

# MA300 User Manual



# MATRIX Mini R4 Controller

# MATRIX Mini R4 Controller

RGB LED 1

Buzzer

RGB LED 2

Status LED

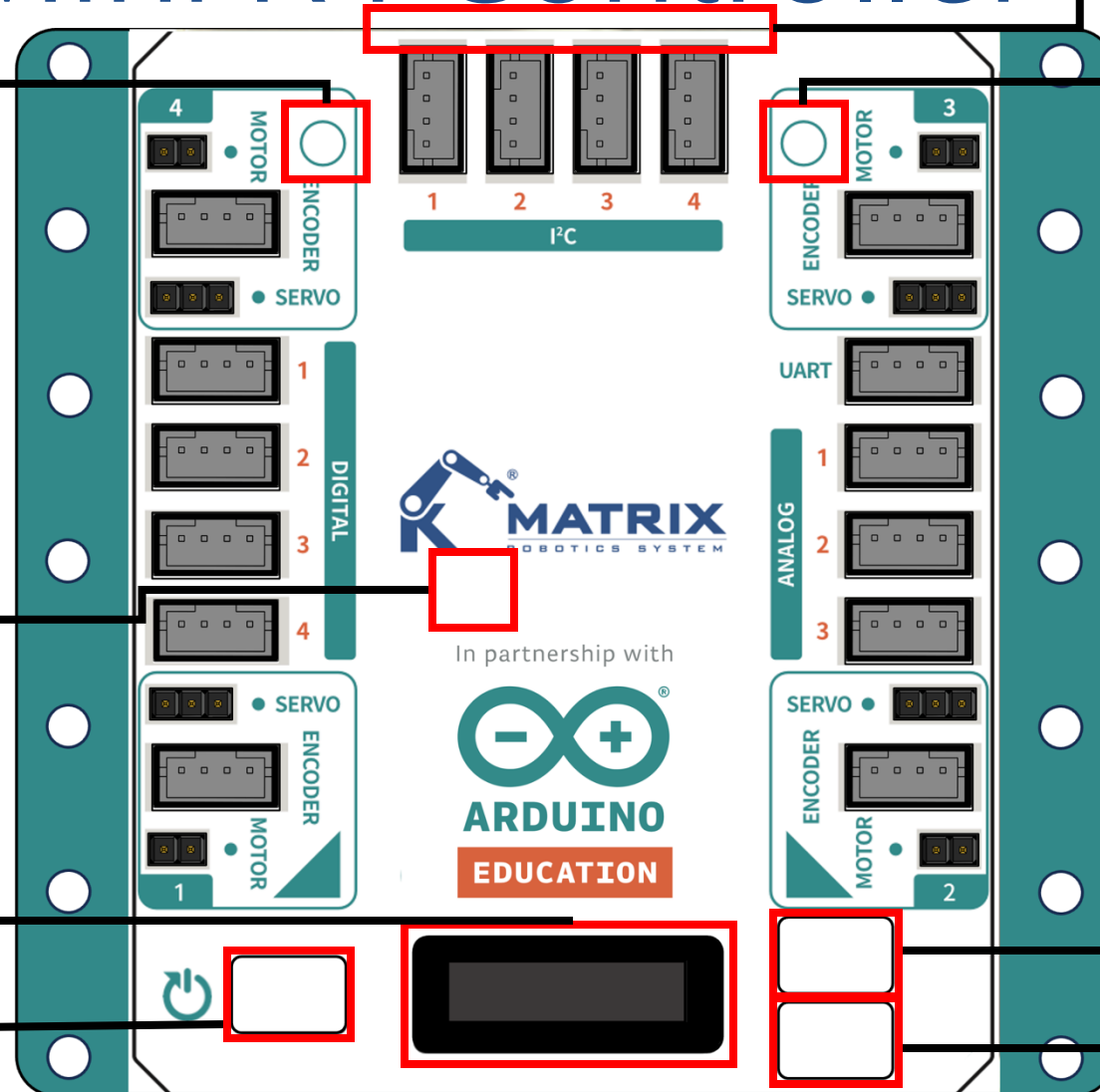
You can interact with the robot through these functions.

OLED

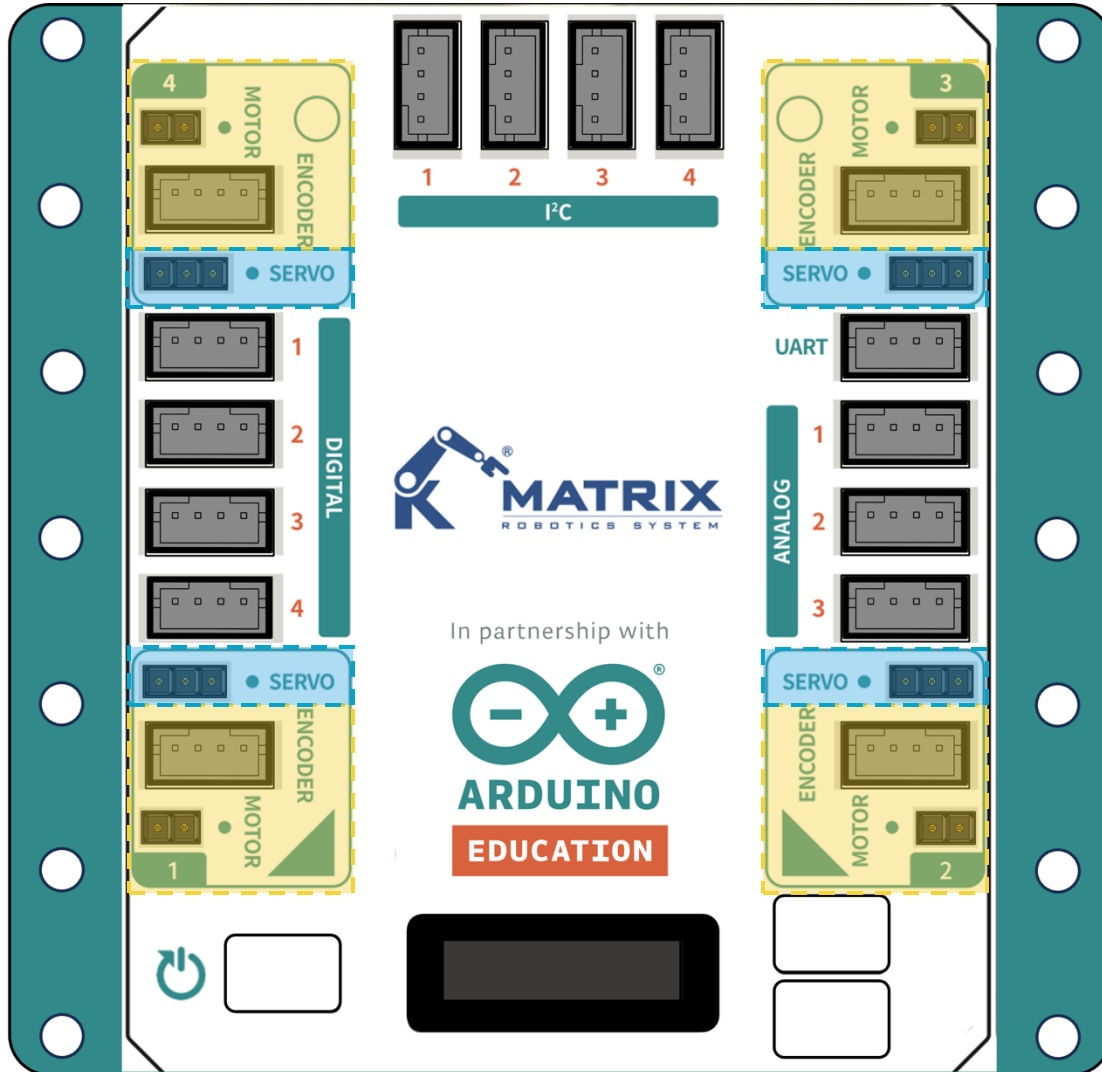
Reset Button

User Button Up



User Button Down

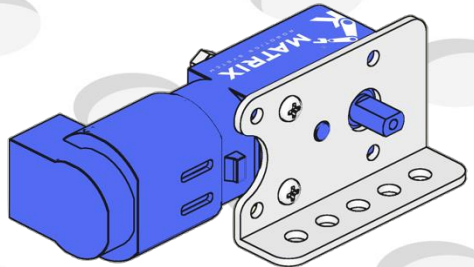


# Motor ports



## DC Encoder Motor

<b>ENCODER</b>  1 2 3 4	1	CH B
	2	CH A
	3	M5V
	4	GND
<b>DC MOTOR PORT</b>  1 2	1	M-
	2	M+

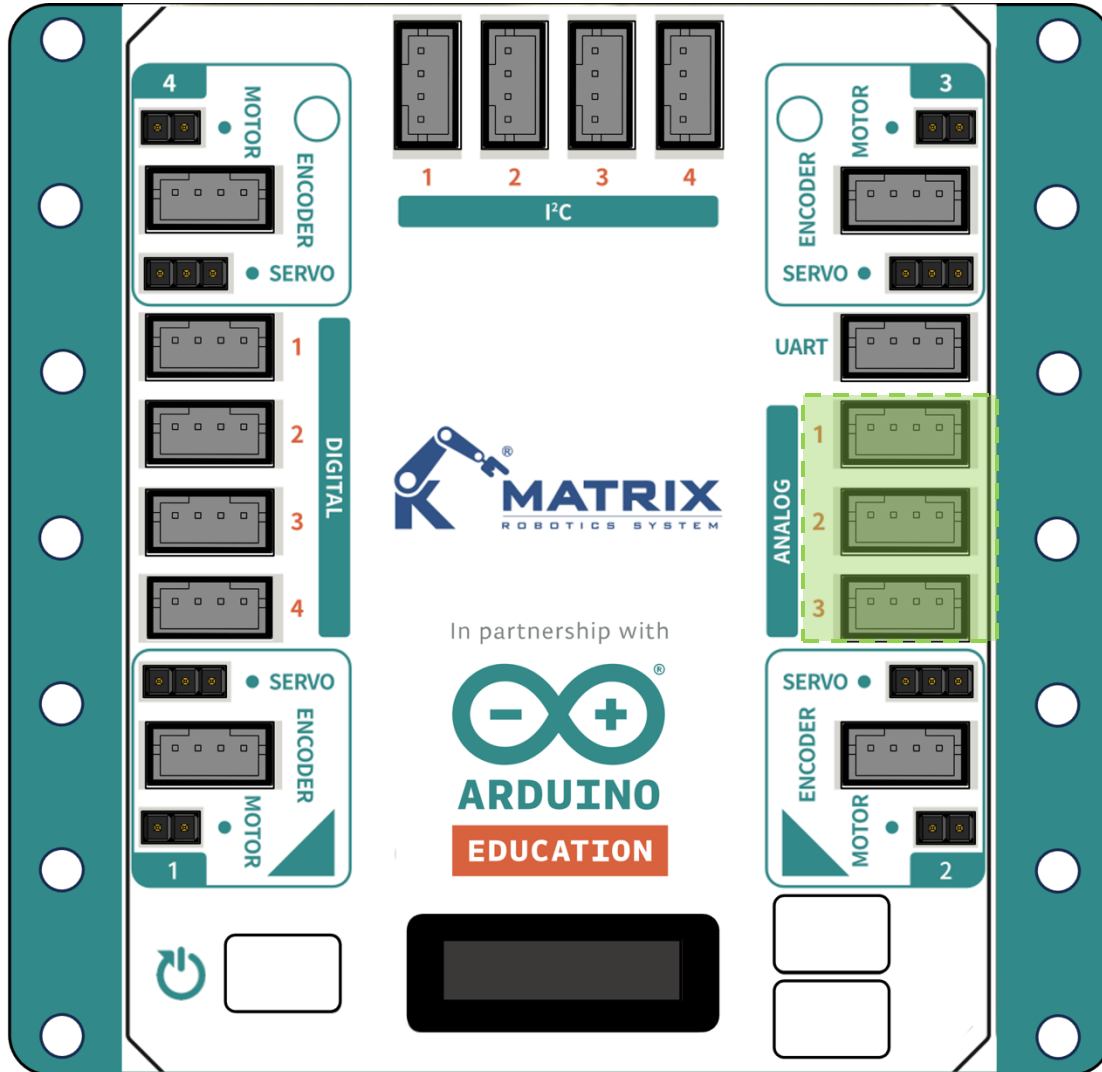


## RC Servo

<b>RC SERVO PORT</b>  1 2 3	1	GND
	2	M5V
	3	PWM




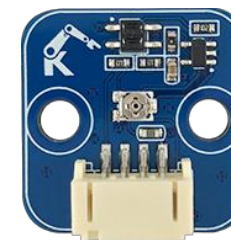
# Analog ports



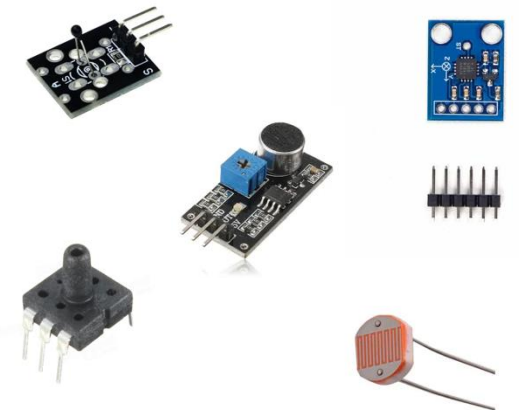
## Analog IN

The Mini R4 can be connected to and integrated with any analog sensor that supports Arduino.

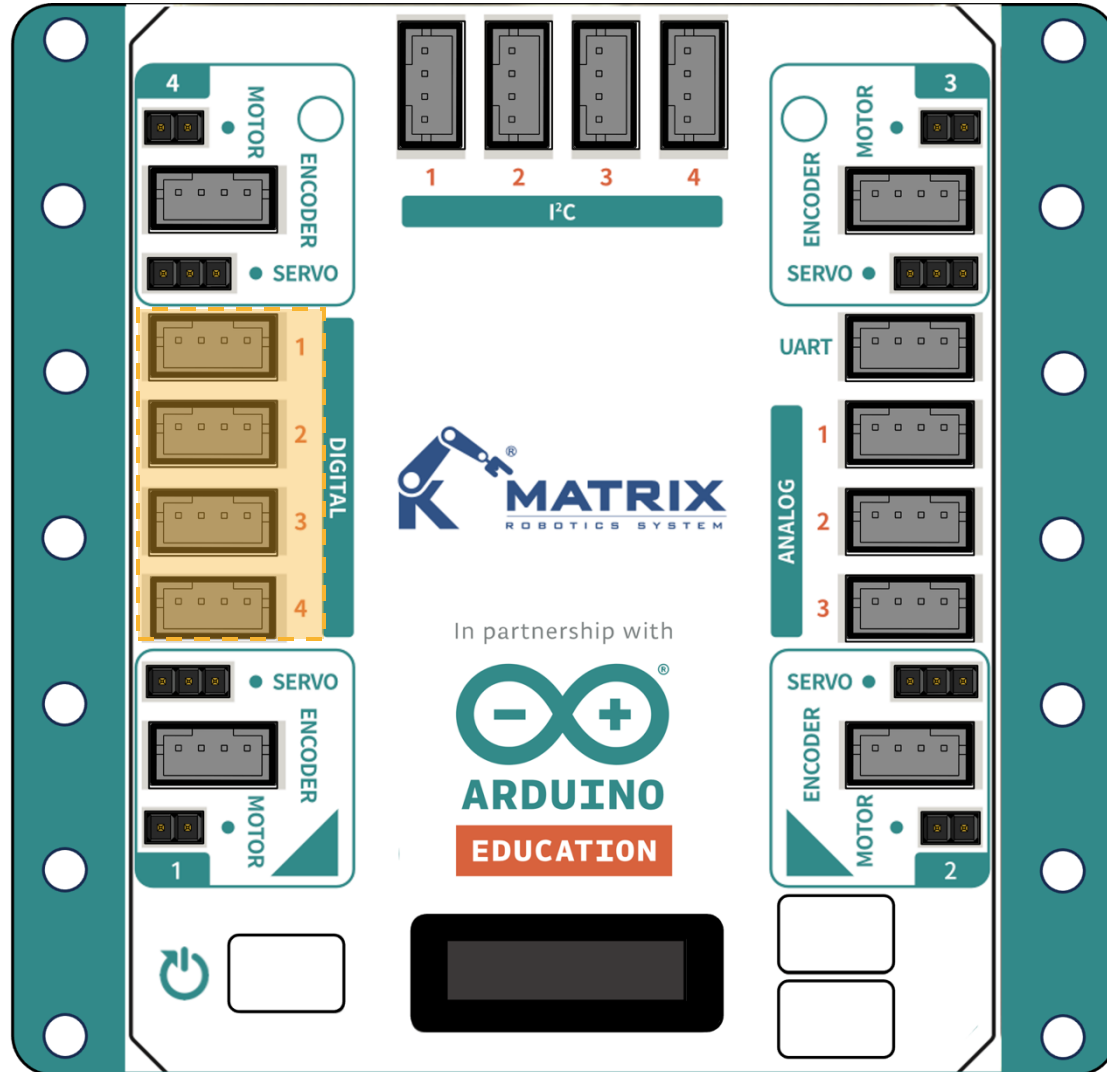
<i>ANALOG PORT</i>	1	AIN A
	2	AIN B
1	3	A5V
2	4	GND



Gray Scale



# Digital ports



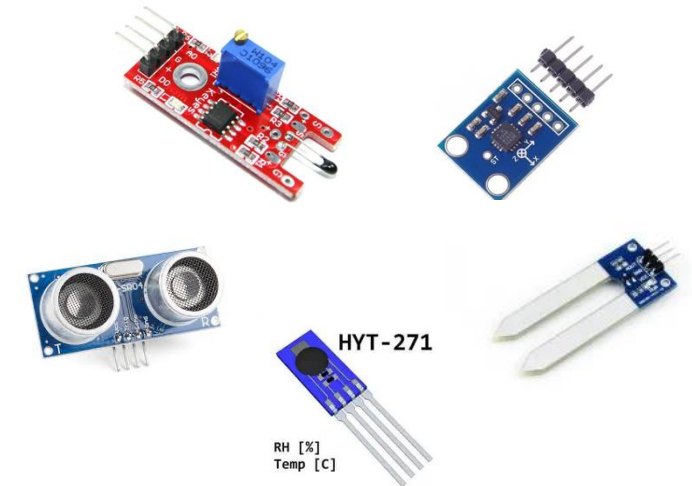
## Digital I/O

The Mini R4 can be connected to and integrated with any digital sensor that supports Arduino.

DIGITAL PORT	1	DIO A
	2	DIO B
	3	5V
	4	GND

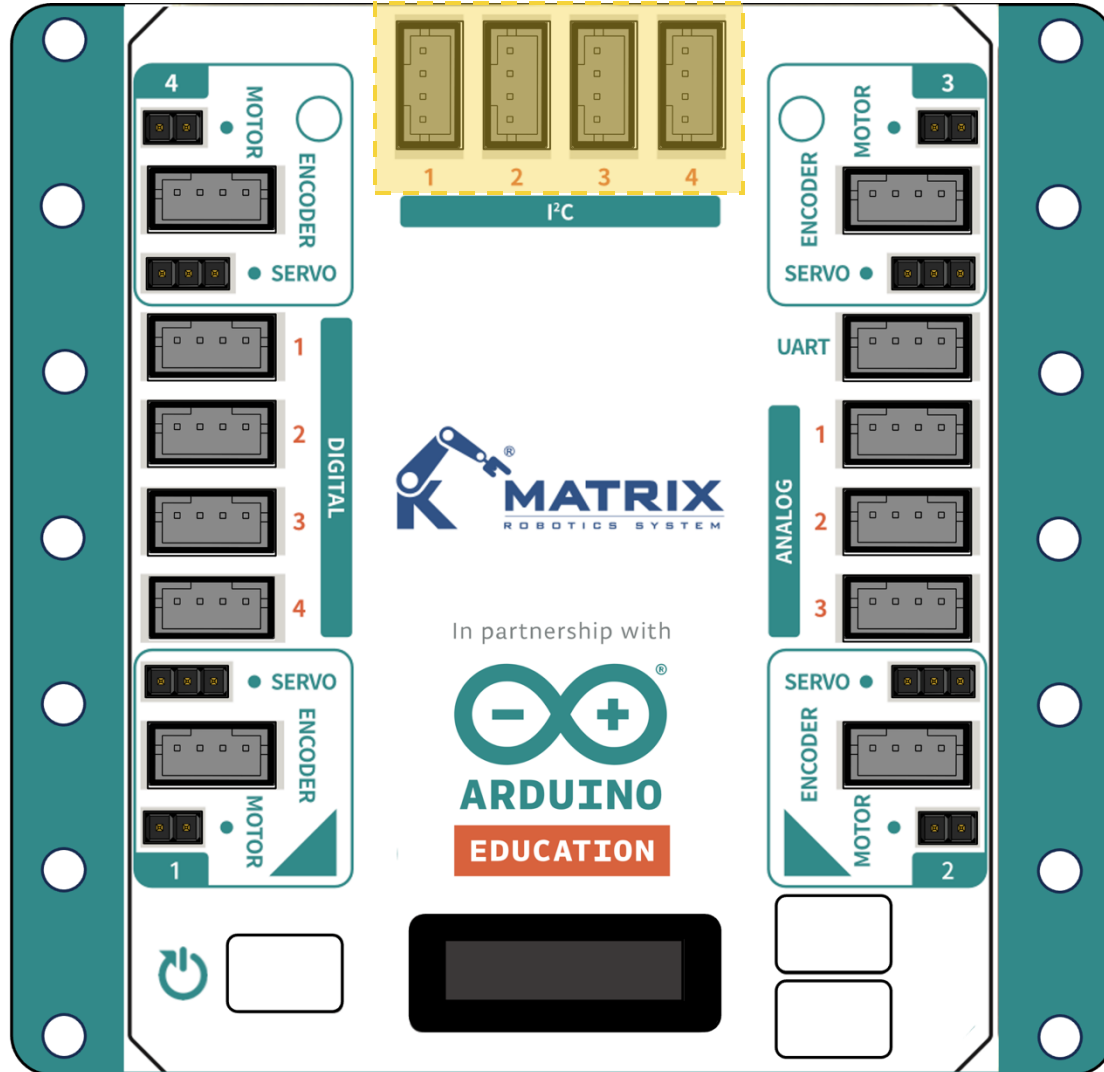


Miniature Switch





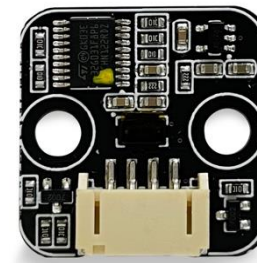
# I2C ports



## I2C I/O

The Mini R4 can be connected to and integrated with any I2C sensor that supports Arduino.

I <sup>2</sup> C	
1	SDA
2	SCL
3	5V
4	GND



Laser



Color



# MATRIX Mini R4 Controller



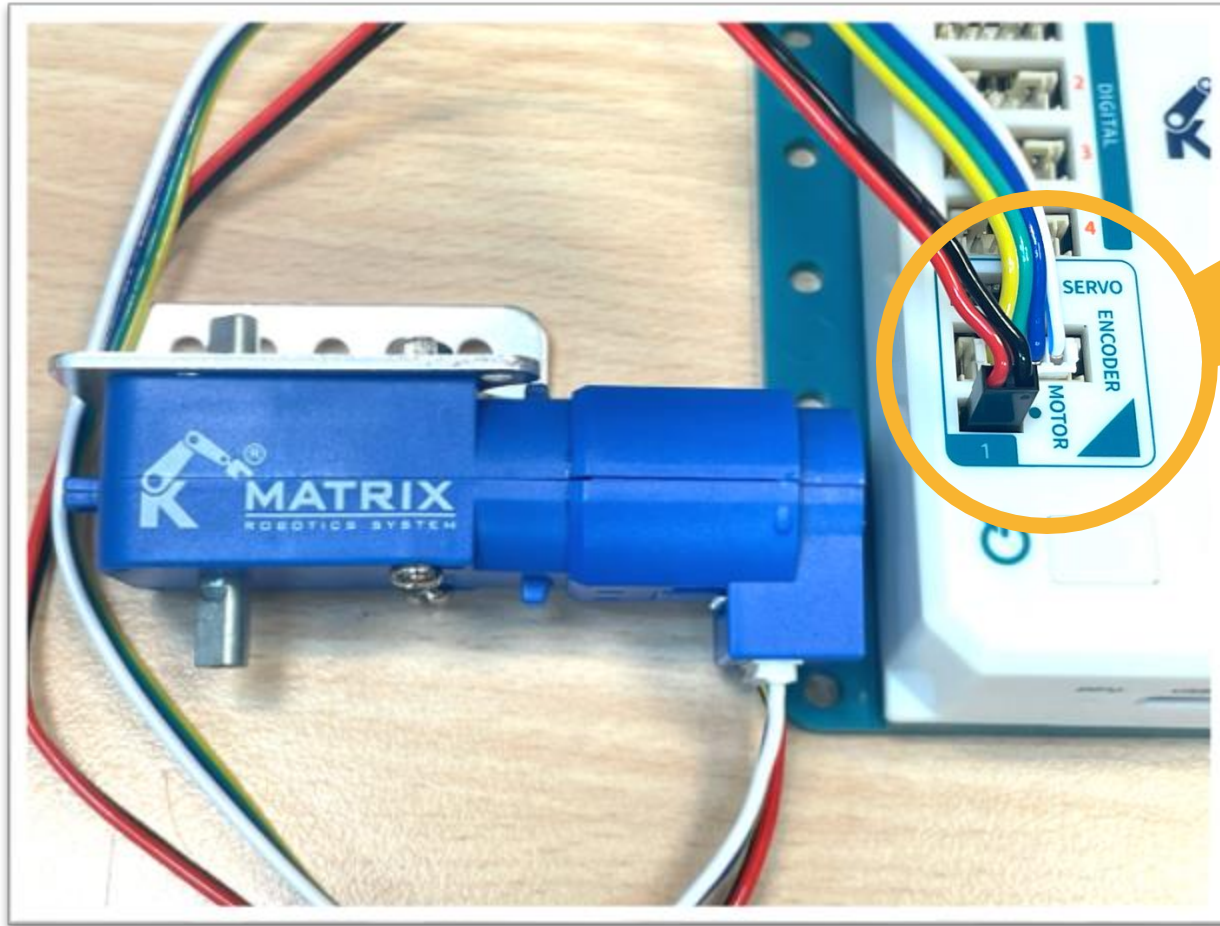
● Device Firmware Upgrade Button

● USB-C for Programming

● DC Input





# Connect the DC Motor



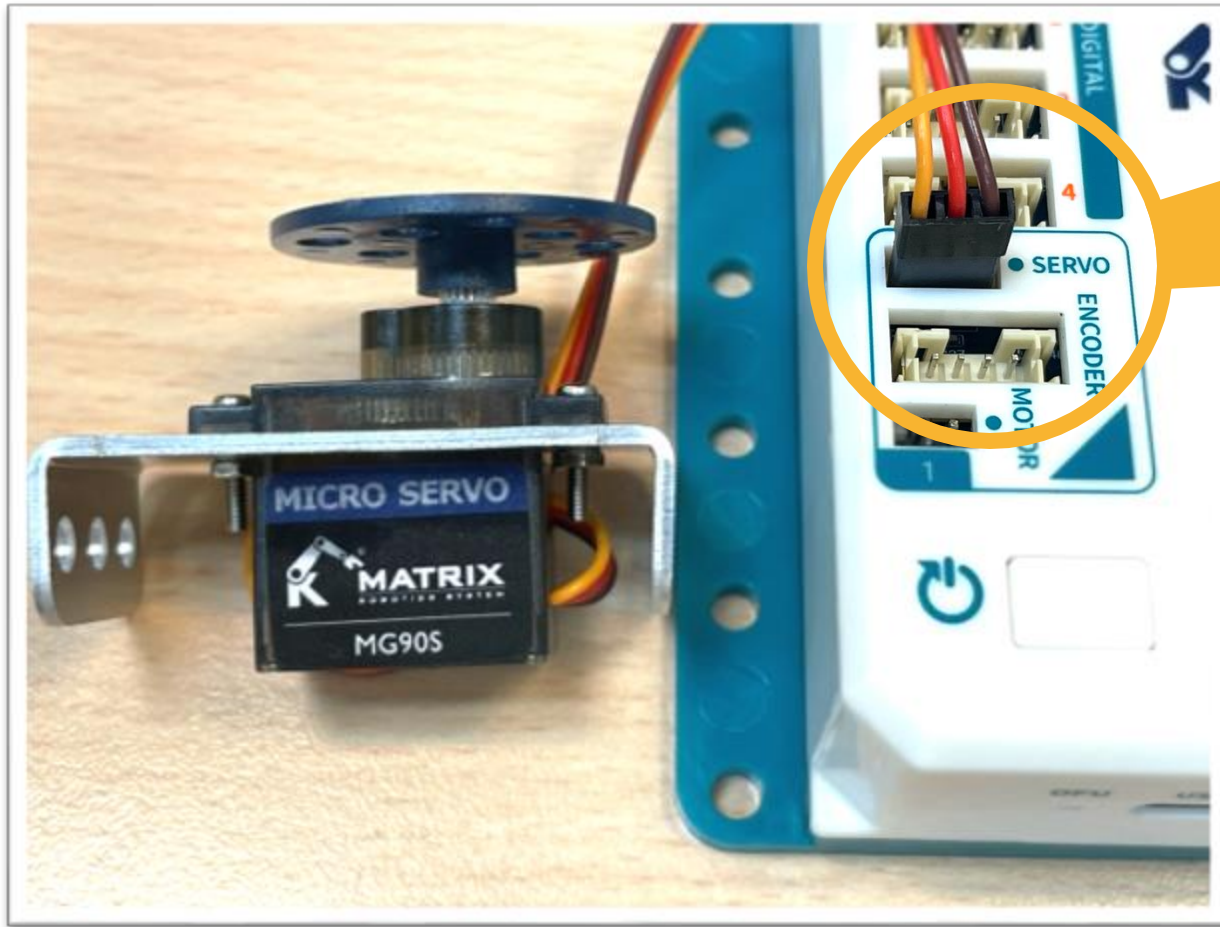
Using the wired to connect the DC Encoder motor and the Mini R4.

If used external motor, connect the wires to the Mini R4 in the following order.

DC MOTOR PORT	1	M-
	2	M+

ENCODER	1	CH B
	2	CH A
	3	M5V
	4	GND

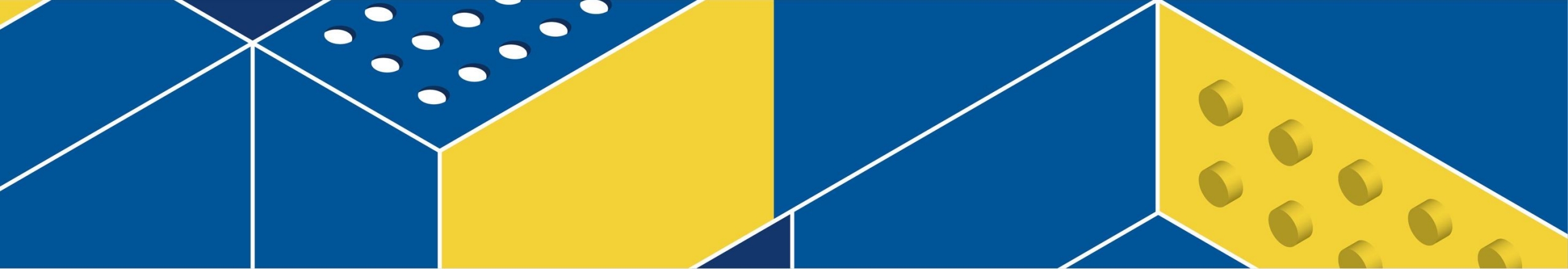
# Connect the RC Servo



Using the wired to connect the RC Servo and the Mini R4.

If used external servo, connect the wires to the Mini R4 in the following order.

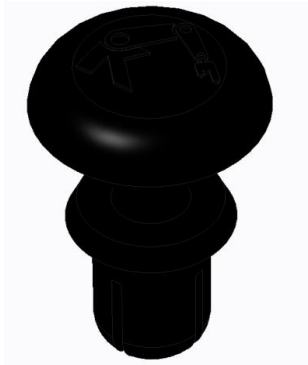
RC SERVO PORT	1	GND
	2	M5V
	3	PWM



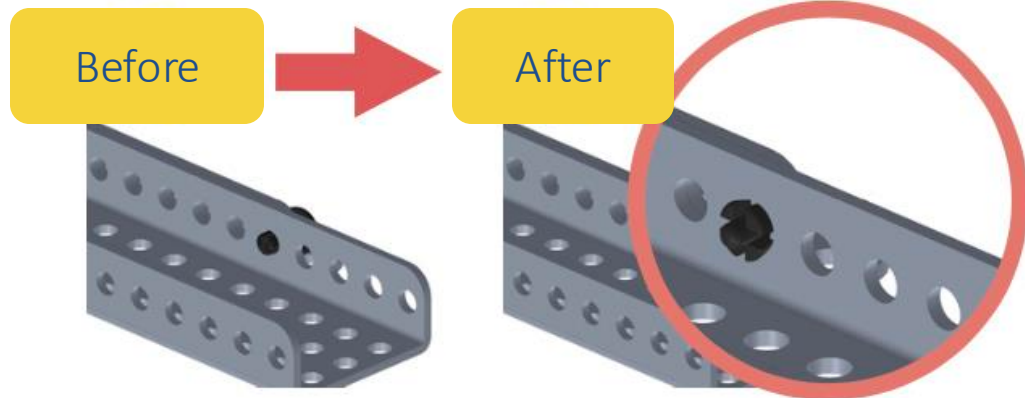
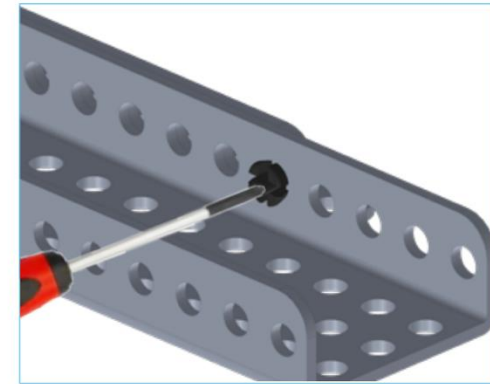
# Assembly techniques



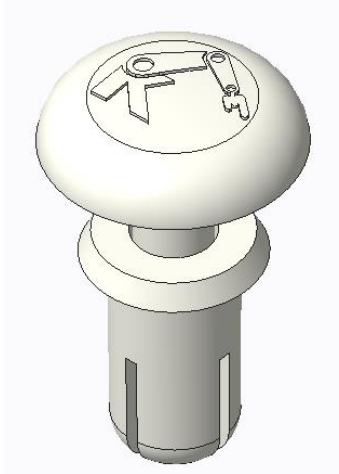
# Fastener Usage Instructions



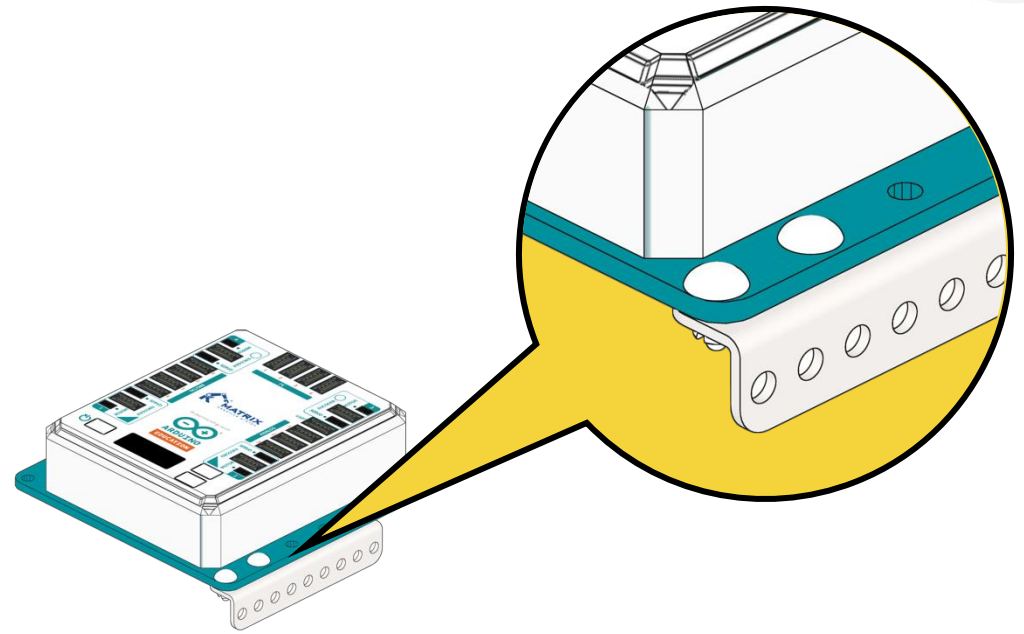
Black Short Fastener : Connect two pieces.



# Fastener Usage Instructions



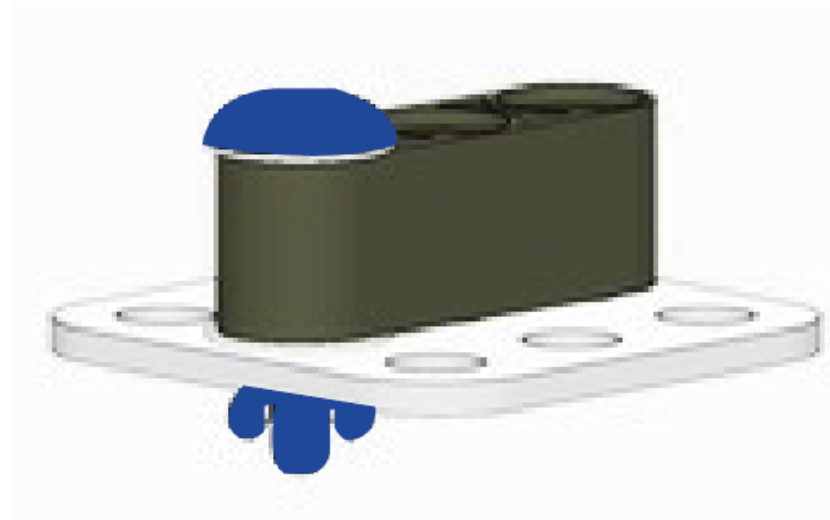
White Medium Fastener : Connect three layers of metal parts or for thicker plastic parts



# Fastener Usage Instructions



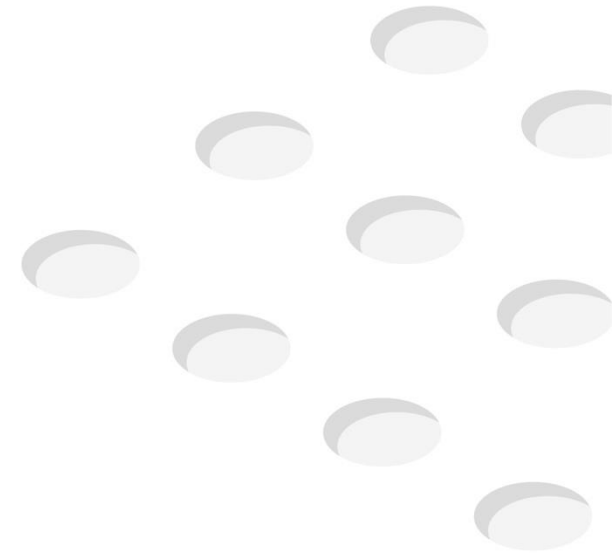
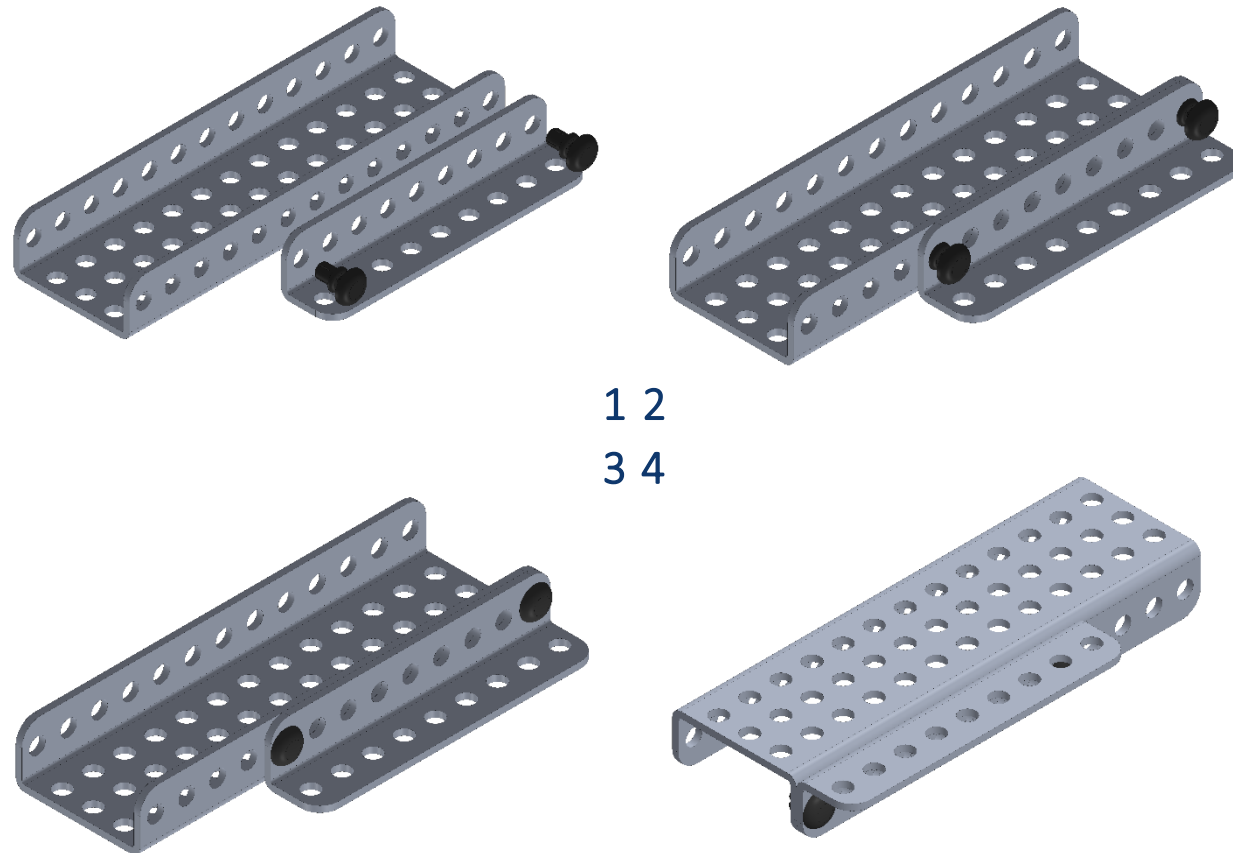
Blue Long Fastener : Connect LEGO Technic parts





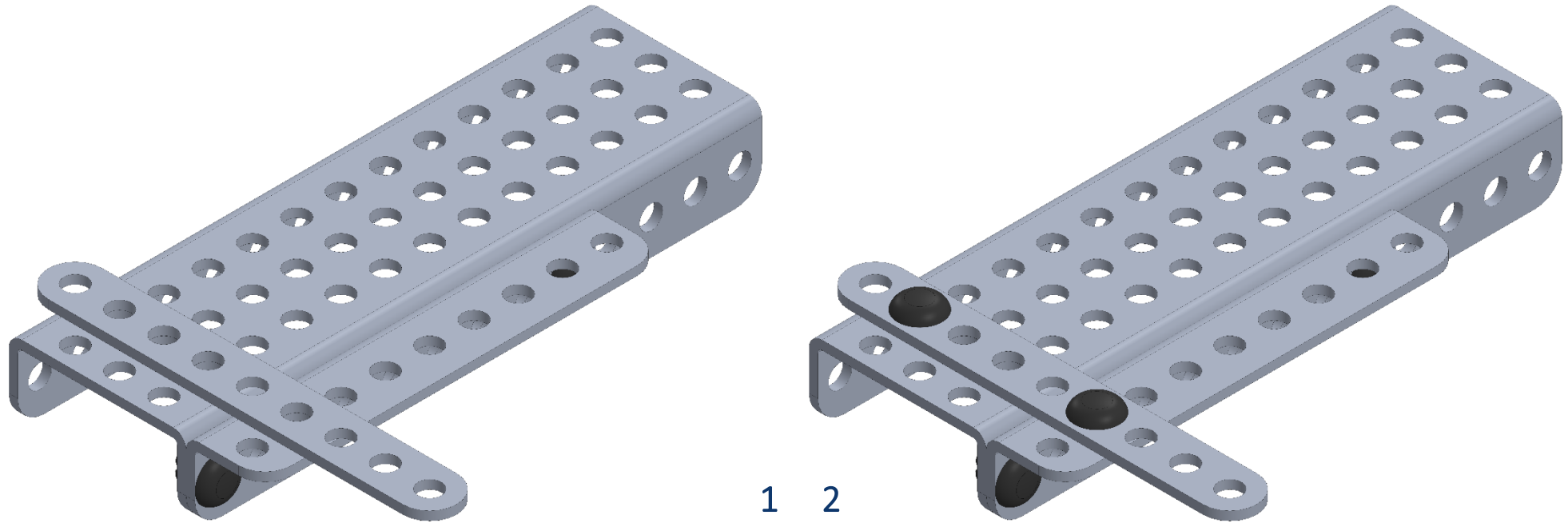
# Assembly technique

Connect two pieces with short connector.



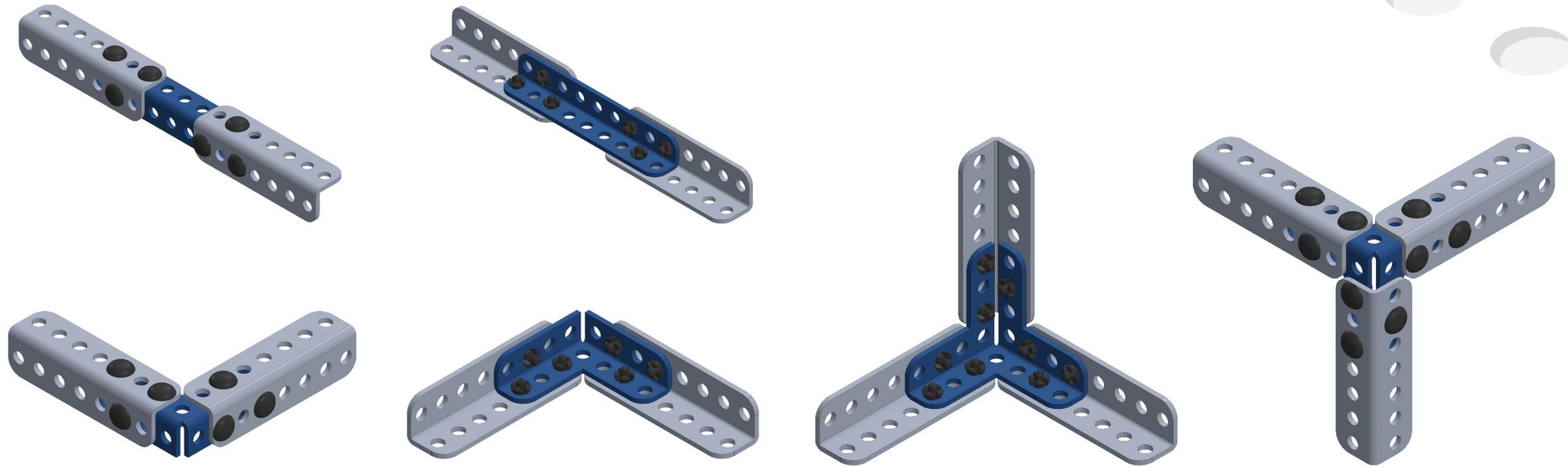
# Assembly technique

Connections can be linked smoothly on the same plate without leaving any gaps.



# Assembly technique

Blue Joiner is used for inside connection



# Motion Parts

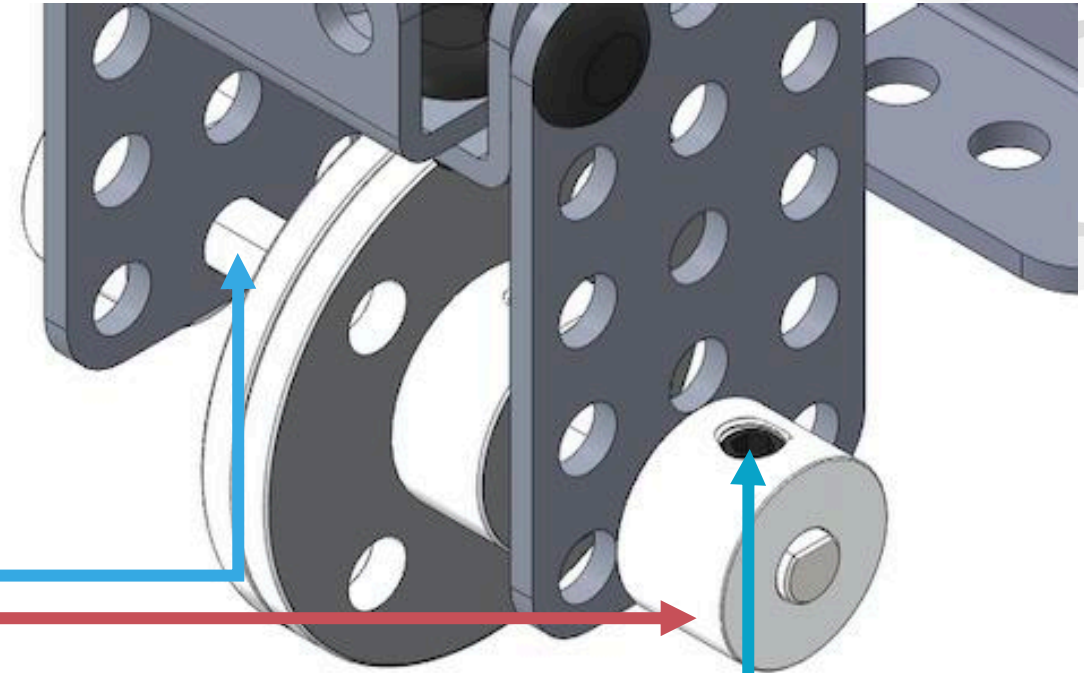
## Shaft Set



D Shaft

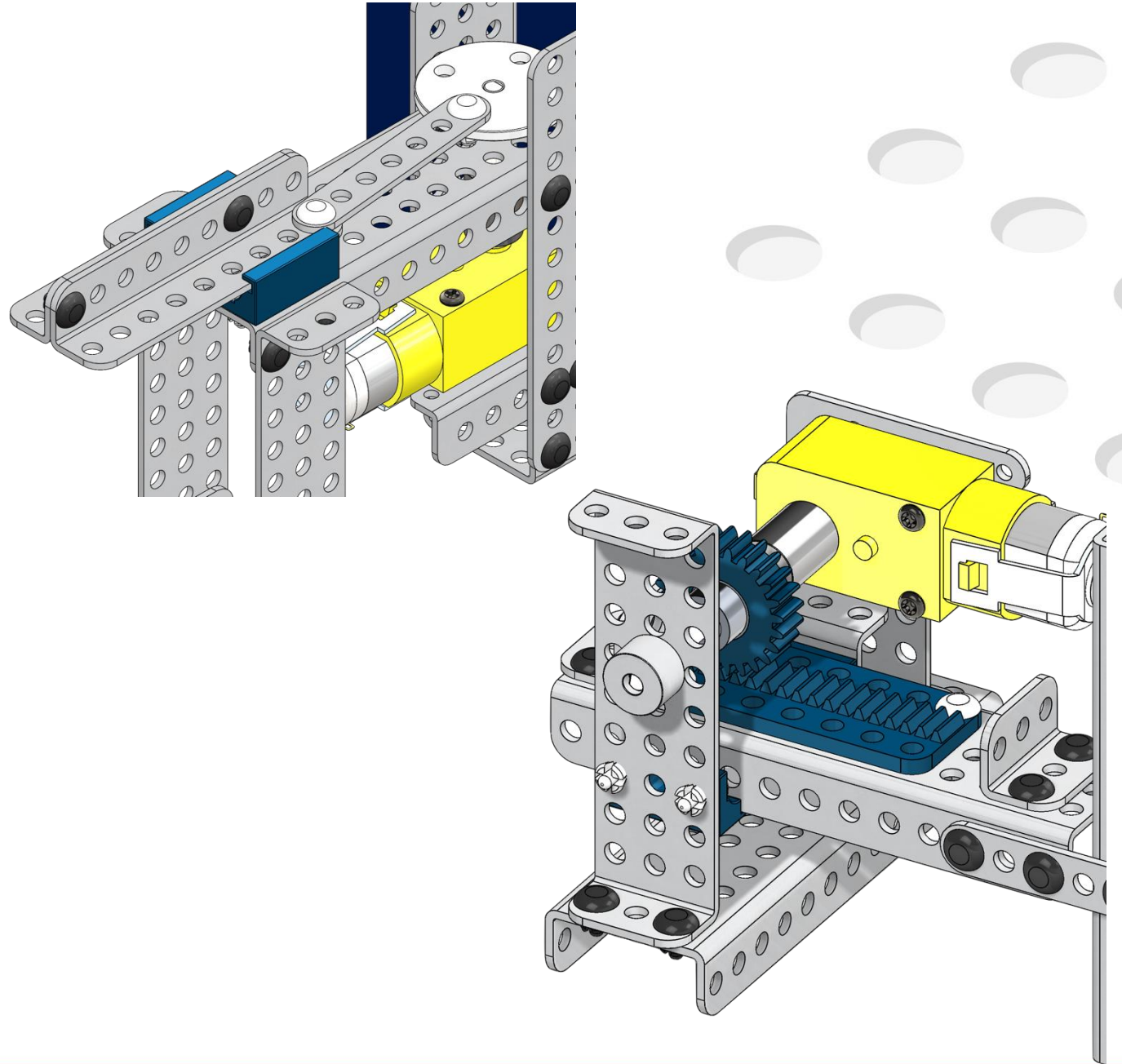
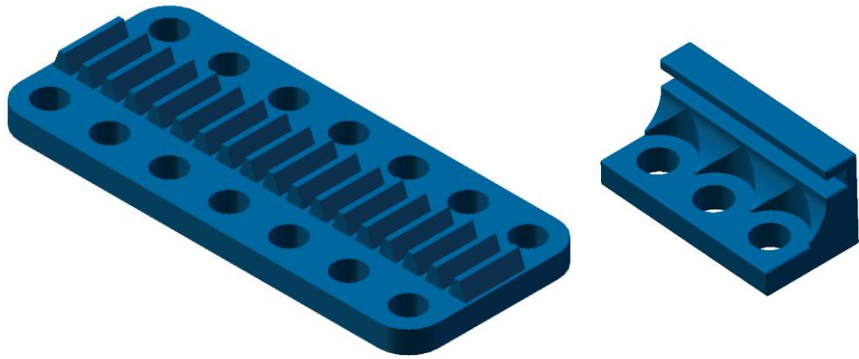
Axle Collar

Flat Point Set Screw



# Motion Parts

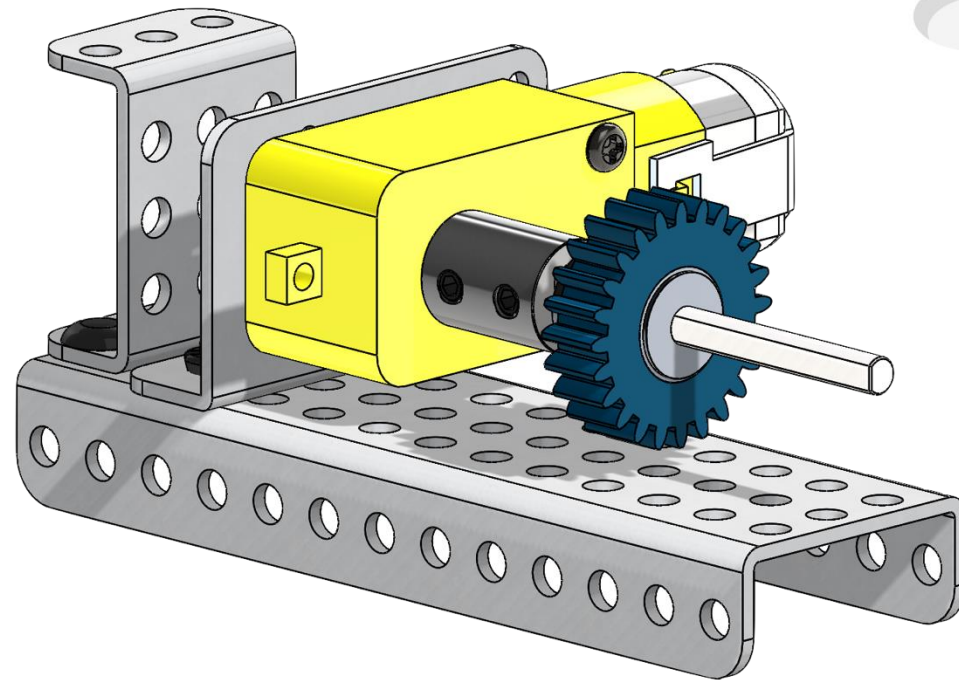
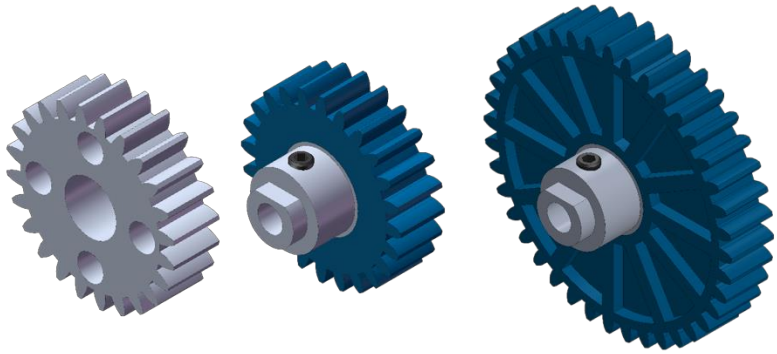
Rack & Slide





# Motion Parts

## Gears

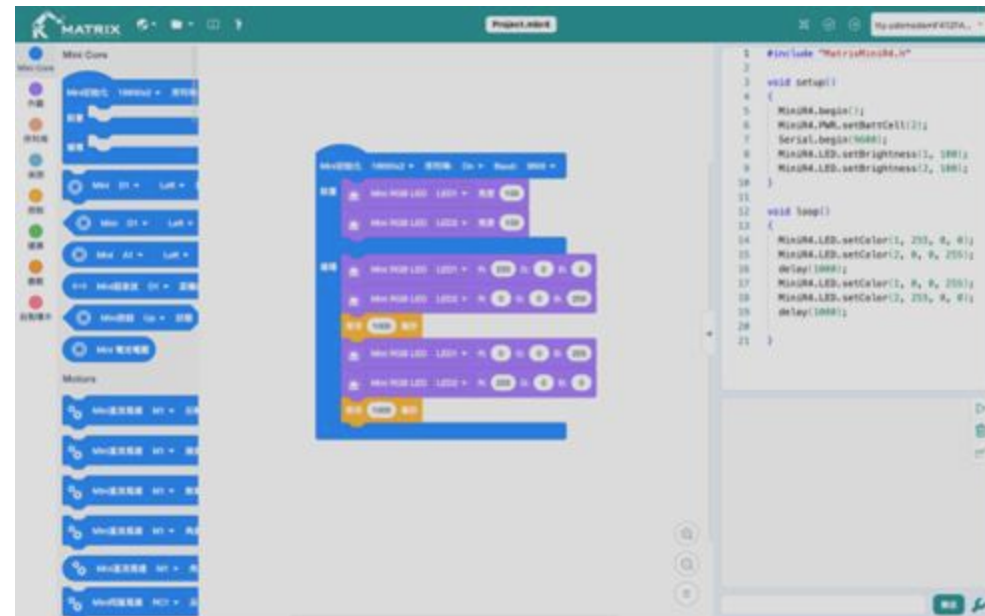
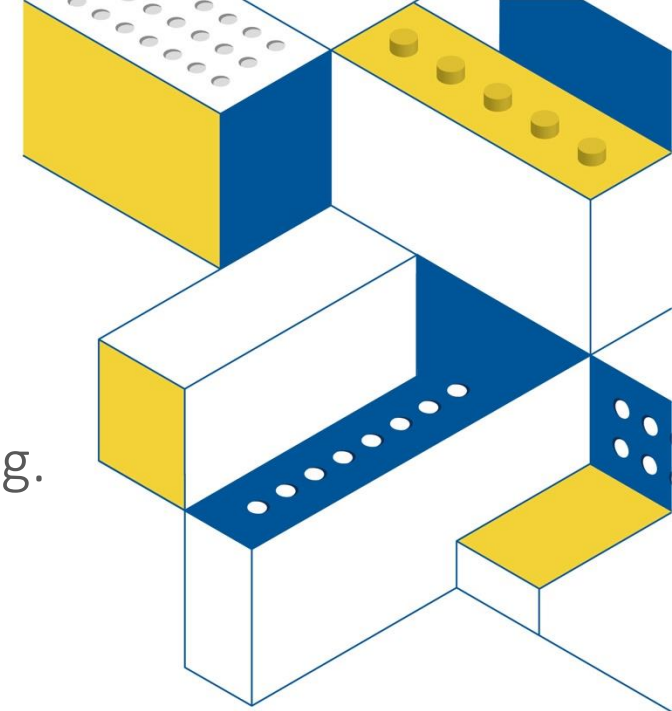




# What is MATRIXblock

MATRIXblock is a robot programming tool based on Scratch. It offers block to C++ previews and serial port monitor for easy data debugging.

This software serves as a perfect bridge from block-based to text-based coding, making it ideal for beginners and educators. With MATRIXblock, users can seamlessly transition to advanced coding while bringing their creative ideas to life.



# Download Sofeware

Go to the following URL:

<https://www.matrixrobotics.com/matrixblock-software>



## MATRIXblock

Visualize Your Code in Action

Please select your product to download

MATRIX Mini 2.0

MATRIX Mini R4



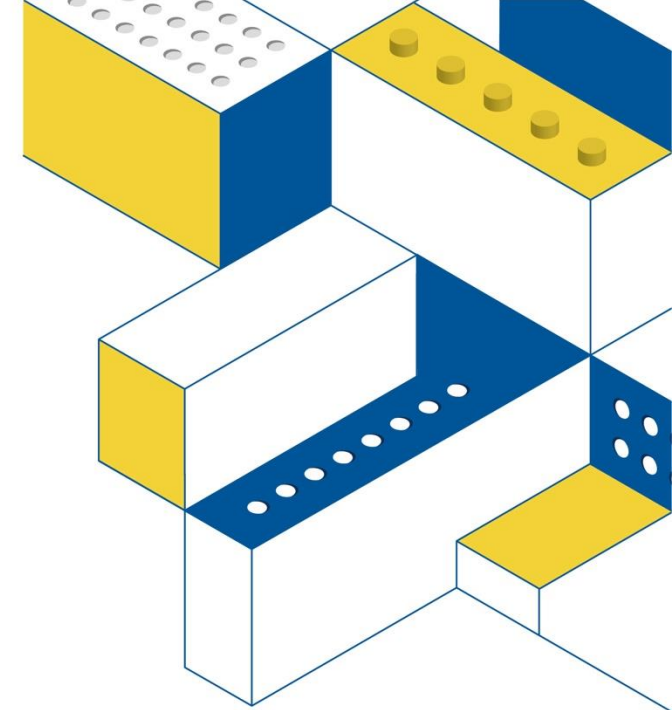
MATRIXblock Mini R4 v1.0.2

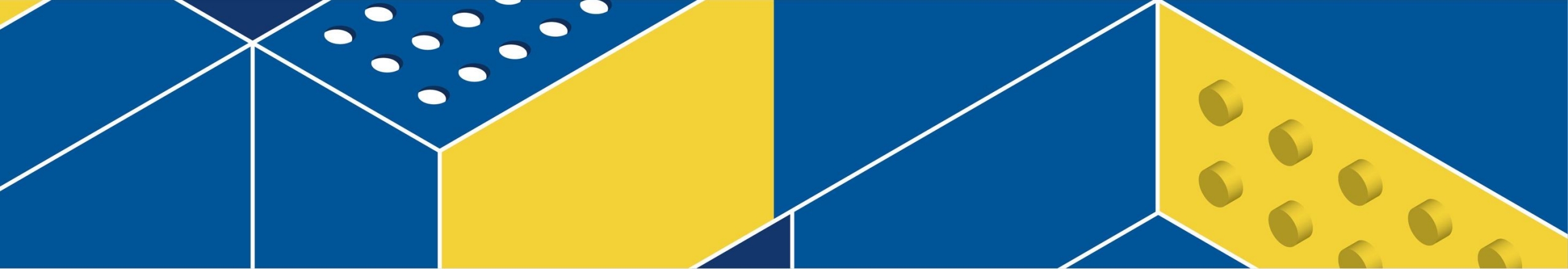
Download For Windows

Download For macOS

Windows: Windows 10 ,11 (x64, Recommend 1803 and above)  
macOS: Monterey or newer (Arm® and Intel® CPU)

Download for supported device.





# Software Tour

# Interface Guide



1. Language: Tap to change the language.
2. Files: Add, open, save files, and firmware update.
3. Teaching: Basic introduction, assembly skills, sample models, sample programs.
4. File name: The name of the current file.
5. Compile verification: Compile and validate programs without equipment.
6. Compile and download the program to MATRIX Mini.
7. Robot connection port.

# Interface Guide-Blocks Area

Find blocks by category and color.

The screenshot displays the Arduino IDE interface. On the left, the 'Blocks' area is highlighted with a yellow border, showing a list of blocks categorized by color and function. The categories include:

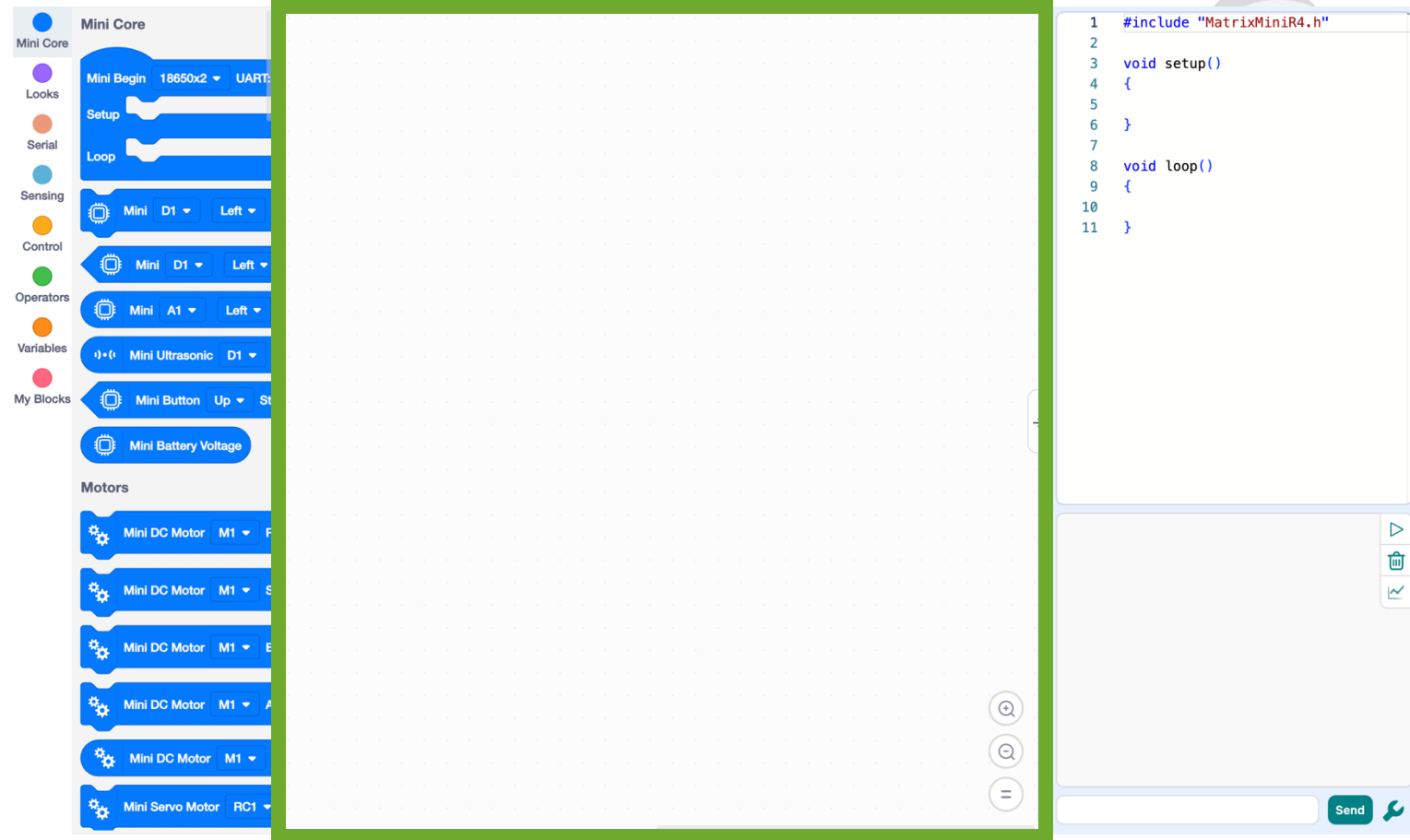
- Mini Core (blue)
- Looks (purple)
- Serial (red)
- Sensing (teal)
- Control (orange)
- Operators (green)
- Variables (light blue)
- My Blocks (pink)
- Motors (grey)

The main workspace is currently empty. On the right, the code editor shows the following code:

```
1 #include "MatrixMiniR4.h"
2
3 void setup()
4 {
5
6 }
7
8 void loop()
9 {
10
11 }
```

# Interface Guide-Edit area

Drag and drop the blocks to this area for programming.



The screenshot displays the Arduino IDE interface. On the left, the 'Mini Core' library is expanded, showing various blocks categorized by function: Mini Core (Mini Begin, Setup, Loop), Looks, Serial, Sensing (Mini D1 Left), Control (Mini D1 Left), Operators (Mini A1 Left), Variables (Mini Ultrasonic D1), My Blocks (Mini Button Up, Mini Battery Voltage), and Motors (Mini DC Motor M1, Mini Servo Motor RC1). The central workspace is a large grid for block assembly, highlighted with a green border. On the right, the code editor shows the following C++ code:

```
1 #include "MatrixMiniR4.h"
2
3 void setup()
4 {
5
6 }
7
8 void loop()
9 {
10
11 }
```

At the bottom right, there is a 'Send' button and a refresh icon.



# Interface Guide- Code View

You can see the C++ code that the blocks have been converted to, or copy it to the Arduino IDE for further editing.

```
1 #include "MatrixMiniR4.h"
2
3 void setup()
4 {
5
6 }
7
8 void loop()
9 {
10
11 }
```

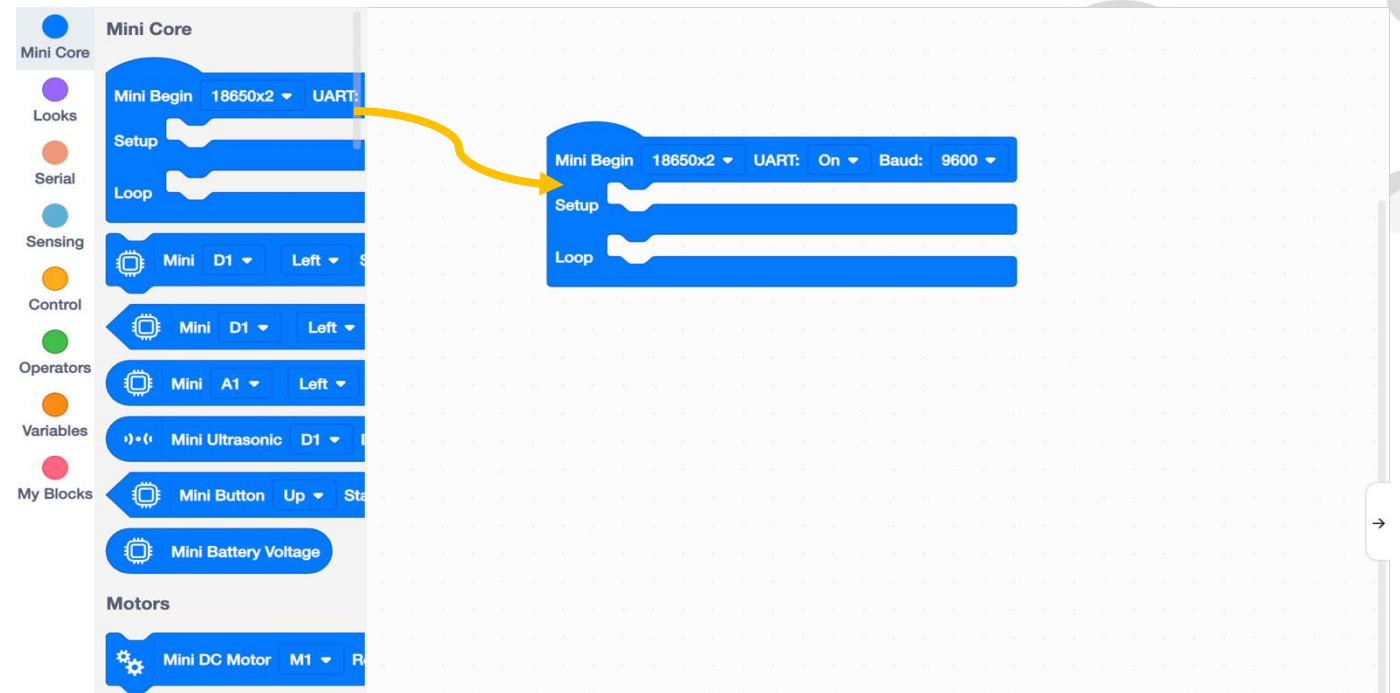
# Interface Guide- Information Window

Use the serial port to communicate with the robot.

```
1 #include "MatrixMiniR4.h"
2
3 void setup()
4 {
5
6 }
7
8 void loop()
9 {
10
11 }
```

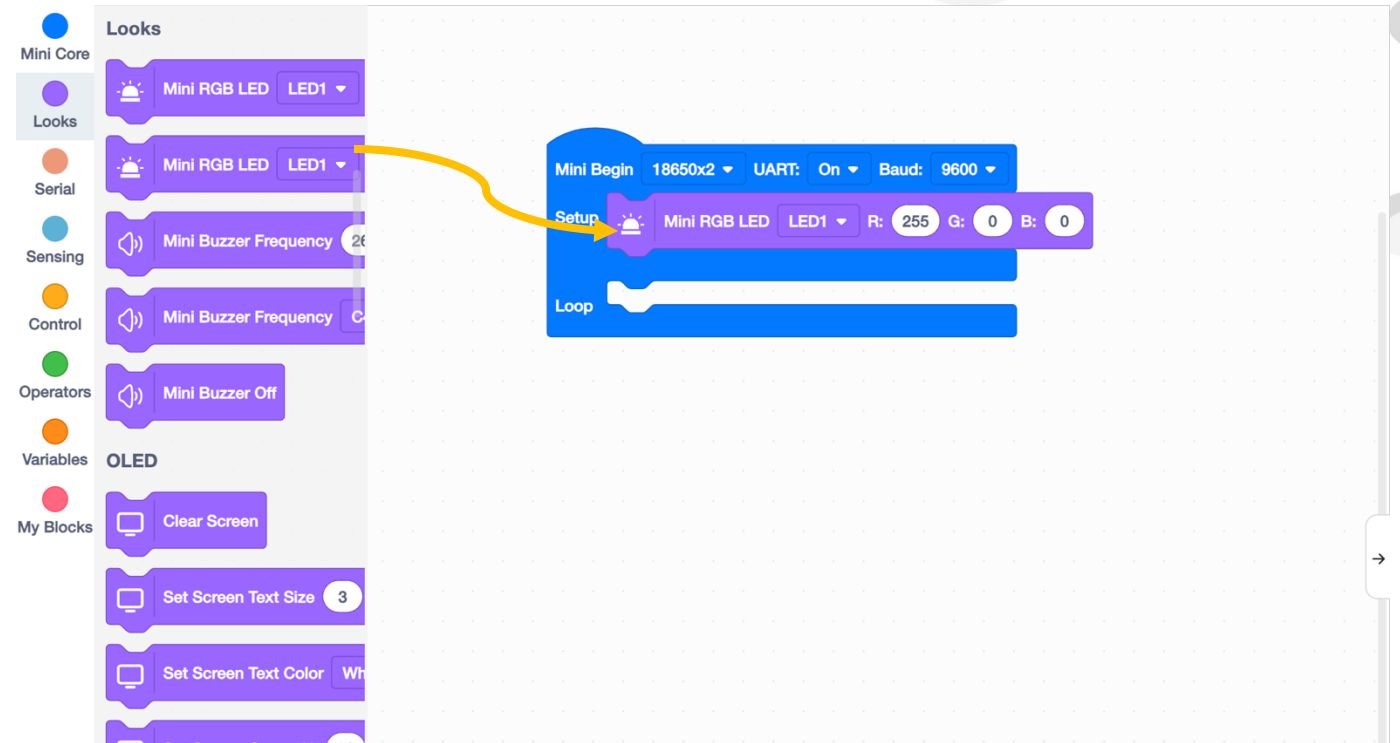
# Quick Start - Let RGBLED Lights Up

1. Drag and drop a Mini Begin block from the Mini Core category into the editing area.



# Quick Start - Let RGBLED Lights Up

2. Drag and drop a **Mini RGB LED** block from the **Looks** category into the **Mini Begin**.



# Quick Start - Let RGBLED Lights Up

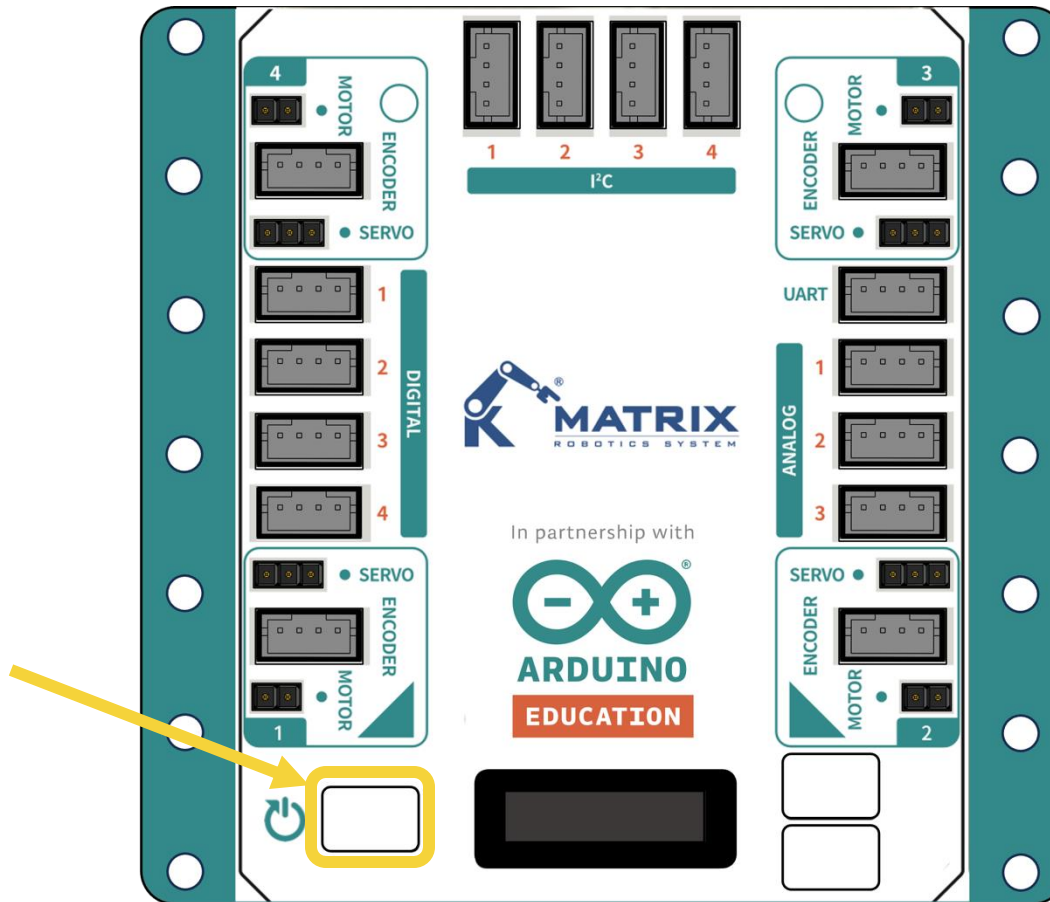
3. Connect the controller to the computer using a USB cable.

(Mac users need to remove the power cables first.)



# Quick Start - Let RGBLED Lights Up

4. Press and hold the Reset Button to switch on the Mini R4.

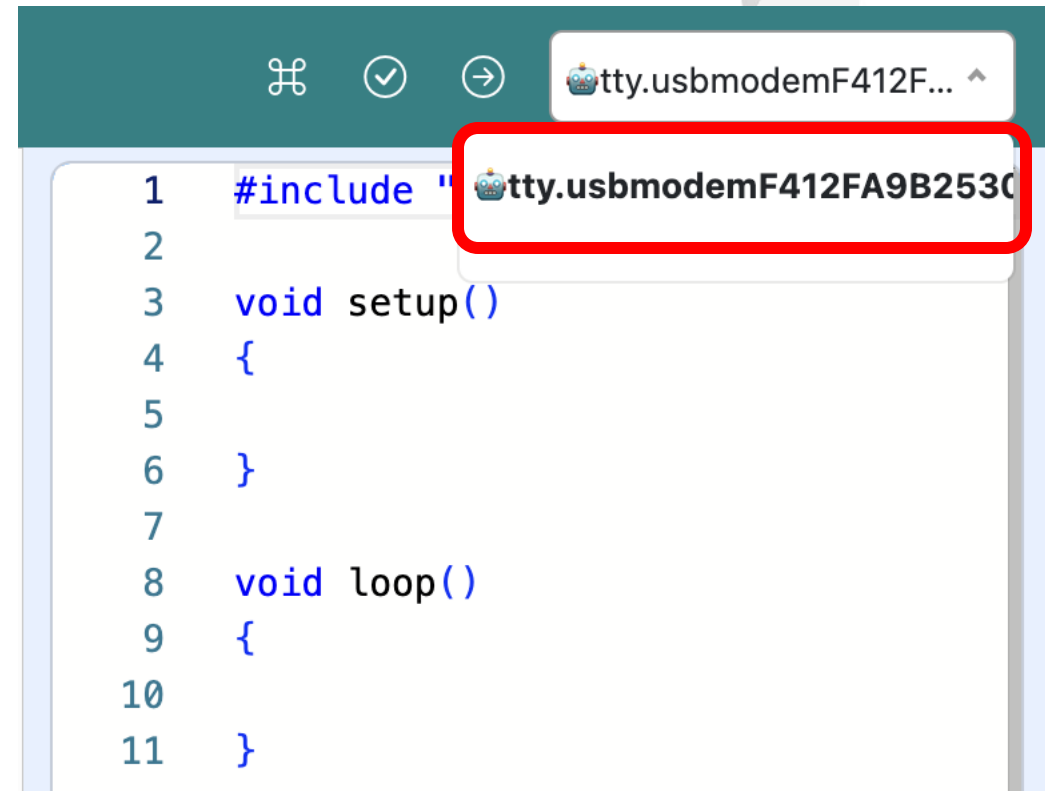




# Quick Start - Let RGBLED Lights Up

5. Choose COM port ◦

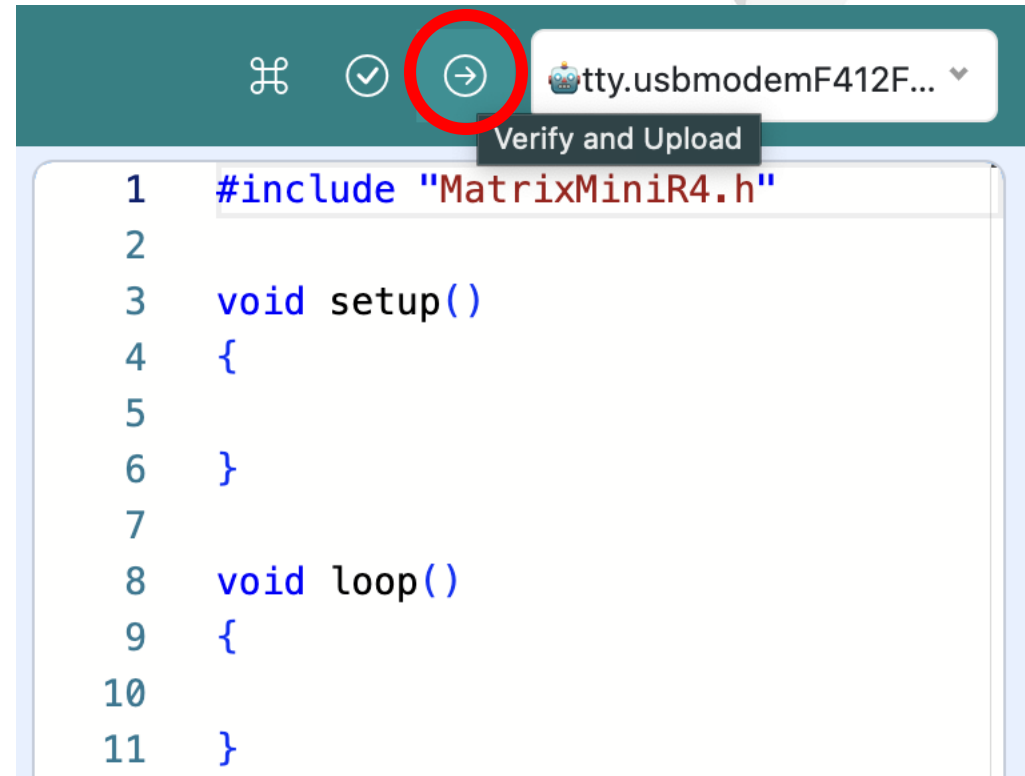
**\*\* The R4 controller is usually the one with the robot symbol in the COM list. \*\***



```
1 #include "tty.usbmodemF412FA9B2530"
2
3 void setup()
4 {
5
6 }
7
8 void loop()
9 {
10
11 }
```

# Quick Start - Let RGBLED Lights Up

6. Click "Verify and upload" in the upper right corner of the screen to upload the program to the MATRIX Mini R4 controller.



```
1  #include "MatrixMiniR4.h"
2
3  void setup()
4  {
5
6  }
7
8  void loop()
9  {
10
11 }
```

# Quick Start - Let RGBLED Lights Up

7. Wait for finish uploading.

