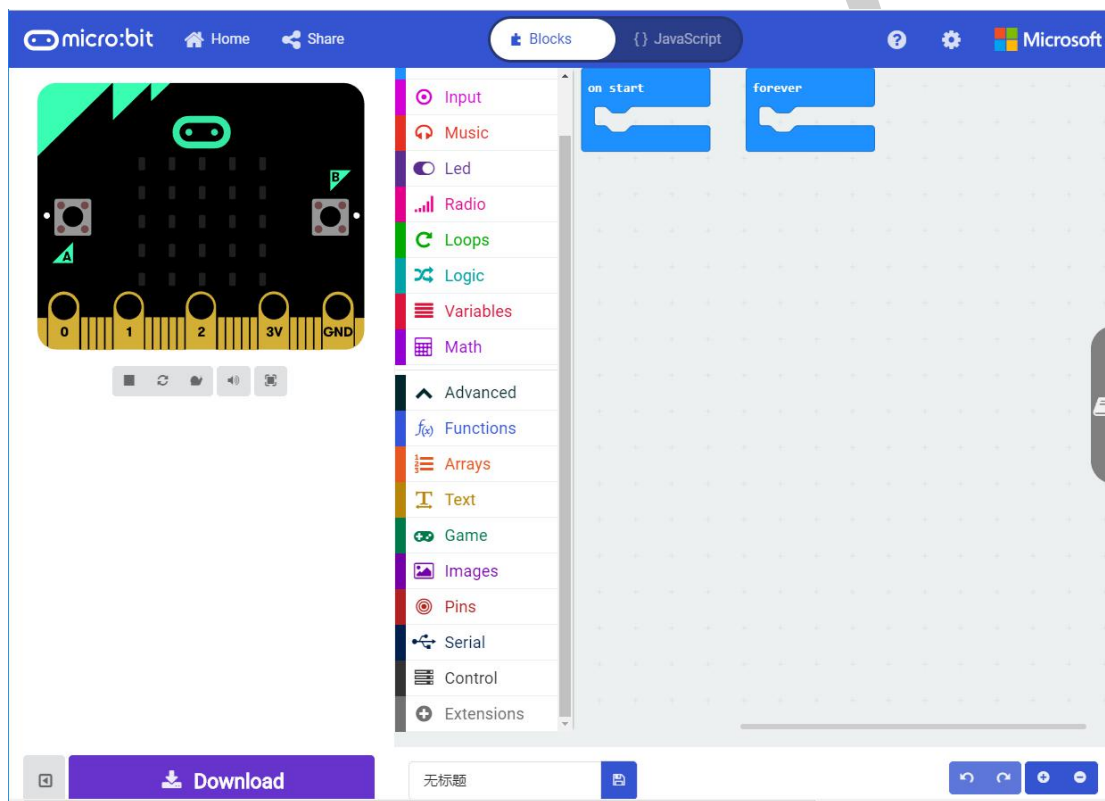
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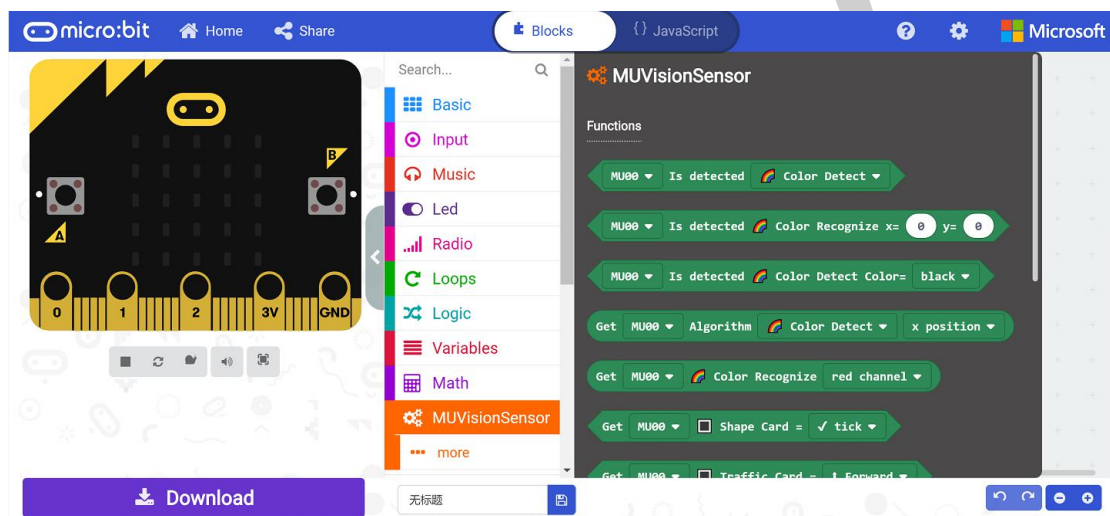
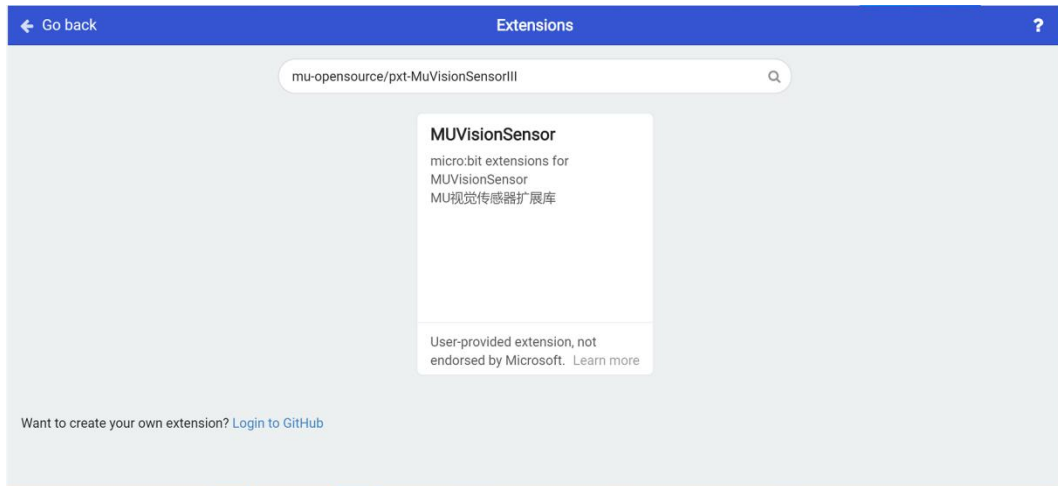
- The information in this manual applies to the MU Vision Sensor III produced by Morpx Inc. Please check the Morpx Inc' s website <http://www.morpx.com> for the latest version of the firmware and library functions. Updates are subject to change without notice.
- Please read this manual carefully before using MU Vision Sensor and make sure you understand it, incorrect operation may cause the device to stop working , worse detection results, or even damaging the device.
- Morpx Inc will not warrant the damage caused by unauthorized repair or modification of electronic components on the product.
- The technical solution, vision algorithms, communication protocol mentioned in this manual is developed by Morpx and protected by intellectual property rights. No organization or individual may copy or plagiarize the technical achievements of Morpx Inc. In case of any infringement, Morpx will take legal actions to protect its rights.
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1. Import Extensions

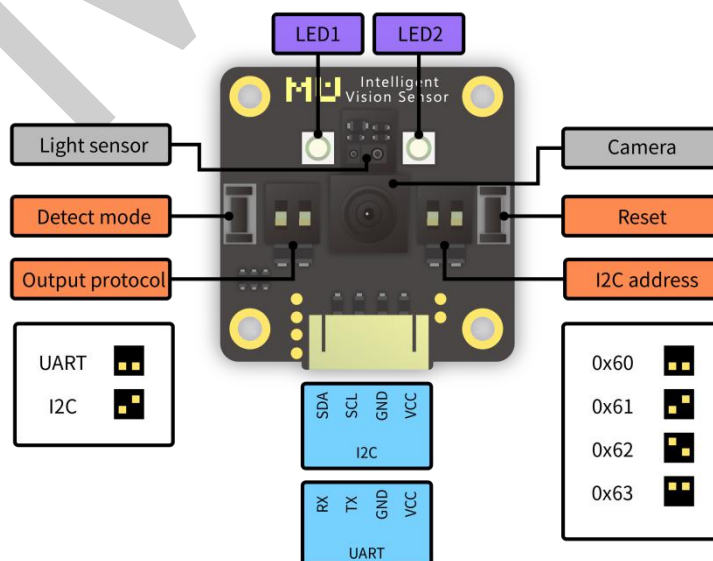
(1) Run MakeCode (open <https://MakeCode.microbit.org/> in the web browser or use an offline version of MakeCode, which can be downloaded from Microsoft MakeCode website (<https://www.microsoft.com/en-us/makecode>)). Start a new project, find *Extensions* in *Advanced* menu.



(2) Type “mu-opensource/pxt-MuVisionSensorIII” in the search box, click search and find ‘MUVisionSensor’ from the results list. Click to import the extension into MakeCode.



2. Connect to Micro:bit



2.1 I2C Mode (recommended)

(1) Output Protocol Switch: set switch 1 downwards and switch 2 upwards

(2) Connect the output Pin1(SDA) to the Pin20 of Micro:bit, and Pin2(SCL) to Pin19 of Micro:bit

(3) Choose the I2C address of MU sensor by resetting Address Switch. By default, both switches are downward and the address is set to 0x60. (Changing this setting is not recommended)

2.2 Serial Mode*

(1) Output Protocol Switch: both switches are downward

(2) Connect the output Pin1(RX) to Pin13(TX) of Micro:bit and Pin2(TX) to Pin16(RX) of Micro:bit

(3) Change the UART address of MU sensor by resetting Address DIP Switches. By default, both switches are downward and the address is 0x60. (Changing this setting is not recommended)

** Micro:bit cannot send messages to PC when MuVisionSensor is running in serial mode, due to a communication conflict.*

**The default communication baud rate is 9600 and cannot be modified.*

3. Instructions of the Programming Blocks

3.1 Initialization

(1) I2C Mode



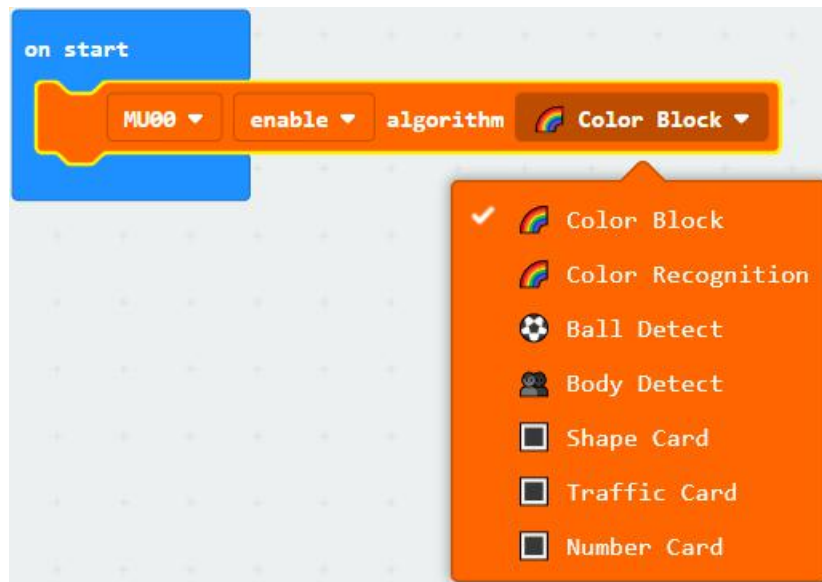
(2) Serial Mode



In serial mode, two pins are defined as TX & RX respectively, according to the hardware connection to the MU Vision Sensor.

3.2 Enable Vision Algorithms

7 recognition algorithms are integrated in current firmware(Version A).For detailed information please refer to the datasheet of MU vision sensor.



3.3 Set Performance Level

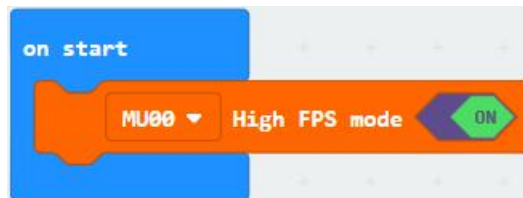
Algorithm performance differs in accuracy and speed. Performance settings can be changed to fit in certain applications.

Default setting: Balance level.



3.4 Enable/Disable the High FPS Mode

The camera is in high FPS mode by default, which has a higher speed than normal mode. High FPS mode can be turned off to save power.



3.5 Set White Balance Mode

Ambient light will influence the detect result of the vision sensor, especially color detection and recognition.

In complex light environment or in color recognition mode, it is recommended to lock white balance. Reset the vision sensor, and put it in front of a white paper to measure brightness. A few seconds later, white balance will be locked.



3.6 Set Digital Zoom Level

Larger digital zoom level means longer detectable distance, and field of view

is narrower meanwhile.

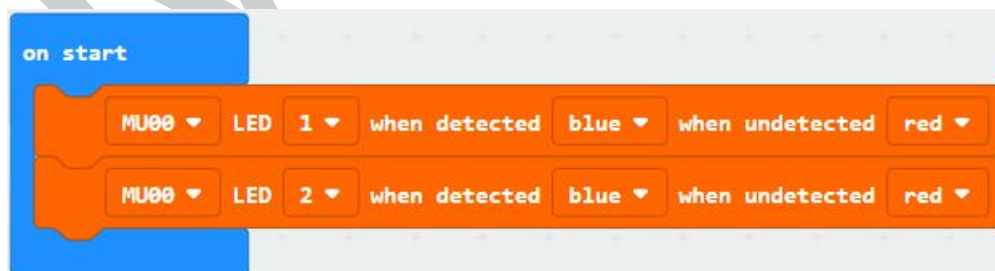
To get a better detect results, set a proper zoom level for the algorithm and test it.



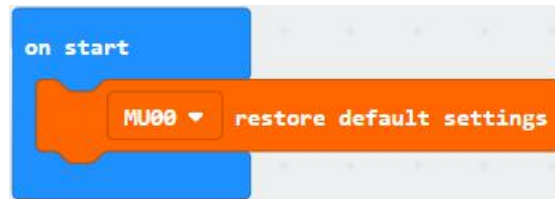
3.7 LED Settings

Two on-board LED lights can be programmed to shine different colors when The sensor has detected an object or not.

Default setting: When undetected objects , two lights are red and when detected they are blue.



3.8 Restore Default Settings



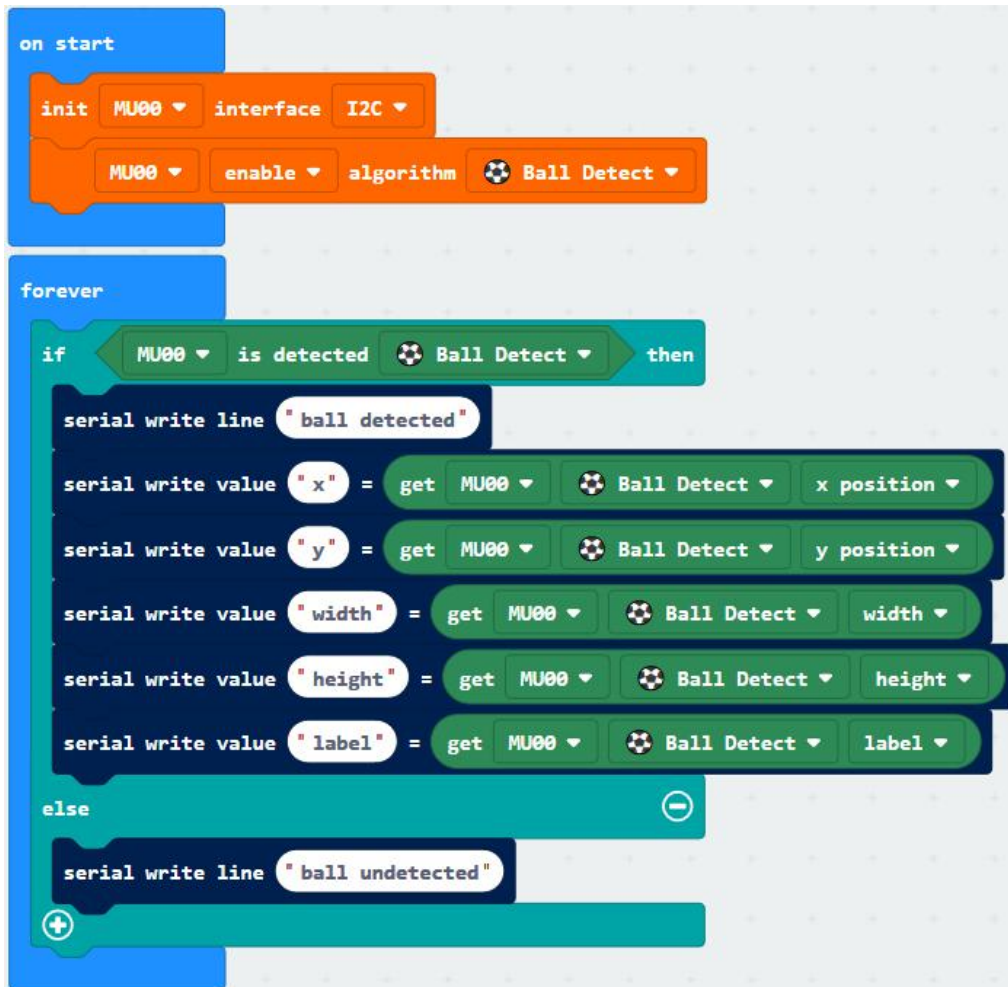
3.9 Get Detection Results

(1) Ball/Body Detection

Setup program: Init I2C connection, and set algorithm to ball detect. Other settings are default.

Loop program: If MU detected a ball, it will send data to Micro:bit through I2C interface. And PC get the data from Micro:bit through USB serial port. The data contains position and size of the ball.

Actual result: After resetting MU and Micro:bit, LED lights flash red. When MU detected a ball, LED lights flash blue and Makecode console will display the data.



(2) Card Detection

Setup program: Init I2C connection, and set algorithm to traffic card. Other settings are default.

Loop program: If MU detected traffic card, it will send data to Micro:bit through I2C interface. And PC get the data from Micro:bit through USB serial port. The data contains position, size and type of the traffic card.

Actual result: After resetting MU and Micro:bit, LED lights flash red light.

When MU detected a traffic card, LED lights flash blue and Makecode console will display the data.



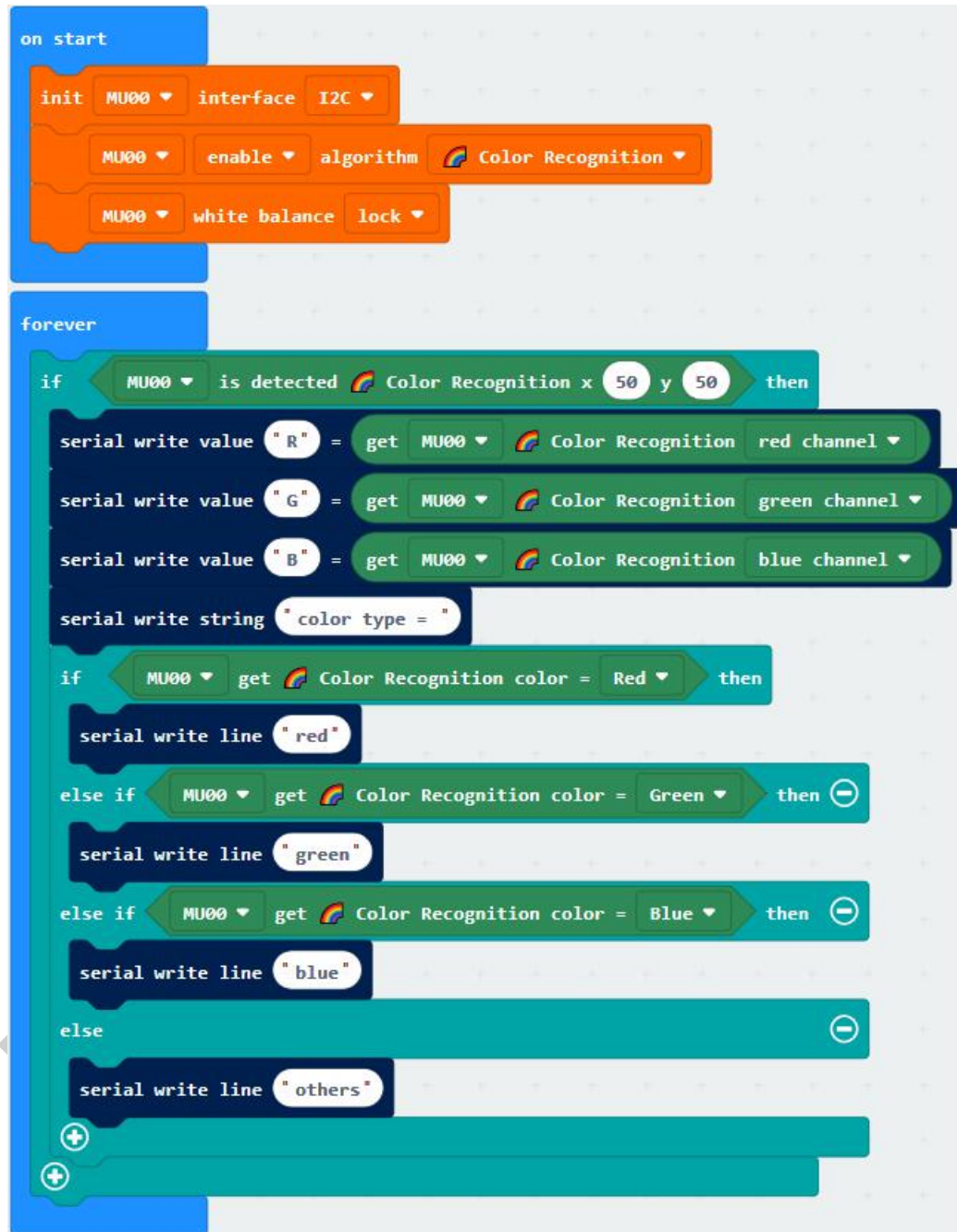
(3) Color Recognition

Setup program: Init I2C connection, and set algorithm to color recognition.

Lock the white balance to get a higher accuracy. Other settings are default.

Loop program: If MU detected color at (50,50), it will send data to Micro:bit through I2C interface. And PC get the data from Micro:bit through USB serial port. The data contains RGB channel and type of the color.

Actual result: After resetting MU and Micro:bit, LED lights are off. Makecode console will display the data.

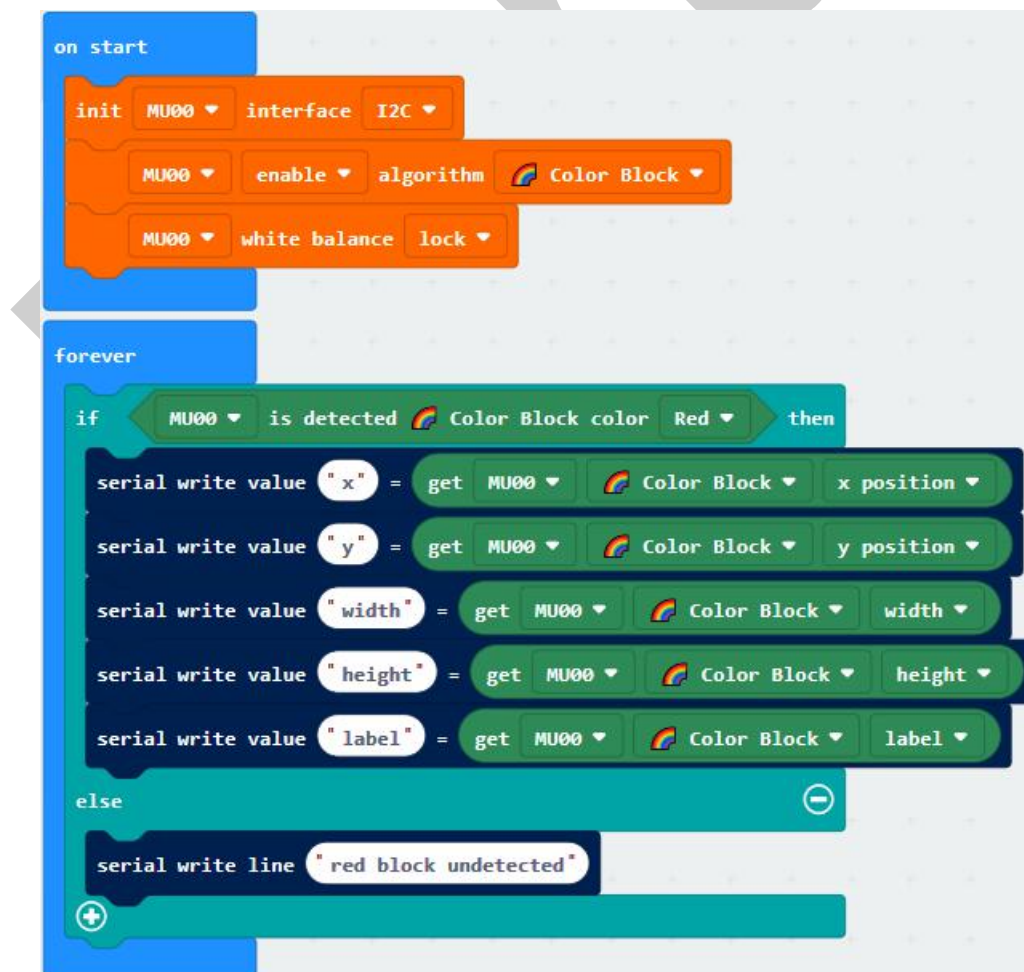


(4) Color Block Detection

Setup program: Init I2C connection, and set algorithm to color block. Lock the white balance to get a higher accuracy. Other settings are default.

Loop program: If MU detected a color block, it will send data to Micro:bit through I2C interface. And PC get the data from Micro:bit through USB serial port. The data contains position, size and type of the color block.

Actual result: After resetting MU and Micro:bit, LED lights flash red light. When MU detected a color block, LED lights flash blue and Makecode console will display the data.



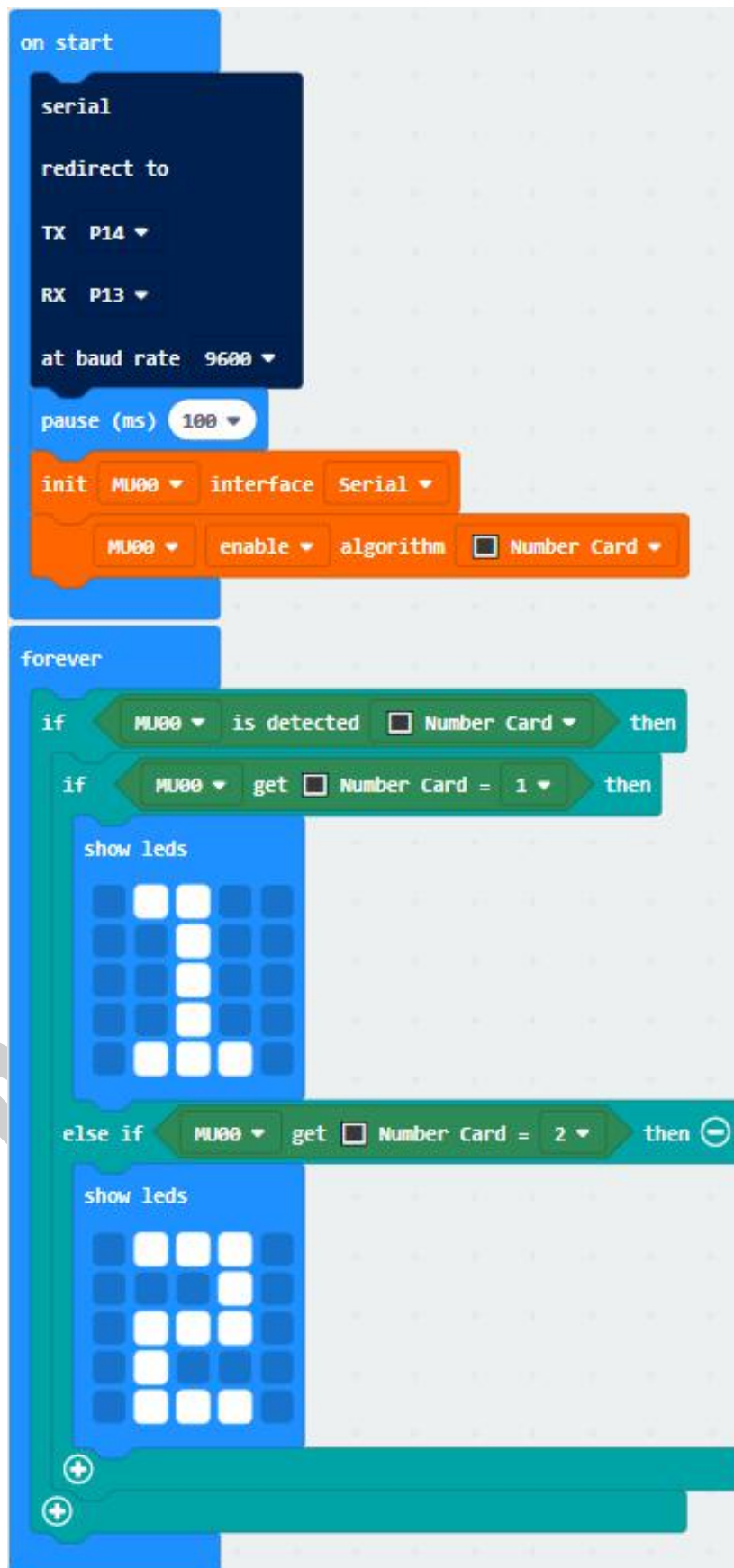
(5) Serial Mode Example

Change the output protocol switch to serial mode and connect MU to Micro:bit through serial port. In this mode PC cannot communicate with Micro:bit, so the led dot screen of the Micro:bit is used to display the data directly.

Setup program: redirect the serial port to P14 and P13, and select 'Number Card' algorithm. Other settings are default.

Loop program: If MU detects one number card, it will send data to Micro:bit through serial interface. The Micro:bit LED screen shows the number.

Actual result: After resetting MU and Micro:bit, LED lights flash red light. When MU detected a number 1 card, LED lights flash blue and Micro:bit screen shows 1.



Technical Support

Thanks for purchasing MU Vision Sensor III, and we would like to provide continuous updating service, please check to our website: www.morpx.com regularly. Updates are subject to change without notice. You can get the latest technical information from the following websites:

GitHub: <https://github.com/mu-open-source/>

Official Website: <http://mai.morpx.com/page.php?a=sensor-support>

If there is any problem, you can contact us through telephone +86-571-81958588 or by email: support@morpx.com.

Official Technical Support

Wechat ID



Official Technical Support

QQ ID



Revision

Date	Version	Release Notes
2019-3-28	V0.0.5-beta	Draft
2019-6-25	V0.8	Standardized this manual; Switched the repository address to " mu-opensource/MuVisionSensorIII-MakeCode" ; Replaced the photo of MU Vision Sensor; Corrected the setting of Output Mode DIP Switch in Serial Mode; Added the official technical support information; Corrected some other mistakes;
2019-7-10	V0.8.2	Added one serial communication mode example; Switched the repository address to " mu-opensource/MuVisionSensorIII-MakeCode" ;