Microbit Robotics Beginner Level 2

Lesson 3

Moving Basket

Presented by Advanced Superlogic Team

Today's Topic

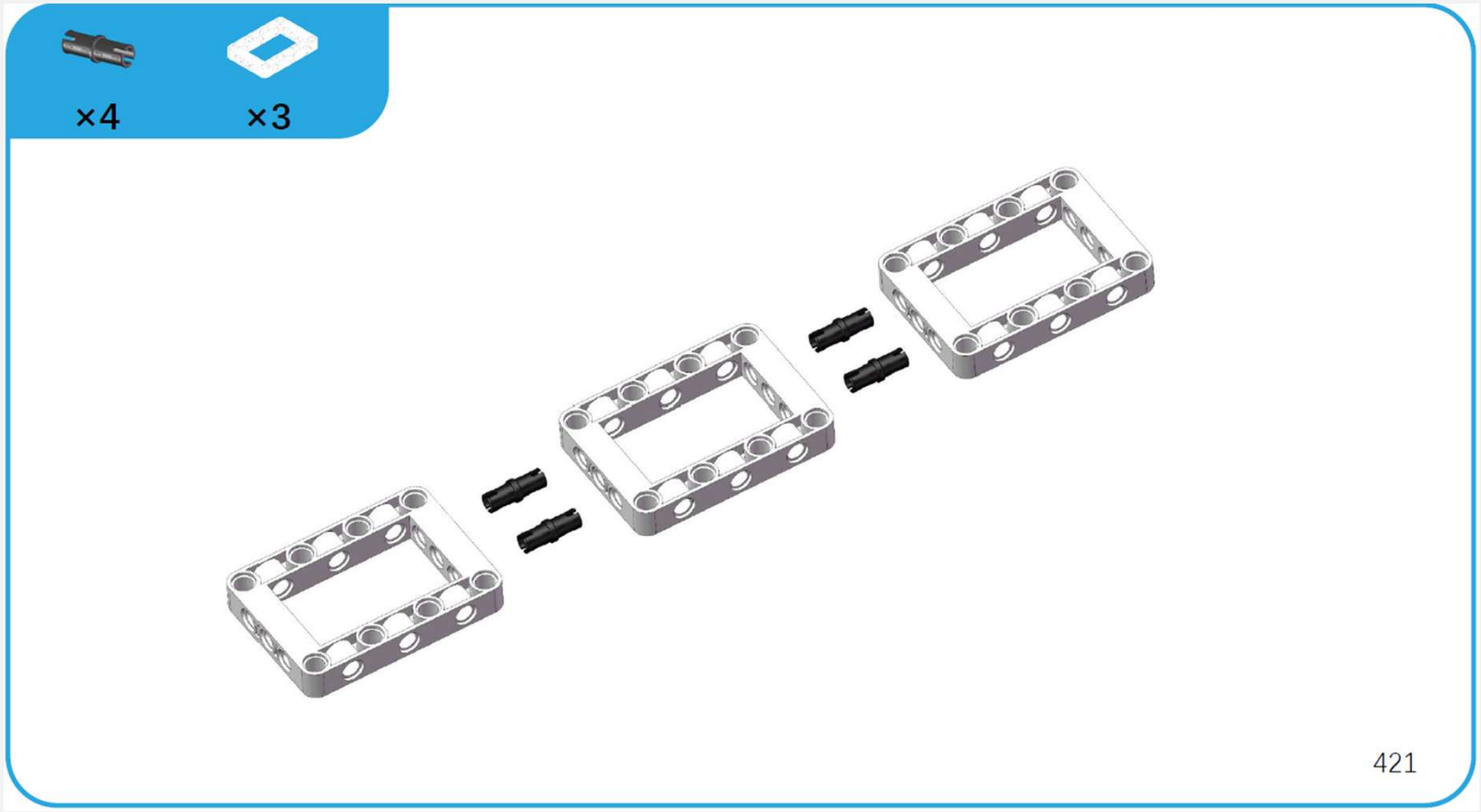
1. Build a Moving Basket with World of Modules
2. Infrared and Button programming
3. Loops programming
4. Servo programming

Learning Outcome

1. Able to build Moving Basket with instruction manual
2. Understand Loops programming
3. Understand Servo programming work
4. Able to program Interactive Box

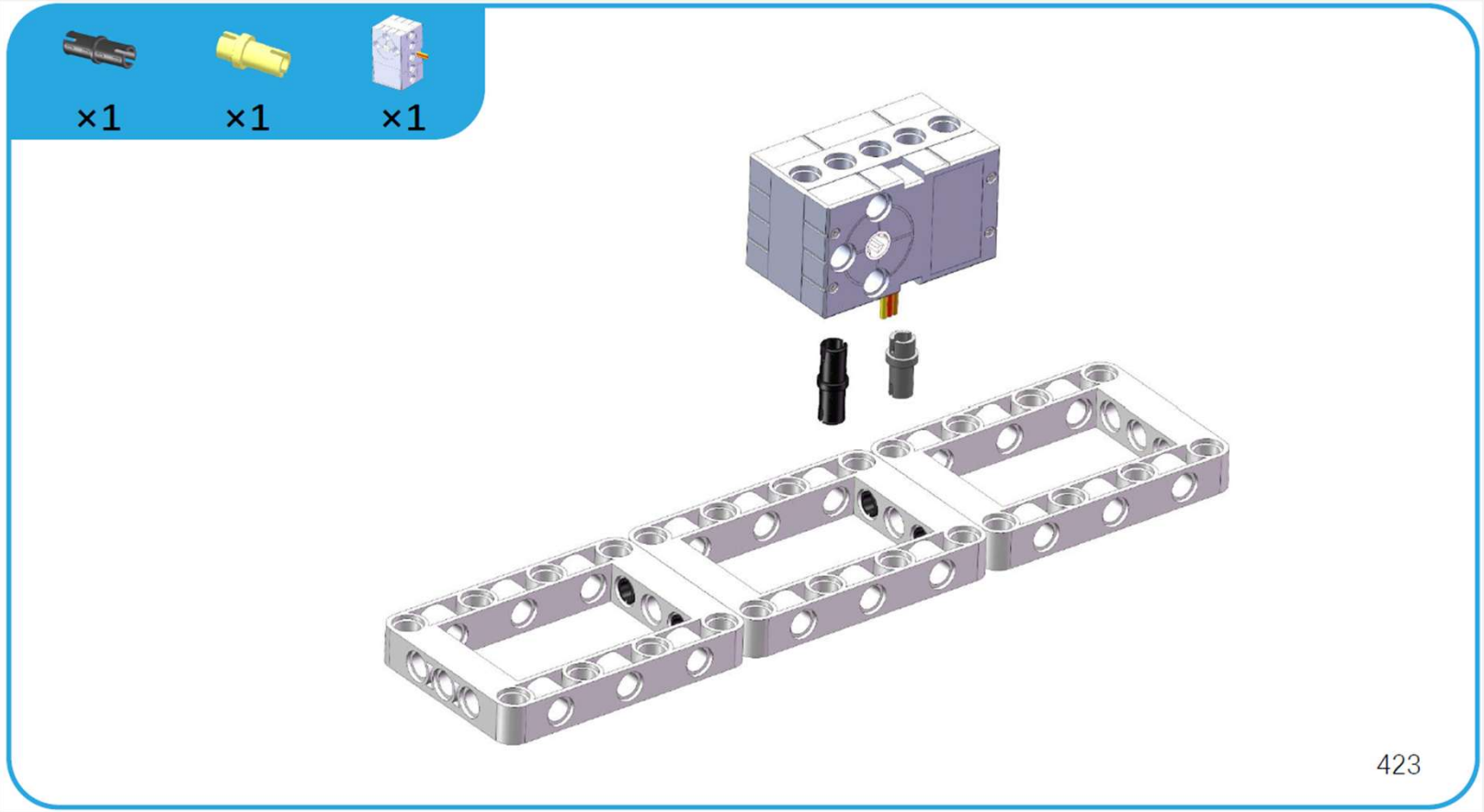
Lets build Moving Basket

Step 1

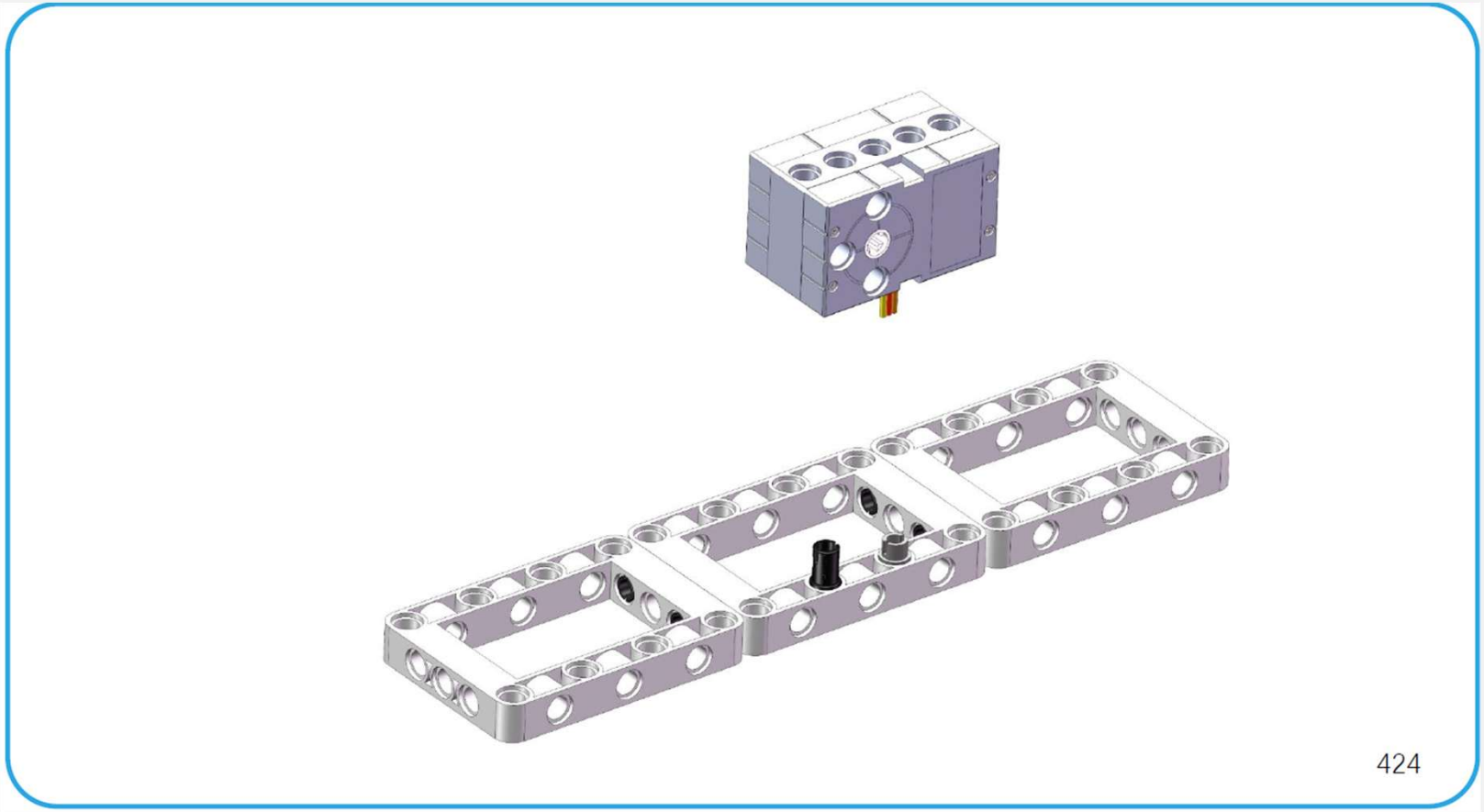


Step 2

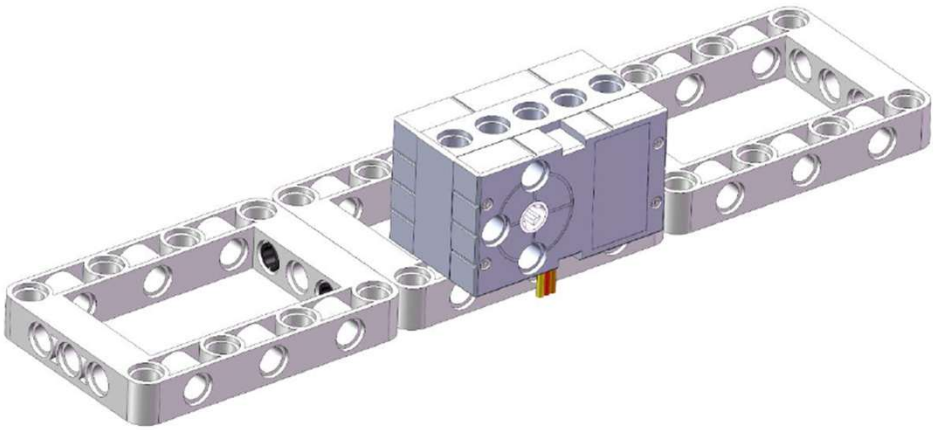
Step 3



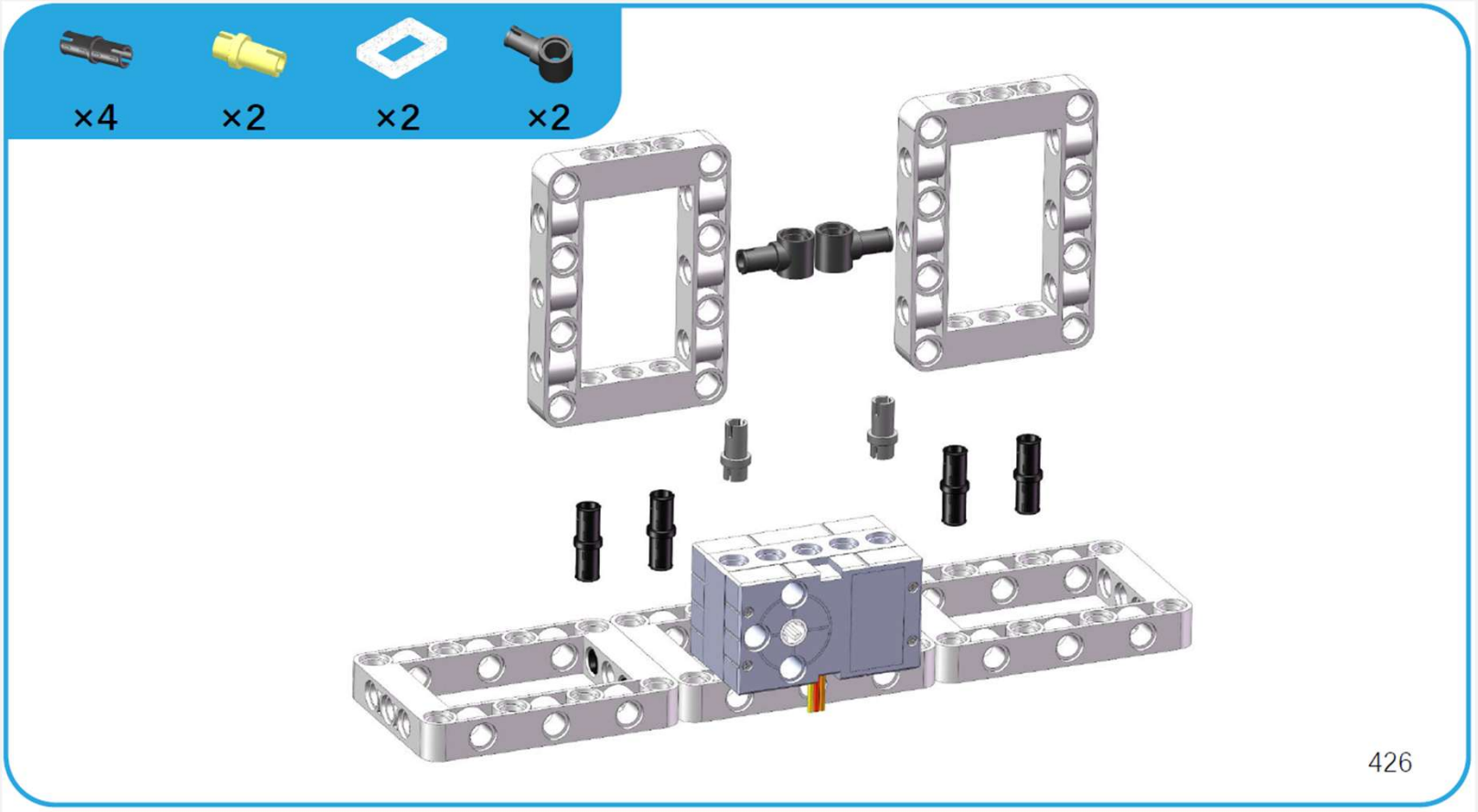
Step 4



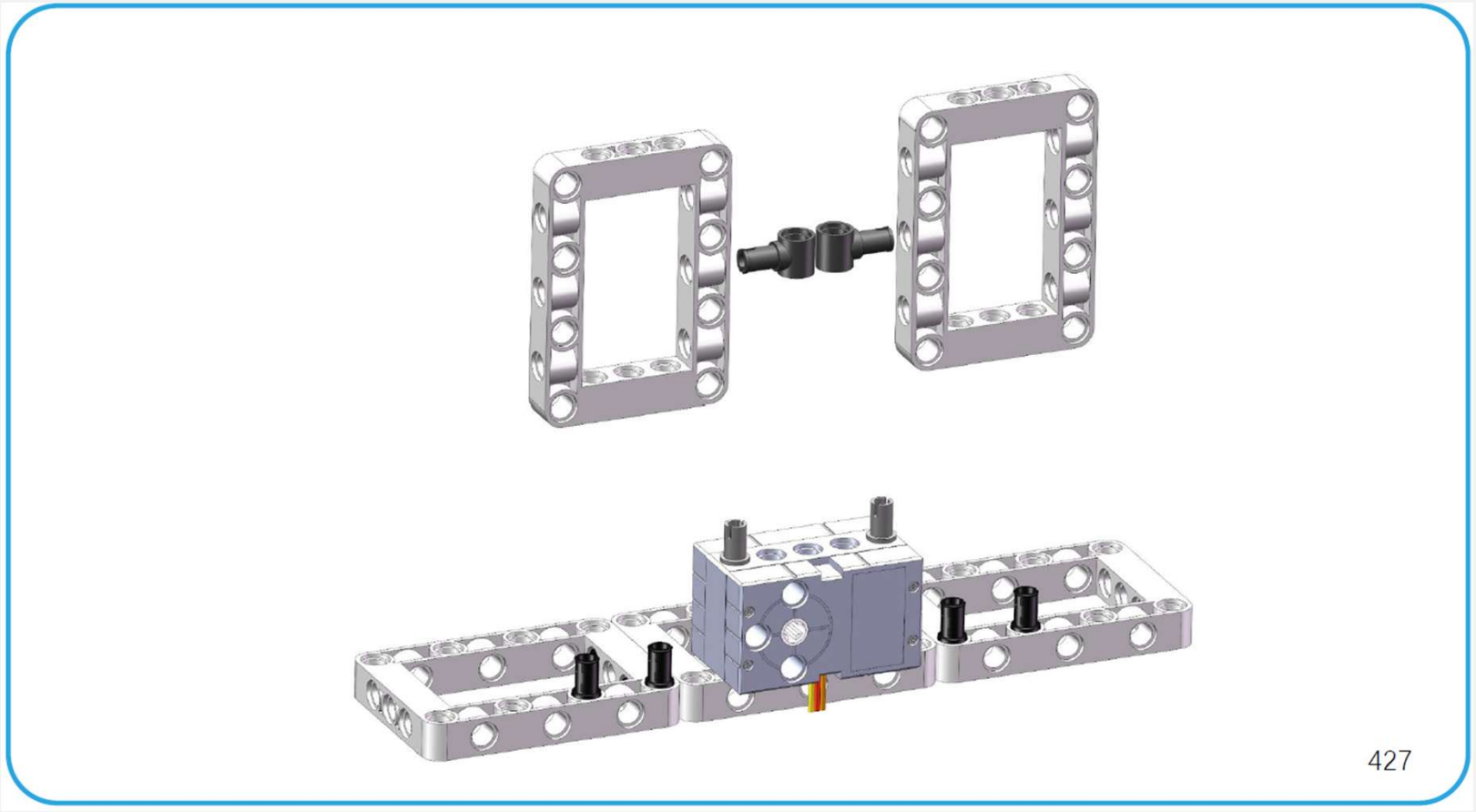
Step 5



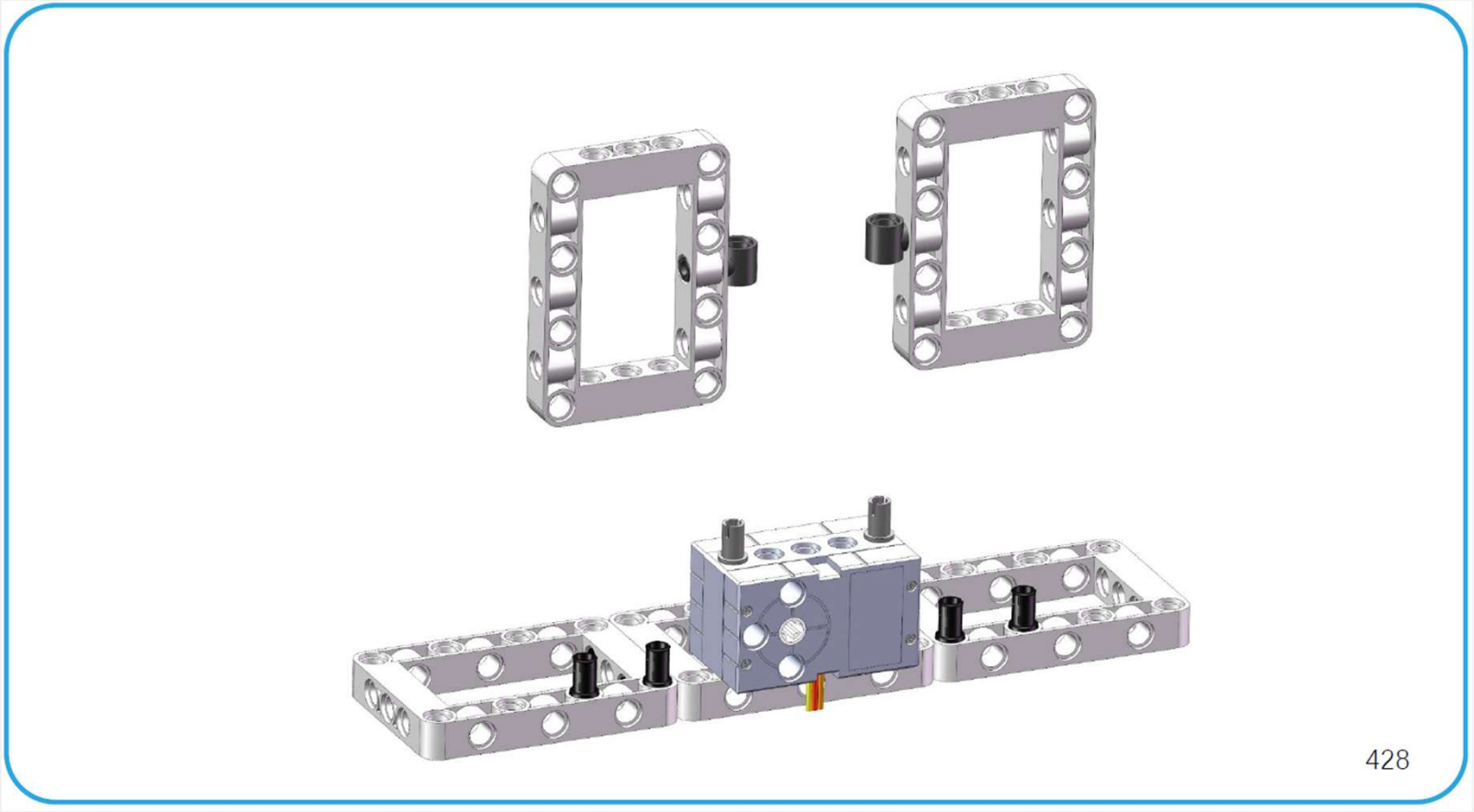
Step 6



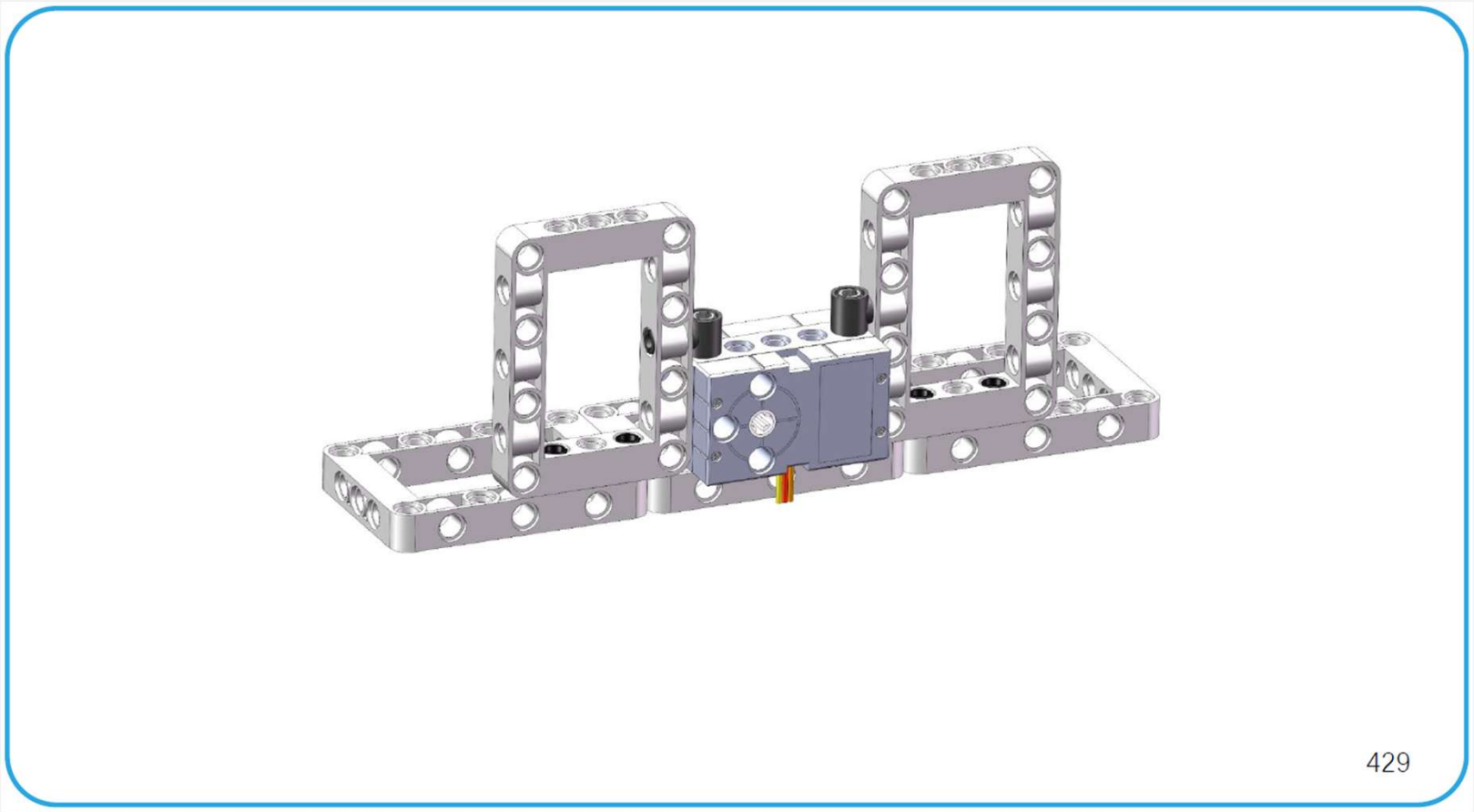
Step 7



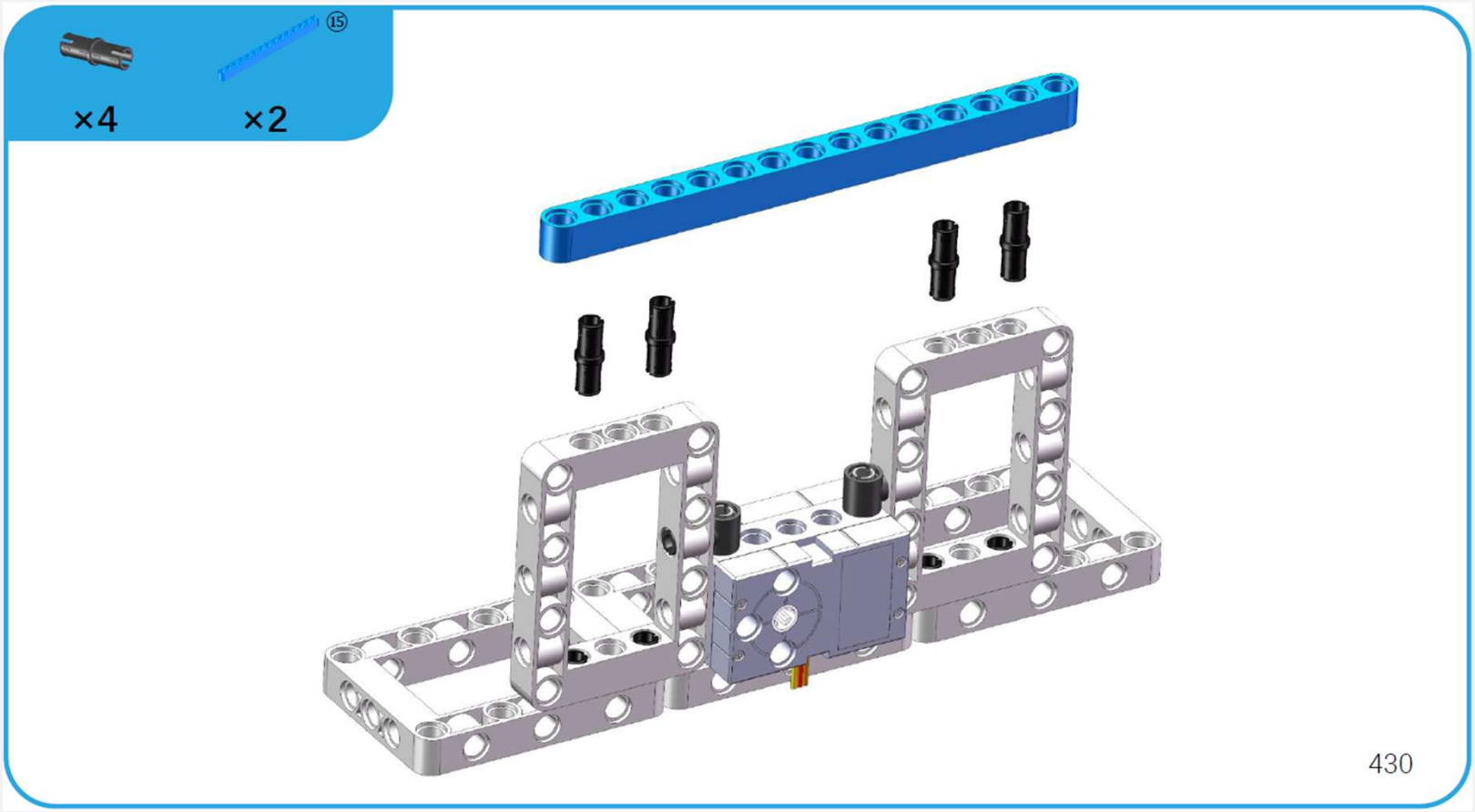
Step 8



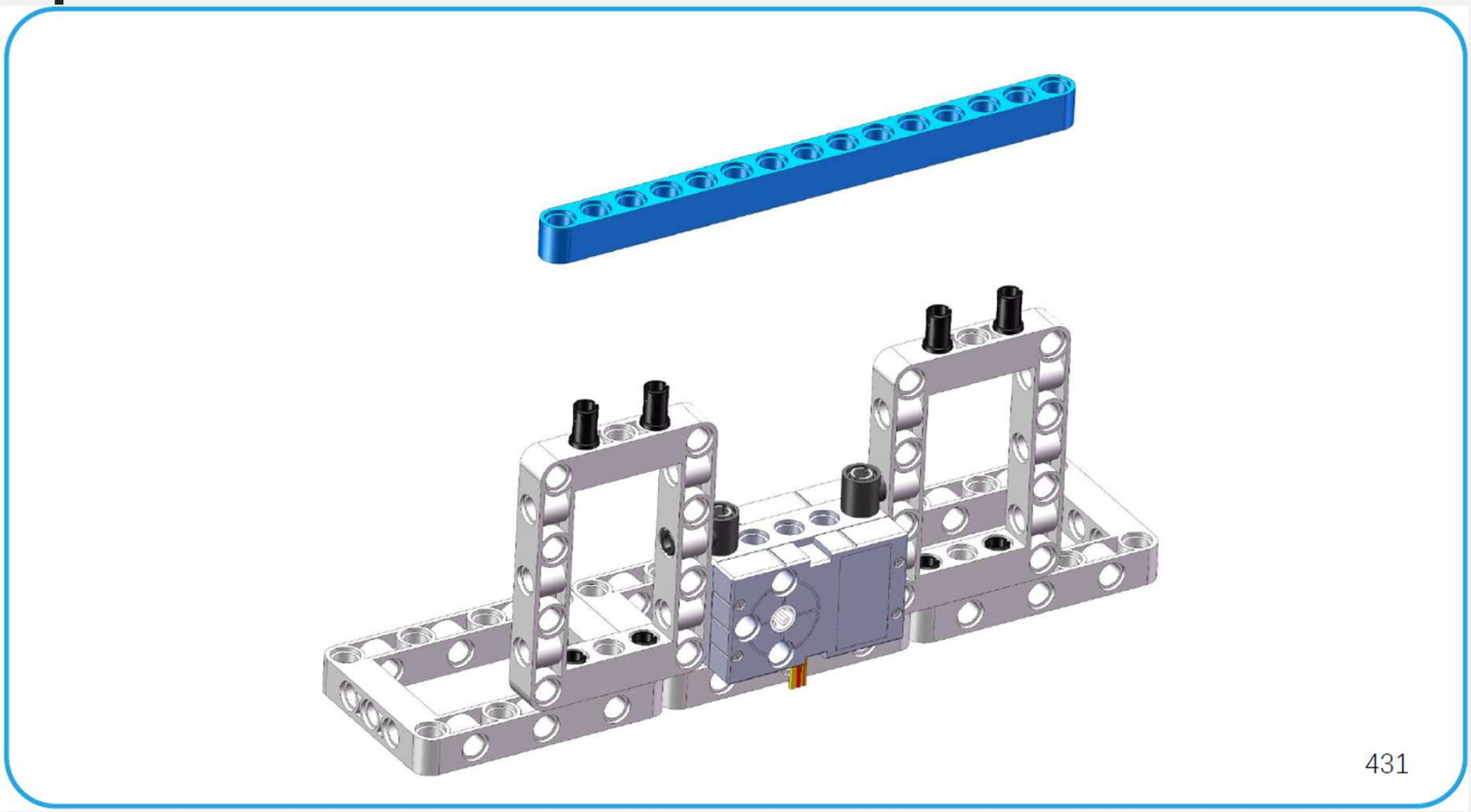
Step 9



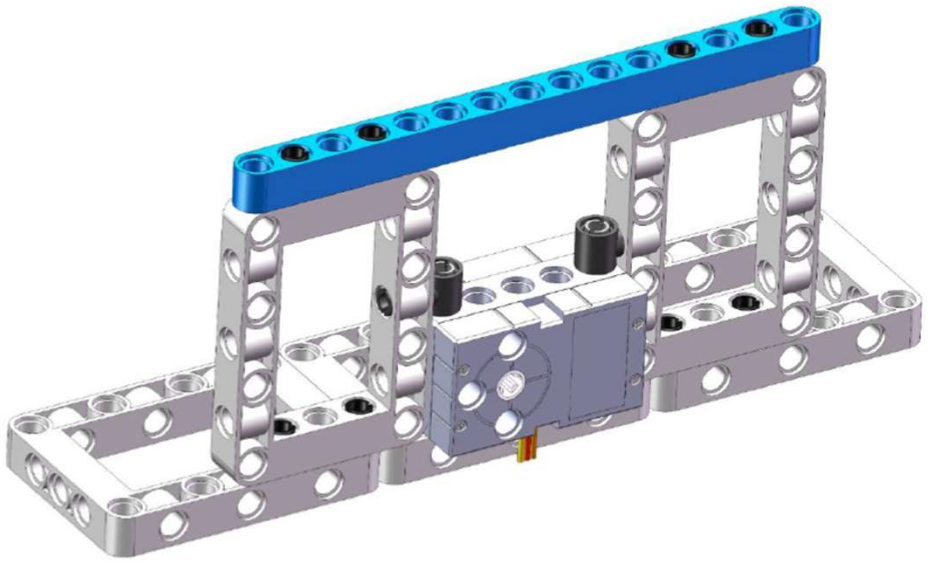
Step 10



Step 11

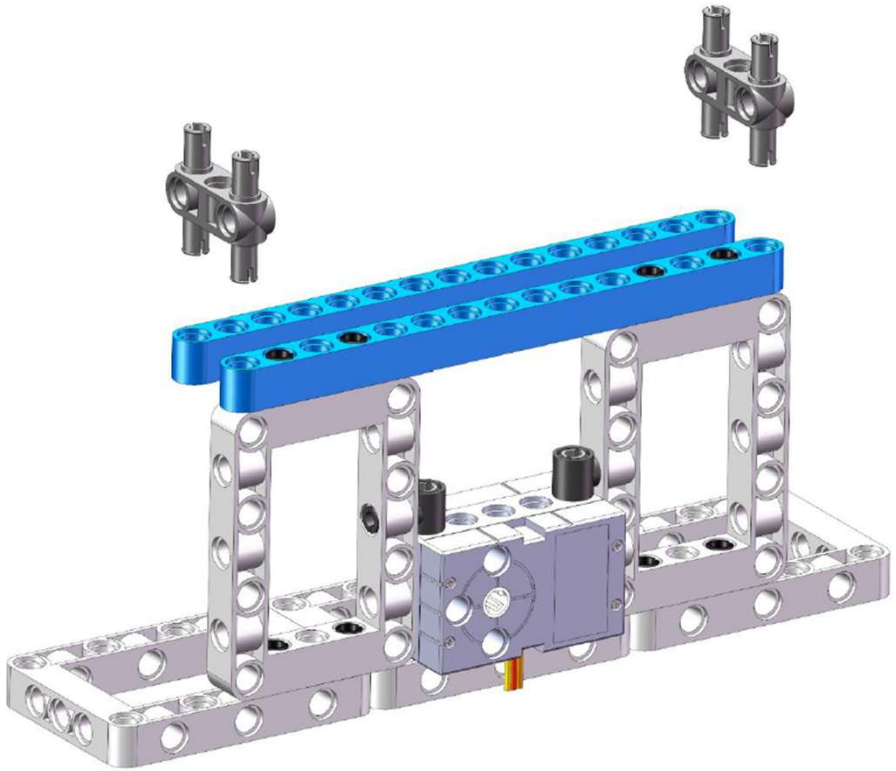


Step 12



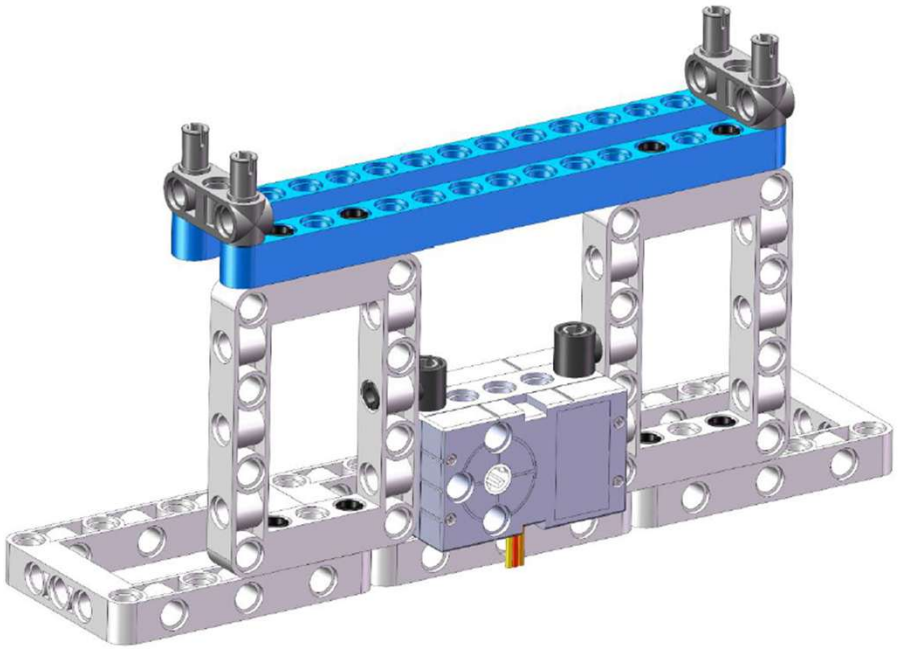
Step 13

×2

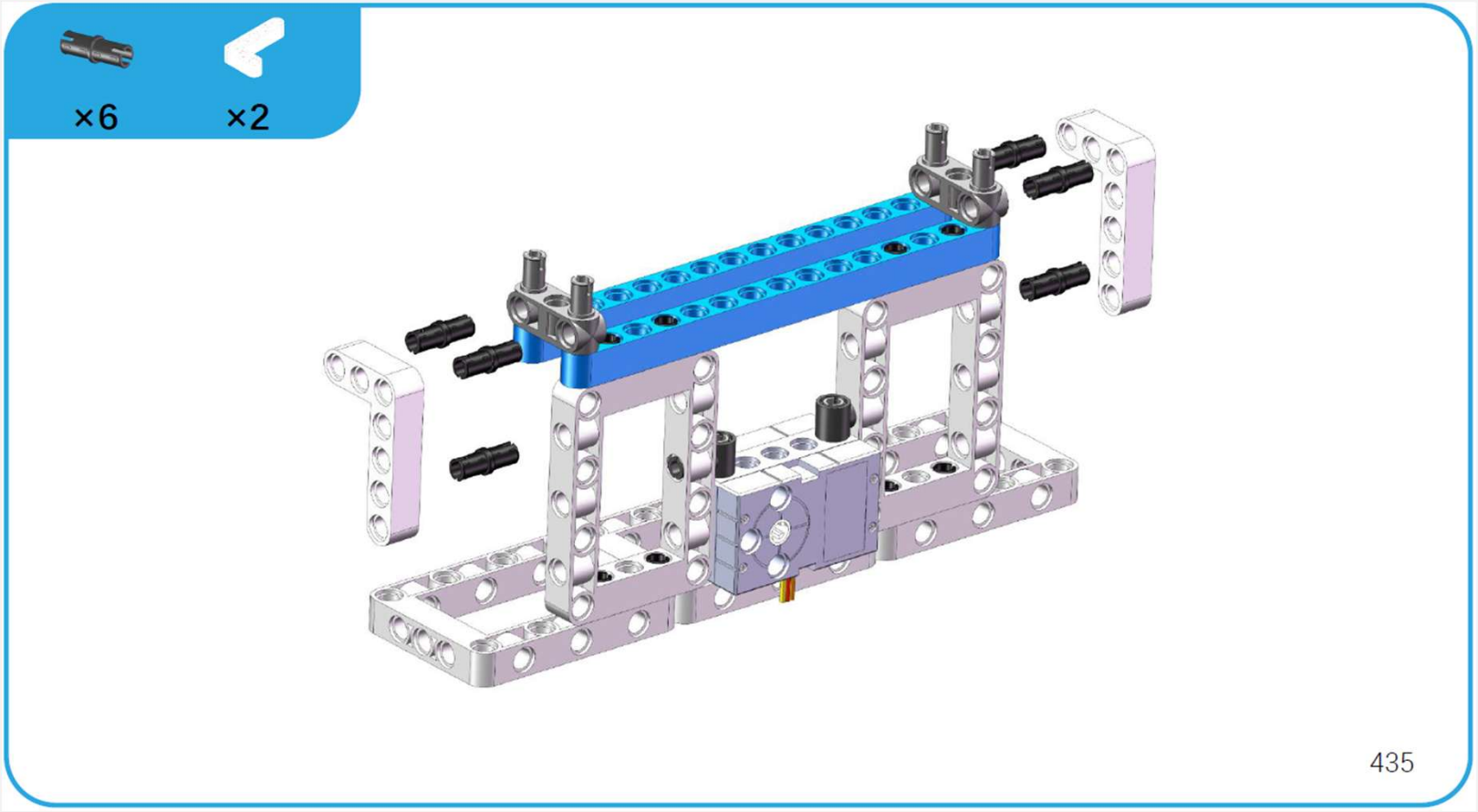


433

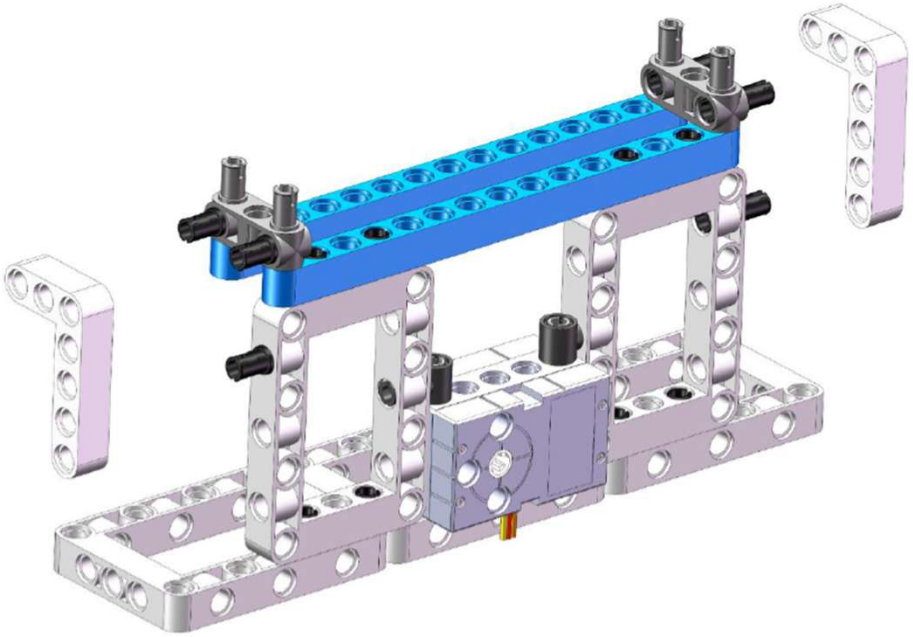
Step 14



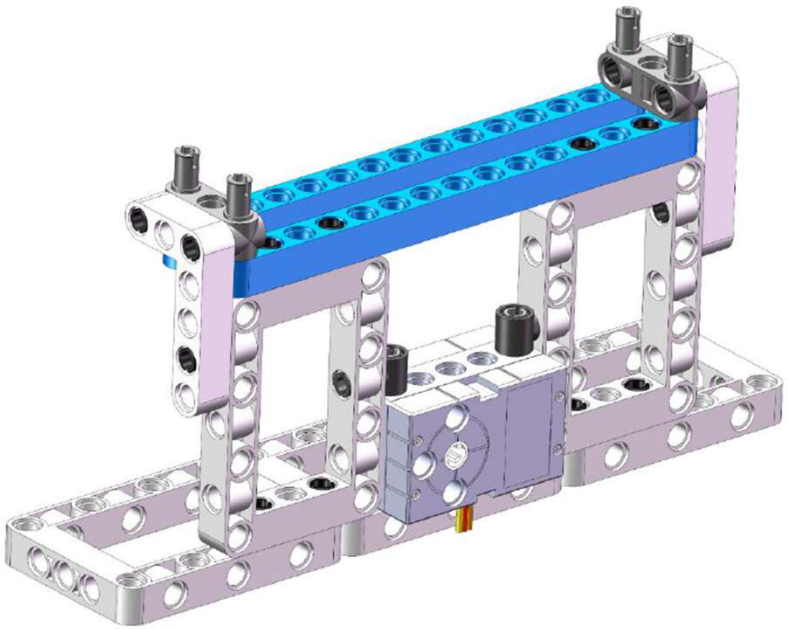
Step 15



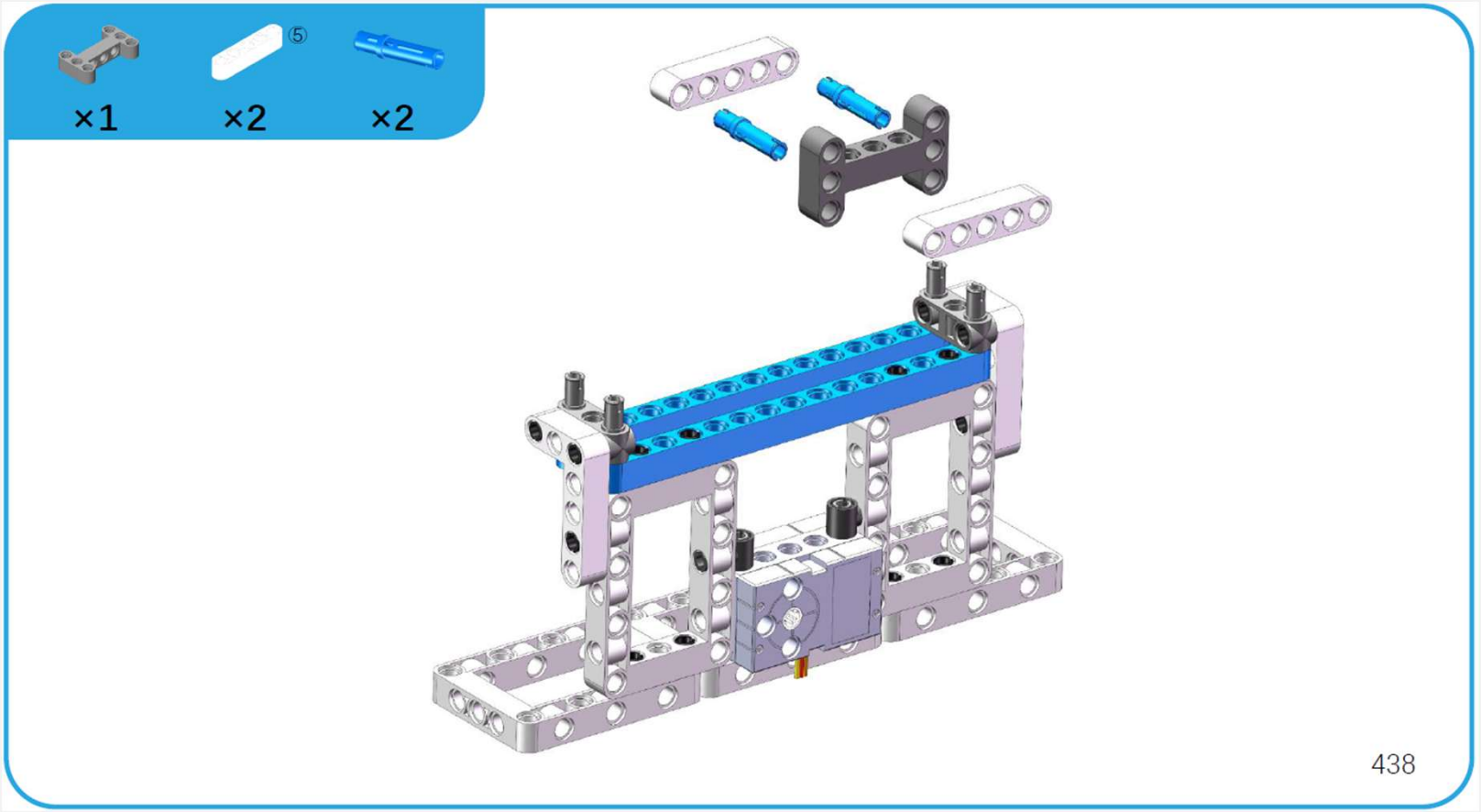
Step 16



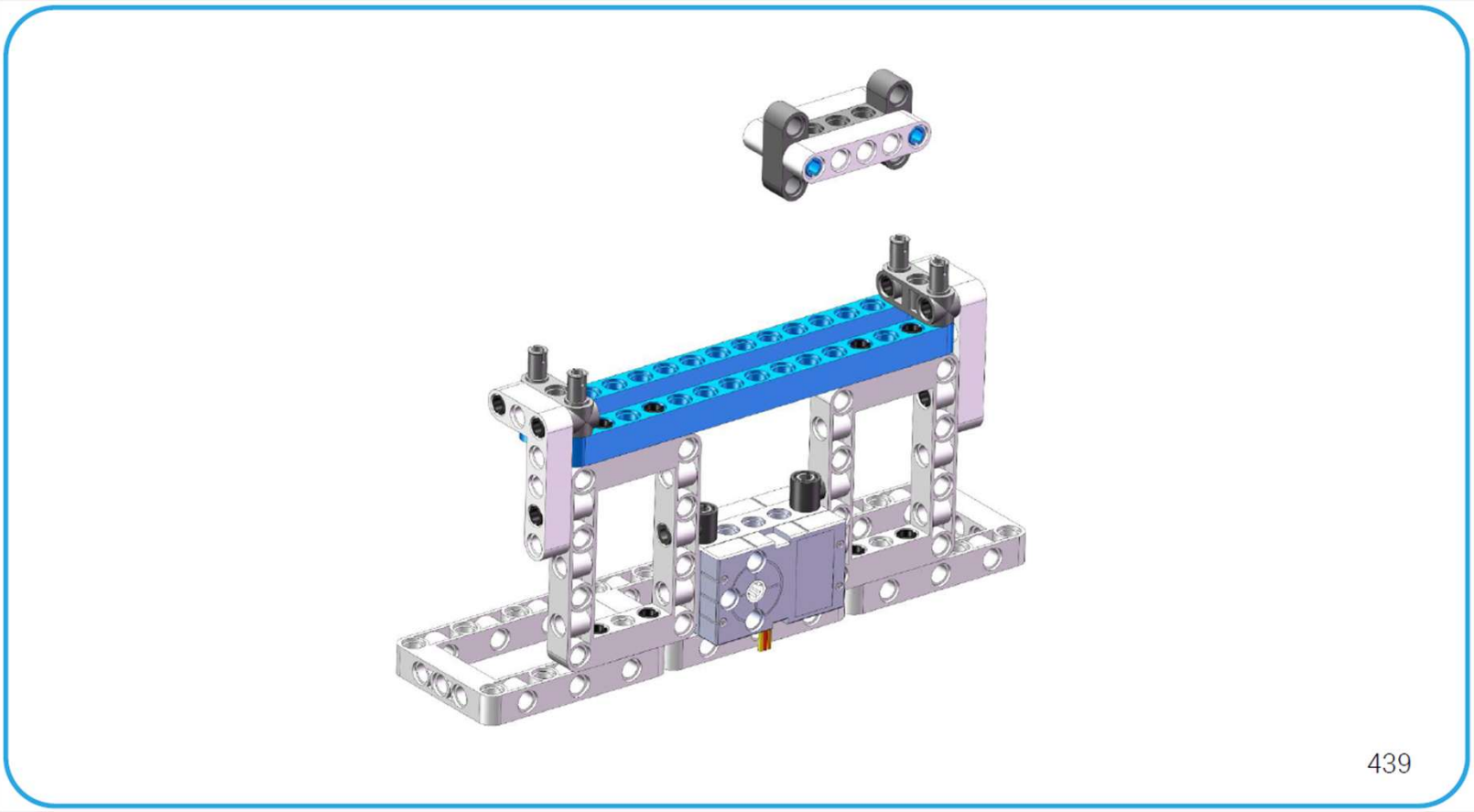
Step 17



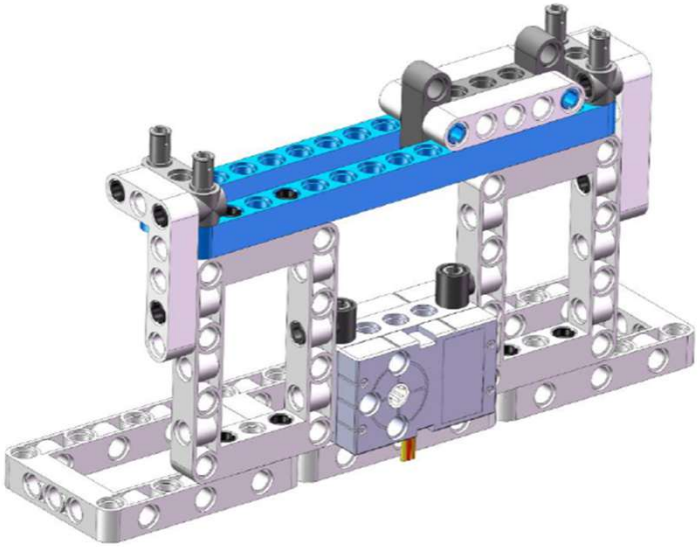
Step 18



Step 19

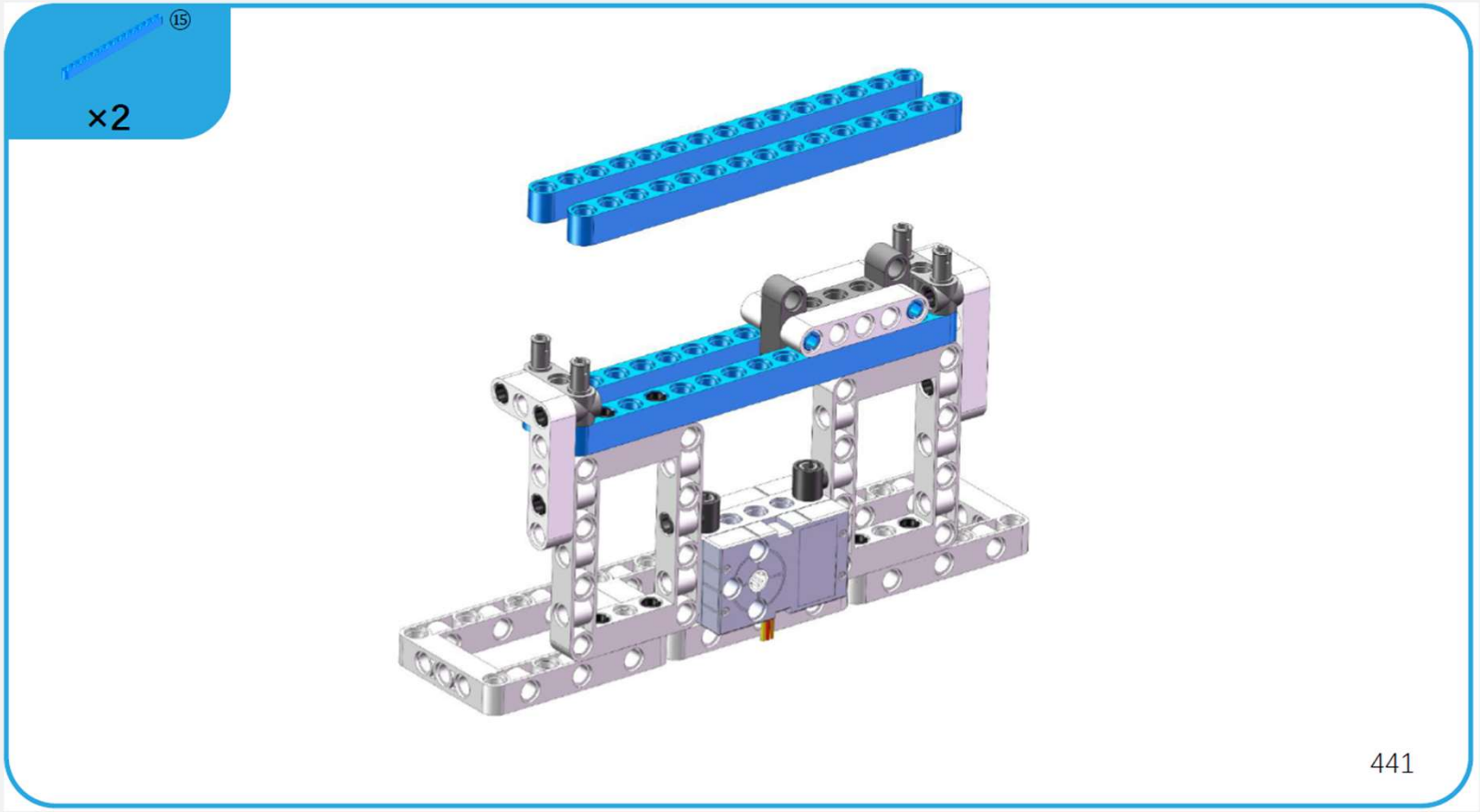


Step 20

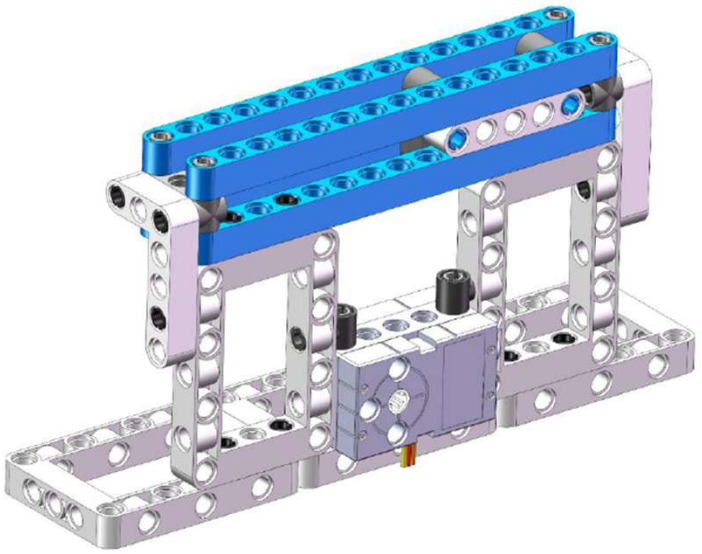


440

Step 21

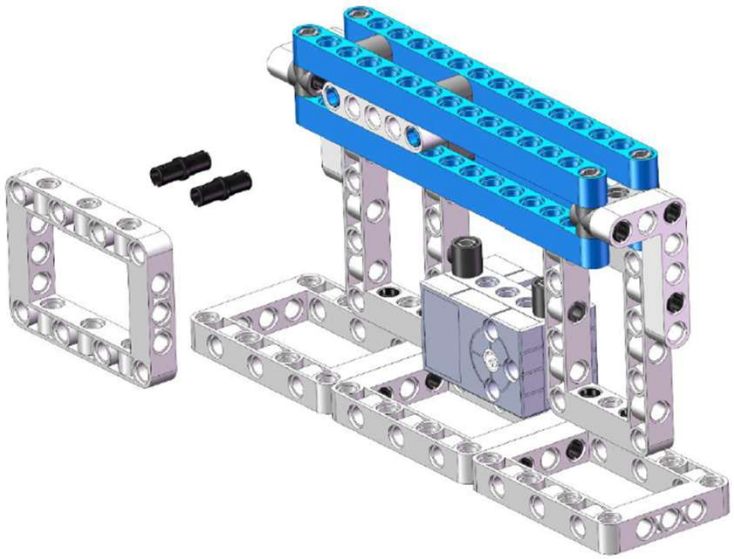


Step 22



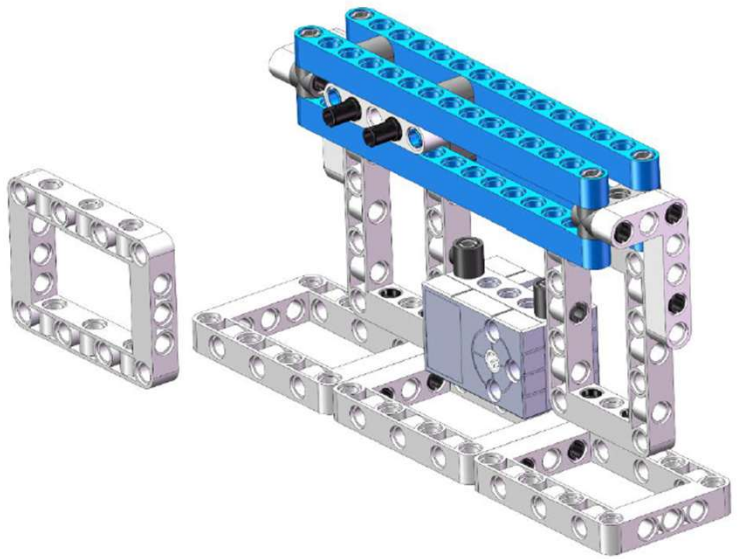
442

Step 23



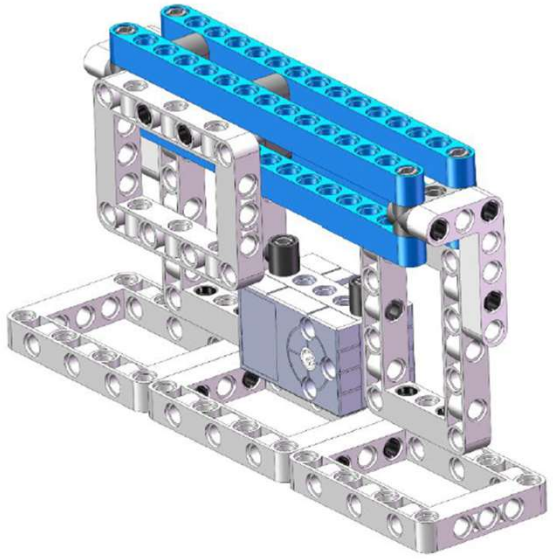
443

Step 24



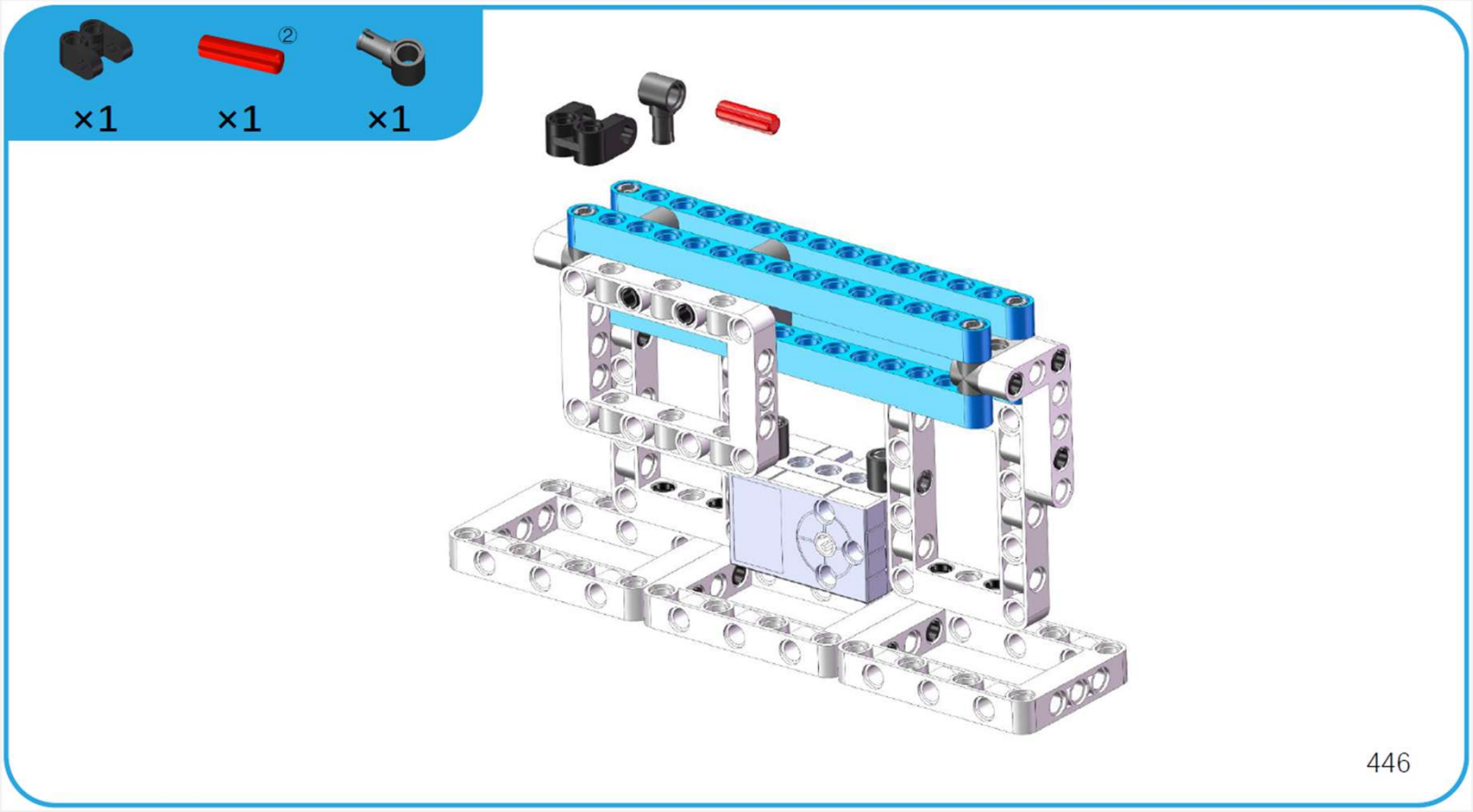
444

Step 25

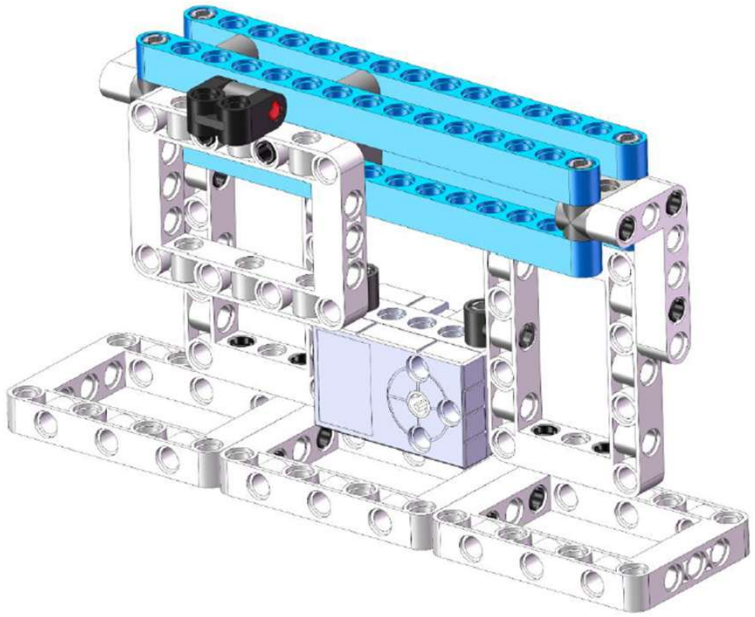


445

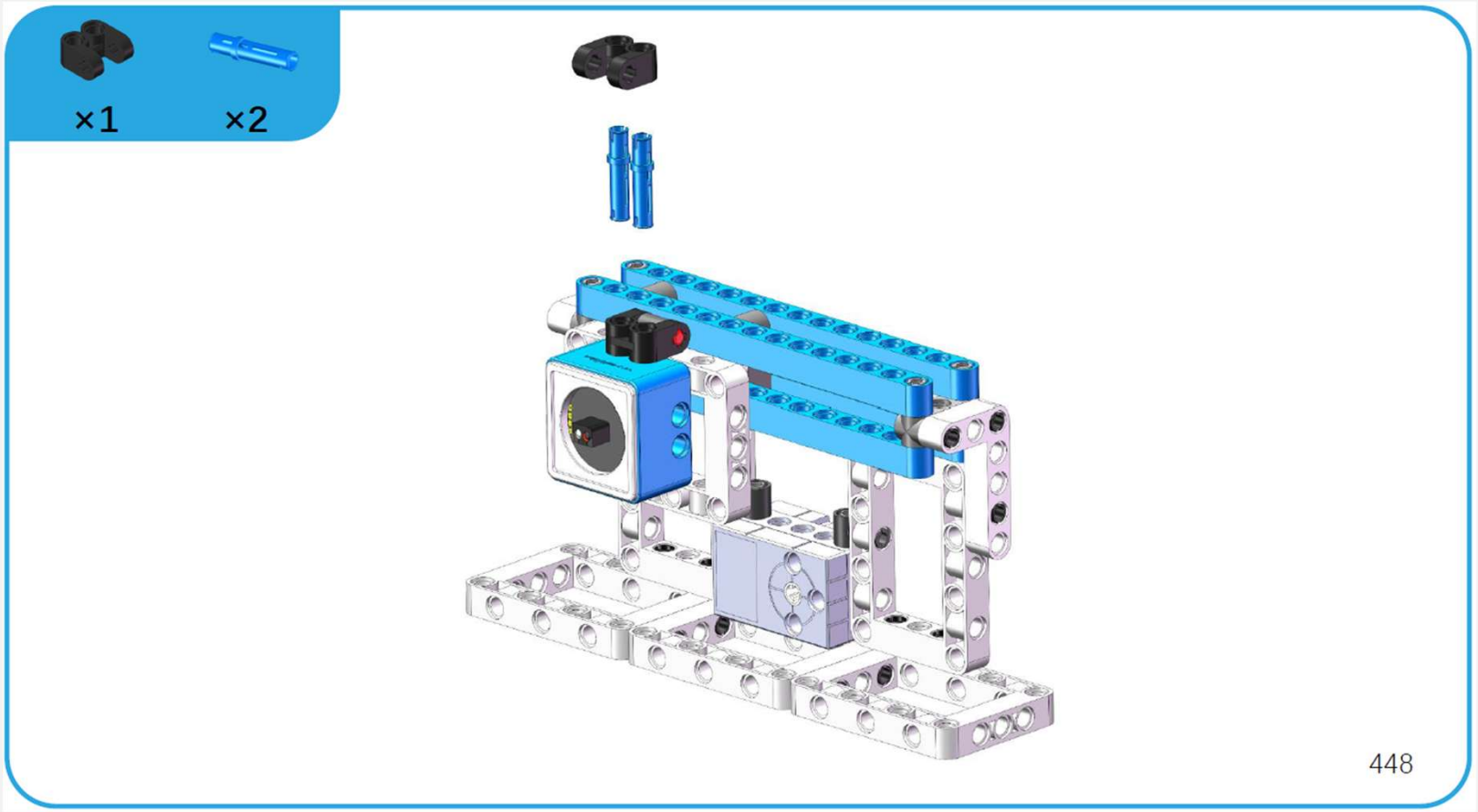
Step 26



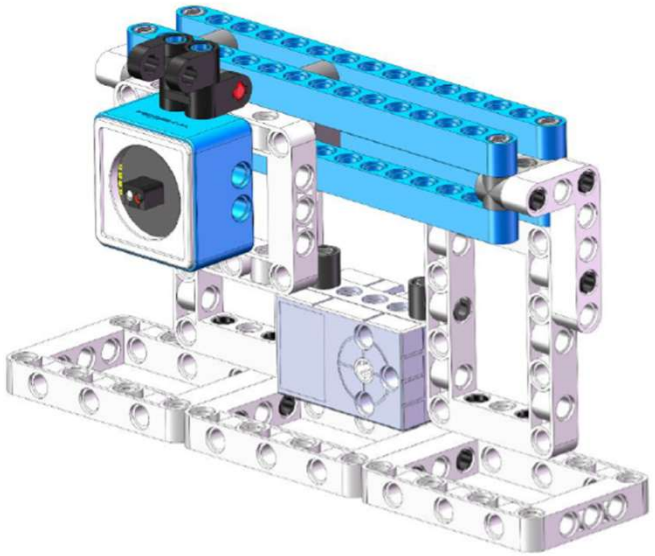
Step 27



Step 28

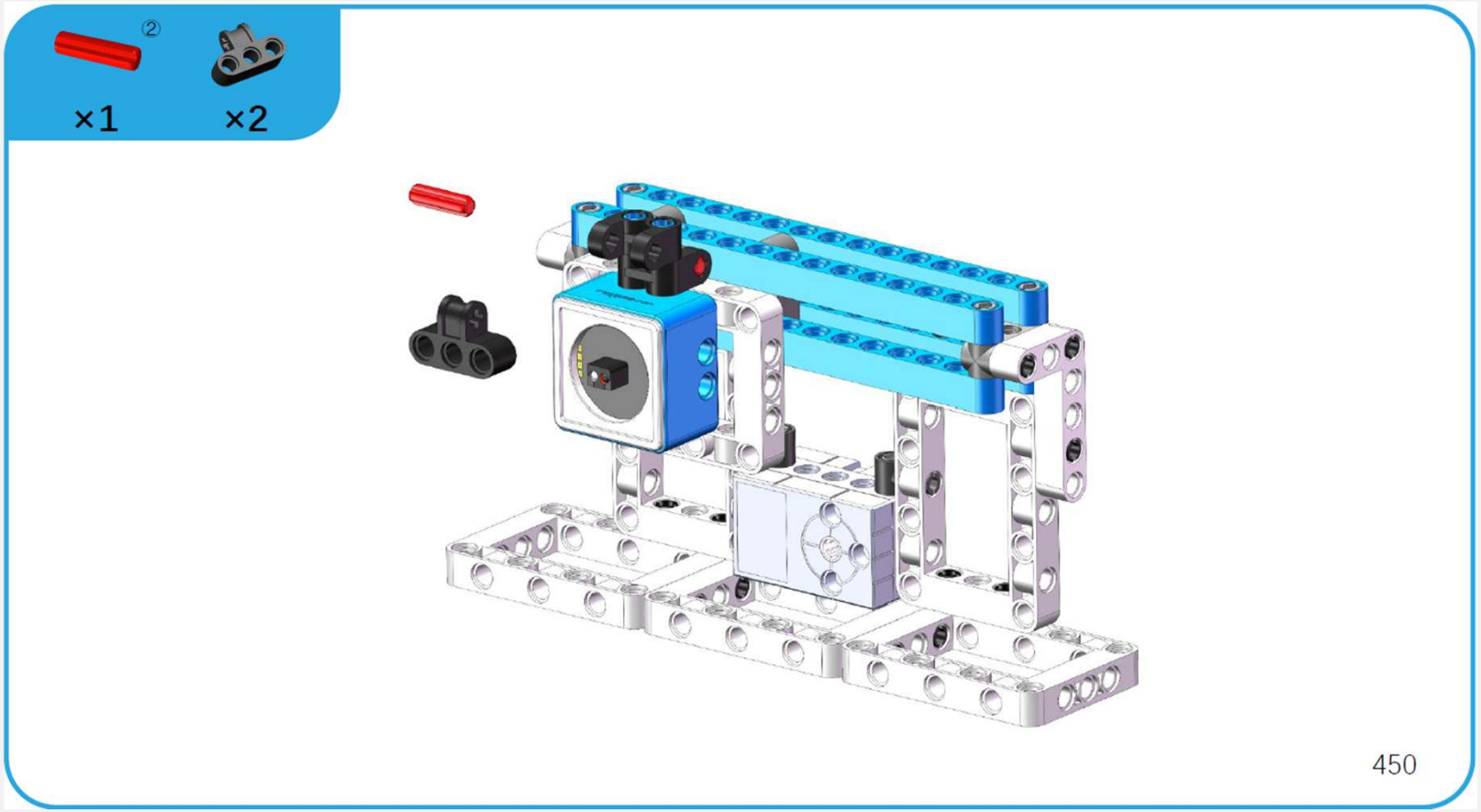


Step 29

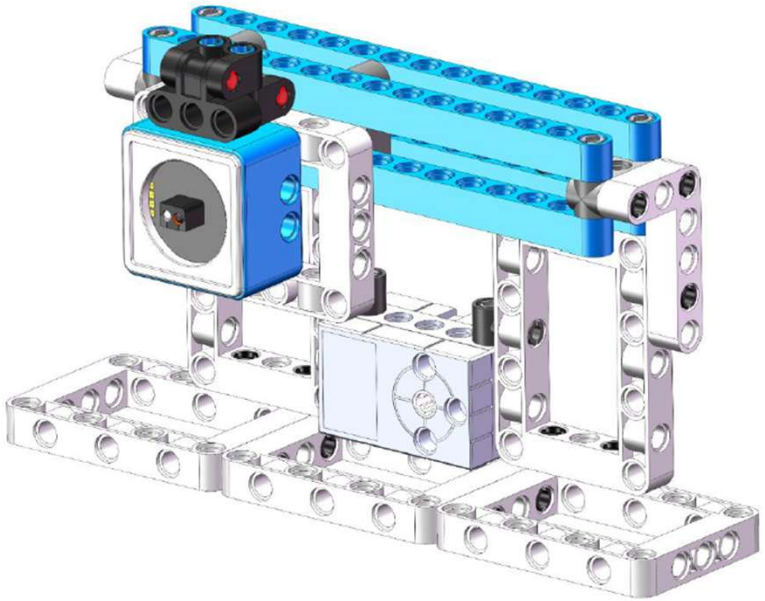


449

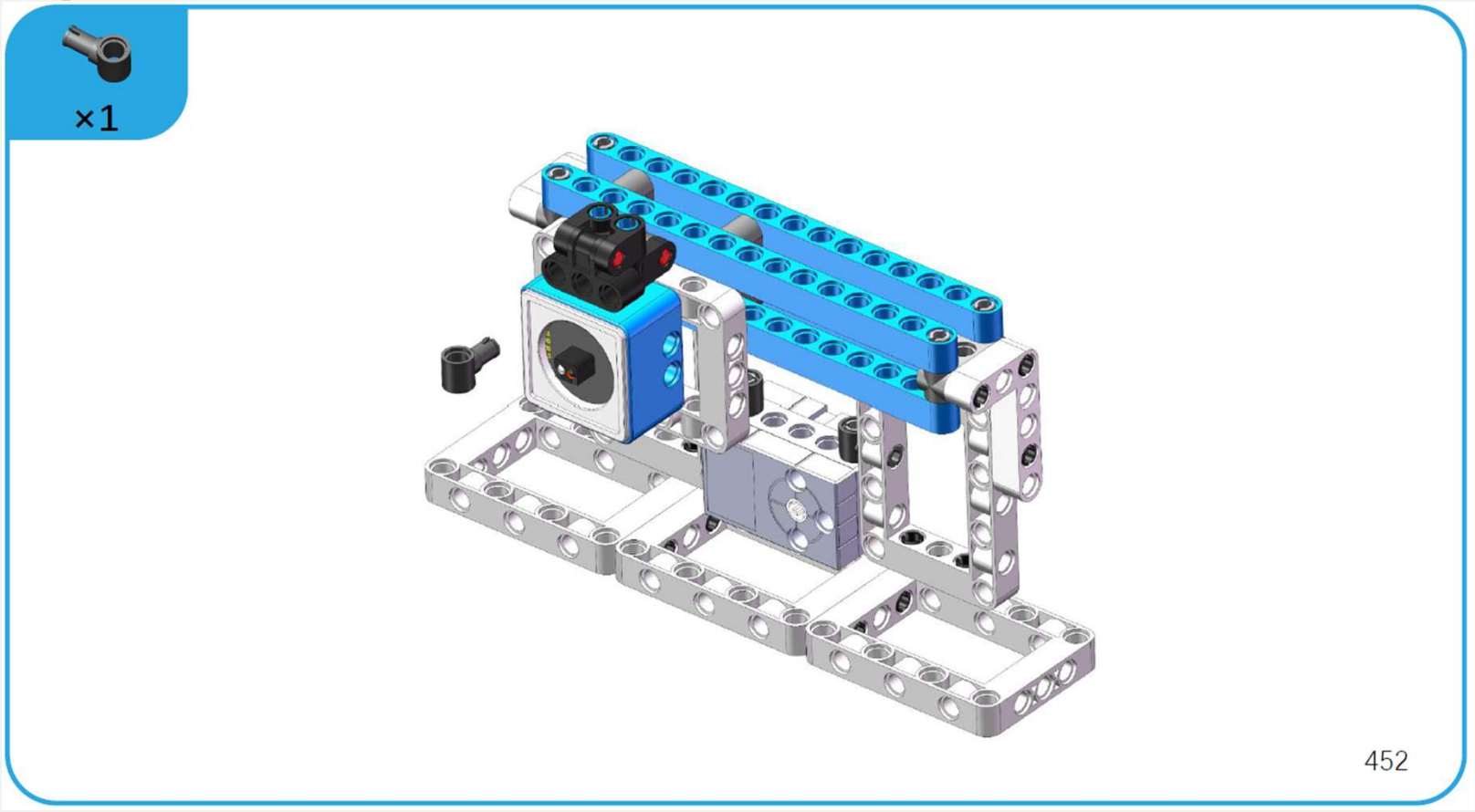
Step 30



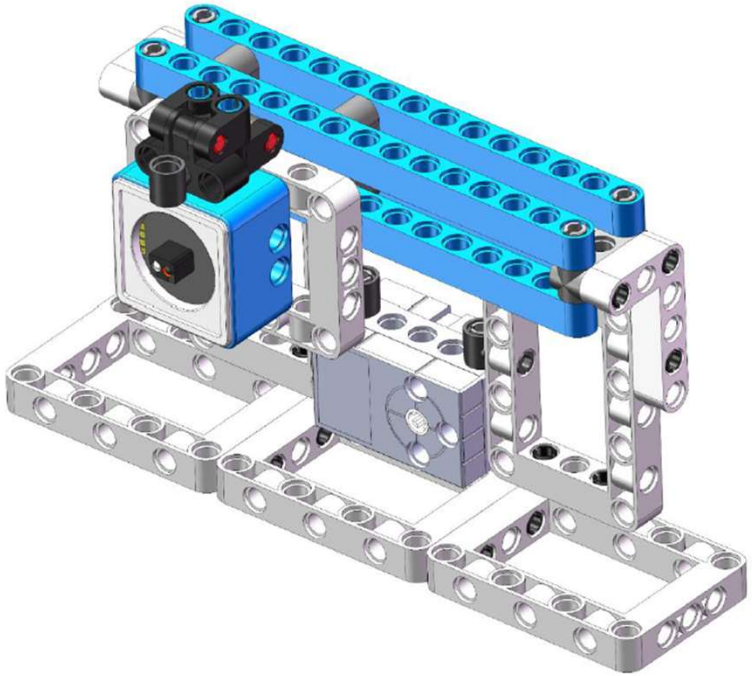
Step 31



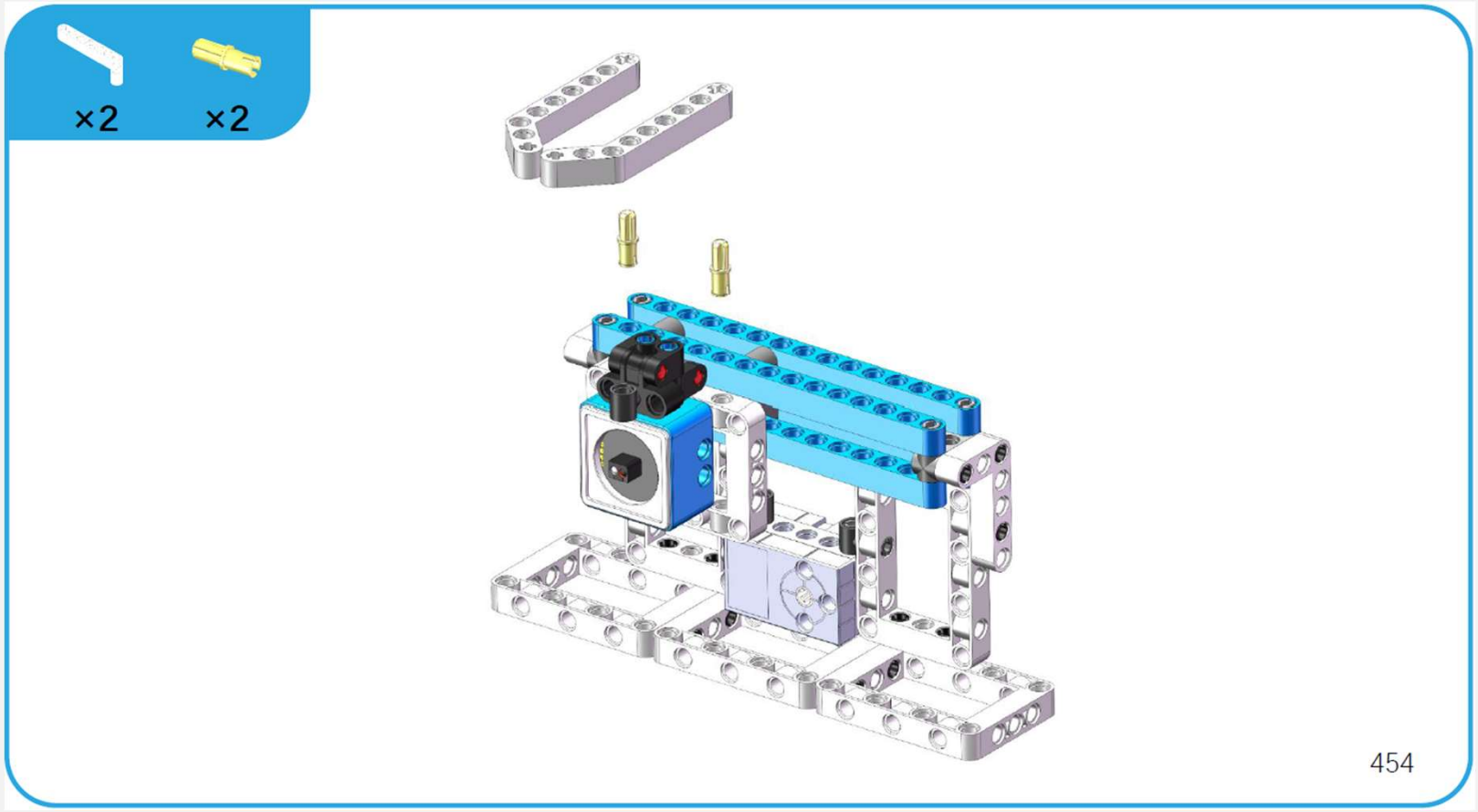
Step 32



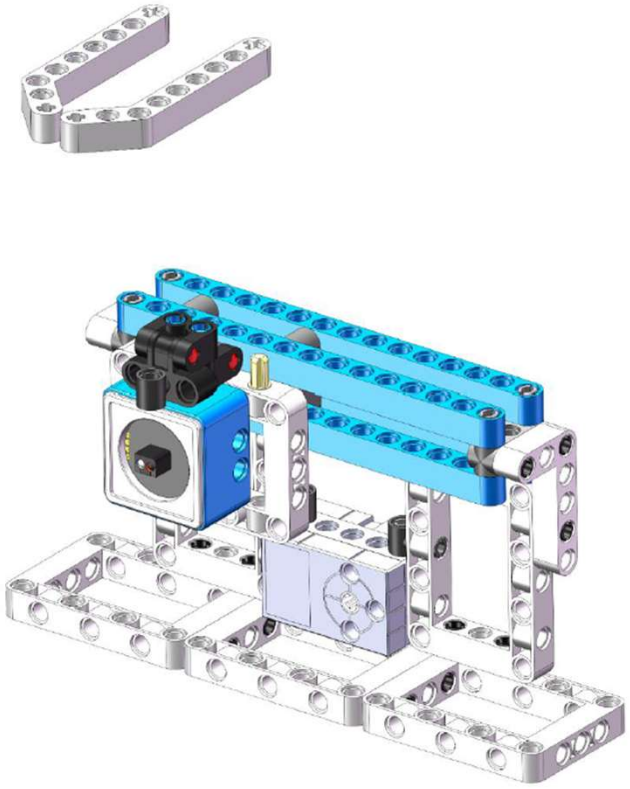
Step 33



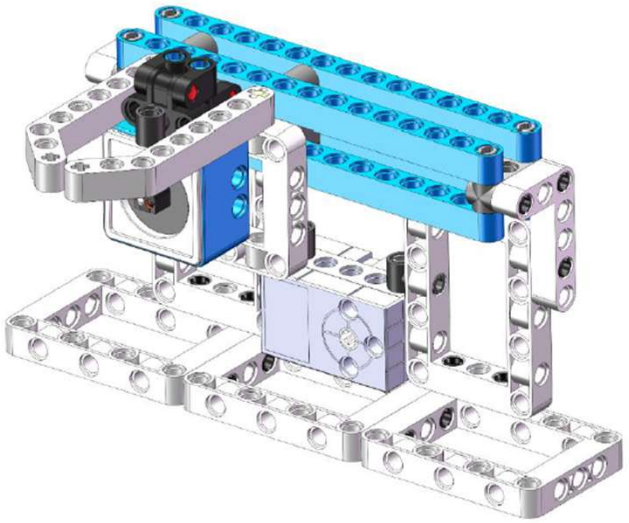
Step 34



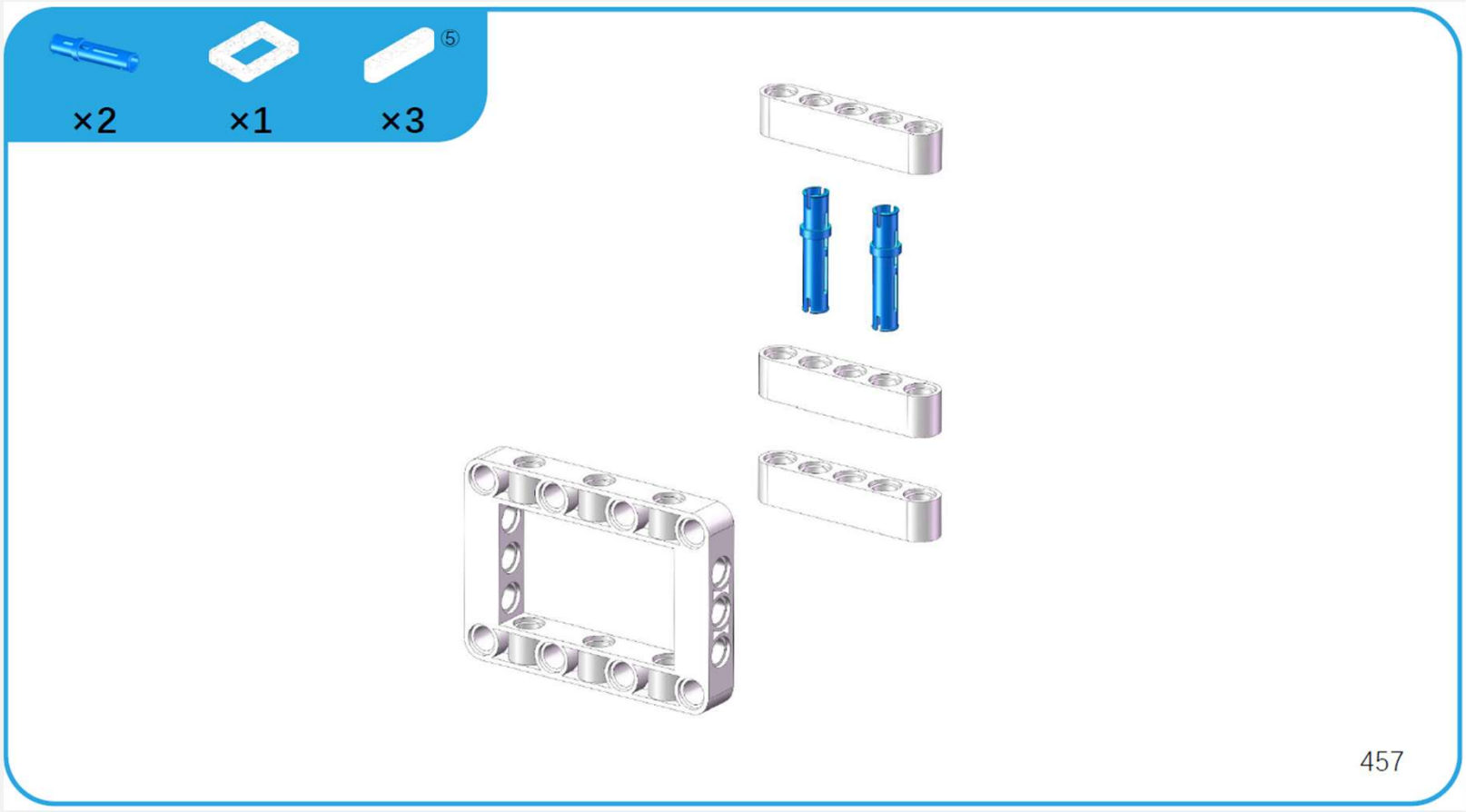
Step 35



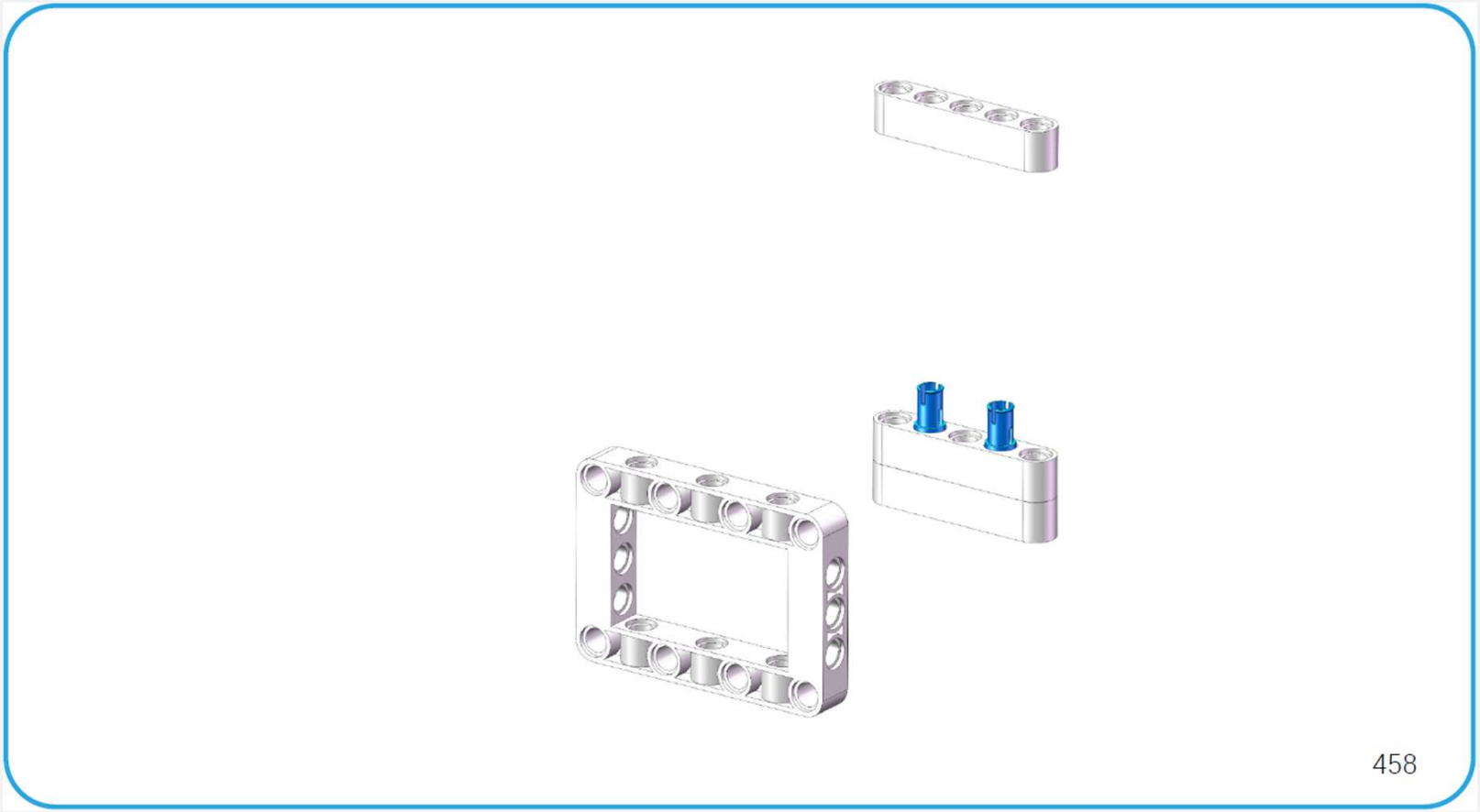
Step 36



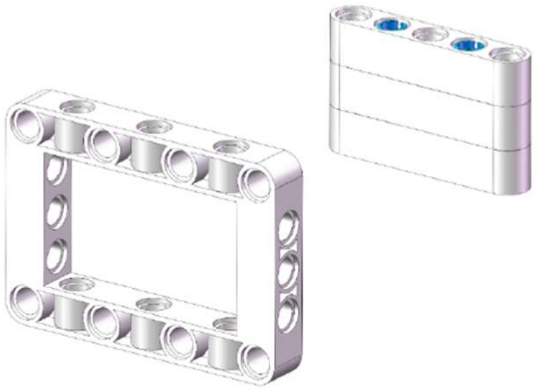
Step 37



Step 38

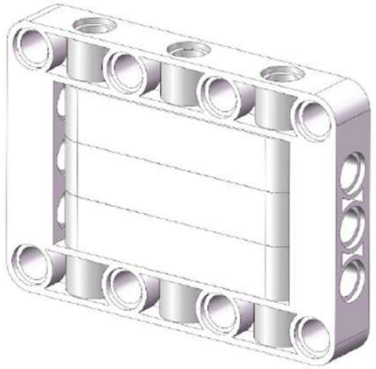


Step 39



459

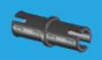
Step 40

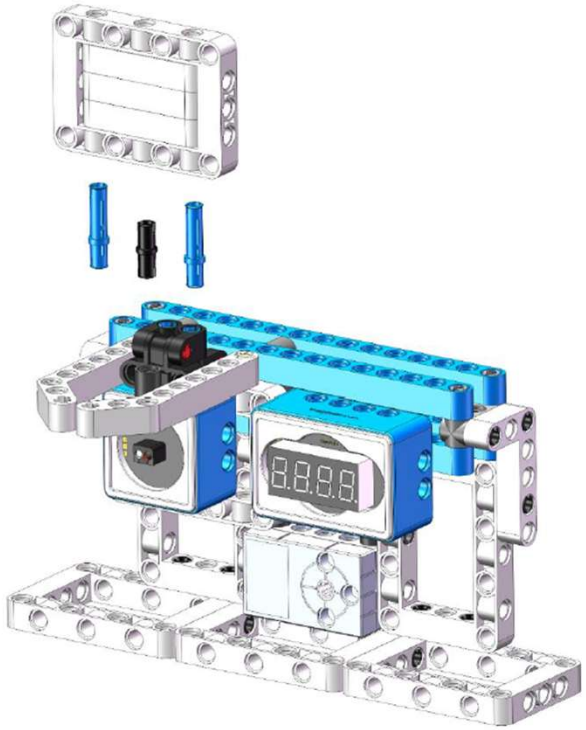


460

Step 41

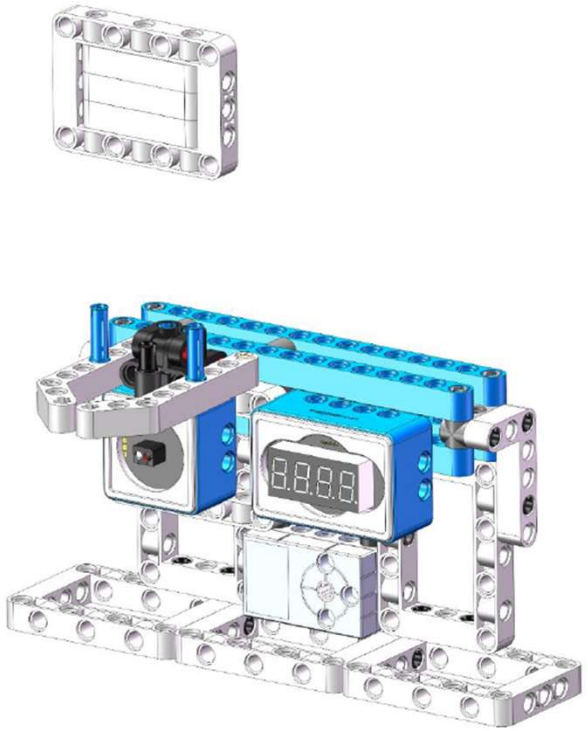

×2


×1

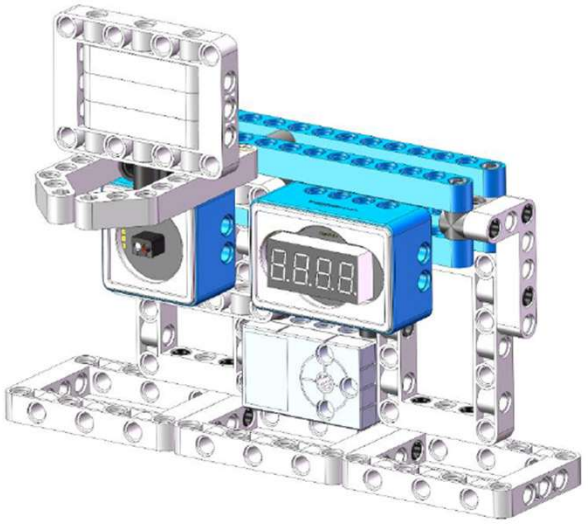


461

Step 42



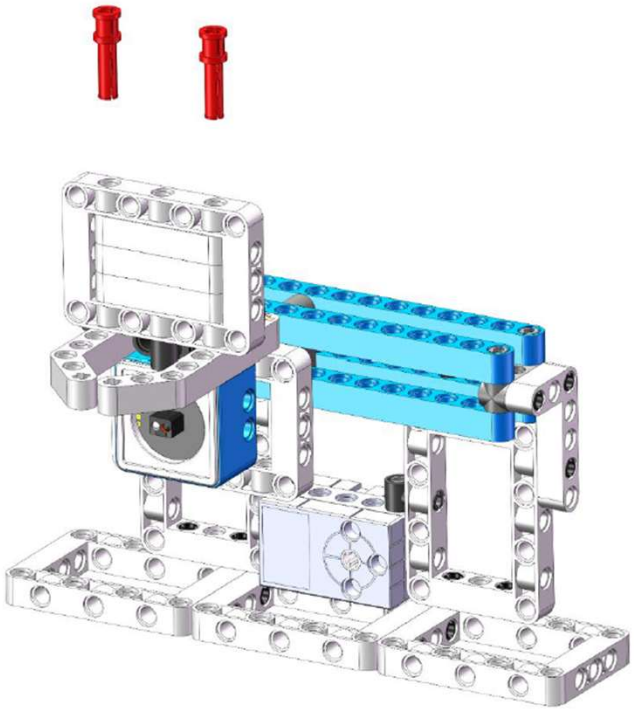
Step 43



463

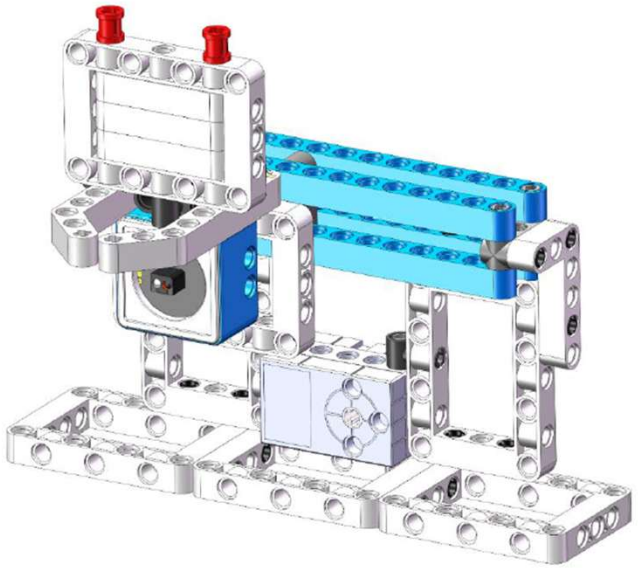
Step 44

×2

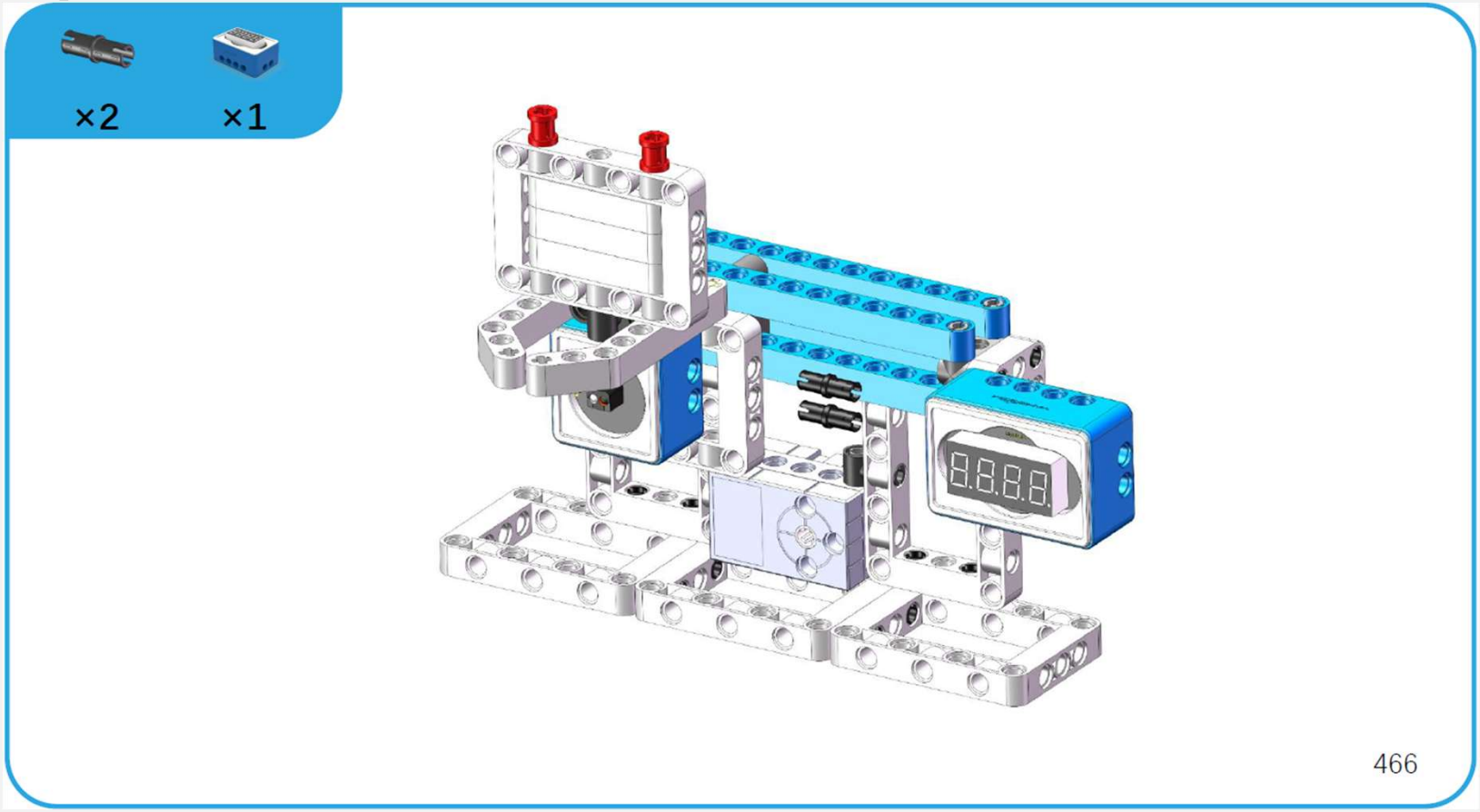


464

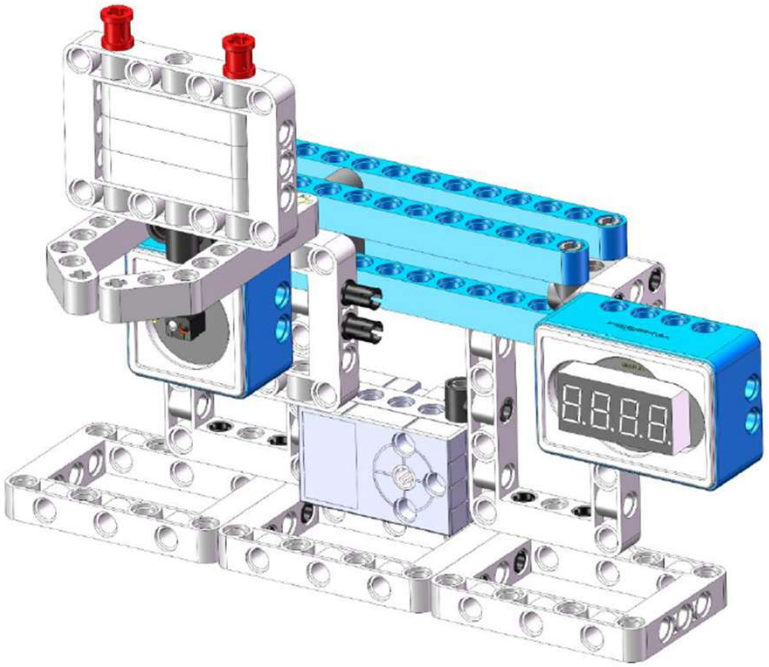
Step 45



Step 46

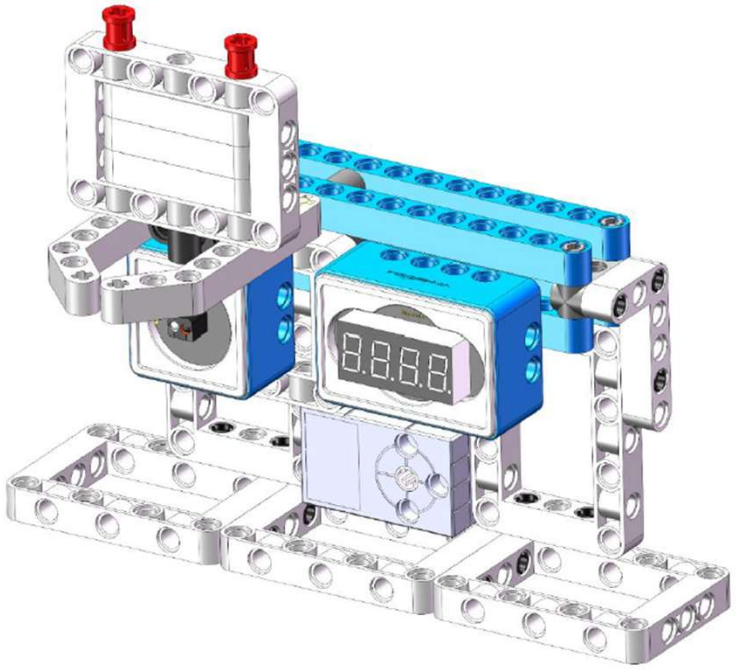


Step 47



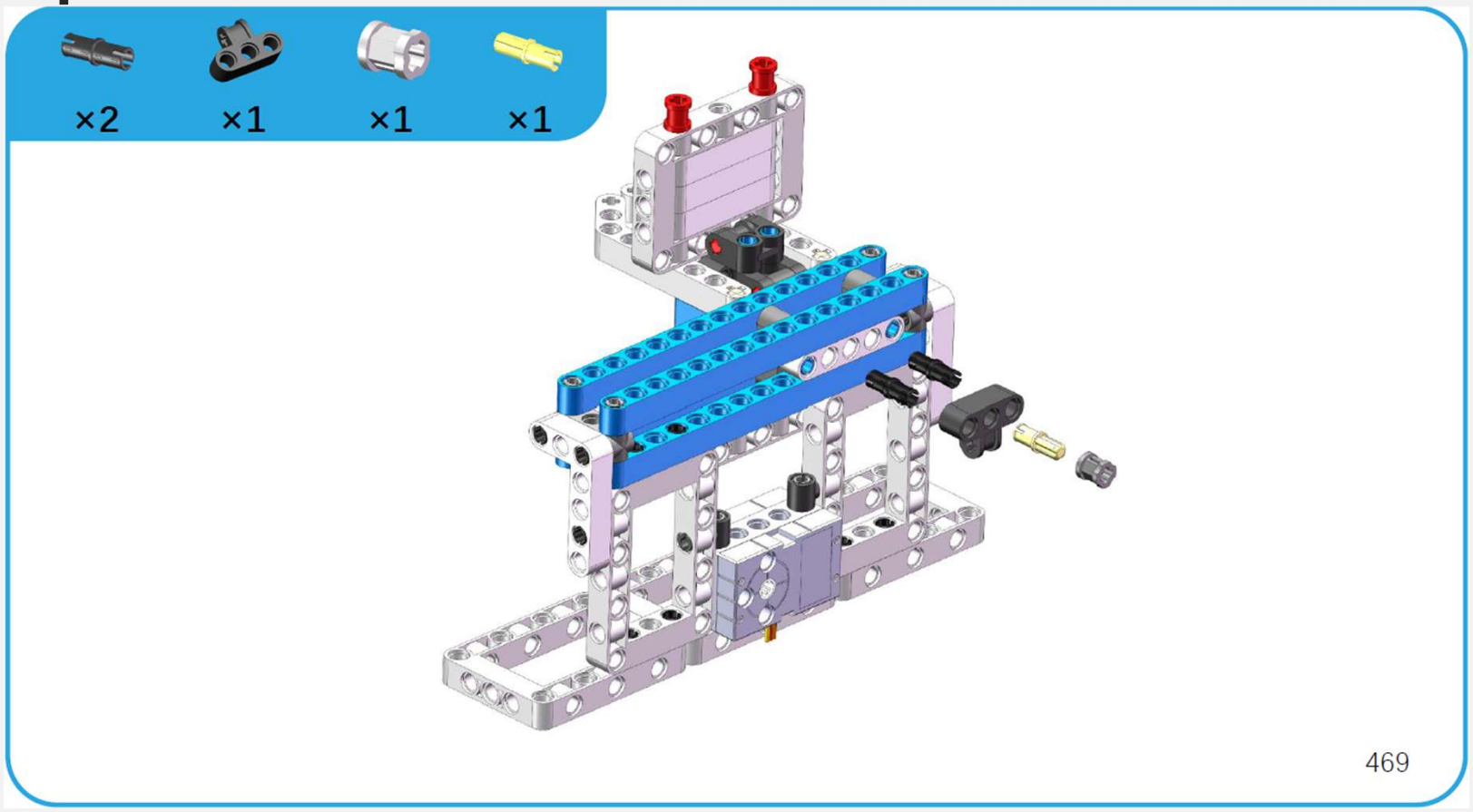
467

Step 48

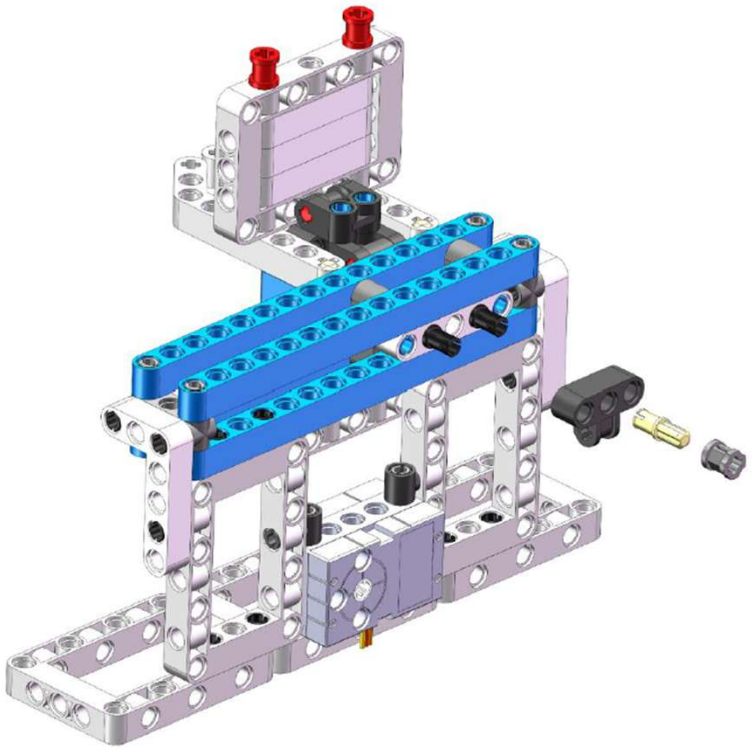


468

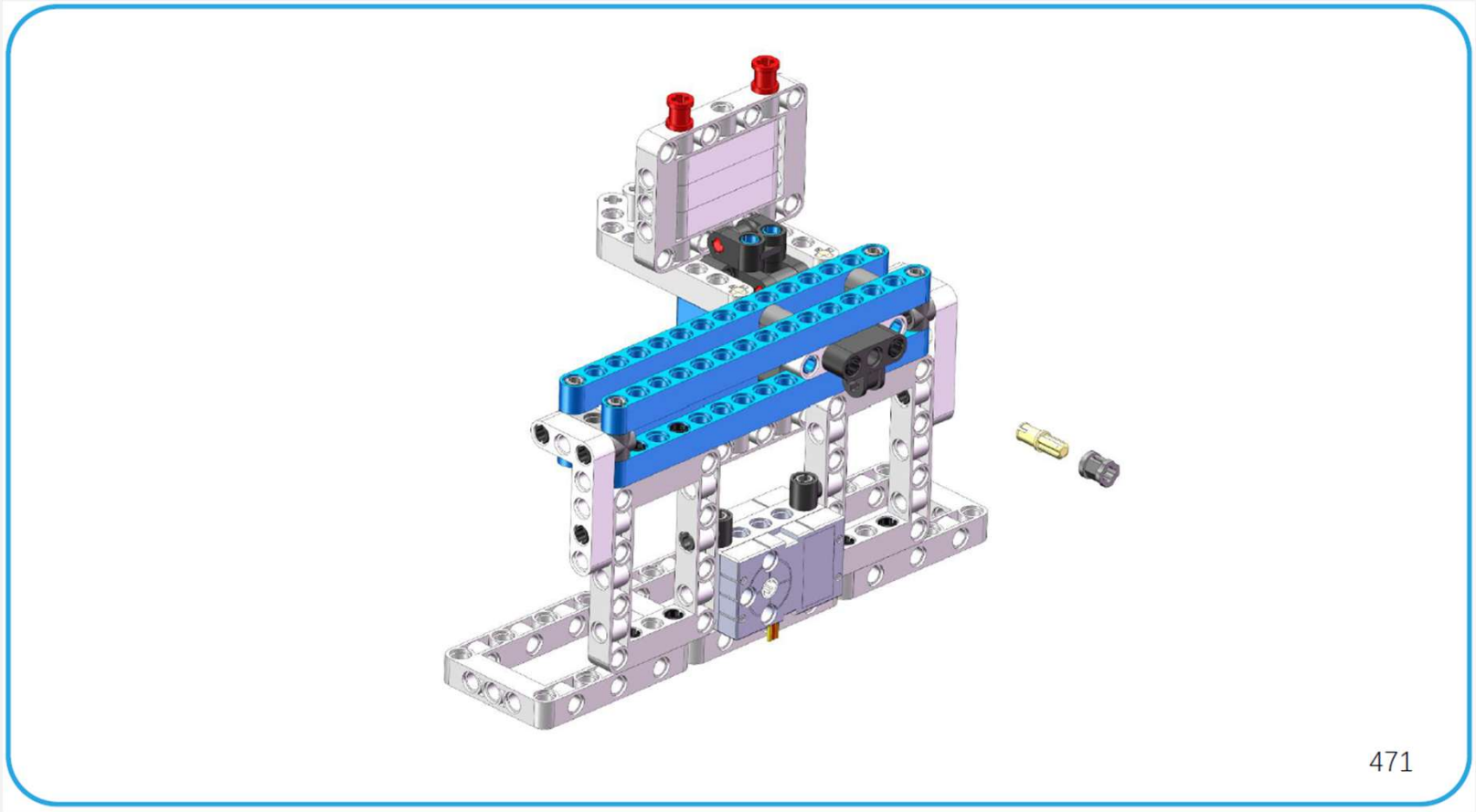
Step 49



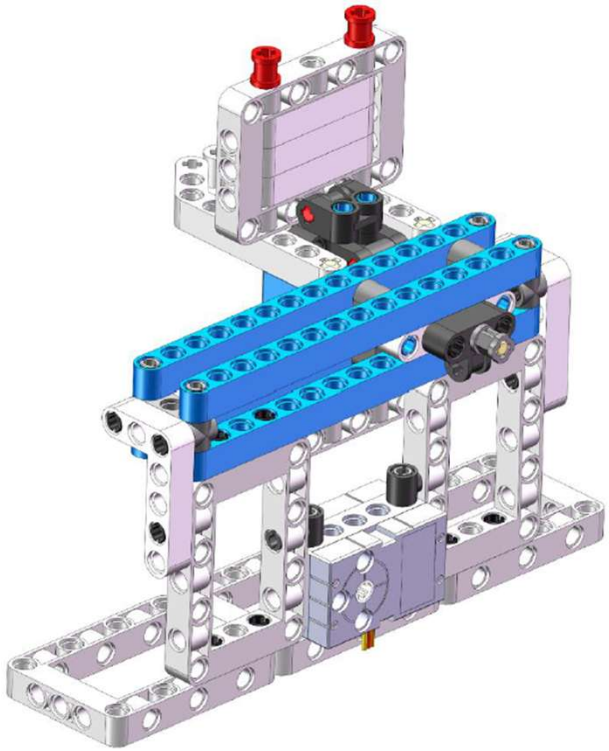
Step 50



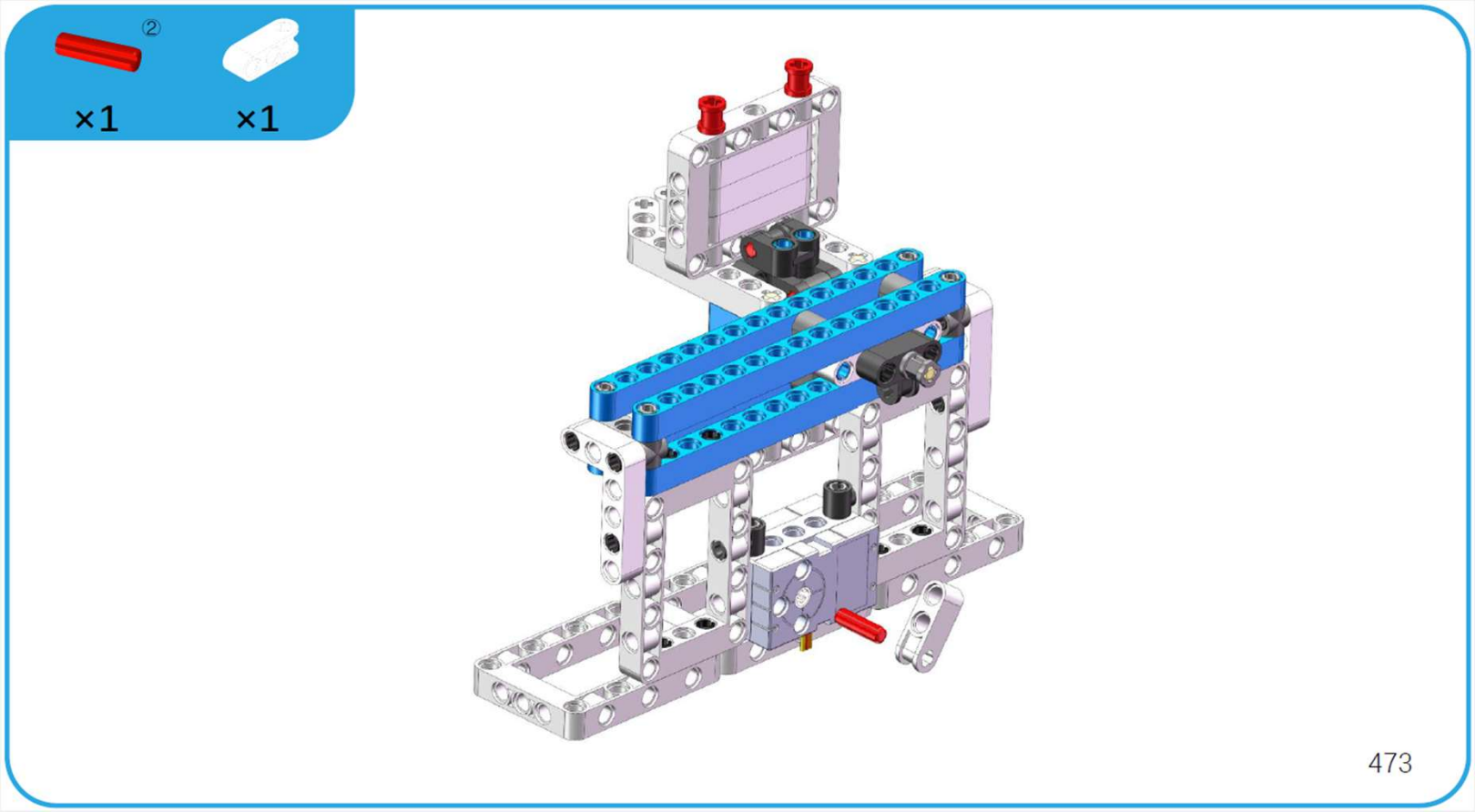
Step 51



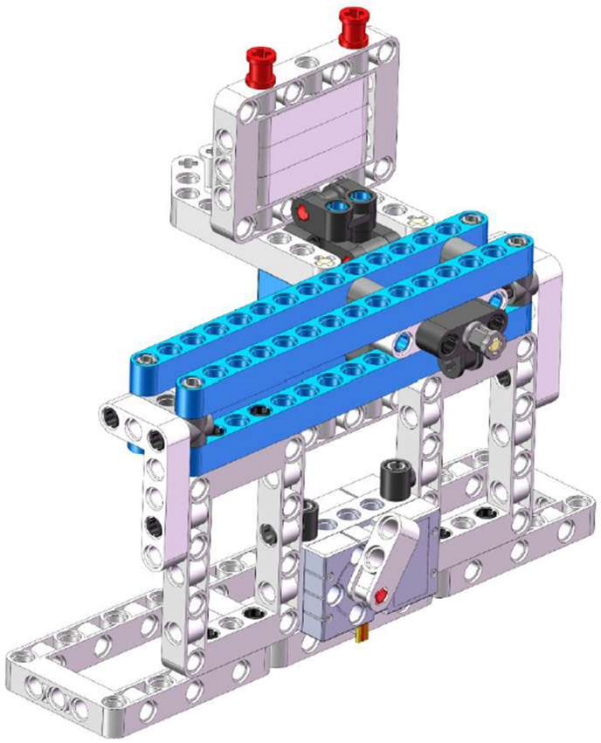
Step 52



Step 53

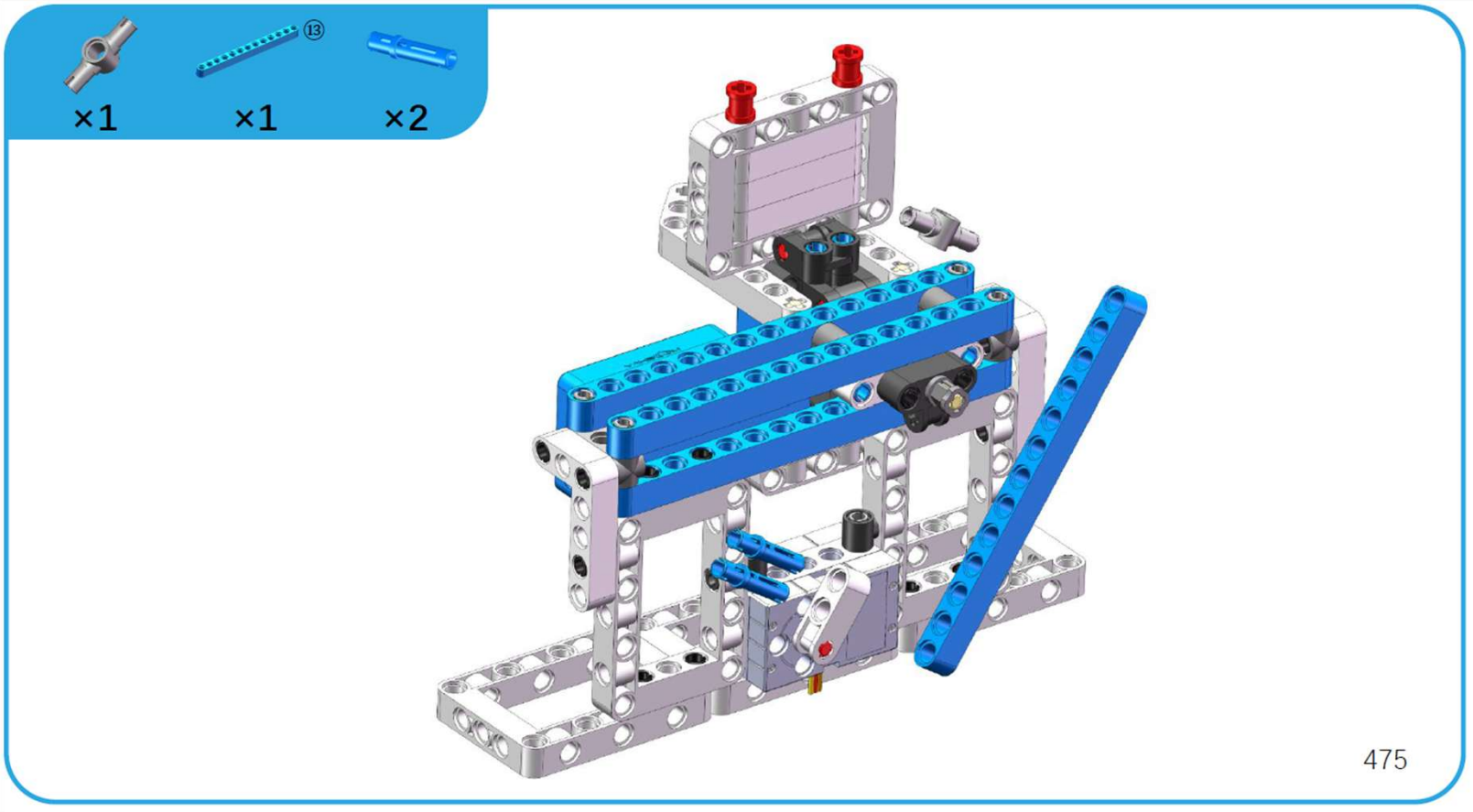


Step 54

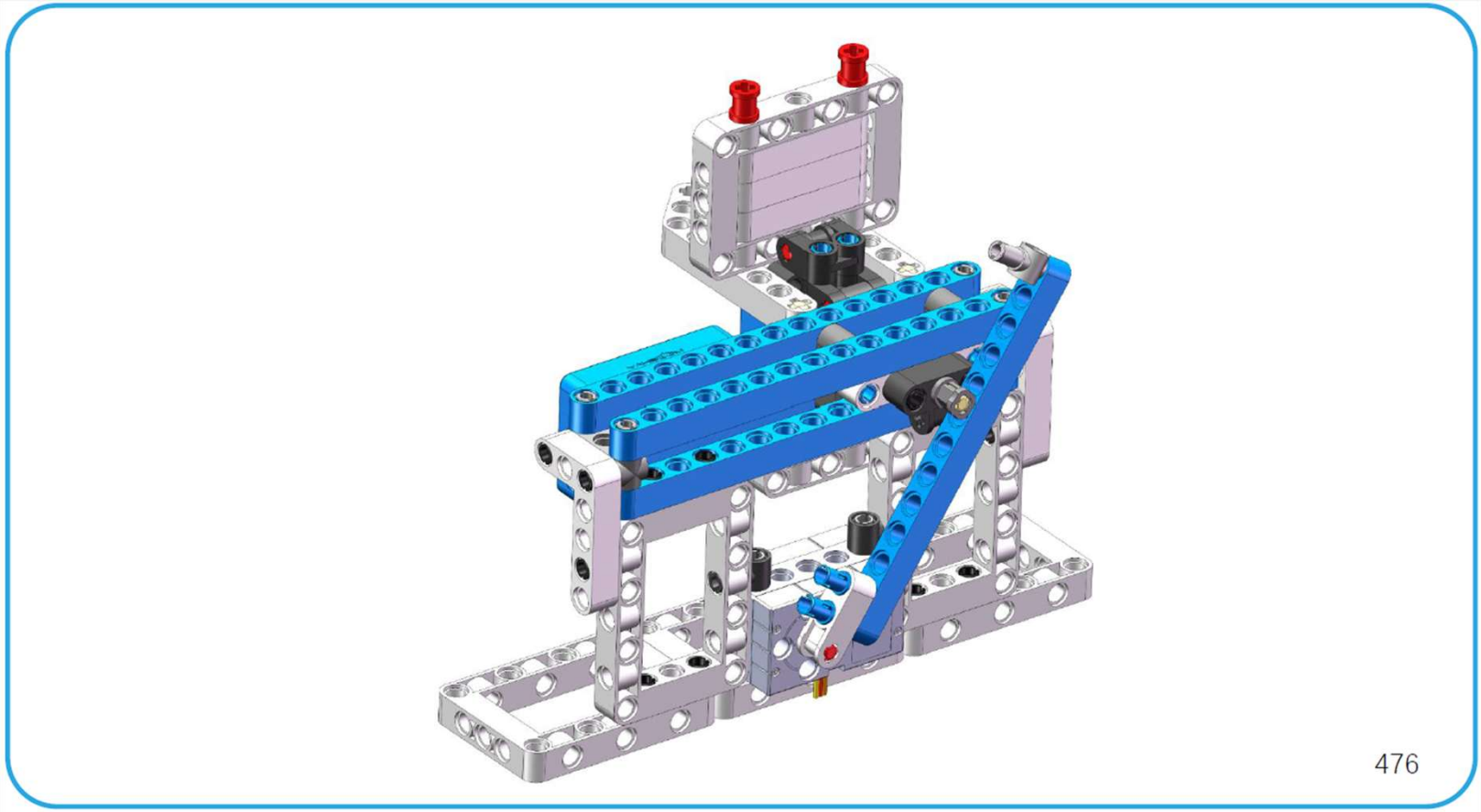


474

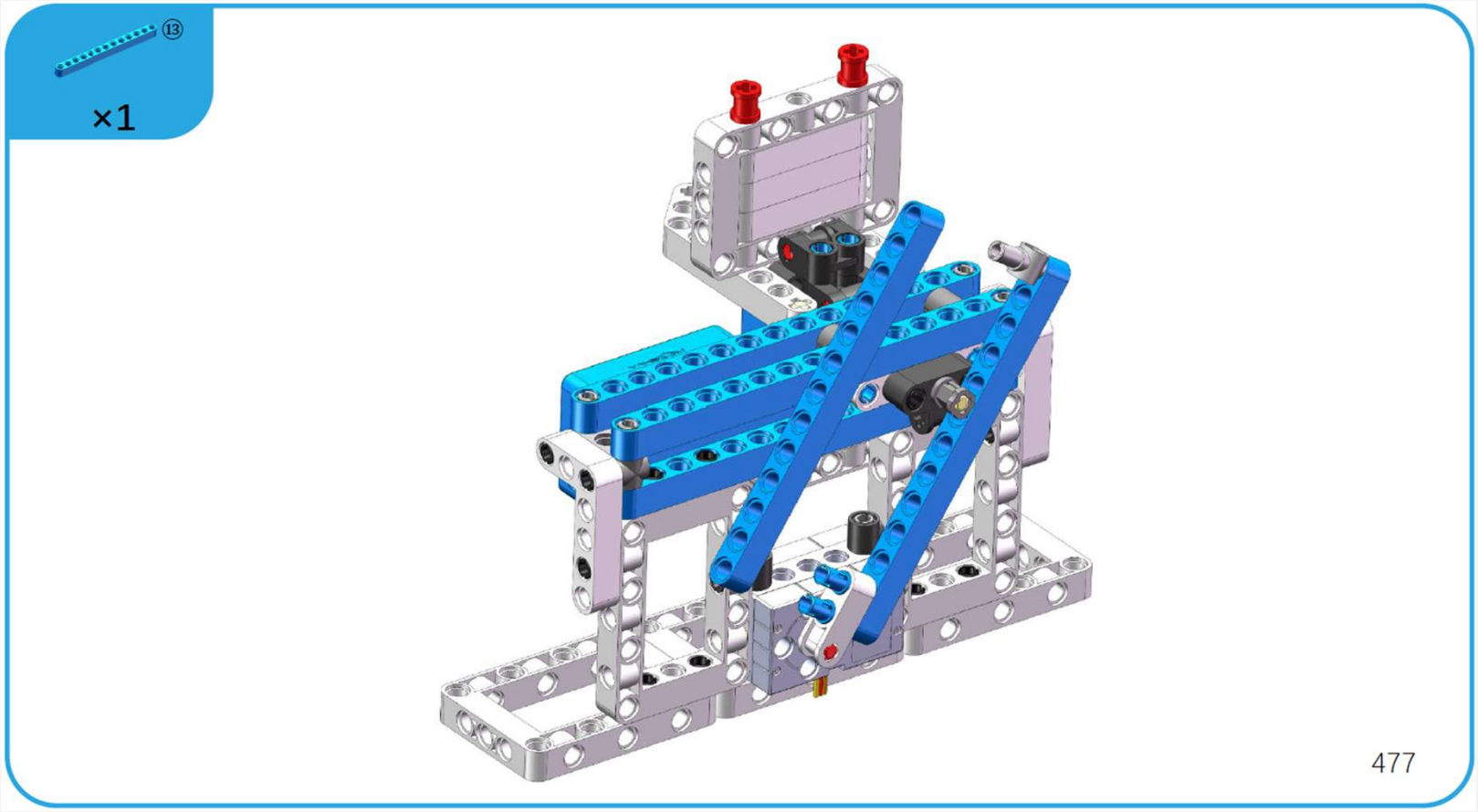
Step 55



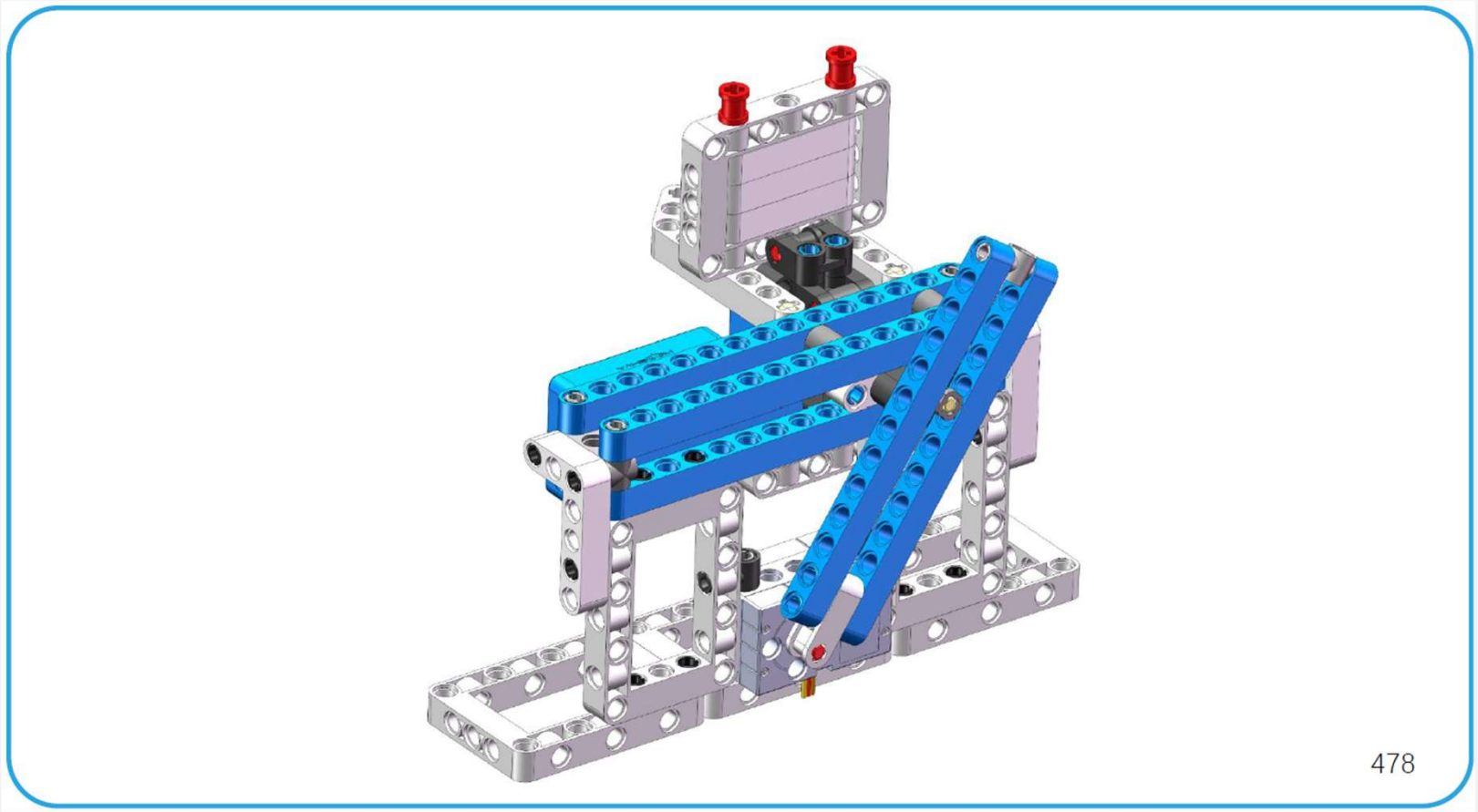
Step 56



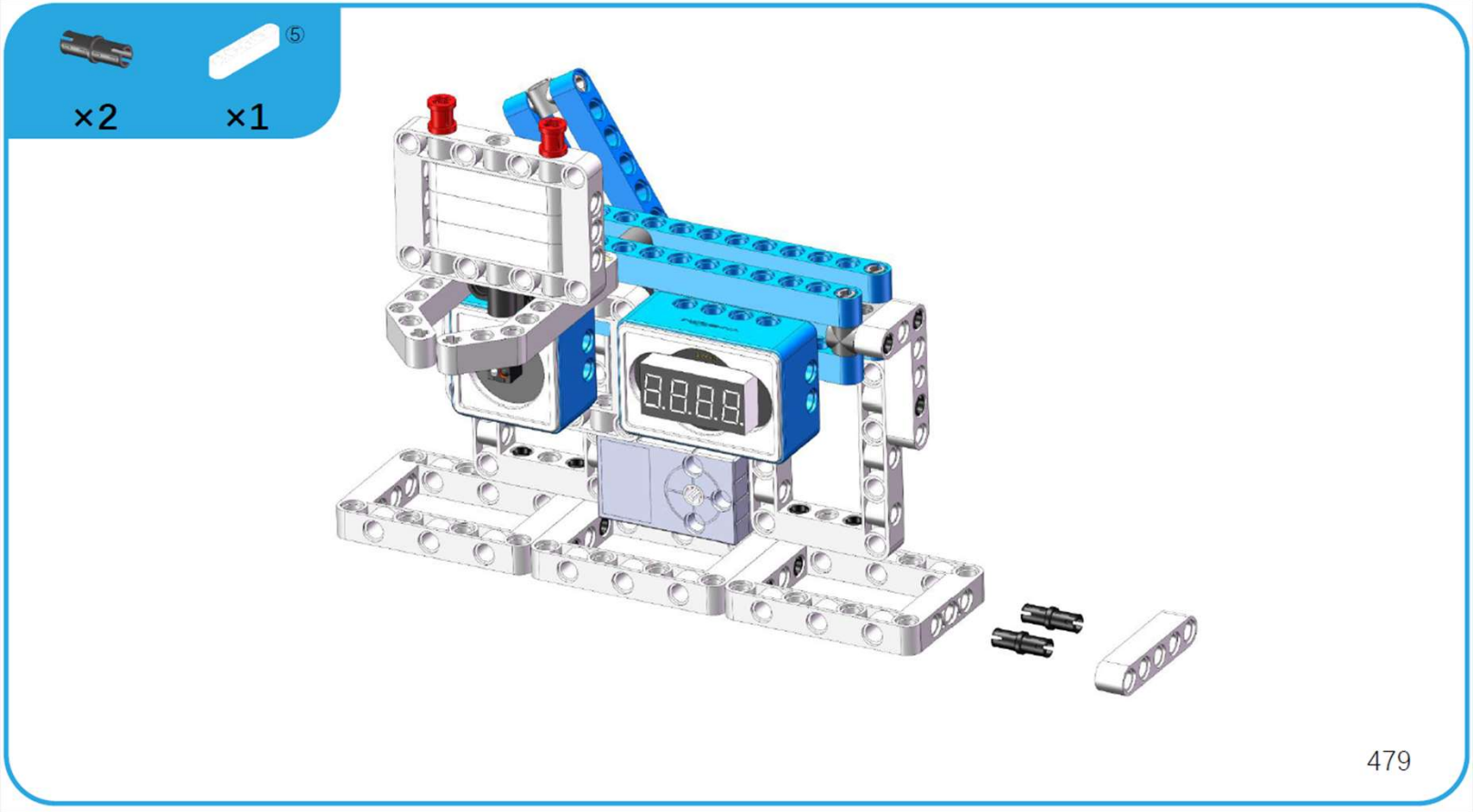
Step 57



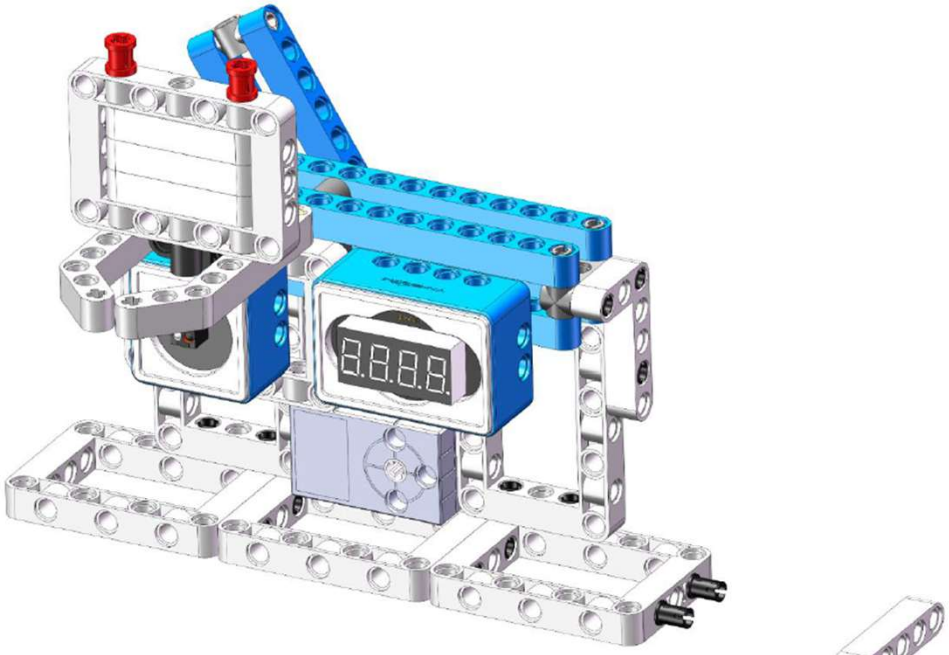
Step 58



Step 59

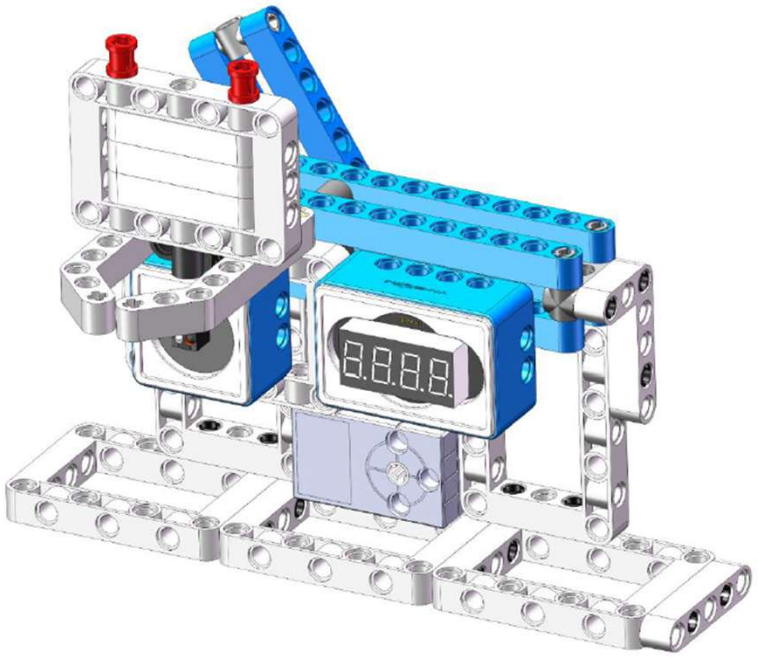


Step 60



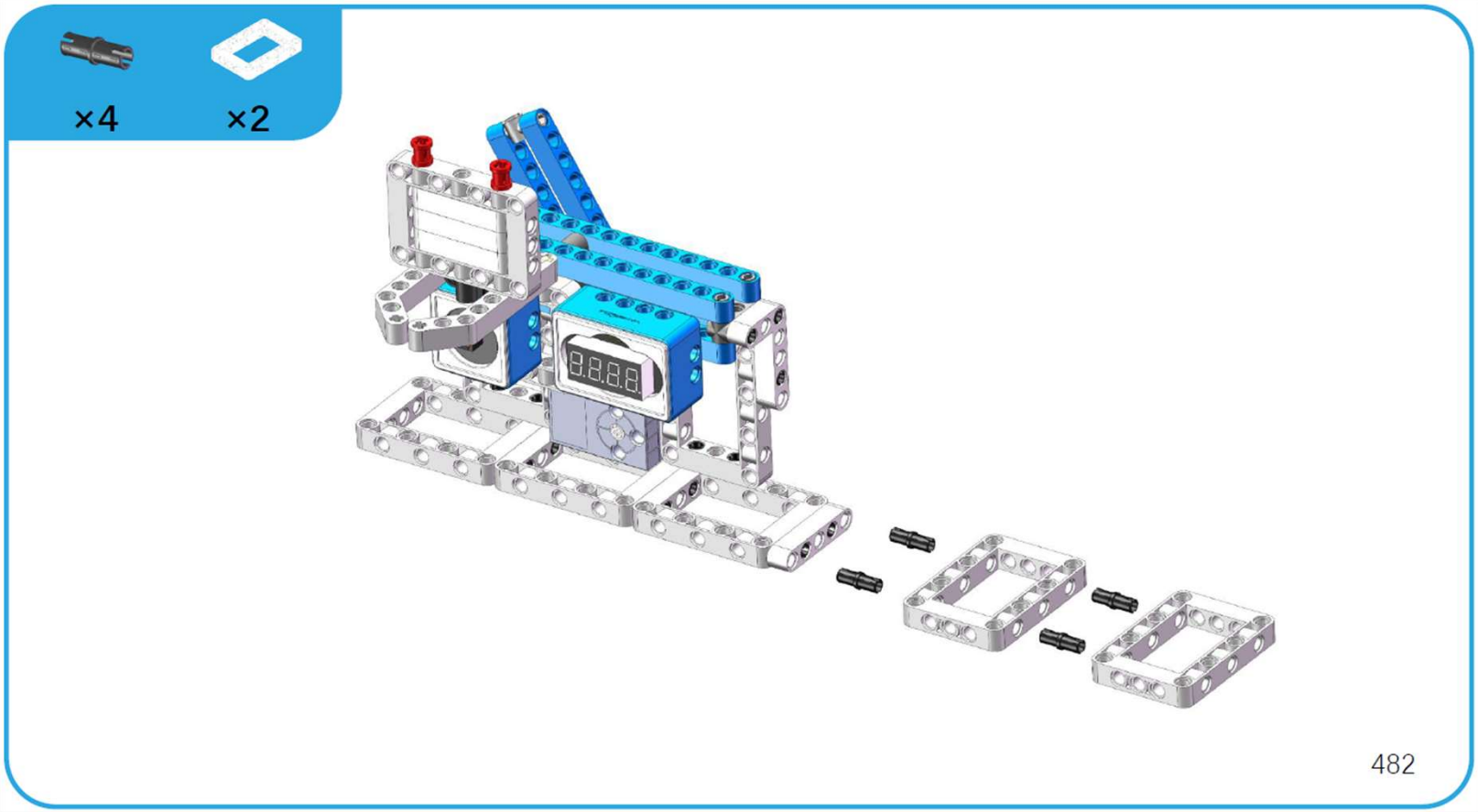
480

Step 61

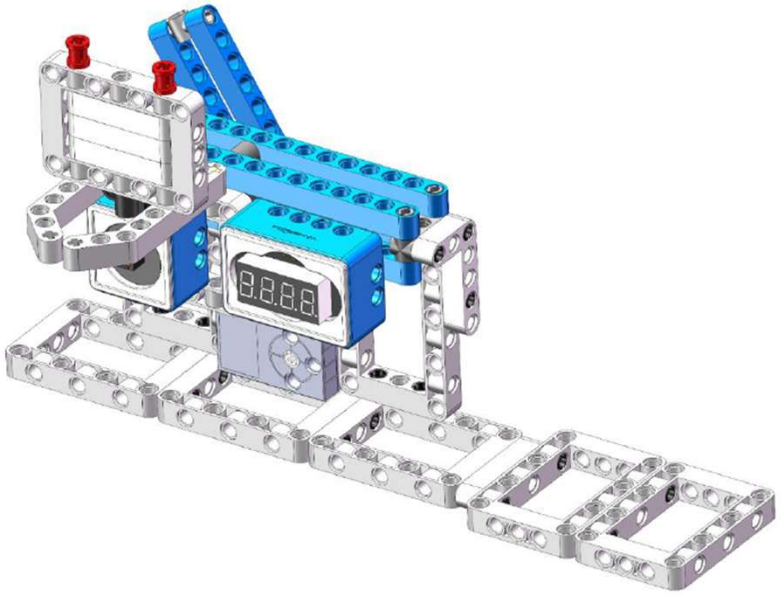


481

Step 62

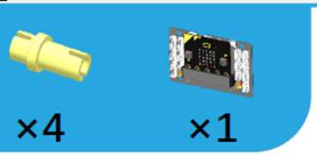


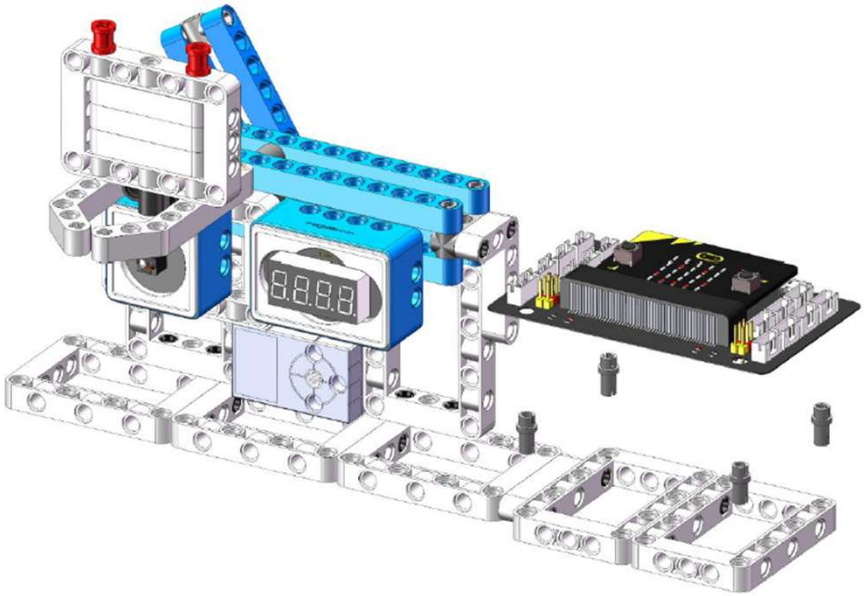
Step 63



483

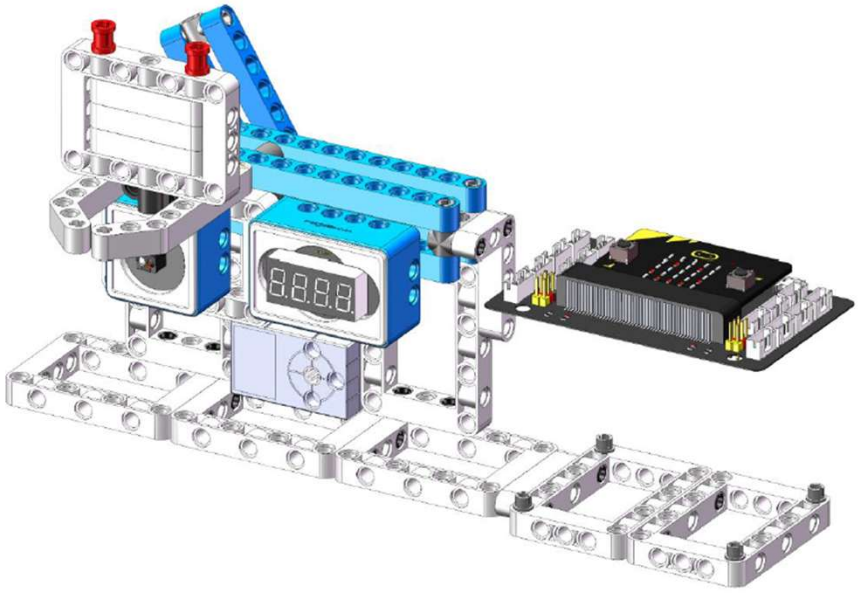
Step 64





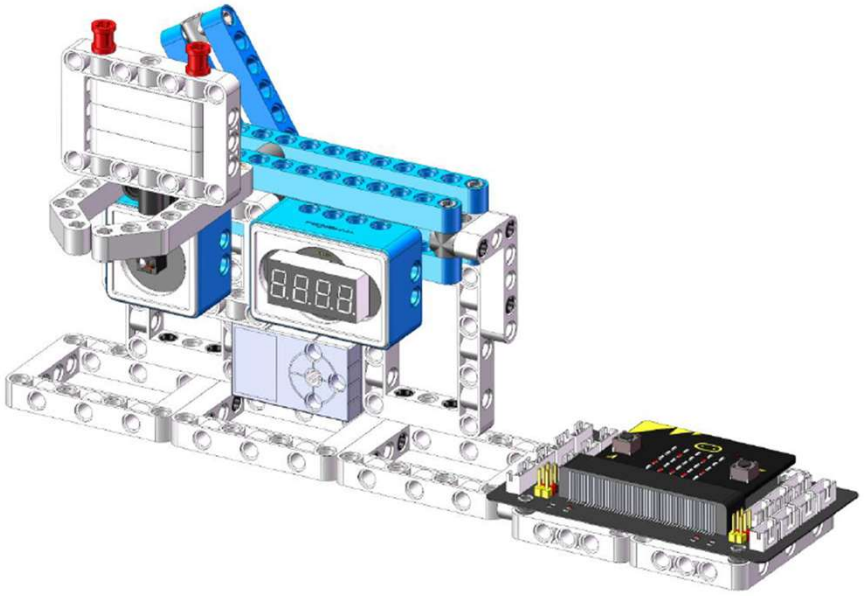
484

Step 65



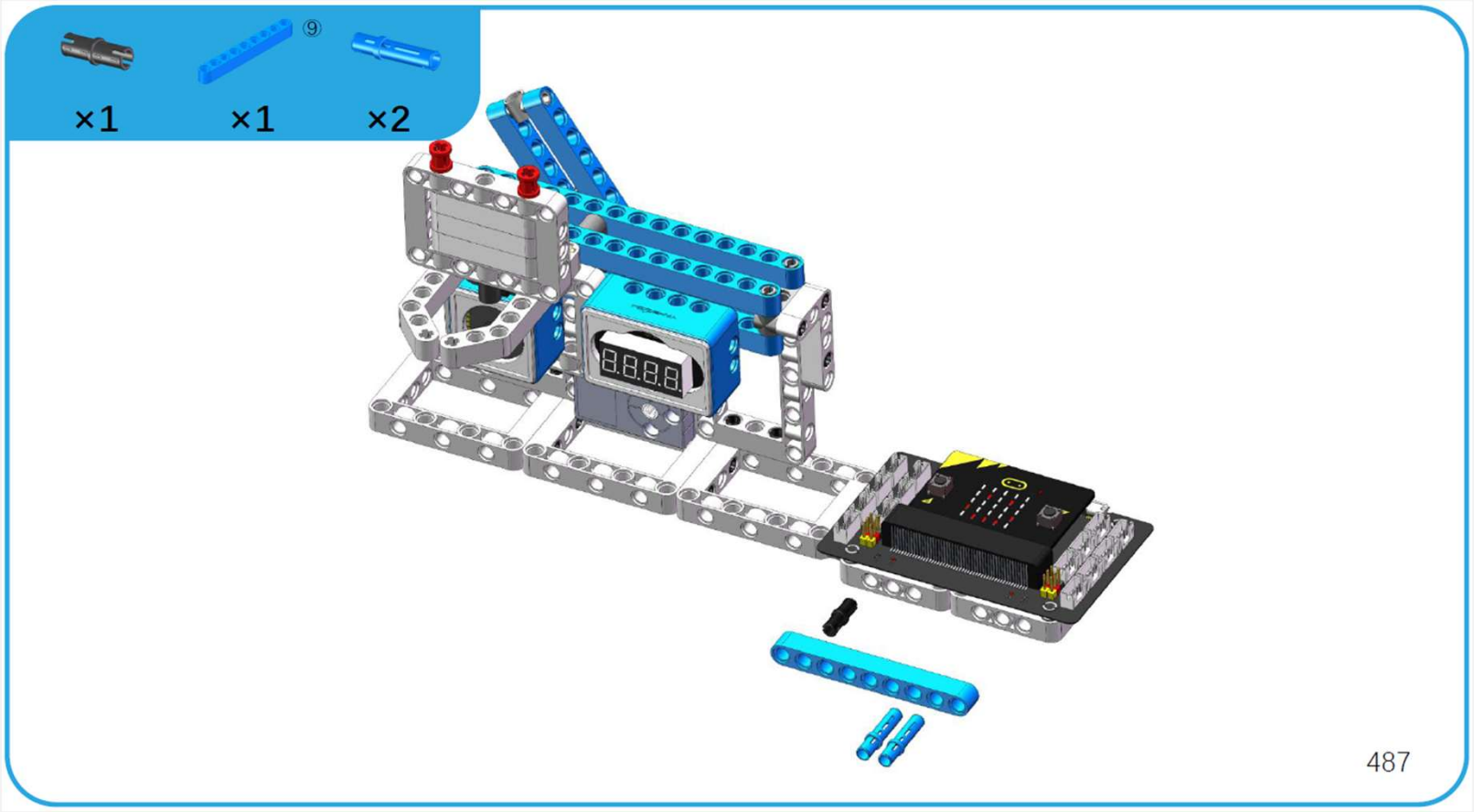
485

Step 66

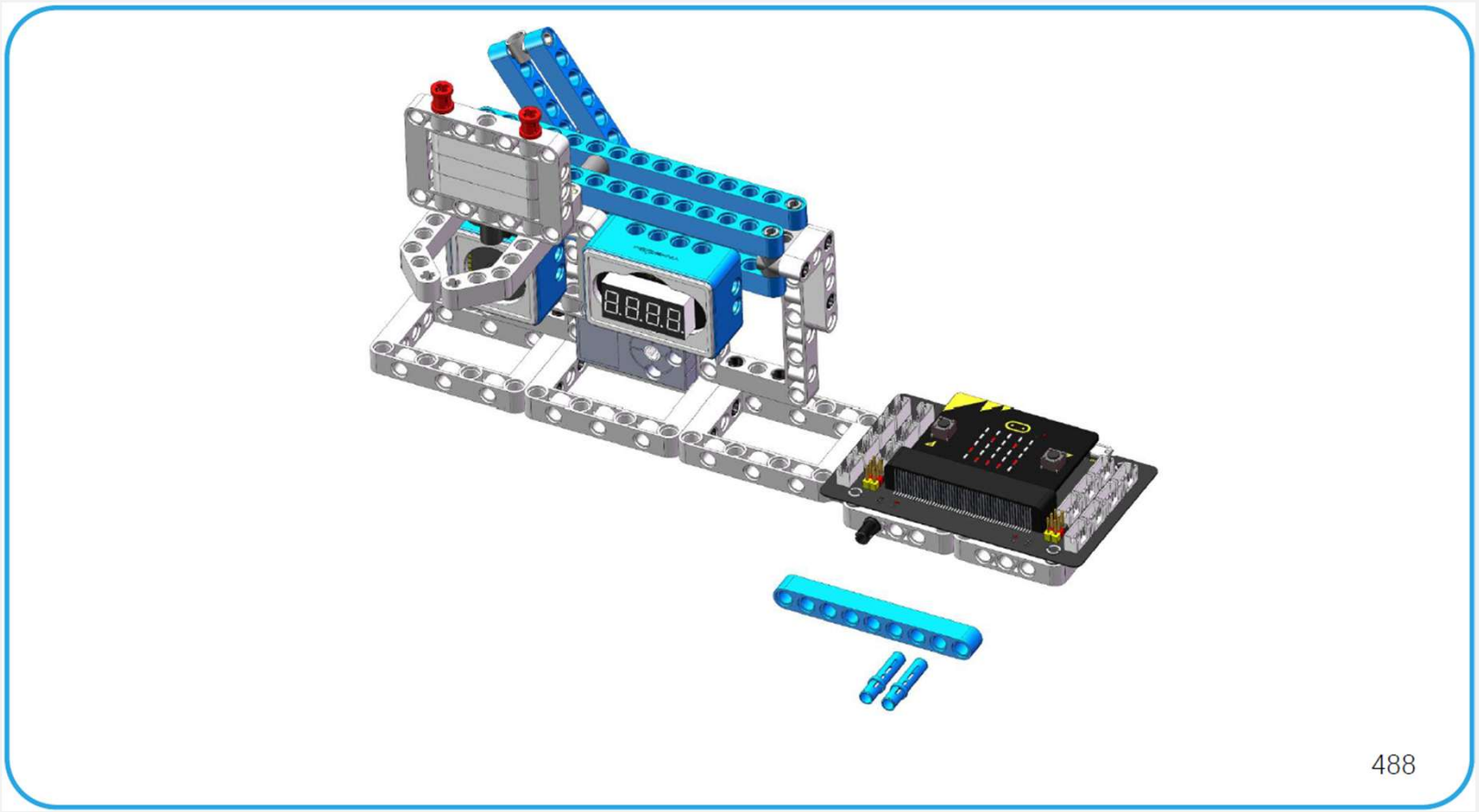


486

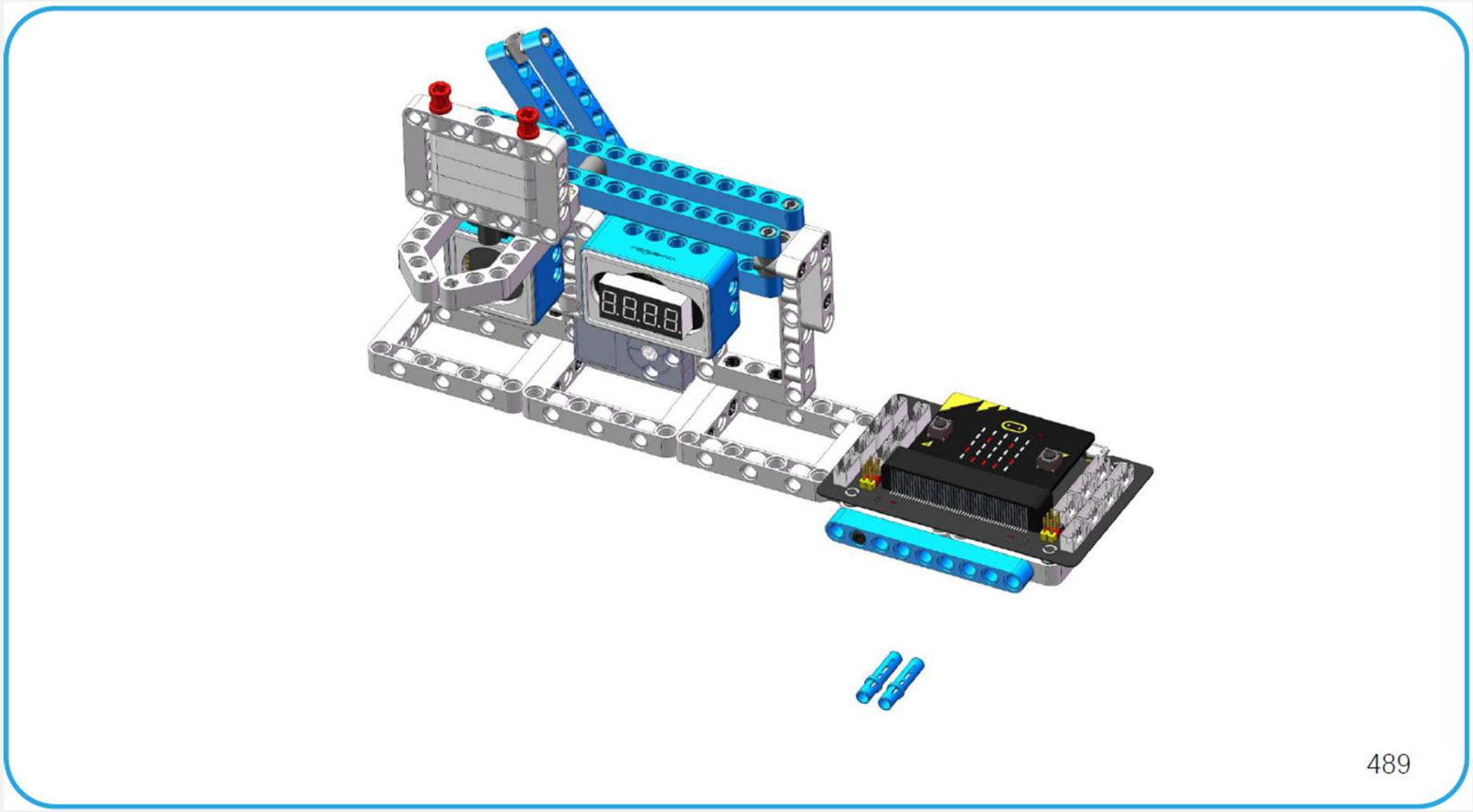
Step 67



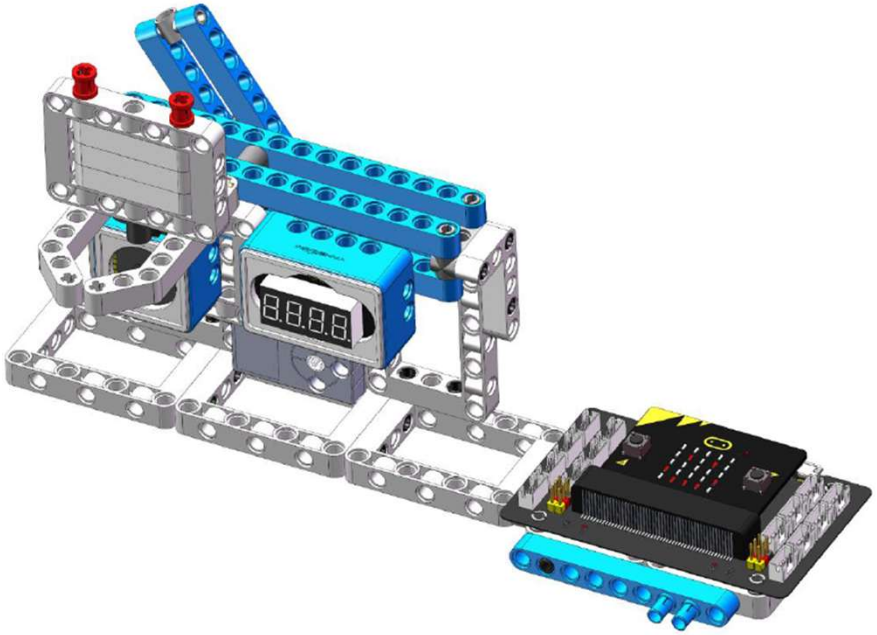
Step 68



Step 69

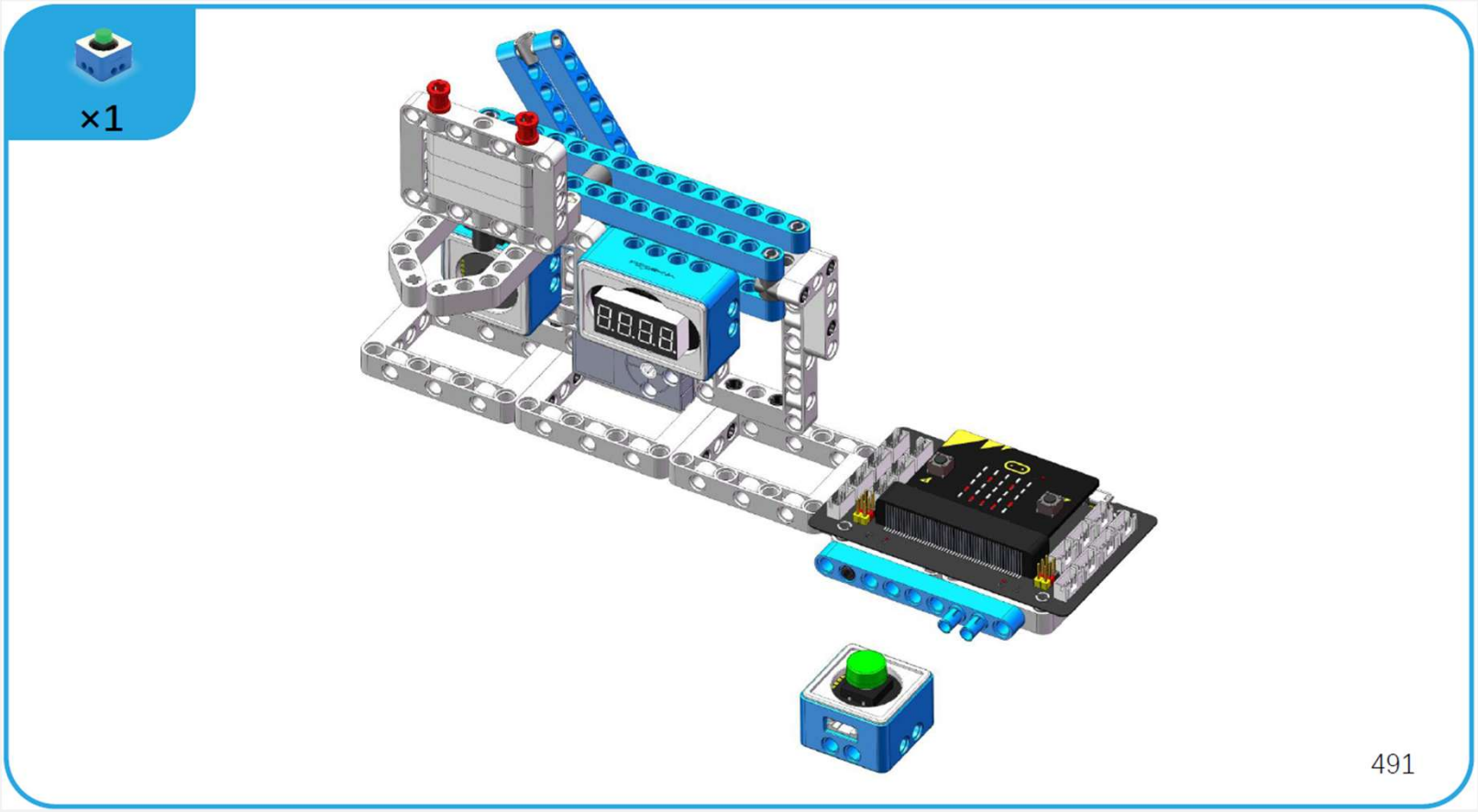


Step 70

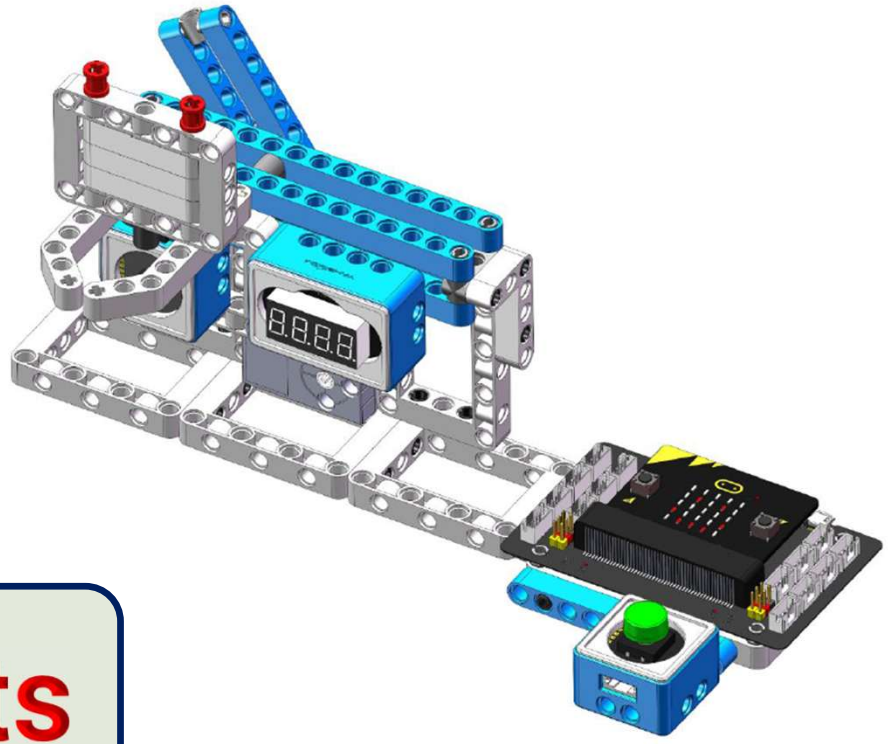


490

Step 71



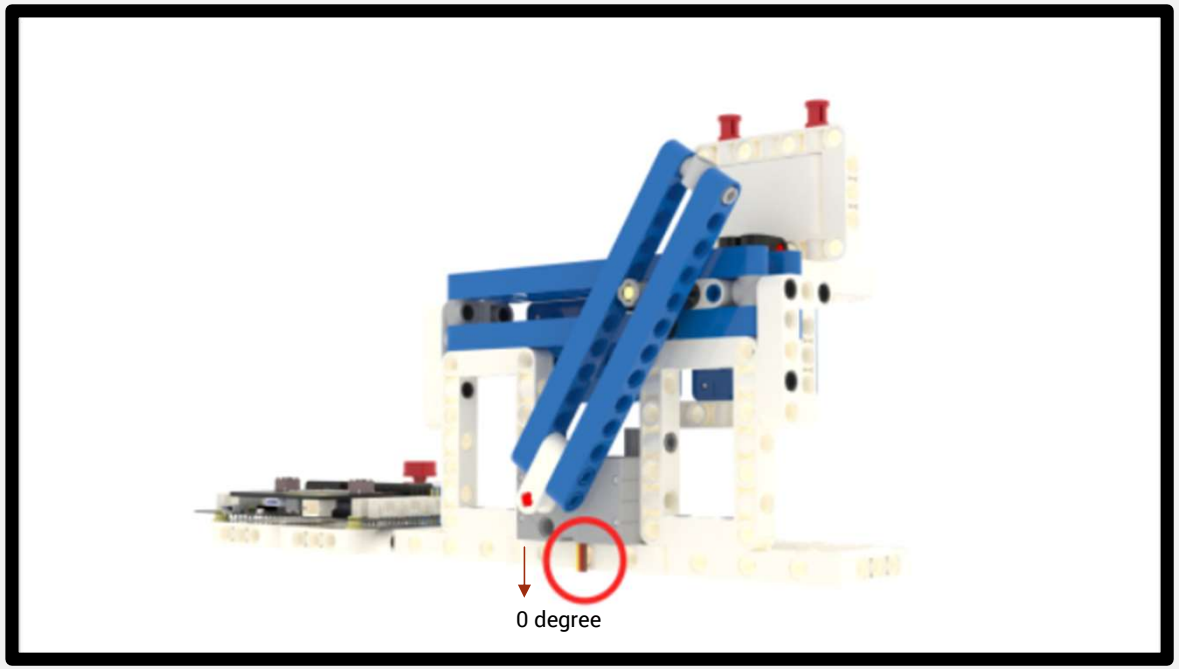
Step 72



492

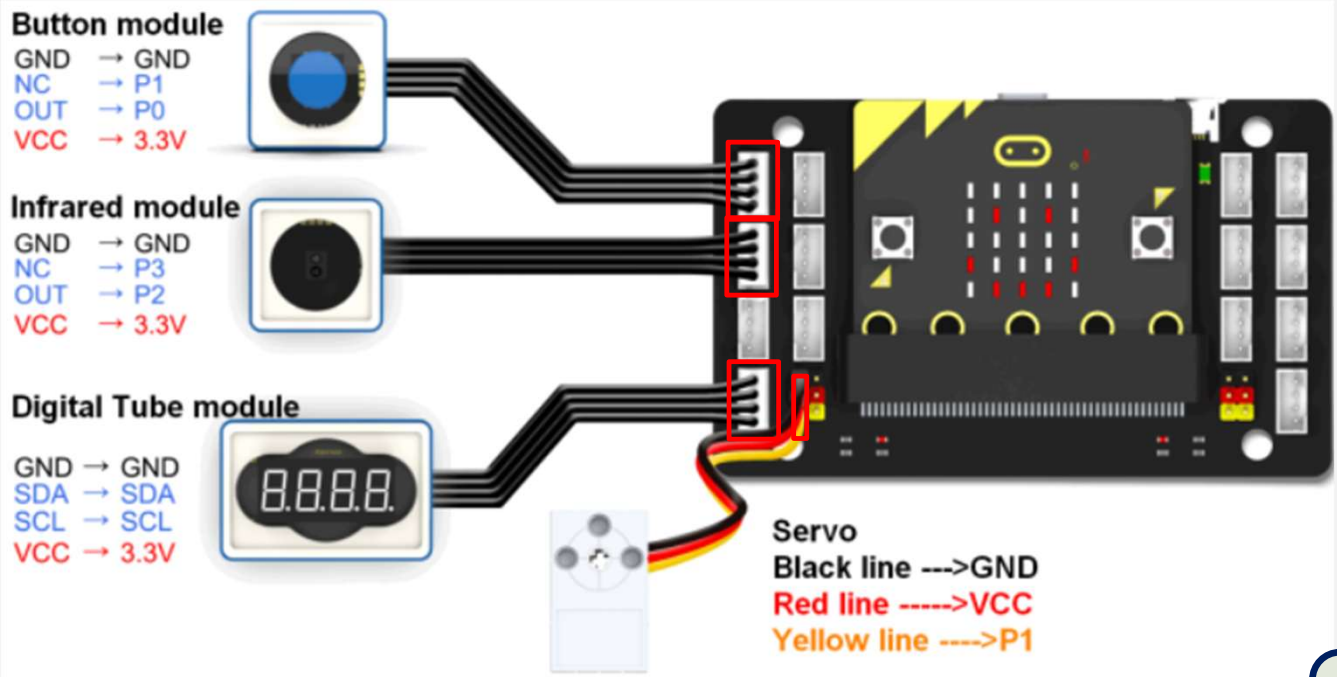
30 Points

Please make sure that the wiper shaft is installed correctly, as shown below.



Wire Connection

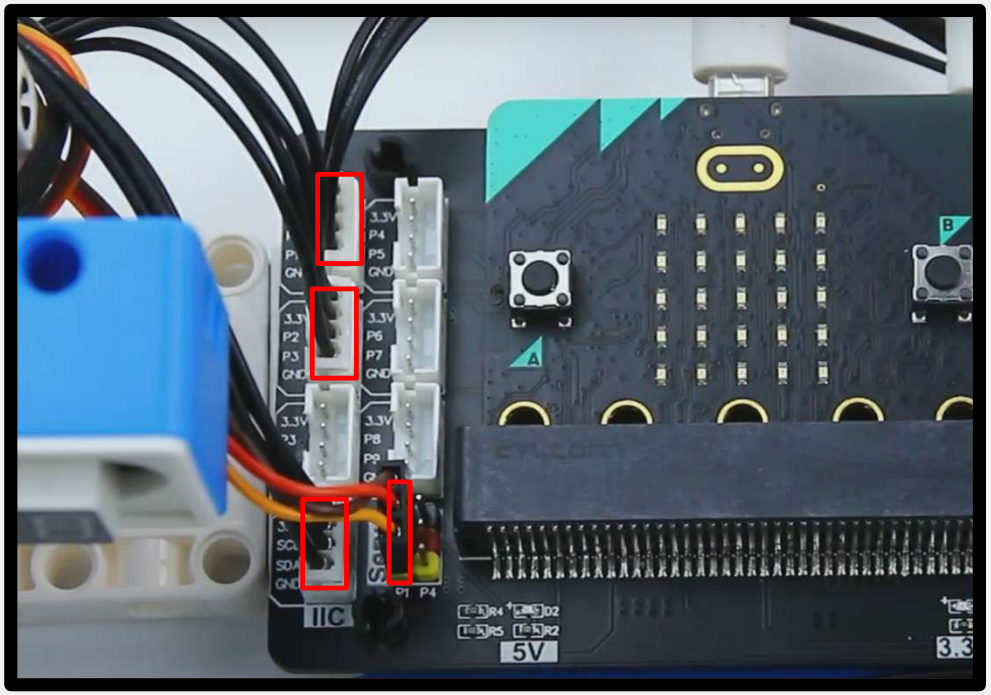
Connect the modules



Let's connect the module like this.

10 Points

Connect the modules



Let's connect the module like this.

MakeCode Programming

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

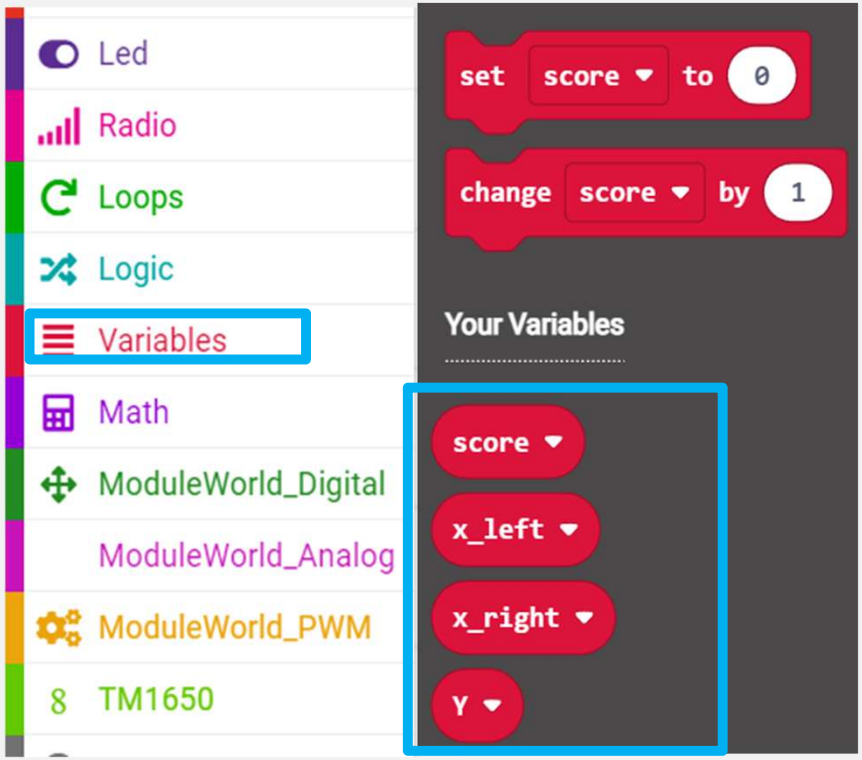
And

https://github.com/YahboomTechnology/tm1650

Or search YahboomTechnology/Module-World in the extension block

Coding – Loops

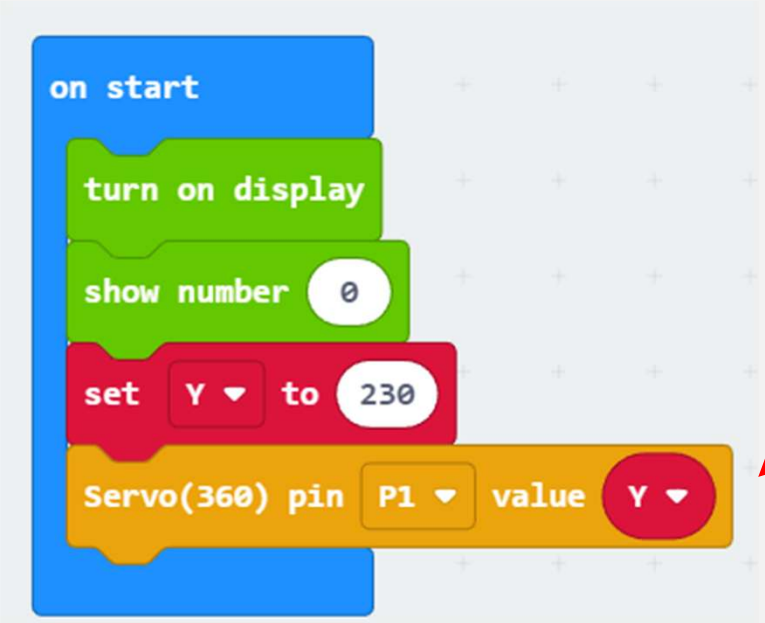
Coding – Variables



We will need 4 variables for this model, let's create:

- Score (for recording score)
- x_left (for indexing in a for loop)
- x_right (for indexing in a for loop)
- Y (position of the servo)

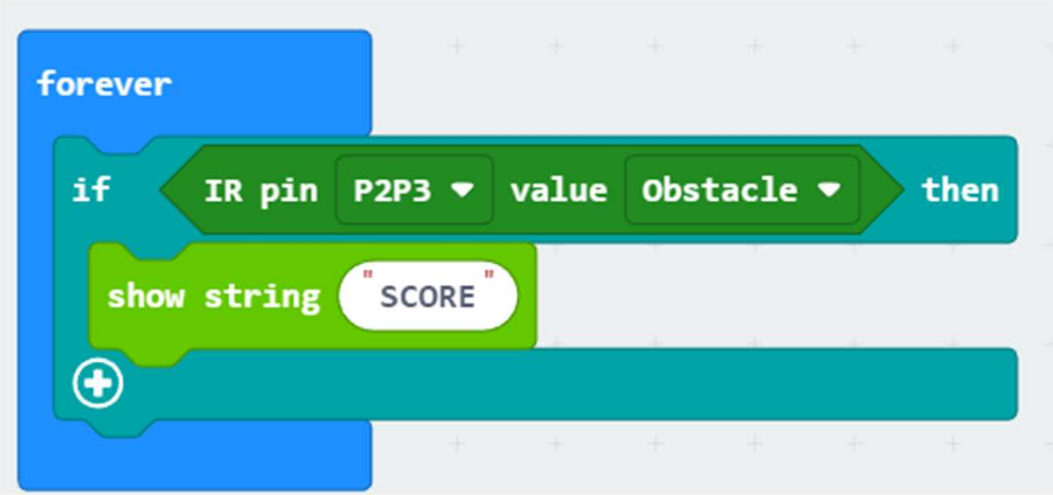
Coding – On start



Let's set a variable called "Y" to 230.

For our servo starting point we make it to go to 230°.

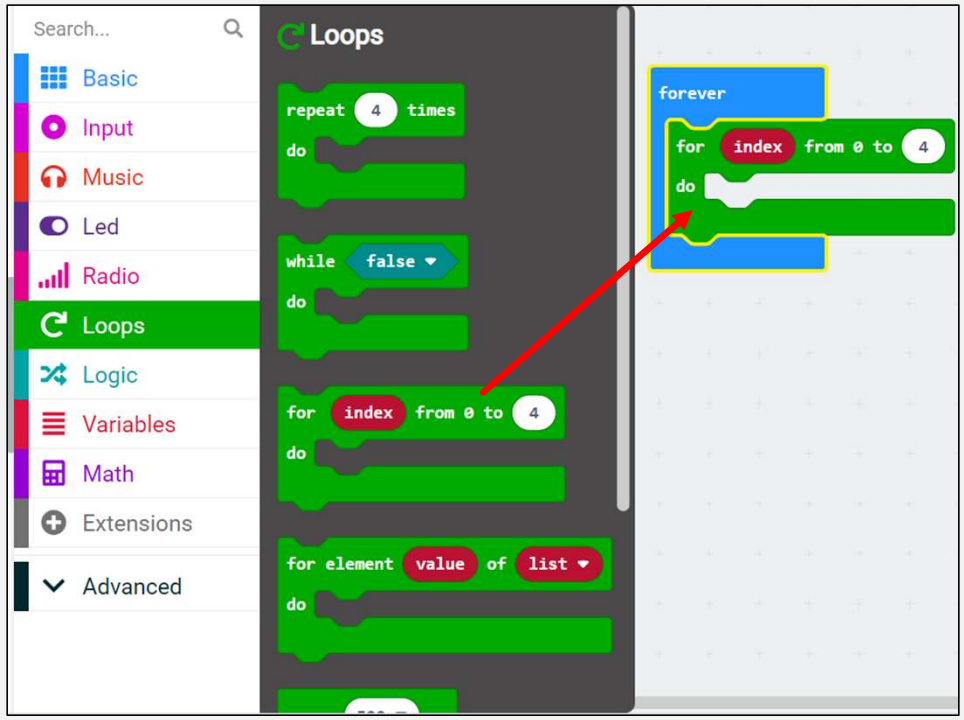
Coding – forever



When a ball is successfully dropped in the basket, it will trigger the Infrared sensor.

Once the Infrared sensor senses the any obstacle (when ball goes in basket), then the digital tube will show a string “Score”.

Coding – forever



Drag a for loop from the loop category to the forever loop.

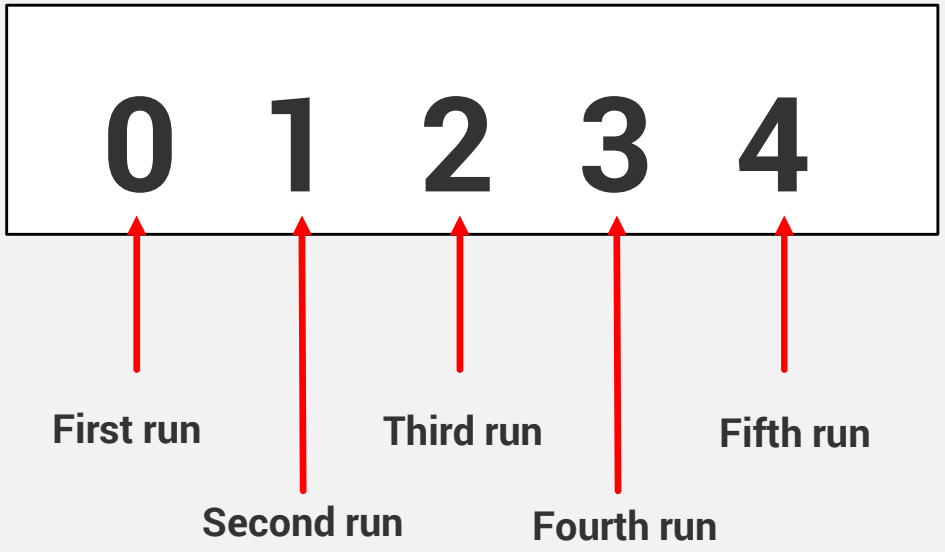
This for loop means how many loops you want to repeat for the action, the default is 0 to 4, which means the action inside will be done 5 times, which are 0, 1, 2, 3, 4.

The index will store the number of the loop that is running currently. (*if the loop is being run in 3rd time, the index is equal to 2)

Coding – forever

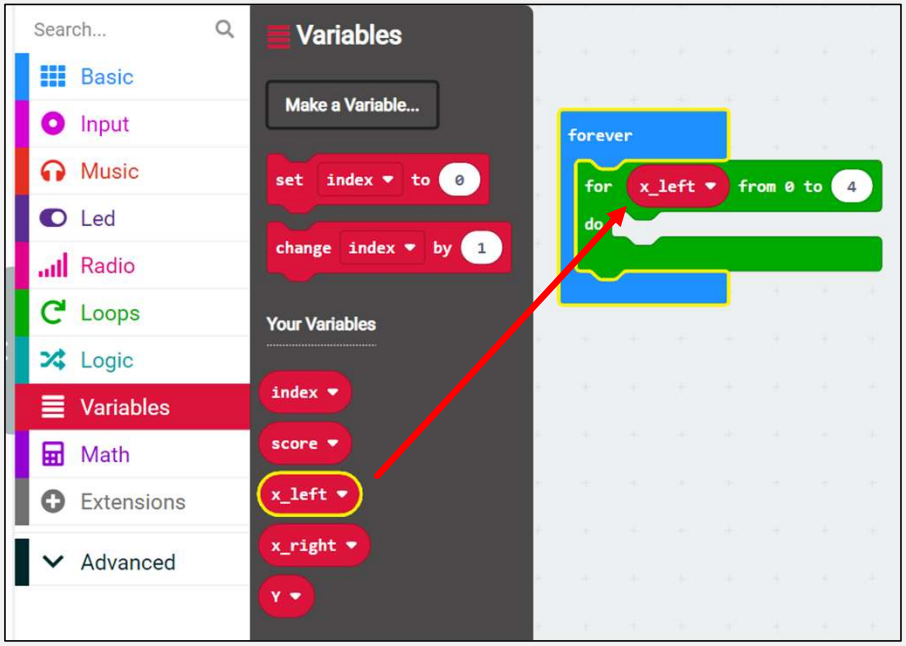
index

Running loop



There might be confusing in the index here, because the index is starting from 0, so the first time running in loop the index is 0, the second run the index will change to 1, so and so on.

Coding – forever



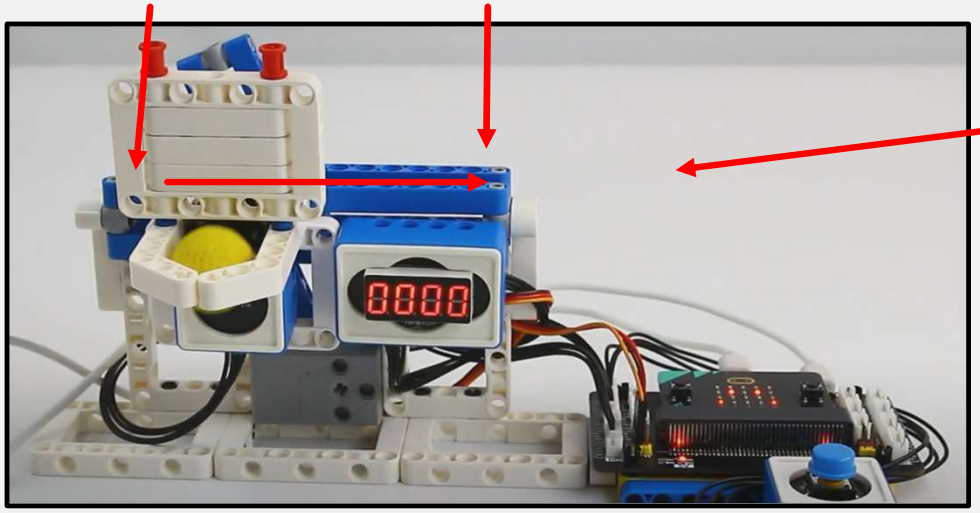
To not making ourselves confused, we will use our variable “x_left” instead of “index”, because we need to make the basket move to the left and also come back to the right, so we will need 2 for loops here.

Let’s replace the “index” with “x_left” from our variable.

Coding – Making basket move

Position of servo = 230°

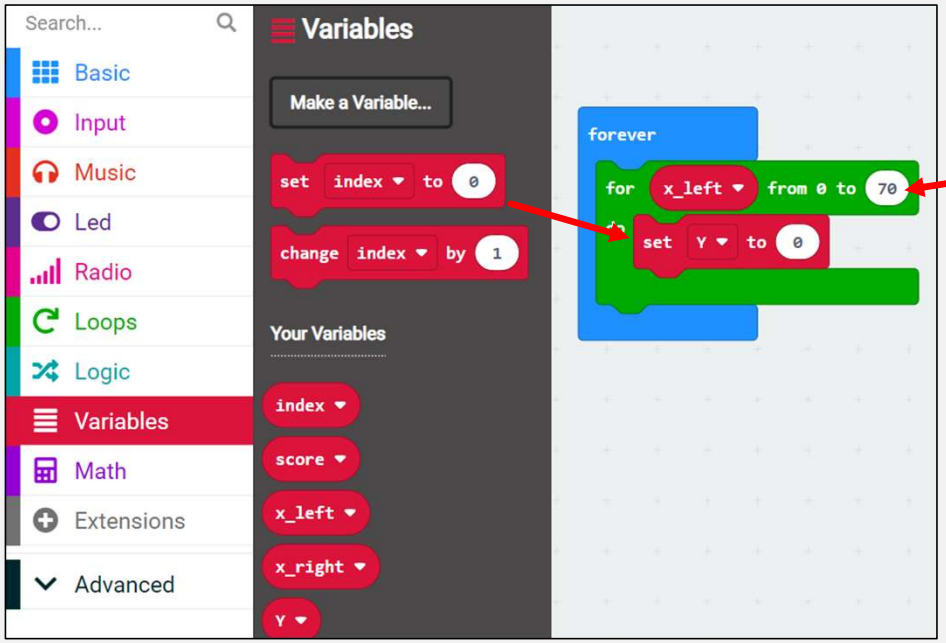
Position of servo = 160°



Since our basket need to move from right to left.

At the most left, our servo position is at 230° while we need to go to the most right with the position of 160°, so with a difference of 70°.

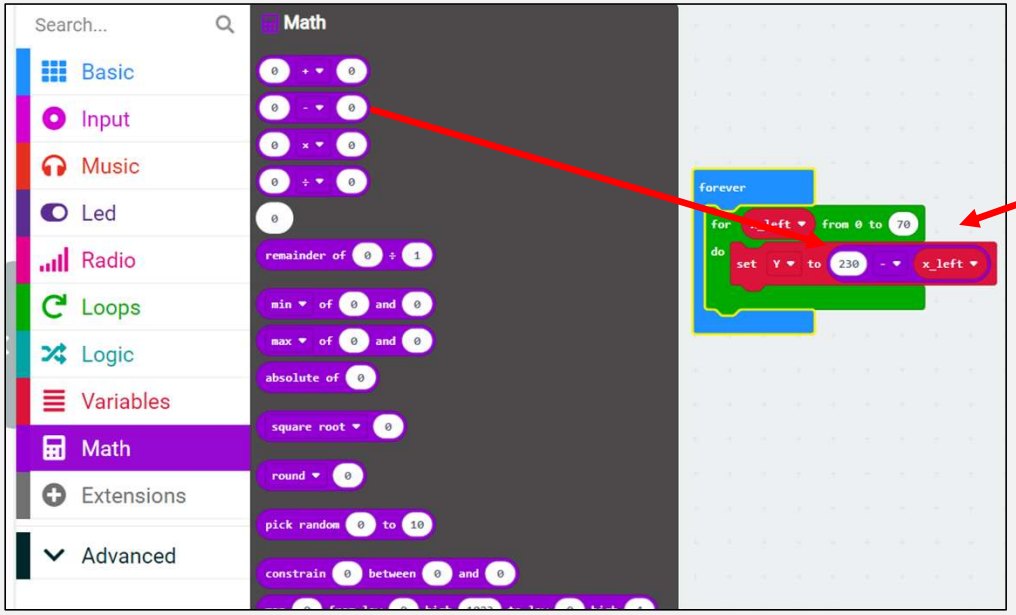
Coding – forever



So we need to loop for 70 times so that the servo can keep reducing from 230° to 160°.

We will use “Y” to store the target position of our servo to be moved to, so we need a “Set Y to ___ “ block in the for loop.

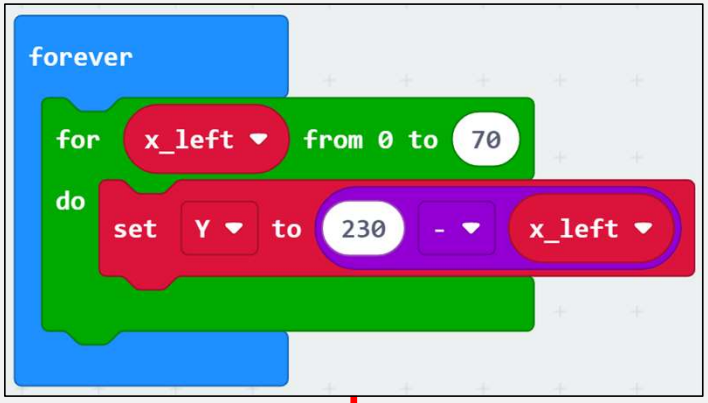
Coding – forever



And now we need to do calculation here, each loop run, it will increase the “x_left” by 1, and the servo position should be reduced by 1 for each loop until the last loop (where x_left = 70), the “Y” position should reach 160°.

So we set an equation for servo position calculation to Y = 230° - x_left

Coding – forever

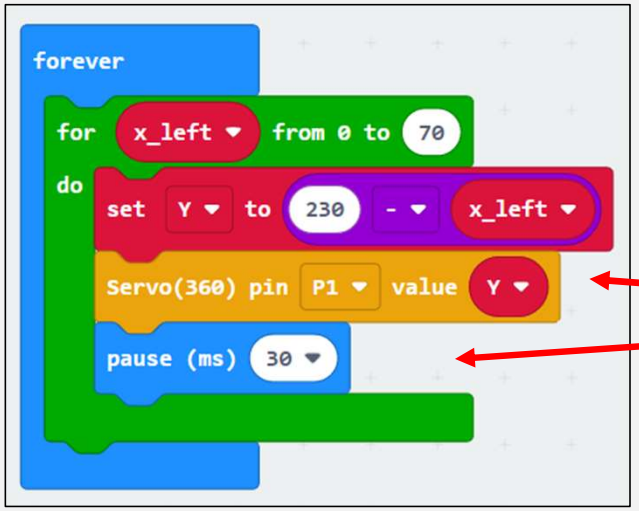


This is how the loop will run.

Y: 230 → 229 → 228 → … … → 162 → 161 → 160

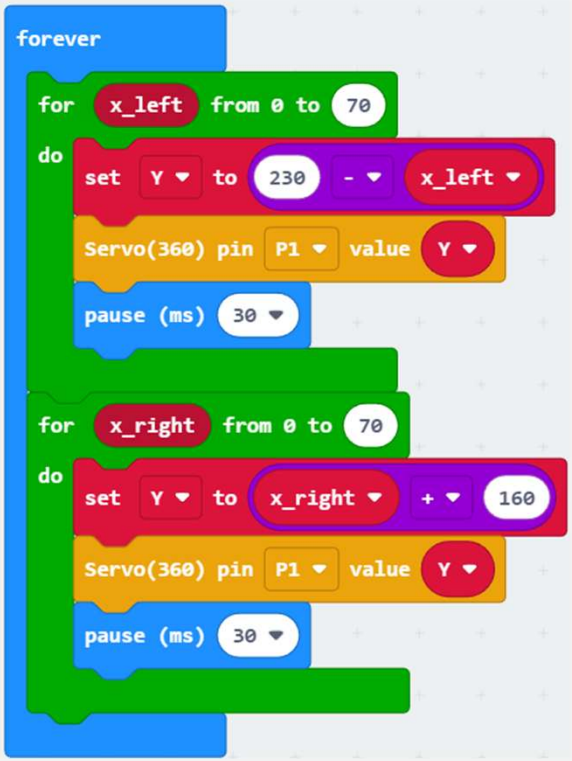
x_left: 0 → 1 → 2 → … … → 68 → 69 → 70

Coding – forever



Then we will ask the servo to go to the position “Y”, and pause a 30 millisecond for every loop run (the longer waiting time will make the basket move slower)

Coding – forever

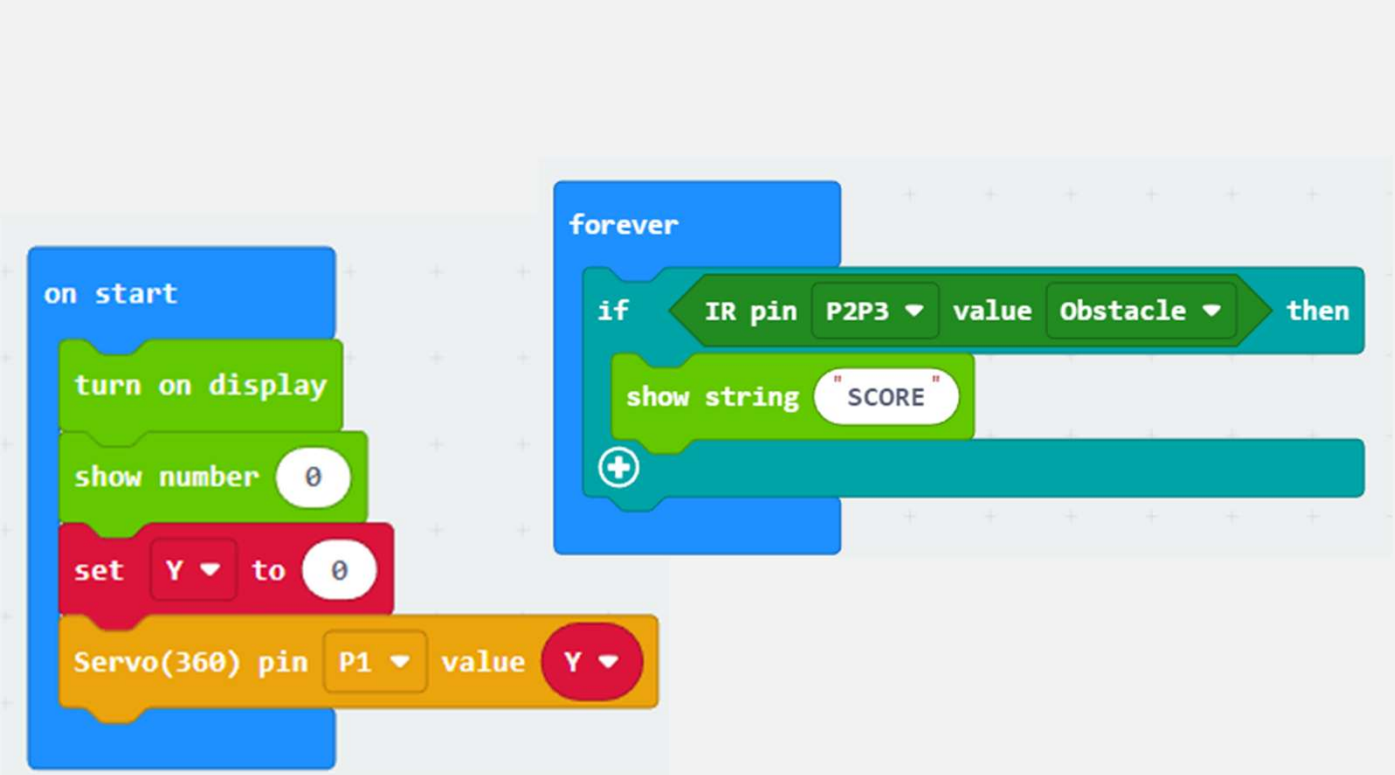


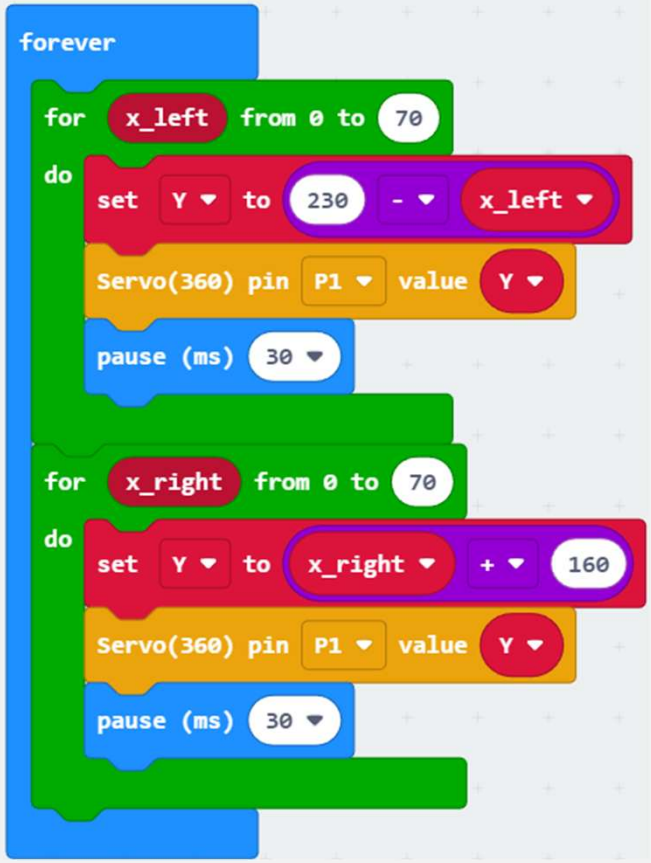
Duplicate the for loop for basket to move to the left, and place it after the x_left loop.

This is to move back to the right side, so we will change the index to x_right.

And equation is adding back the position from 160° to 230°, so we need to set the Y equation to Y = x_right + 160°

Coding - Overview

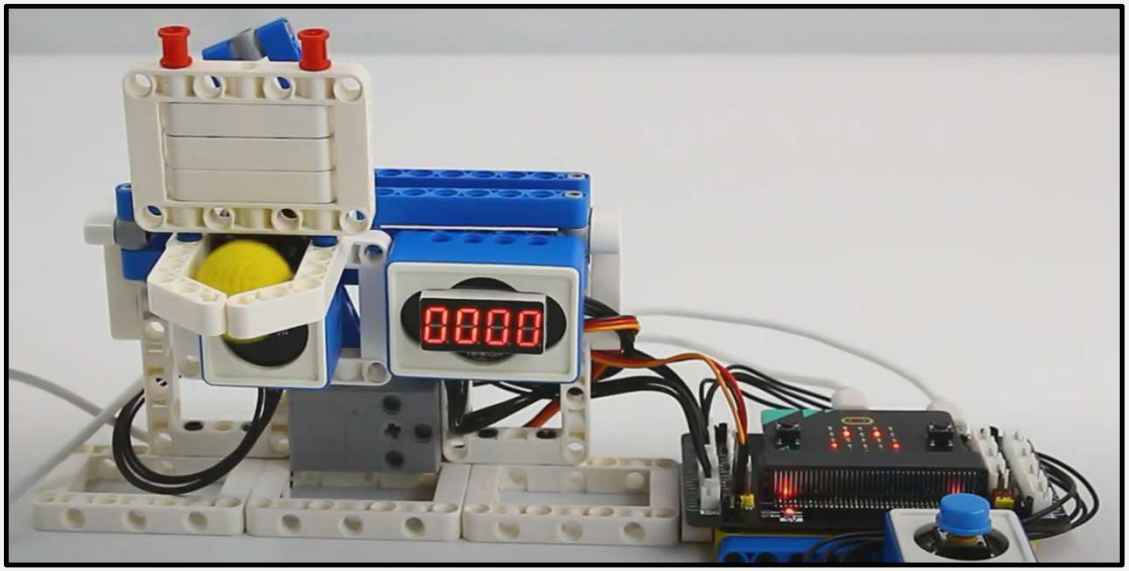




Phenomenon

After the program is downloaded successfully.
The servo controls the basket to move cyclically left and right.

If you throw the ball in the basket, there will be a corresponding prompt sound, and the digital tube will display “score”.



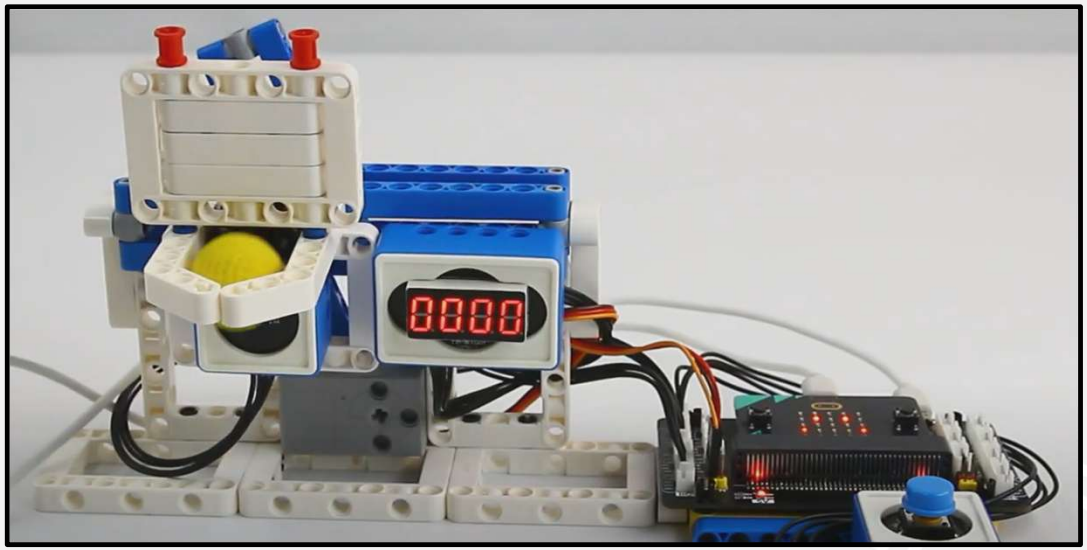
30 Points

CHALLENGE
for : Lesson 4

L4 – Challenge 1

Can you demonstrate the program and explain how to program works?

1. Explain what for loop is.
2. What is variable and why do we use variable in this program?

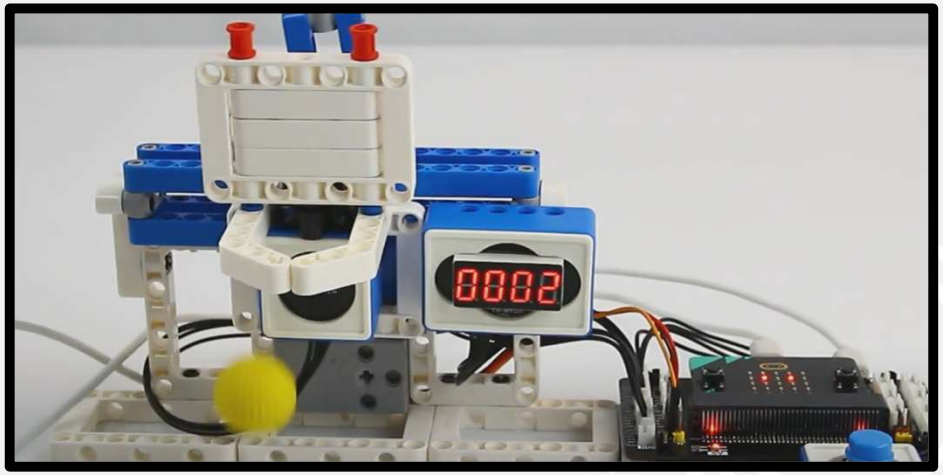


30 Points

L4 – Challenge 2

After the program is downloaded successfully.

If you throw the ball in the basket, the buzzer will play the "ba ding" sound, and the digital tube will count up by 1.

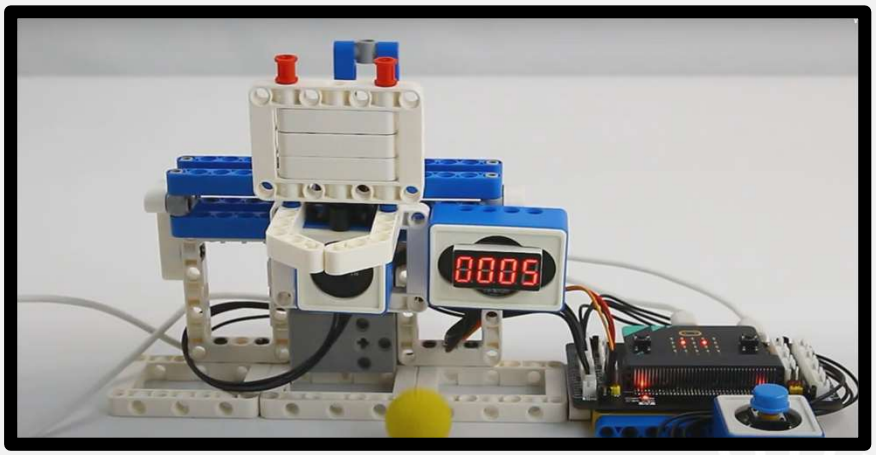


30 Points

L4 – Challenge 3

After the program is downloaded successfully.

If you press the button, Micro:bit board will displays "√", the moving basket will start to add speed, increasing the difficulty of shooting.

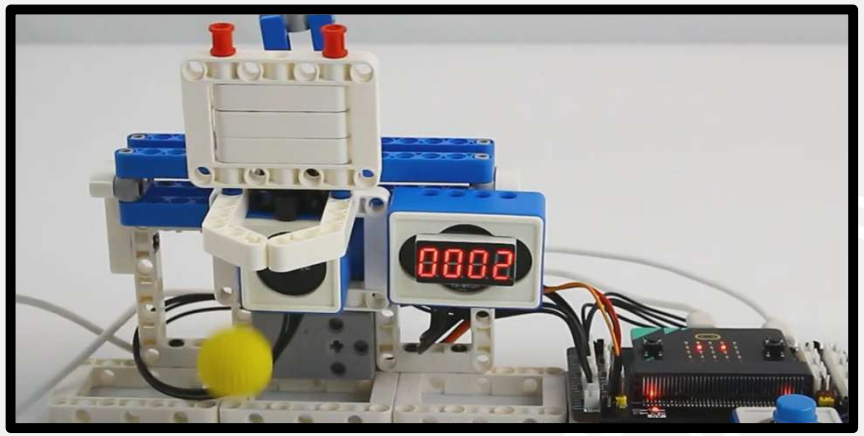


30 Points

L4 – Mission

After the program is downloaded successfully.
Increase the difficulty of shooting when the score increases.
The button module may act as a reset button.

Example: When the score is 5, make the basket move faster, and when the score is 10, the basket will move even faster.



50 Points