

Microbit Robotics Advanced Level 3

Lesson 4

Proficient Carrier

Presented by Advanced Superlogic Team

Today's Topic

- 1. Robot Challenge – Brick War**
- 2. Modify Your Robot**
- 3. Build a Proficient Carrier**
- 4. Programming for the Shovel**

Learning Outcome

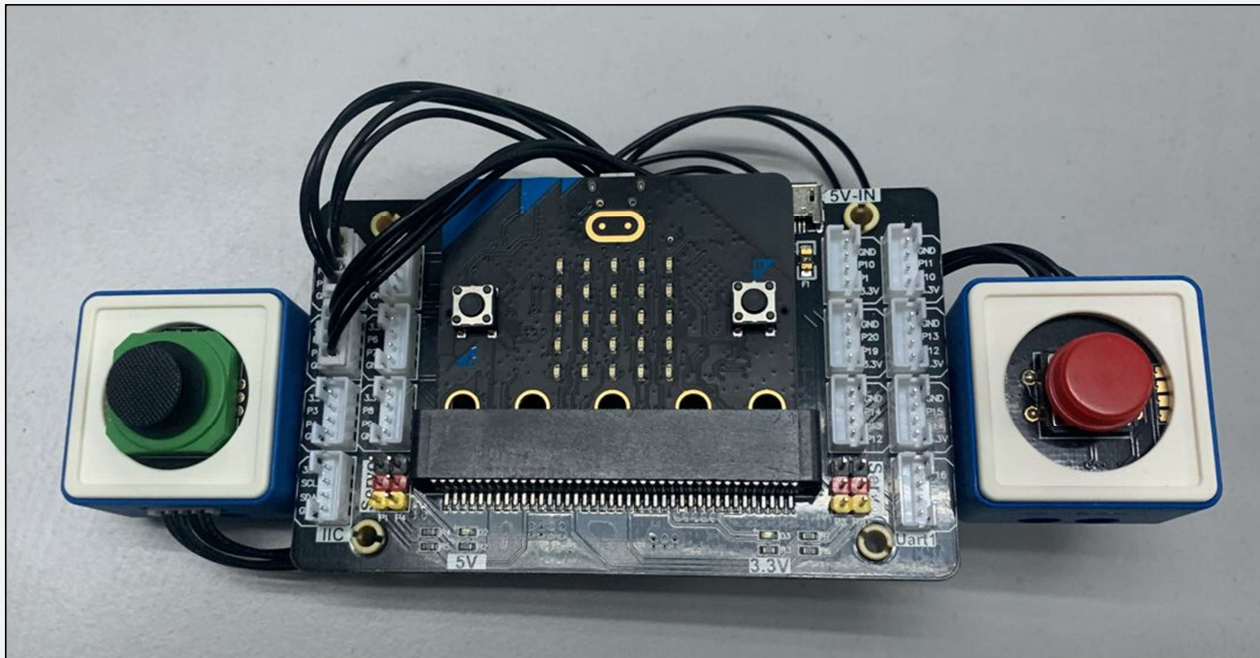
- 1. Able to enhance your clip robot for grabbing bricks**
- 2. Able to build a proficient Carrier**
- 3. Able to program the shovel for your proficient carrier**

WOM Remote Controller

WOM Controller Setup

**Rocker
Module:**

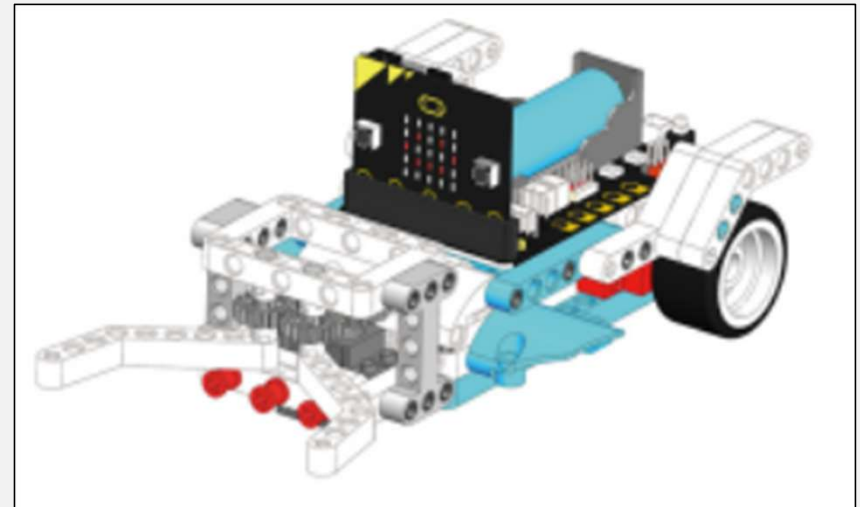
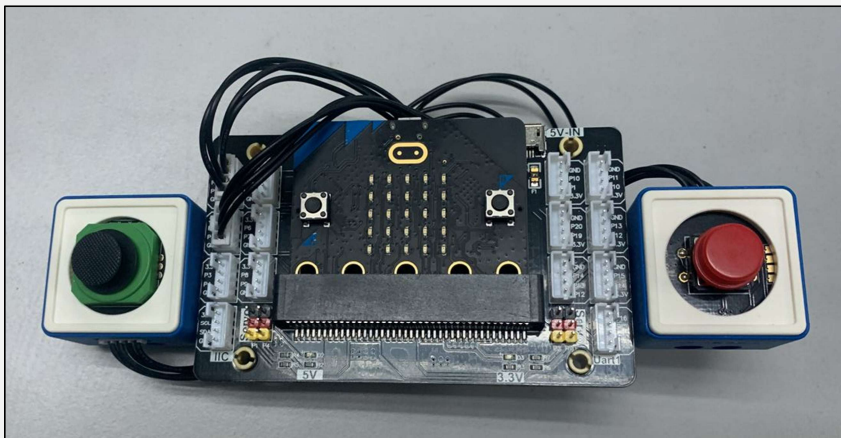
Movement
Control



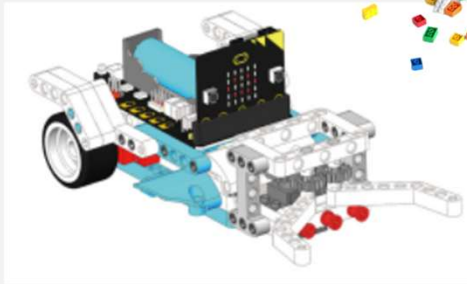
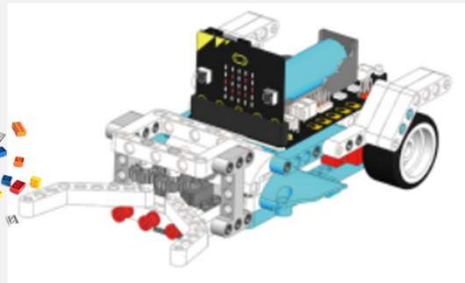
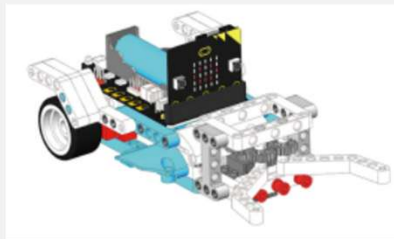
**Button
Module:**

Grab &
Release

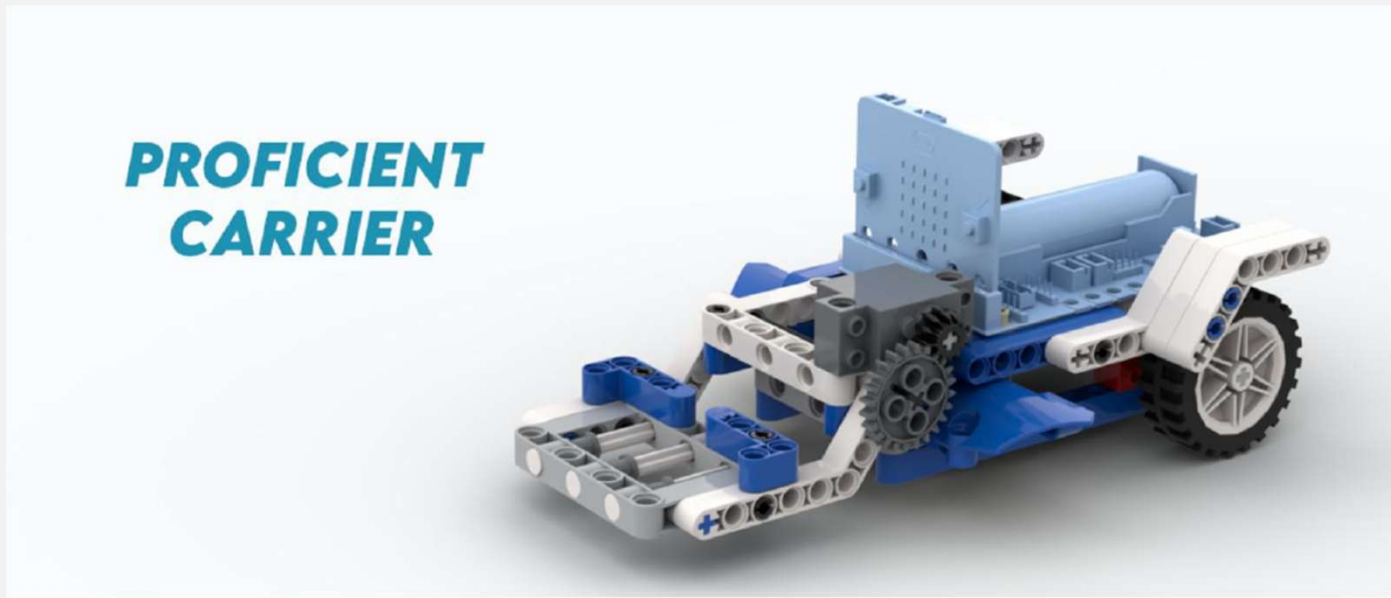
Test the remote control



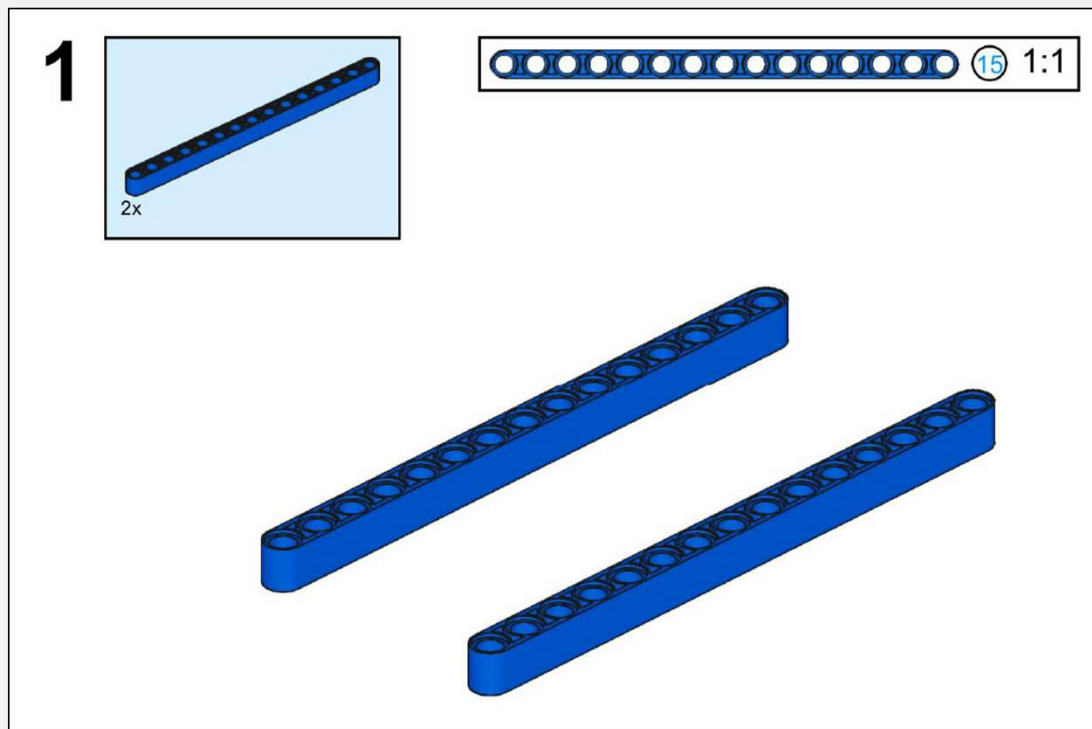
Ready for Brick War?



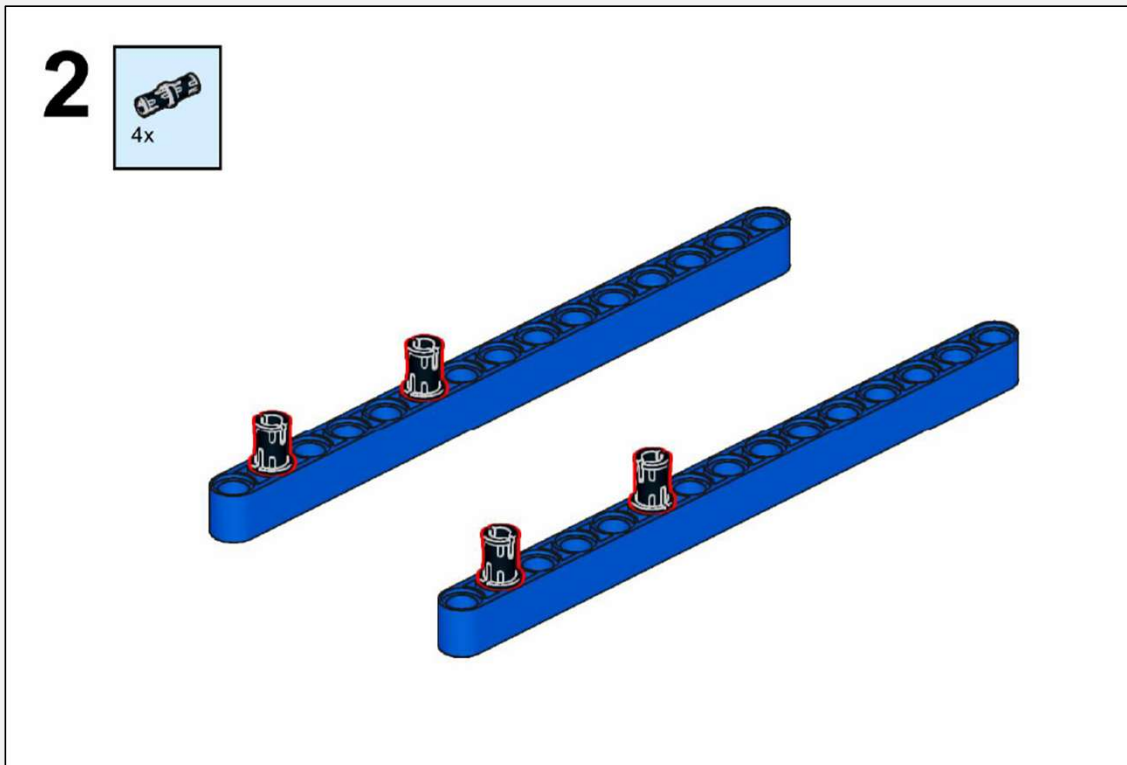
Build a Proficient Carrier



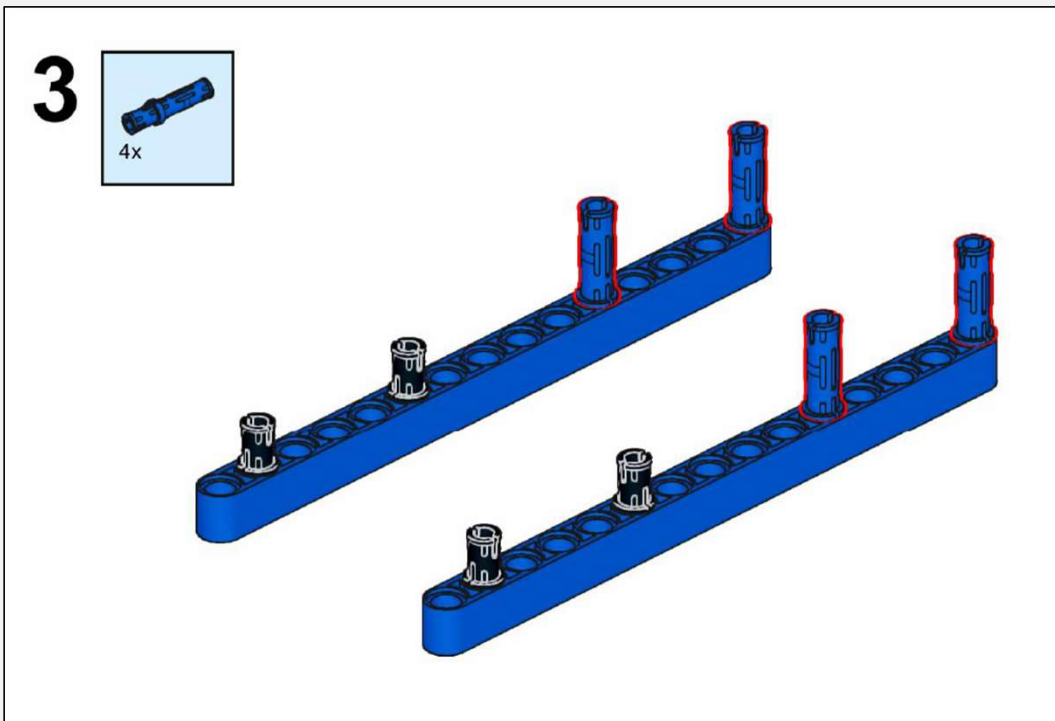
Step 1



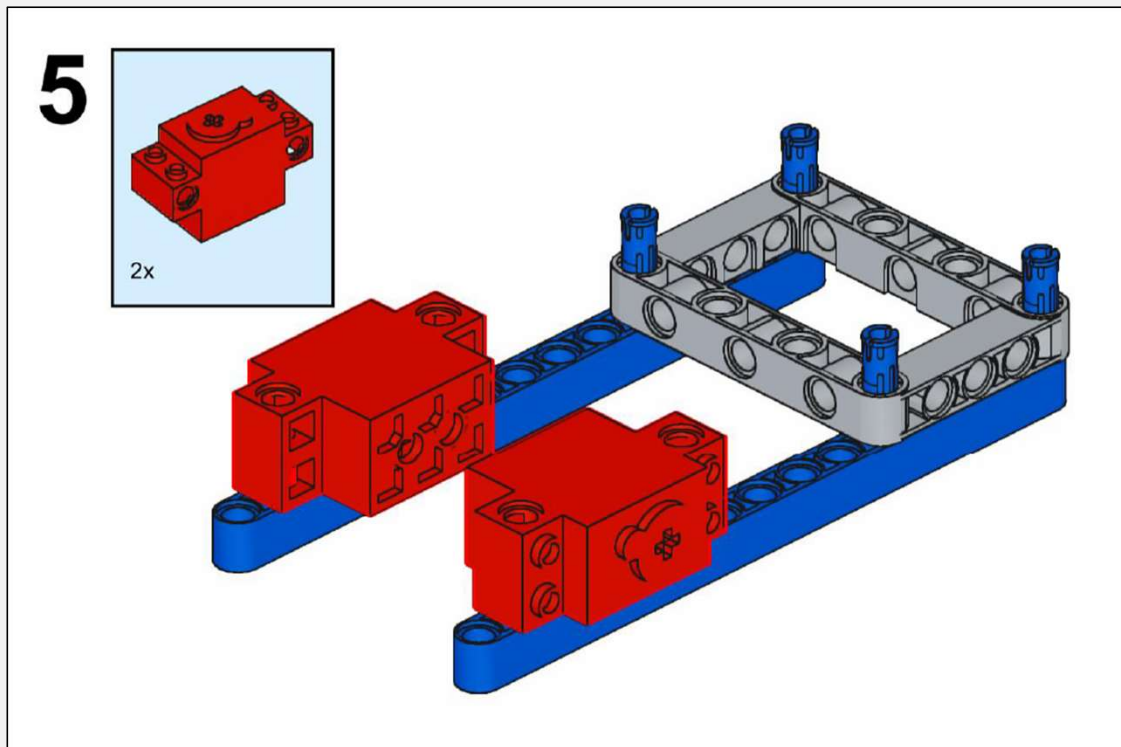
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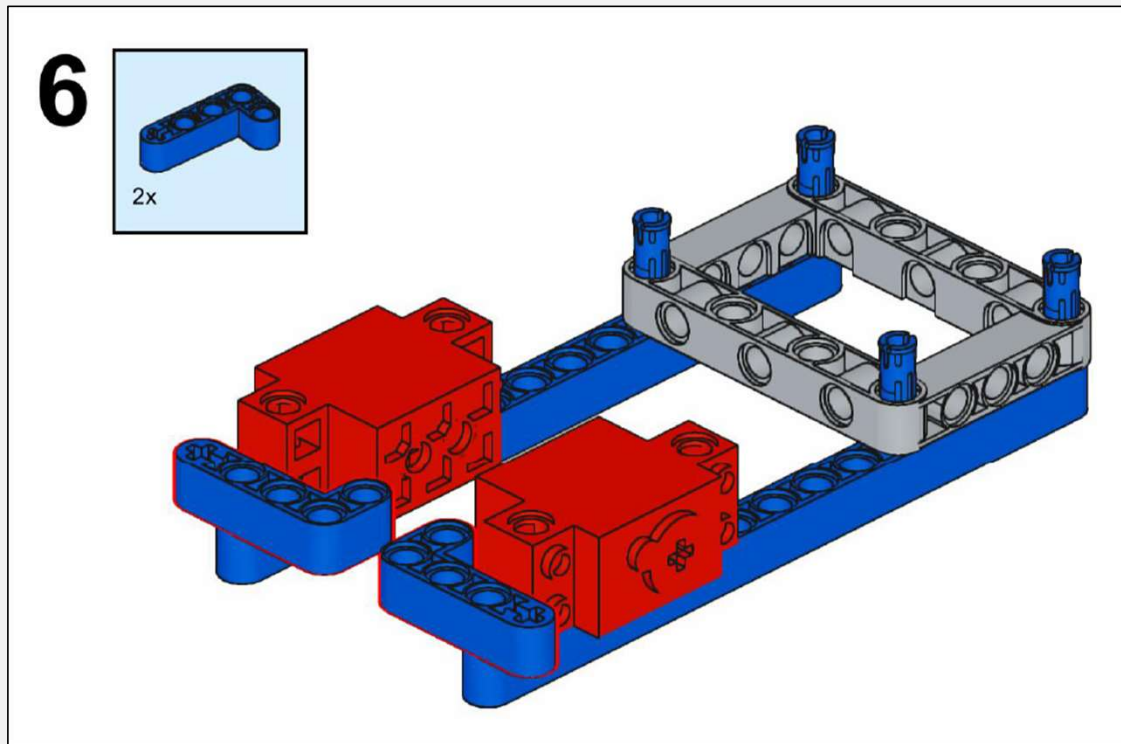
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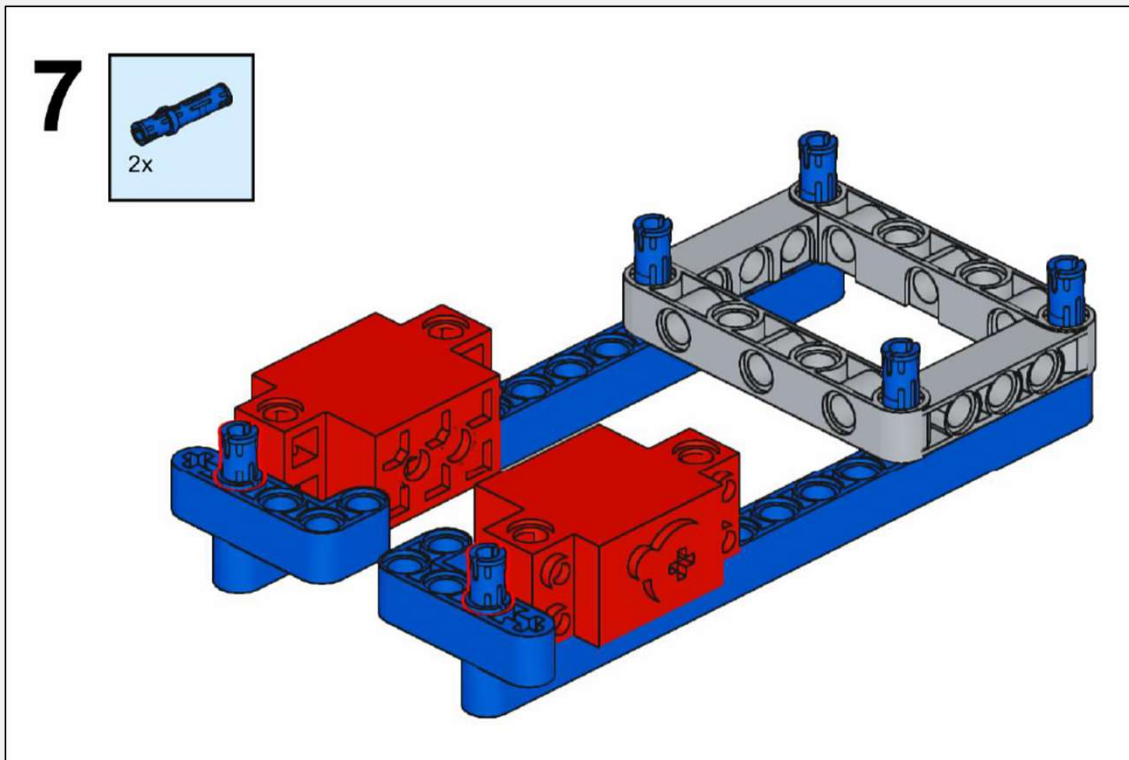
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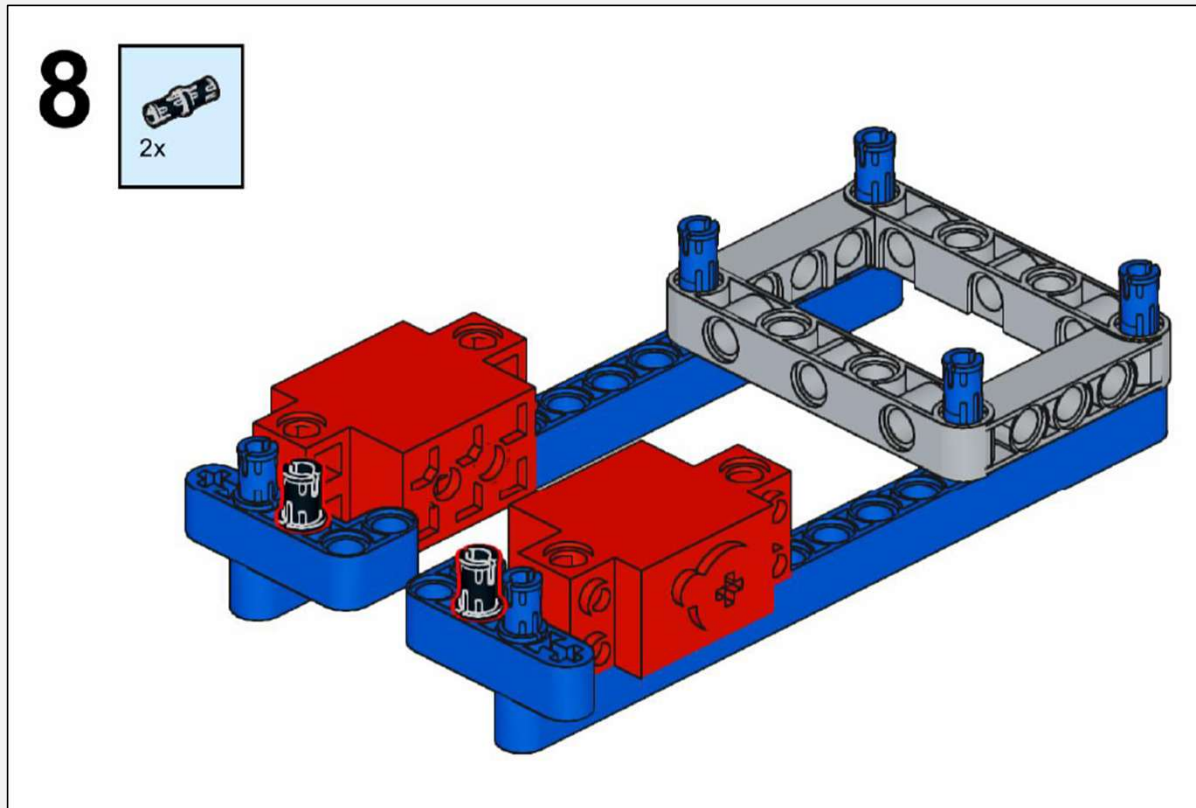
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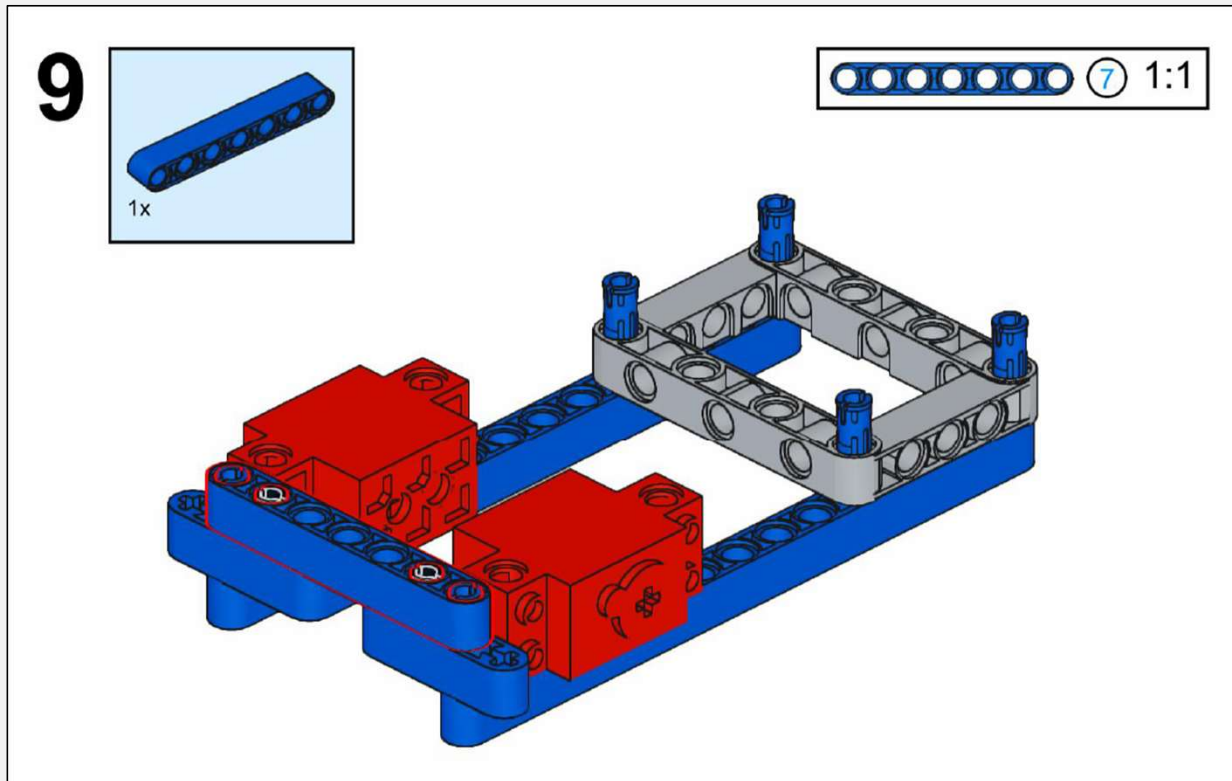
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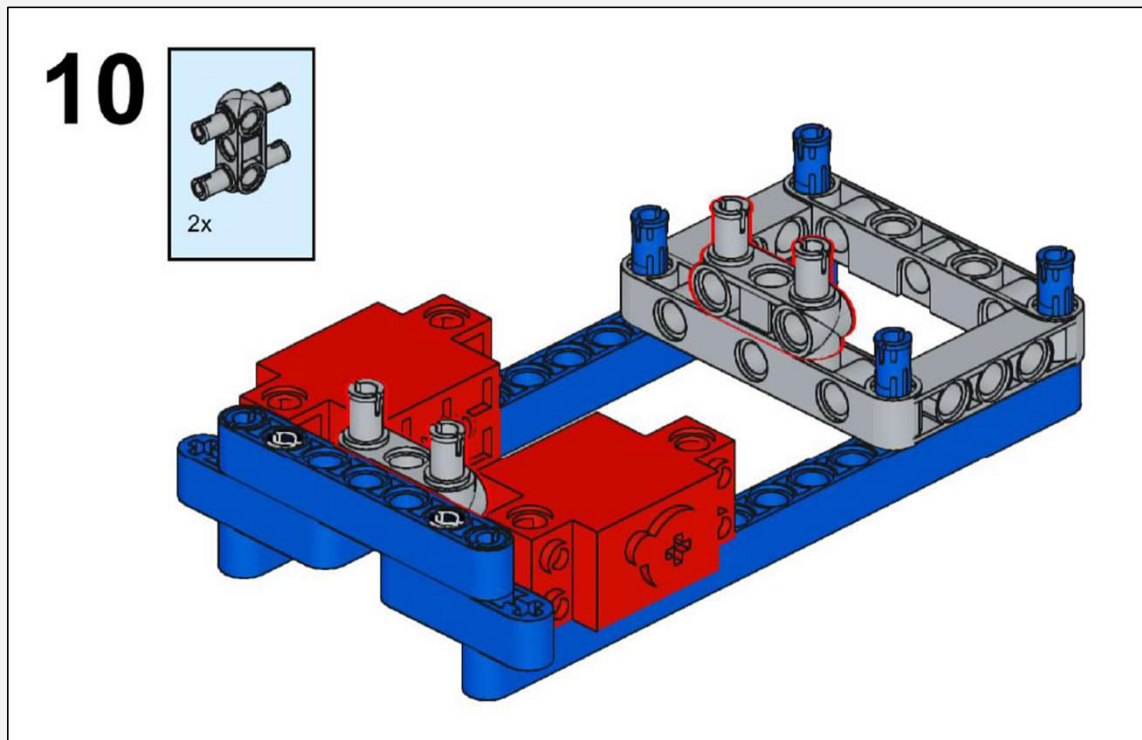
Step 8



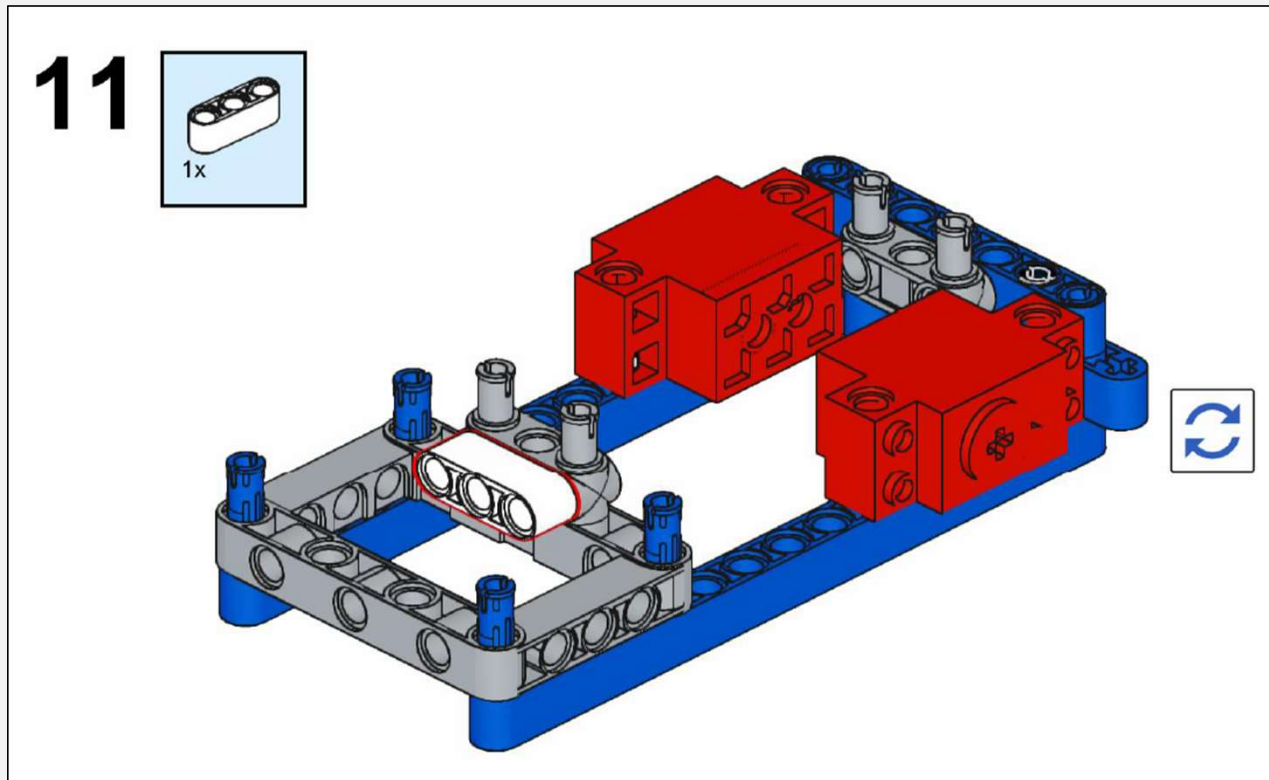
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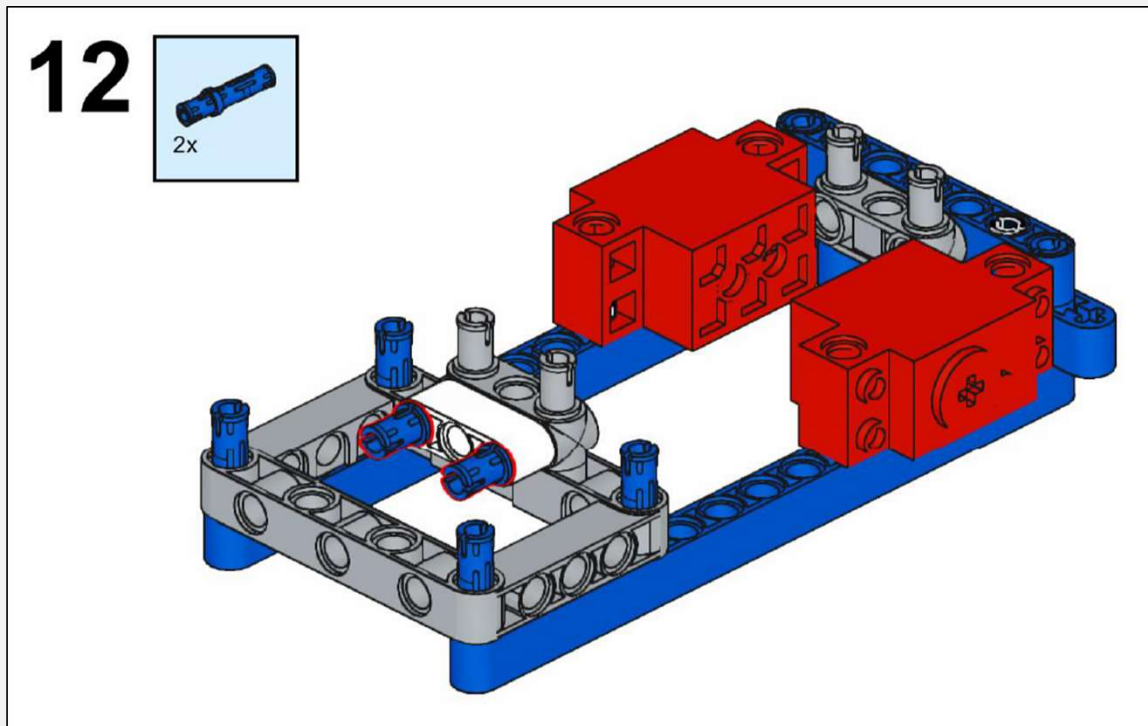
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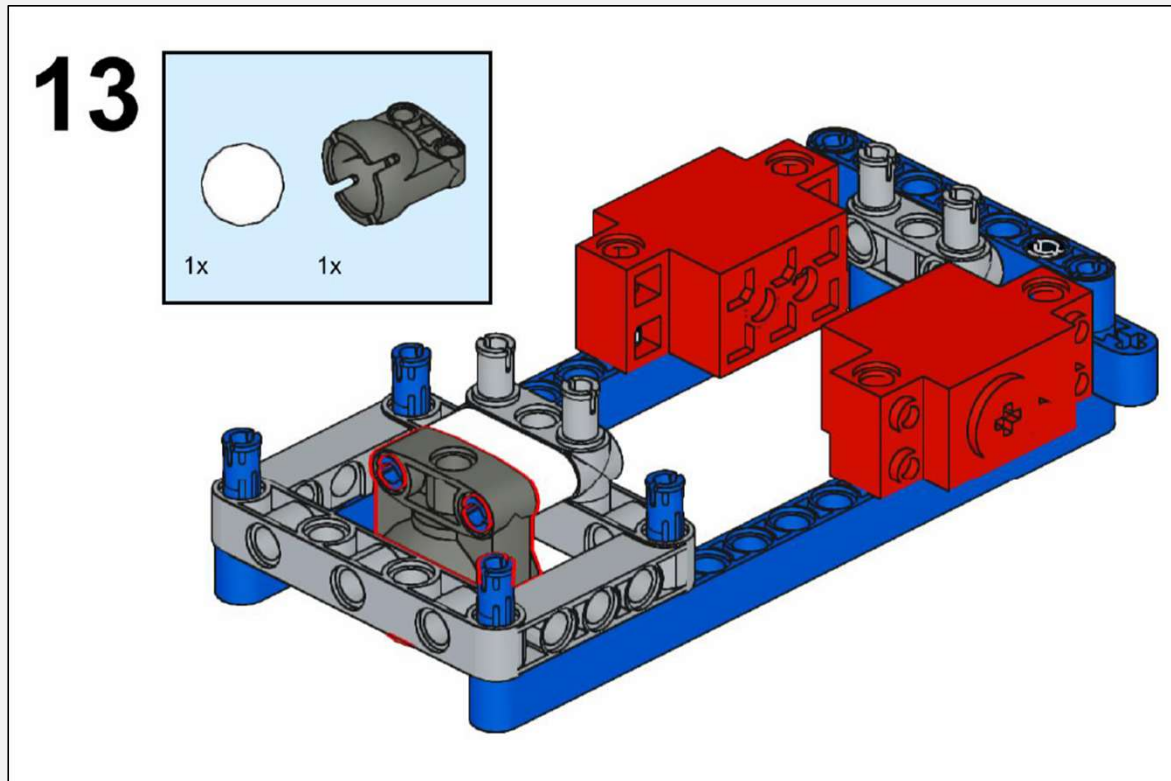
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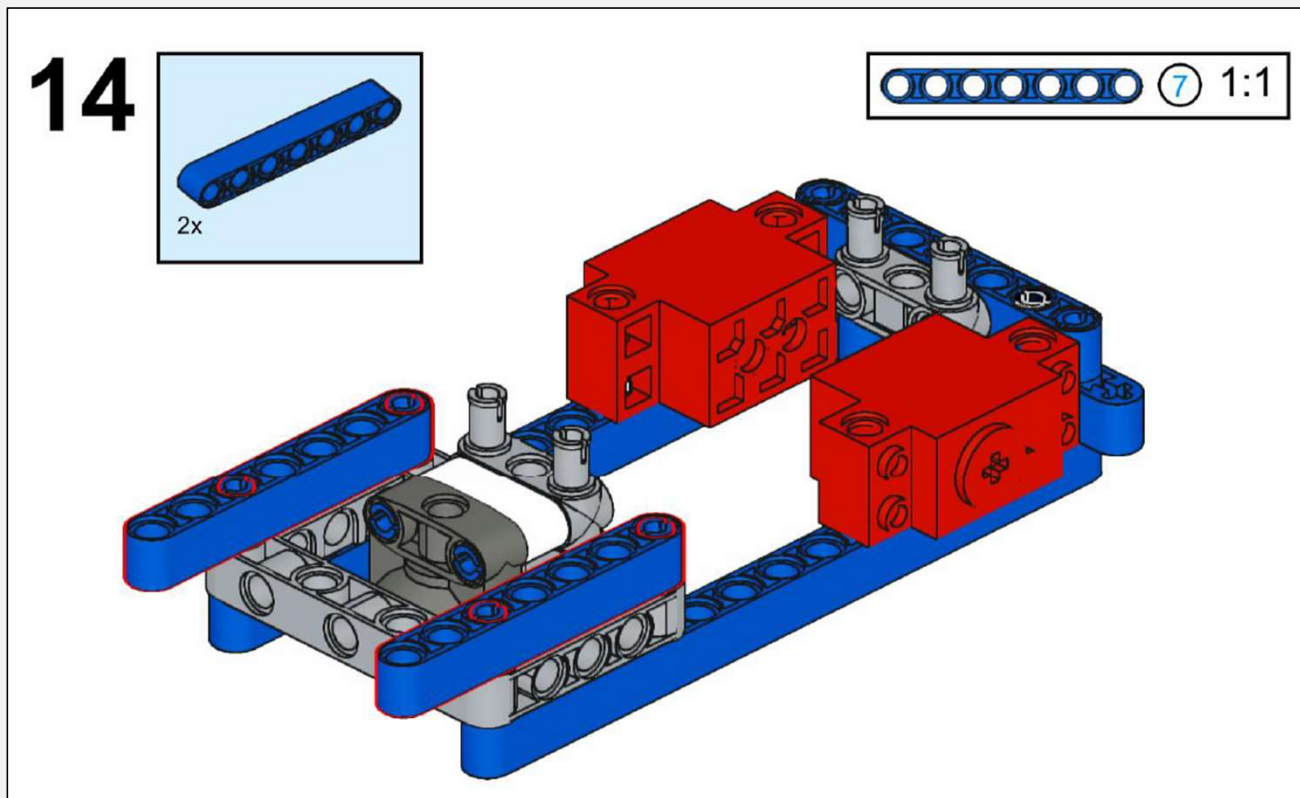
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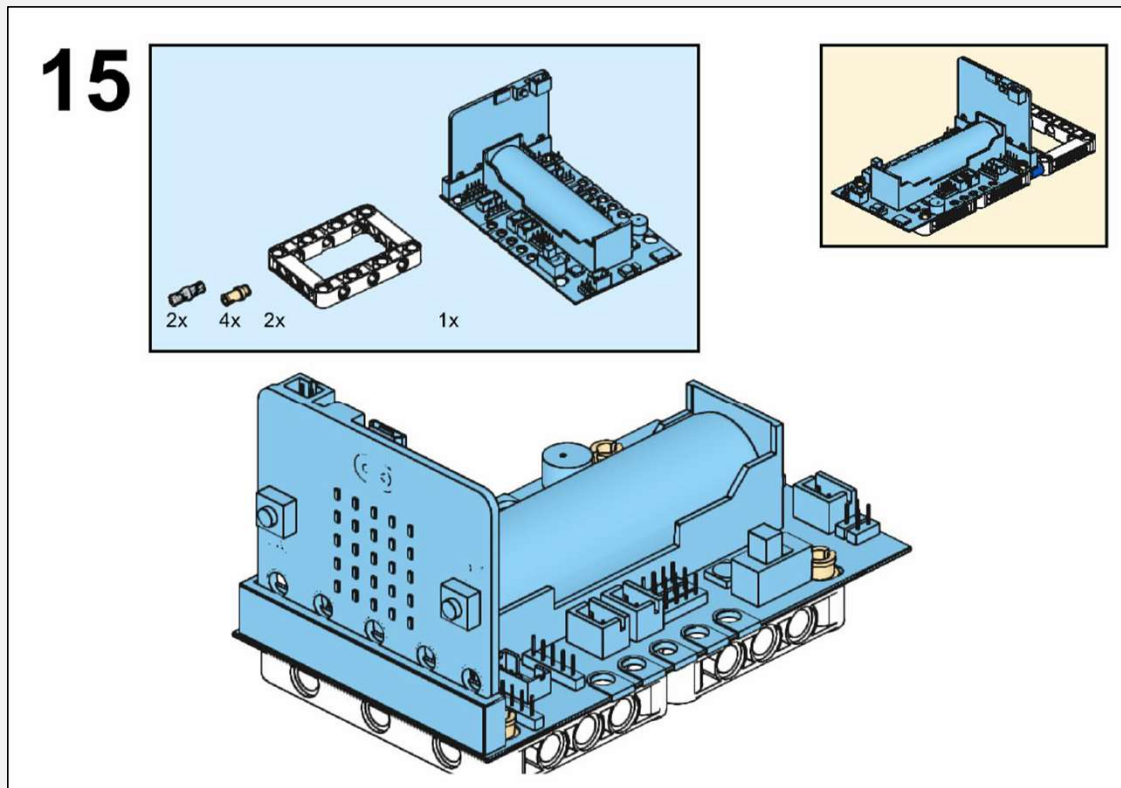
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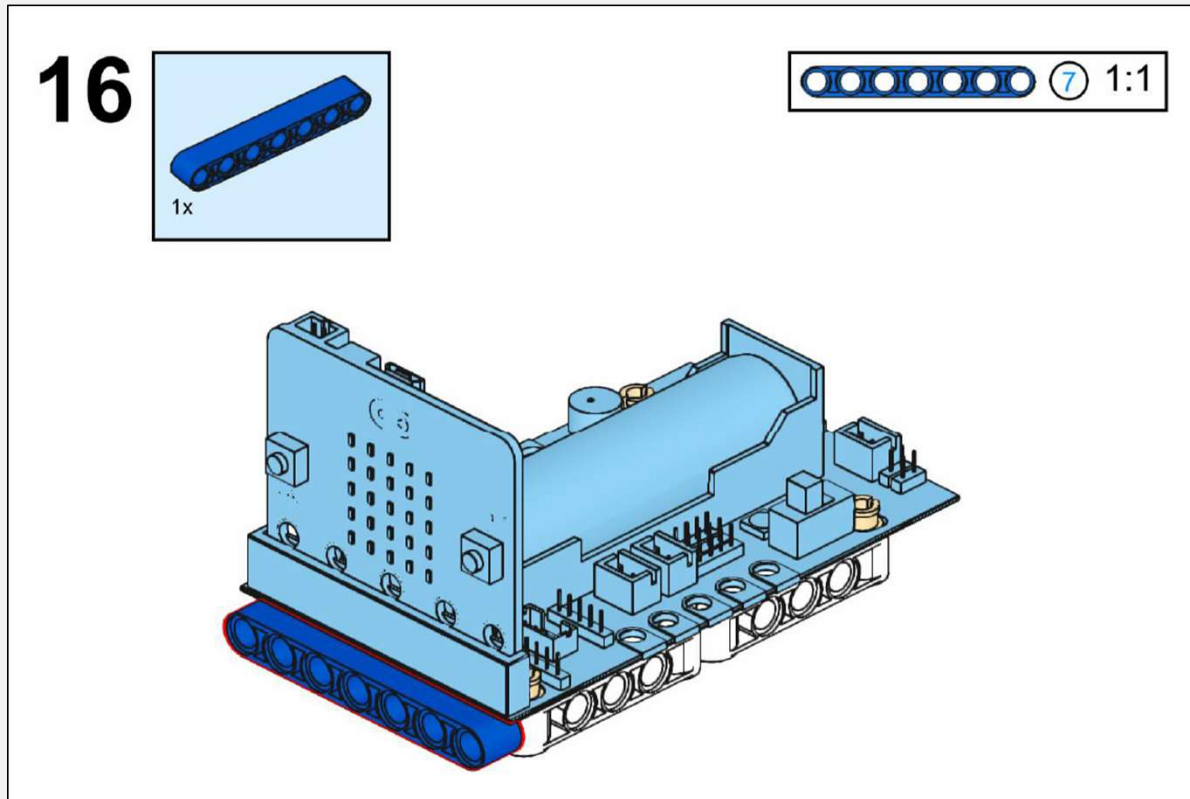
Step 14



Step 15

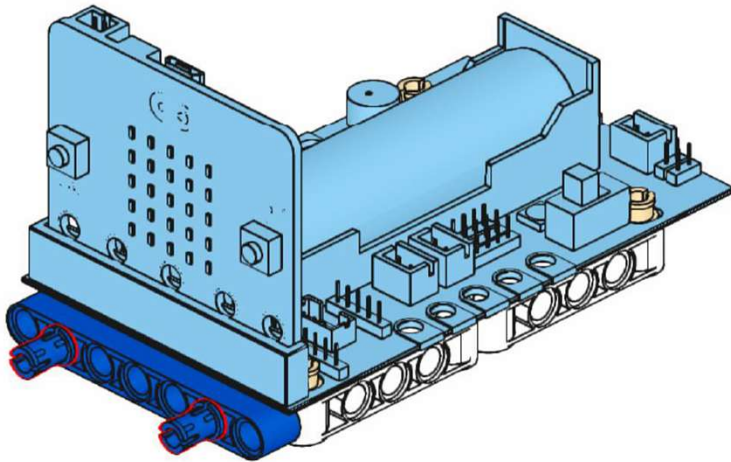


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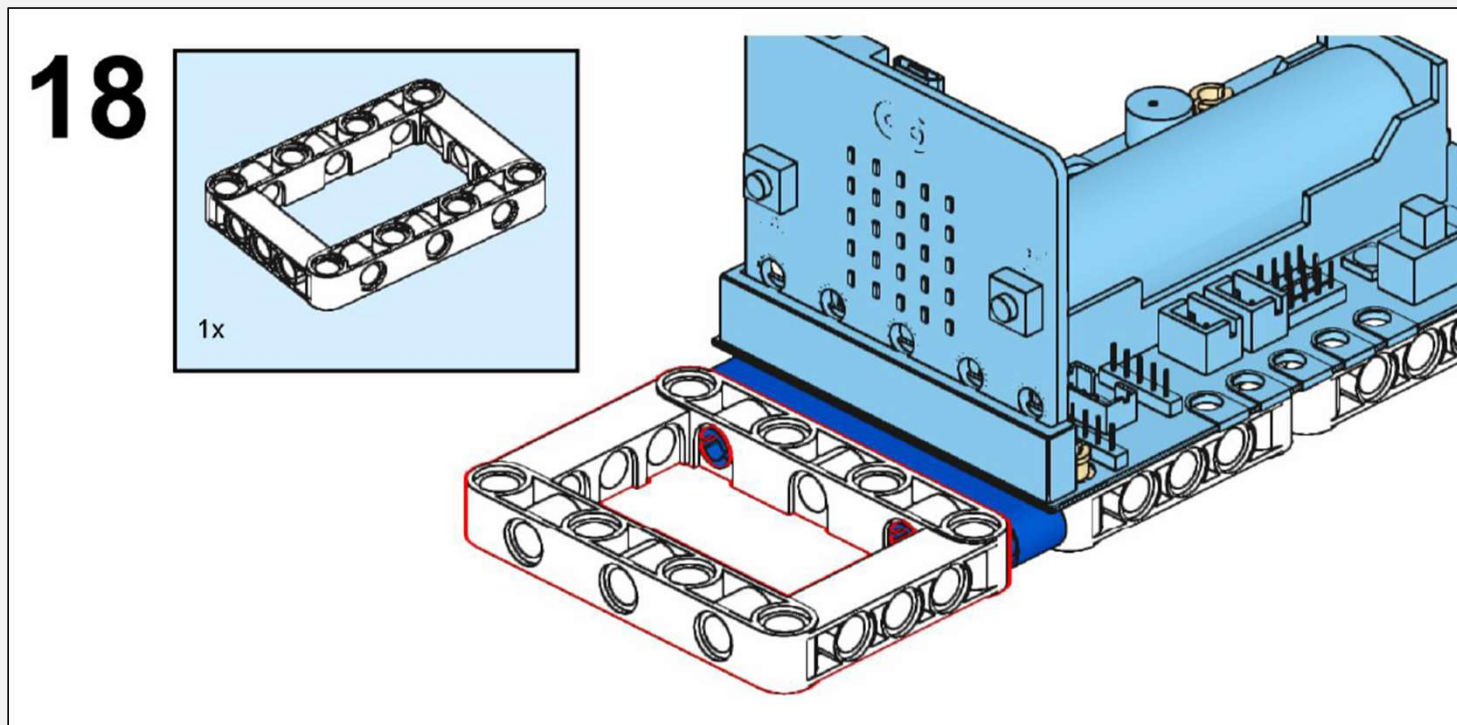


Step 17

17

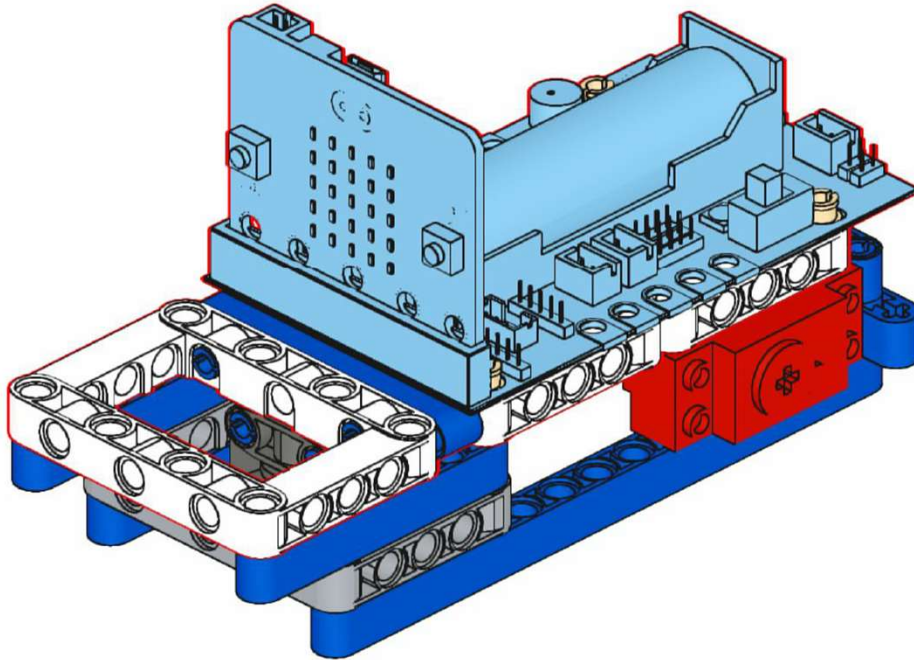


Step 18



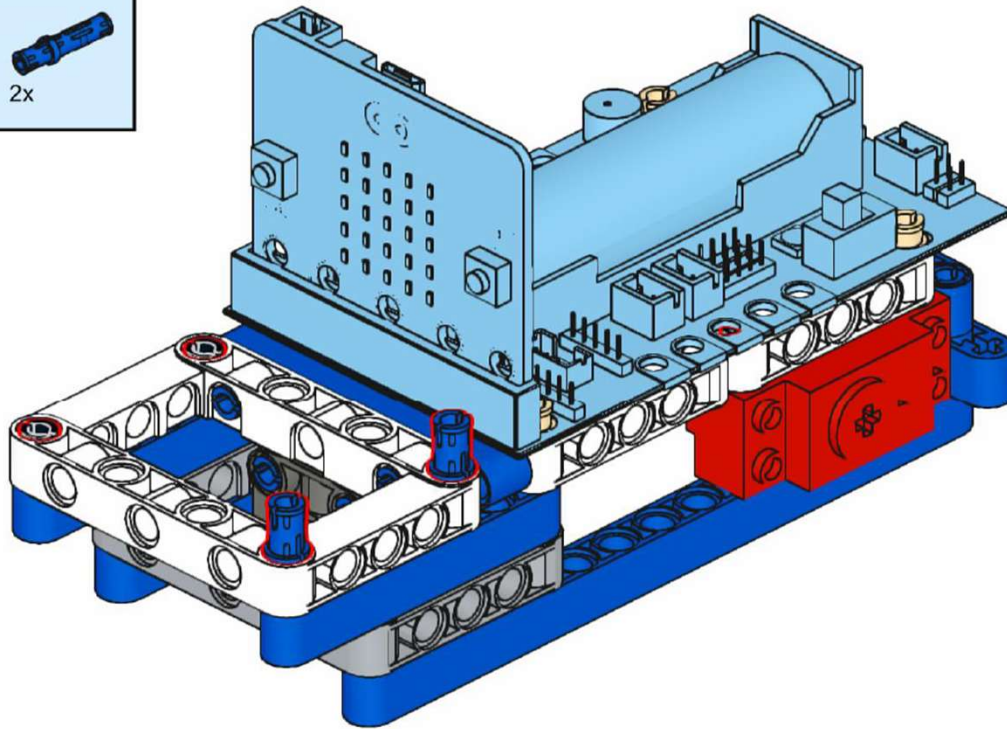
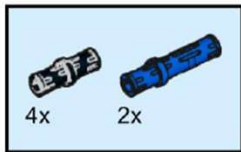
Step 19

19



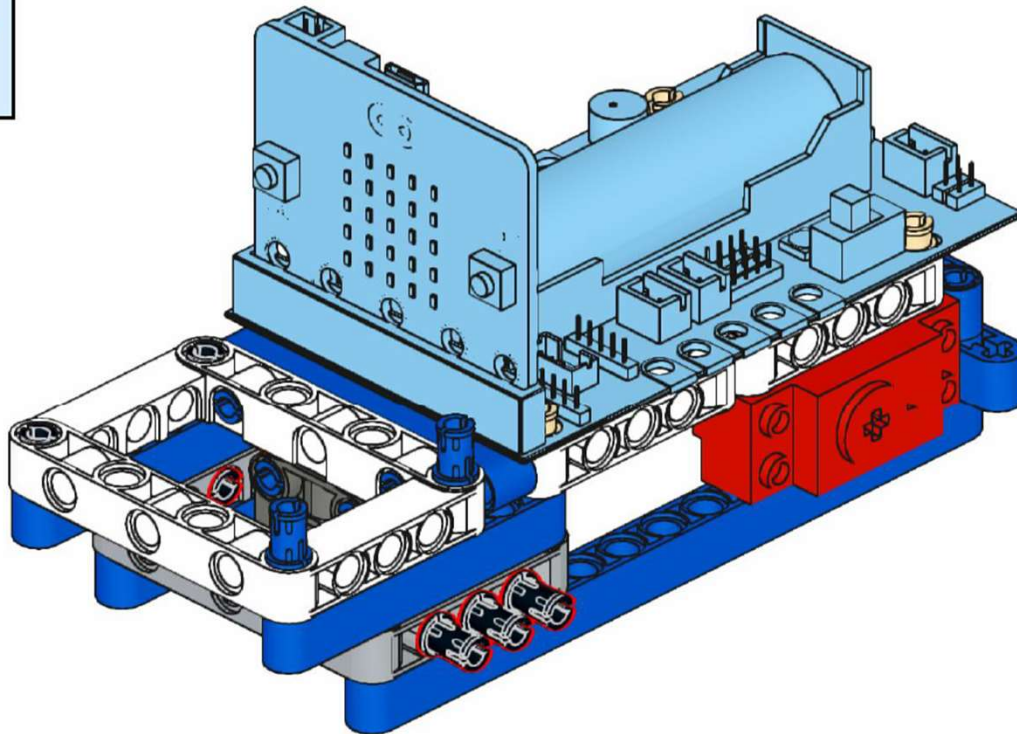
Step 20

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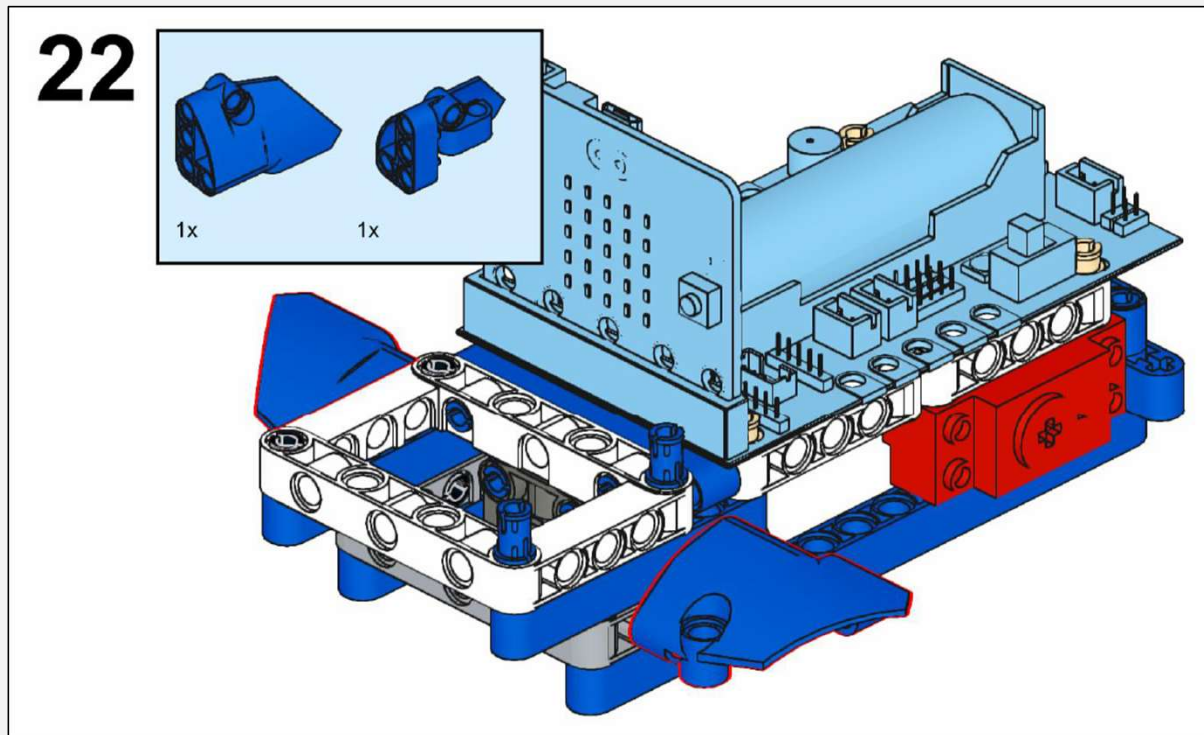


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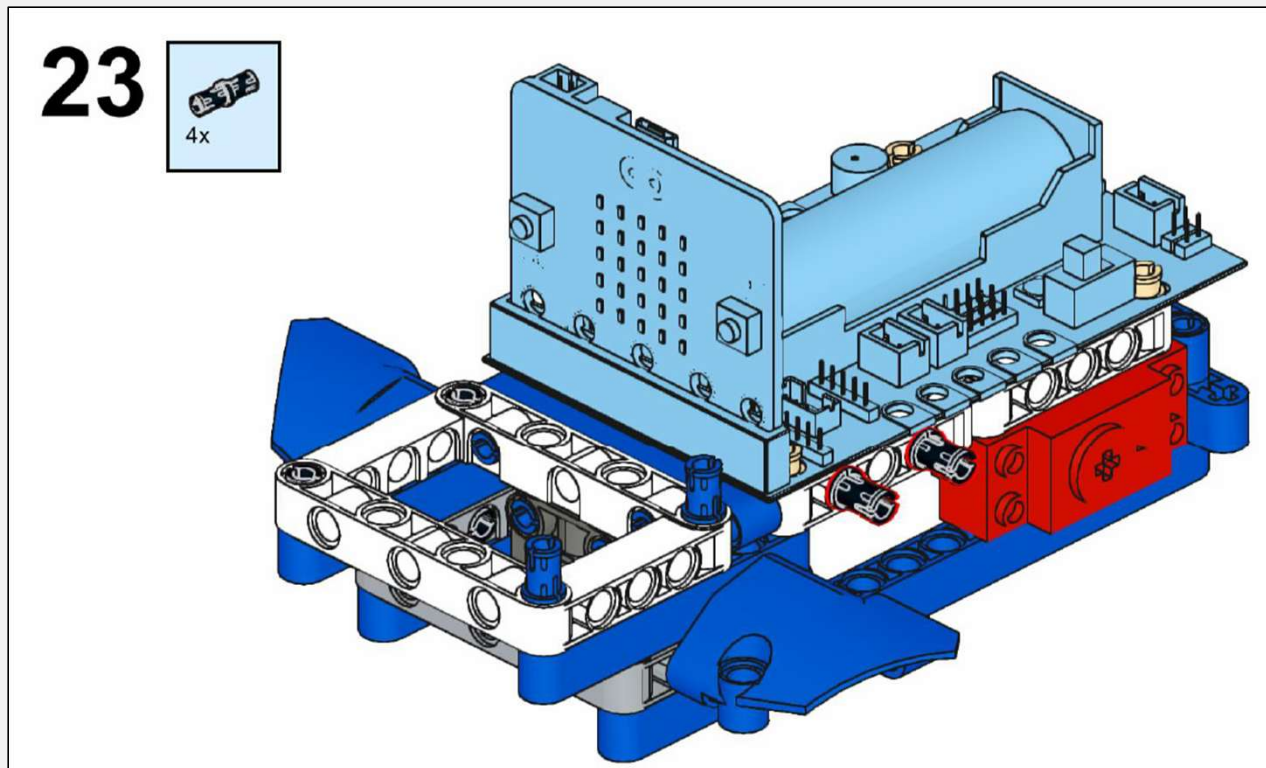
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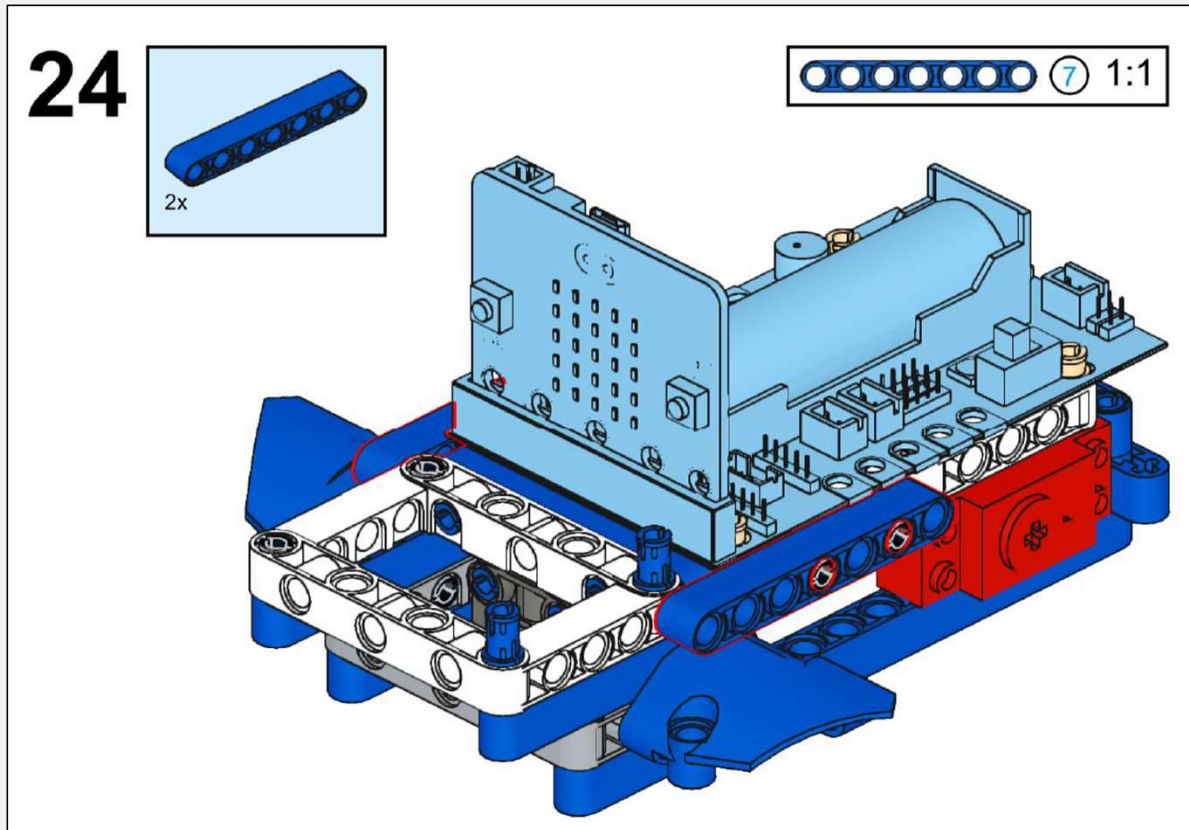
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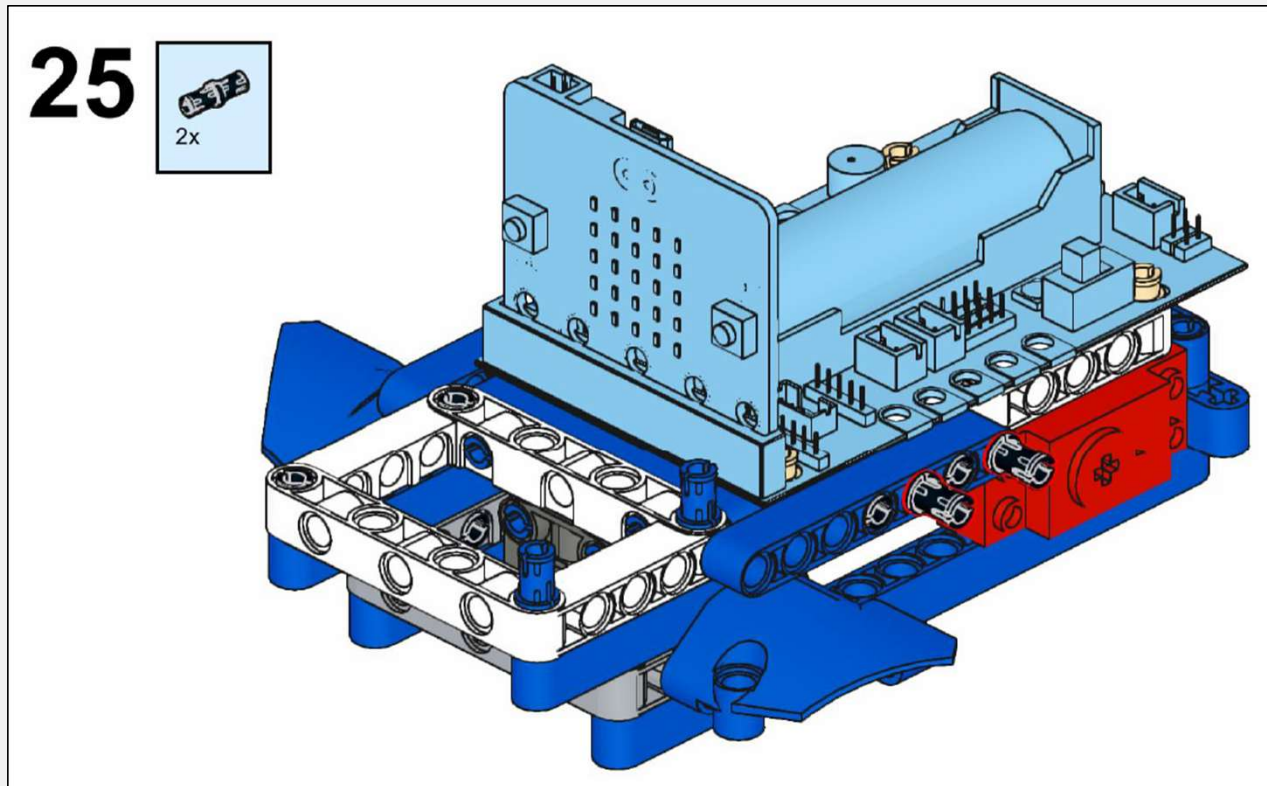
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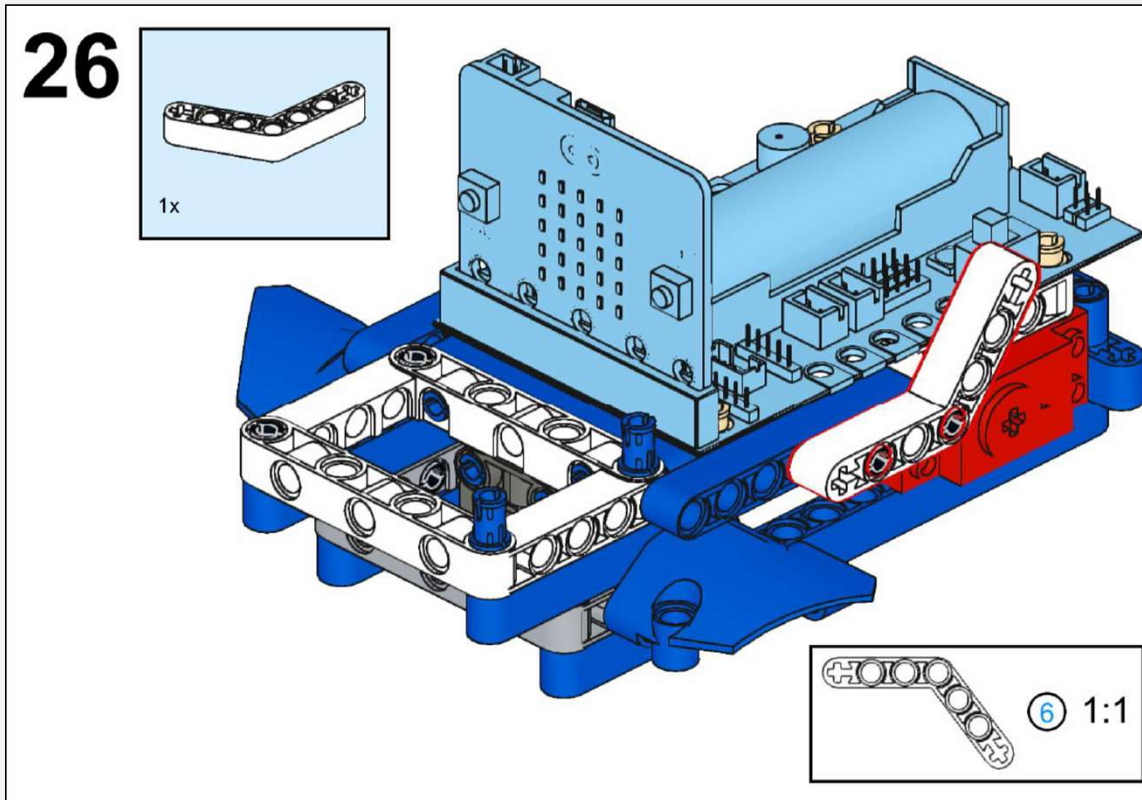
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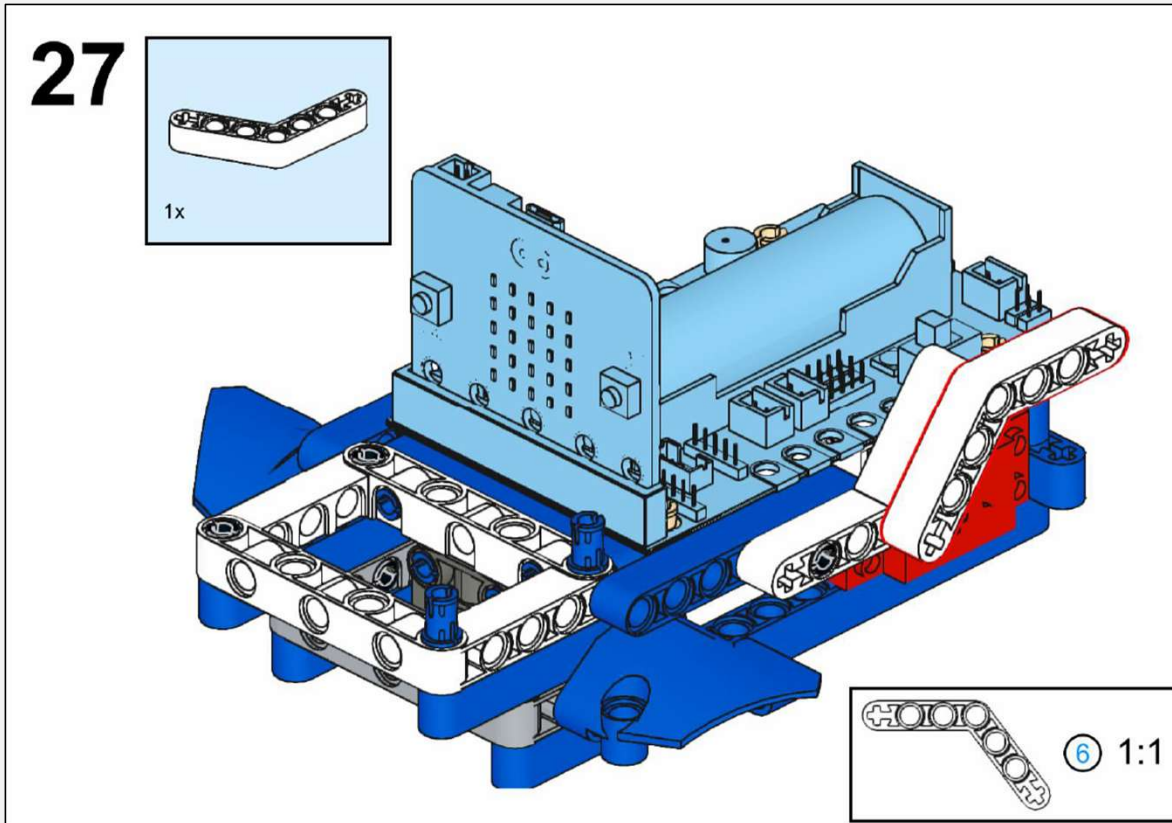
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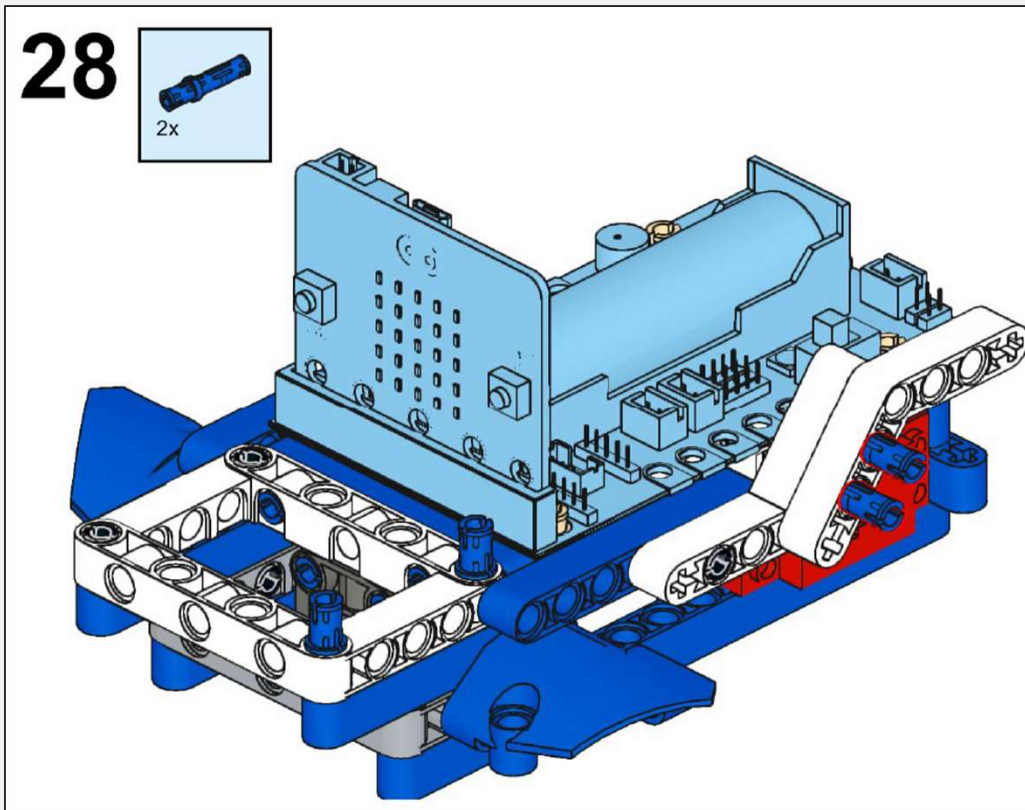
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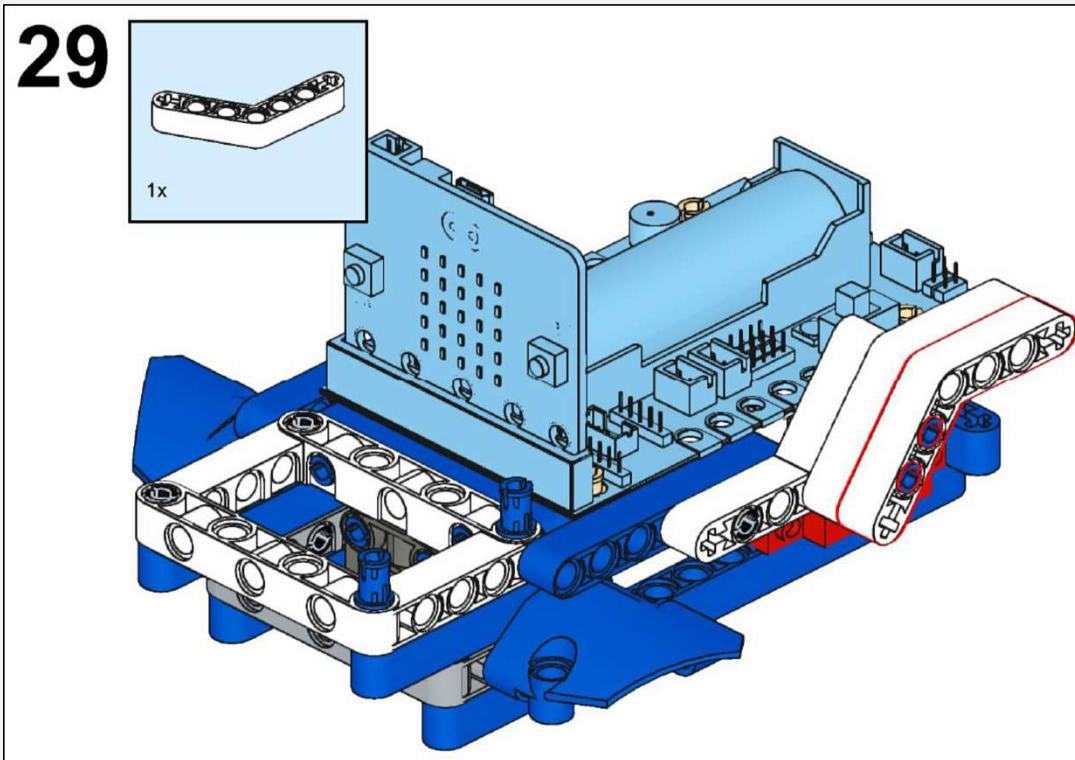
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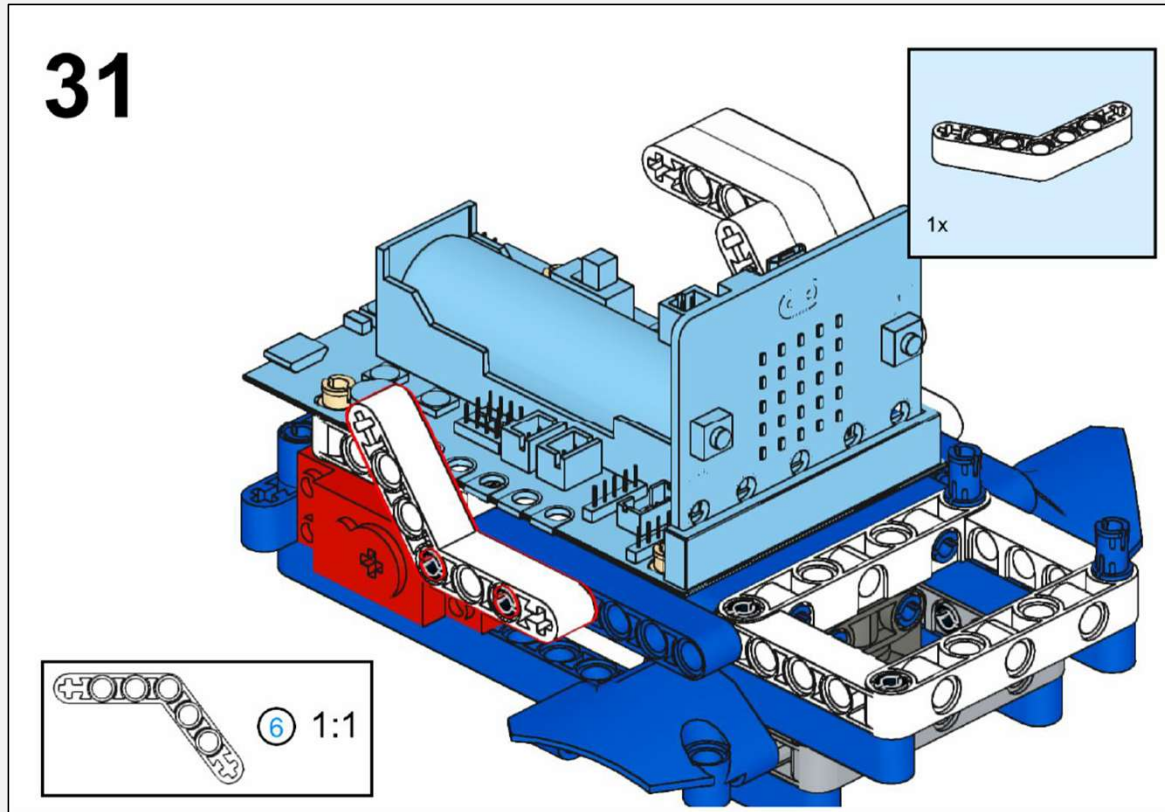
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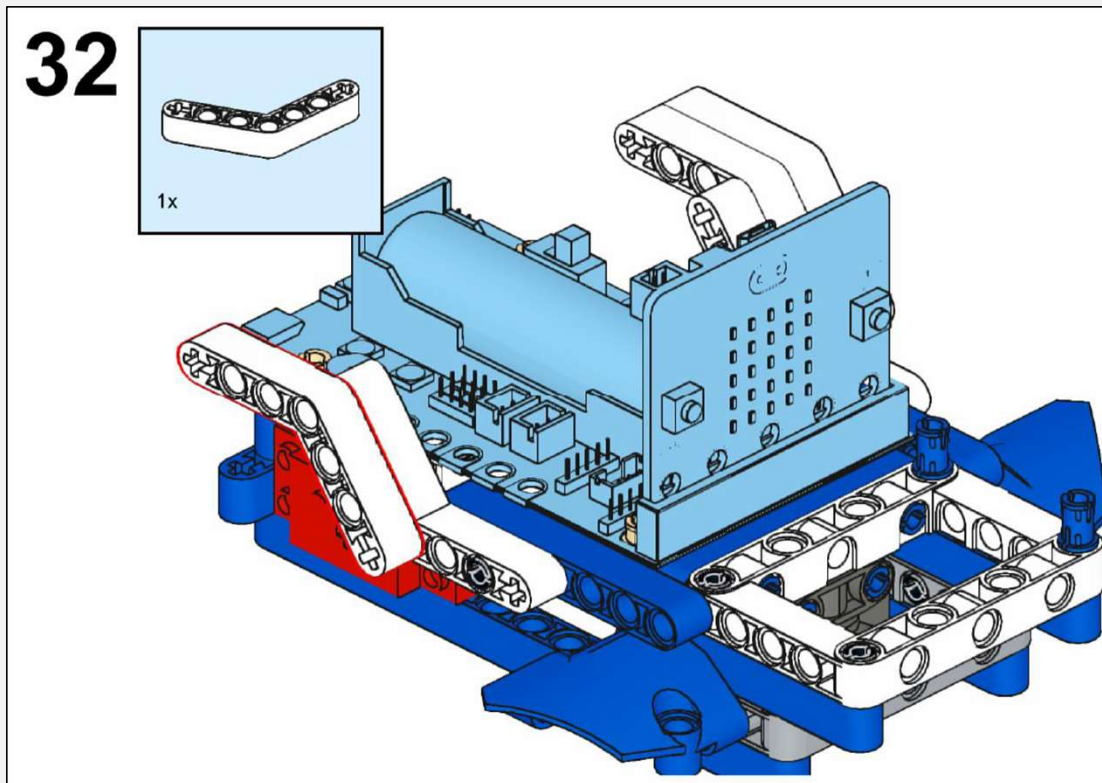
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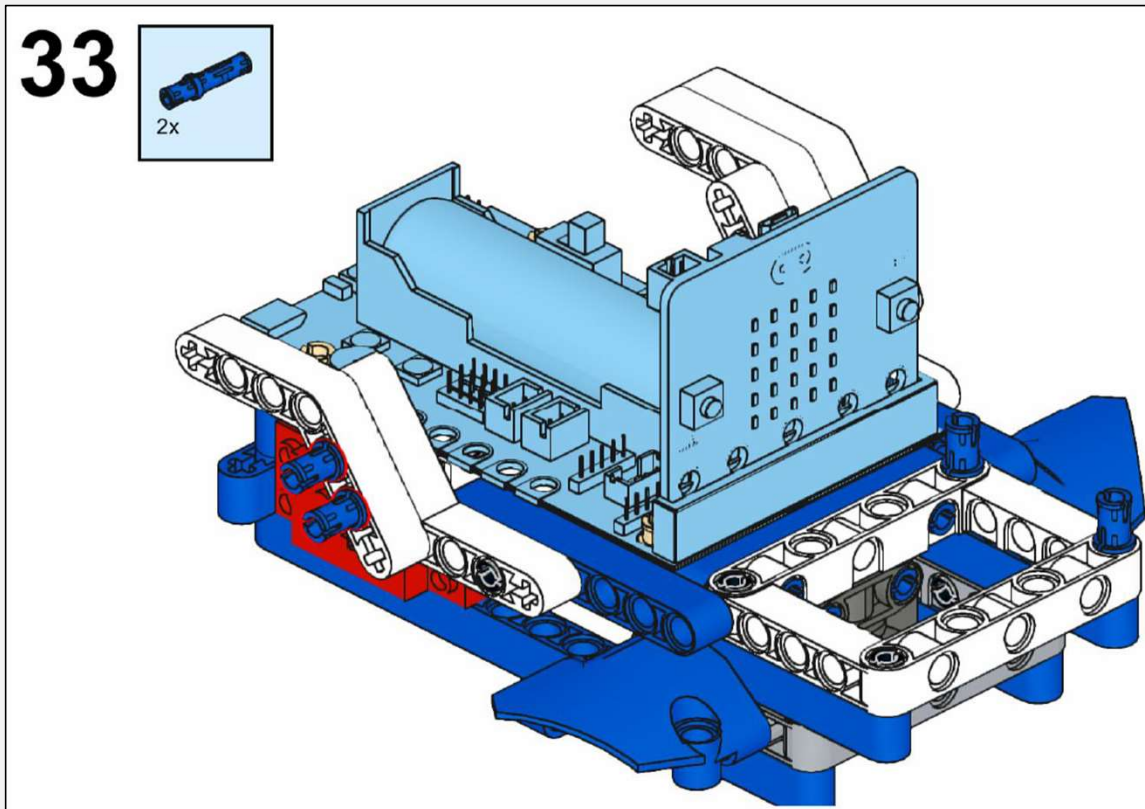
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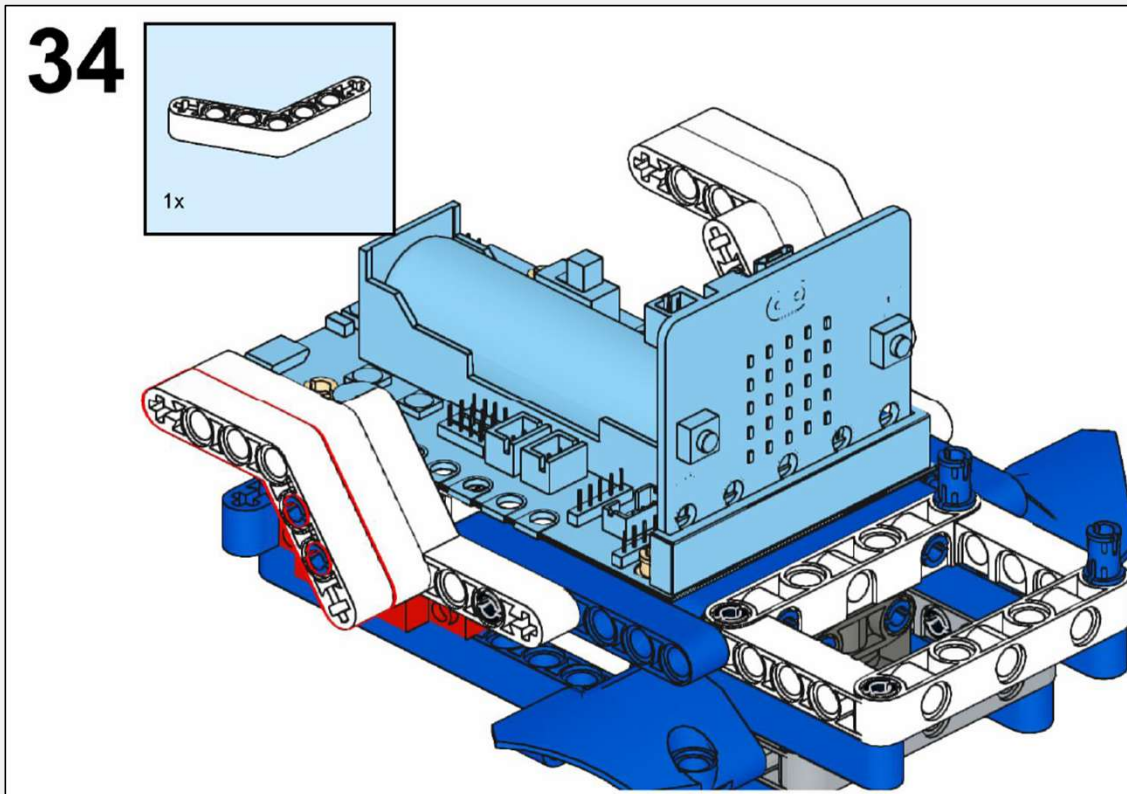
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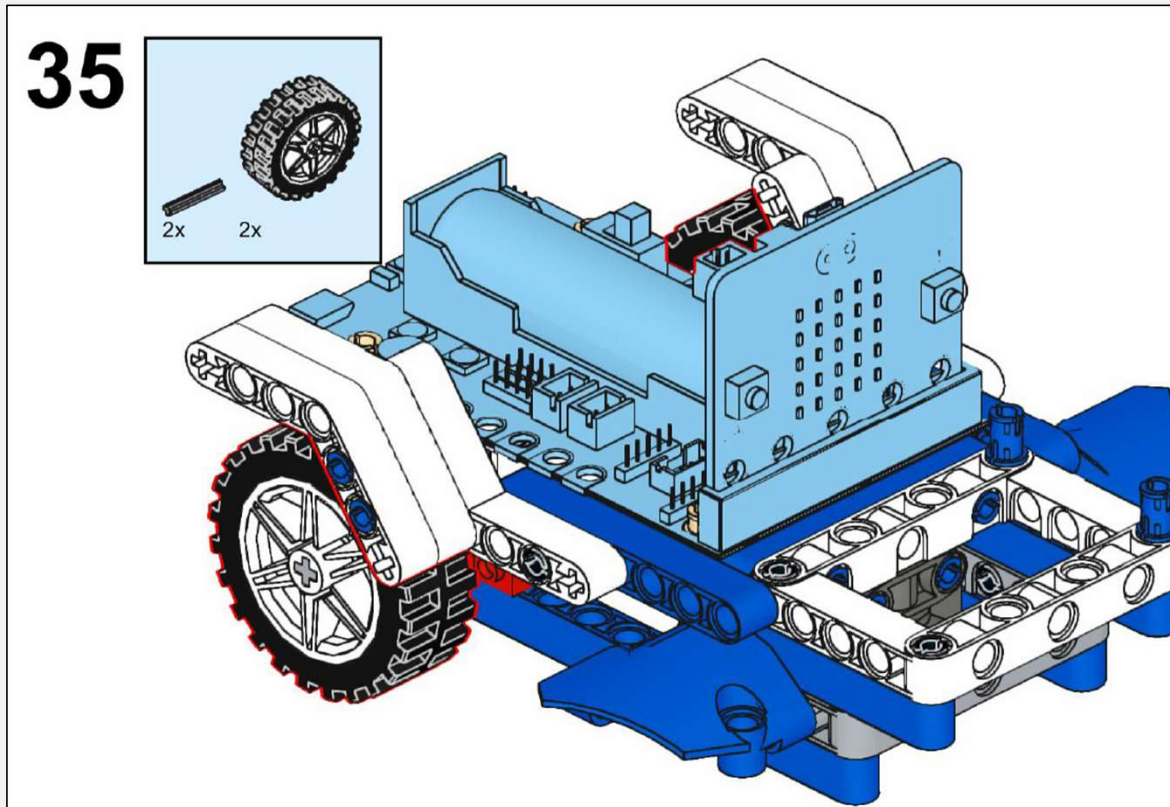
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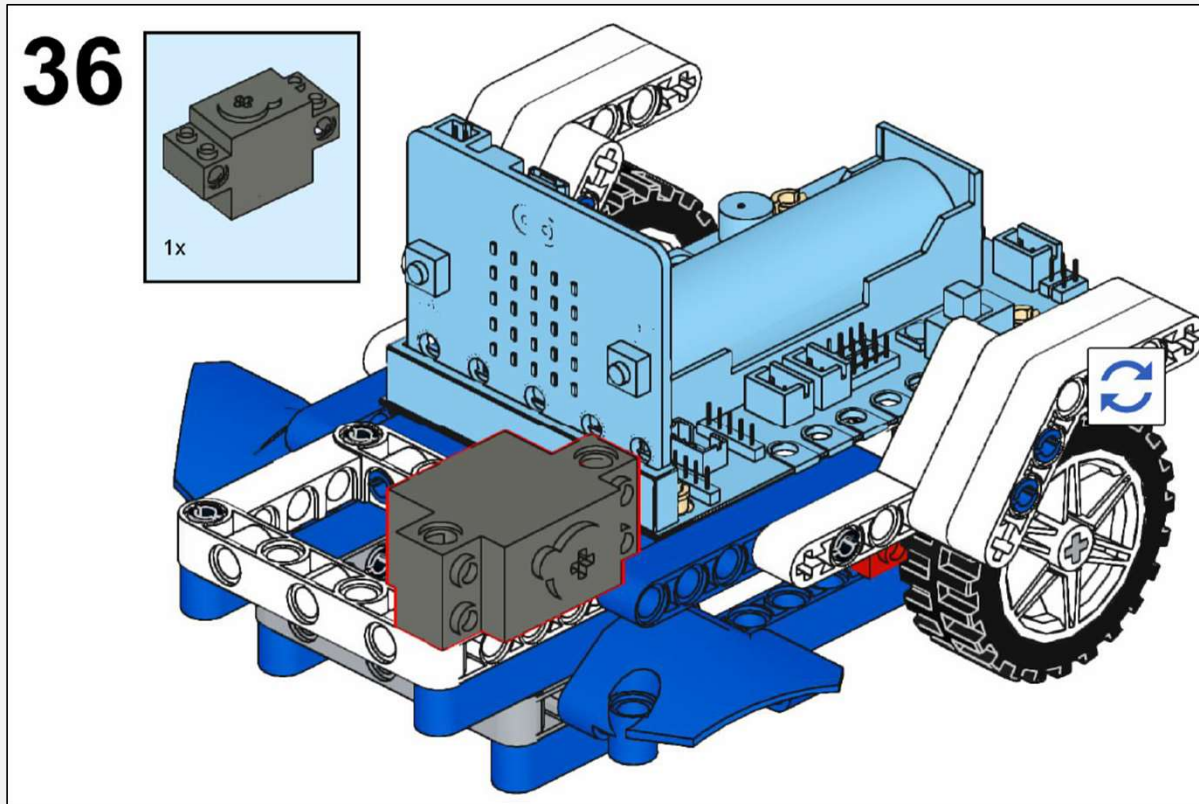
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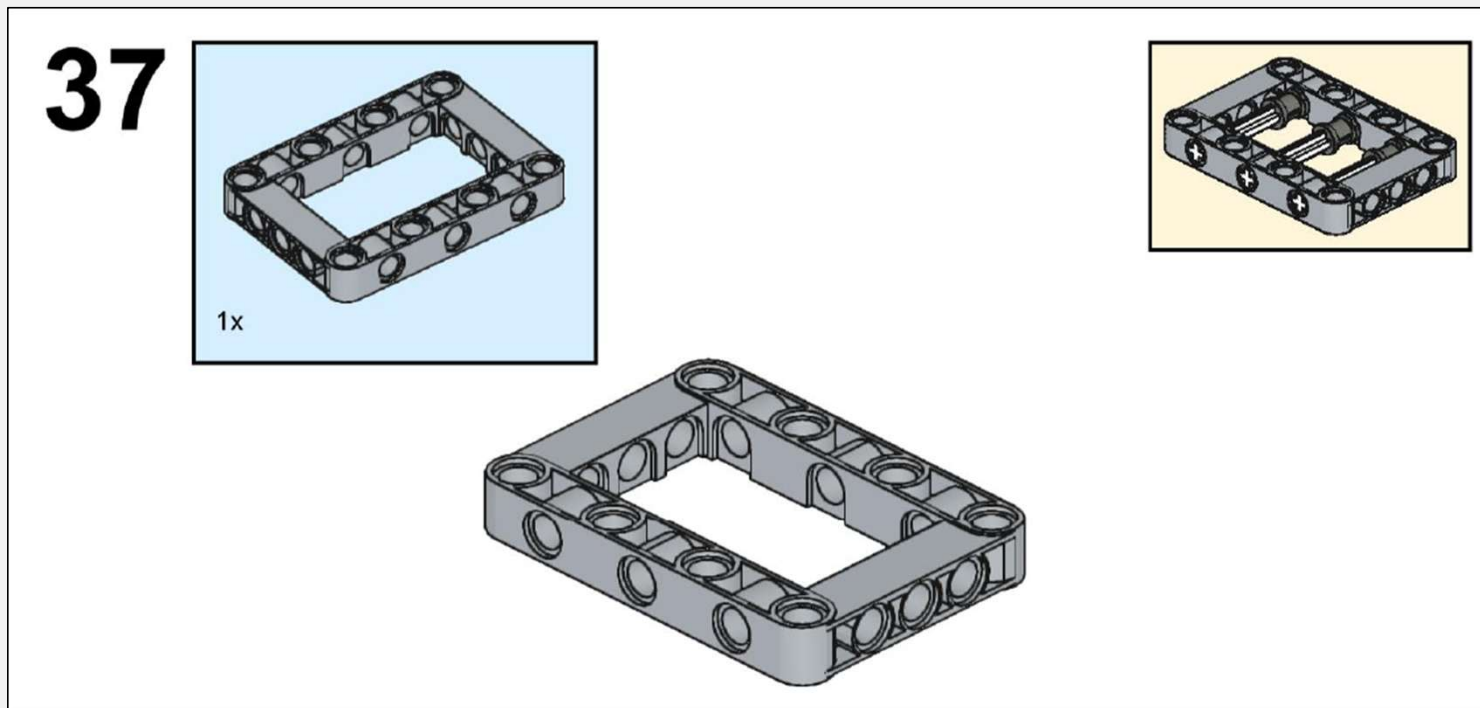
Step 35



Step 36

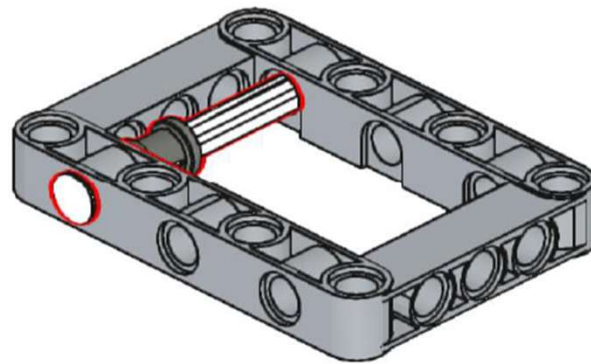
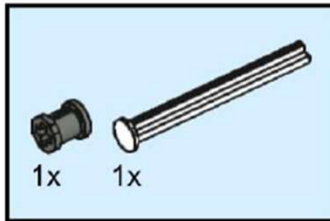


Step 37



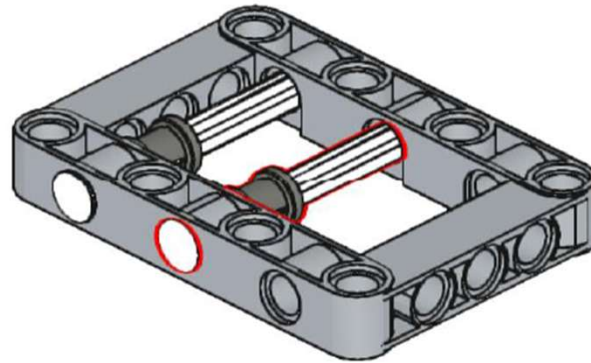
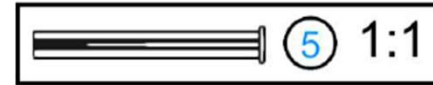
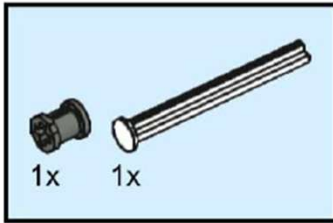
Step 38

38



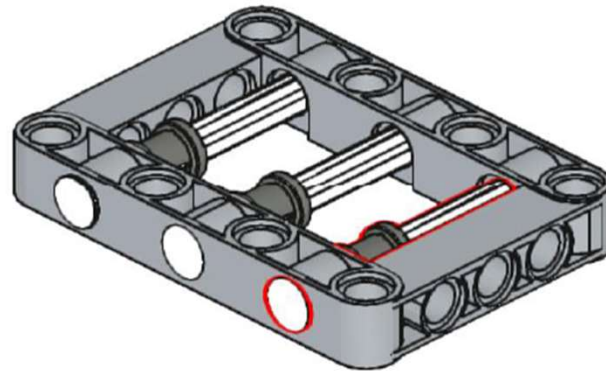
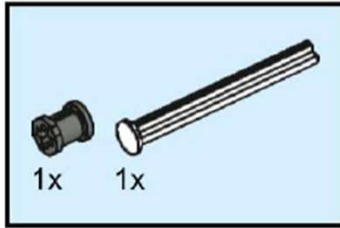
Step 39

39

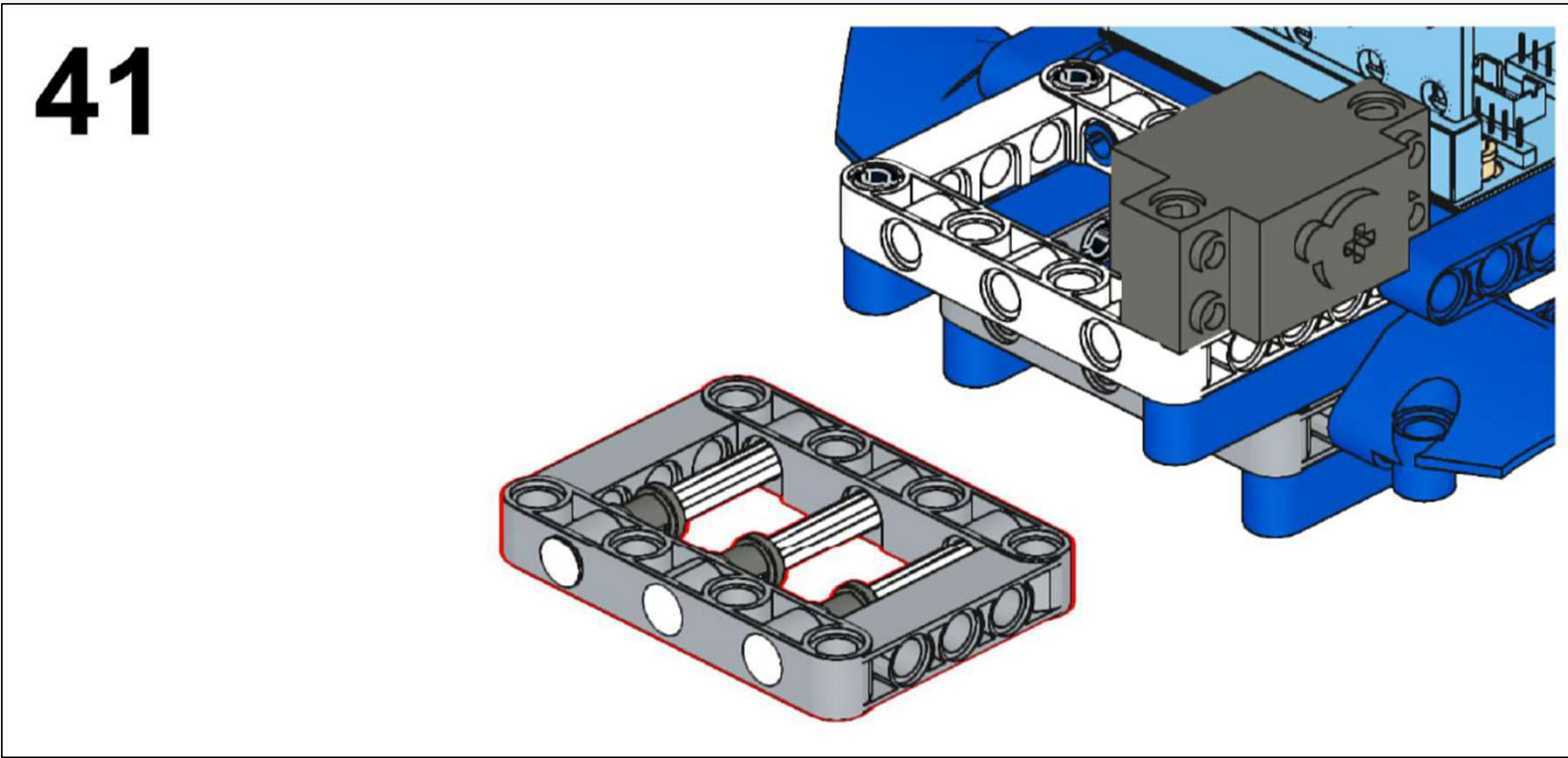


Step 40

40

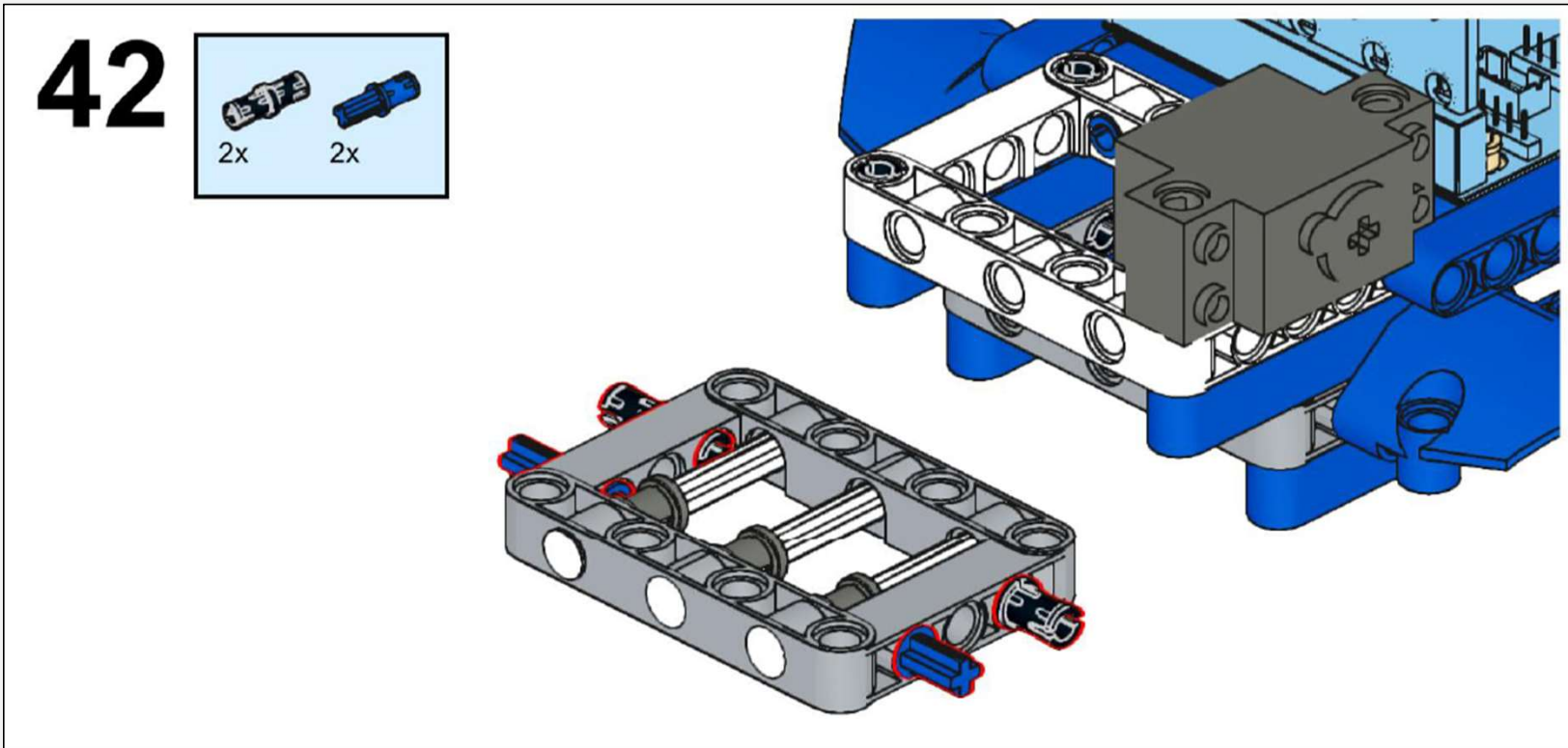


Step 41

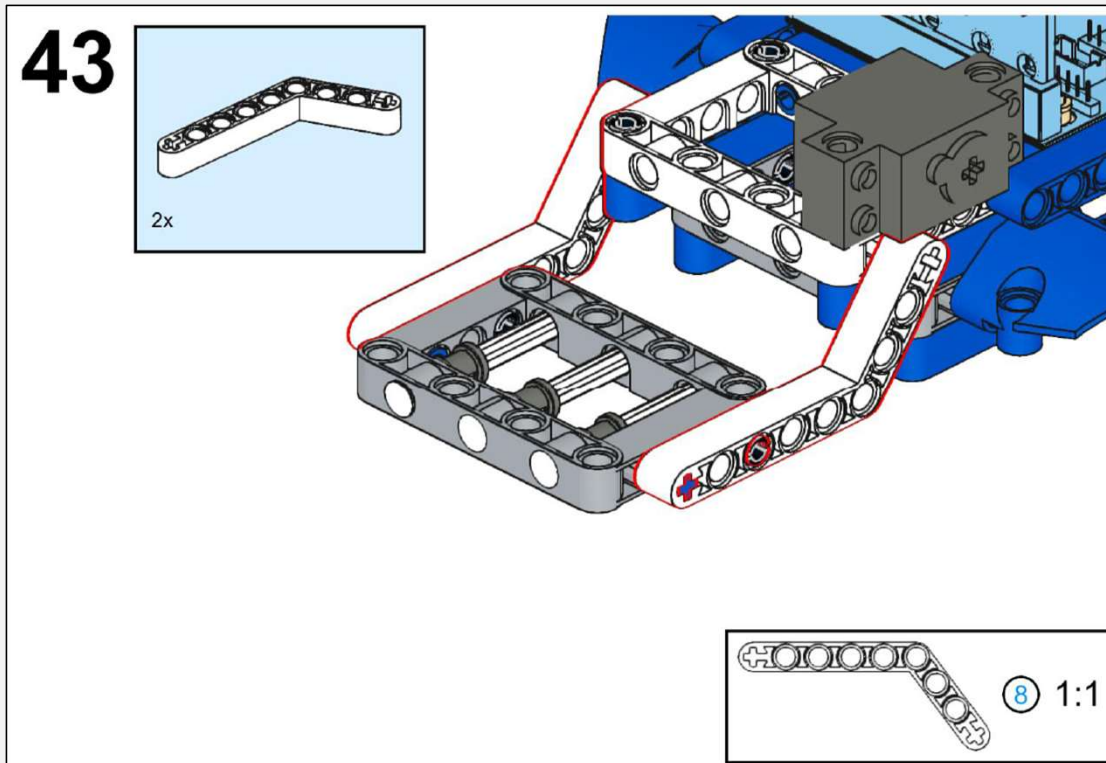




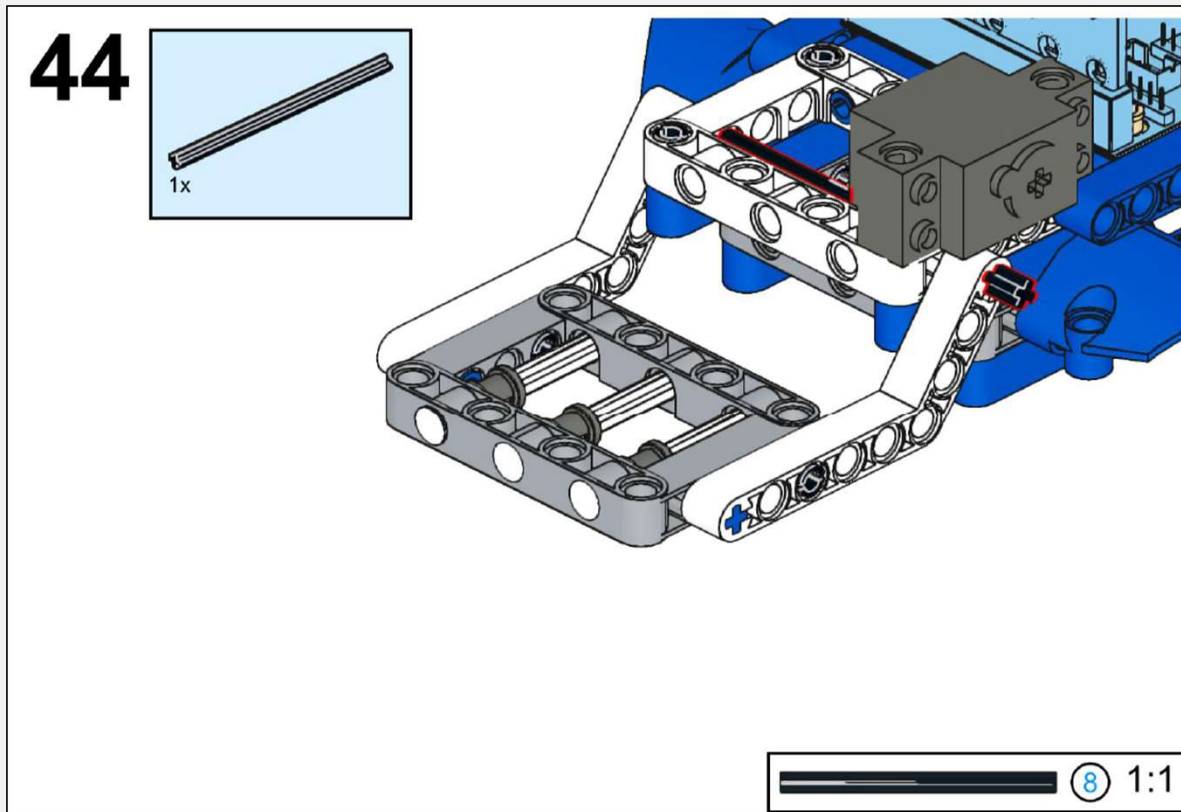
Step 42



Step 43



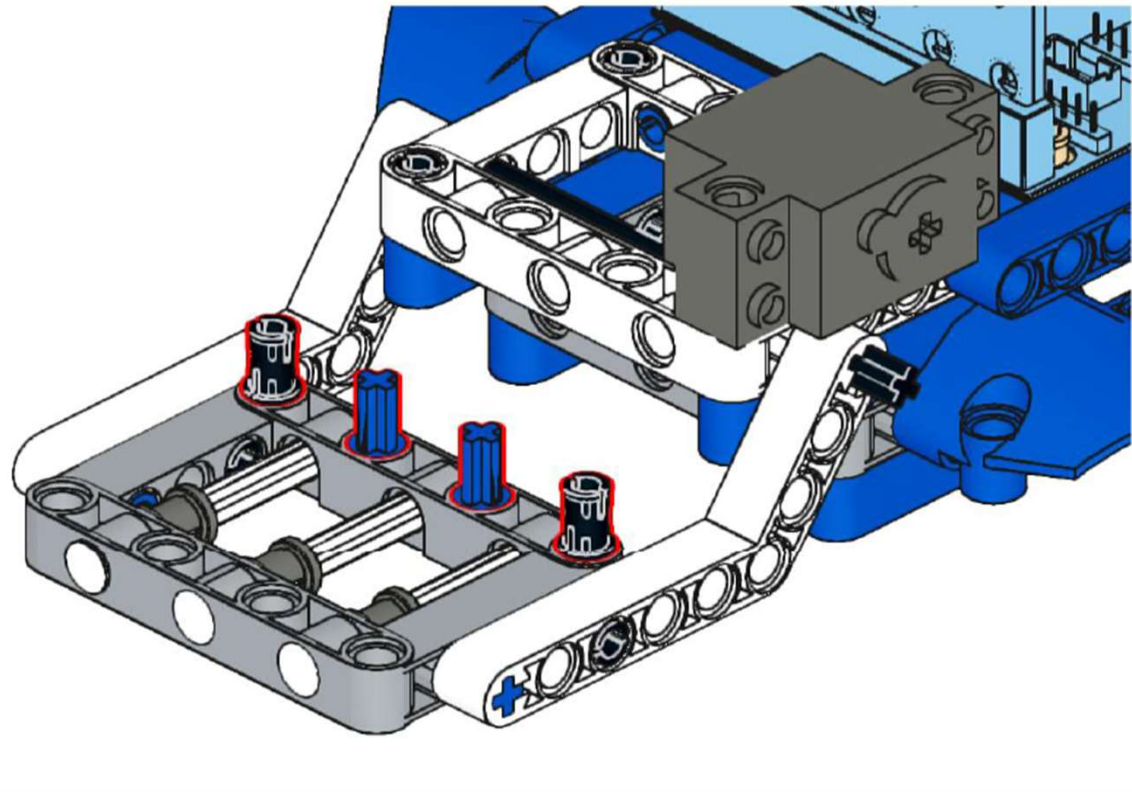
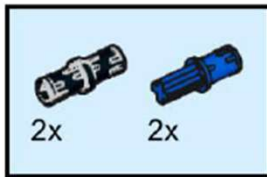
Step 44





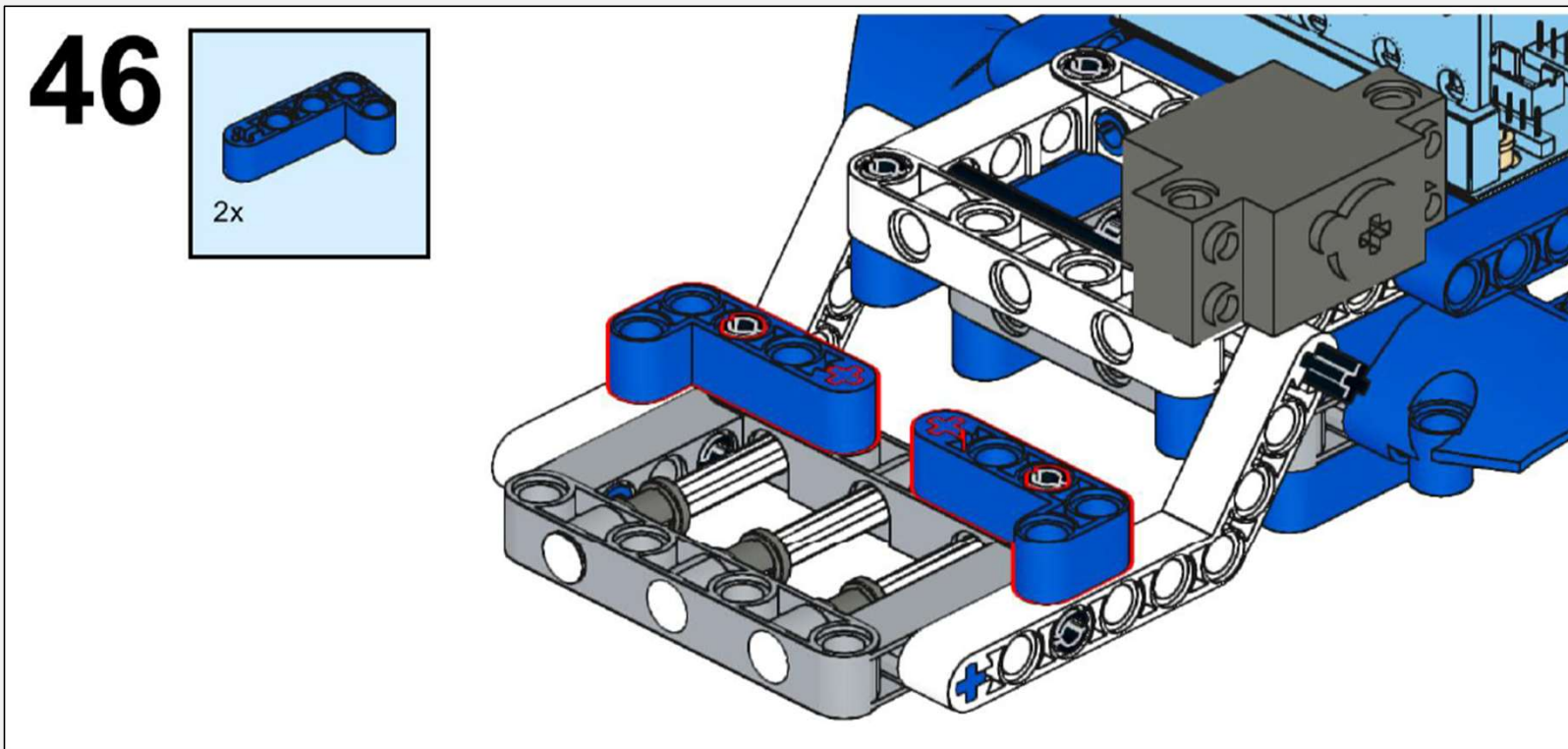
Step 45

45

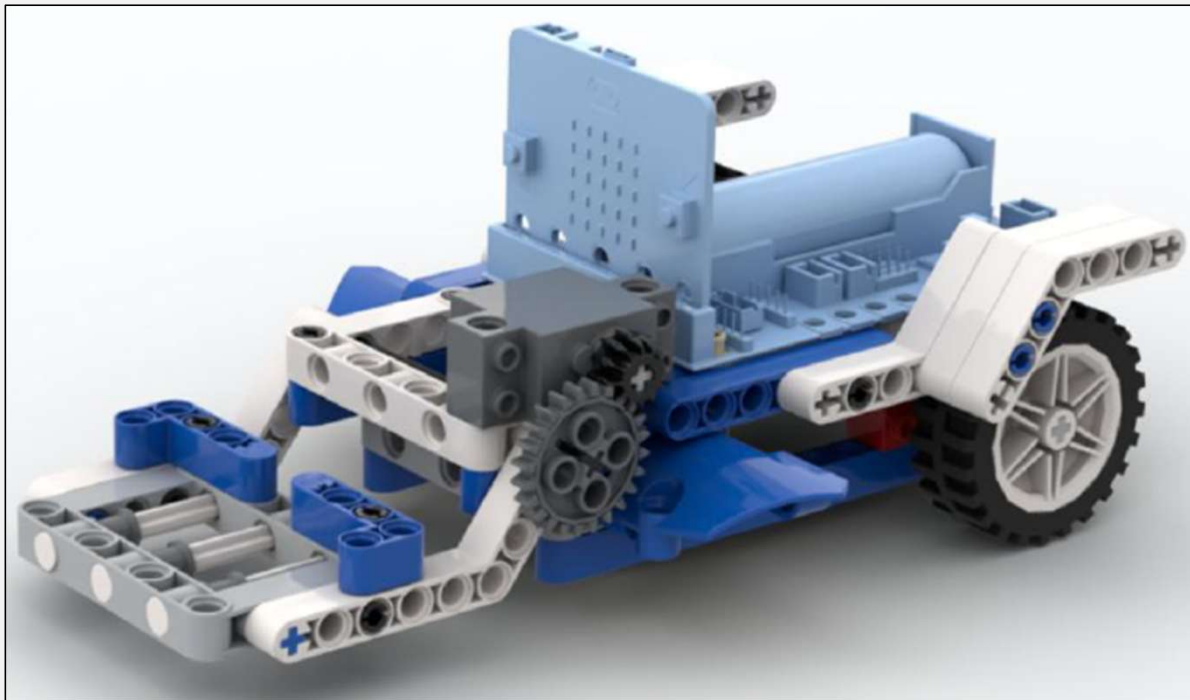




Step 46



Completed Proficient Carrier



Program your Proficient Carrier

Code your Remote Controller



Remote Control



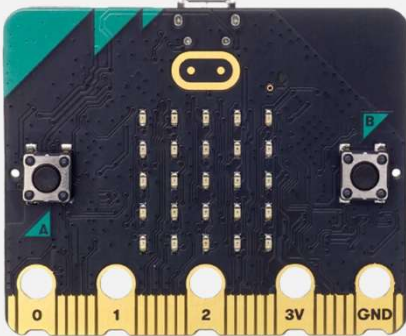
Let's program our remote controller first.

At first, we need to set radio group, please select a number from 0 – 255.

I will be using 1 as an example.

The radio group is served as a channel for your microbit to communicate via radio signal. So your Proficient Carrier should be listening to the same channel to work.

Code your Remote Controller



Remote Control

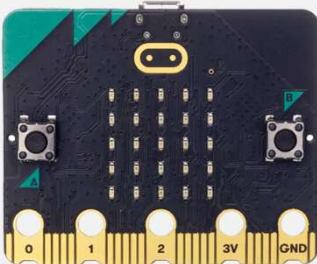
```
on start
  radio set group 1
```

```
forever
  if button A+B is pressed then
    +
```

Let's add a condition that when your button A and button B are pressed together, I will send a signal through radio to other microbit with the same group.

Code your Remote Controller

```
on start
  radio set group 1
```



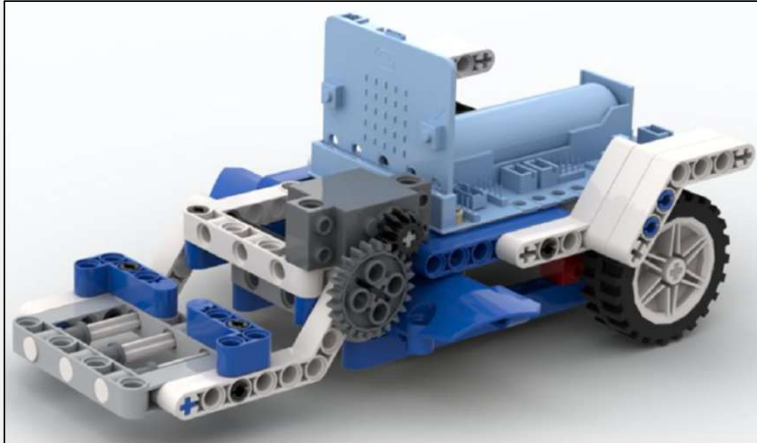
Remote Control

```
forever
  if button A+B is pressed then
    radio send string "forward"
  else if button A is pressed then
    radio send string "left"
  else if button B is pressed then
    radio send string "right"
  else
    radio send string "stop"
```

Then we add in different trigger to send different strings.

Then your remote controller is done.

Code your Proficient Carrier



Proficient Carrier

Now is the time to code your Proficient Carrier to do action when receiving strings via radio from the remote controller.

30 Points

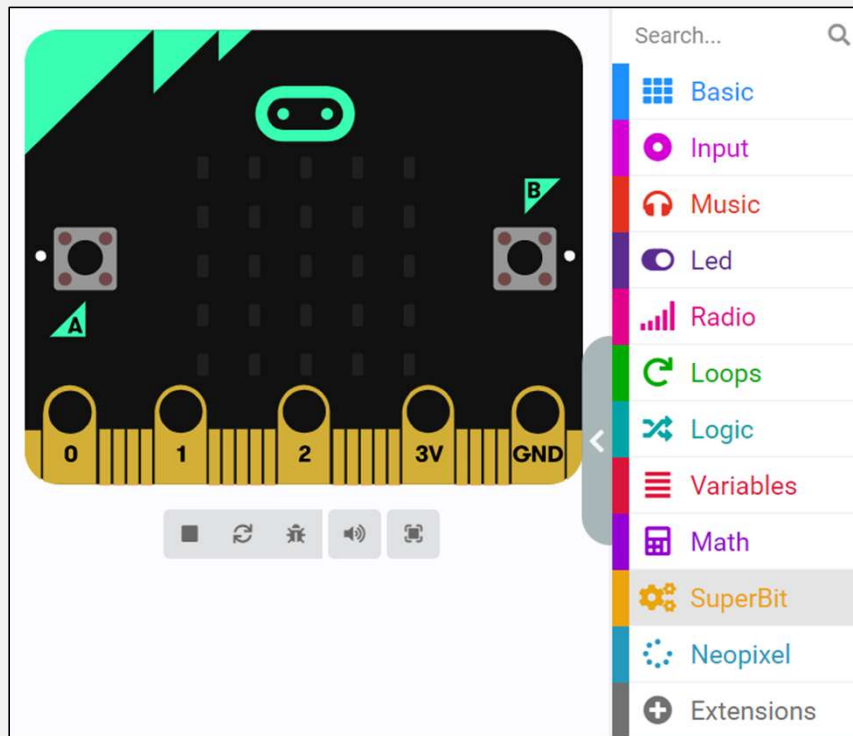
MakeCode Programming

First, we need to connect the micro:bit to the computer by USB cable. The computer will pop up a USB flash drive and click on the URL in the USB flash drive: <http://microbit.org/> to enter the programming interface.

Add the Yahboom package <https://github.com/lzty634158/SuperBit> to program.

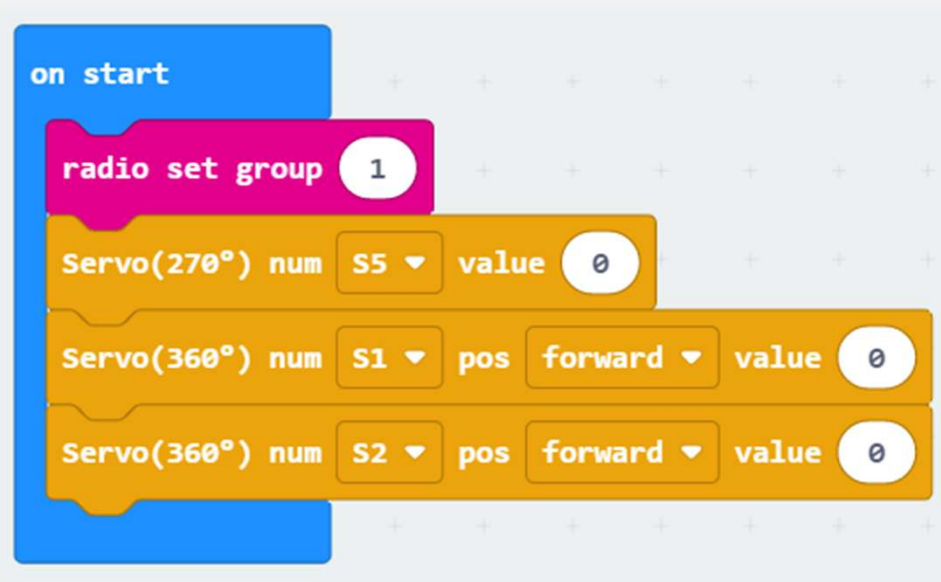
Or search [lzty634158/SuperBit](https://github.com/lzty634158/SuperBit) in the Microbit extension.

Superbit Extension



After importing the superbite extension, you will see **SuperBit** and **Neopixel** in your coding blocks.

MakeCode Programming



Program our starting state of our servos. And also set the radio group to the group that you set on your remote controller.

**You can use your last lesson's program.

**We just need to add the actions for received signals from the remote controller.

Make a Function - Move Forward



To make our program easy, we better make functions for our move forward, turn right, turn left and move backward as well as shovelling.

Let's start with Move Forward.

****You can use your last lesson's program.**

****We just need to add the actions for received signals from the remote controller.**

Make a Function

```
function moveBackward  
  Servo(360°) num S1 pos reverse value 50  
  Servo(360°) num S2 pos forward value 50
```

```
function turnLeft  
  Servo(360°) num S1 pos forward value 50  
  Servo(360°) num S2 pos forward value 50
```

```
function turnRight  
  Servo(360°) num S1 pos reverse value 50  
  Servo(360°) num S2 pos reverse value 50
```

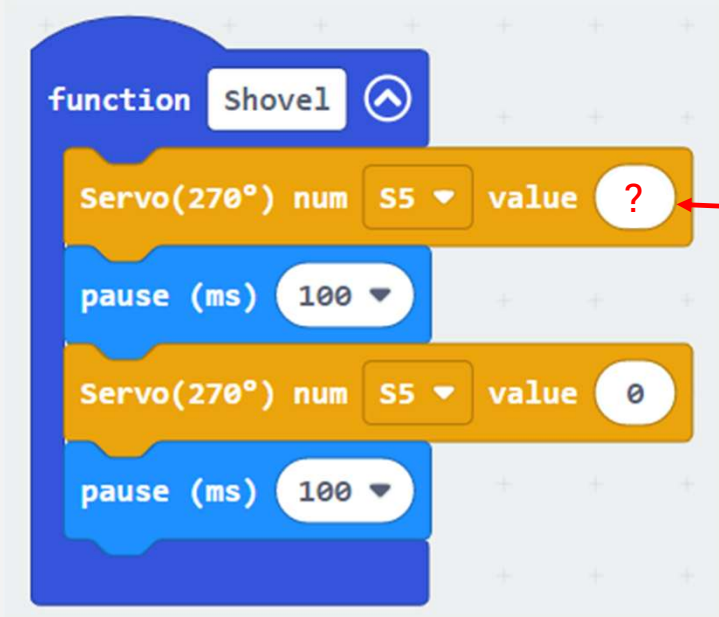
```
function stop  
  Servo(360°) num S1 pos forward value 0  
  Servo(360°) num S2 pos forward value 0
```

**You can use your last lesson's program.

**We just need to add the actions for received signals from the remote controller.

Let's program for the remaining functions.

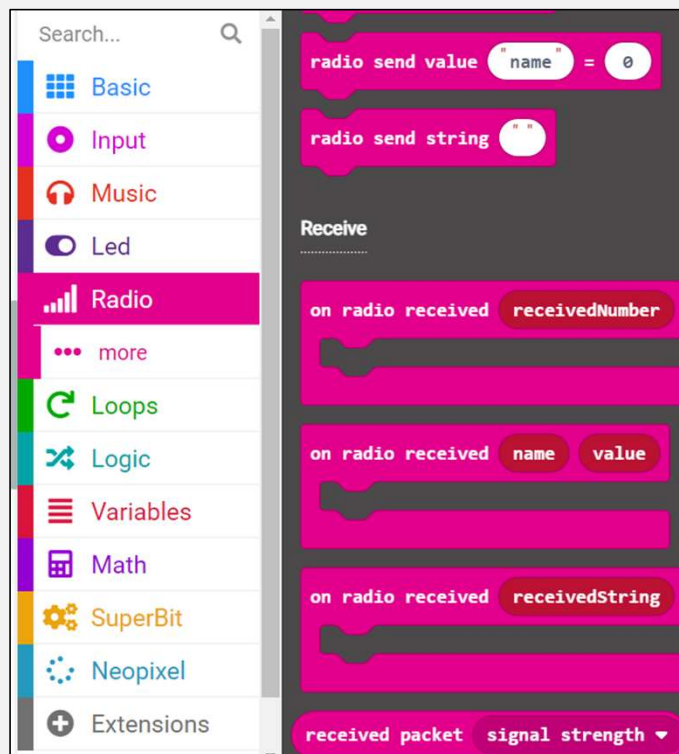
Make a Function – Shovel



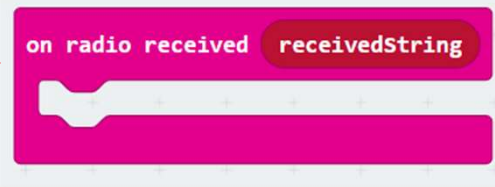
To make the shovel function, test your 270° servo with different value to make it shovel.

But you must make sure your servo is calibrated and not be overturned.

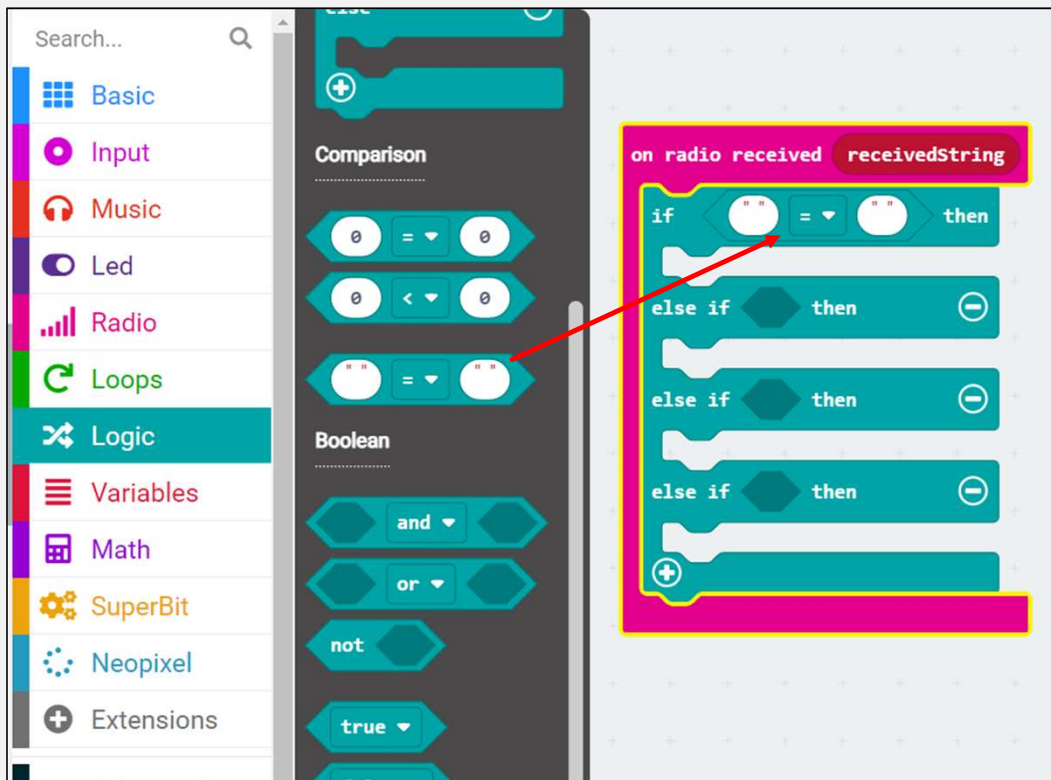
Code your Proficient Carrier's actions



Let's take the block "on radio received **receivedString**" for the actions when received the signals from other microbit.



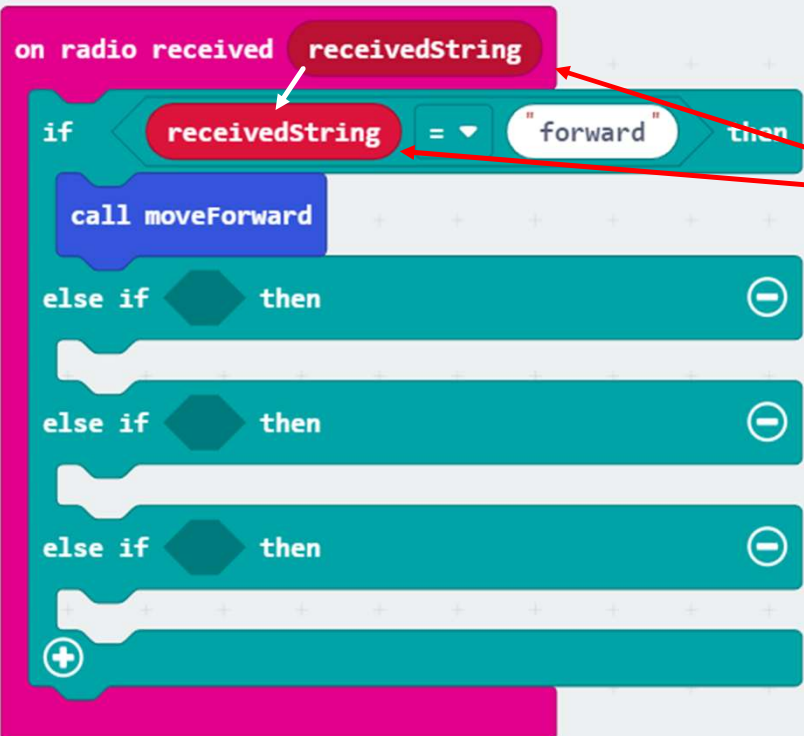
Code your Proficient Carrier's actions



Since we got 4 possible strings received from our controller, we need to set 4 **conditions** inside.

As now we are comparing the string, not the number, make sure your comparison operator is using the **string comparison** with the quotation mark ("").

Code your Proficient Carrier's actions



```
on radio received receivedString
if receivedString = "forward" then
  call moveForward
else if then
else if then
else if then
+
```

The image shows a Scratch code block for a radio receiver. The block is titled 'on radio received' and contains a variable 'receivedString'. Below this, there is an 'if' block with the condition 'receivedString = "forward"'. If this condition is true, the code block contains a 'call moveForward' block. Below the 'if' block, there are three 'else if' blocks, each with a 'then' clause and a minus sign in a circle, indicating they are currently empty. At the bottom of the code block, there is a plus sign in a circle, indicating that more code can be added.

We will need to check what string is received and set if the string received is **“forward”**, then we want to call the **moveForward** function.

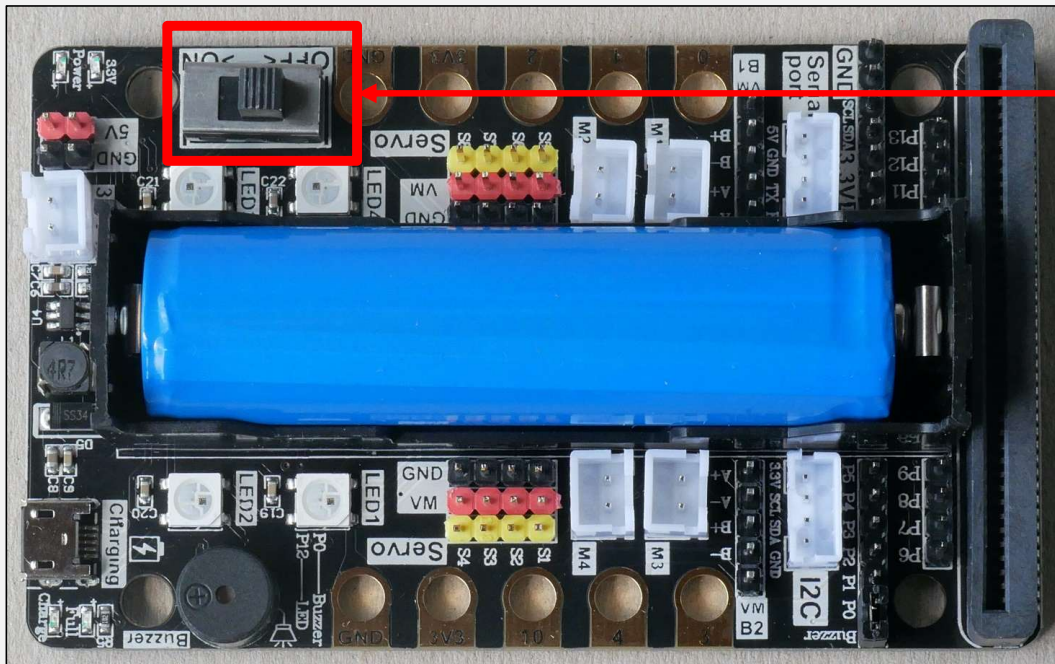
Code your Proficient Carrier's actions

```
on radio received receivedString
  if receivedString = "forward" then
    call moveForward
  else if receivedString = "right" then
    call turnRight
  else if receivedString = "left" then
    call turnLeft
  else if receivedString = "stop" then
    call stop
```

Complete the actions for remaining functions.

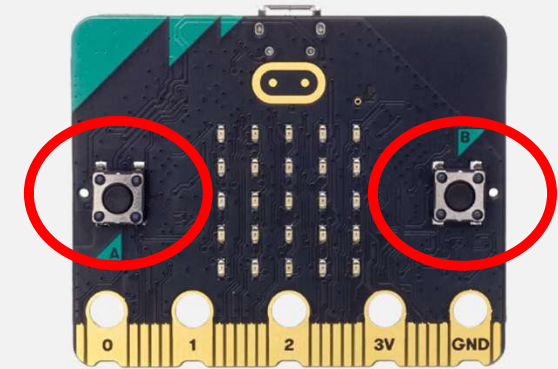
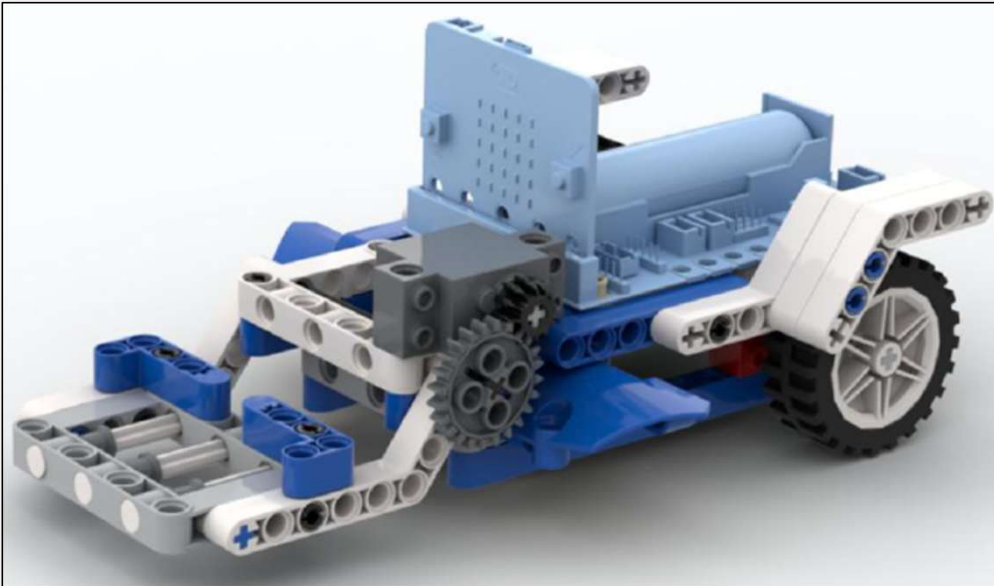
Please make sure the strings must be totally same (case sensitive) from the strings that you program with your remote controller.

MakeCode Programming



After the program is downloaded, turn on the SuperBit with the power switch to turn on your Proficient Carrier.

Phenomenon



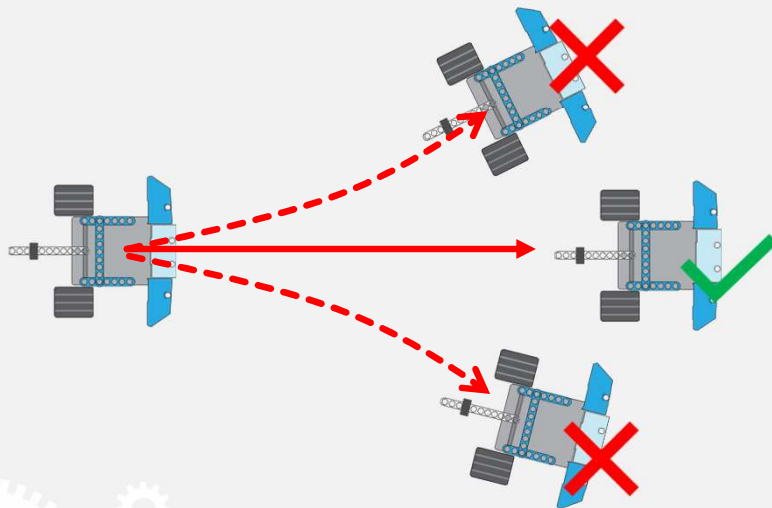
Connect your remote controller to your laptop to power on and try to interact with the button A & button B, then observe what happen to your Proficient Carrier. You now should be able to control your Proficient Carrier with forward, left and right.

30 Points

CHALLENGE

for : Lesson 4

L4 – Challenge 1

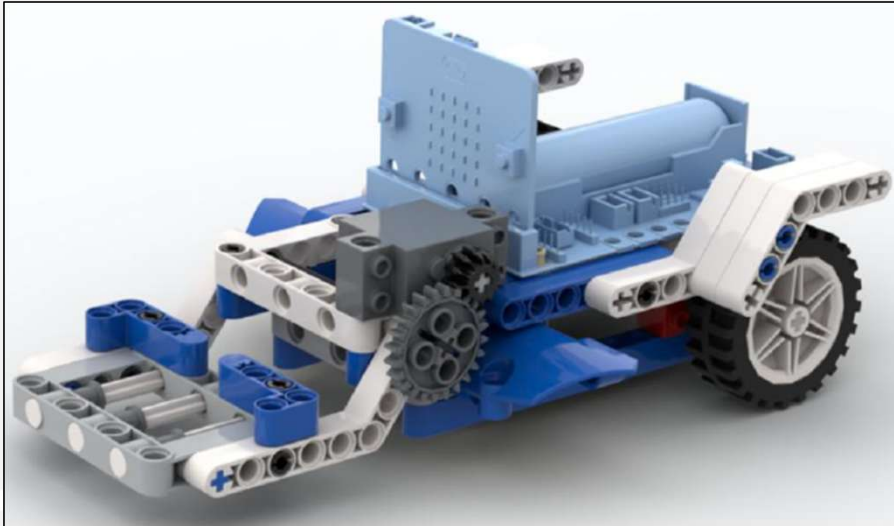


Program your Proficient Carrier to have full movement functions:

1. Move Forward (Tune it to be straight)
2. Turn Right
3. Turn Left
4. Move Backward (Tune it to be straight)

30 Points

L4 – Challenge 2



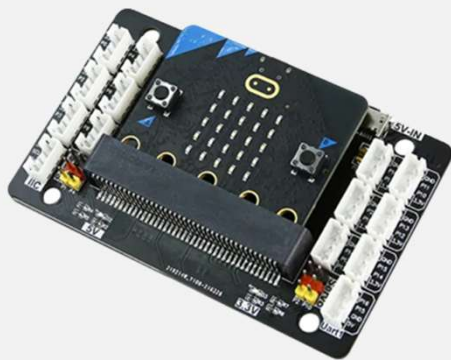
Add the shovelling function for your proficient carrier.

You may need to adjust your robot shovel and calibrate your servo motor before you start coding.

**Go to your input coding blocks and see what are the inputs can be used as a trigger.

30 Points

L4 – Mission



Can you use WOM modules as a controller and add in button as for grab function, and the rocker module as the movement control for the proficient carrier?



50 Points