Microbit Robotics Beginner Level 1

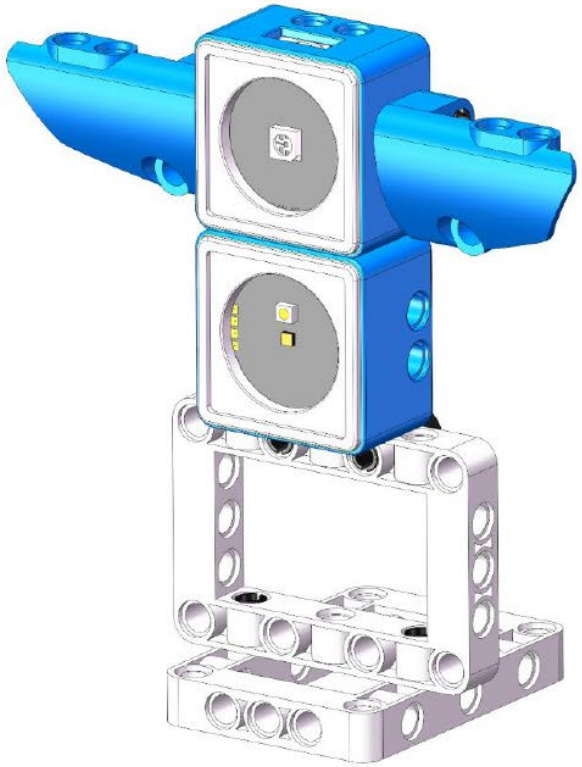
Lesson 9

Smart Wiper

Presented by Advanced Superlogic Team

Review previous lesson

Color Recognition Model



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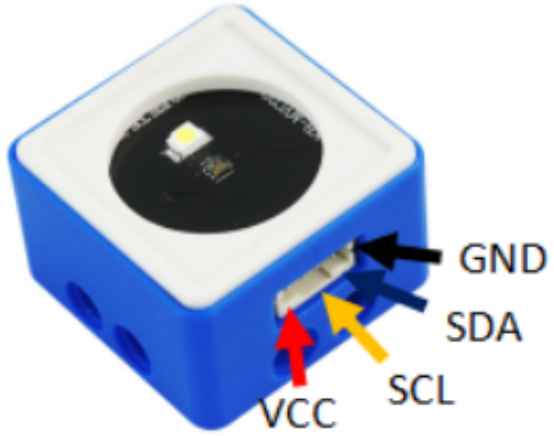
Connect the modules

Let's connect the module like this.

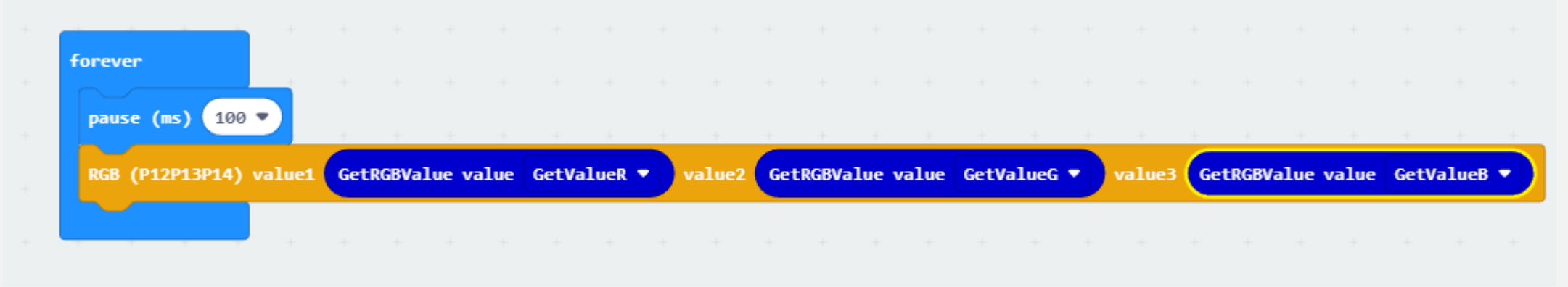
Introducing the Color Recognition Module



GND: connect GND	VCC: connect 3.3V, 5V
SDA: I2C Data transmission port	SCL: I2C sequential transmission port
Working Voltage: 3.3V/5V	Size of module: 29.4mm*28.8mm

Color recognition sensor, also known as color sensor, is a sensor that detects the color by comparing the color of the object with the reference color that has been set previously. When the two colors match within a certain error range, it outputs the detection result. The detection result is output through I2C communication.

Coding – Combine Bocks



Thermometer and Humidity

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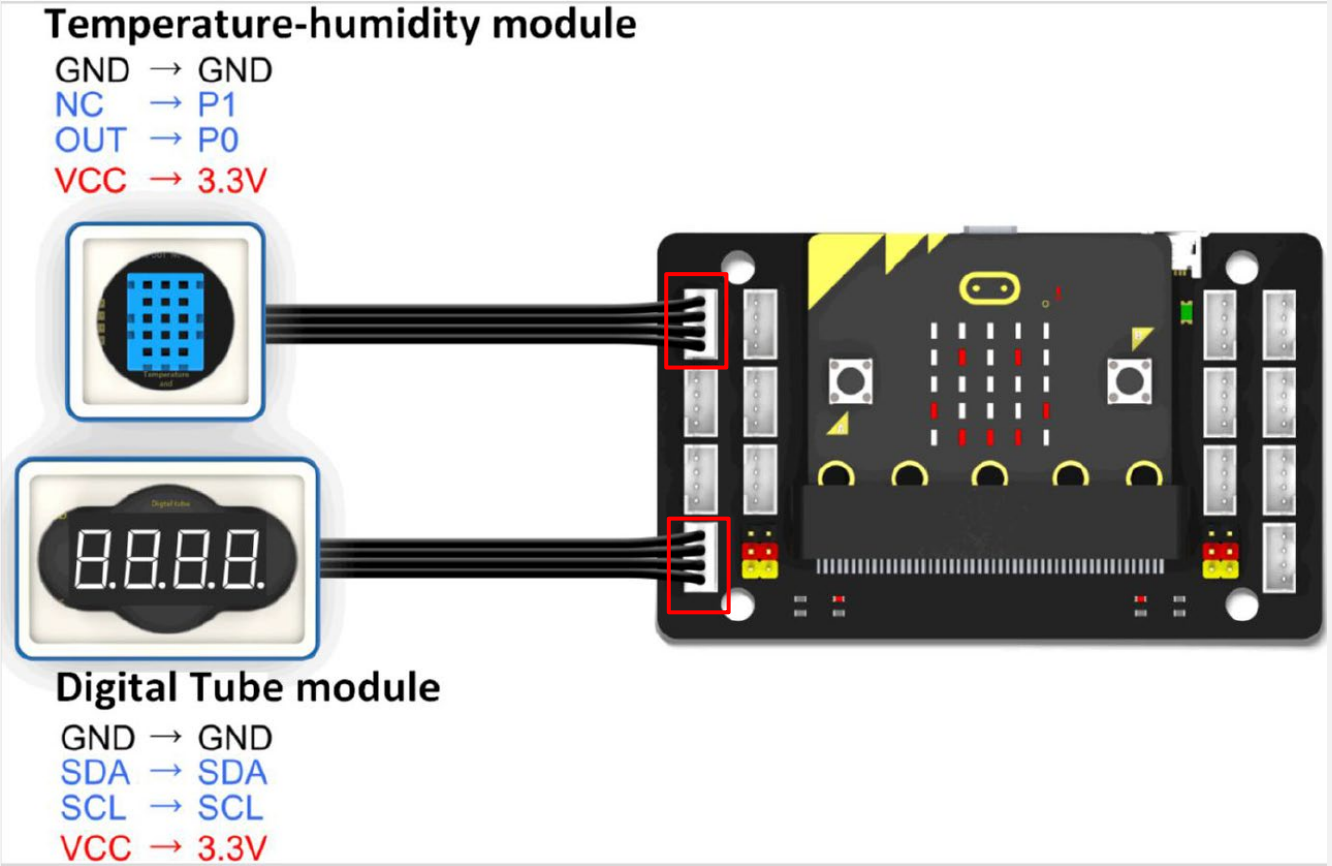
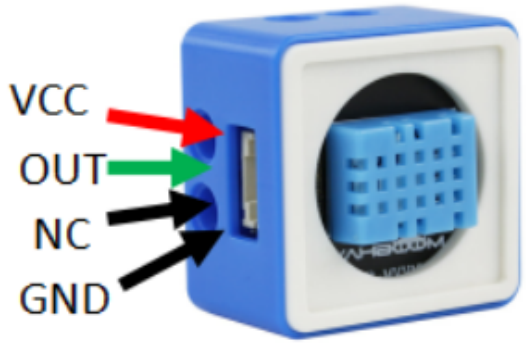
Connect the modules



Let's connect the module like this.

Introducing the Humidity and Temperature module

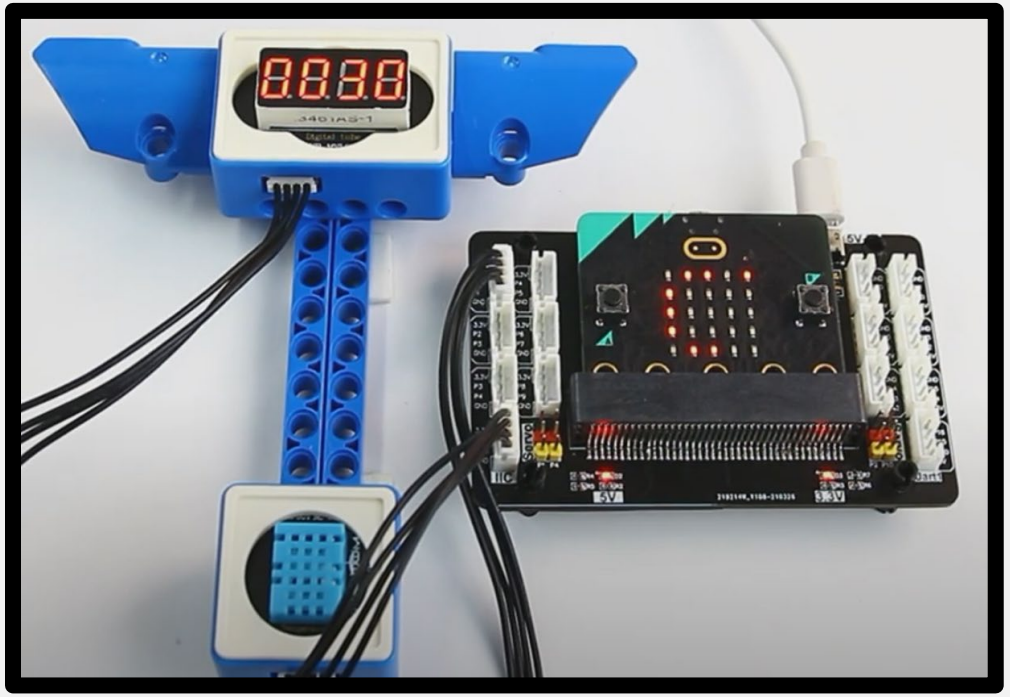


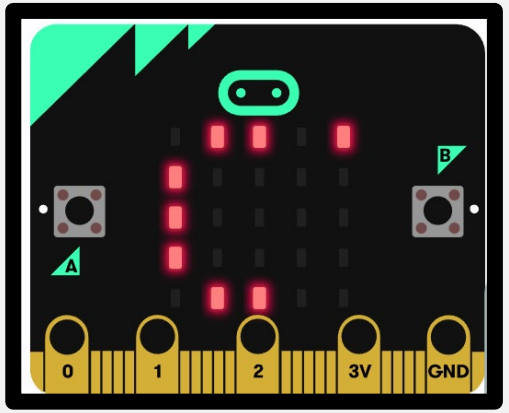
GND: connect gnd	OUT: Single bus digital signal output	+: Connect 3.3V, 5V
Range	Humidity: 20-90%RH	Temperature: 0~50℃
Accuracy	Humidity: ±5%RH	Temperature: ±2℃
Resolution	Humidity: 1%RH	Temperature: 1℃

DHT11 is a temperature and humidity sensor. Its accuracy range, humidity: + -5% RH, temperature: + -2 ℃. Measuring range, humidity: 20-90% RH, temperature: 0 ~ 50 ℃.

Phenomenon

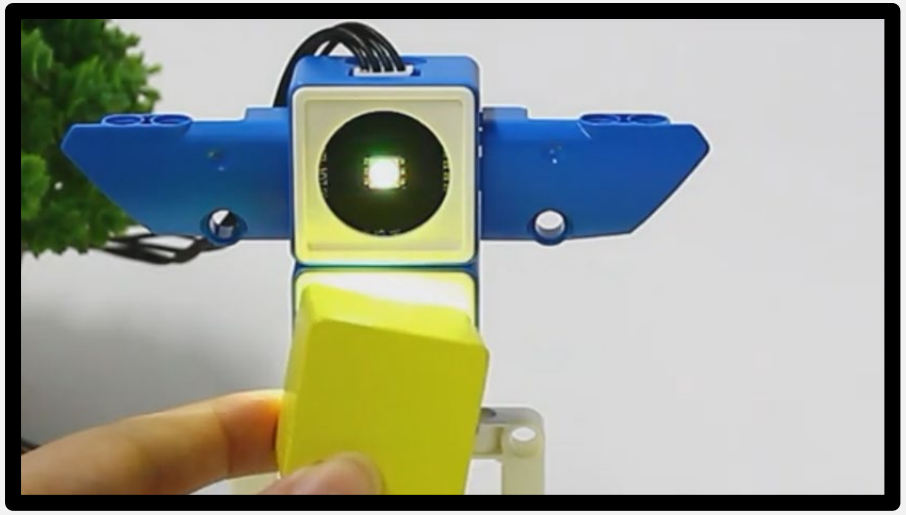
After the program is downloaded successfully. The temperature and humidity of the current environment will be displayed on the digital tube module.

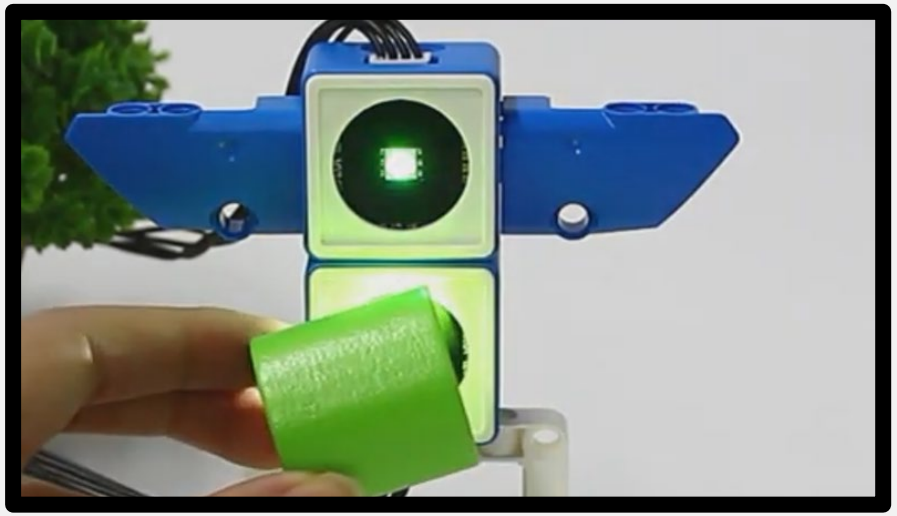




Phenomenon

After the program is downloaded successfully. When the color sensor recognizes different colors, the RGB lights display the corresponding colors.



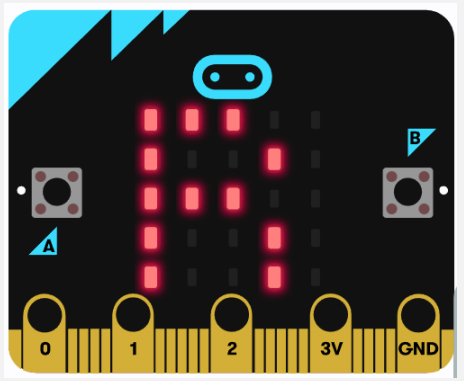


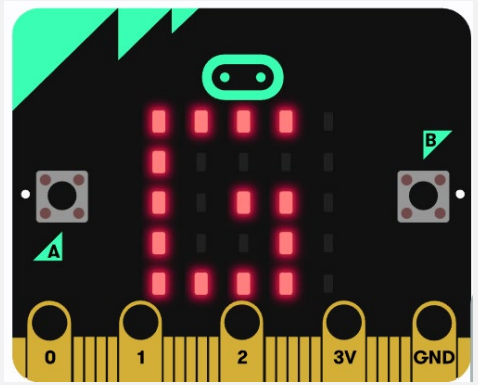
L8 – Challenge

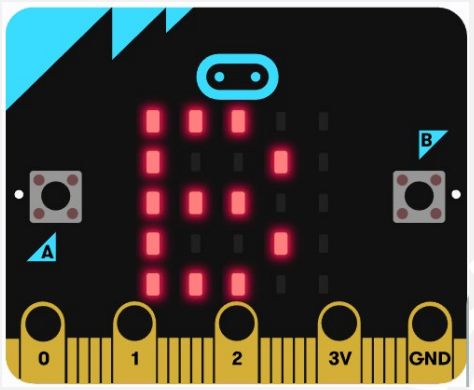
After the program is downloaded successfully. When the color sensor recognizes different colors, the RGB lights display the corresponding colors.

Condition:

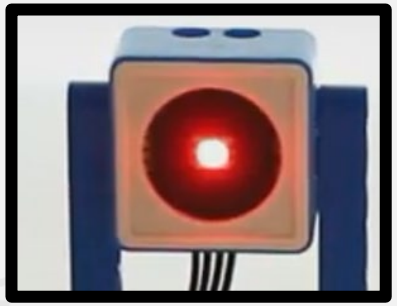
1. **When RGB display Red, LED show "R"**
2. **When RGB display Green, LED show "G"**
3. **When RGB display Blue, LED show "B"**







L8 – Challenge level 2



Using 3 modules Color recognition, Button, and RGB:

<u>Chameleon Lamp:</u>
Make a torch light that can sense and changes to the corresponding color. The use of a button serves as an on/off switch.

Today's Topic

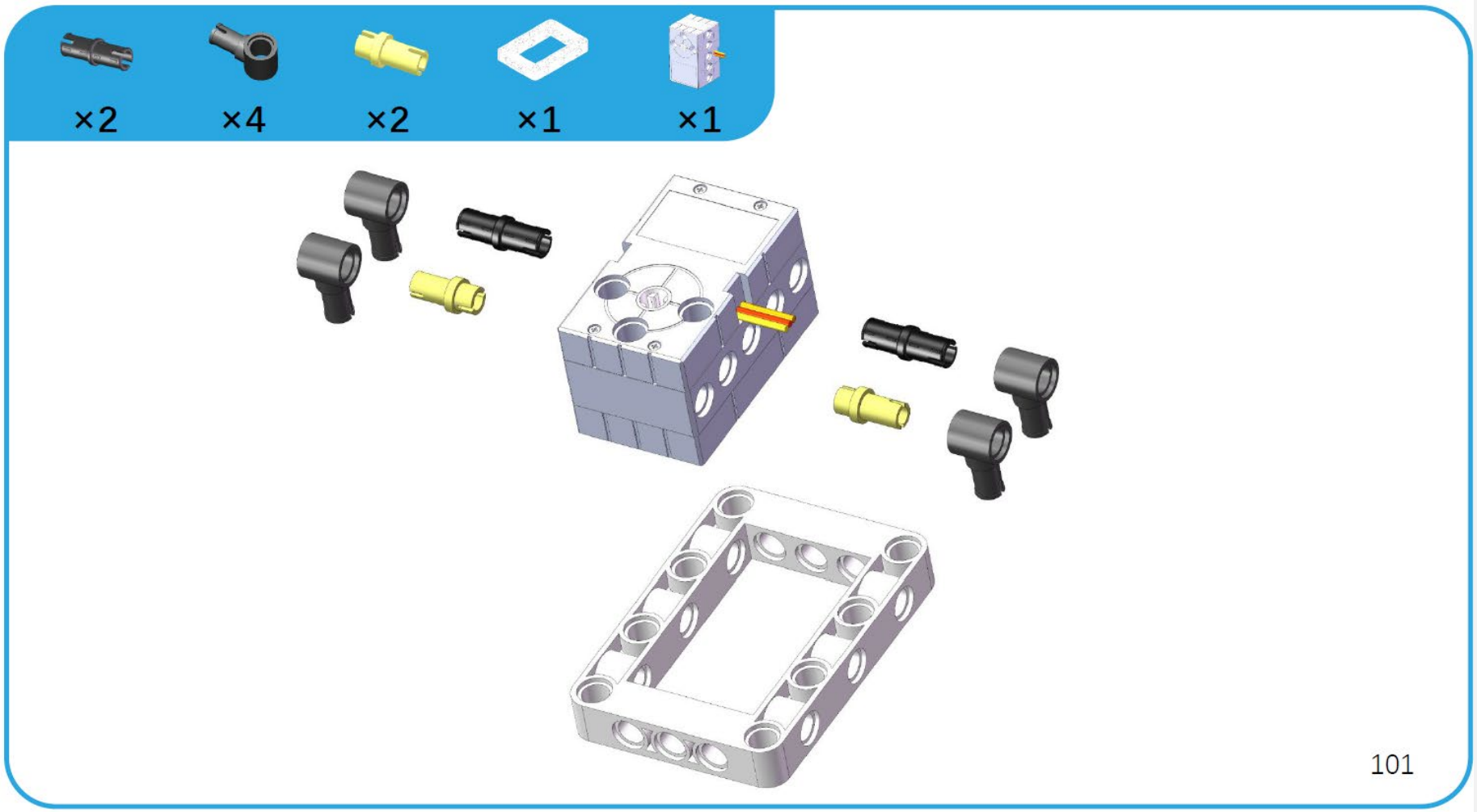
1. Build a smart wiper with World of Modules
2. Button, Rocker module and servo connection method
3. Servo Programming
4. Rocker programming

Learning Outcome

1. Able to build a smart wiper with instruction manual
2. Understand how servo programming works
3. Able to program the wiper turning with rocker module

Let’s build a smart wiper

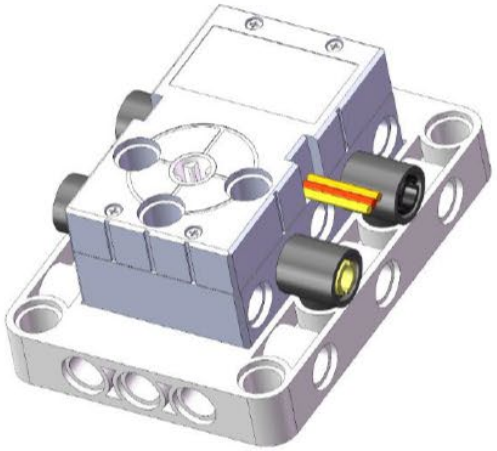
Step 1



Step 2

Step 3

Step 4



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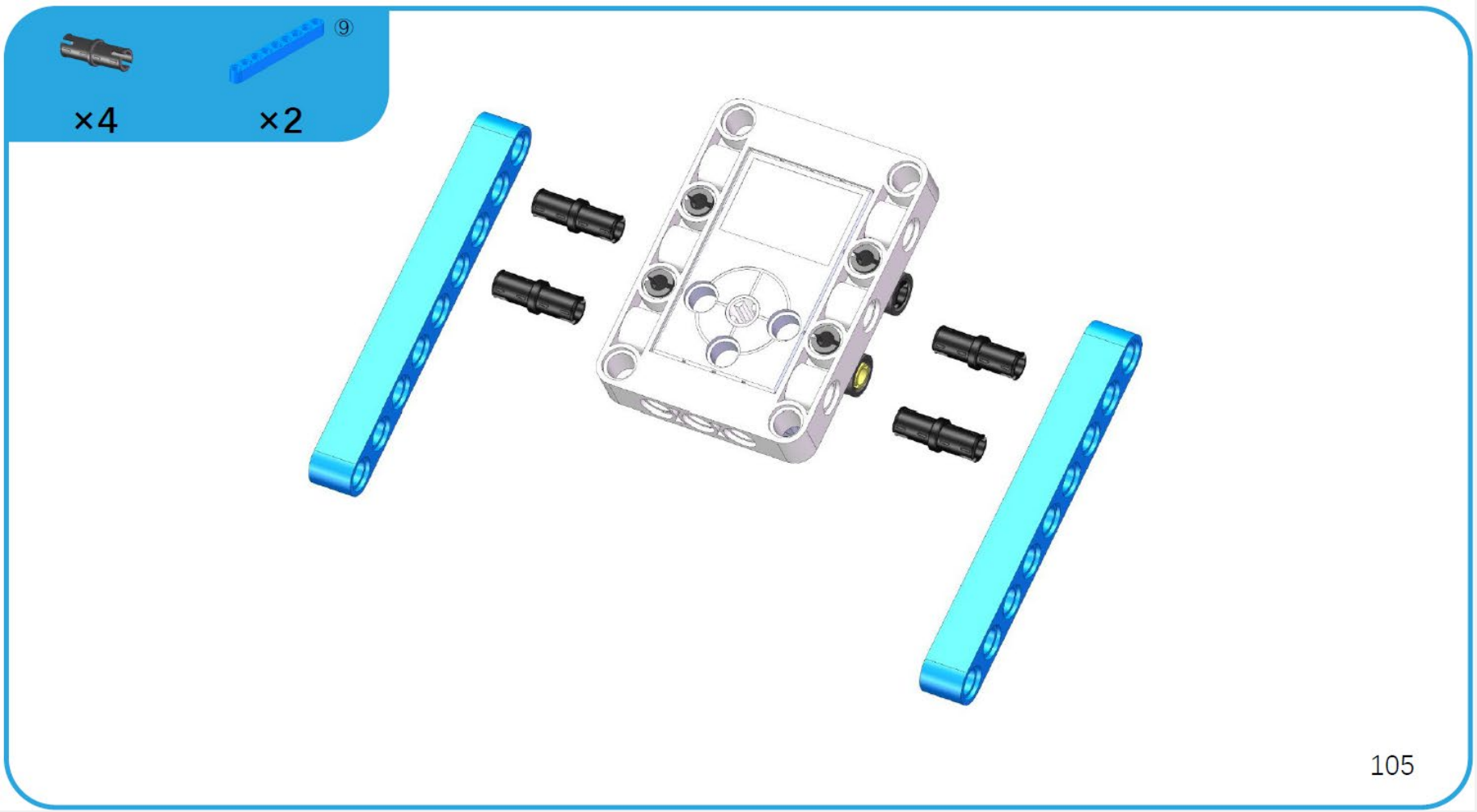
Step 5



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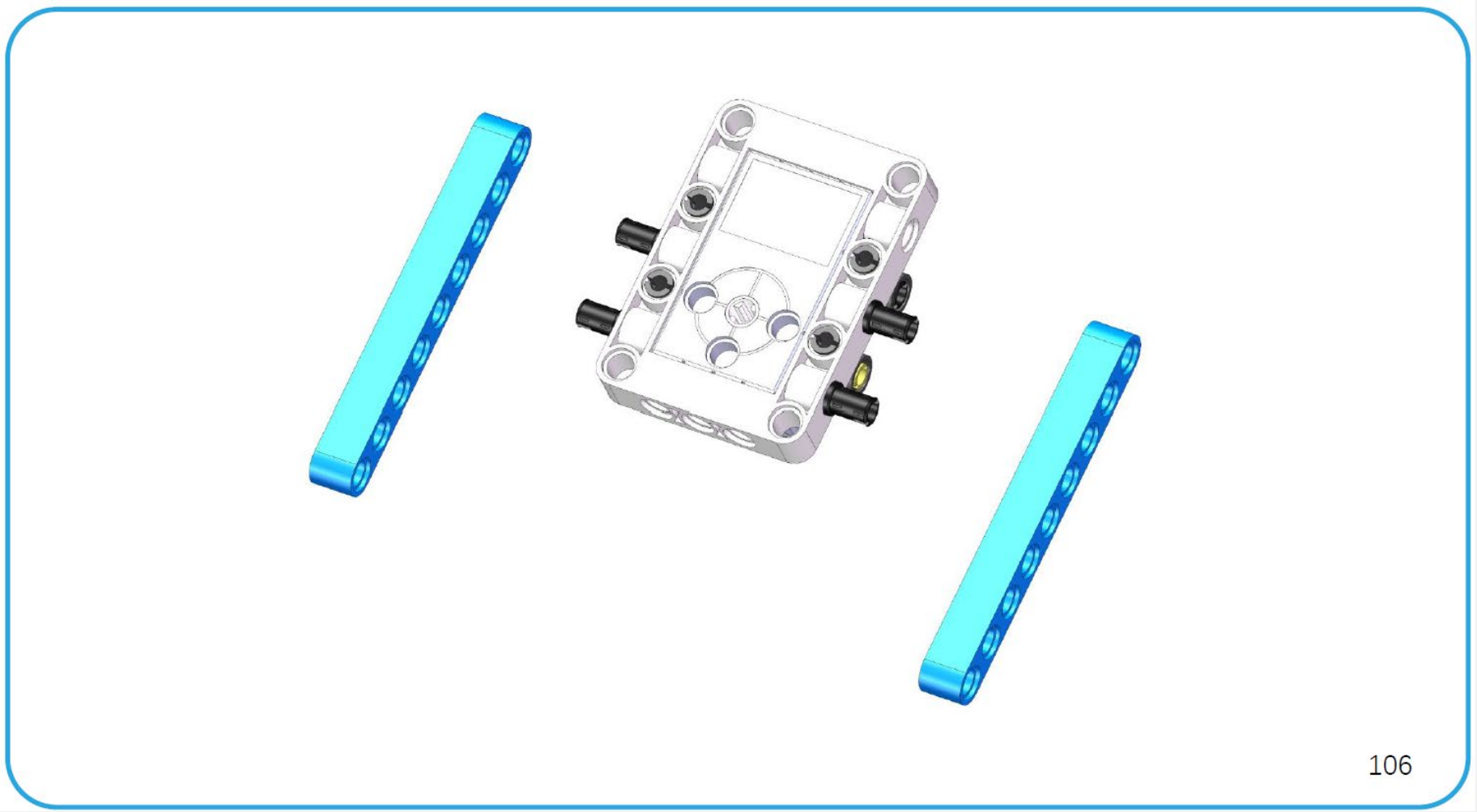

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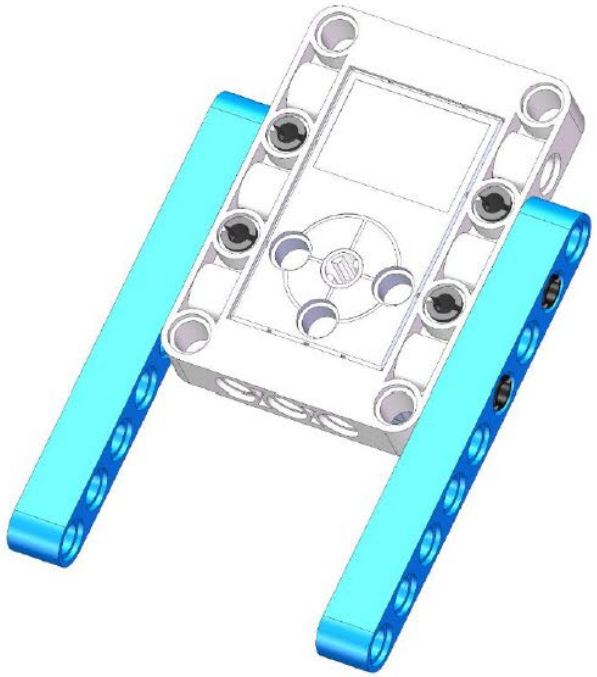

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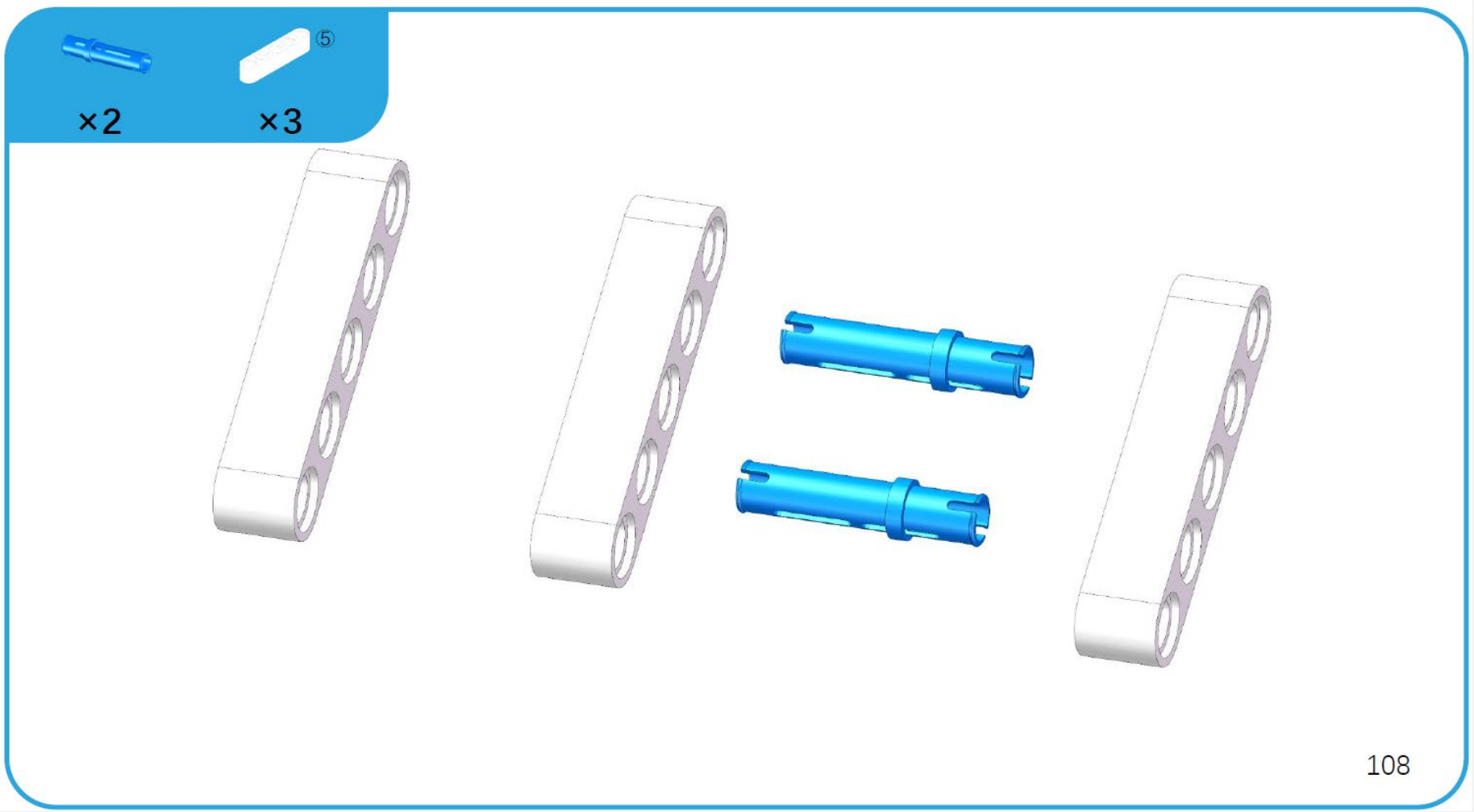
Step 8



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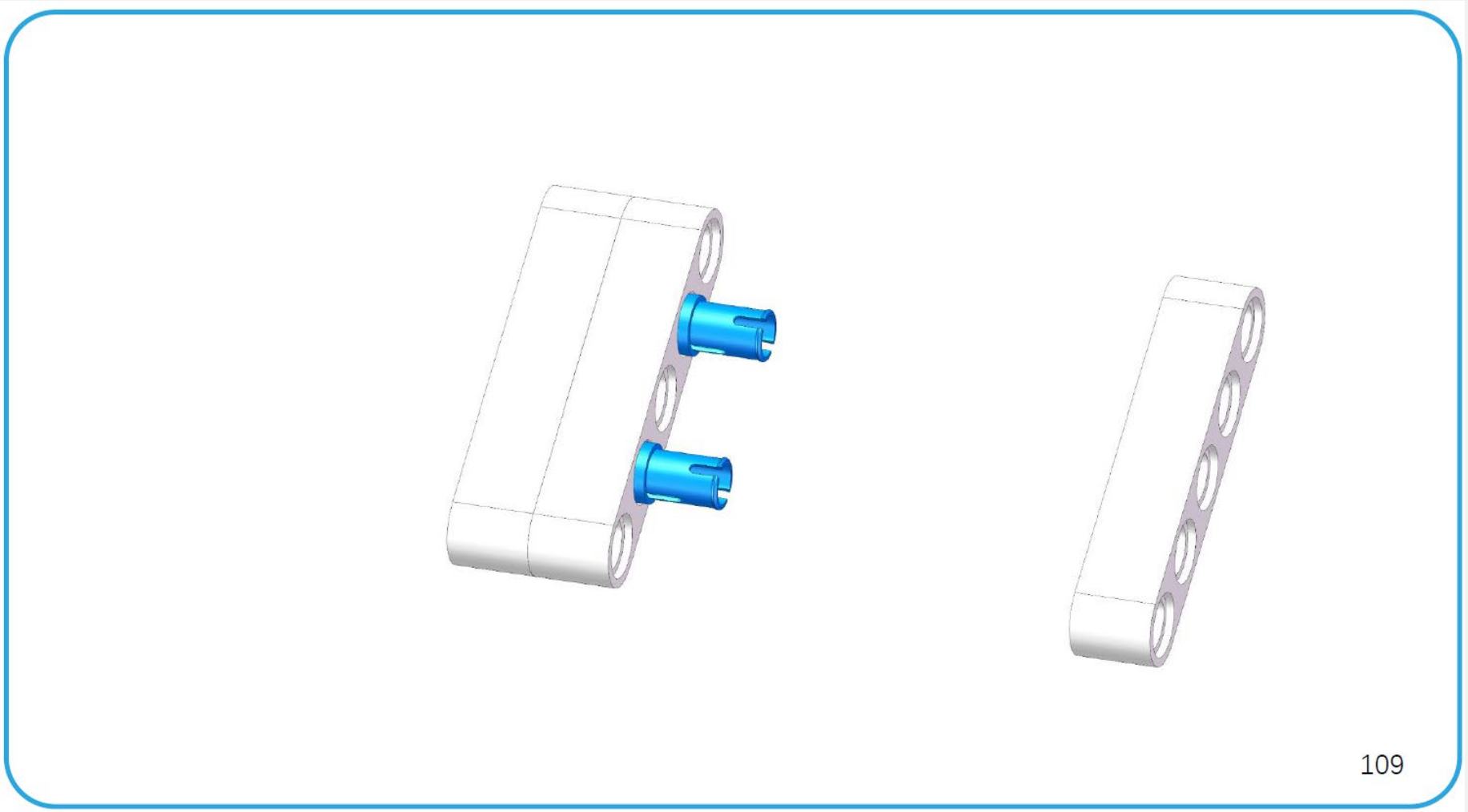

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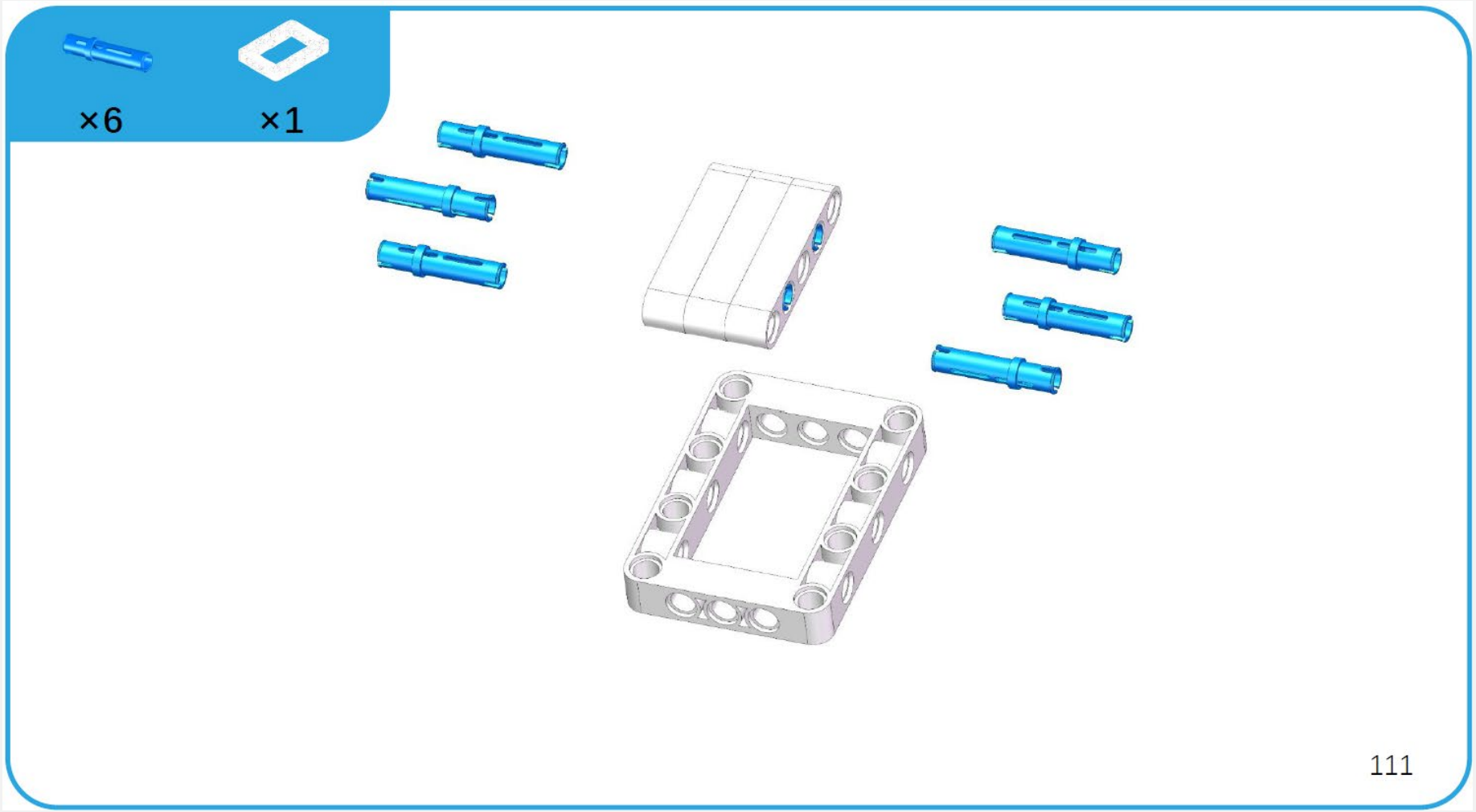

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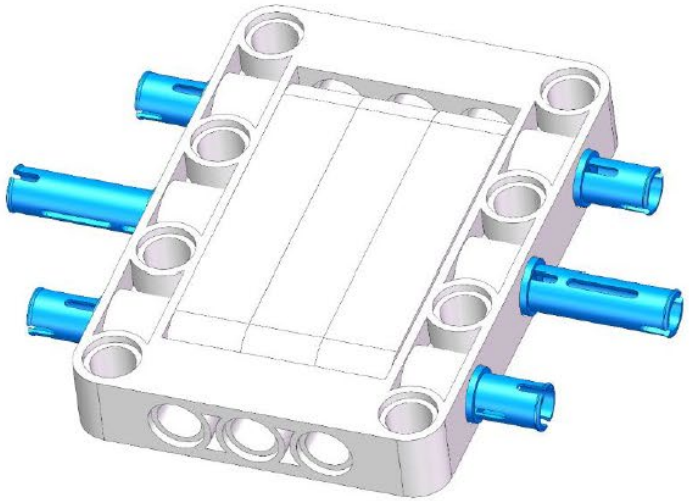

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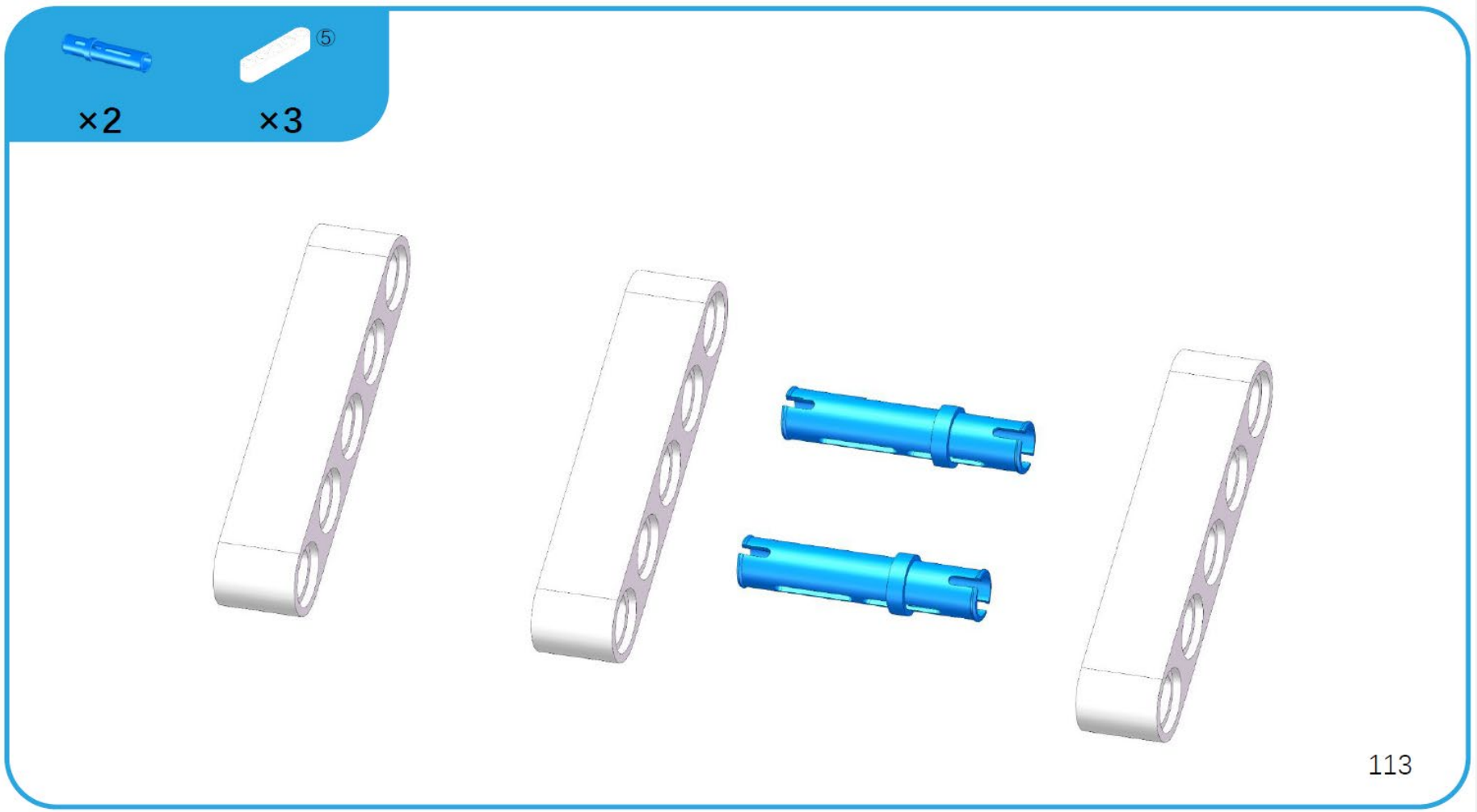

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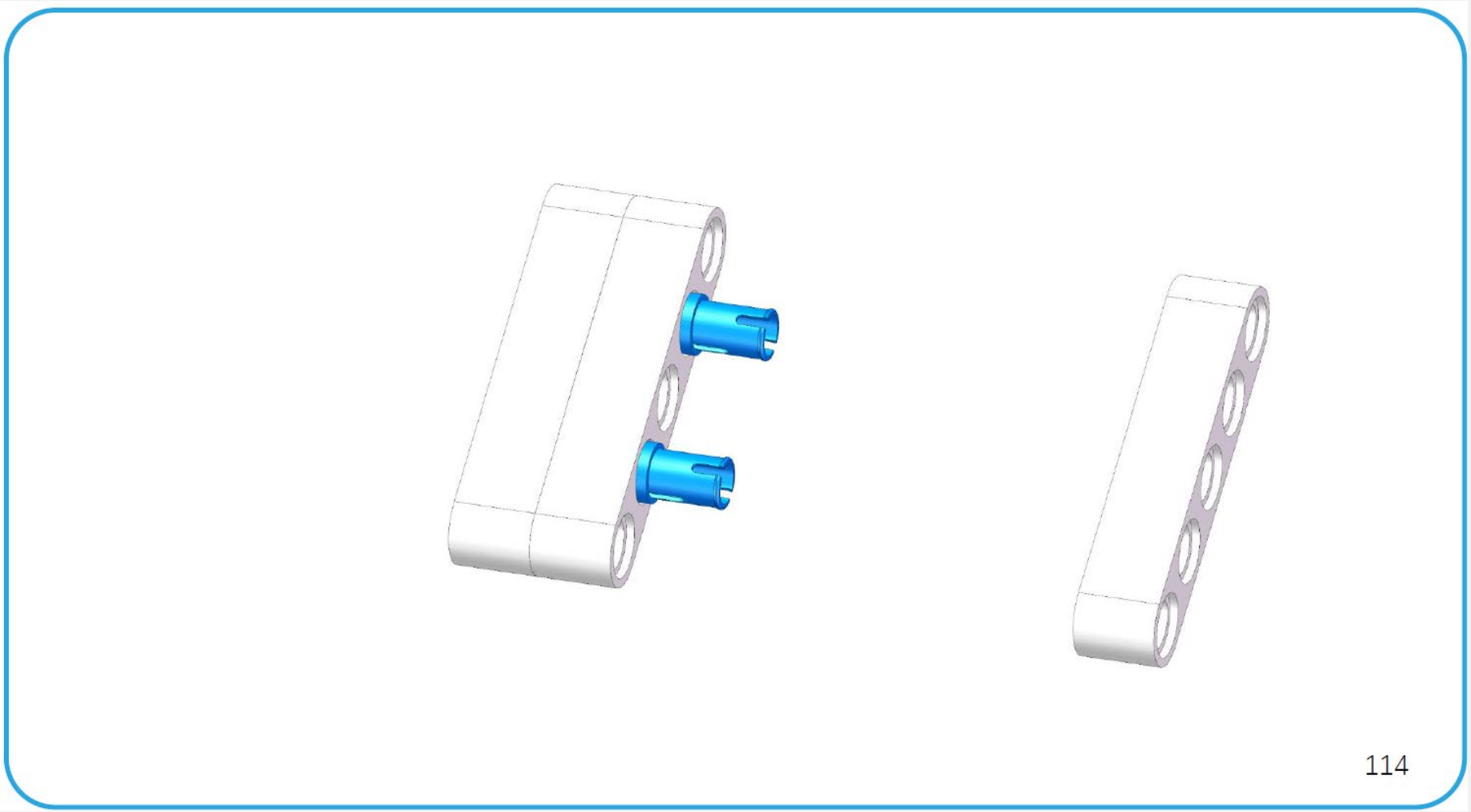

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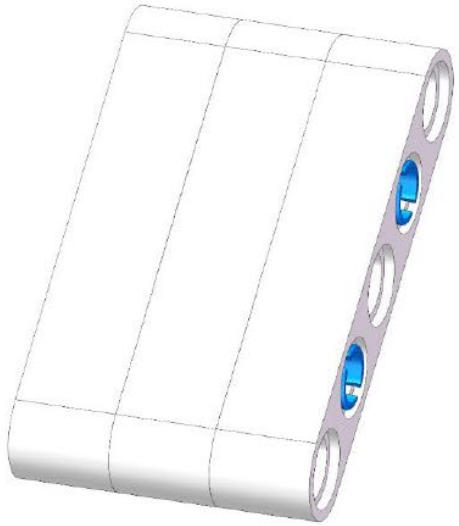

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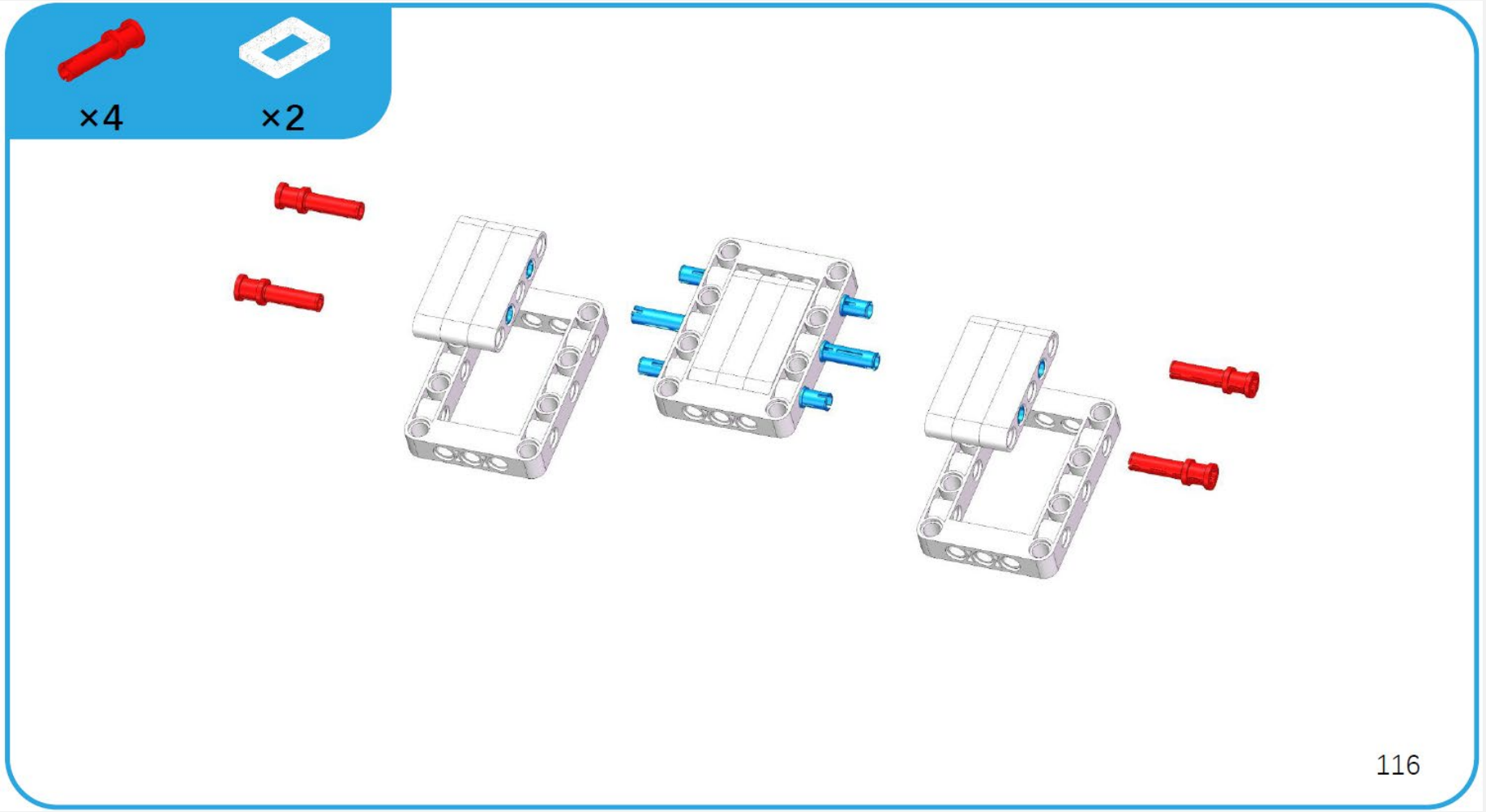

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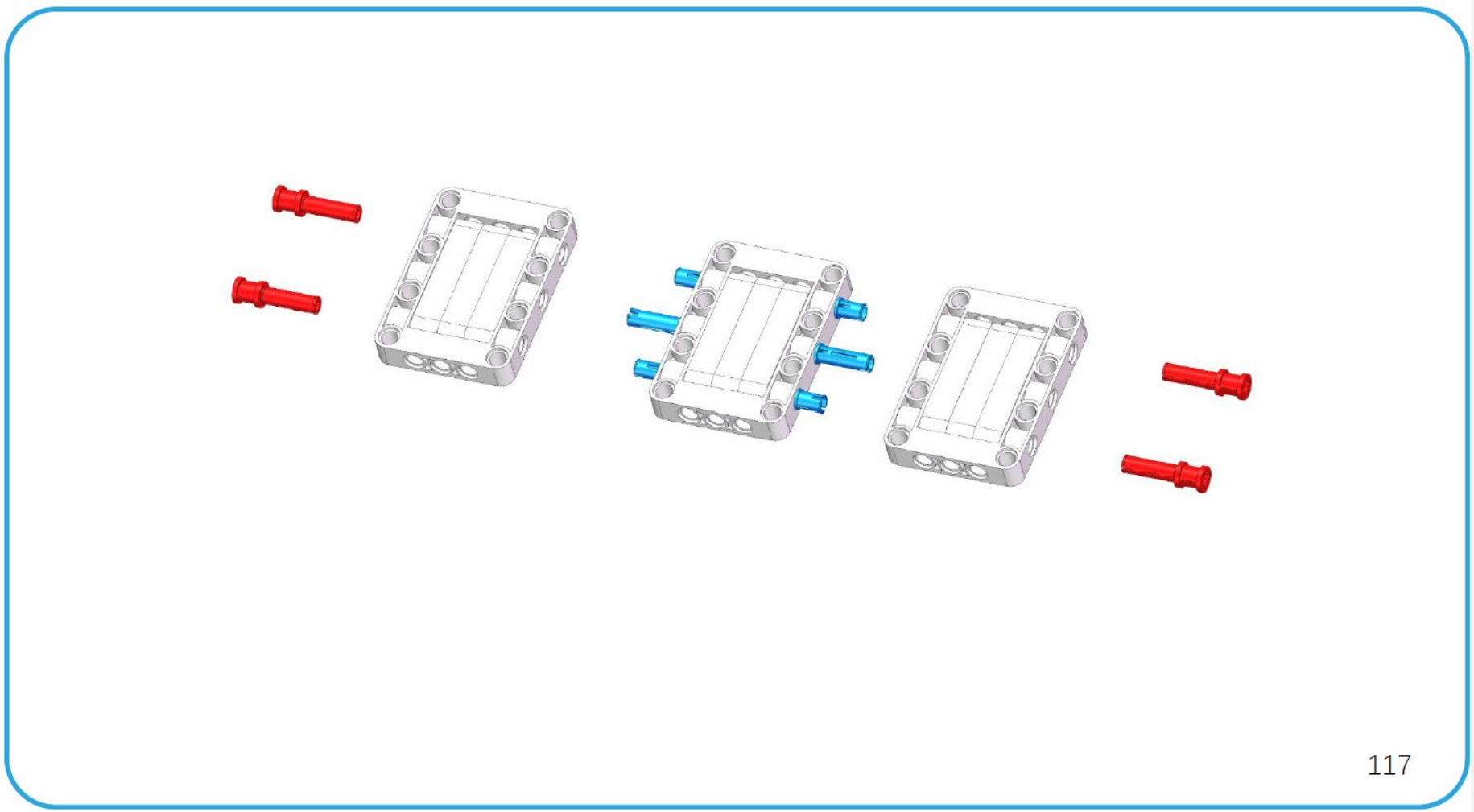

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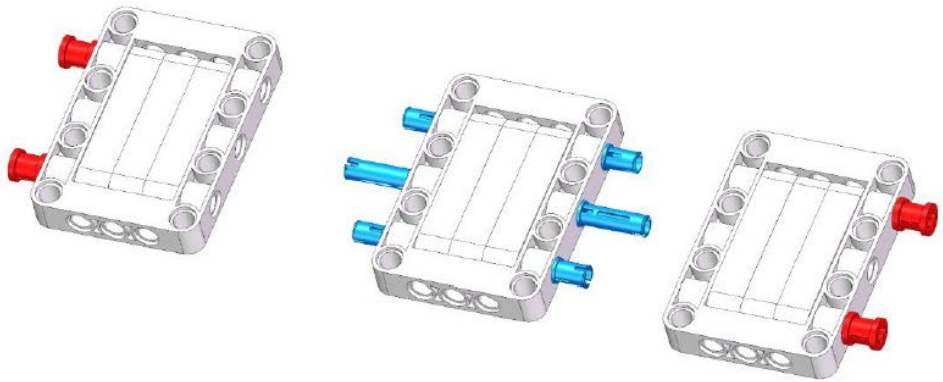

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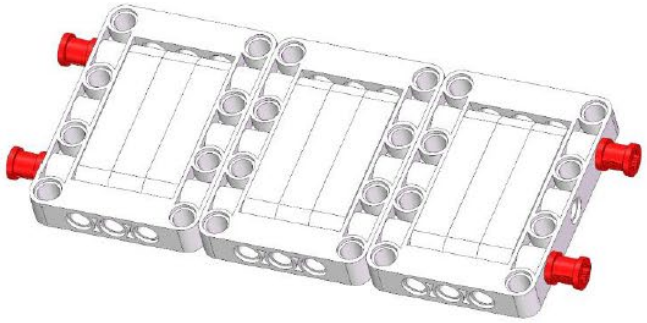

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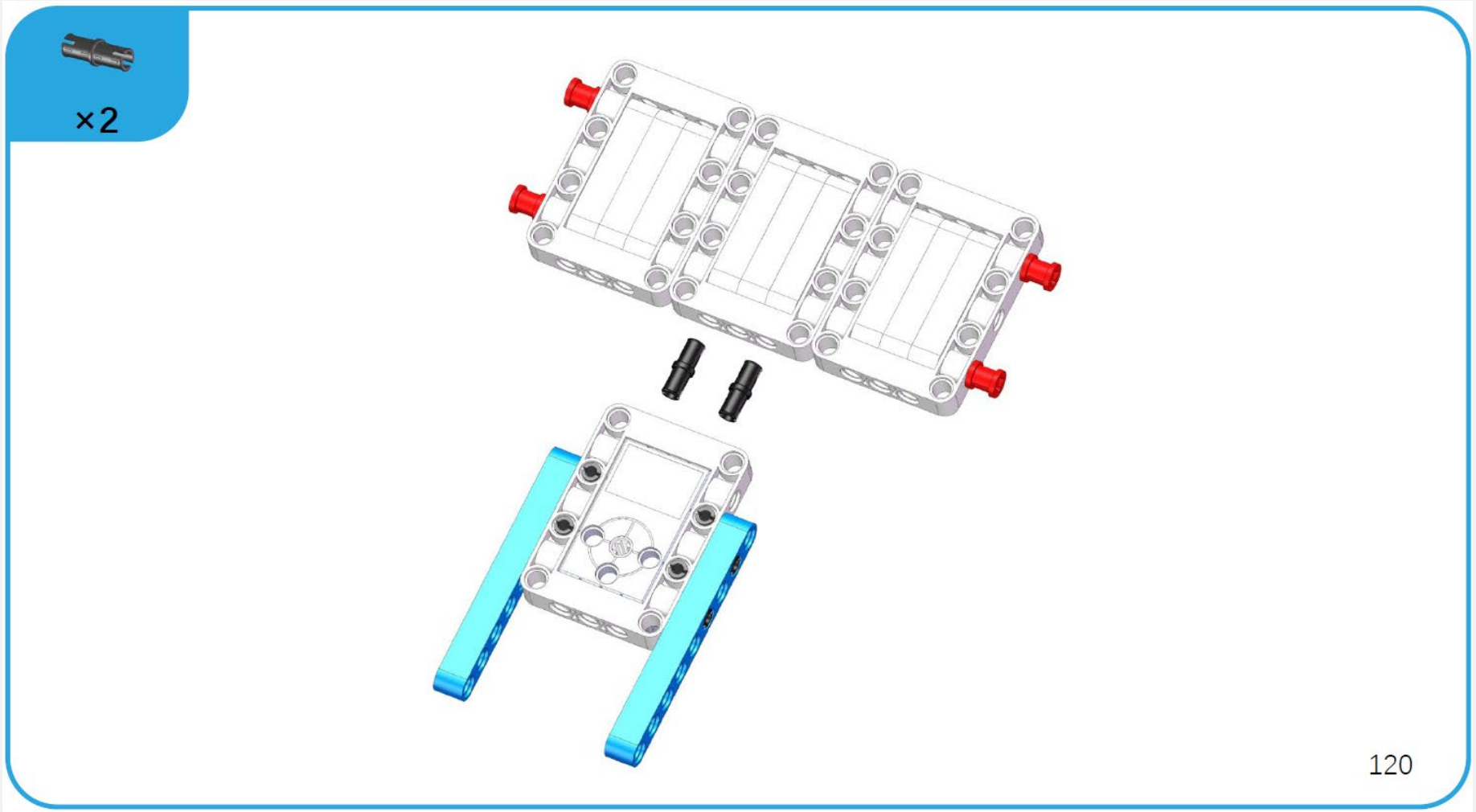

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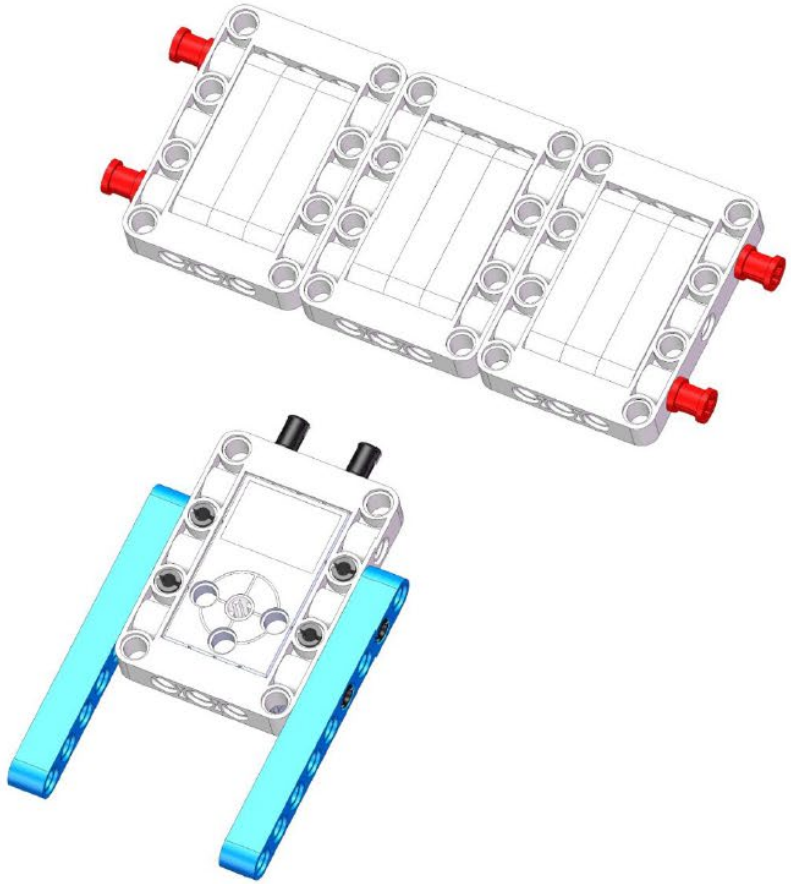

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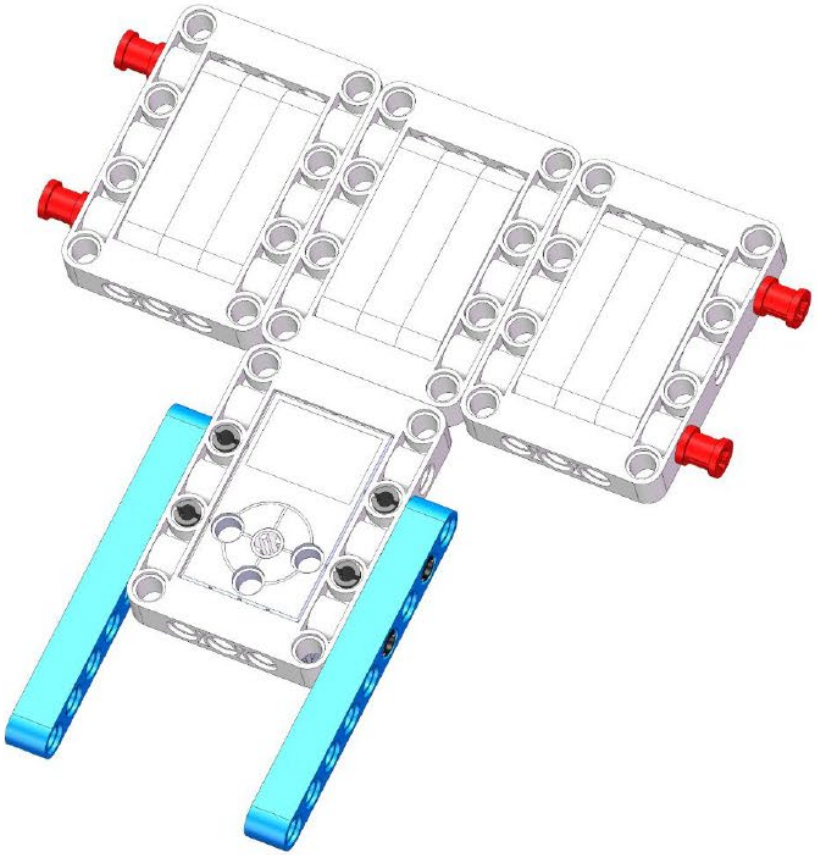

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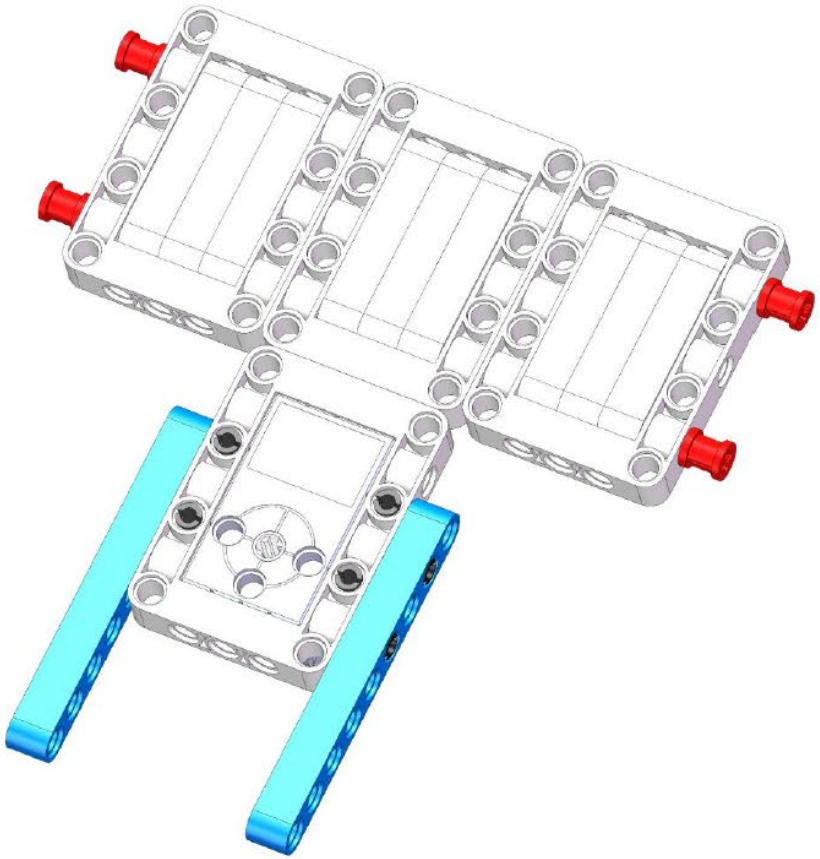
Step 22

Step 23



Step 24

Step 25

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Step 26

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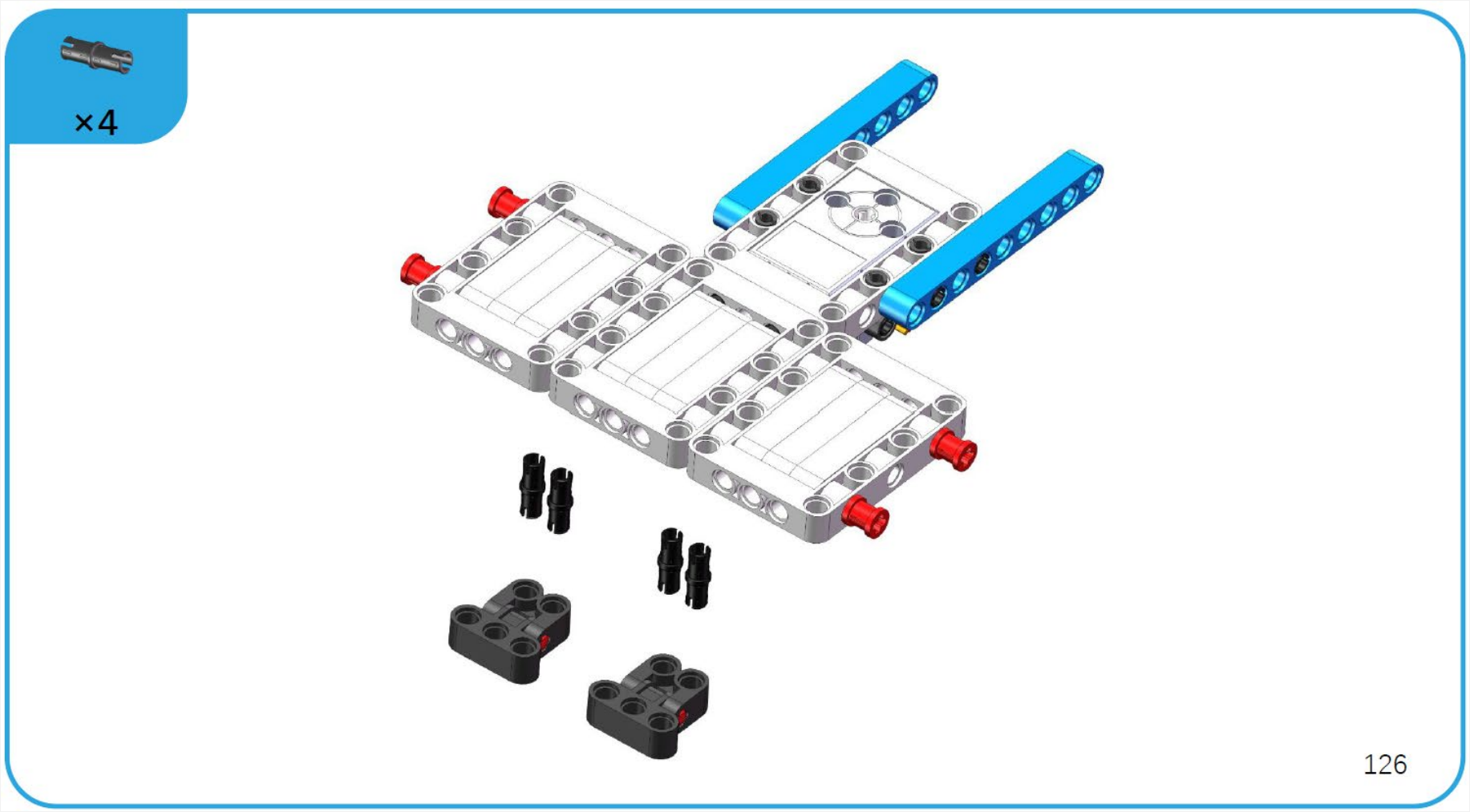
Step 27



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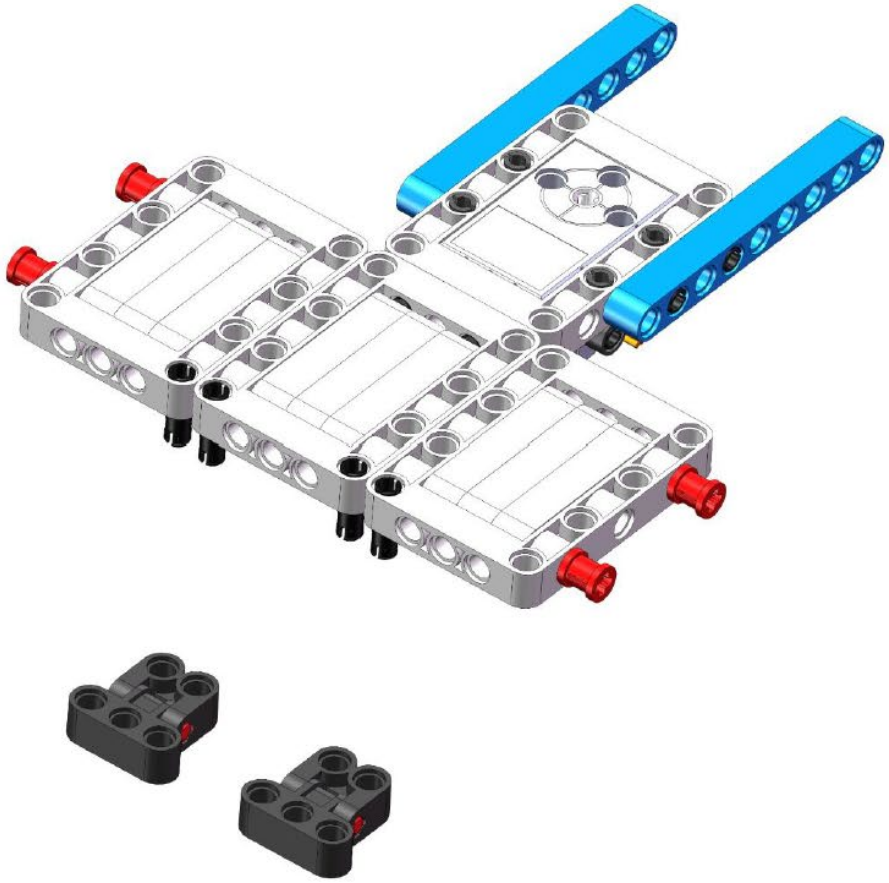

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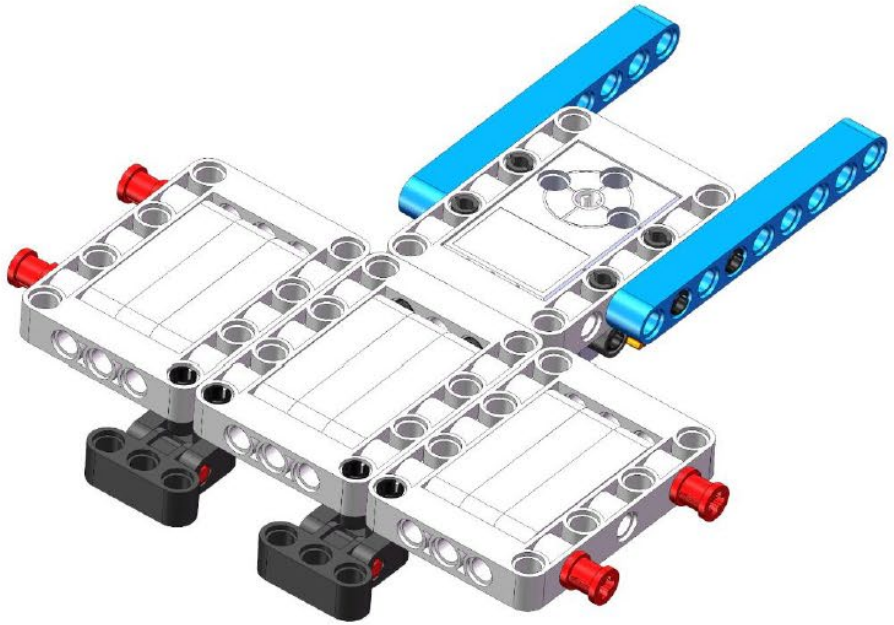

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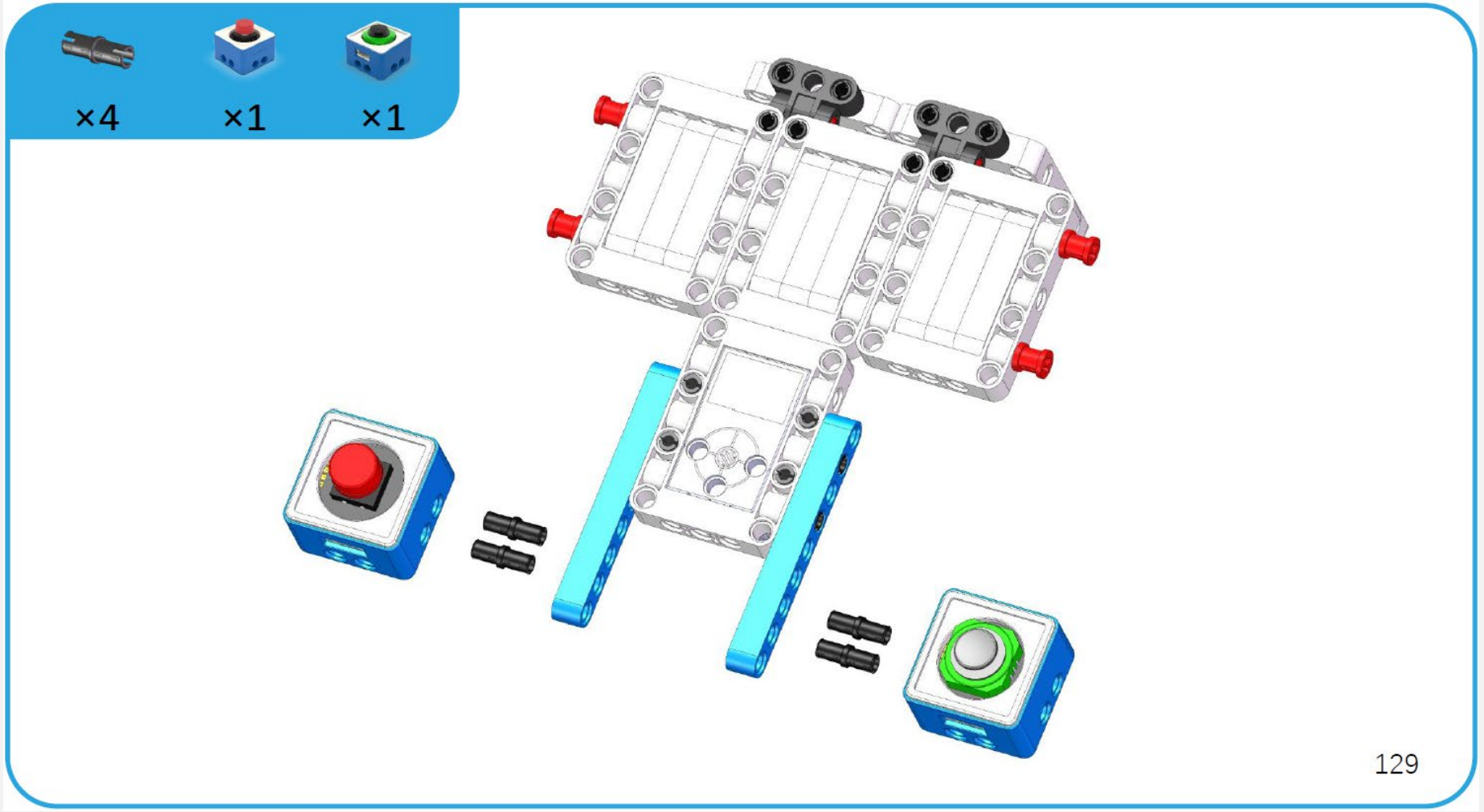

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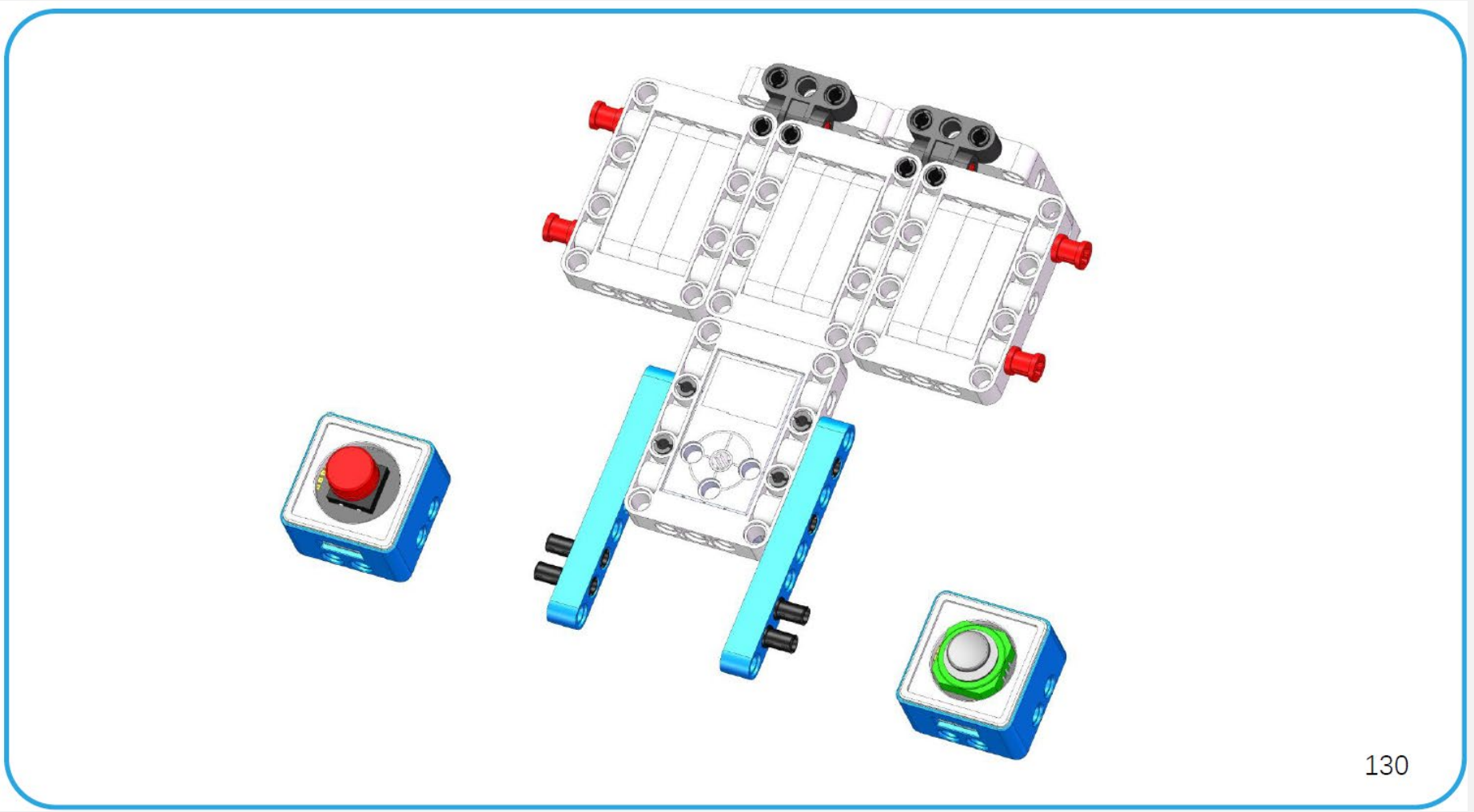

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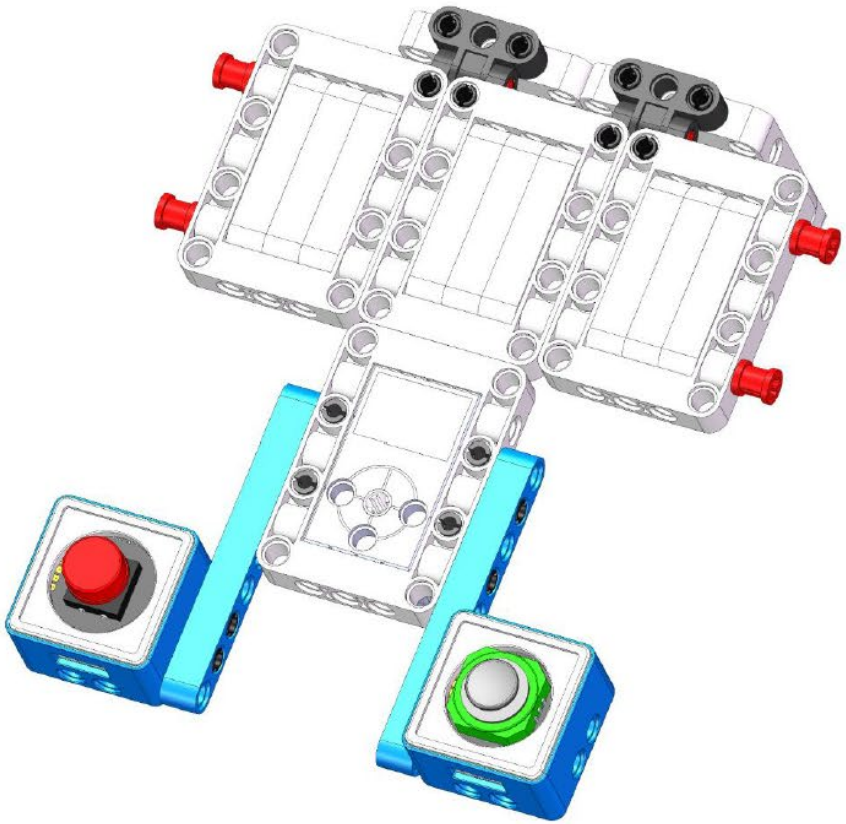

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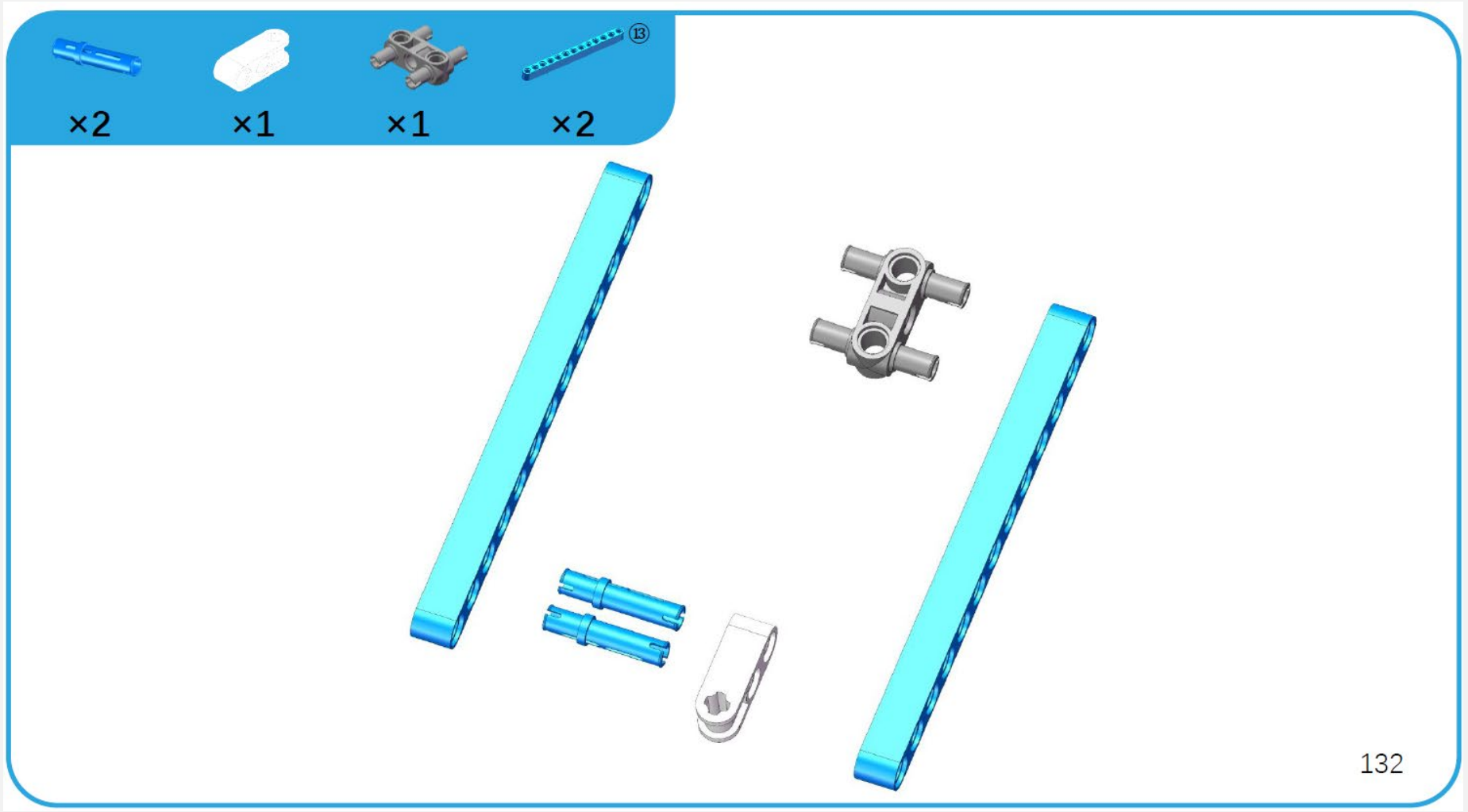

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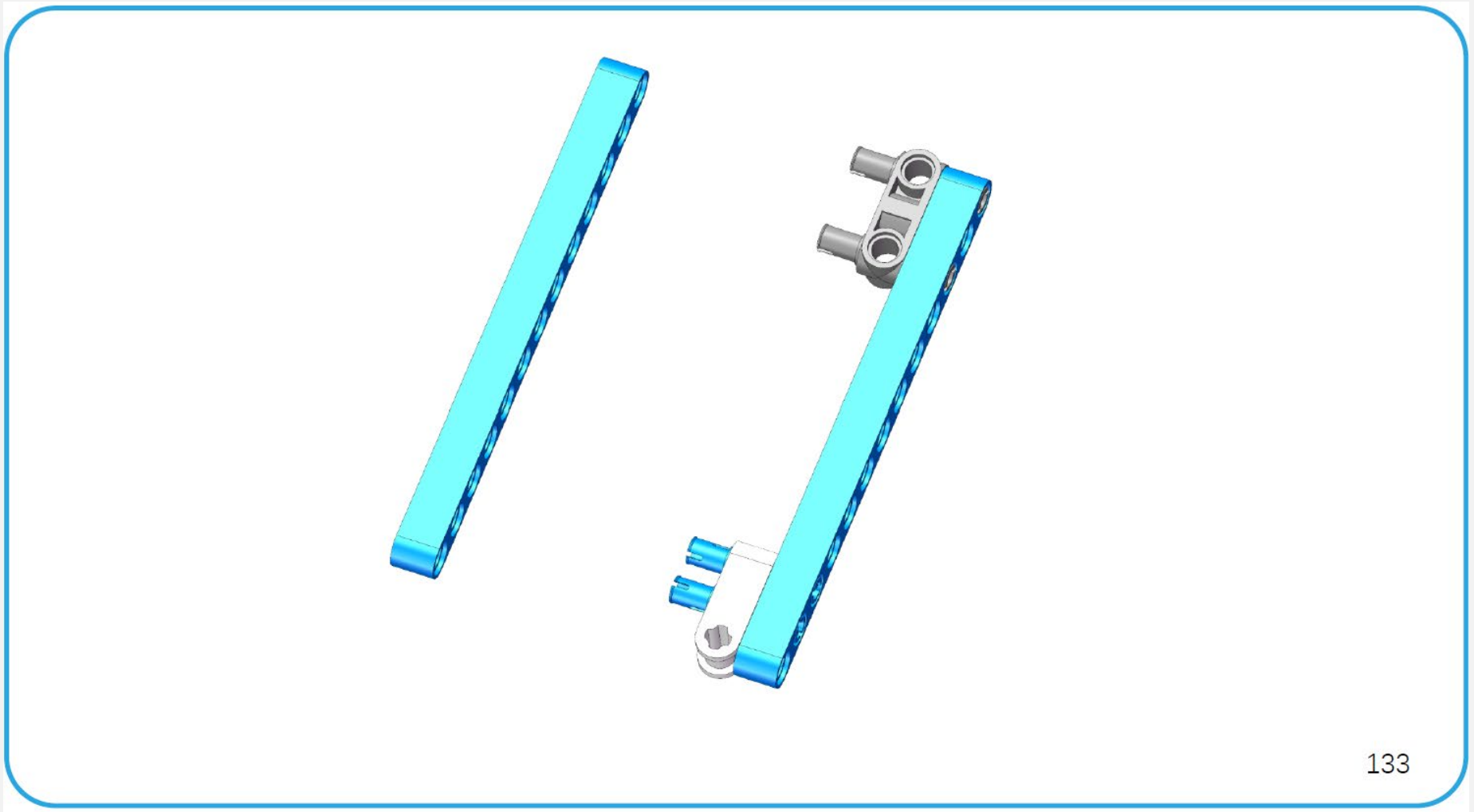

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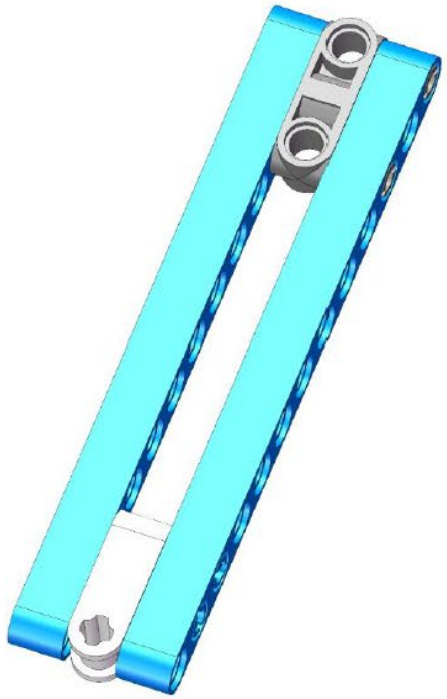

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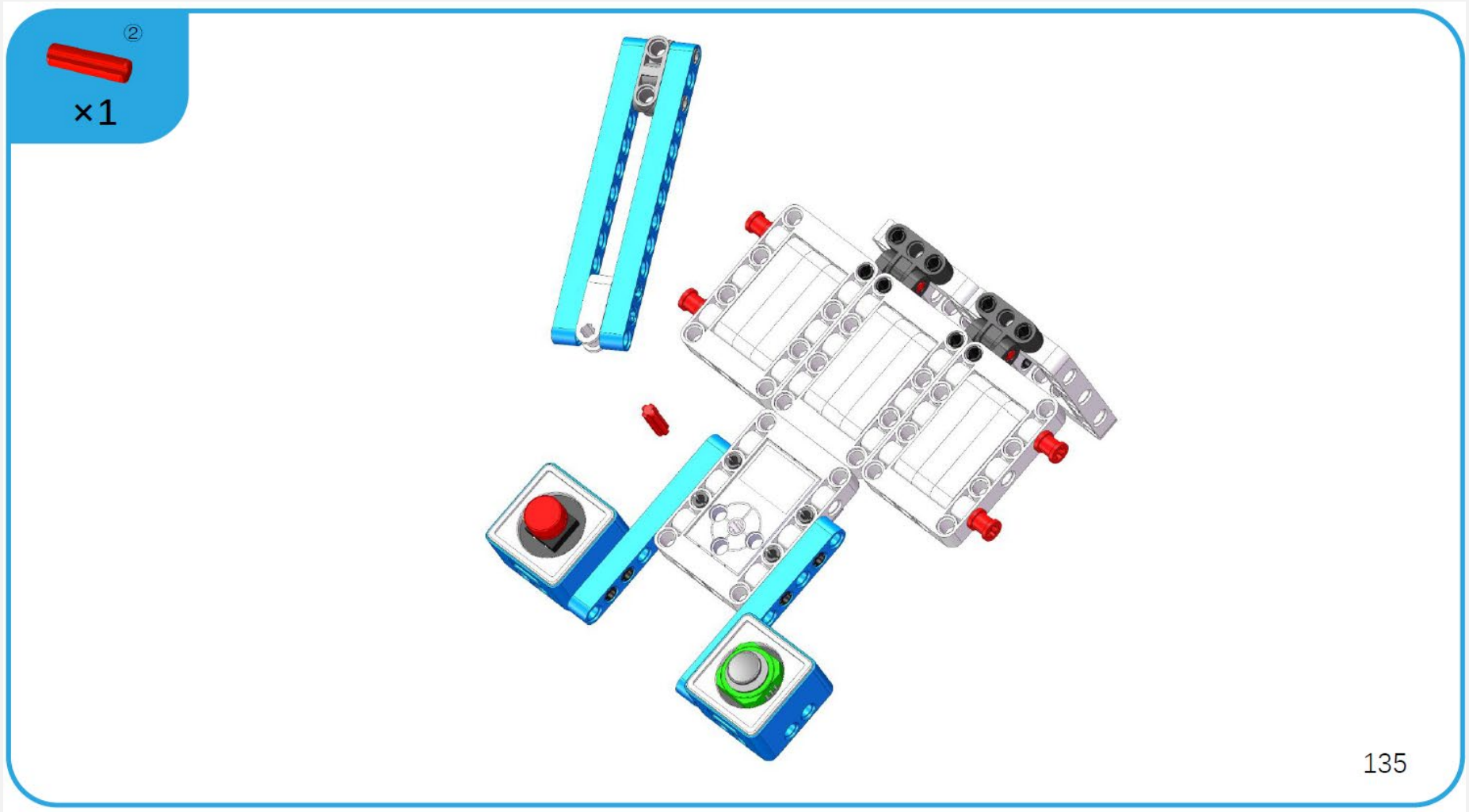

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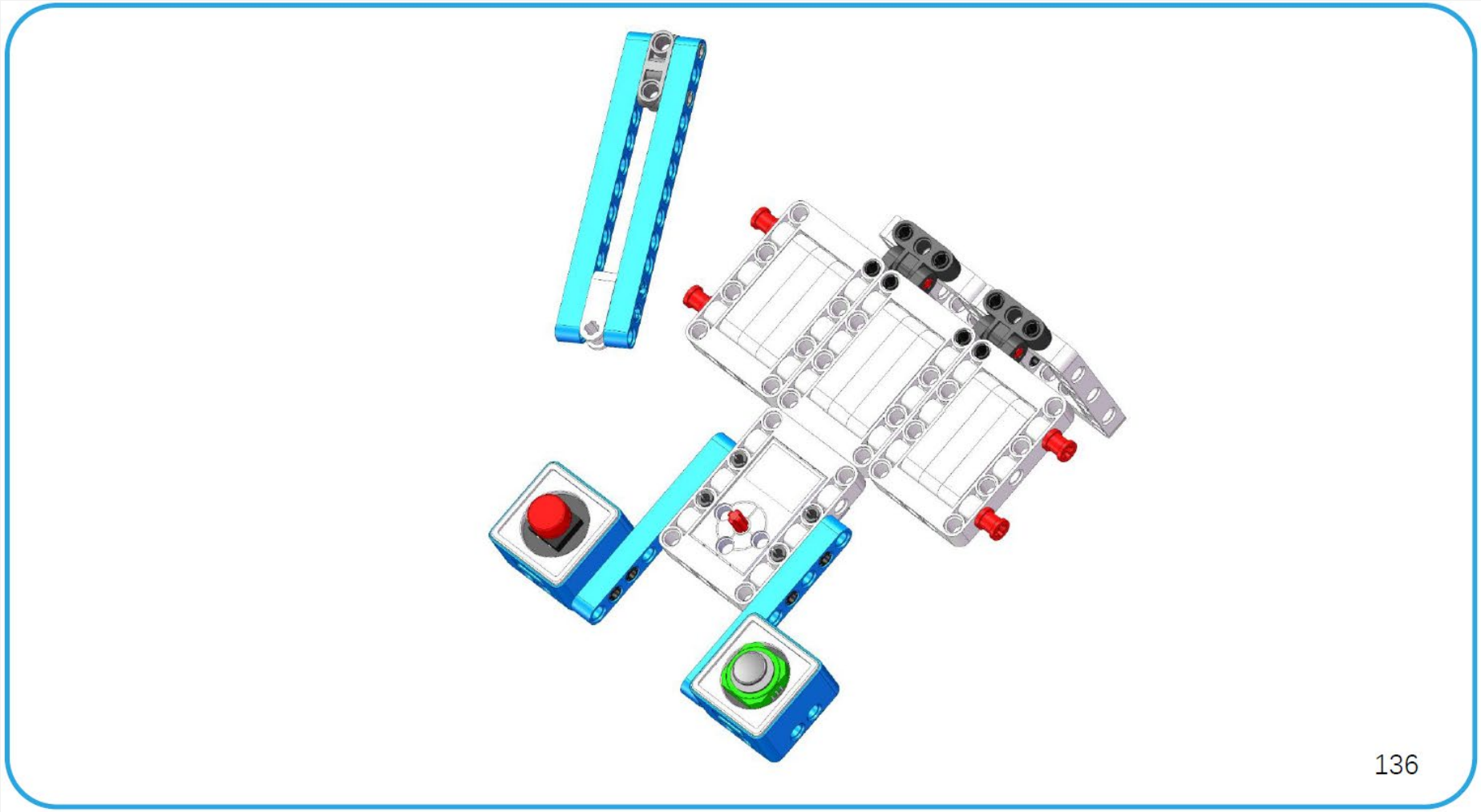

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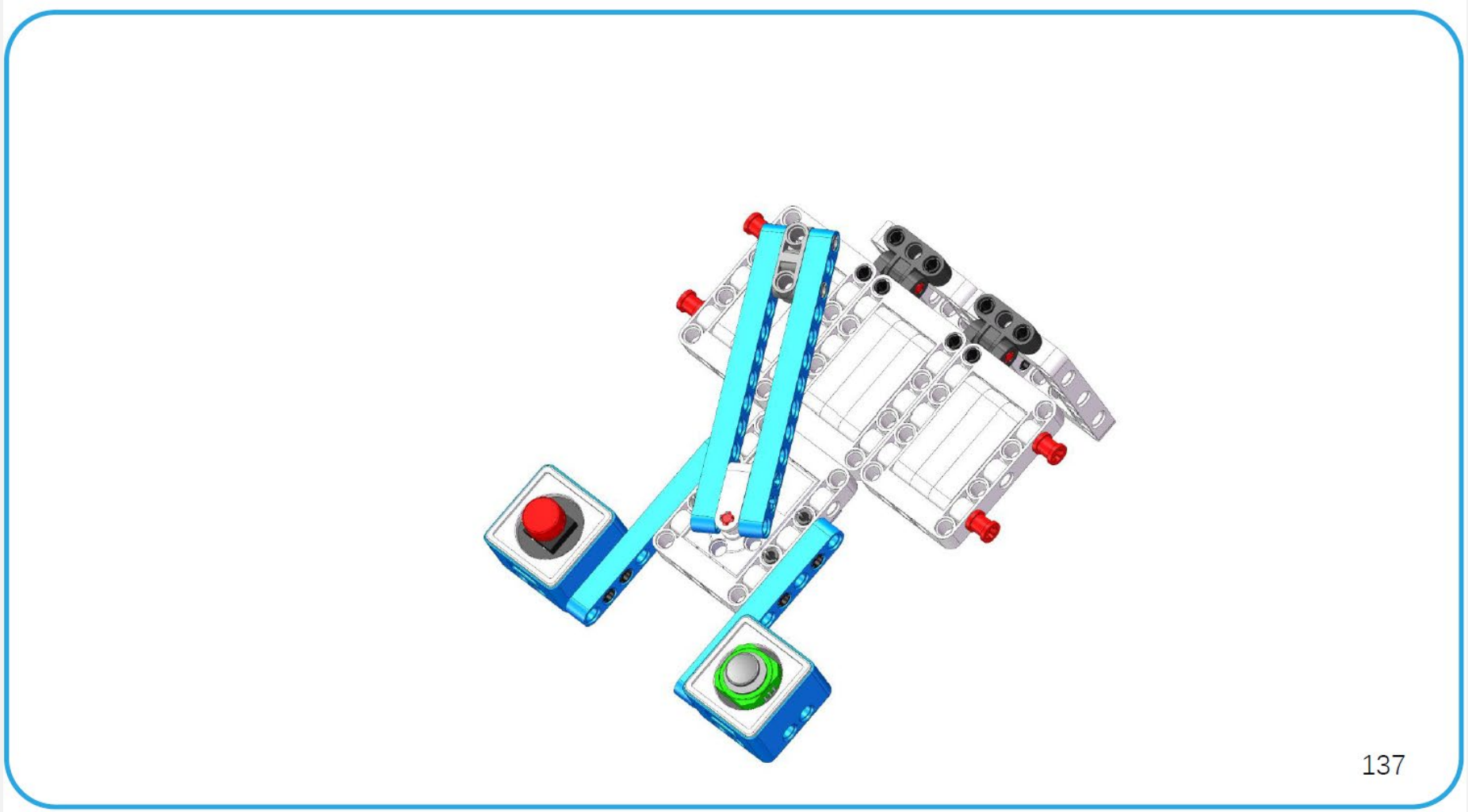

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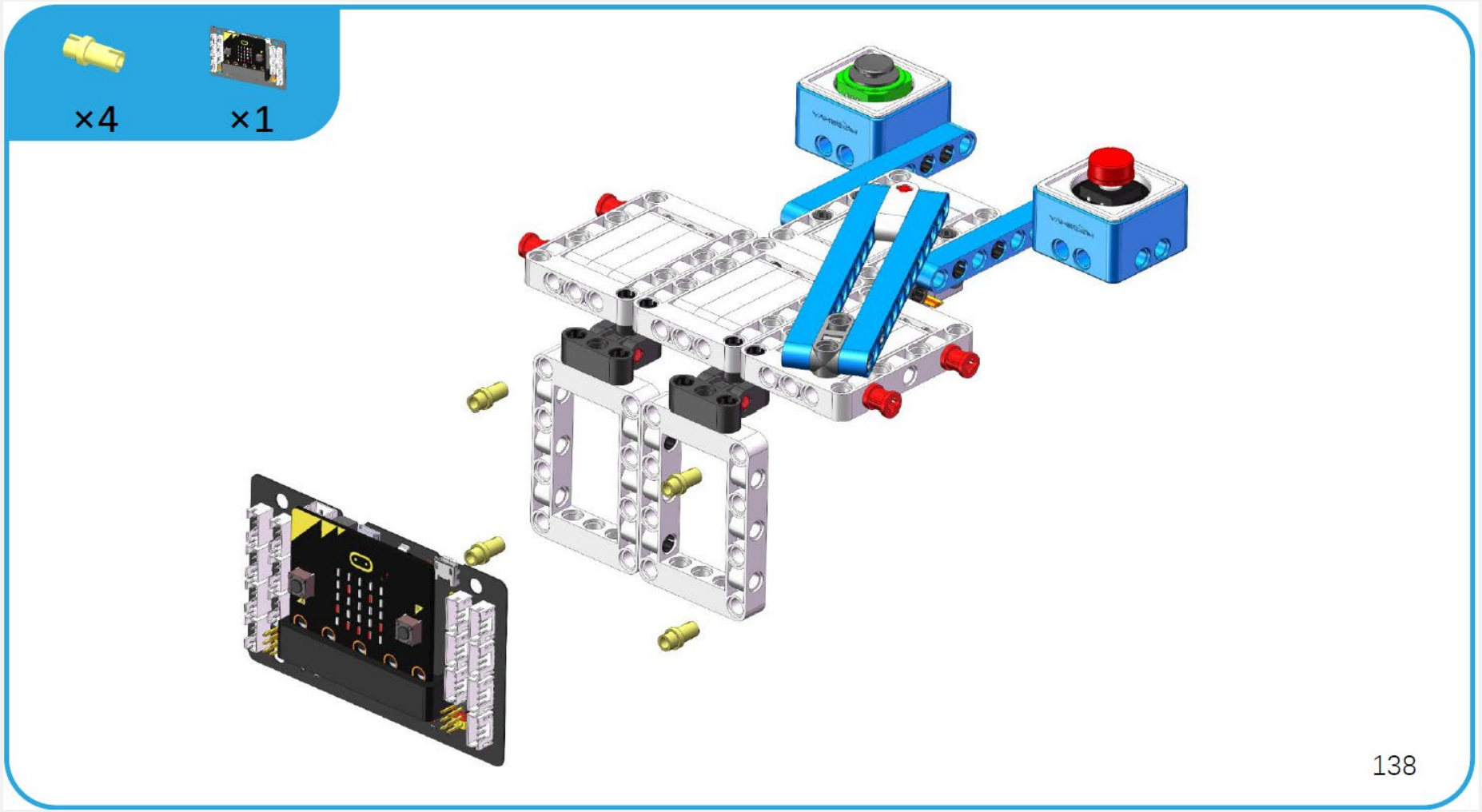

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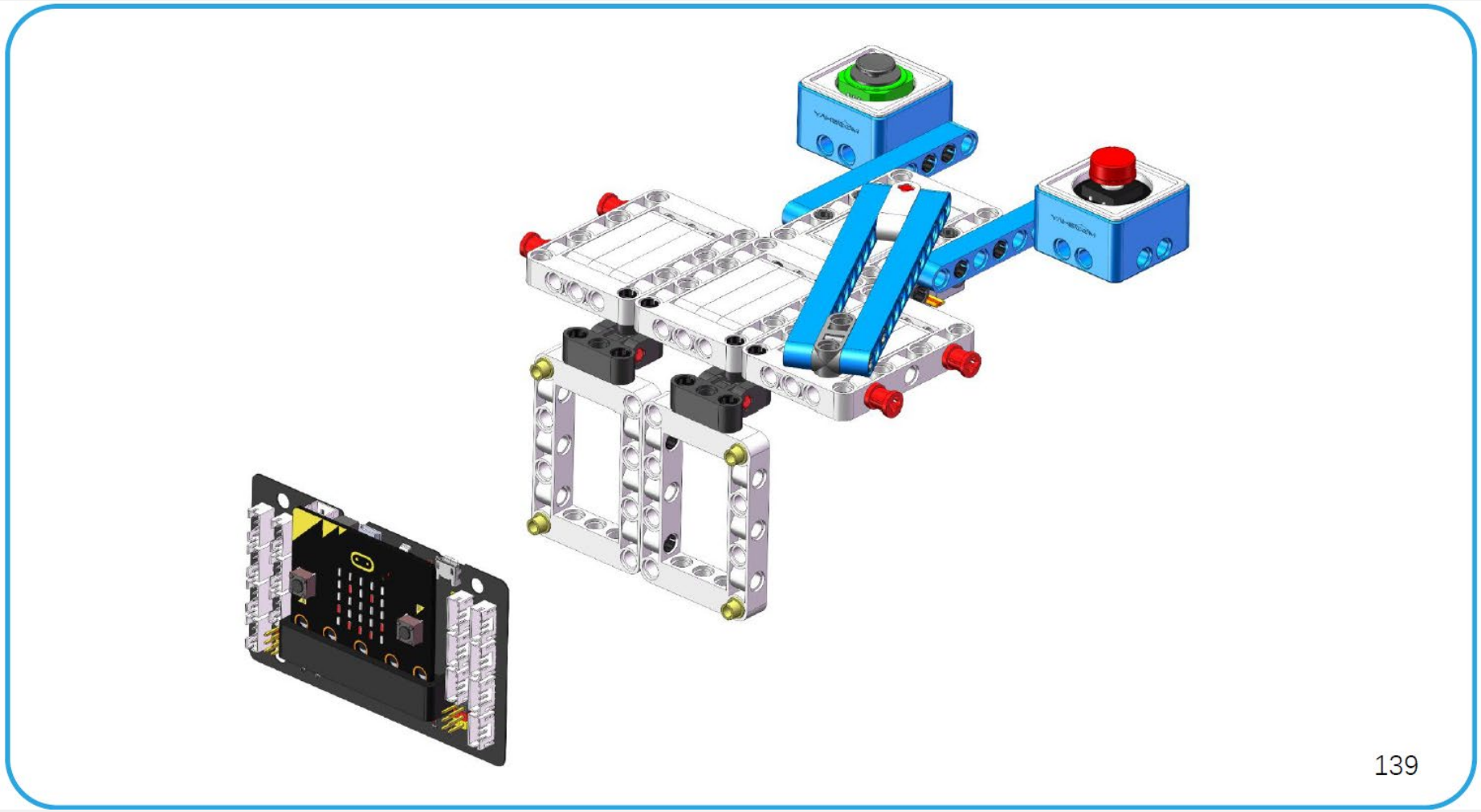

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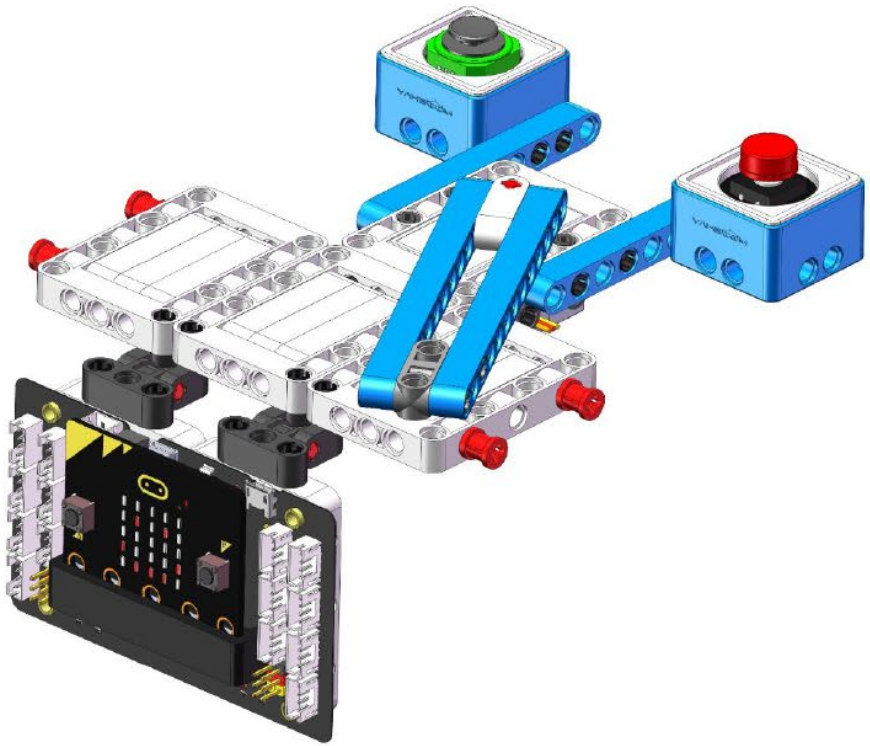

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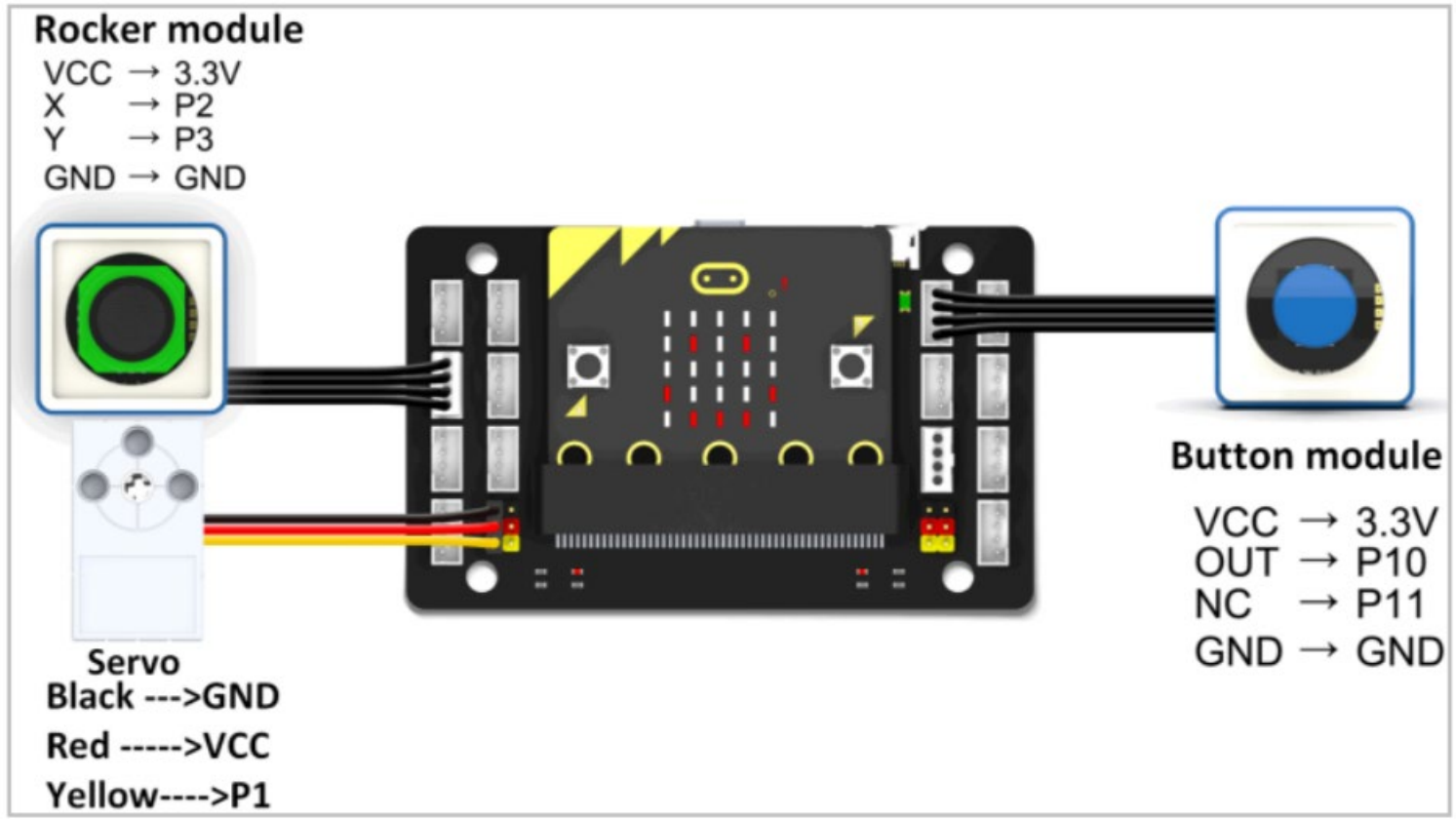
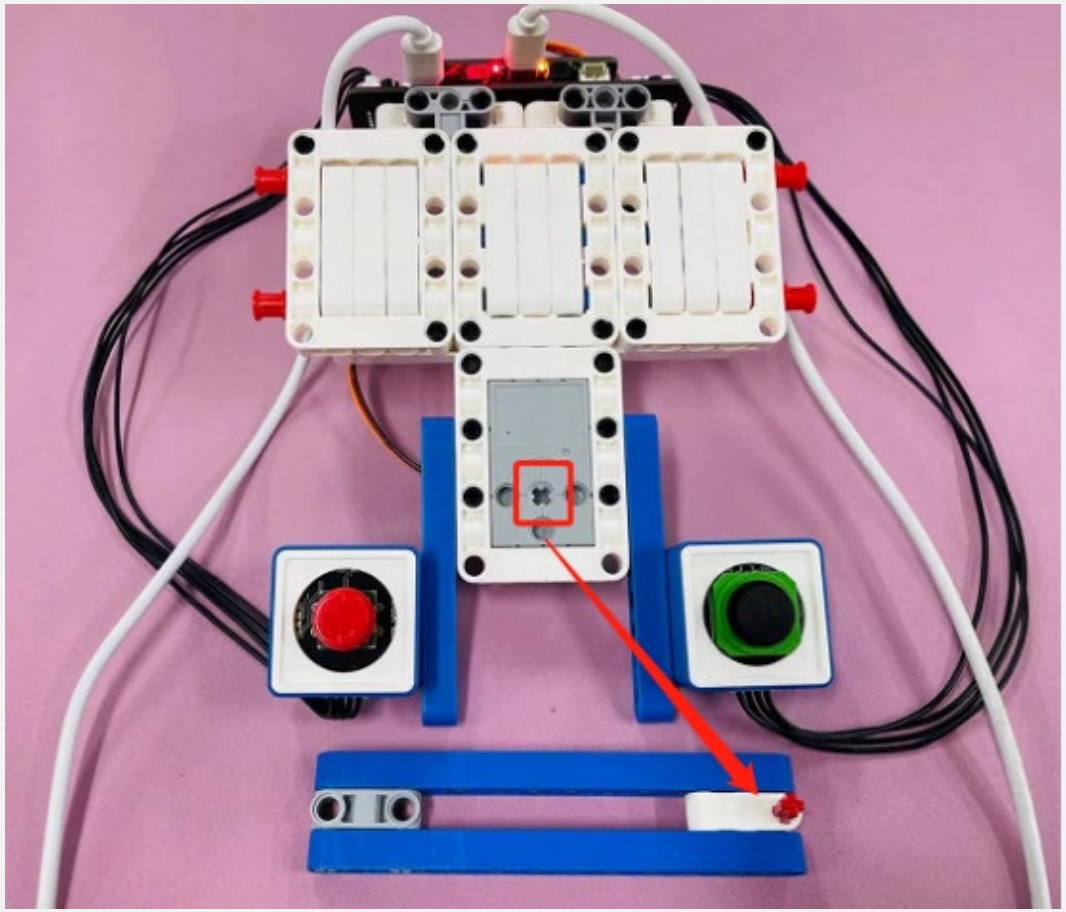
Wire Connection

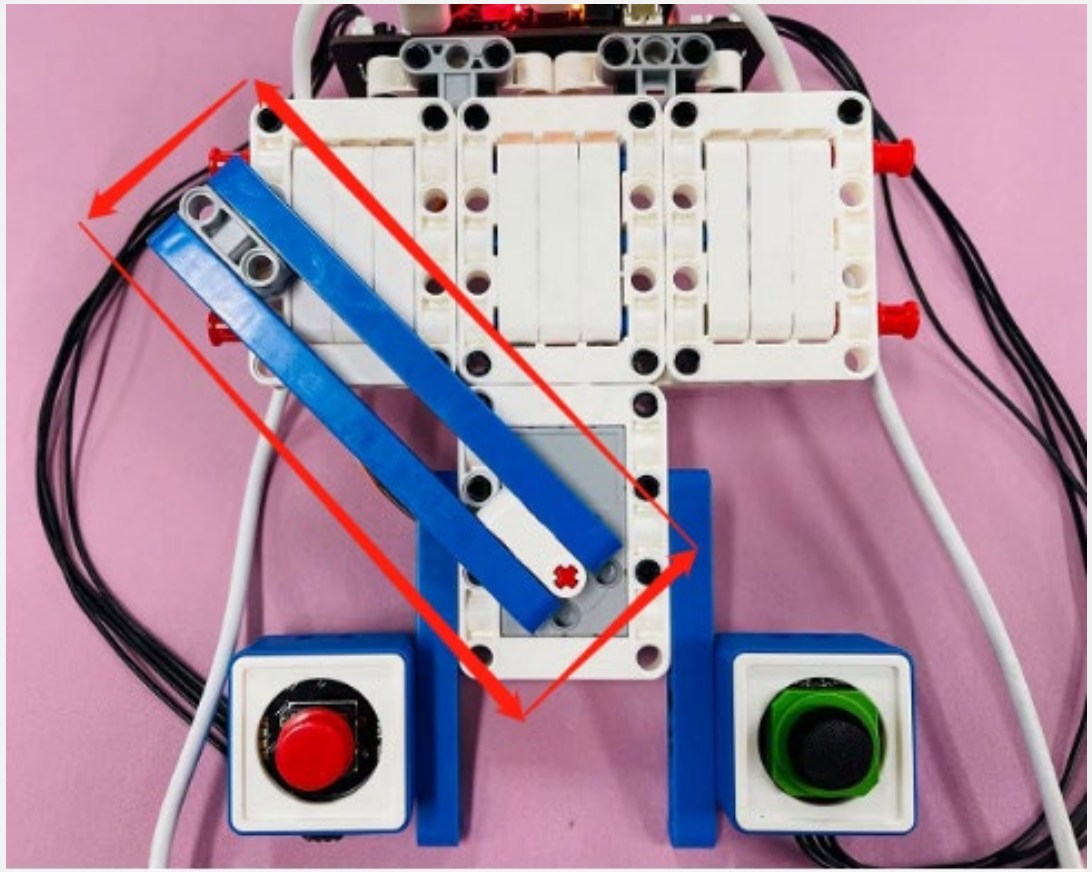
Connect the modules



Let's connect the module like this.

Connect the wiper





Introduction to Servo

Gray Servo （A02）	GND: connect ground
Black line: GND	Working Voltage: 4.8-6V
Red line: VCC	Angle range: 0-360°
Yellow line:signal line	Size: 29.4mm*28.8mm
No-load current: 90±20mA	Stop torque: 2±0.2kg-cm
Maximum torque:2000g*cm	The pulse width corresponds to the angle value: 0-360° （500-2500us）

The working principle of the servo: the rotation speed and direction of the 360° building block servo can be controlled by PWM. The 500-1500us PWM controls the forward rotation of the servo. The smaller the value, the greater the rotation speed; the 1500-2500us PWM controls the reverse rotation of the servo.

The greater the value, the greater the rotation speed. 1500us PWM is to control the servo to stop.

Before using the building block servo to build the building block shape, you must calibrate the angle of the servo to determine the center position of the servo, because all the angles used in the modeling are not all 360°, so if the servo is not calibrated , which will easy to jam the servo after power-on, thereby damaging the servo.

What is Servo?

What is a Servo Motor? Servo motors or “servos”, as they are known, are electronic devices and rotary or linear actuators that rotate and push parts of a machine with precision. Servos are mainly used on angular or linear position and for specific velocity, and acceleration.

Is Servo Motor Input or Output?
A servomotor is a closed-loop servomechanism that uses position feedback to control its motion and final position.
The input to its control is a signal (either analogue or digital) representing the position commanded for the output shaft.
How is Servo Motor controlled?
Servos are controlled by sending an electrical pulse of variable width, or pulse width modulation (PWM), through the control wire. There is a minimum pulse, a maximum pulse, and a repetition rate. A servo motor can usually only turn 90° in either direction for a total of 180° movement.

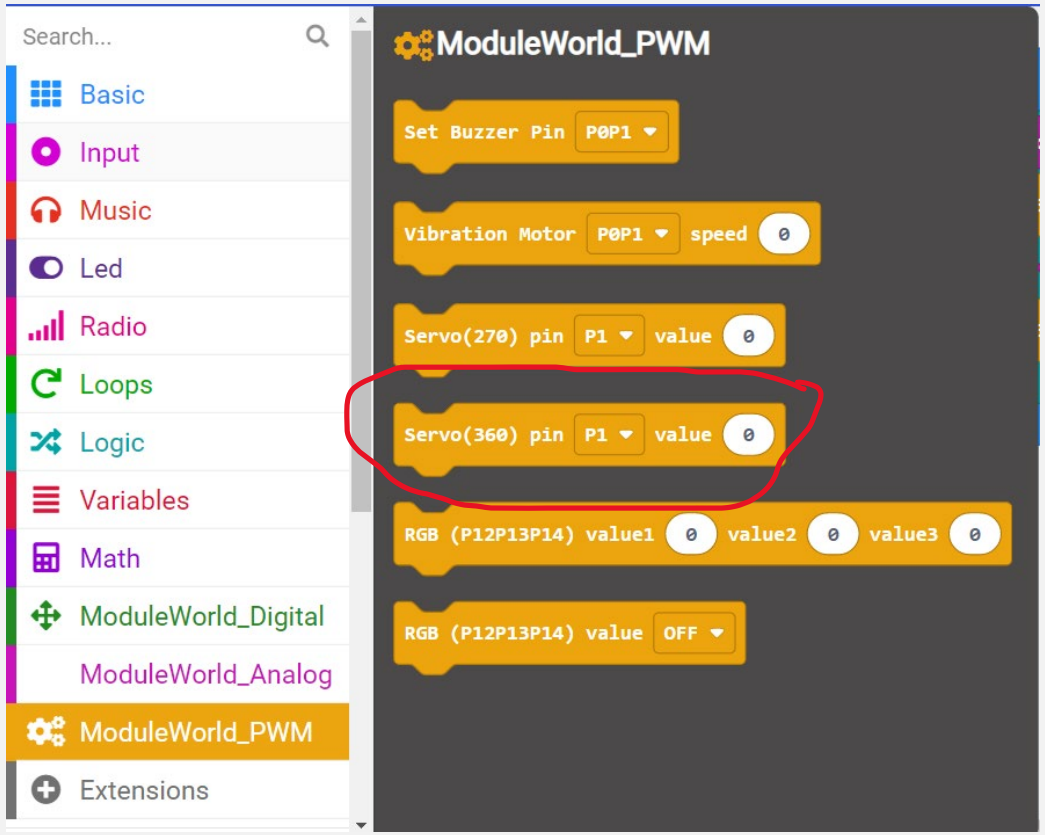
https://www.youtube.com/watch?v=ditS0a28Sko
From time 1:44 – 4:58

Make code programming

https://github.com/YahboomTechnology/Module-World.

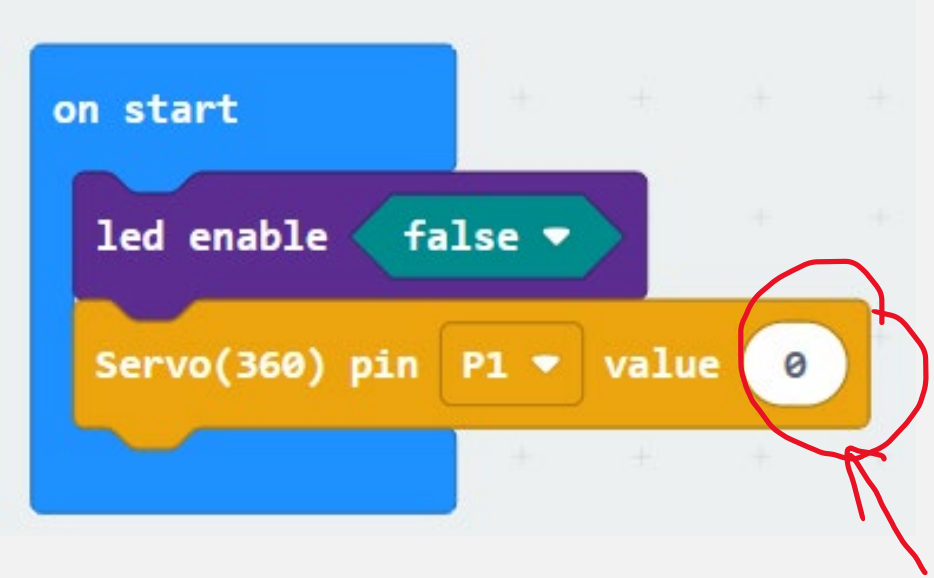
Or search YahboomTechnology/Module-World in the extension block

Coding - Servo



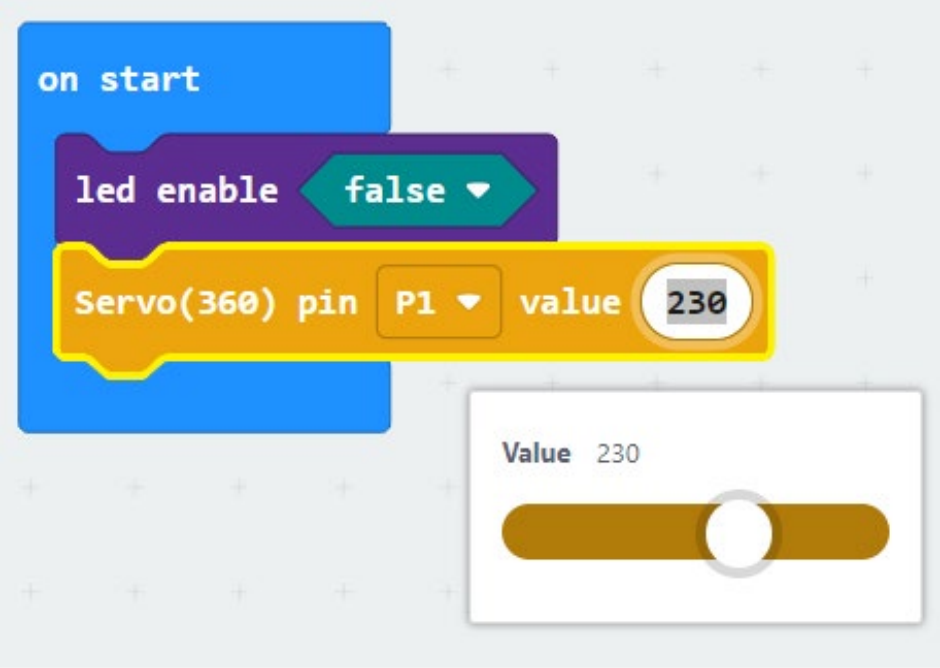
We need to take the Servo (360) coding block to code the movement of servo

Coding - Servo



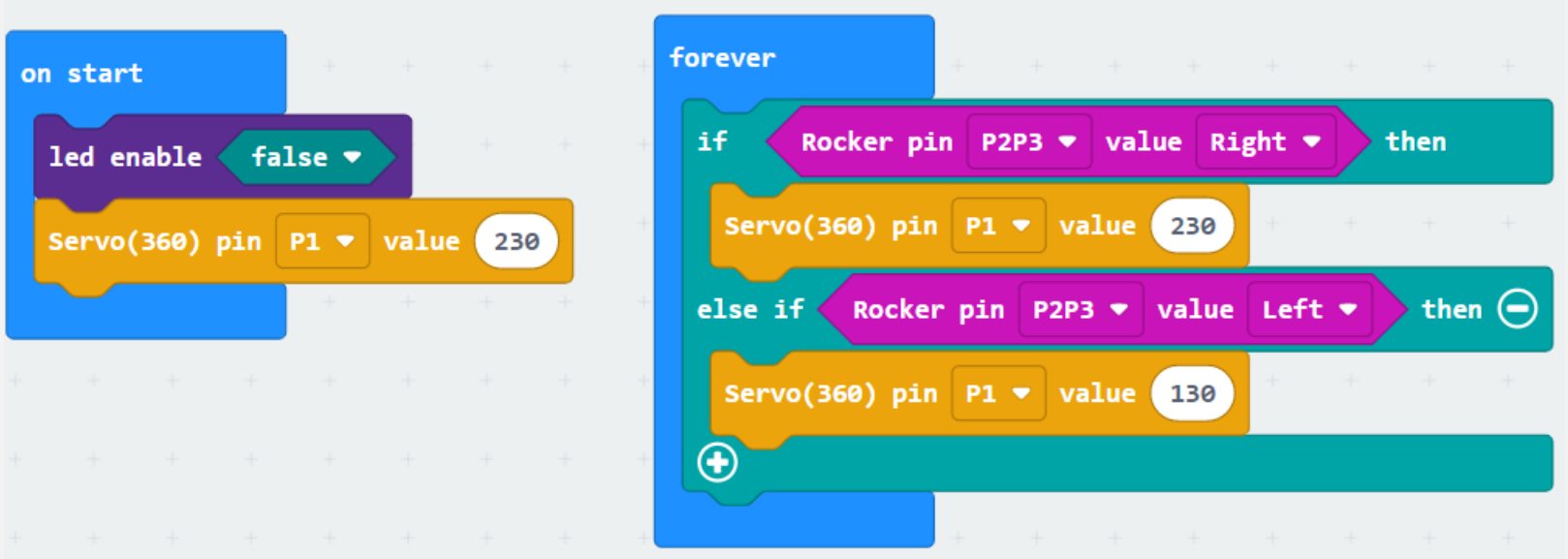
Let's manipulate this value to make the servo run to different position

Coding - Servo



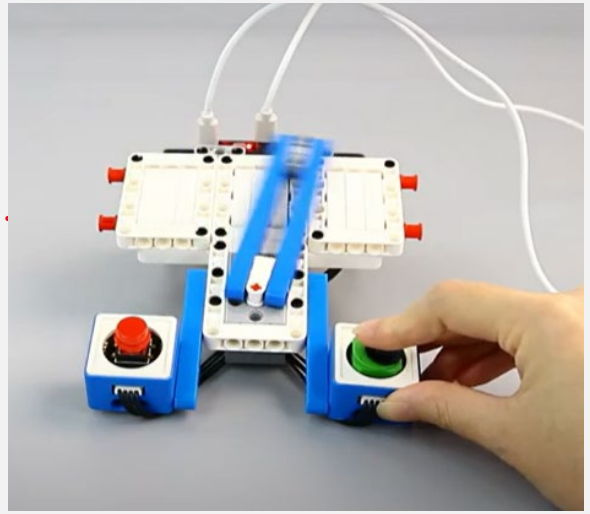
The value of the servo range from 0 degree to 360 degrees.

Coding - Servo



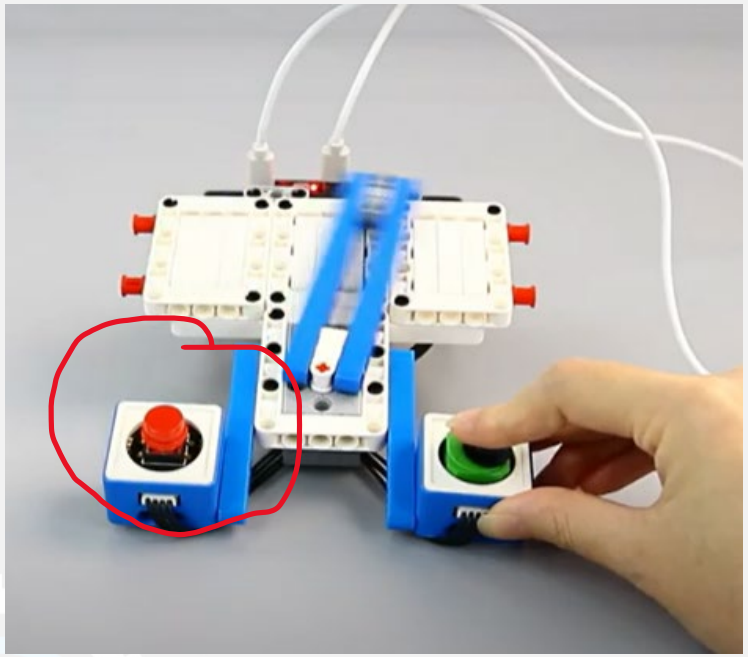
To run it with the rocker module, we can make it run to different position when rocker module is being pushed.

Coding – Combination



After your program downloaded successfully, you can use the rocker module to turn your wiper to left or right

L9 – Challenge level 1

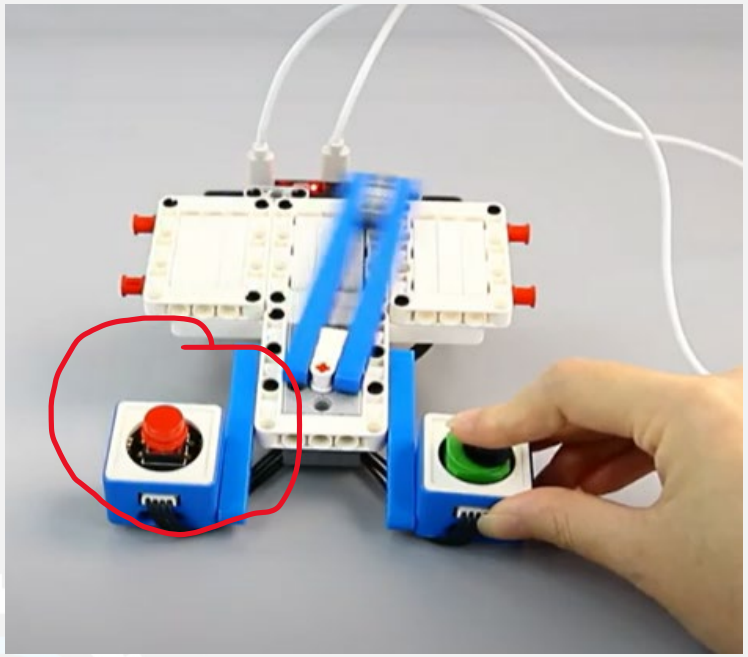


Program your button module as a toggle switch to turn it on / off for the wiper.

If button is pressed first time, the wiper will go back to starting position and rocker module can't turn the wiper.

If button pressed another time, it will make the wiper go back to starting position and enable the rocker to control the wiper direction

L9 – Challenge level 2

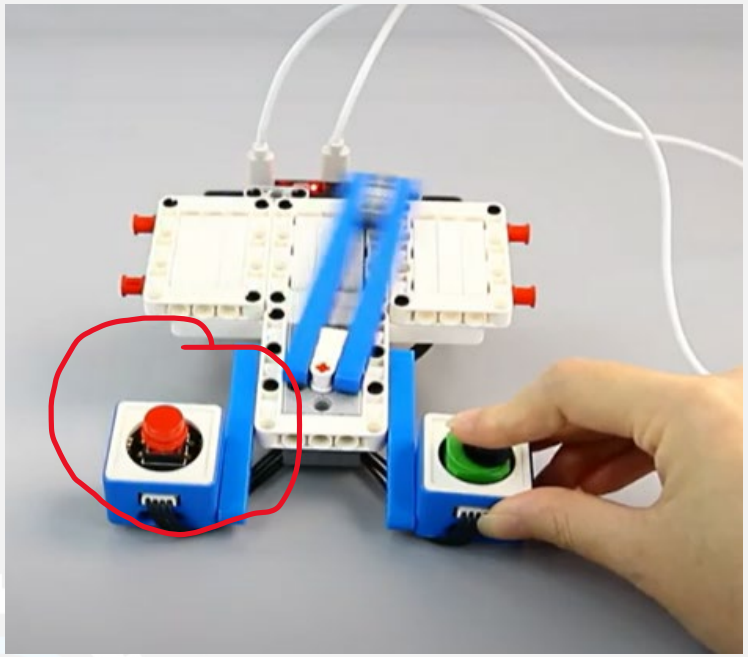


Program your button module as a toggle switch to turn the wiper either to the left or to the right.

When button is pressed at first time, it will go to the right.

When the button is pressed for another time, it will go to left, so and so on.

L9 - Mission



Can you make your rocker module to slowly turn the wiper instead of just going into 2 positions (left or right)?

Use the button module as a toggle switch to adjust the speed of the wiper.

Any Questions?

Thank you :)