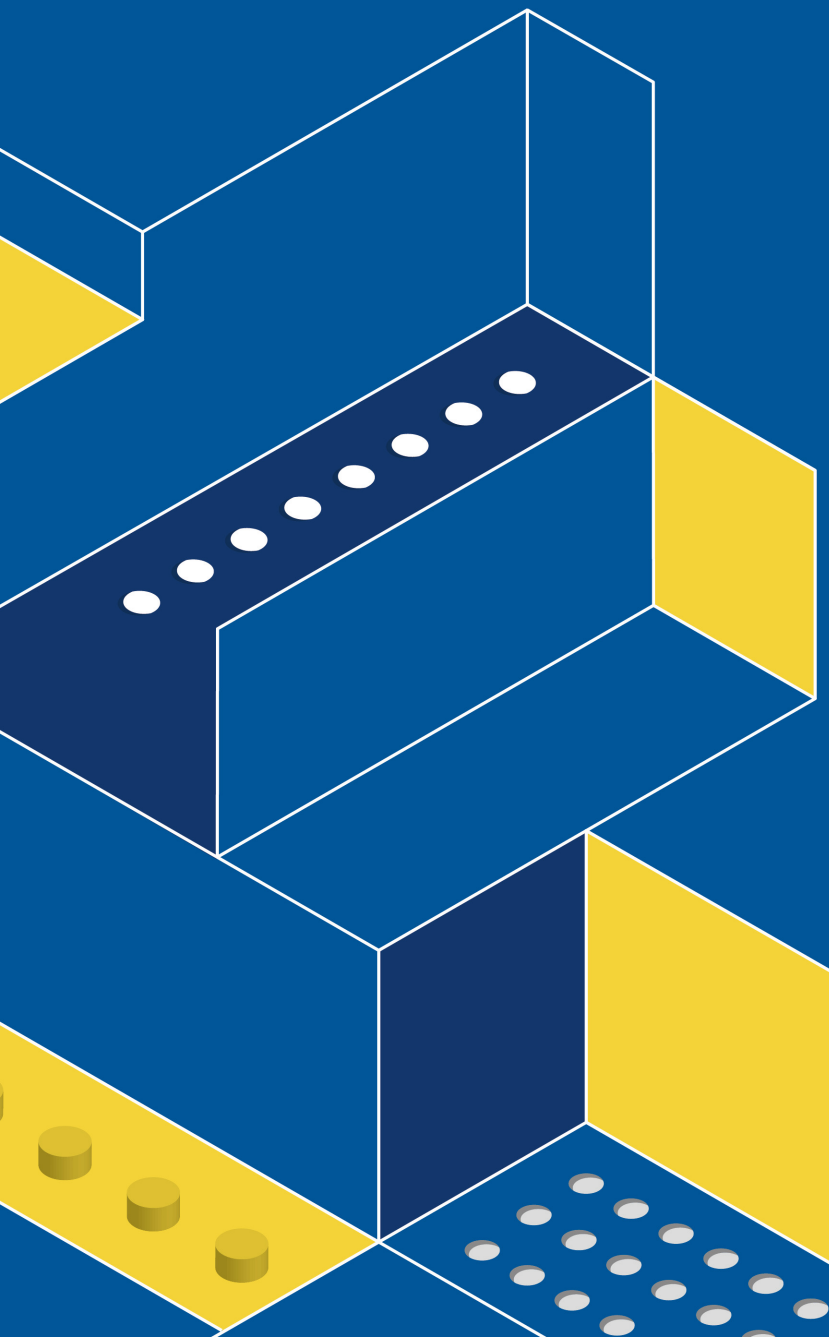
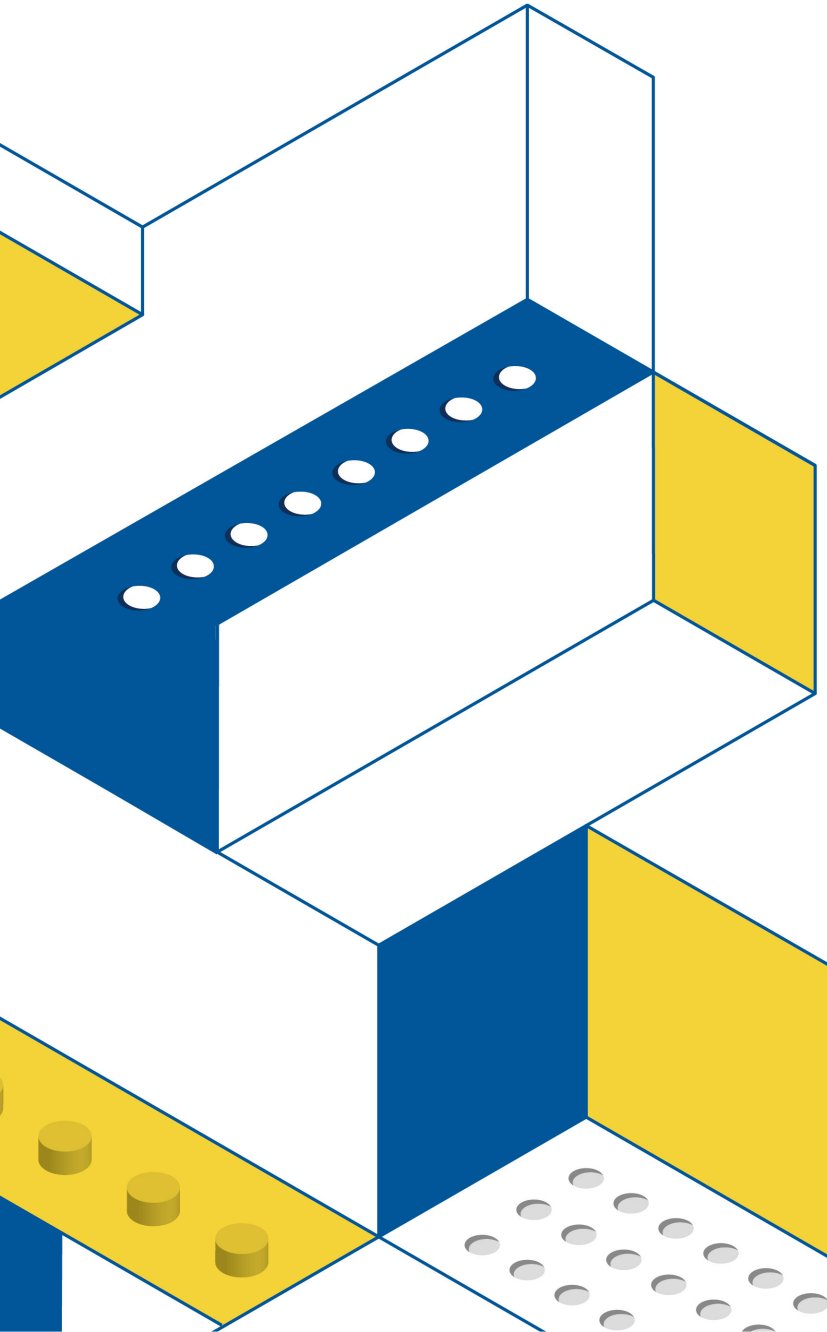


MR120 User Manual

貝登堡智能
KK INTELLIGENT TECHNOLOGY INC.

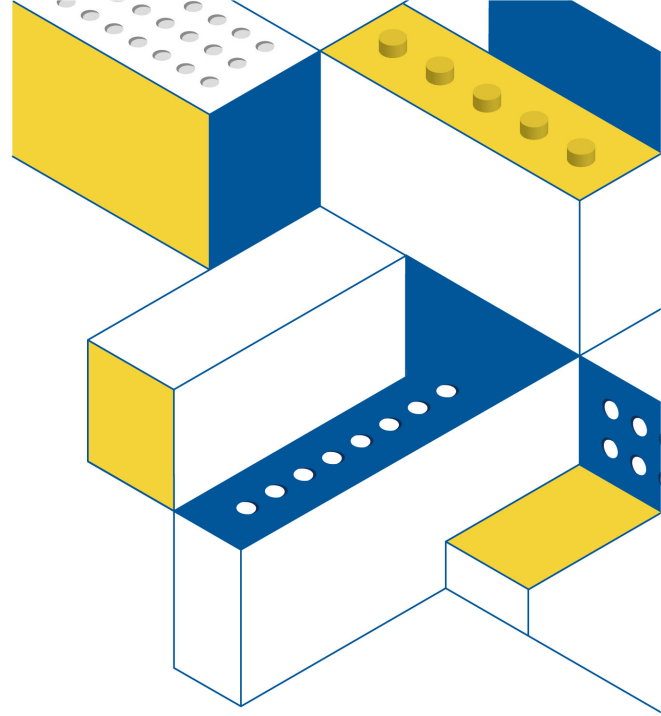


Outline

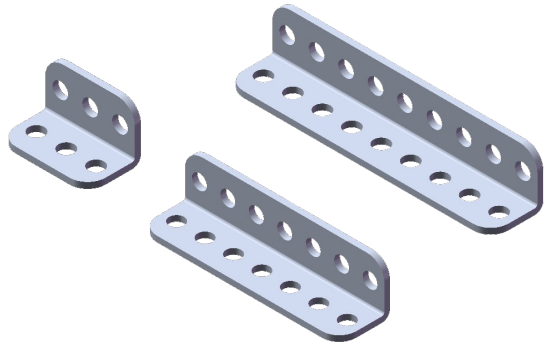
- MATRIX Building System
- MATRIX Mini Controller
- Software Environment Setup
- Connect and download
- Build the Car
- Control motors and sensors
- Example Model

MATRIX Building System

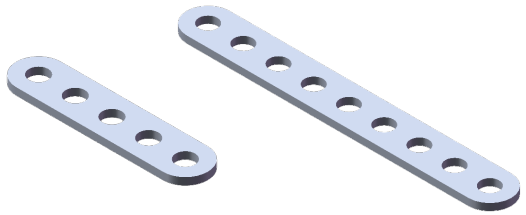
Beam



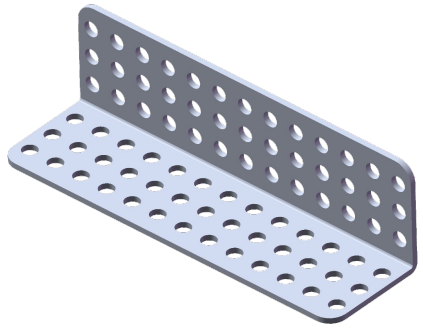
L Shaped Beam



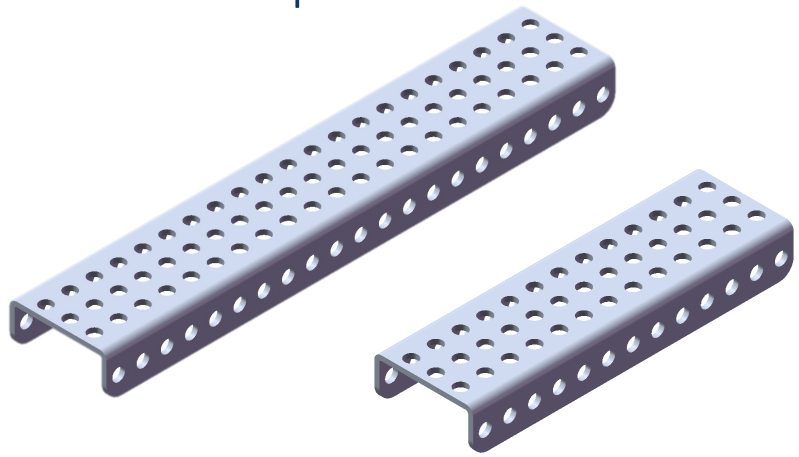
Flat Beam



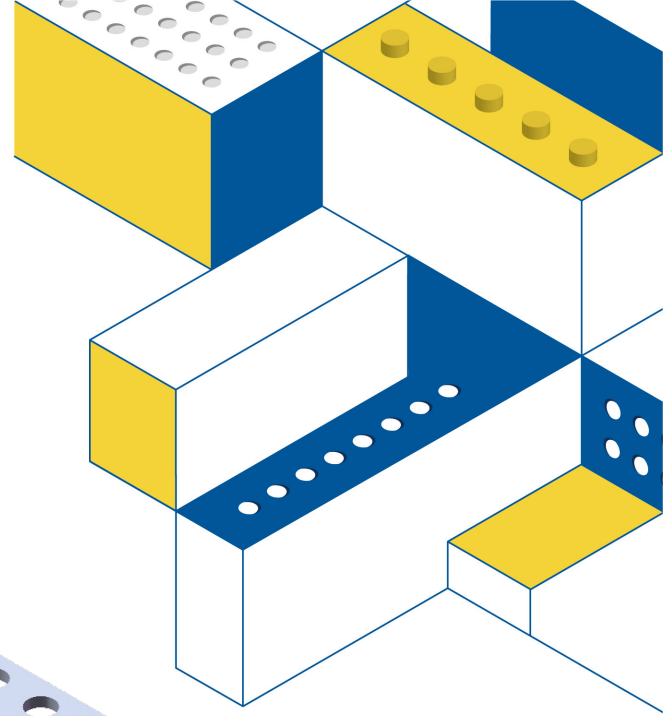
XL L Shaped Beam



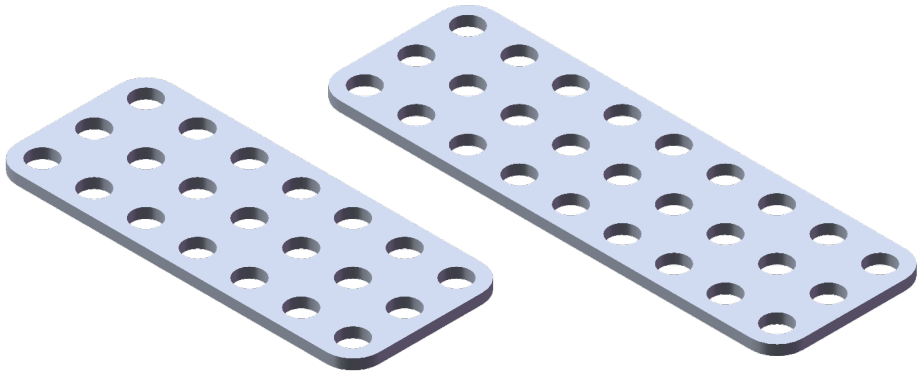
C Shaped Beam



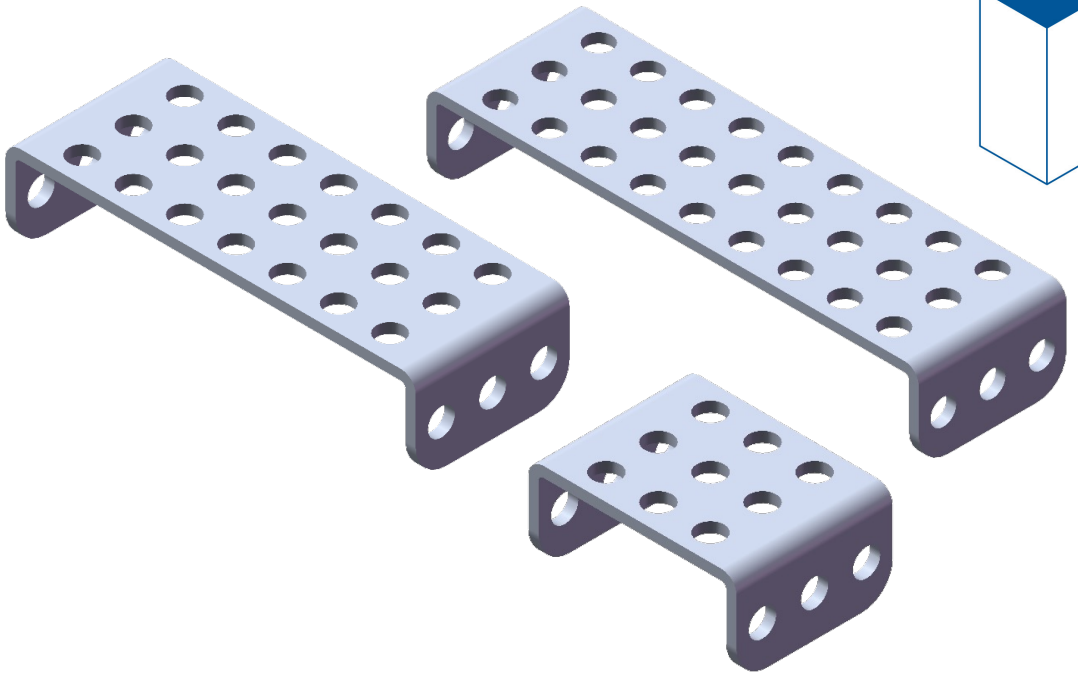
Plate



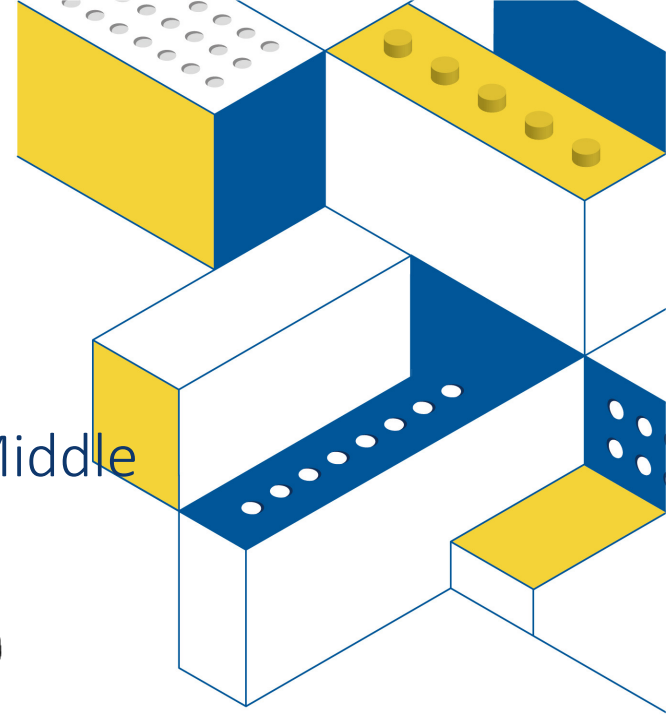
Gusset Plate



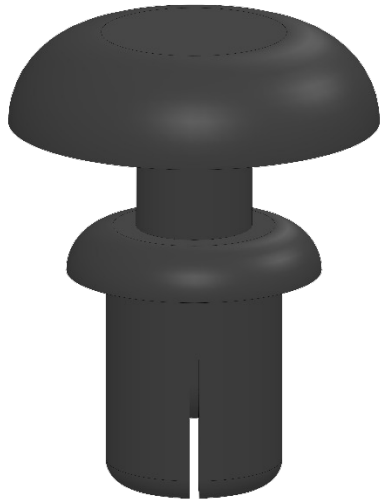
Flanged Plate



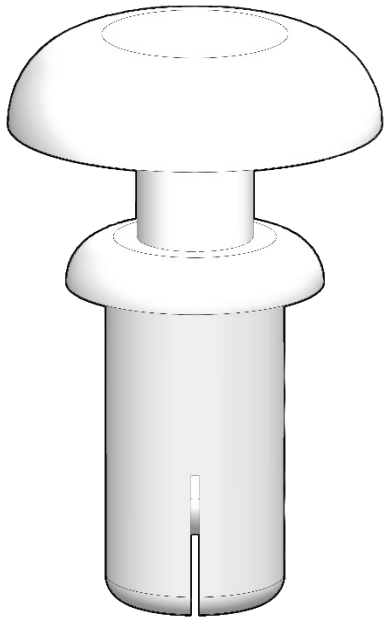
Fastener



Quick Connector - Short



Quick Connector - Middle

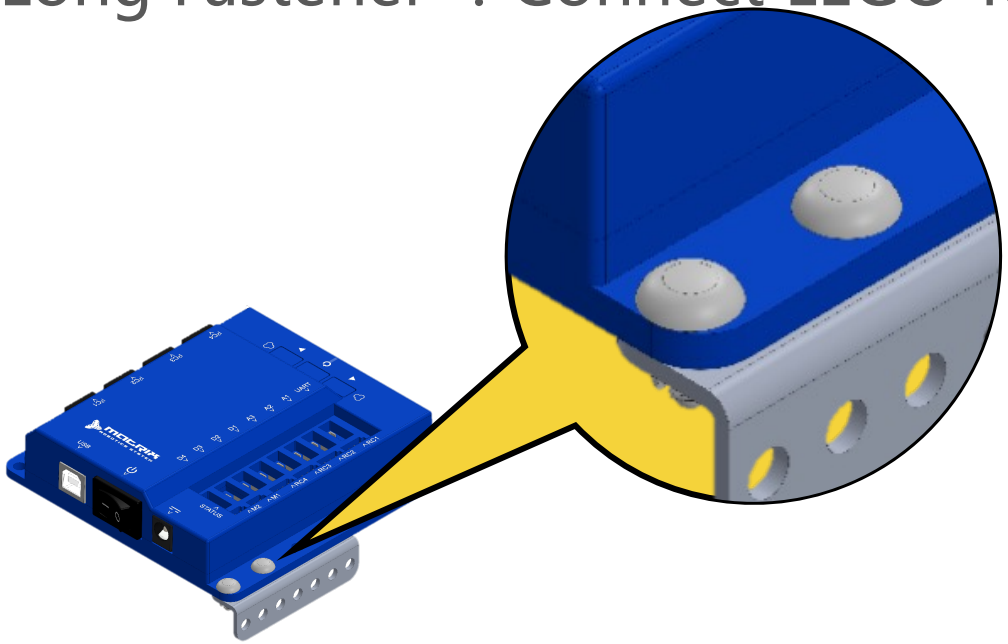


Assembly technique

Black Short Fastener：Connect two pieces.

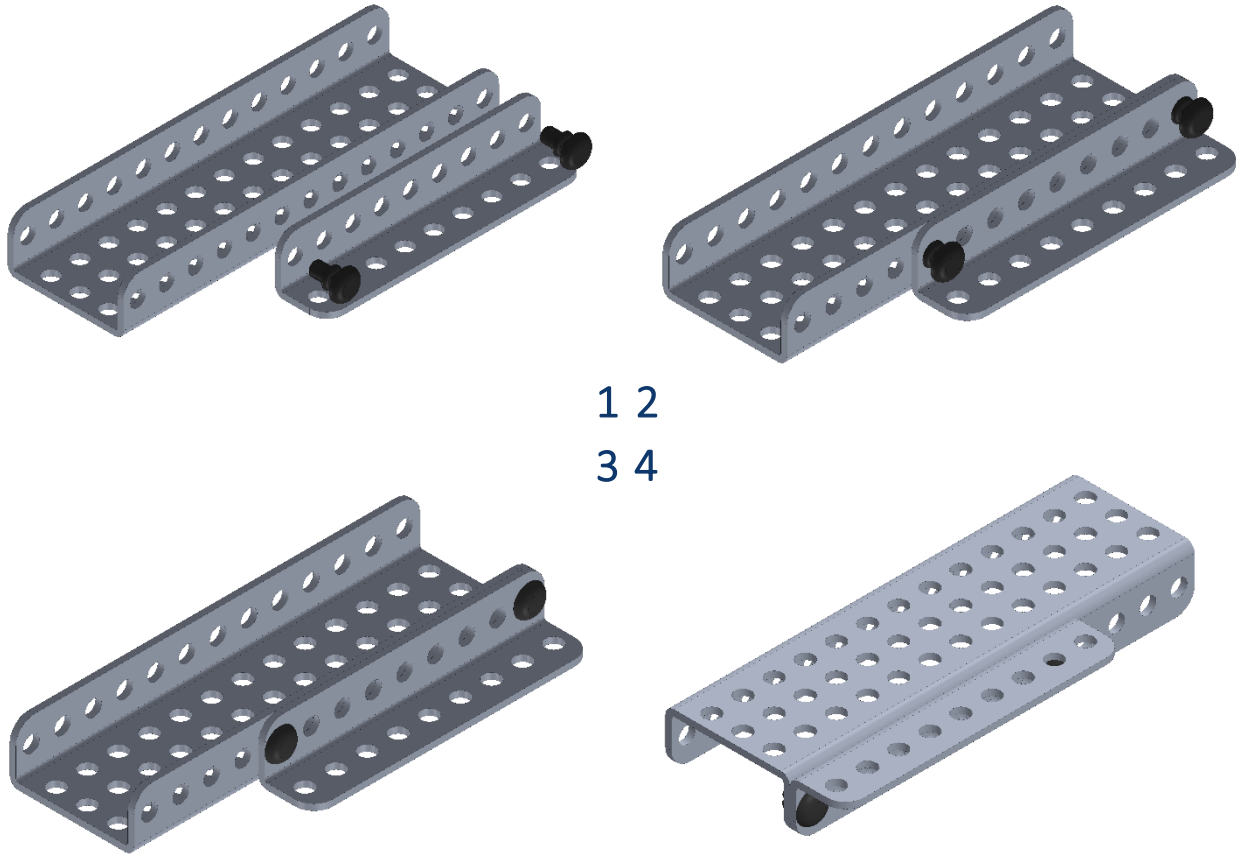
White Medium Fastener：Connect three layers of metal parts or for thicker plastic parts

Black Long Fastener ：Connect LEGO Technic parts



Assembly technique

Connect two pieces with short connector.

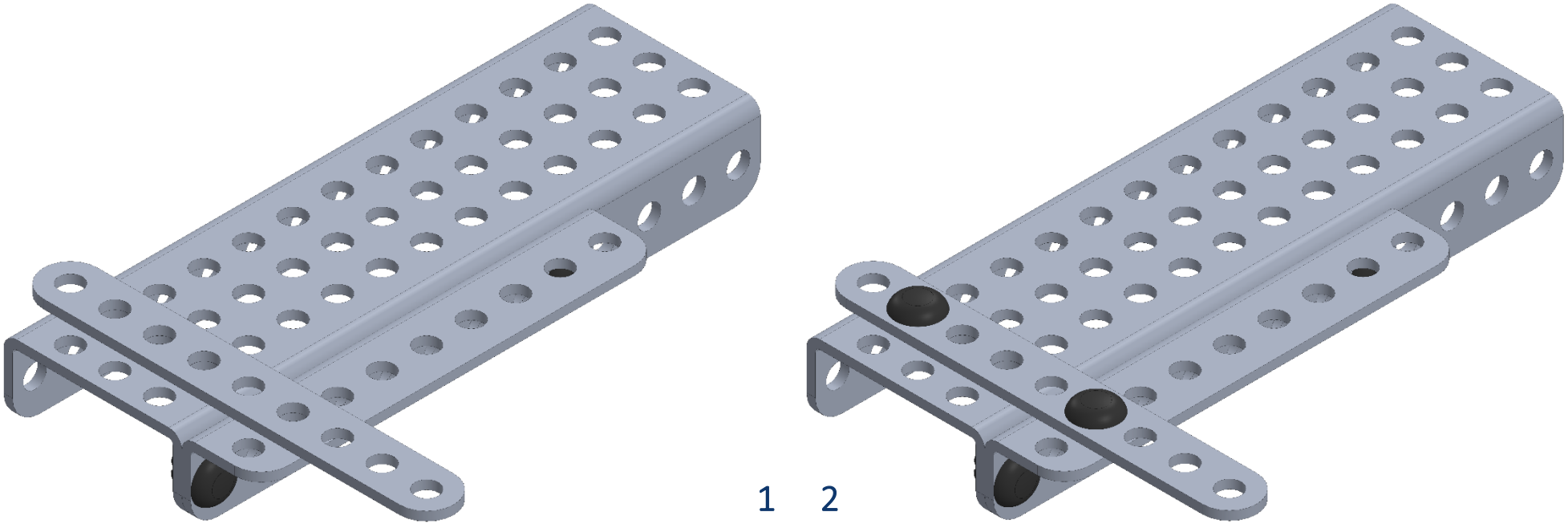


1 2

3 4

Assembly technique

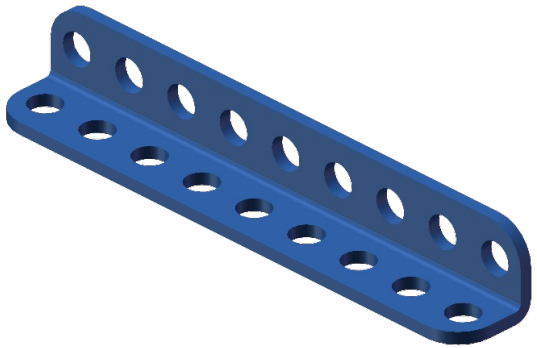
Continuable on the same plane



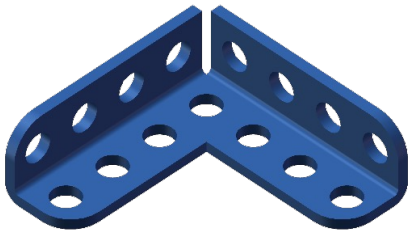
1 2

Joiner

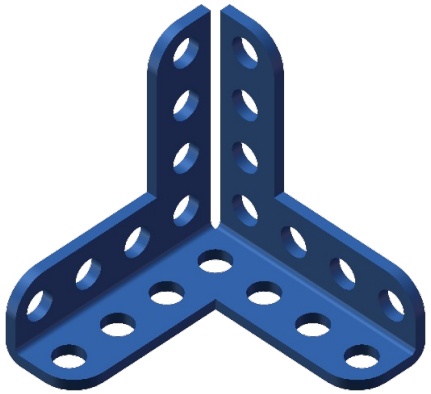
1D



2D

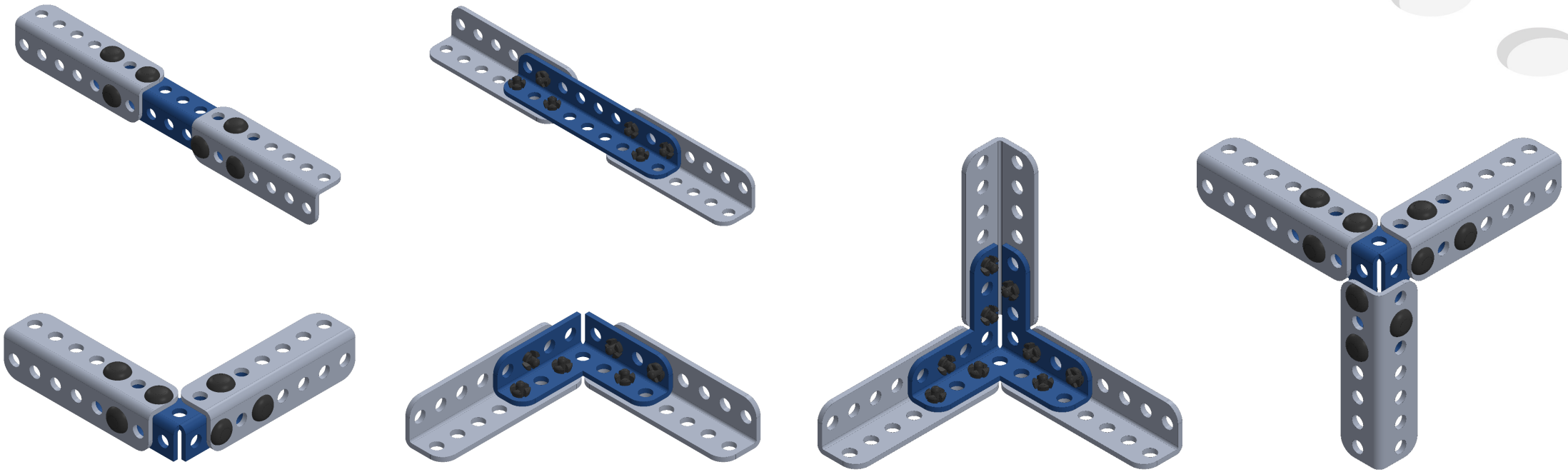


3D



Assembly technique

Blue Joiner is used for inside connection

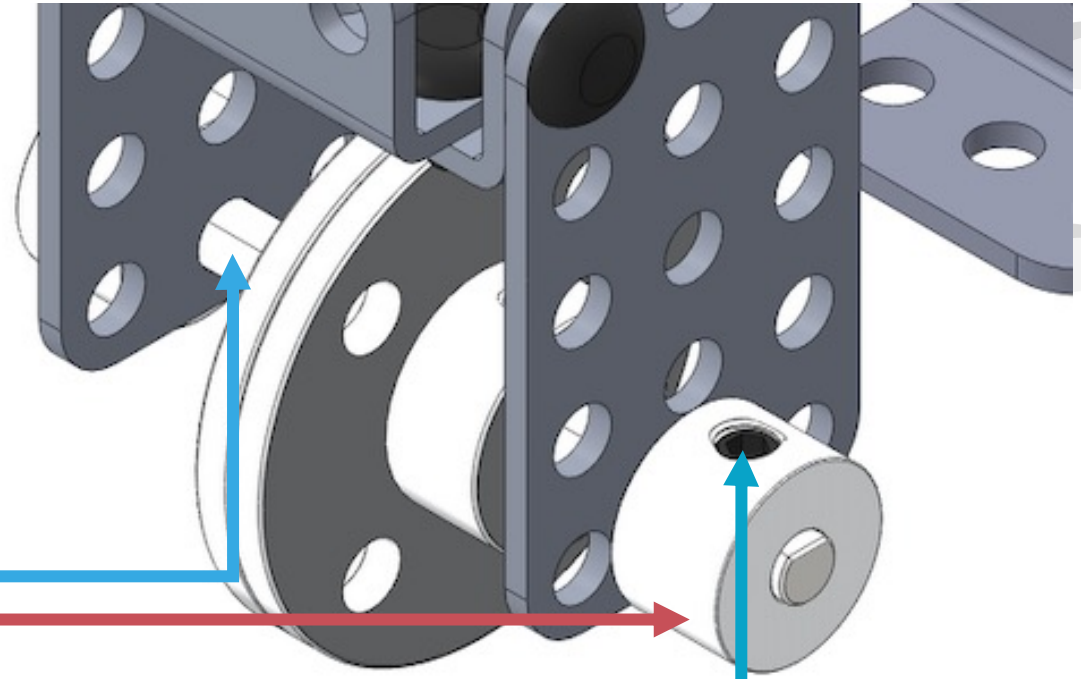


Motion Parts

Shaft Set

D Shaft

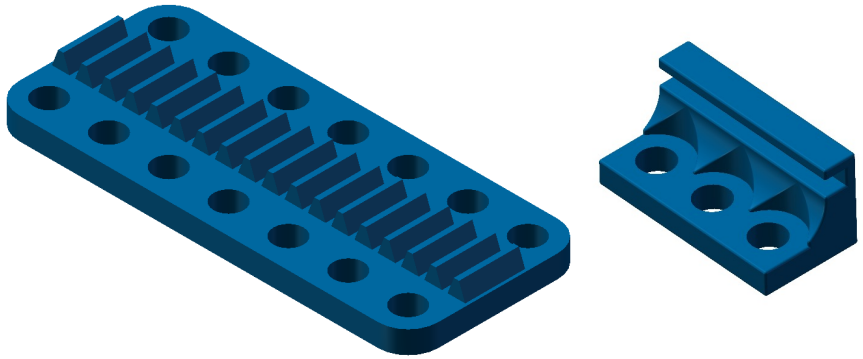
Axle Collar

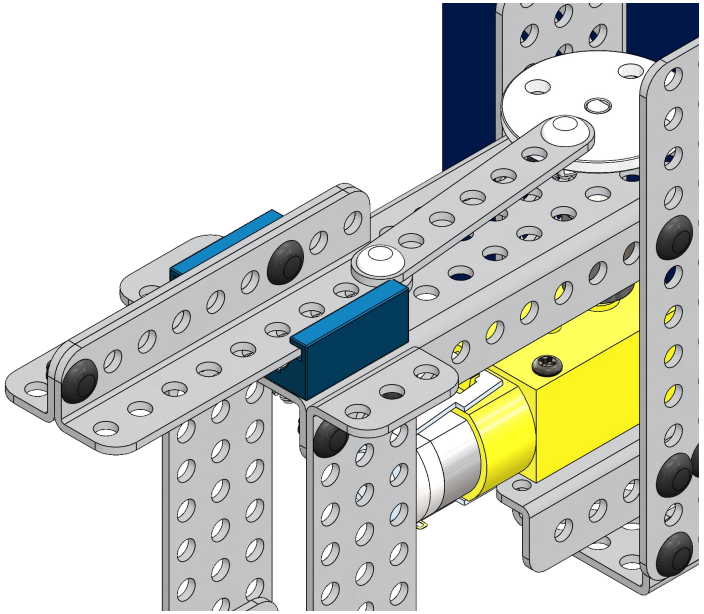


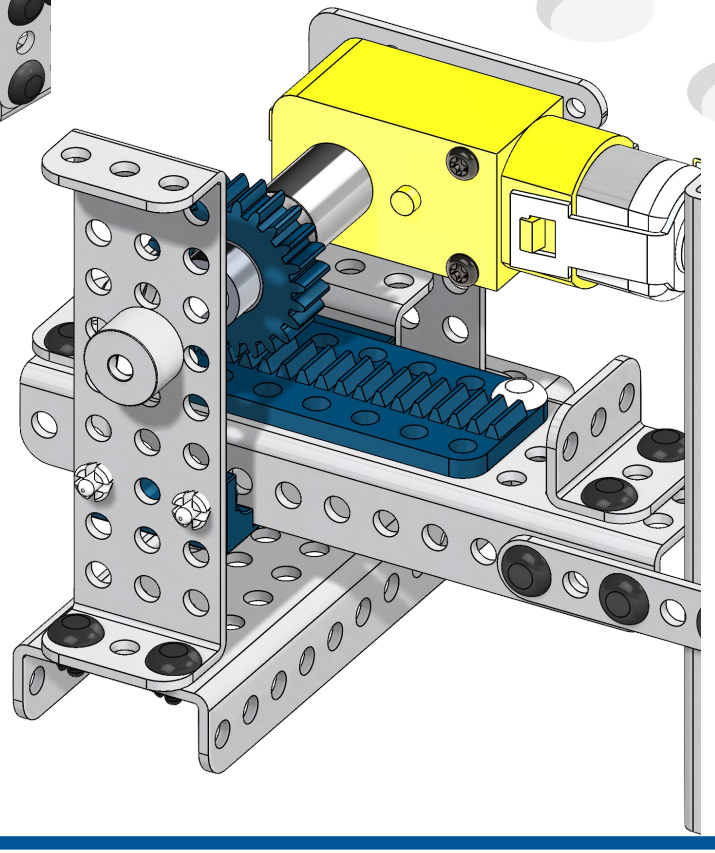
Flat Point Set Screw

Motion Parts

Rack & Slide

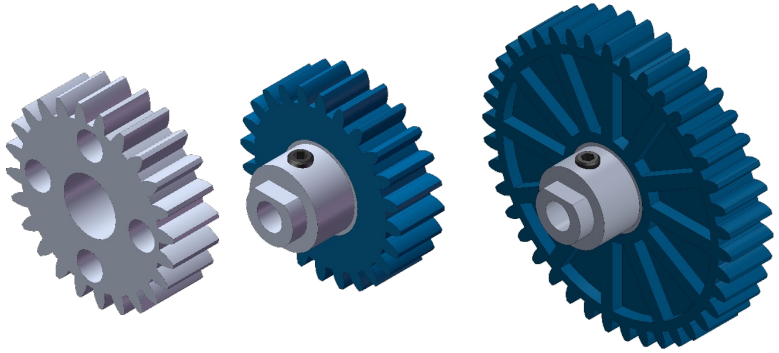


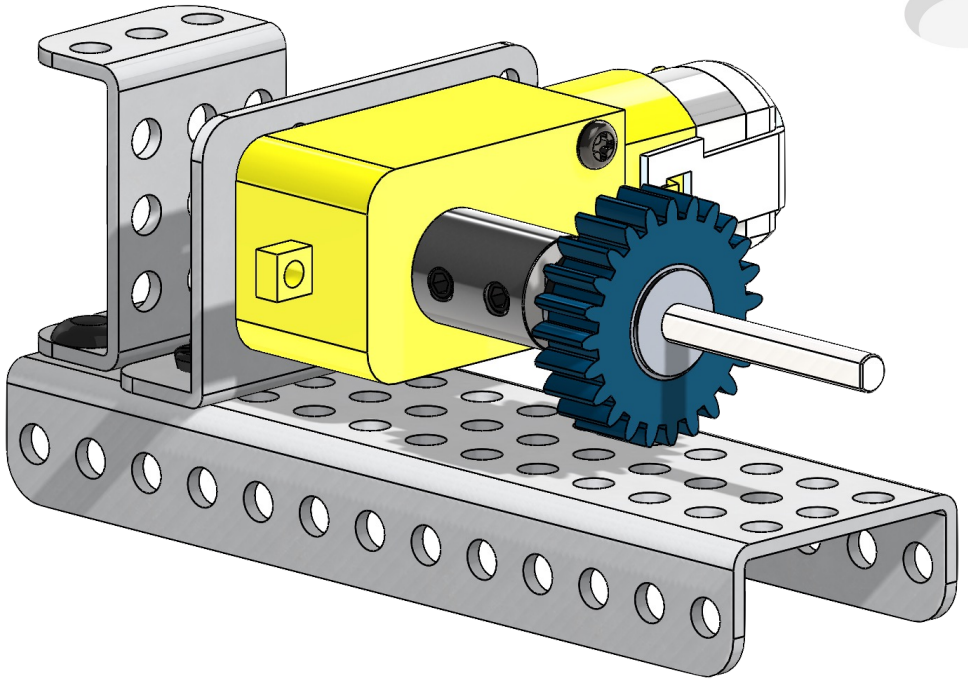




Motion Parts

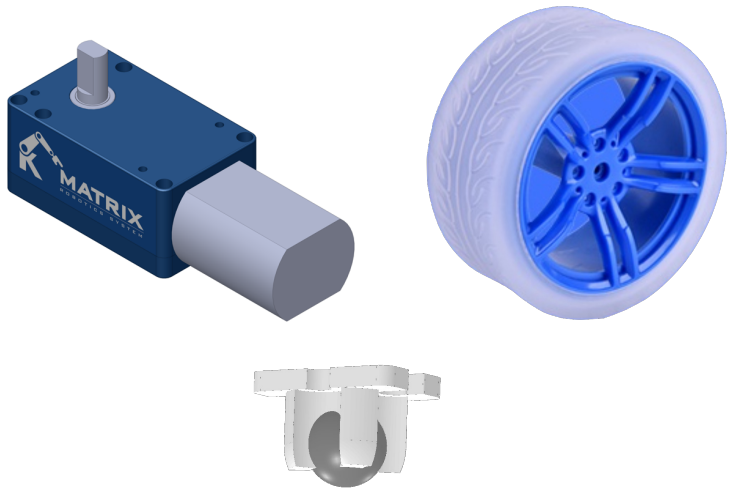
Gears



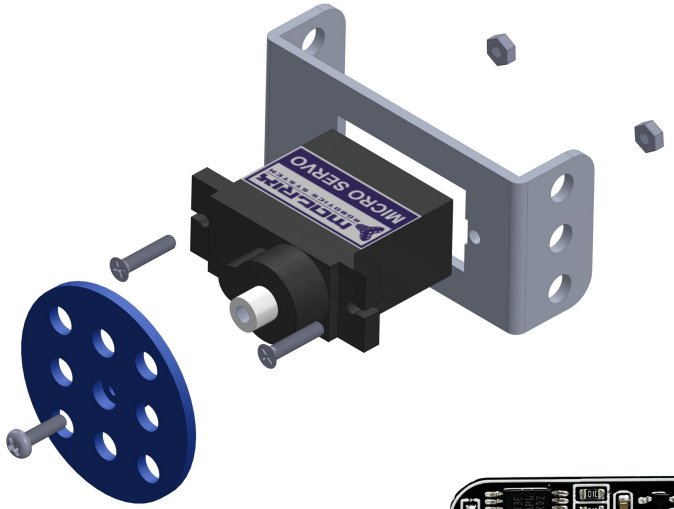


Electrical

DC motor



RC motor



Sensors

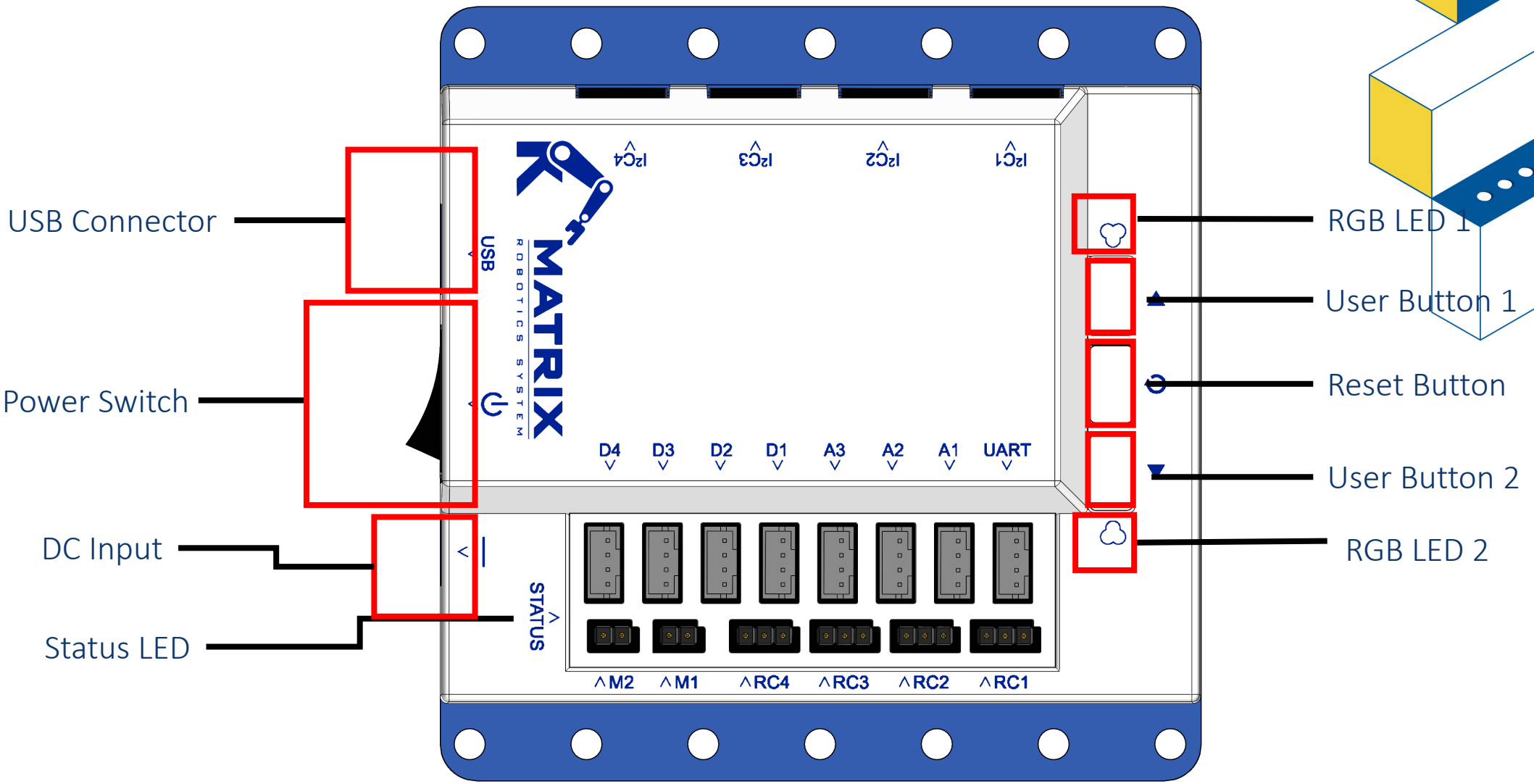
Laser Sensor

Miniature Switch

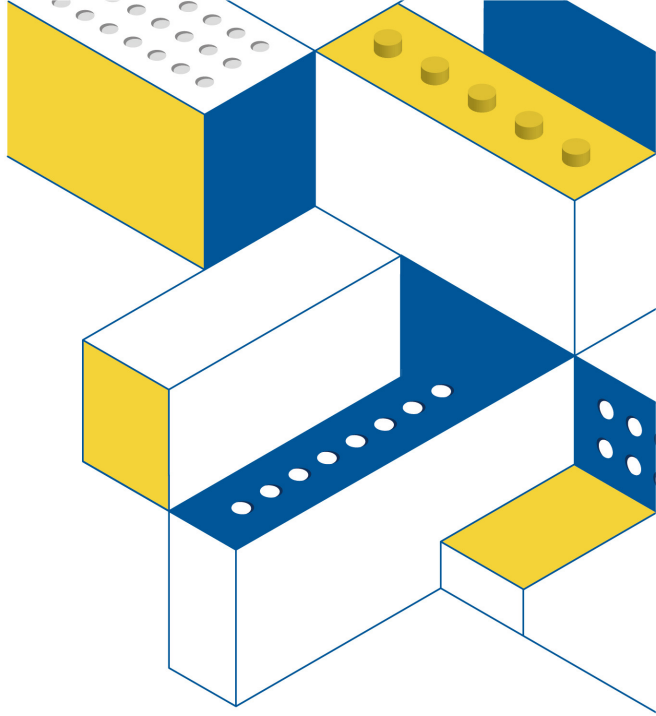
Gray Scale Sensor

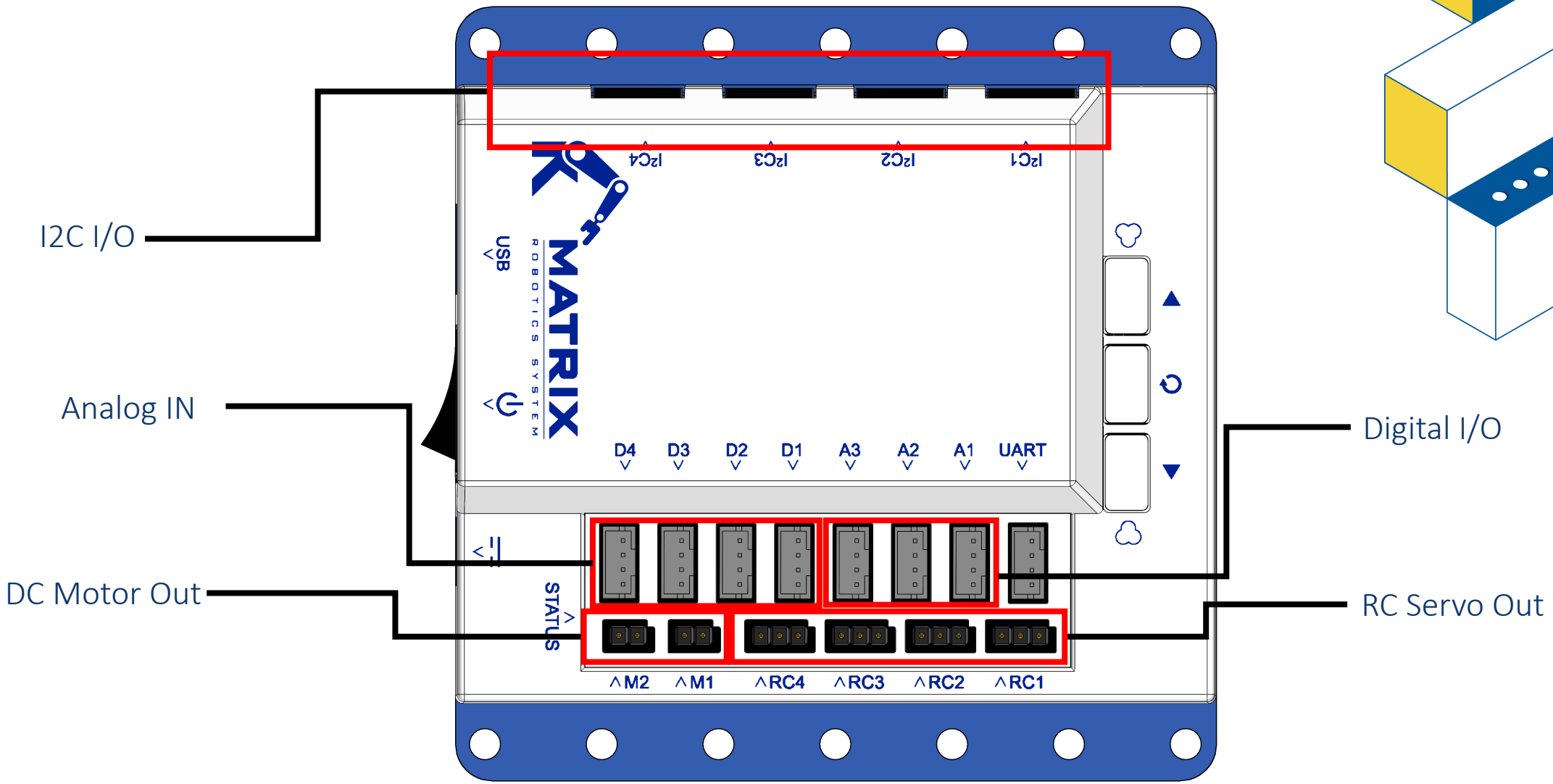
MATRIX Mini Controller

MATRIX Mini Controller

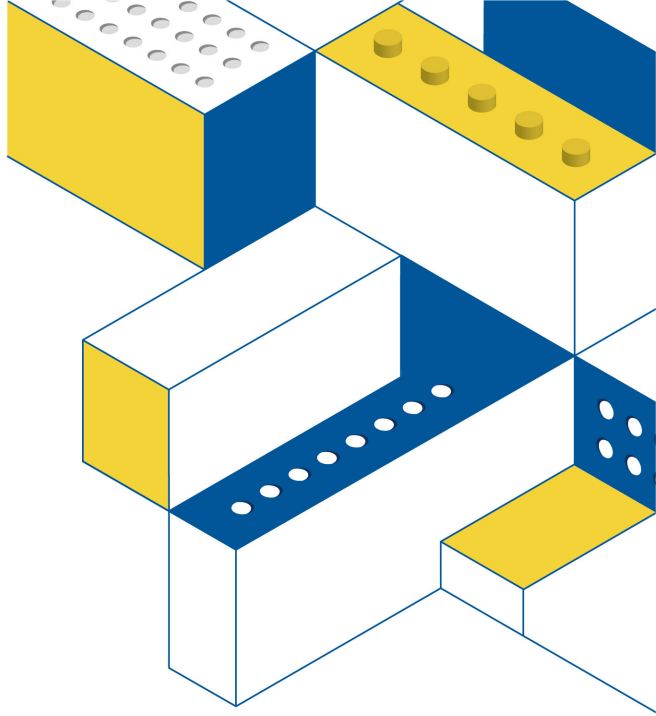


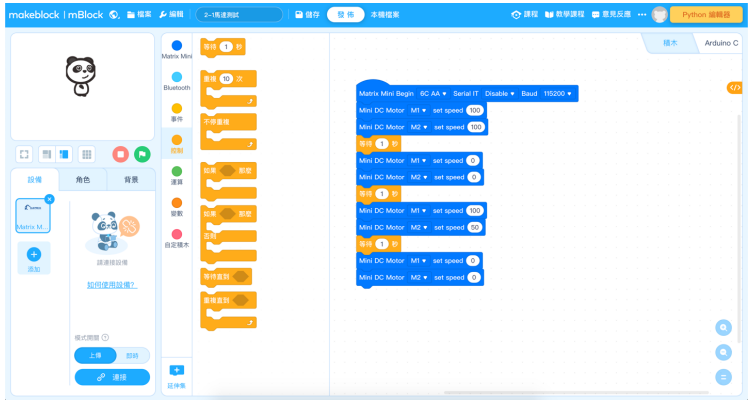
MATRIX Mini Controller





Programming





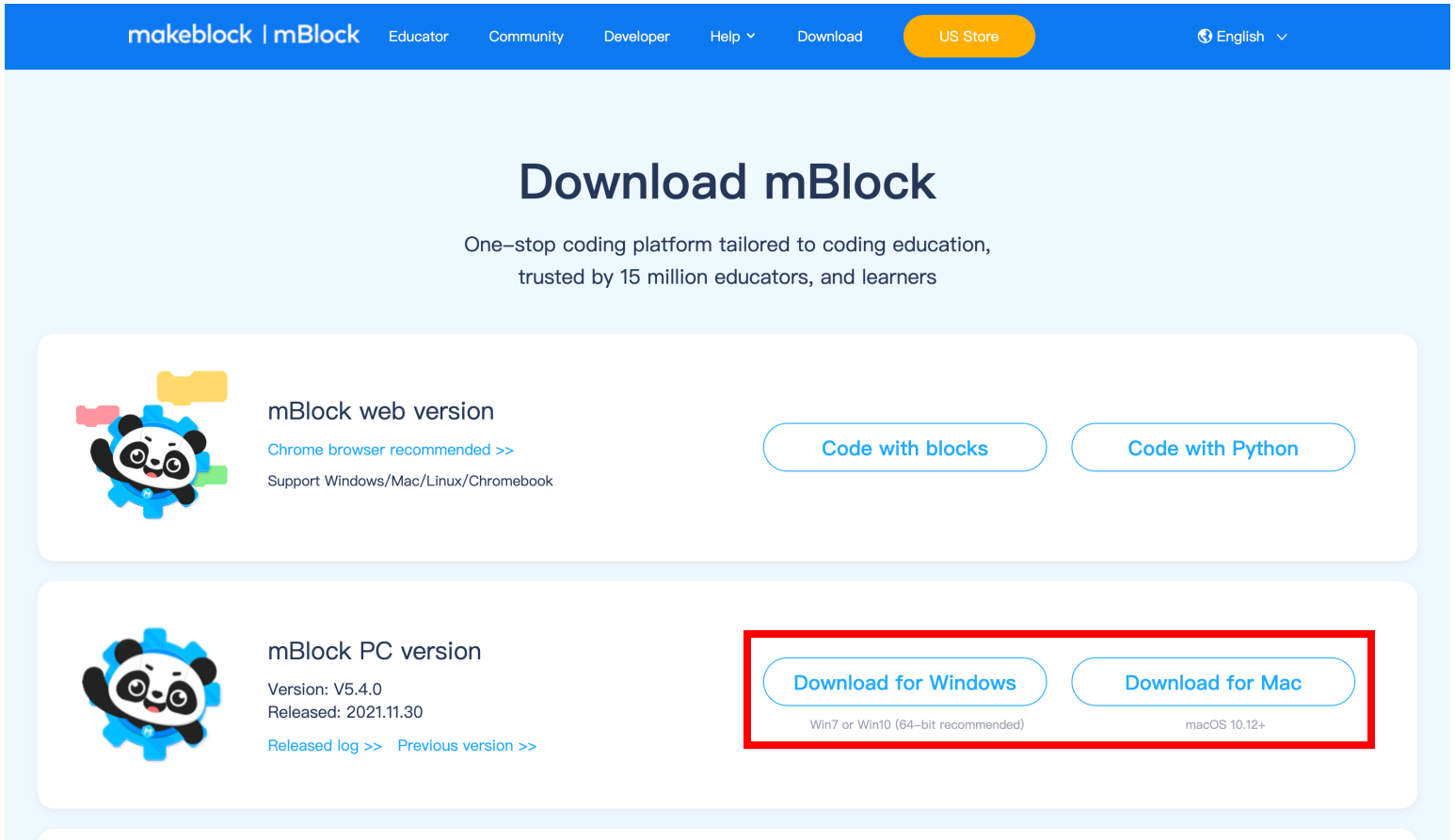
mBlock

Arduino

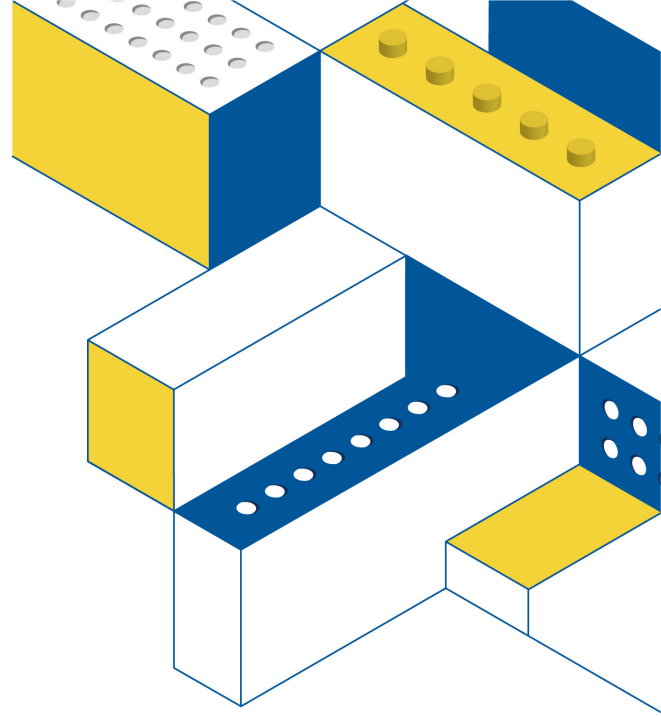
Software Environment Setup

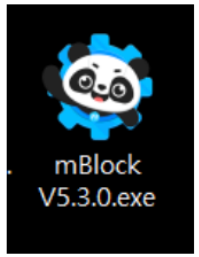
Download mBlock

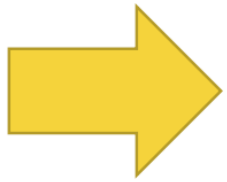
https://mblock.makeblock.com/en-us/download/

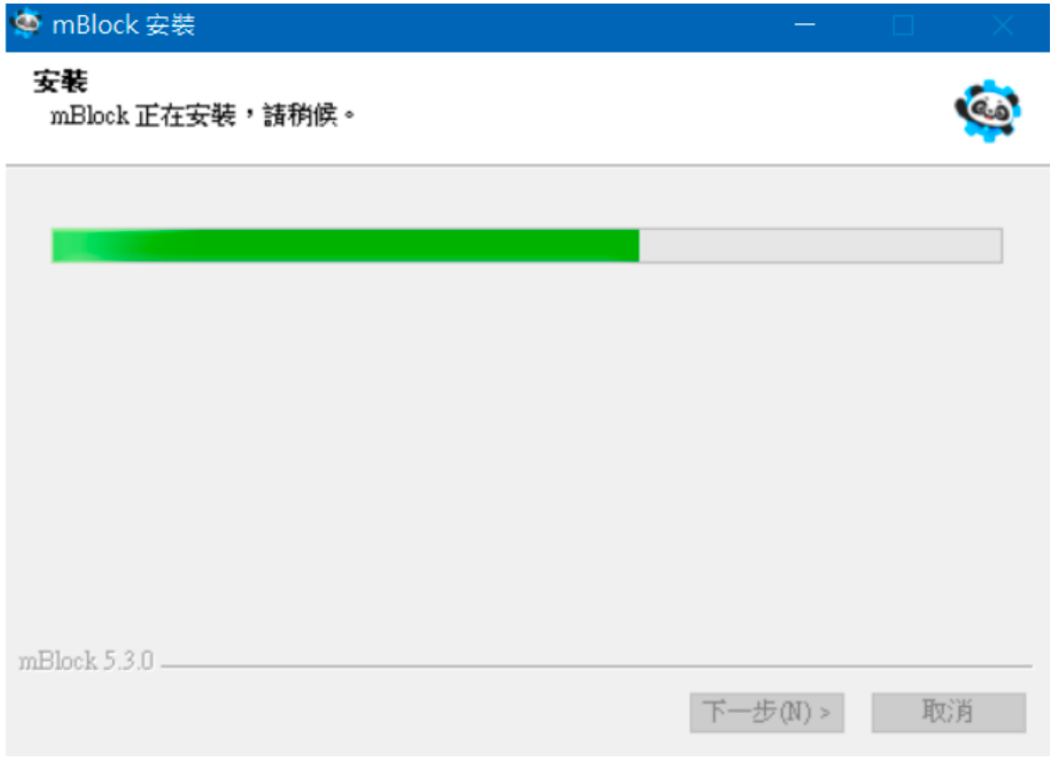


Install mBlock5









Download USB Driver and Install

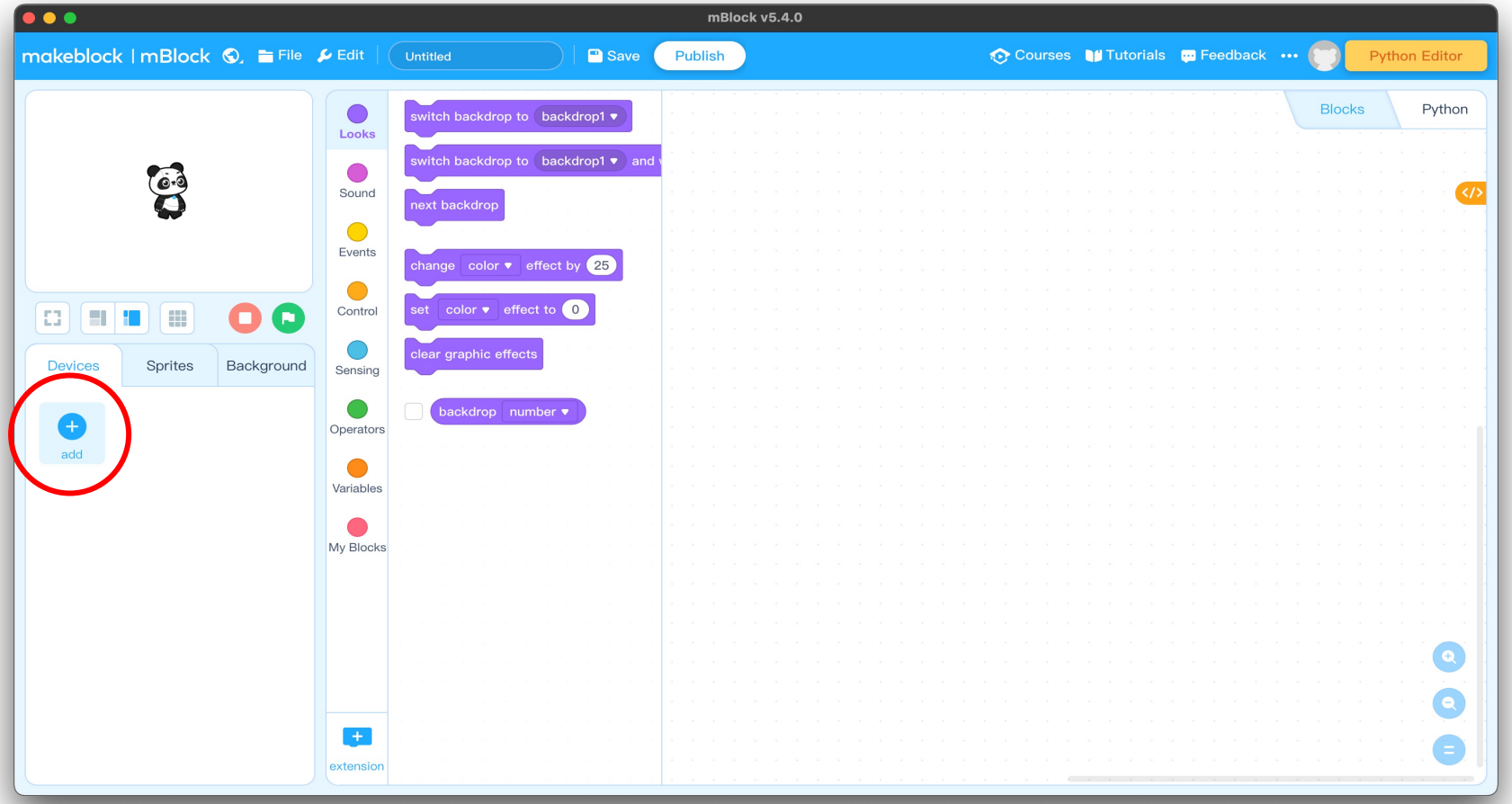
Windows：

CDM21228_Setup(Windows).exe.zip

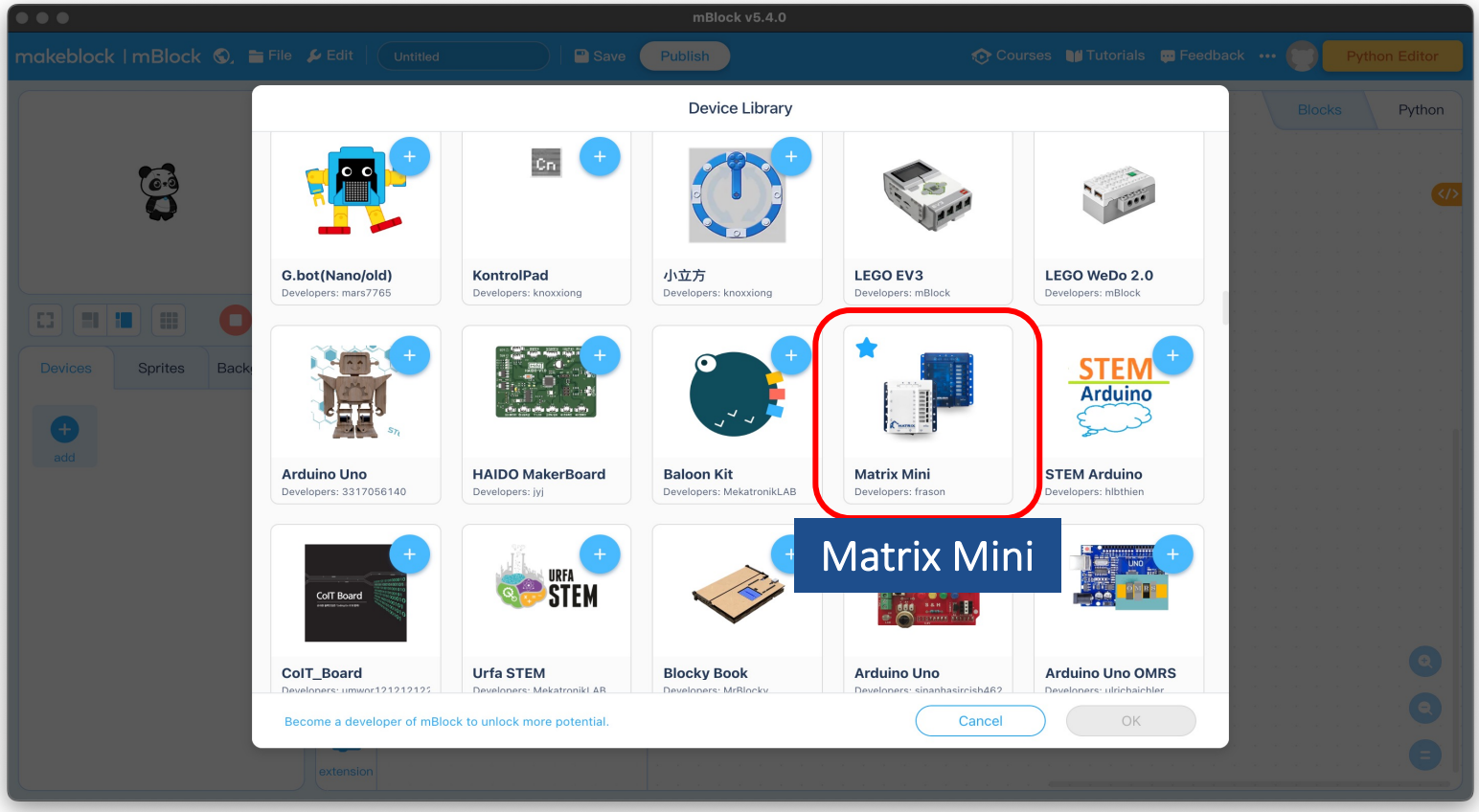
Mac：

FTDIUSBSerialDriver_v2_2_18 (Mac).zip

Click on "Add Device"

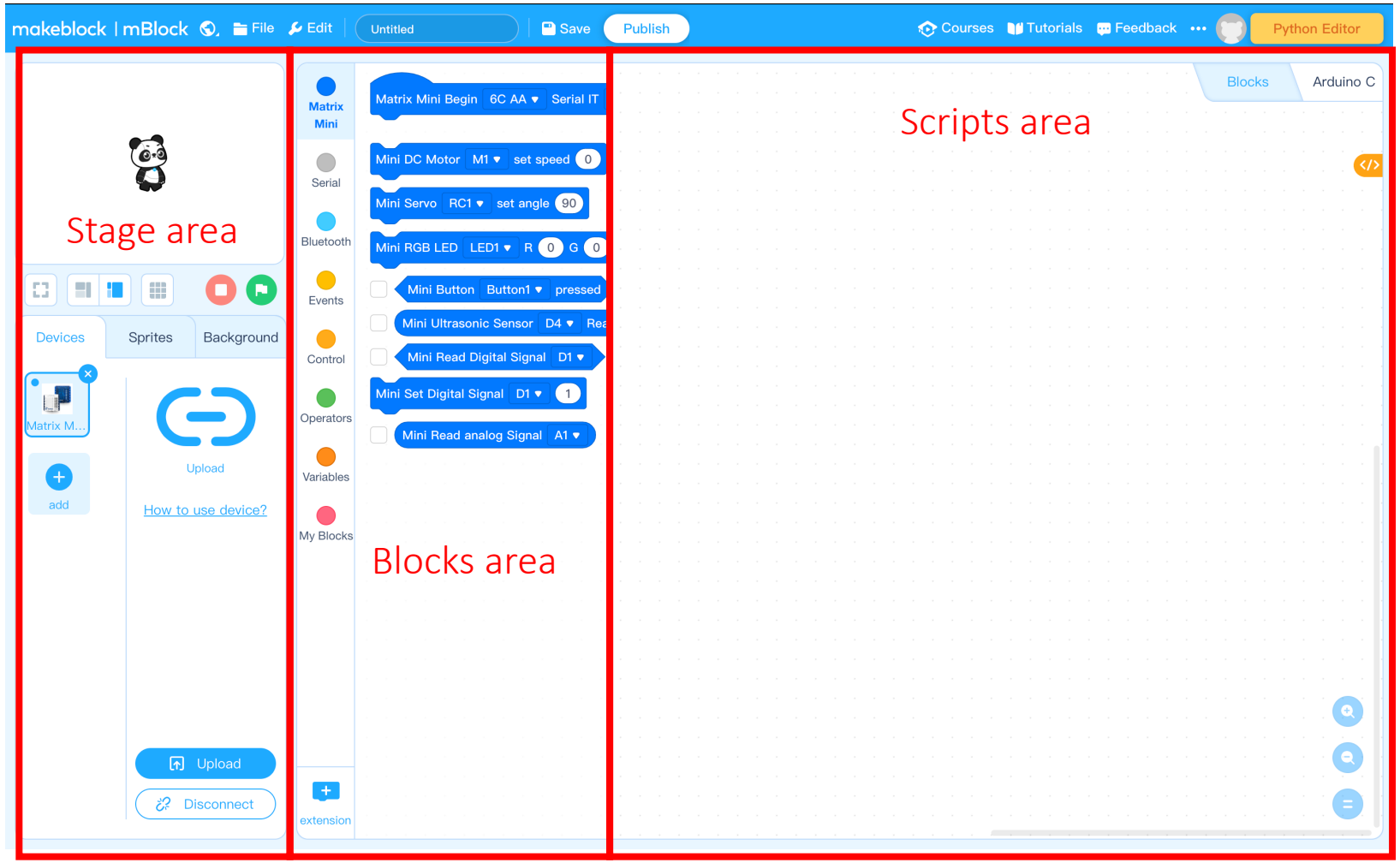


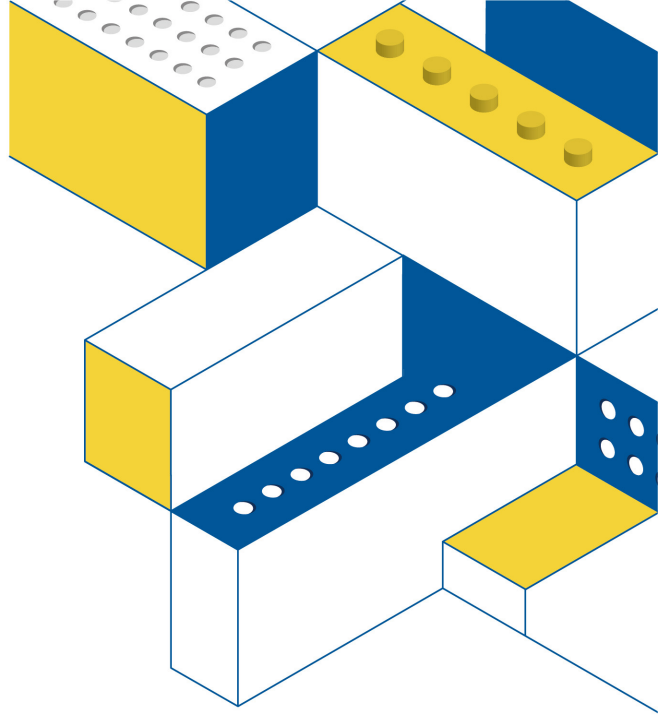
Scroll down to find the Matrix Mini device



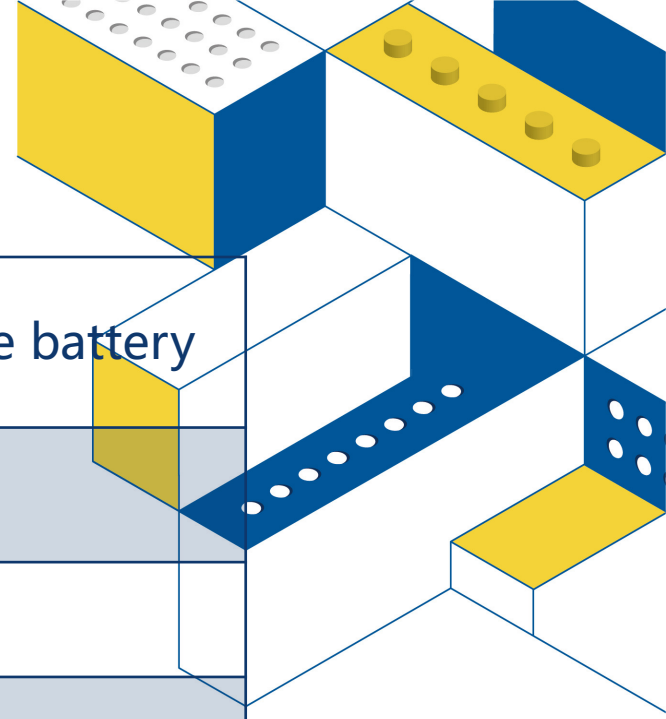
Program Tour

Programing Tour





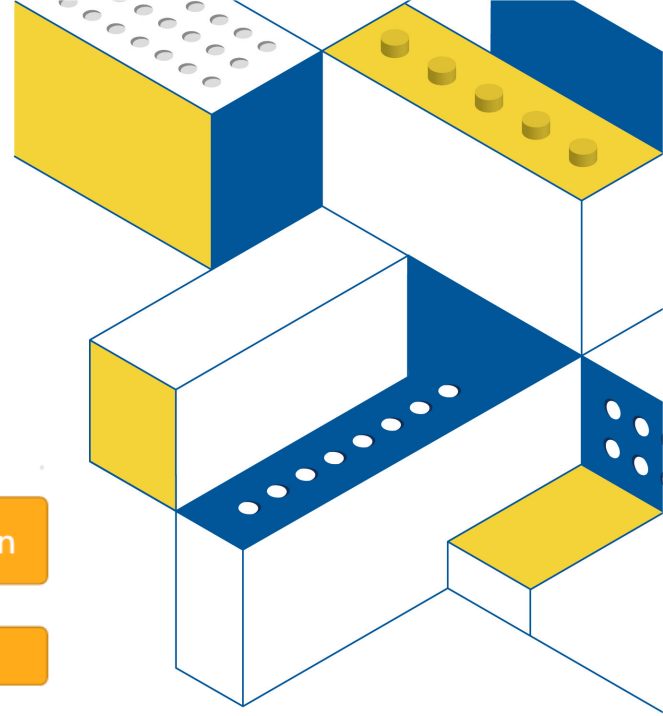
Matrix Mini Blocks

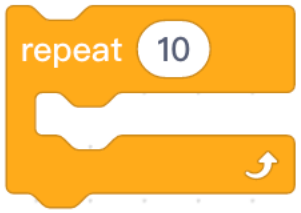


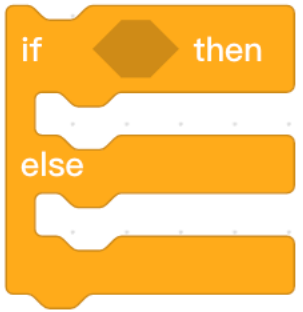
Matrix Mini Begin 6C AA Serial IT Disable Baud 115200	Program start and setting the battery
Mini DC Motor M1 set speed 0	Set speed of DC motor
Mini Servo RC1 set angle 90	Set RC servo angle
Mini RGB LED LED1 R 0 G 0 B 0	Set RGB LED
Mini Button Button1 pressed	Read the signal of button
Mini Ultrasonic Sensor D4 Read Distance	Read distance from Ultrasonic Sensor
Mini Read Digital Signal D1	Read digital signal
Mini Set Digital Signal D1 1	Set output voltage
Mini Read analog Signal A1	Read analog port

Control

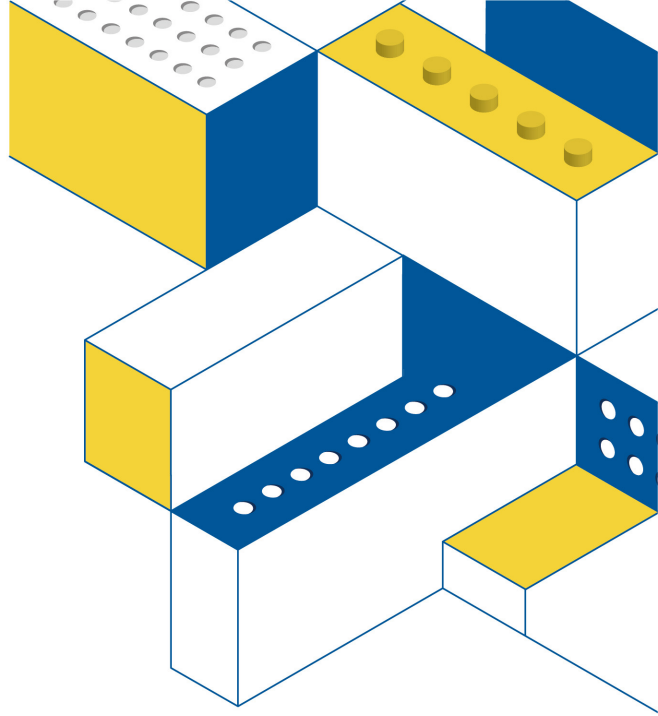
Wait, loops, conditionals







LED Switch
(Connect device、Check Com port)



- Wait Until
- Loop (repeat)
- Test Mini Button
- Test RGB LED

Wait for Button 1 pressed

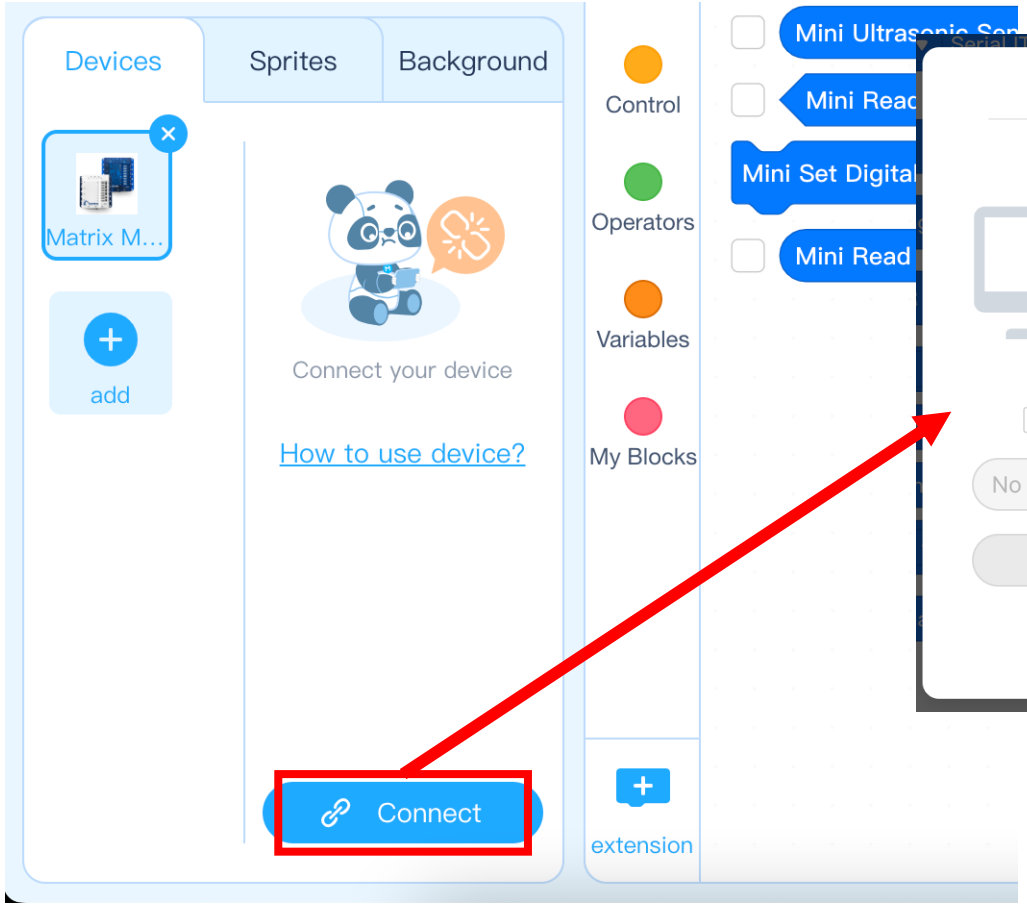
Keeps LED1 on red until button 2 is pressed

Turn off LED1 when button 2 is pressed

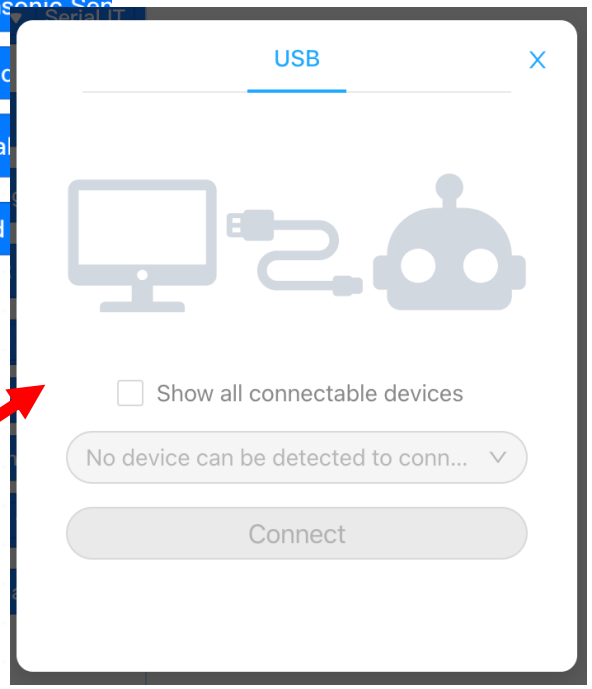
Connect and Upload

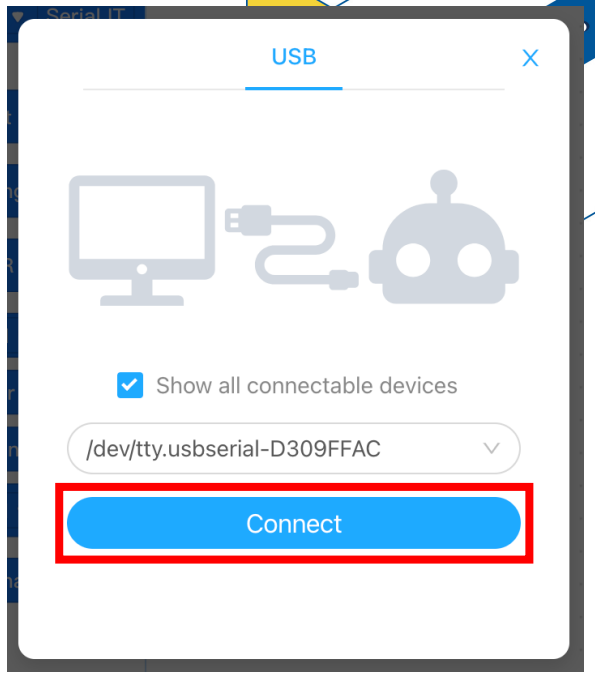
Connect Mini

1 Click "Connect"



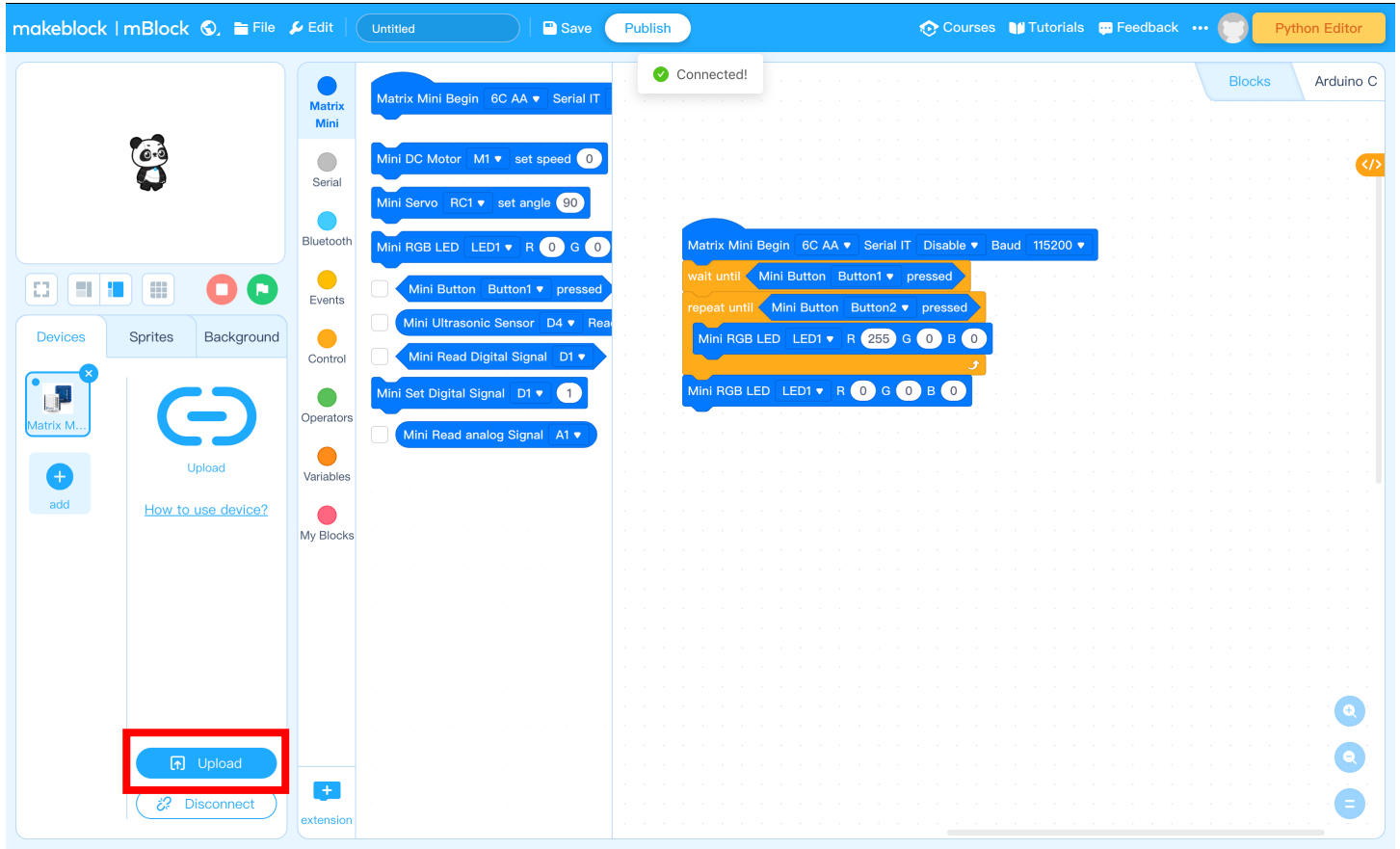
2 Check "Show all connectable devices"



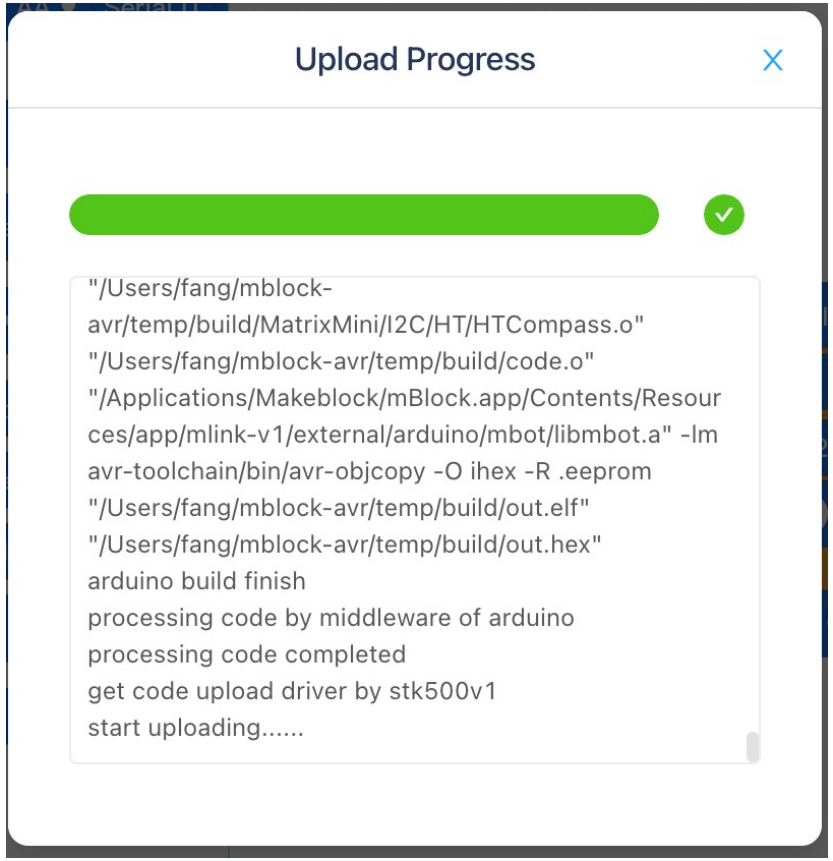


3 Select the right COM, and click "Connect"

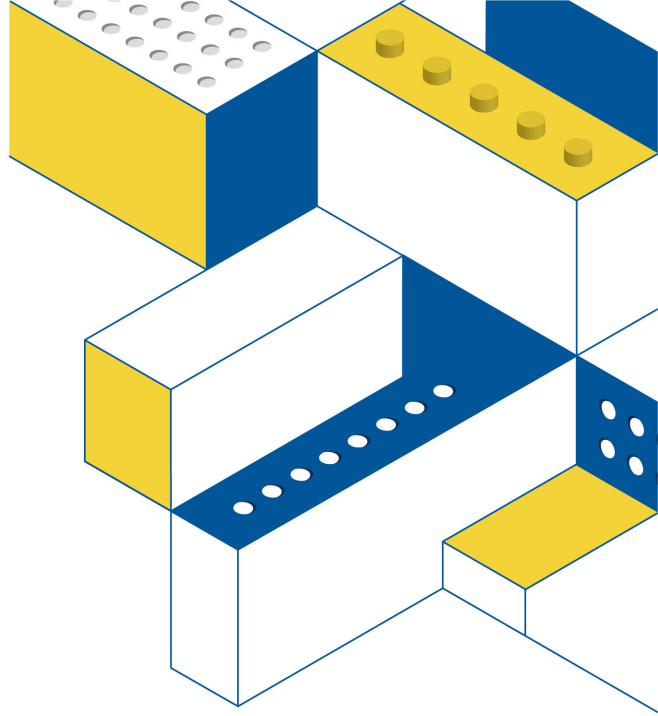
Connection succeeded



Progress Window will automatically close



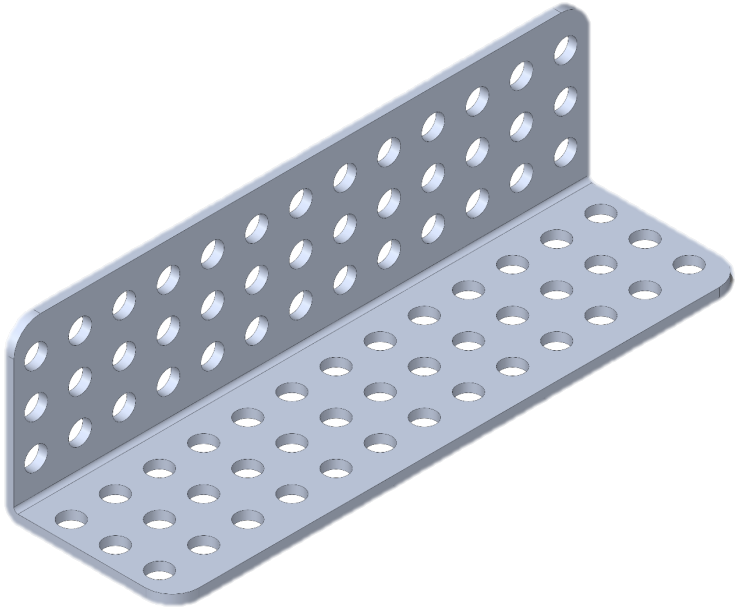
Checklist before upload



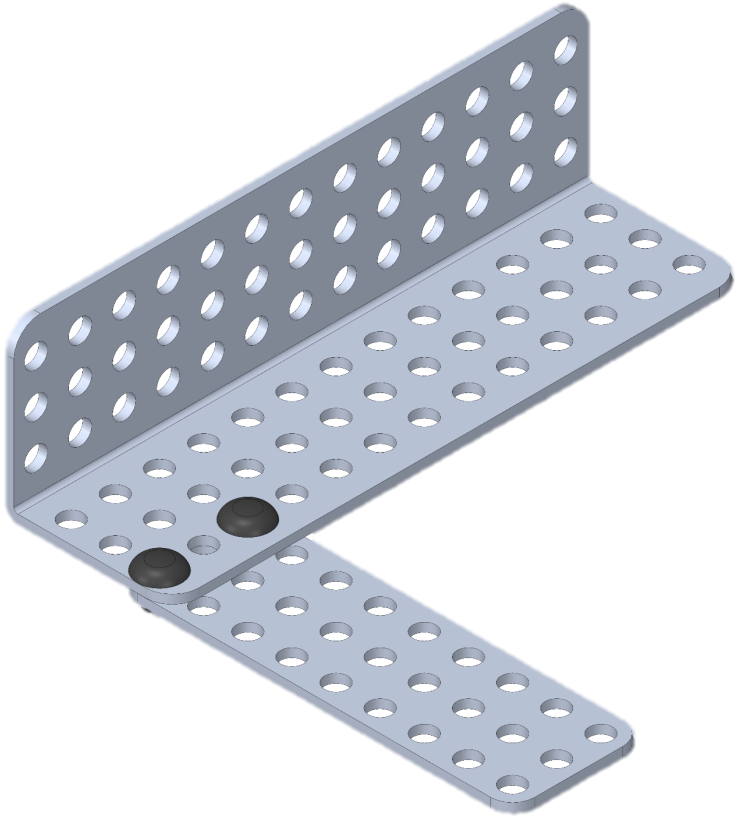
1. USB Connection
2. Select the correct COM port
3. Keeping robots safe

Build the Basic Car

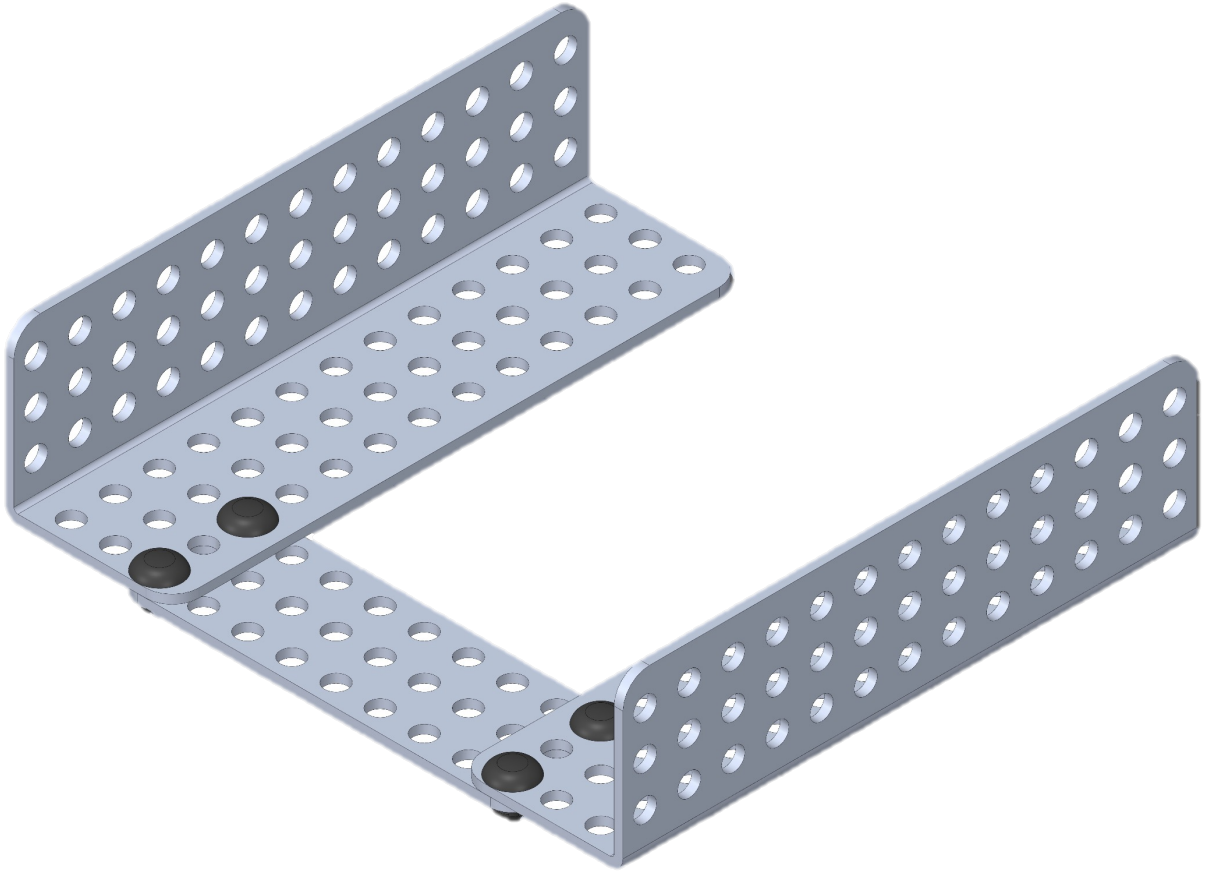
Step1.



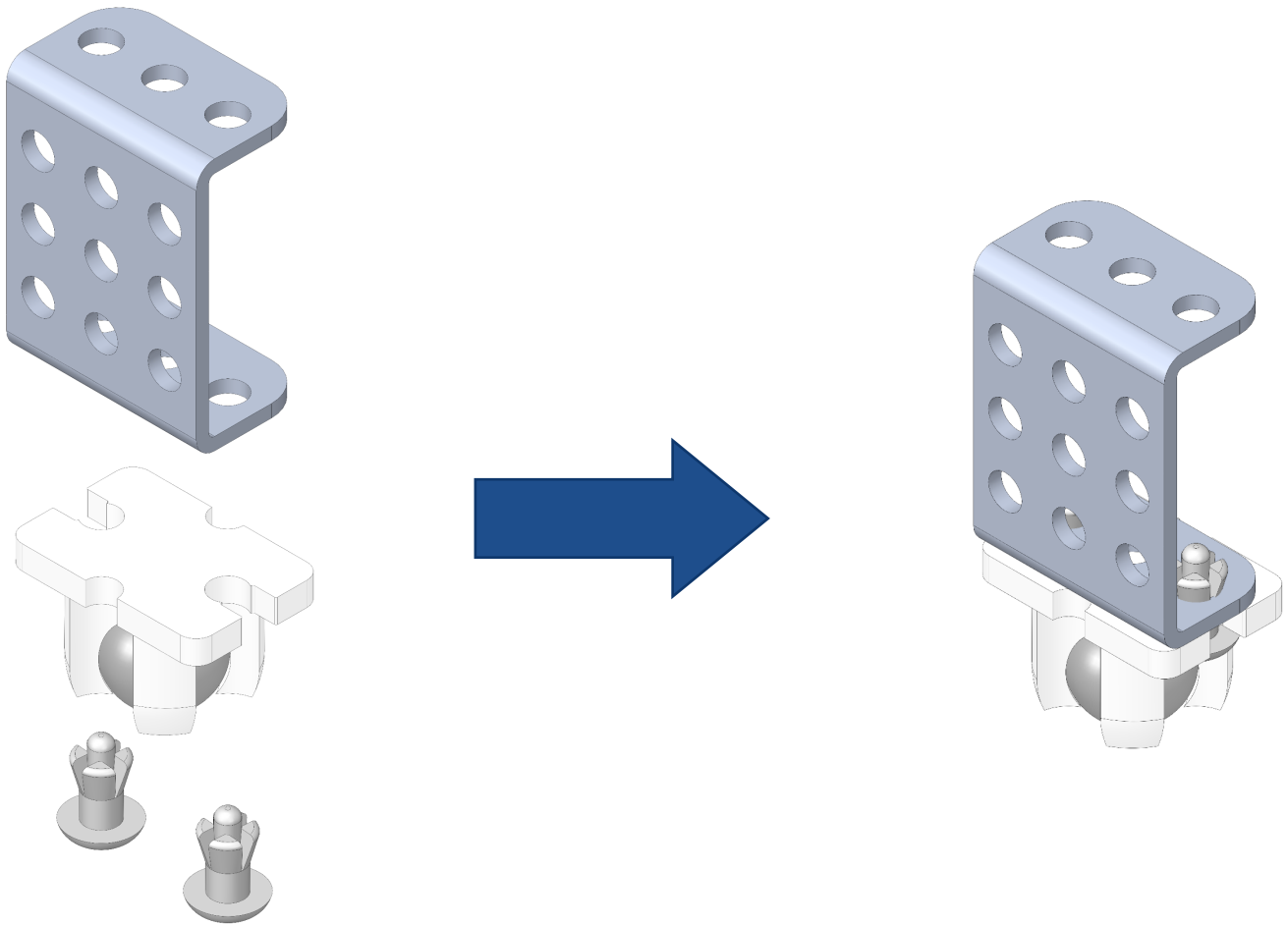
Step2.



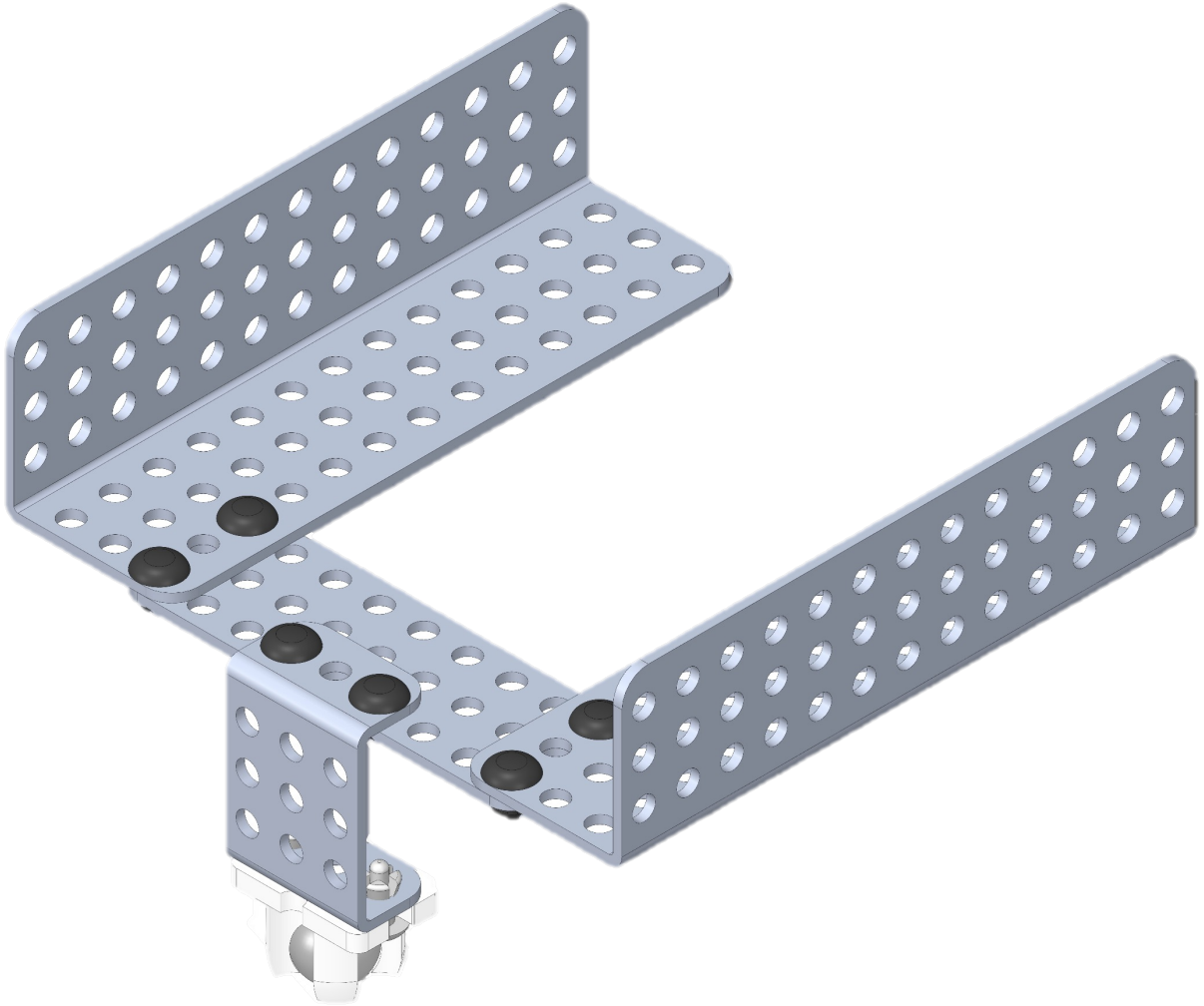
Step3.



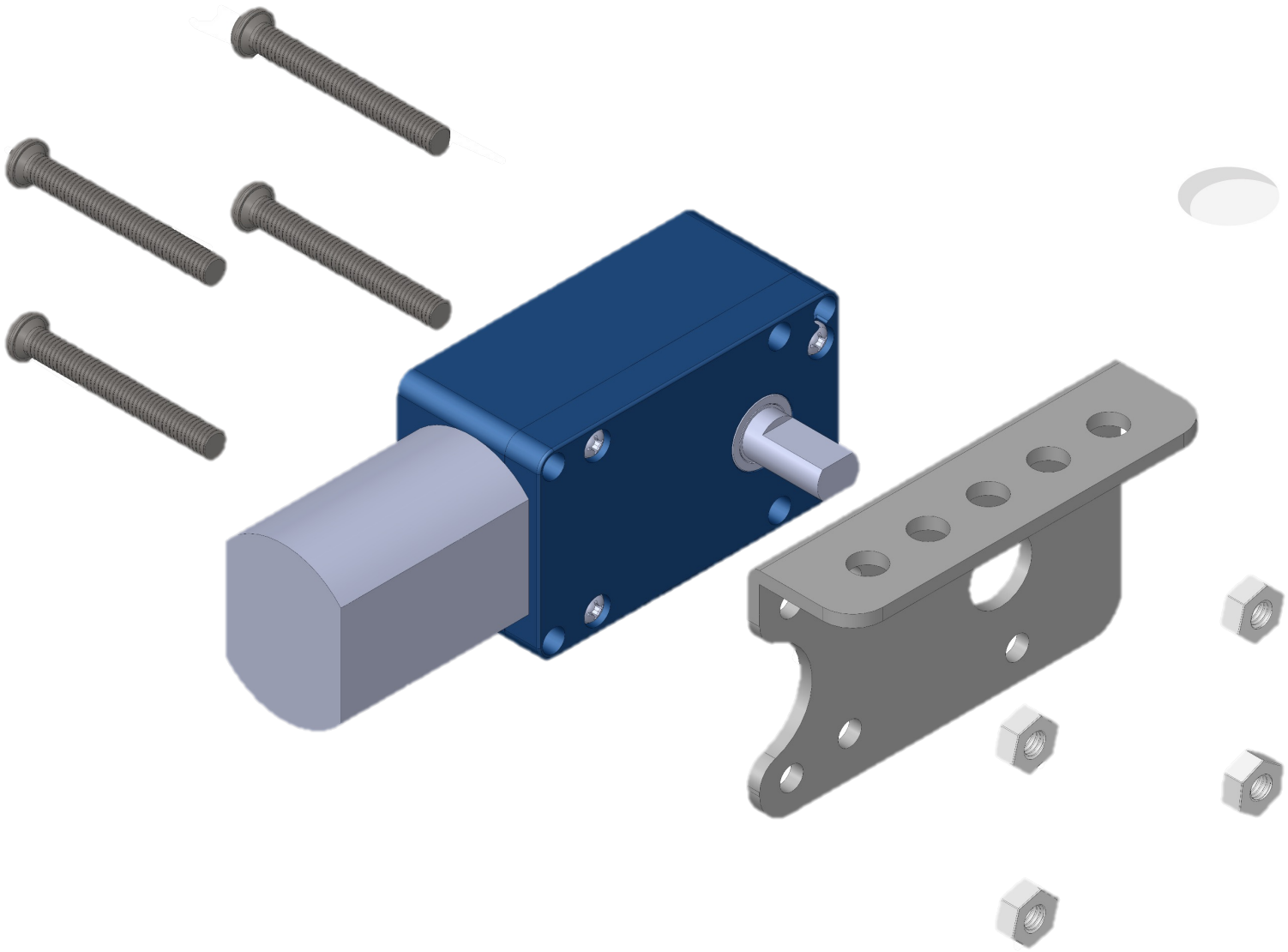
Step4.



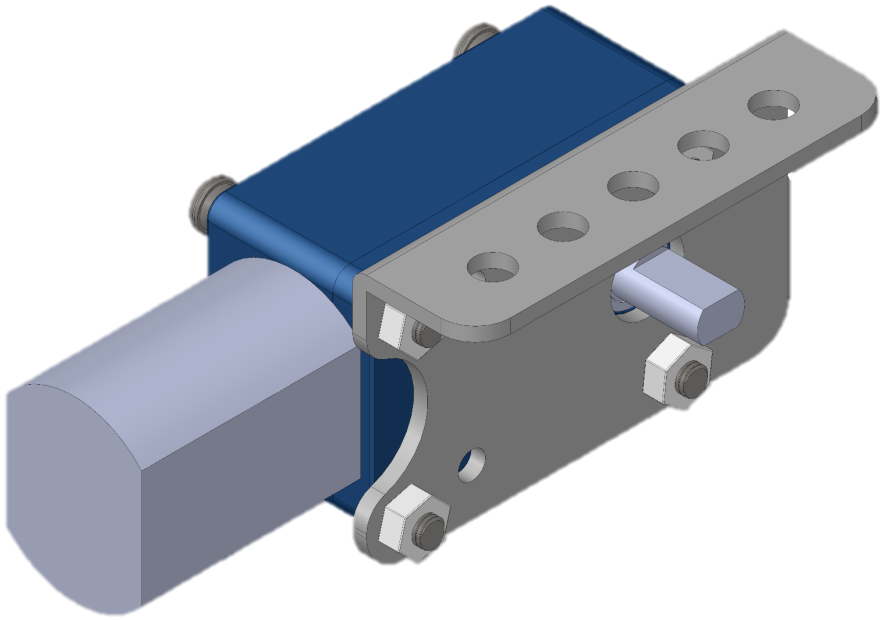
Step5.



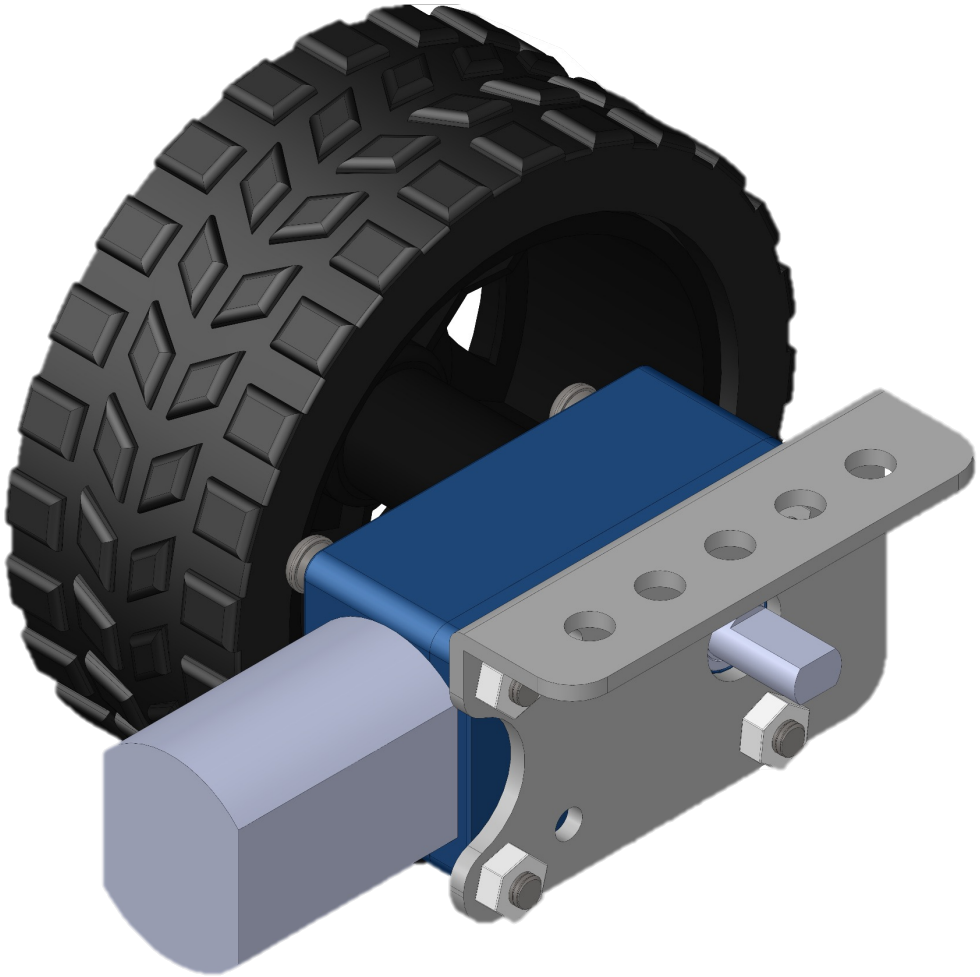
Step6.



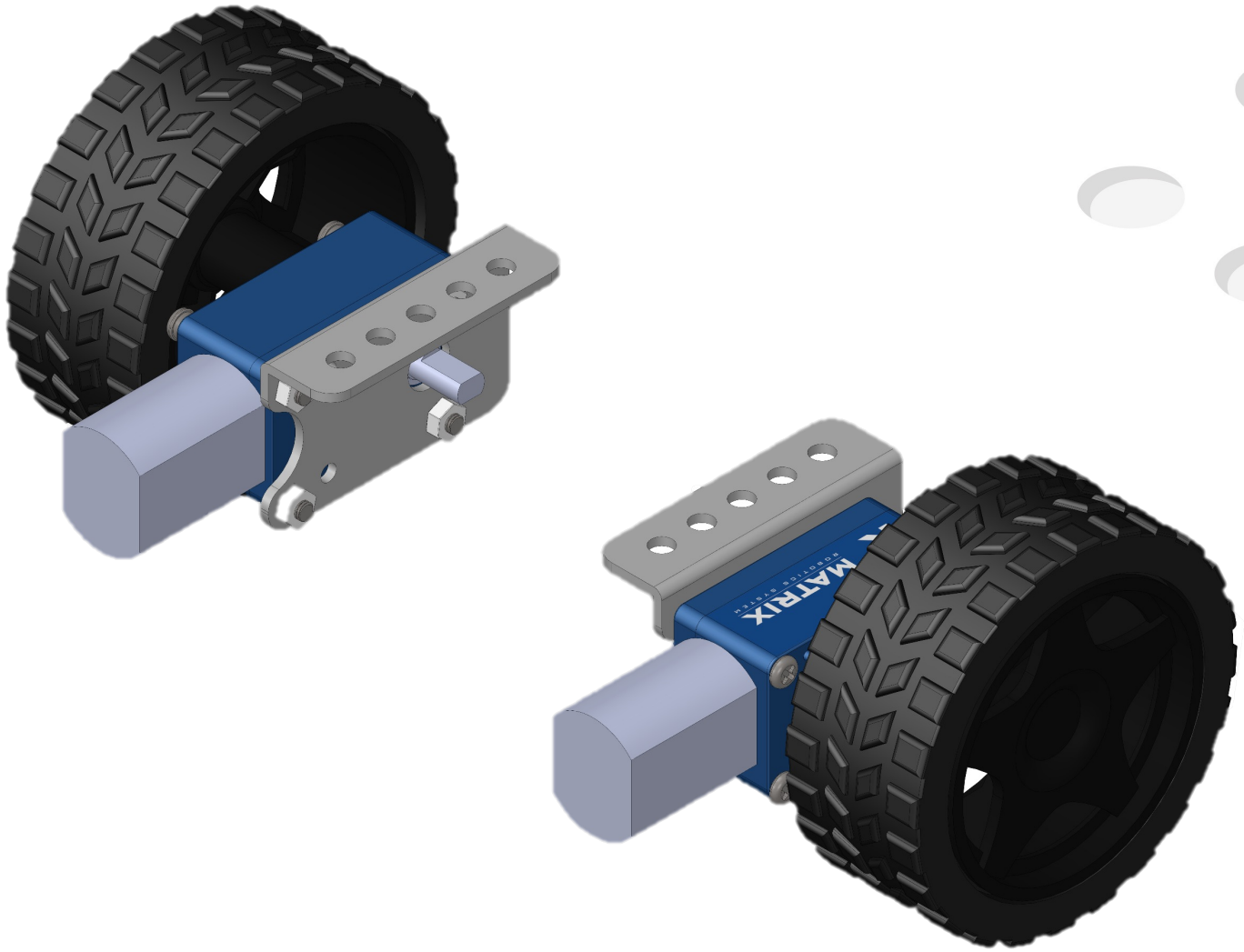
Step7.



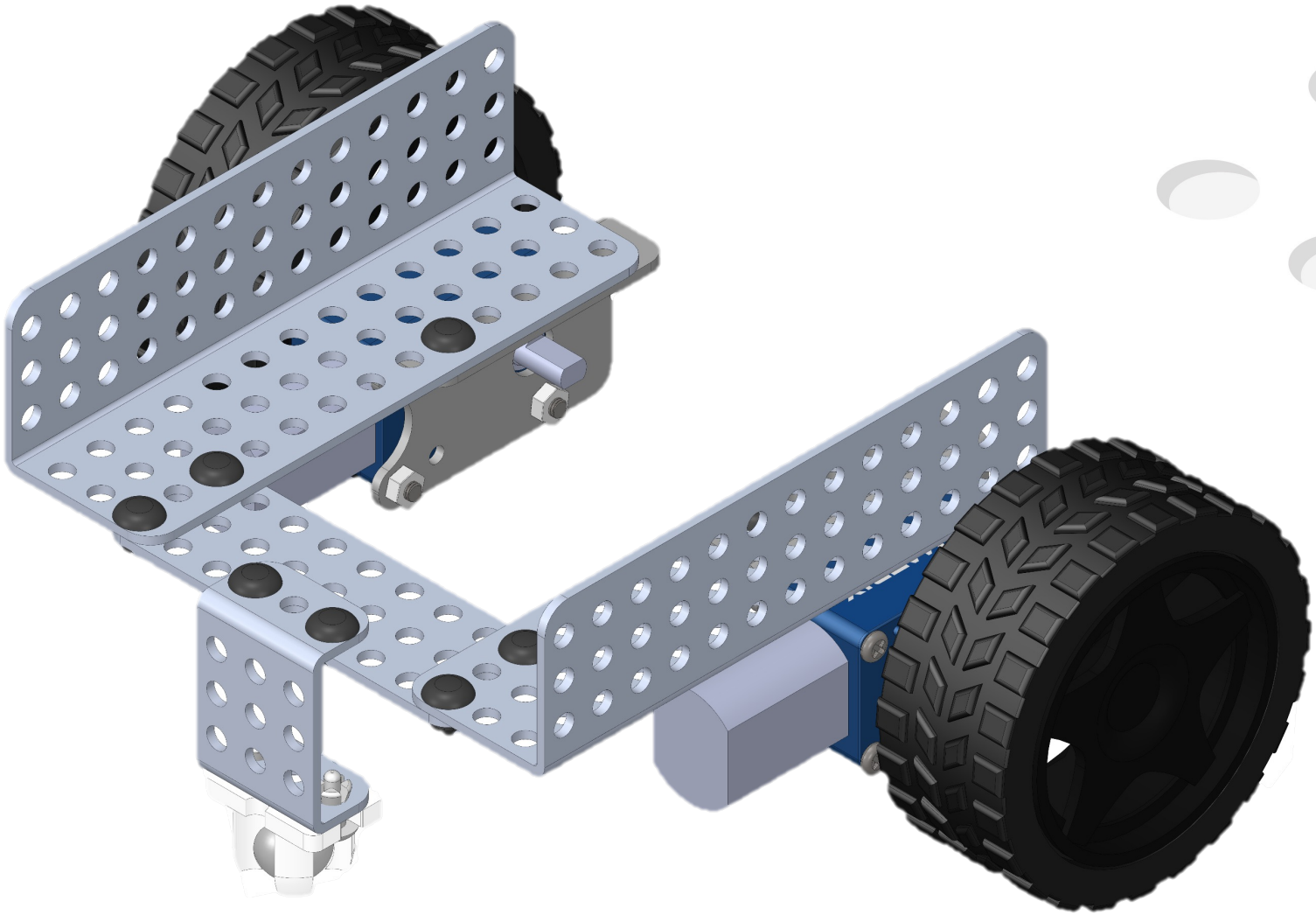
Step8.



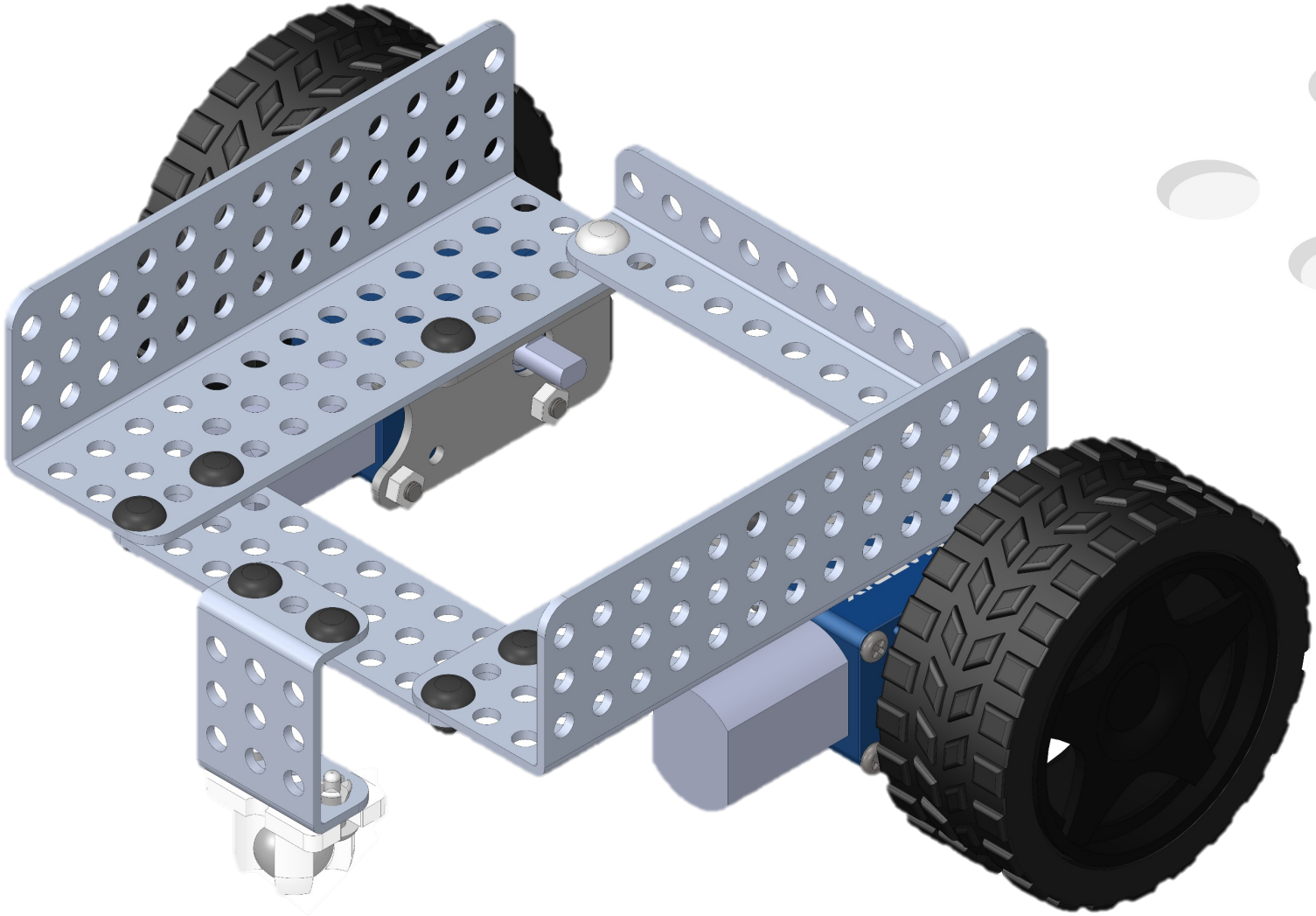
Step9.



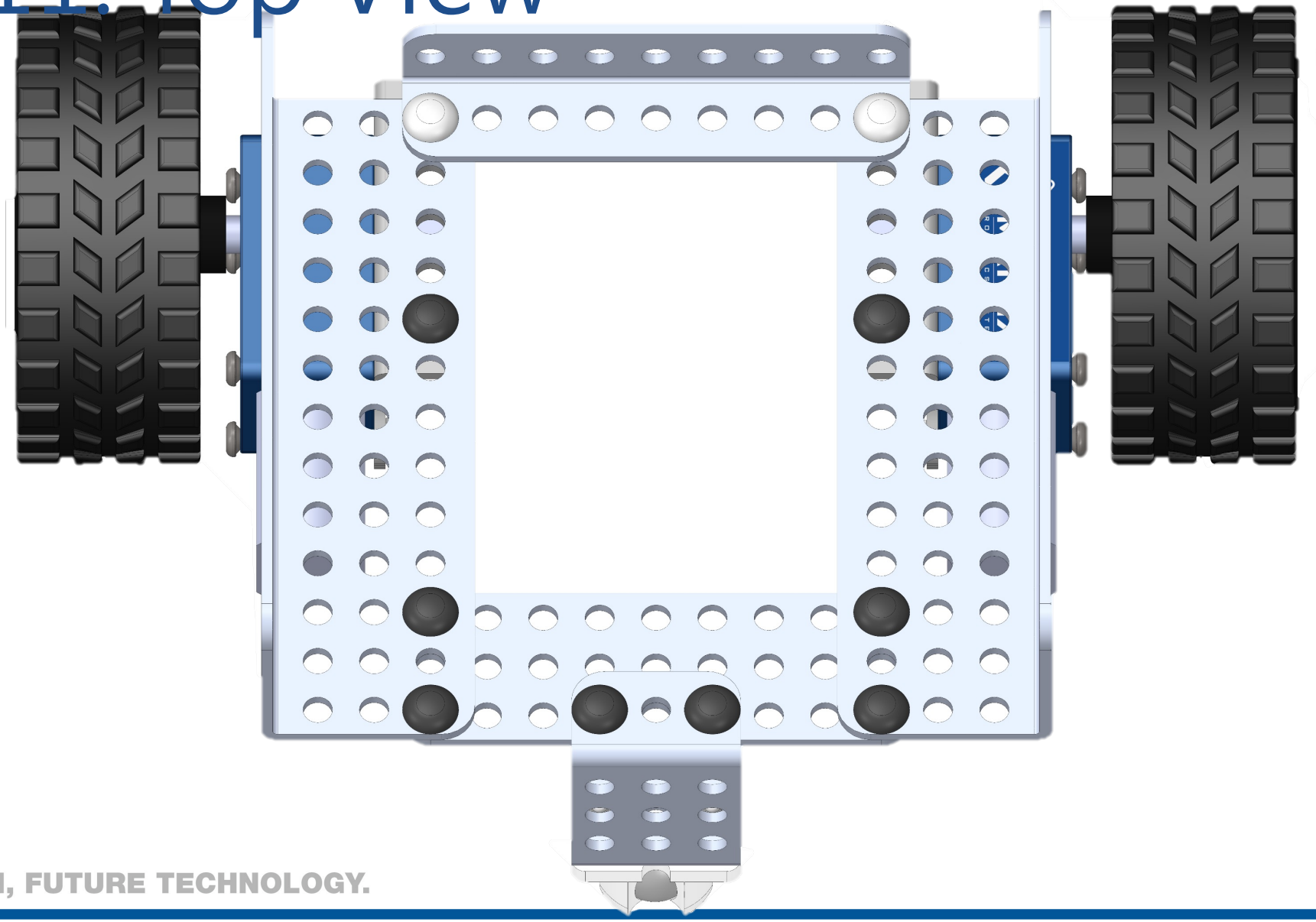
Step10.



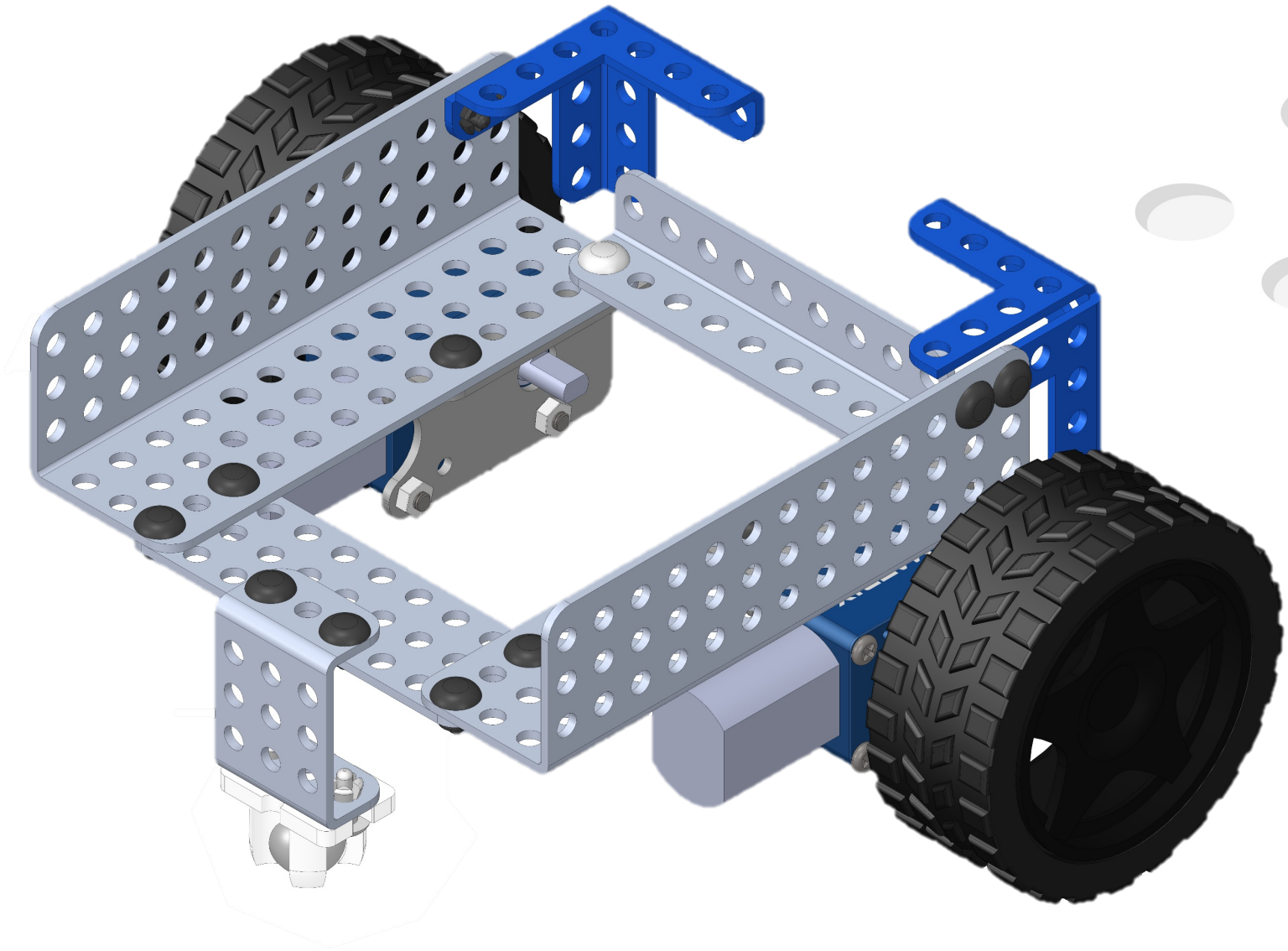
Step11.



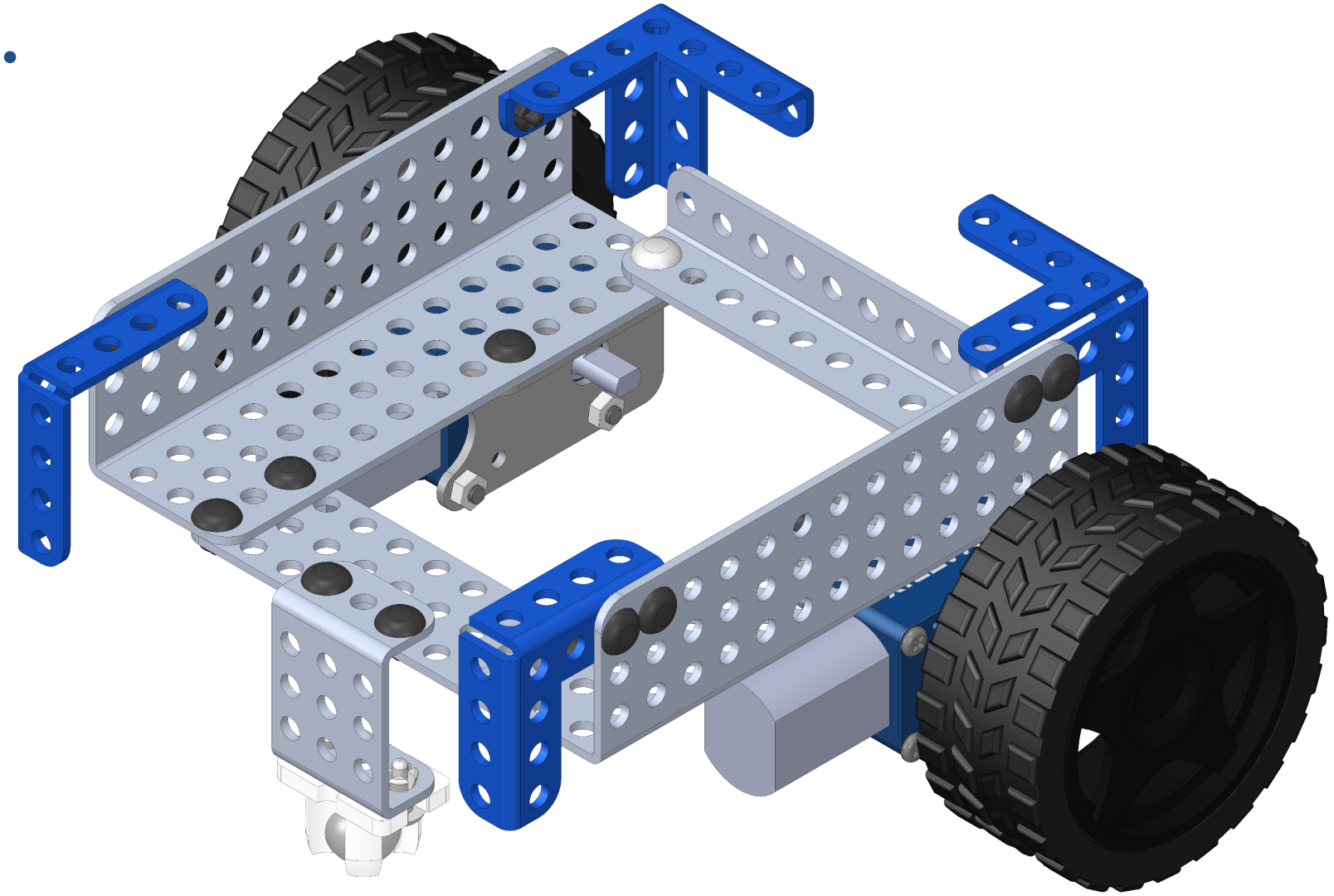
Step11. Top View



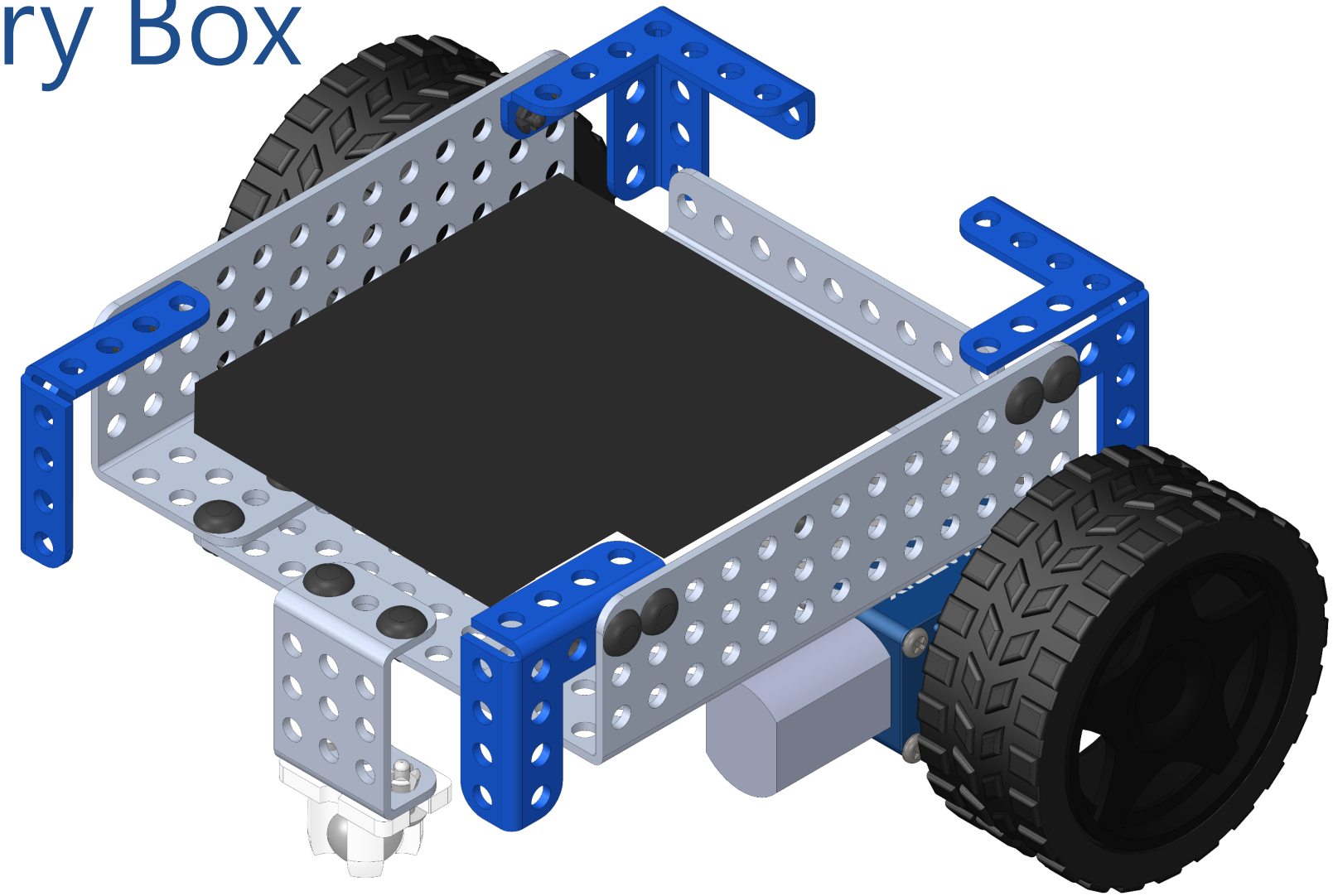
Step12.



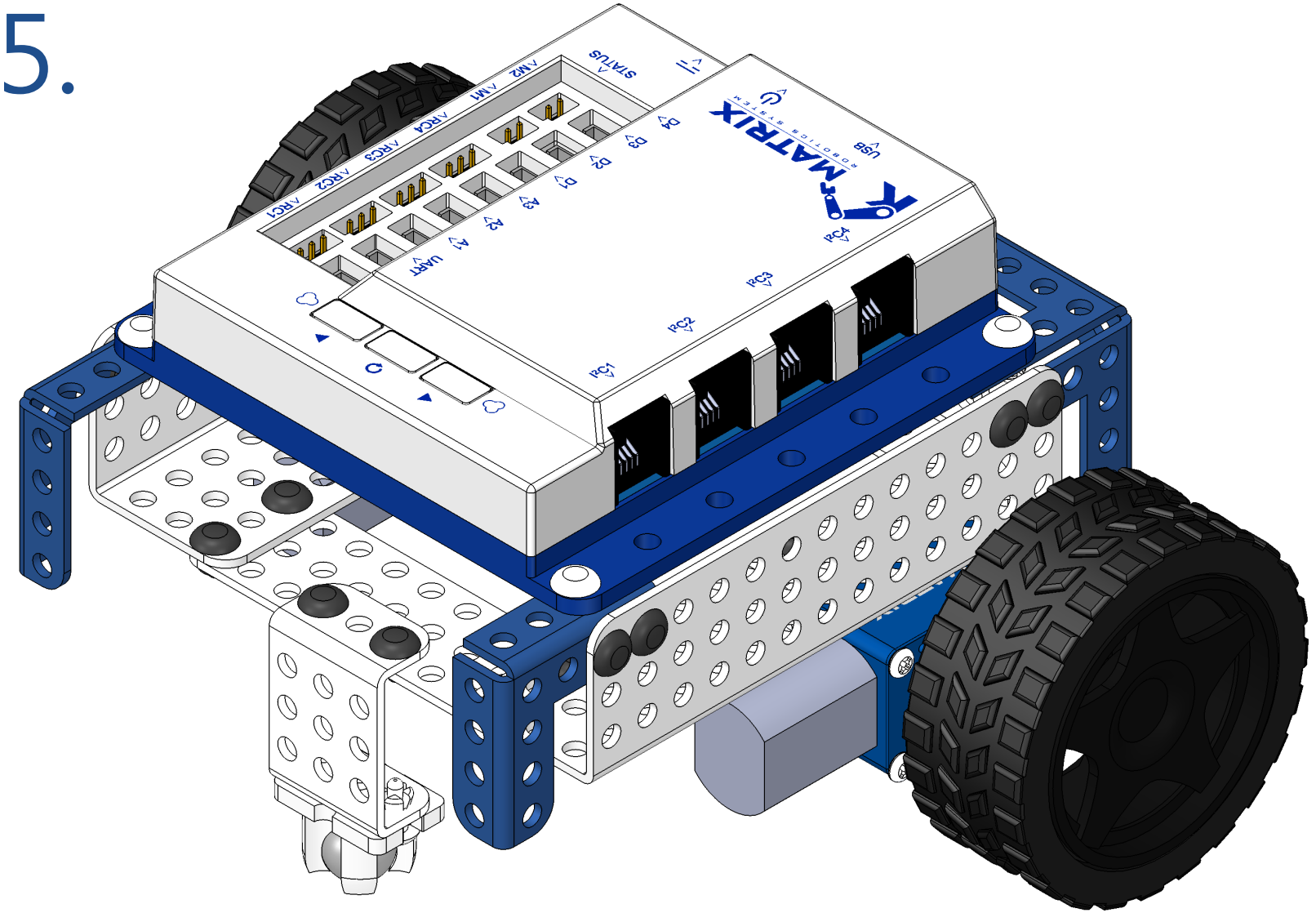
Step13.



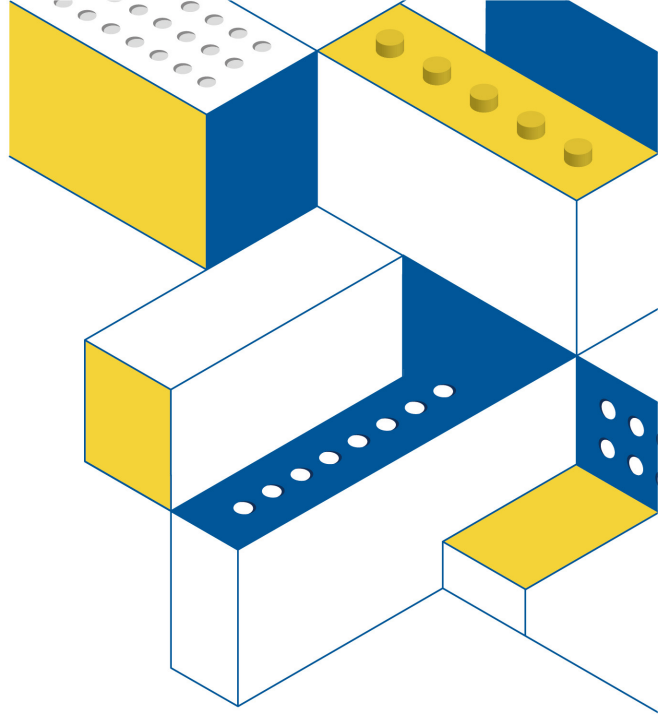
Step14.Battery Box

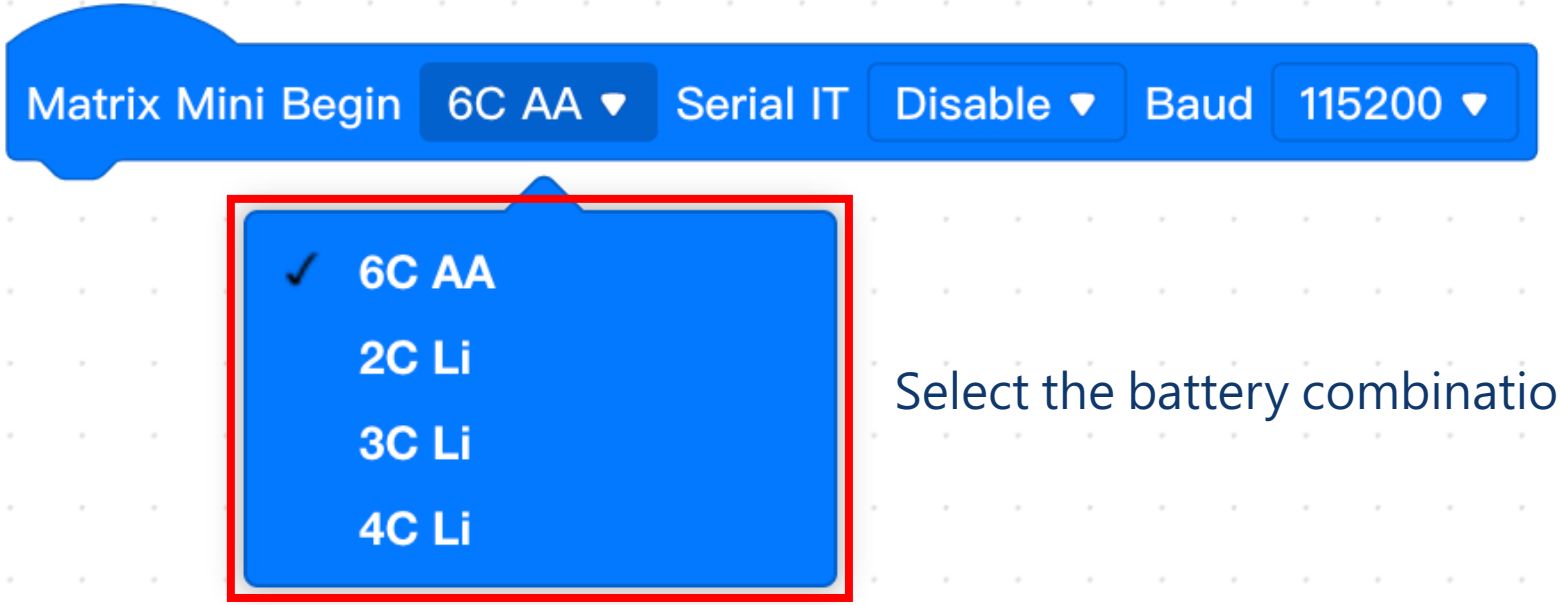


Step15.


STATUS
M2
M1
RC4
RC3
RC2
RC1
D7
D6
D5
D4
D3
D2
D1
D0
UART
USB
IRC4
IRC3
IRC2
IRC1

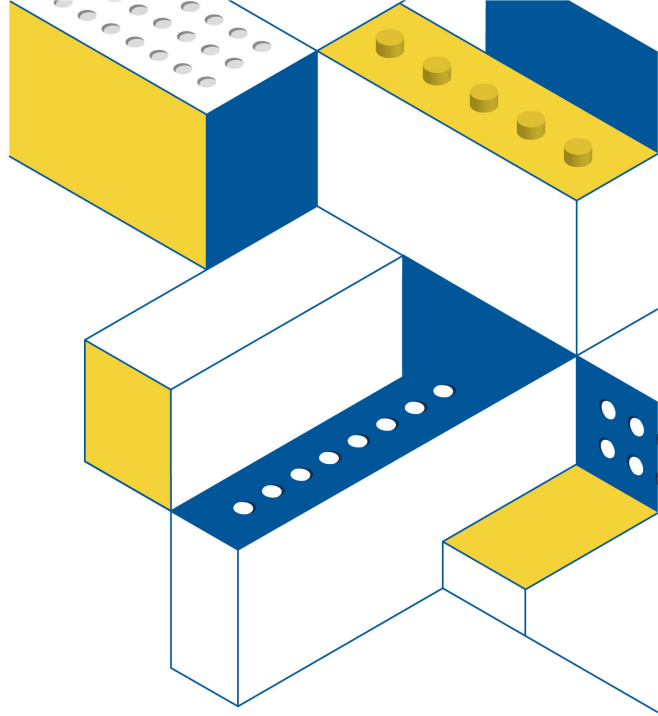
Matrix Mini Begin

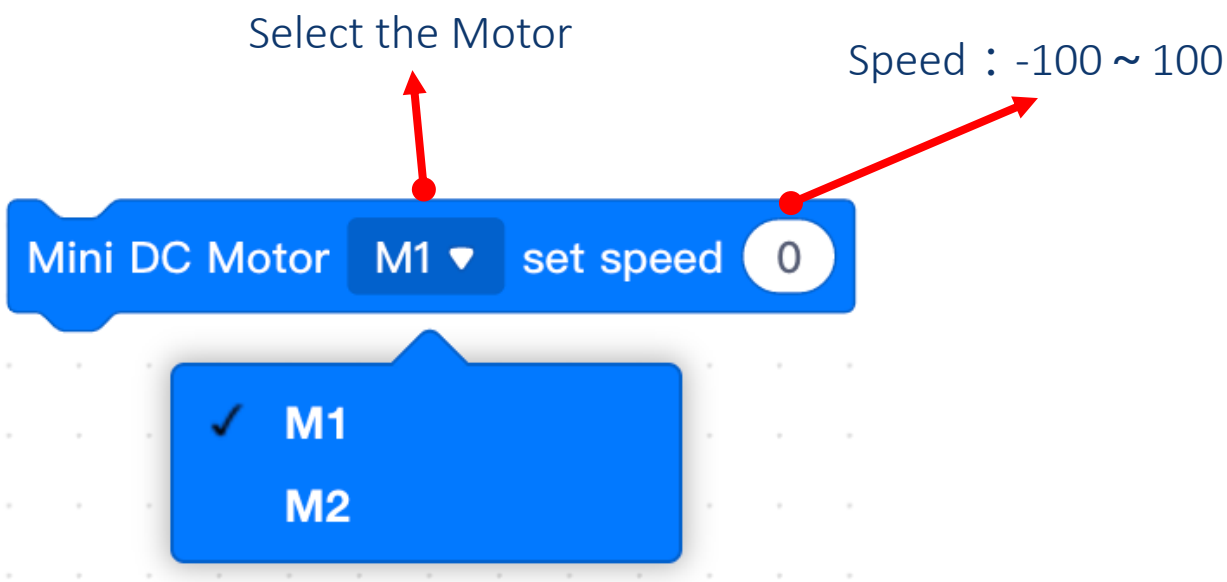




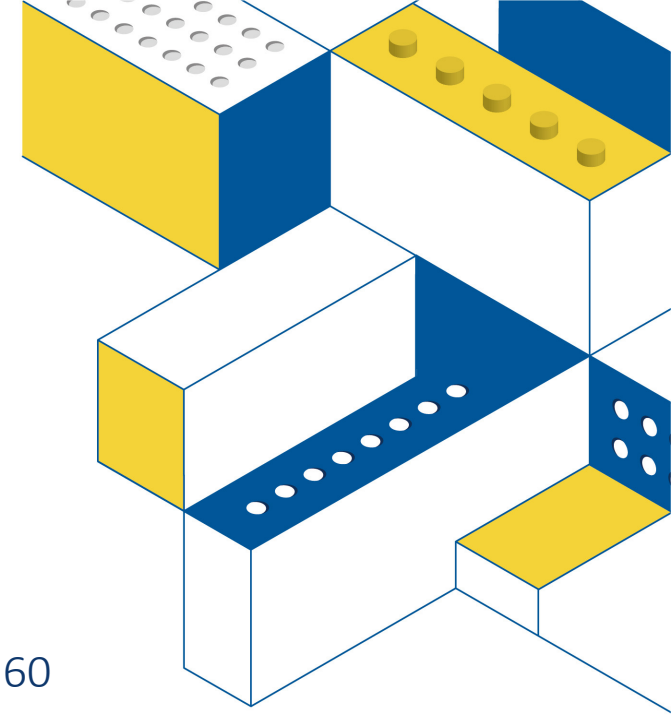
Select the battery combination you use

DC Motors

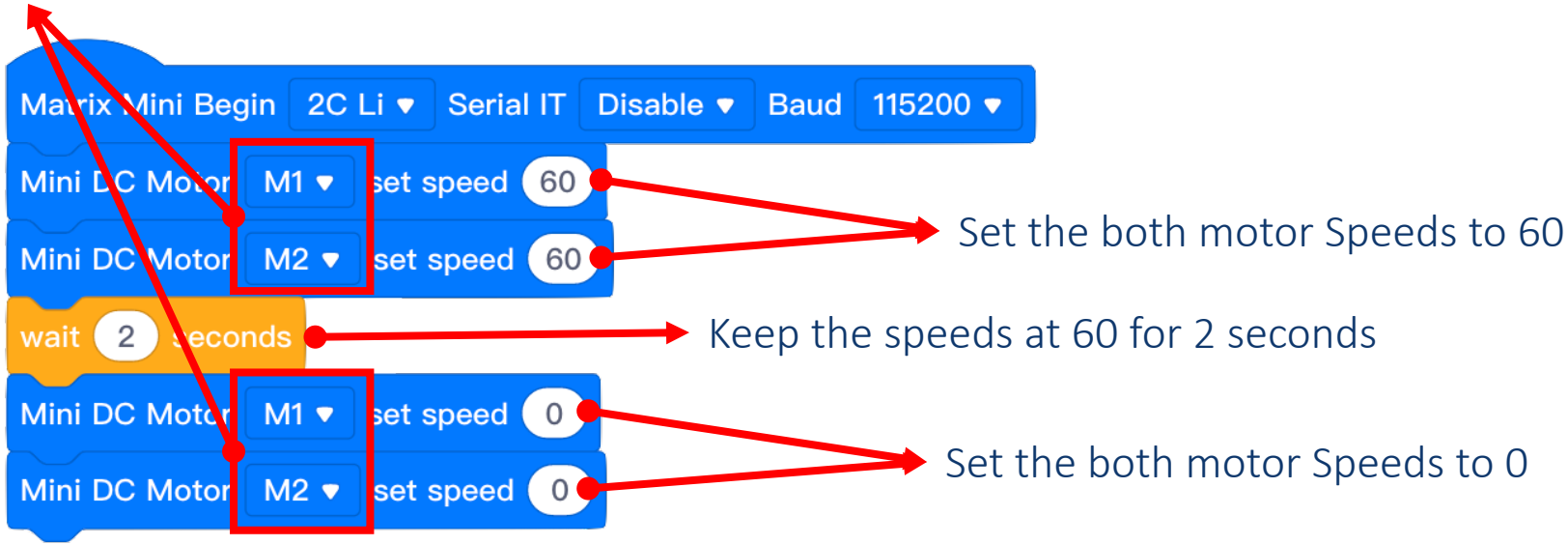



Select the Motor
Speed：-100 ~ 100
Mini DC Motor
M1
set speed
0
M1
M2

Let’s Go Forward



Choose the correct ports



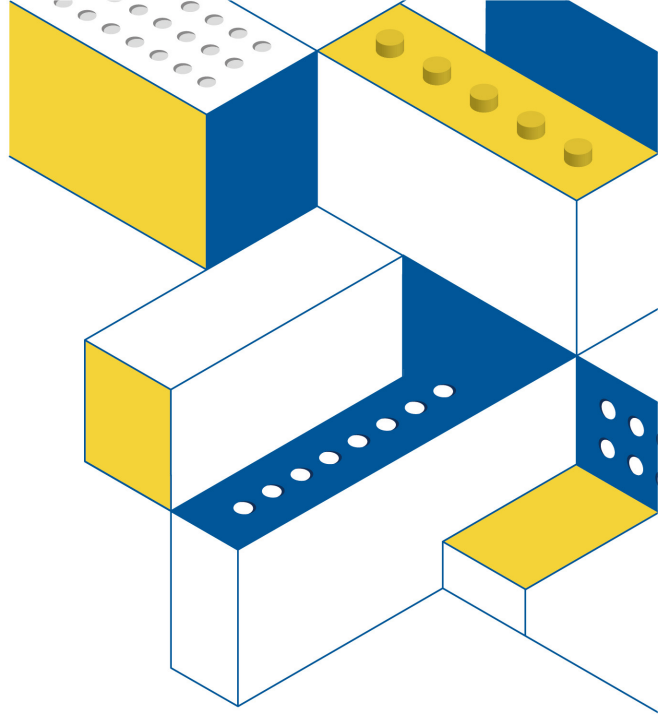
Set the both motor Speeds to 60

Keep the speeds at 60 for 2 seconds

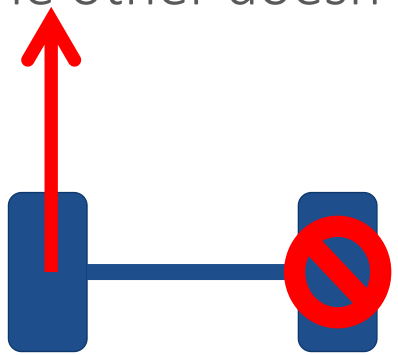
Set the both motor Speeds to 0

※ If the Car does not move forward, please check the wired of the reverse motor.

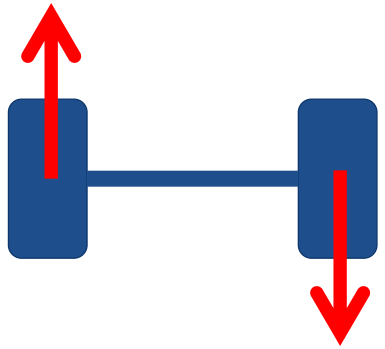
Turning



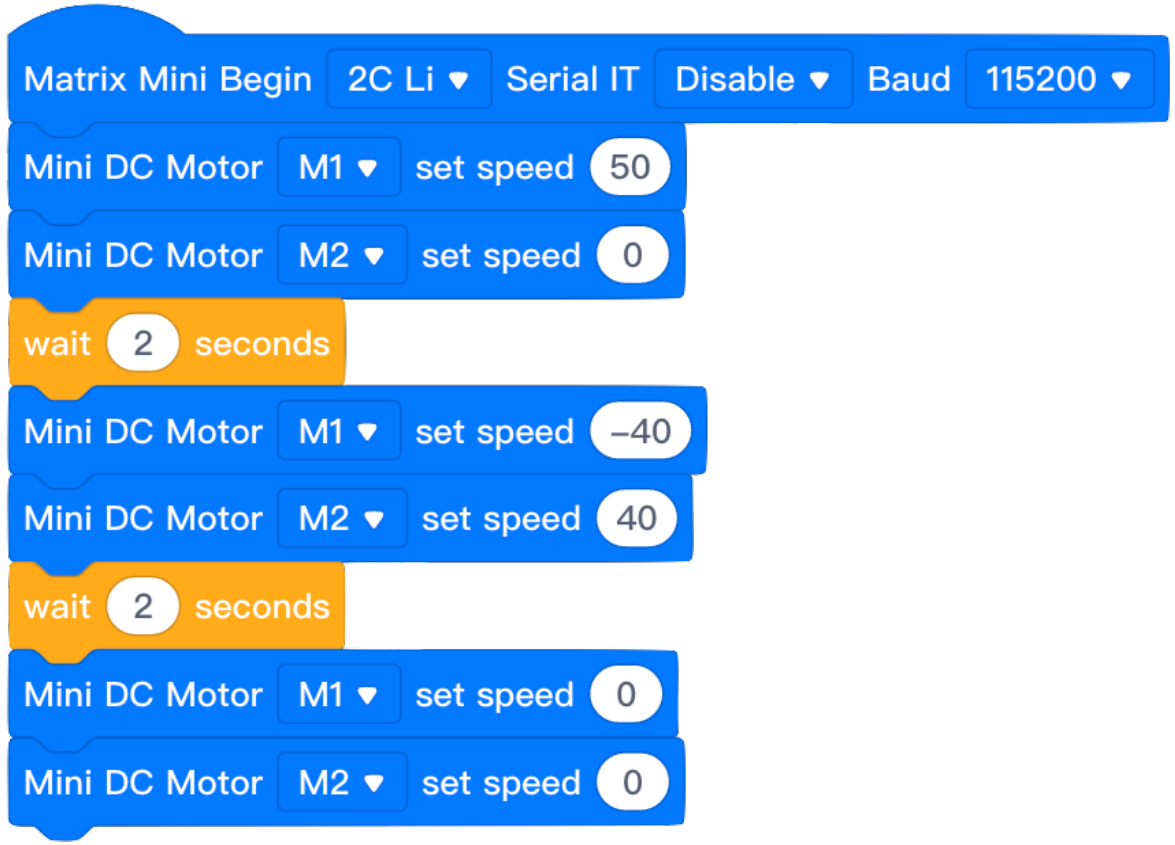
1. Pivot Turn：
   One wheel moves forward or backward and the other doesn’t move.

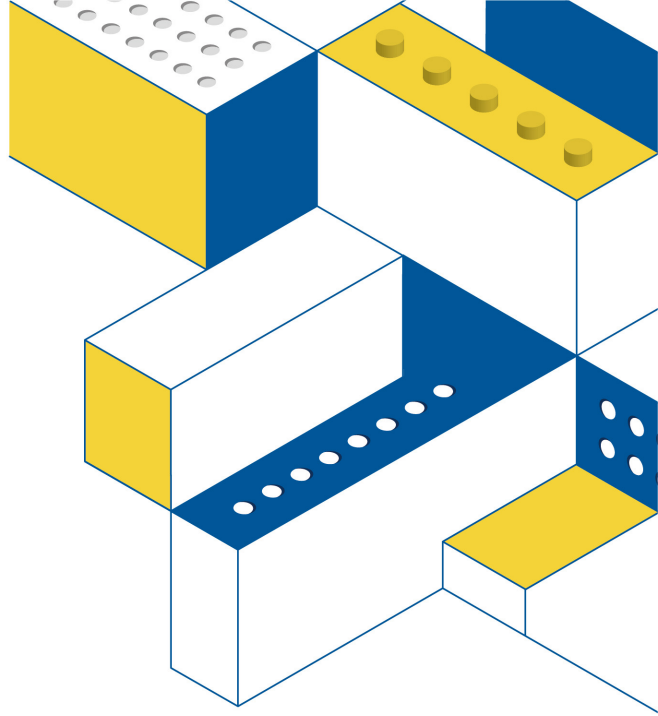


1. Spin Turn：
   One wheel moves forward or backward and the other wheel moves in opposite direction.



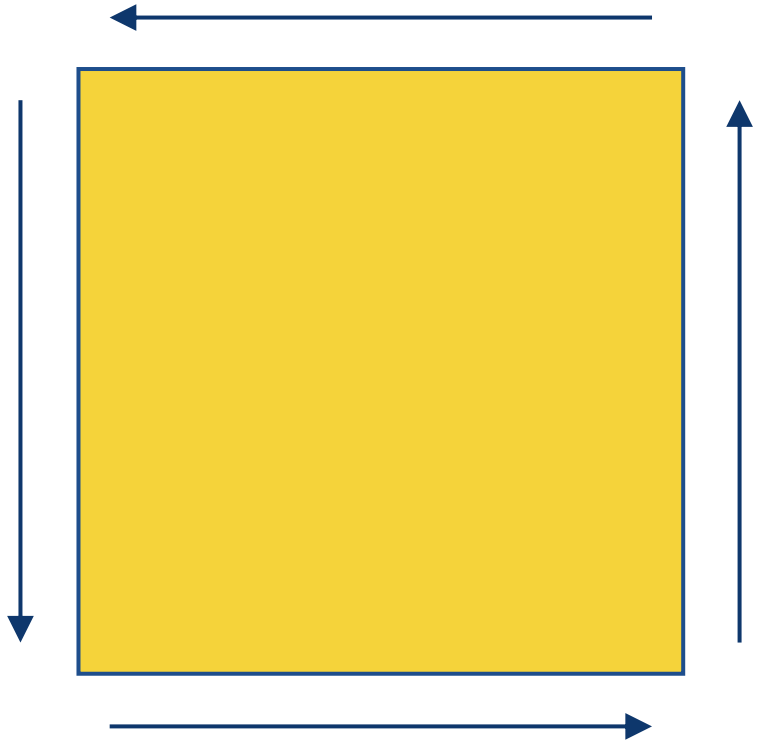
Turning Method

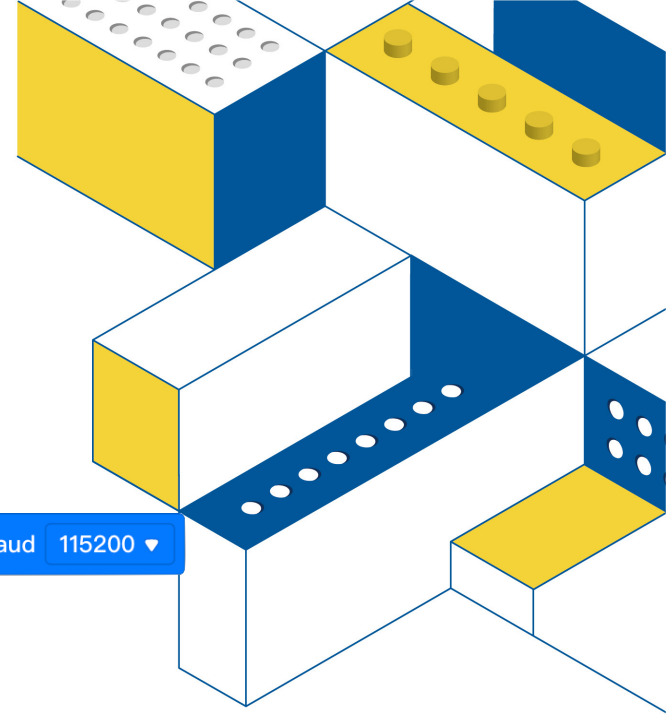




Turning Challenge 1

Program your robot to move a square.





Challenge 1 Solution

```
Matrix Mini Begin  2C Li ▾  Serial IT  Disable ▾  Baud  115200 ▾
Mini DC Motor  M1 ▾  set speed  50
Mini DC Motor  M2 ▾  set speed  50
wait  2  seconds
Mini DC Motor  M1 ▾  set speed  0
Mini DC Motor  M2 ▾  set speed  50*
wait  1*  seconds
Mini DC Motor  M1 ▾  set speed  50
Mini DC Motor  M2 ▾  set speed  50
wait  2  seconds
Mini DC Motor  M1 ▾  set speed  0
Mini DC Motor  M2 ▾  set speed  50*
wait  1*  seconds
Mini DC Motor  M1 ▾  set speed  50
Mini DC Motor  M2 ▾  set speed  50
wait  2  seconds
Mini DC Motor  M1 ▾  set speed  0
Mini DC Motor  M2 ▾  set speed  50*
wait  1*  seconds
Mini DC Motor  M1 ▾  set speed  50
Mini DC Motor  M2 ▾  set speed  50
wait  2  seconds
Mini DC Motor  M1 ▾  set speed  0
Mini DC Motor  M2 ▾  set speed  0
```

Go forward for 2 seconds

Turn left for 90 degrees

```
repeat  10
```

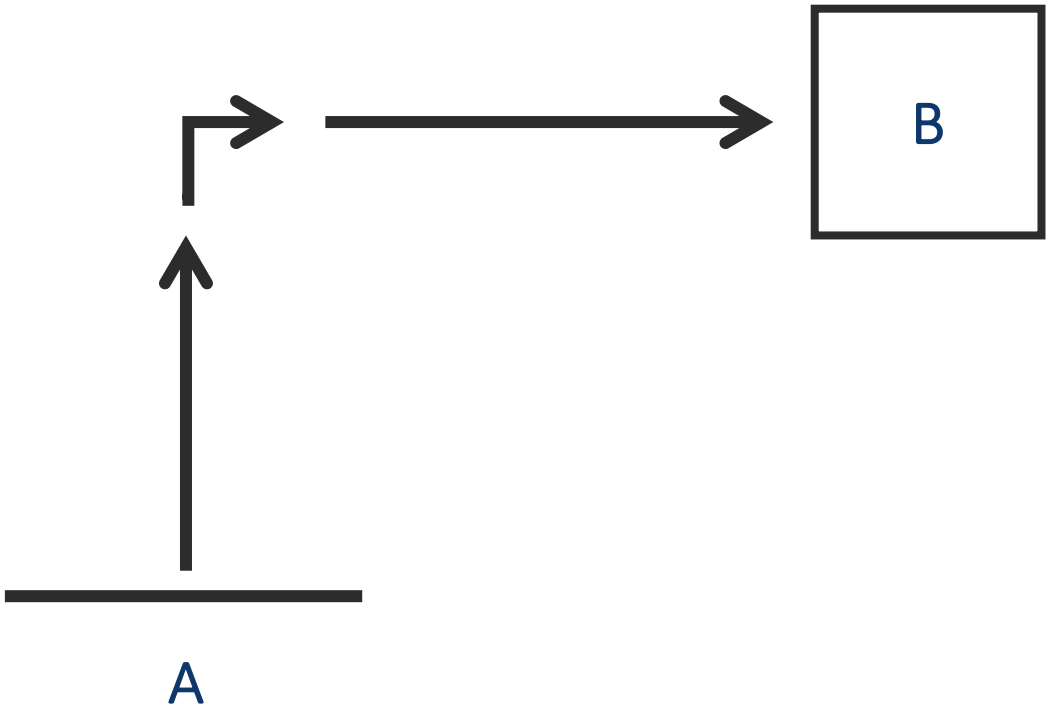
```
Matrix Mini Begin  2C Li ▾  Serial IT  Disable ▾  Baud  115200 ▾
repeat  4
    Mini DC Motor  M1 ▾  set speed  50
    Mini DC Motor  M2 ▾  set speed  50
    wait  2  seconds
    Mini DC Motor  M1 ▾  set speed  0
    Mini DC Motor  M2 ▾  set speed  50*
    wait  1*  seconds
Mini DC Motor  M1 ▾  set speed  0
Mini DC Motor  M2 ▾  set speed  0
```

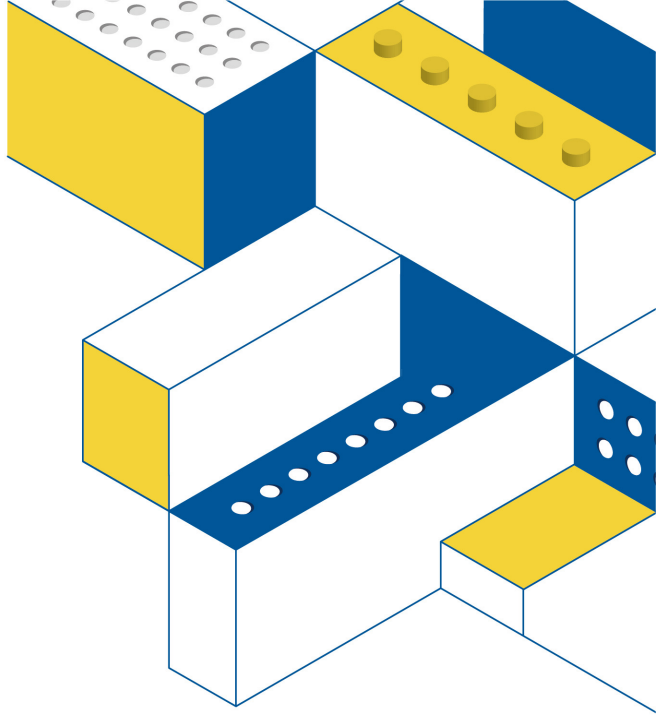
**Parameters need to be adjusted.

Sample Code : W-4

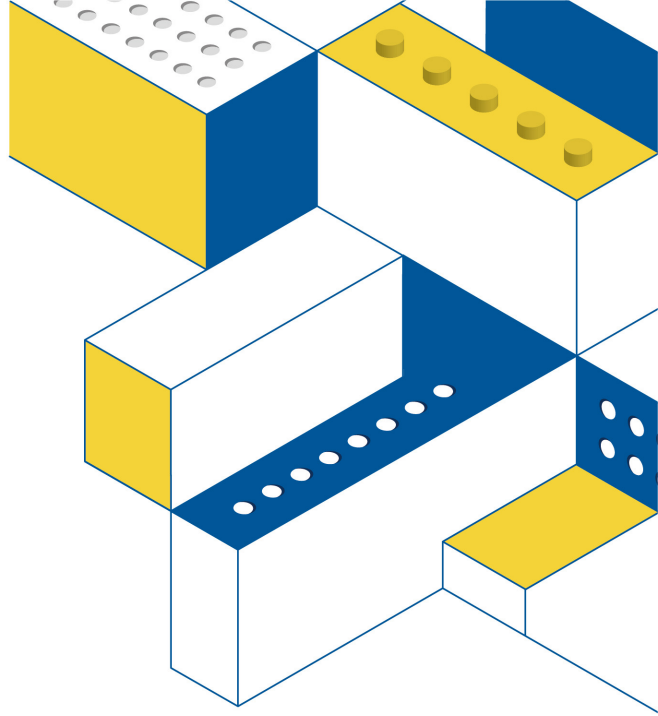
Turning Challenge 2

Program your car to move the item from “A” to “B”, then return to “A”.





Challenge 2 Solution

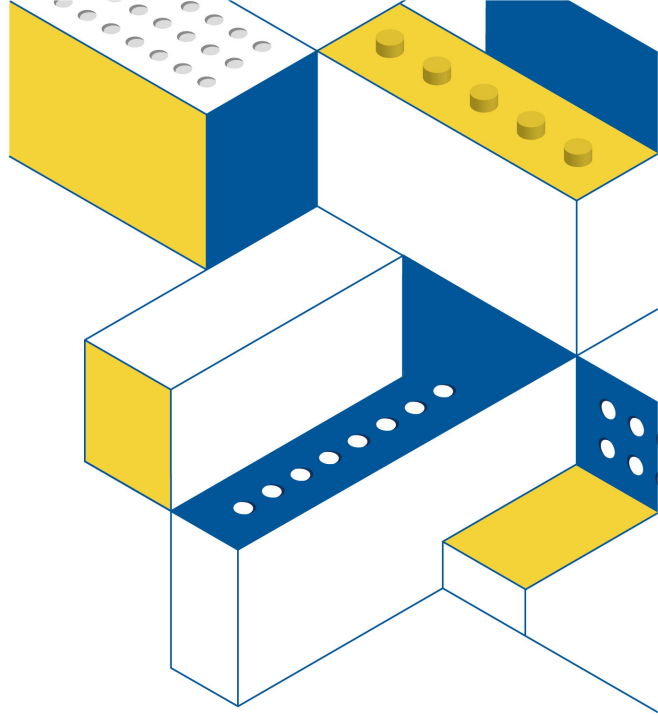


```
Matrix Mini Begin 2C Li ▾ Serial IT Disable ▾ Baud 115200 ▾
Mini DC Motor M1 ▾ set speed 50
Mini DC Motor M2 ▾ set speed 50
wait 2 seconds
Mini DC Motor M1 ▾ set speed 50
Mini DC Motor M2 ▾ set speed 0
wait 1 seconds
Mini DC Motor M1 ▾ set speed 50
Mini DC Motor M2 ▾ set speed 50
wait 2 seconds
Mini DC Motor M1 ▾ set speed 0
Mini DC Motor M2 ▾ set speed 0
wait 1 seconds
Mini DC Motor M1 ▾ set speed -50
Mini DC Motor M2 ▾ set speed -50
wait 2 seconds
Mini DC Motor M1 ▾ set speed -50
Mini DC Motor M2 ▾ set speed 0
wait 2 seconds
Mini DC Motor M1 ▾ set speed -50
Mini DC Motor M2 ▾ set speed -50
wait 2 seconds
Mini DC Motor M1 ▾ set speed 0
Mini DC Motor M2 ▾ set speed 0
```

Wait Block

Wait for … seconds

Wait until …



Miniature Switch

Pressed = 1

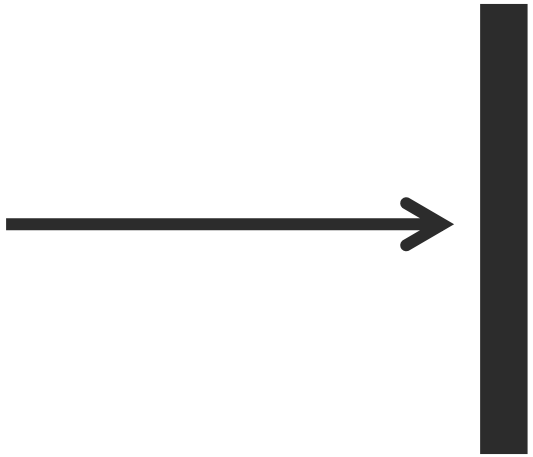
Released = 0

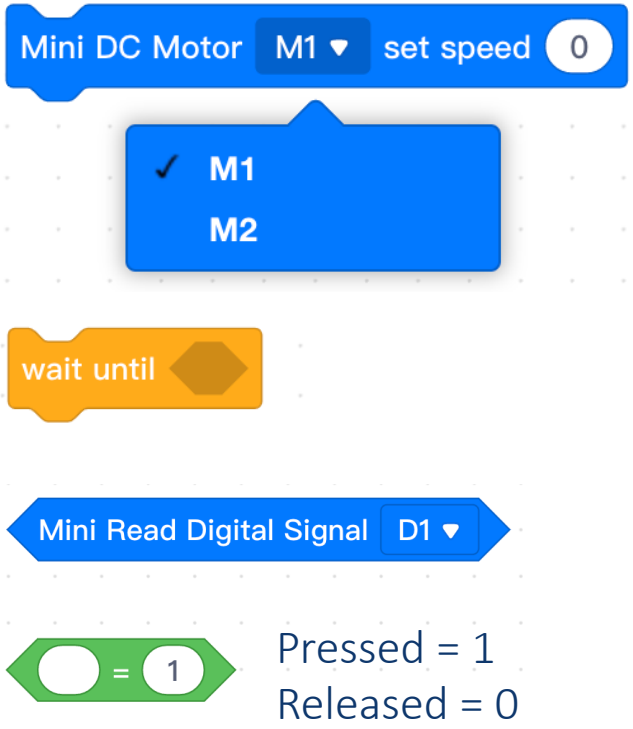
Digital I/O：D1 ~ D4

Assemble the miniature switch on the basic car.

Challenge 3

Program your robot to move until it hits the wall.

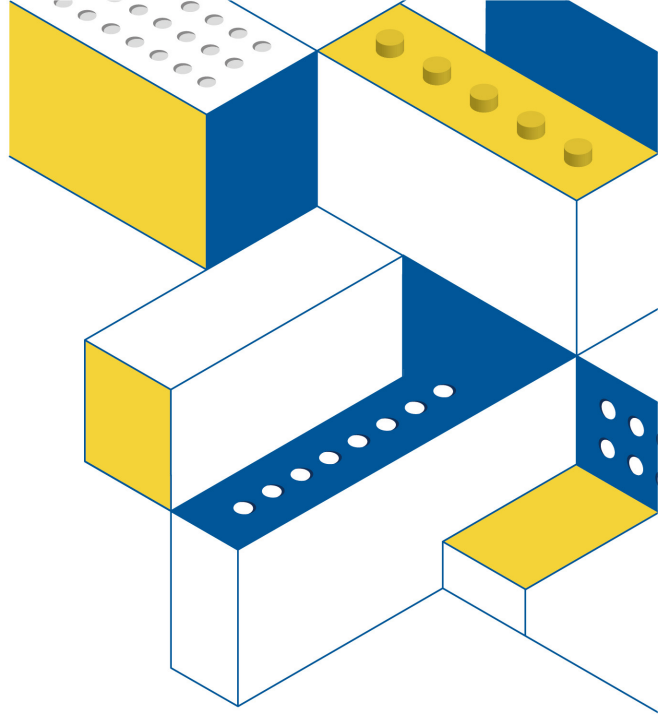


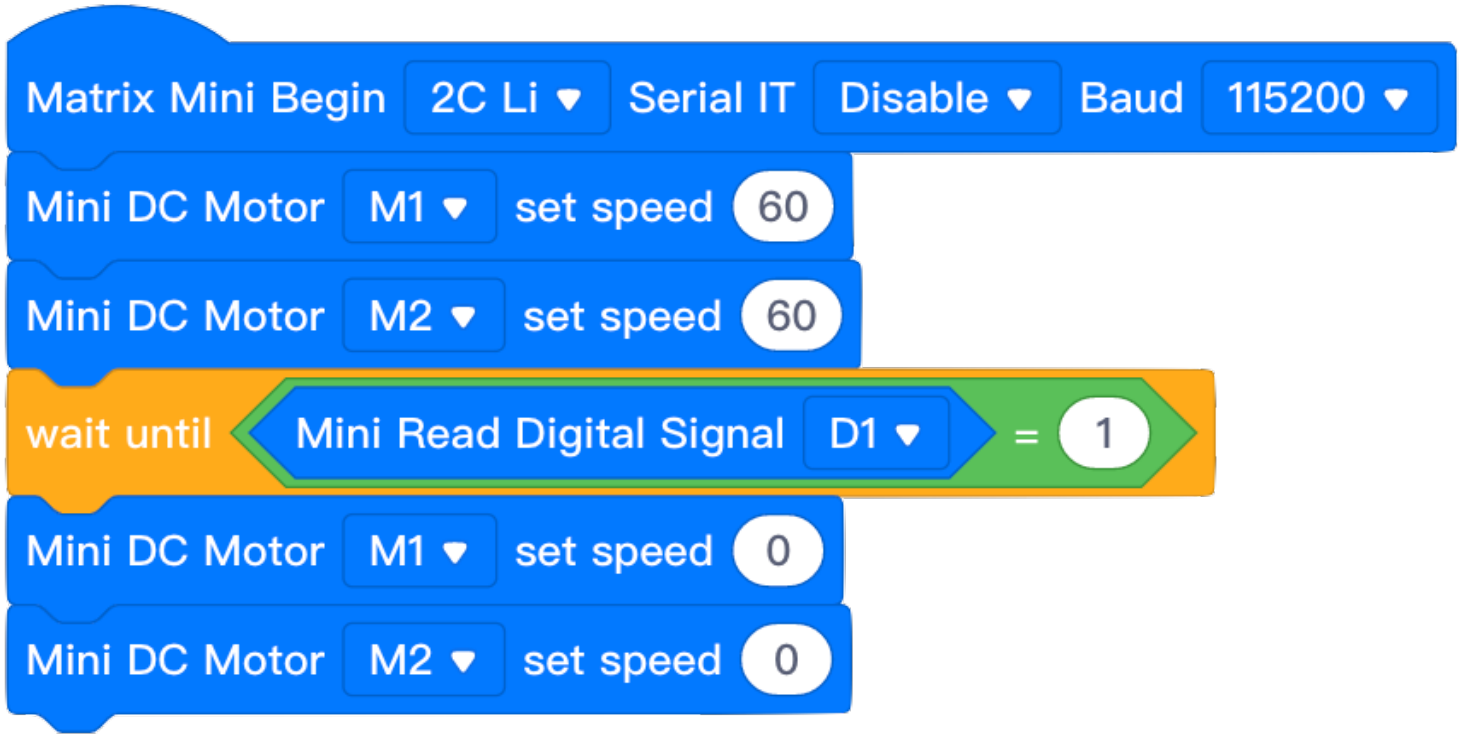


Pressed = 1
Released = 0

Hint: You will combine DC motor + wait + Read Digital + Compare

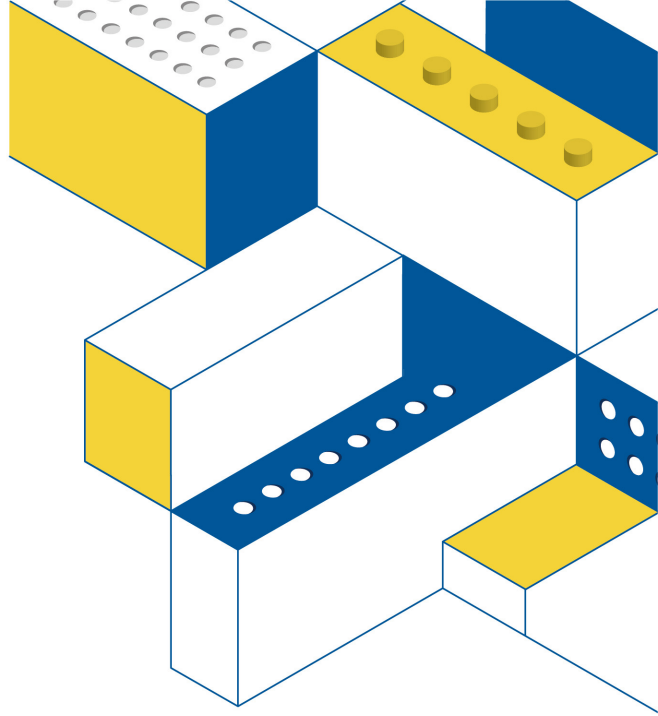
Challenge 3 Solution





The goal of this program is to make your robot to move straight until the touch sensor is pressed.

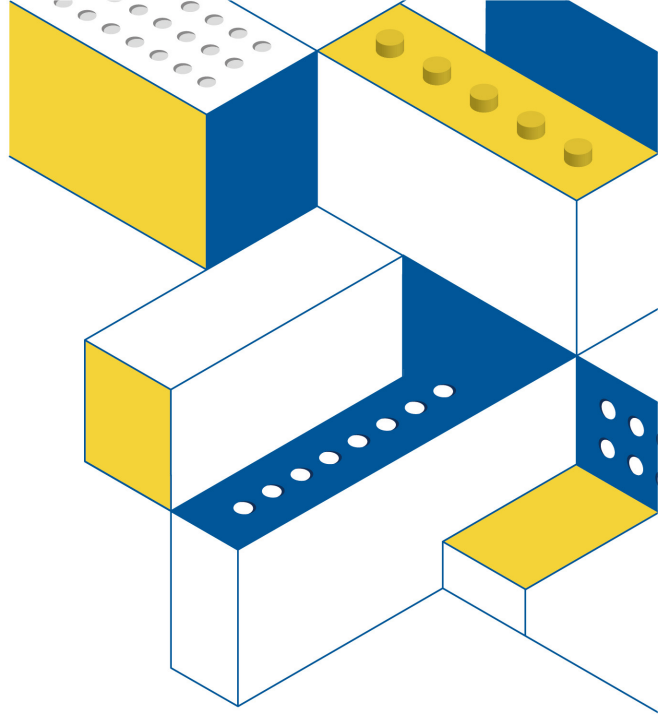
Challenge 4

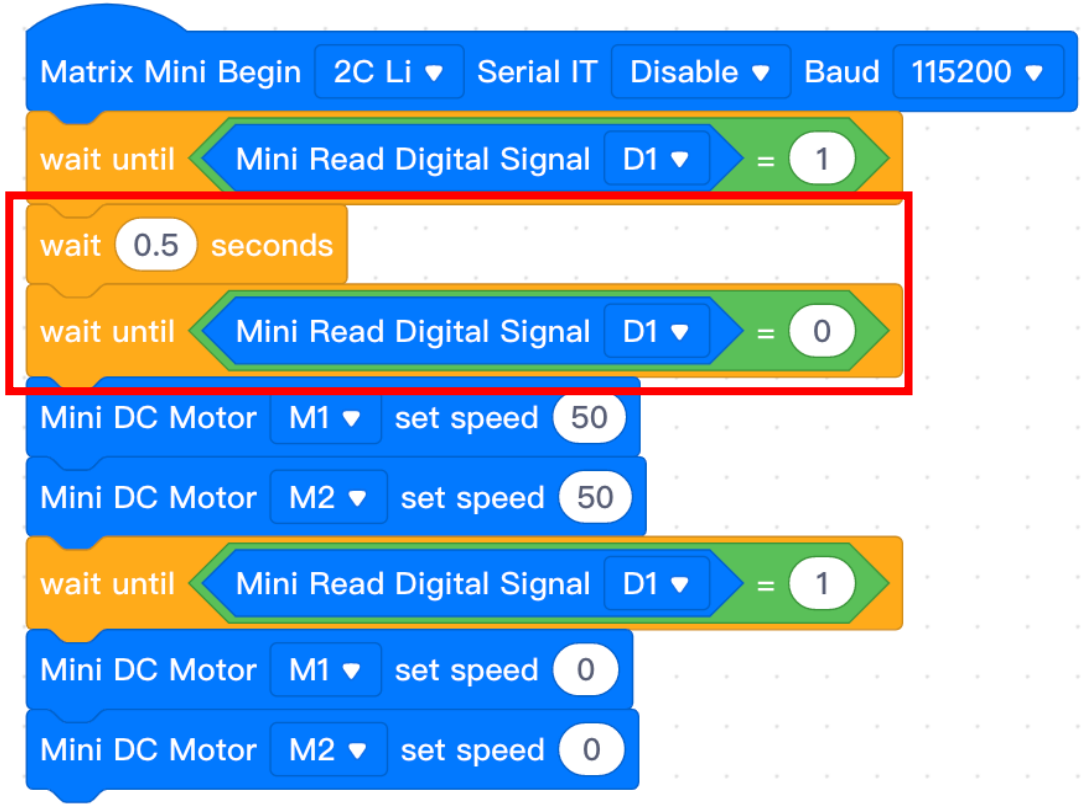


Program your robot to use the touch sensor as a switch of robot.

The robot starts to move after the sensor is pressed,
stop the robot until the sensor is pressed again.

Challenge 4 Solution



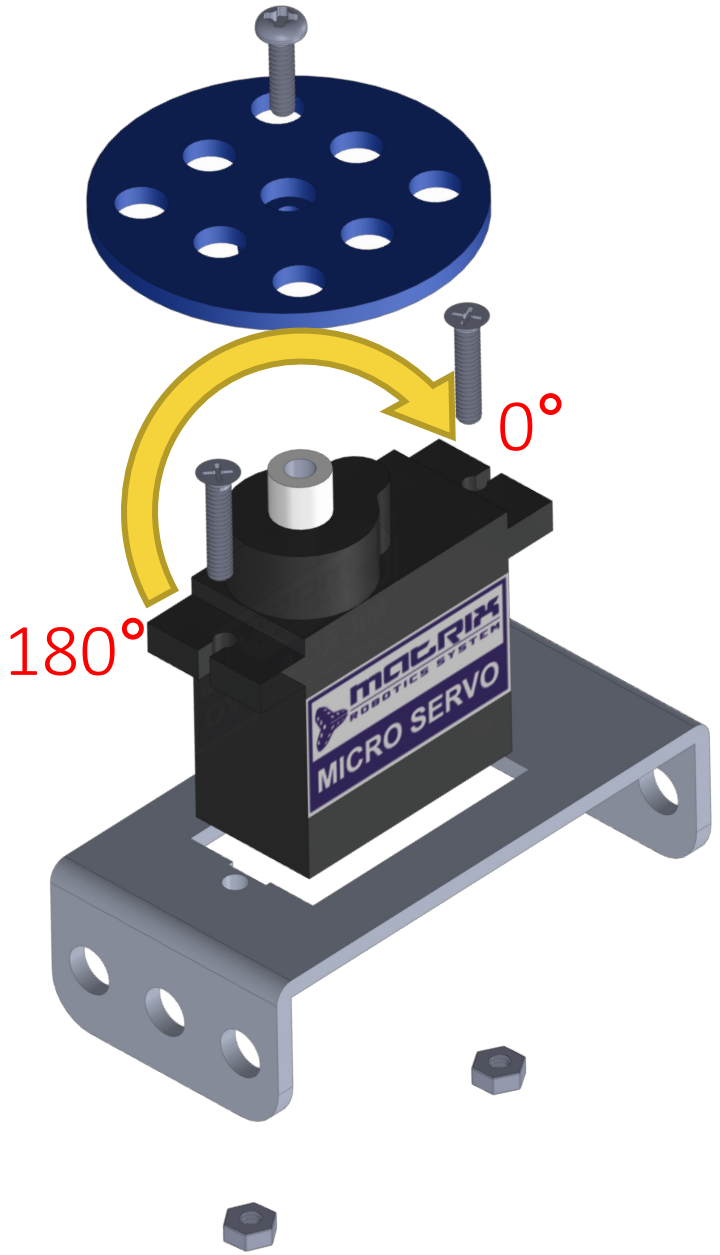


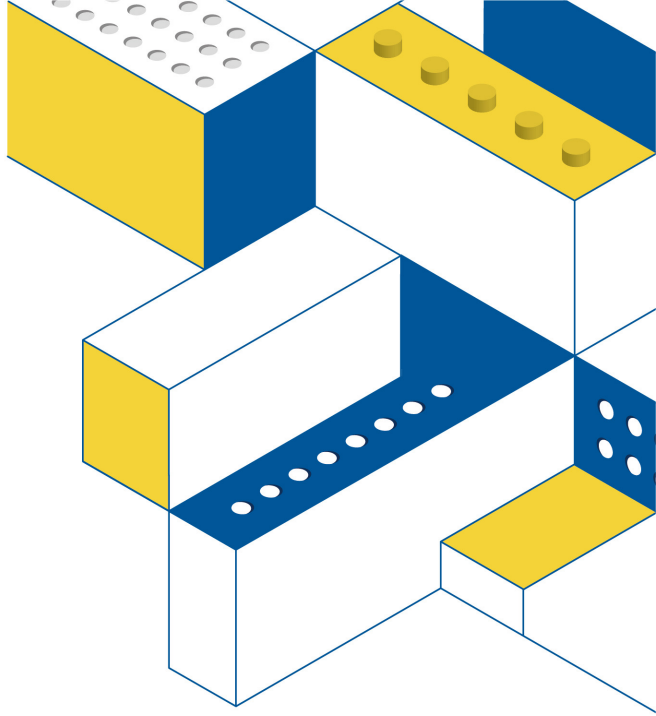
※Not the only solution

Micro Servo

Angle Setting : 0° ~ 180°

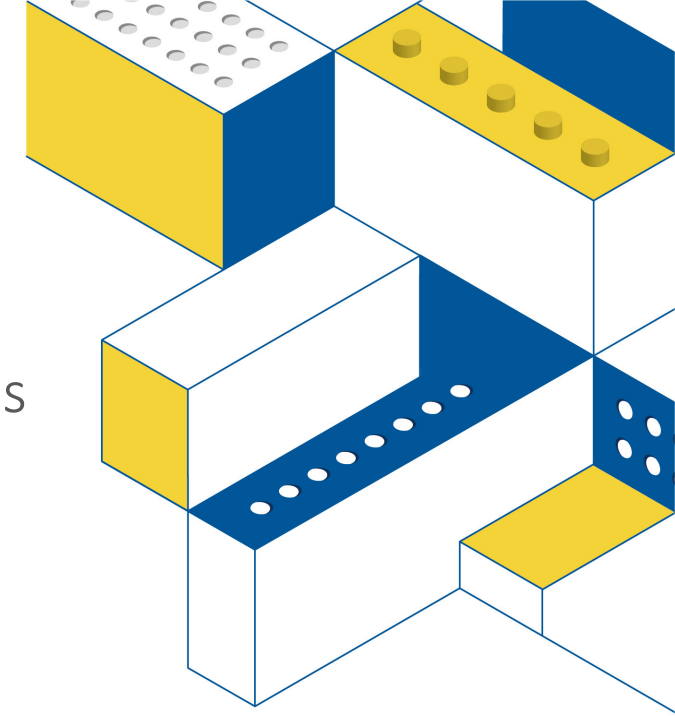
RC Port : RC1 ~ RC4



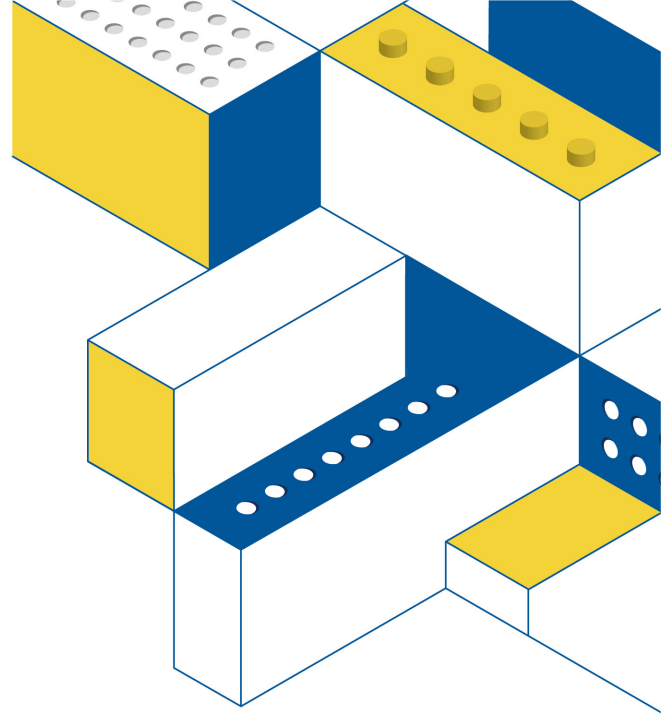


Challenge 5

Let the servo motor rotate to 180 degrees and then back to 0 degrees



Challenge 5 Solution



If you do not wait one second, the servo motor will turn to 0 degrees directly.

Grey Scale Sensor

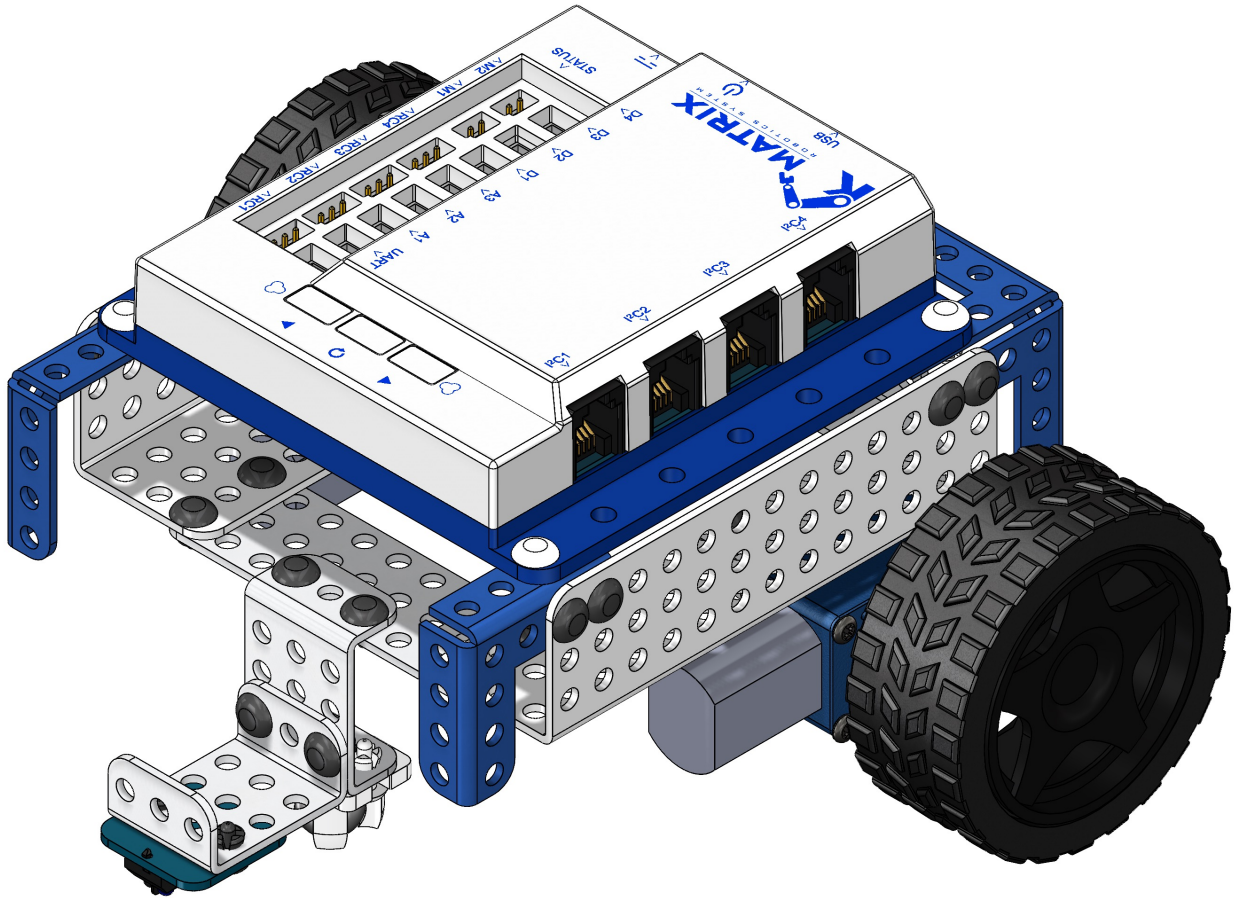
Return value：0~1023

The return value of black is larger

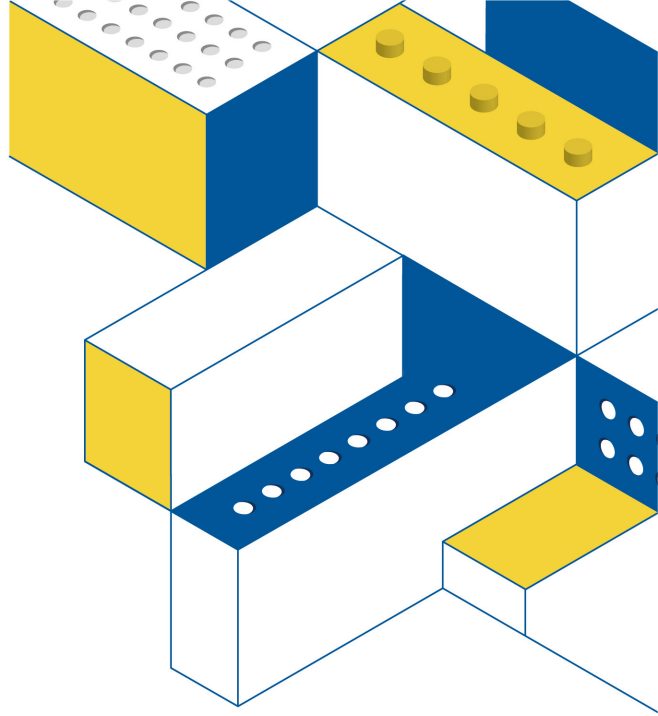
The return value of white is smaller

Analog ports: A1~A3

Assemble the sensor in front of the car



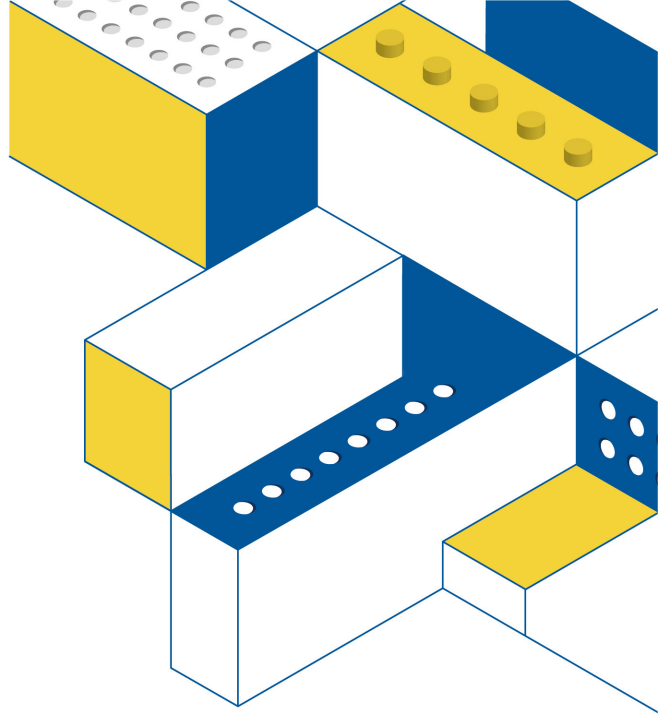
Challenge 6

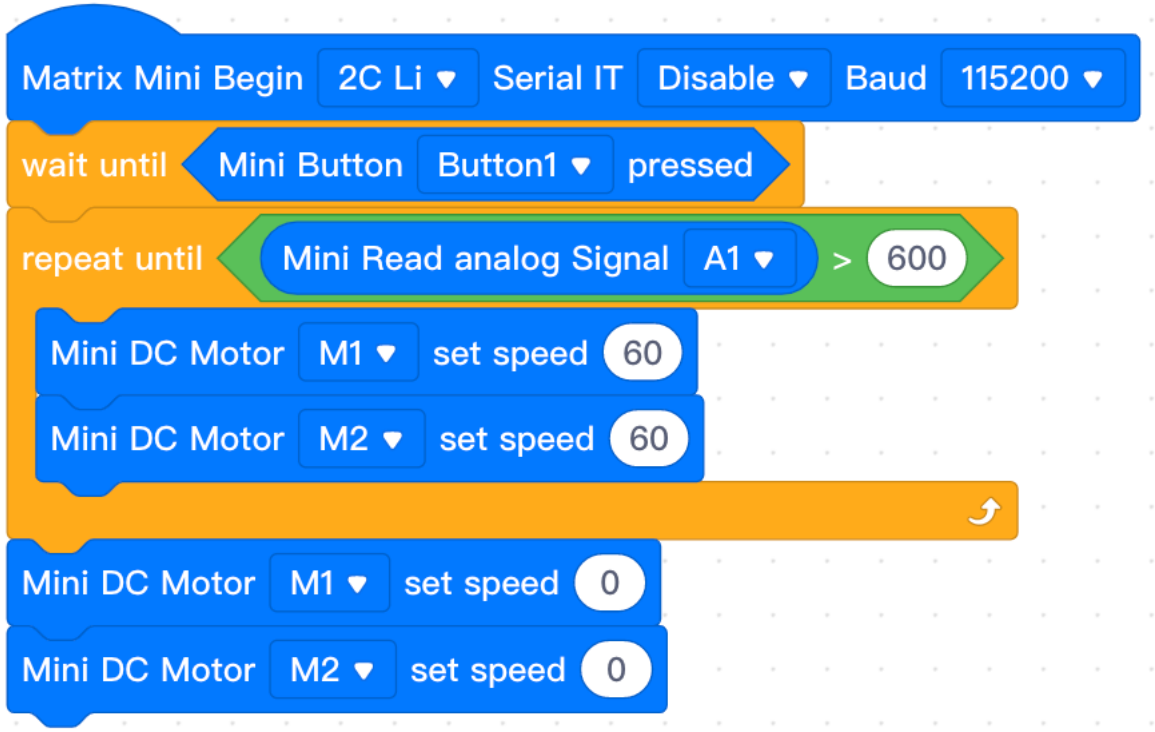


Use the greyscale sensor as a condition to stop the car:

Press button 1 to move the car forward until the sensor detects the black line and stops the car.

Challenge 6 Solution



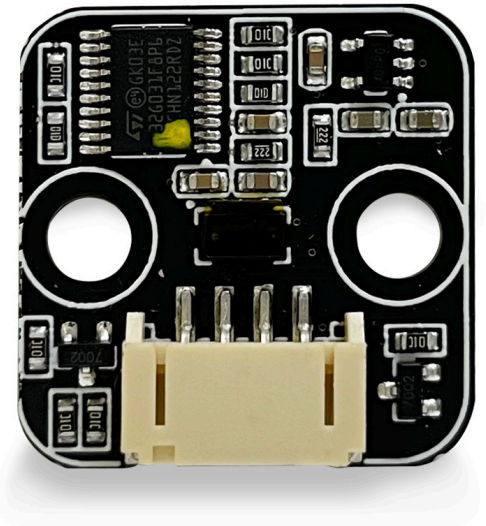


※Not the only solution

Laser Sensor

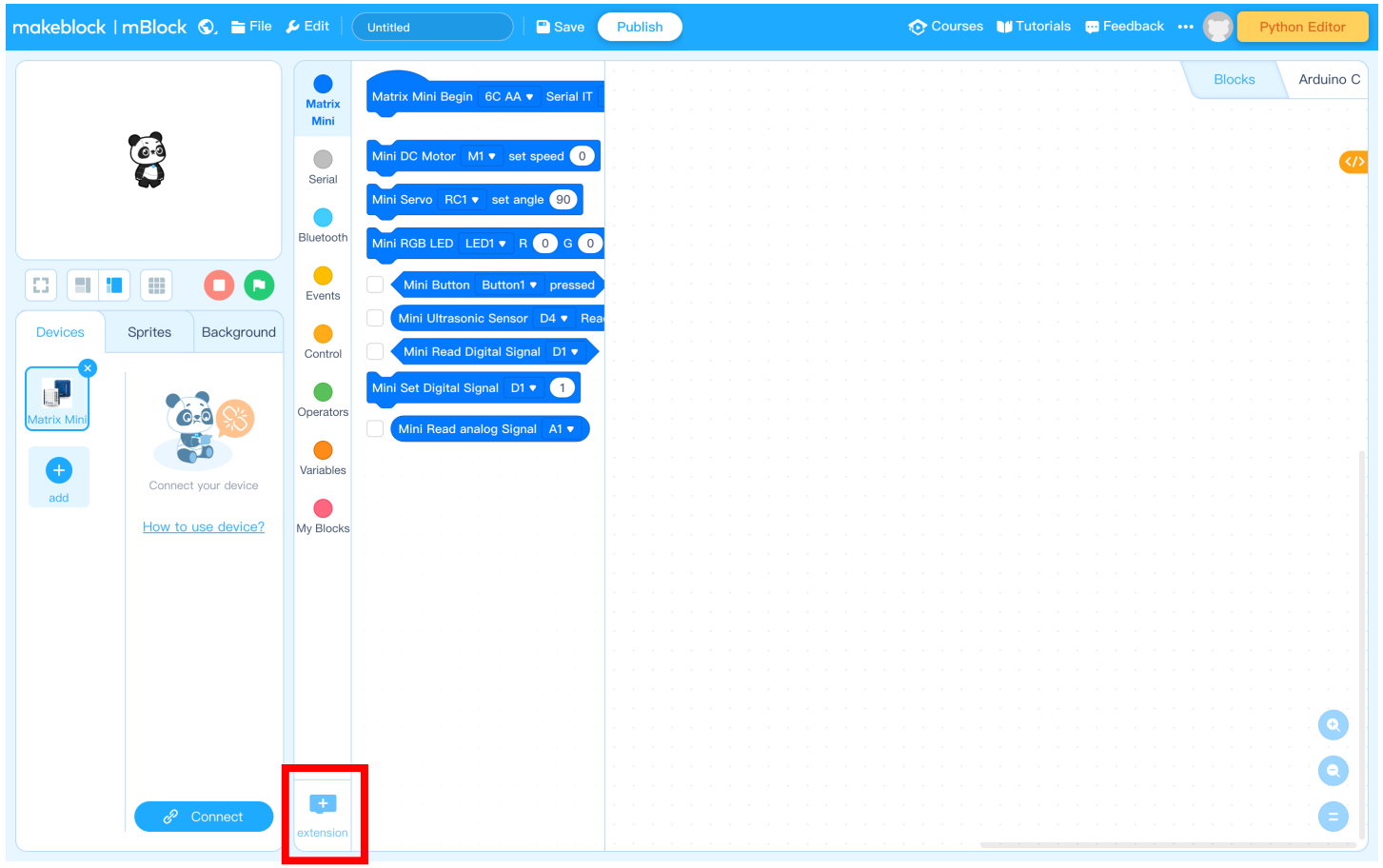
Return value：21 ~ 1999mm

I²C ports : I²C1~I²C4



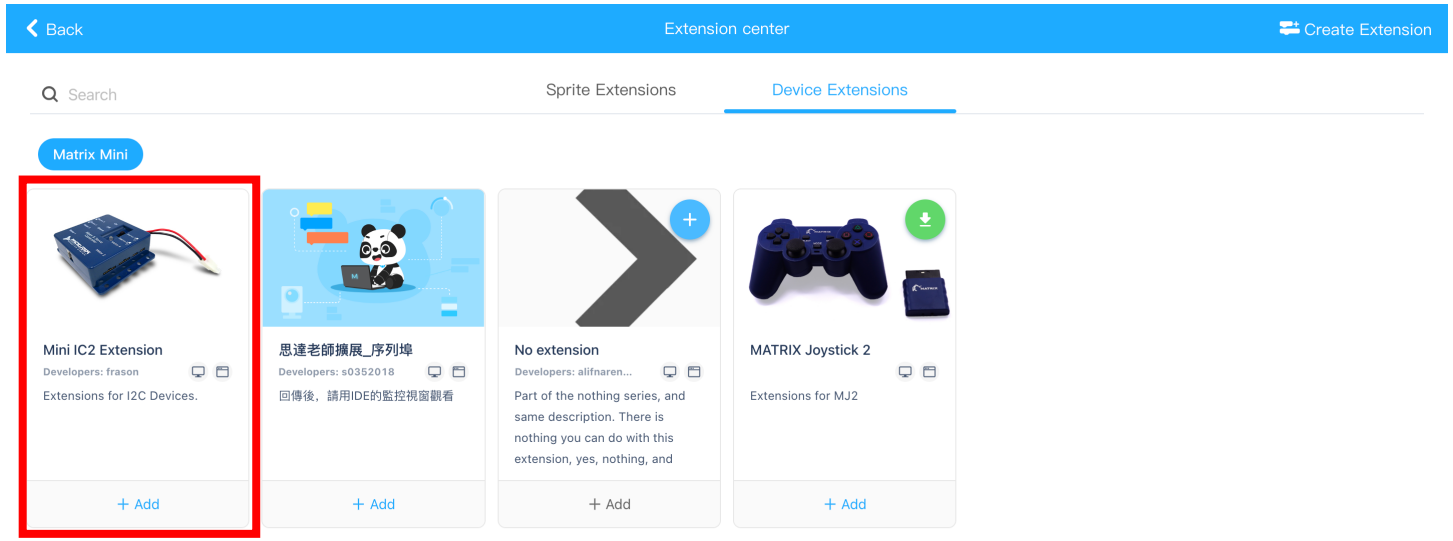
Read the value from laser sensor.

Import extension



Click “Extension”

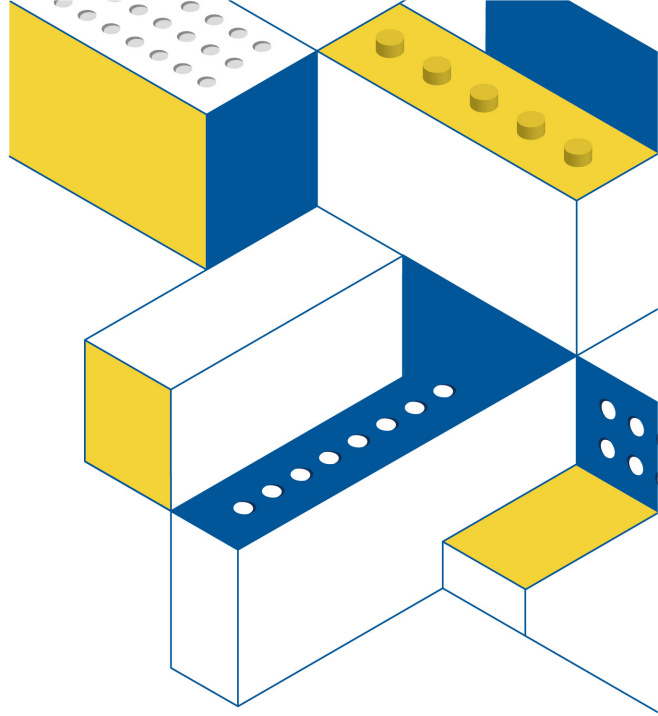
Import extension



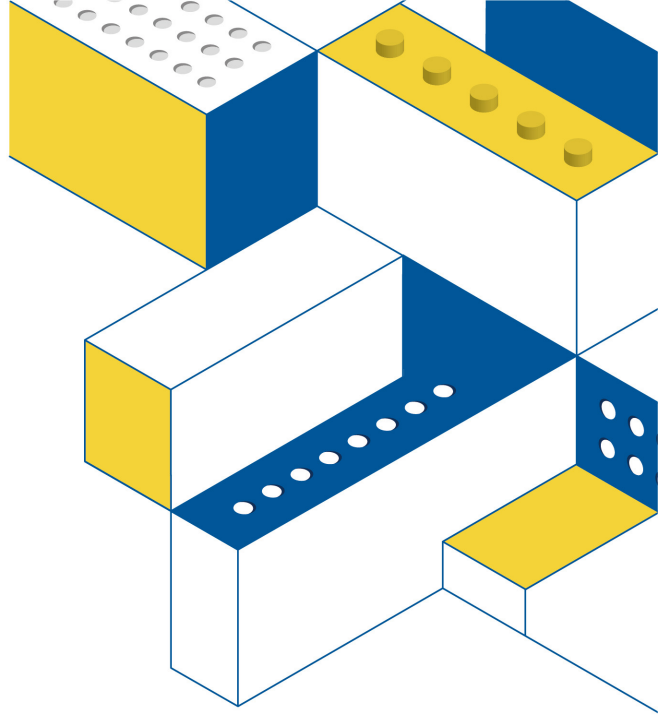
Add IC2 Extension

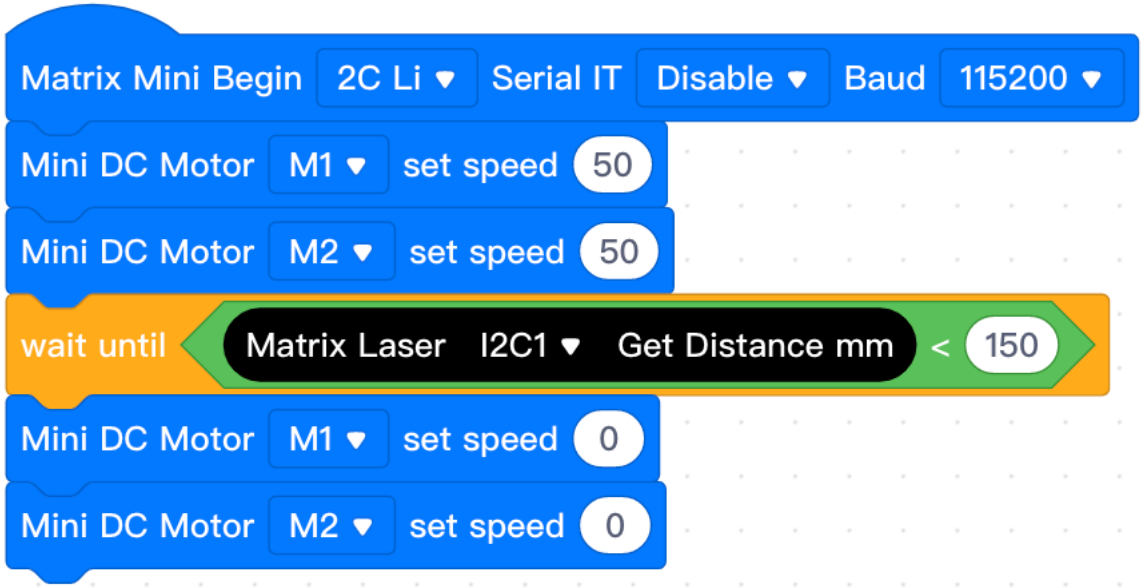
Challenge 7

Stop the car in front of the obstacle 15cm.



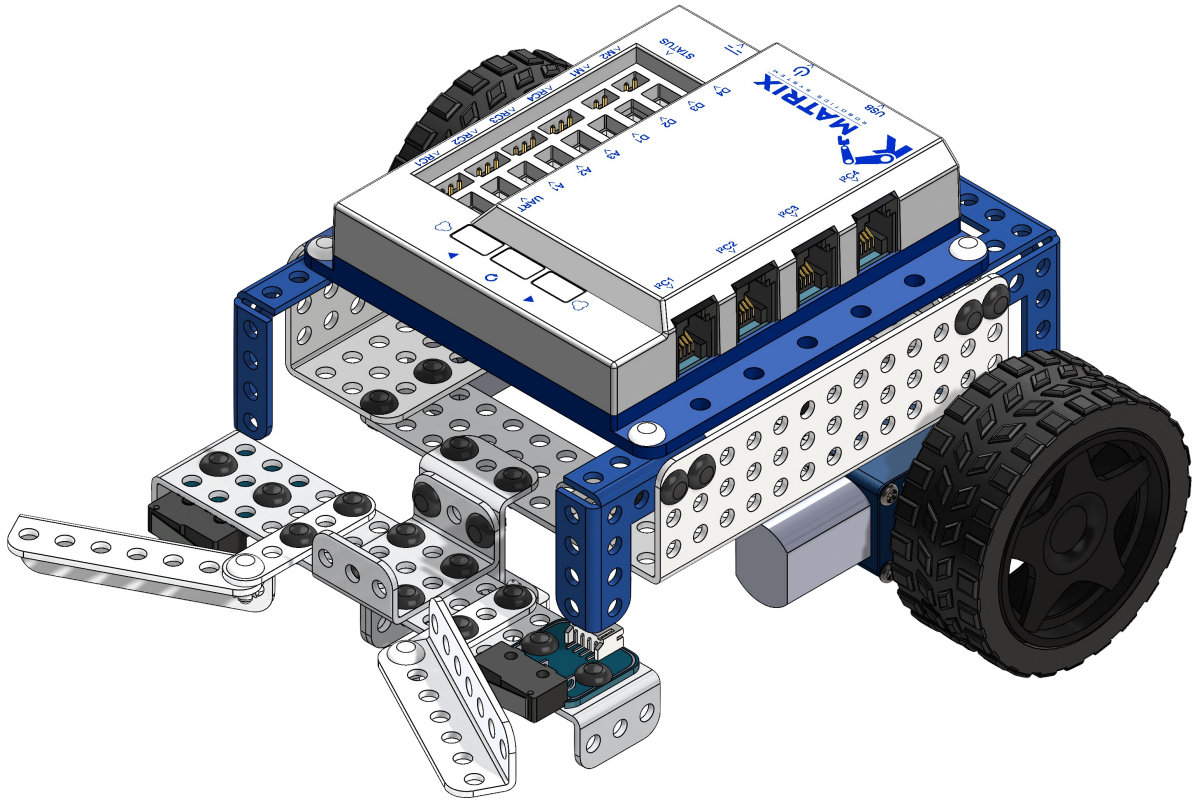
Challenge 7 Solution





※Not the only solution

Example Model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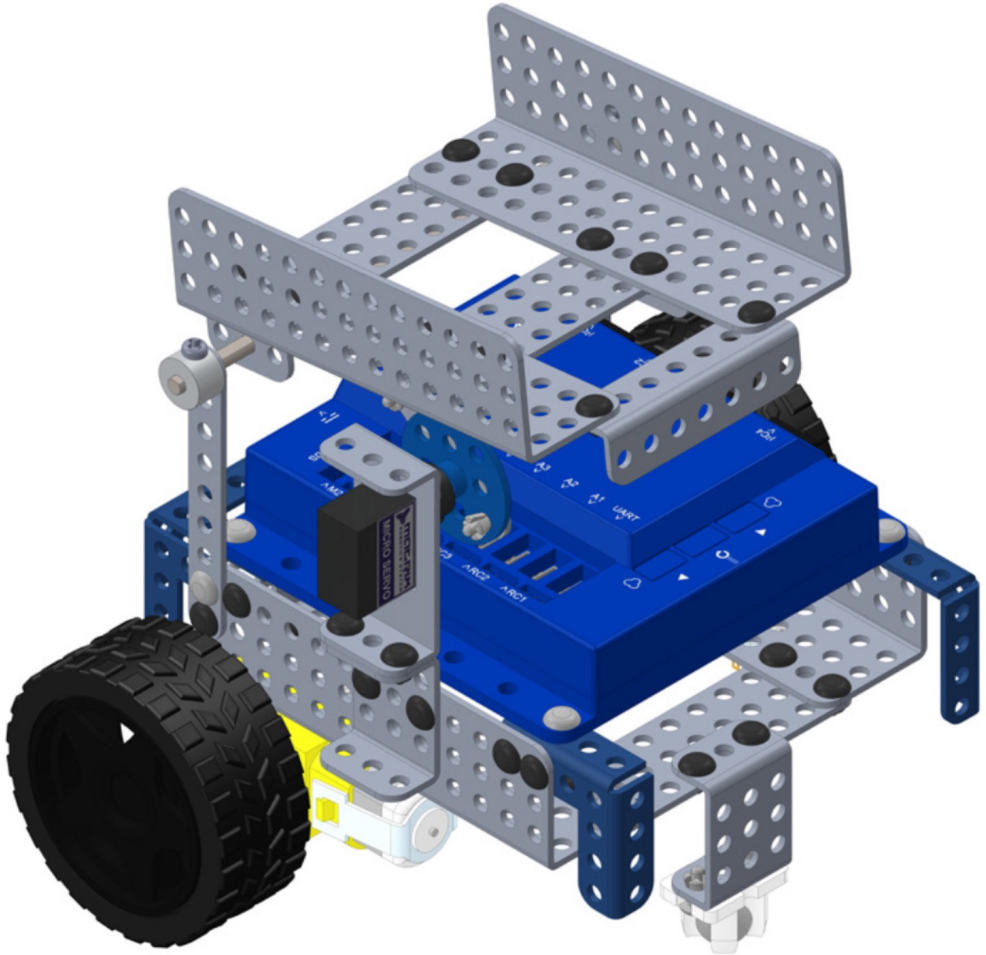
MICRO SERVO