05.Horizontal Bar Athlete

1.Introduction

Strange enjoys watching all kinds of sports shows.

He found out that there was a cool event in the Olympics Games called the horizontal bar.

Dear all, do you know the sport of horizontal bar?

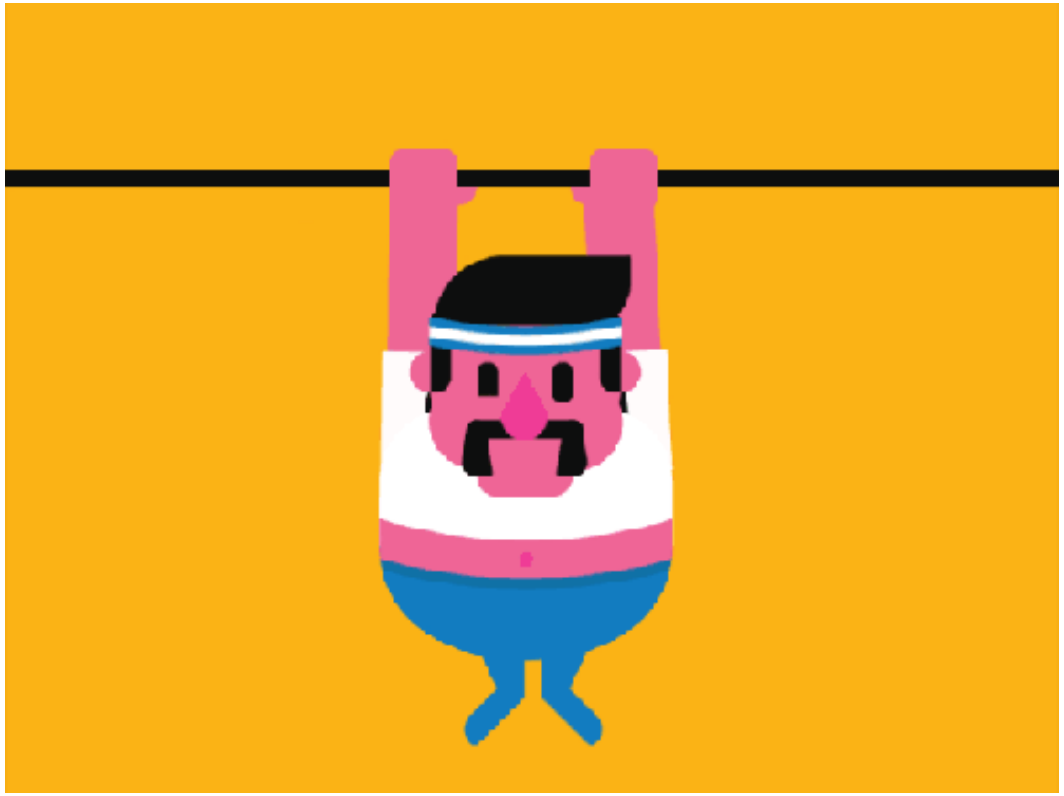


Strange

1.Introduction

Horizontal bar (or high bar) is one of the artistic gymnastics apparatus.

The entire set of movements on the horizontal bar consists of swinging movements and cannot be stopped.



2.Exploration



Horizontal bar athletes need to make all kinds of complex movements on the horizontal bar, which requires higher stability of the horizontal bar. What can be done to increase the structural stability?

Let's do an experiment.

2.Exploration

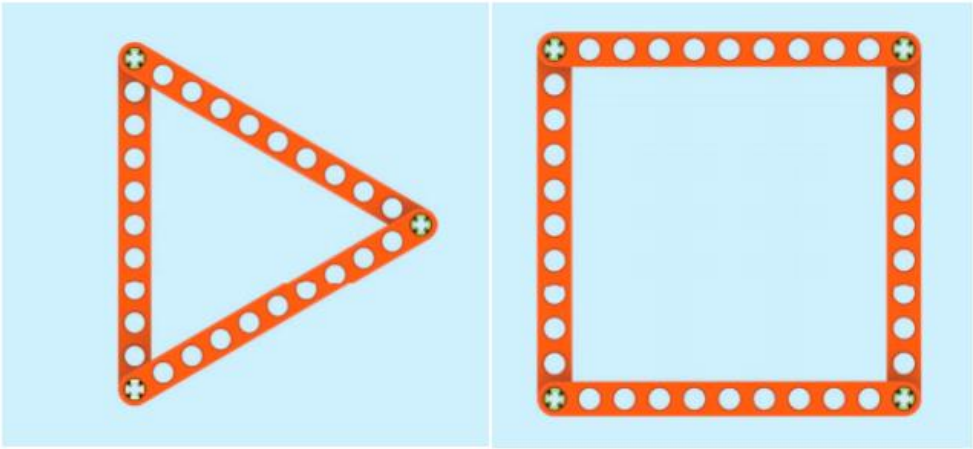
Experiment 1

Objective: To verify the difference between a triangle and a quadrilateral in an articulated connection

Experimental process:
By articulating the beam and pin of the structural part, construct triangle and quadrilateral respectively.

Observe and record down the differences in term of structural stability.

(Note that the parts should be connected using round holes, not cross holes.)

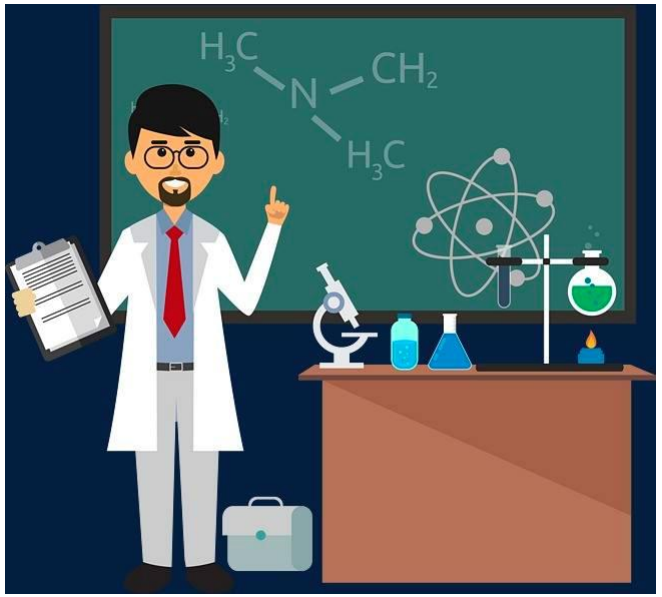


2.Exploration

Experiment Summary:

When hinged, triangles are stable and difficult to deform unless violently damaged. It has good stability.

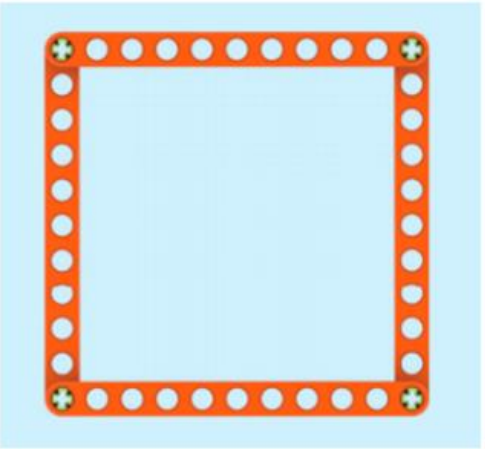
When hinged, quadrilateral does not have the stability of triangle. It is an unstable structure and prone to deformation.



2.Exploration

Experiment 2

Objective: Use cross hole to build quadrilateral, test its stability.

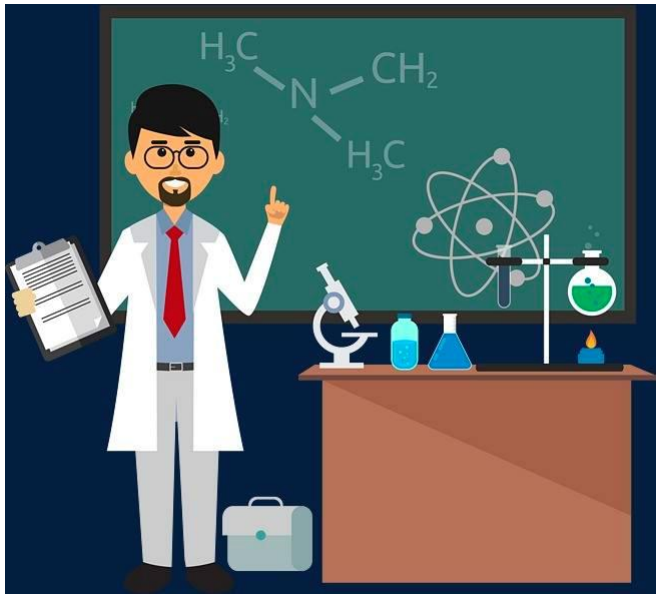


2.Exploration

Experiment Summary:

In the rigid case, the quadrilateral is also stable.

So for horizontal bars, our design can be either hinged triangles, or rigidly connected quadrangles.



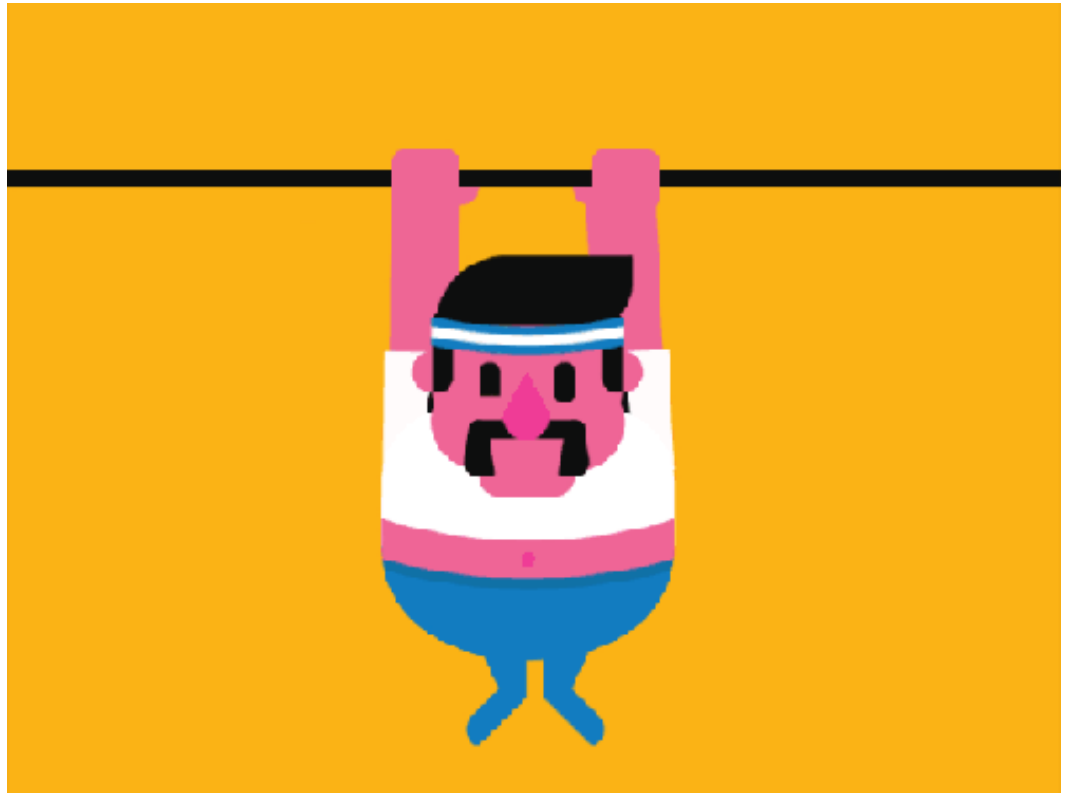
3.Construction

The following points need to be addressed when making horizontal bar athlete structures

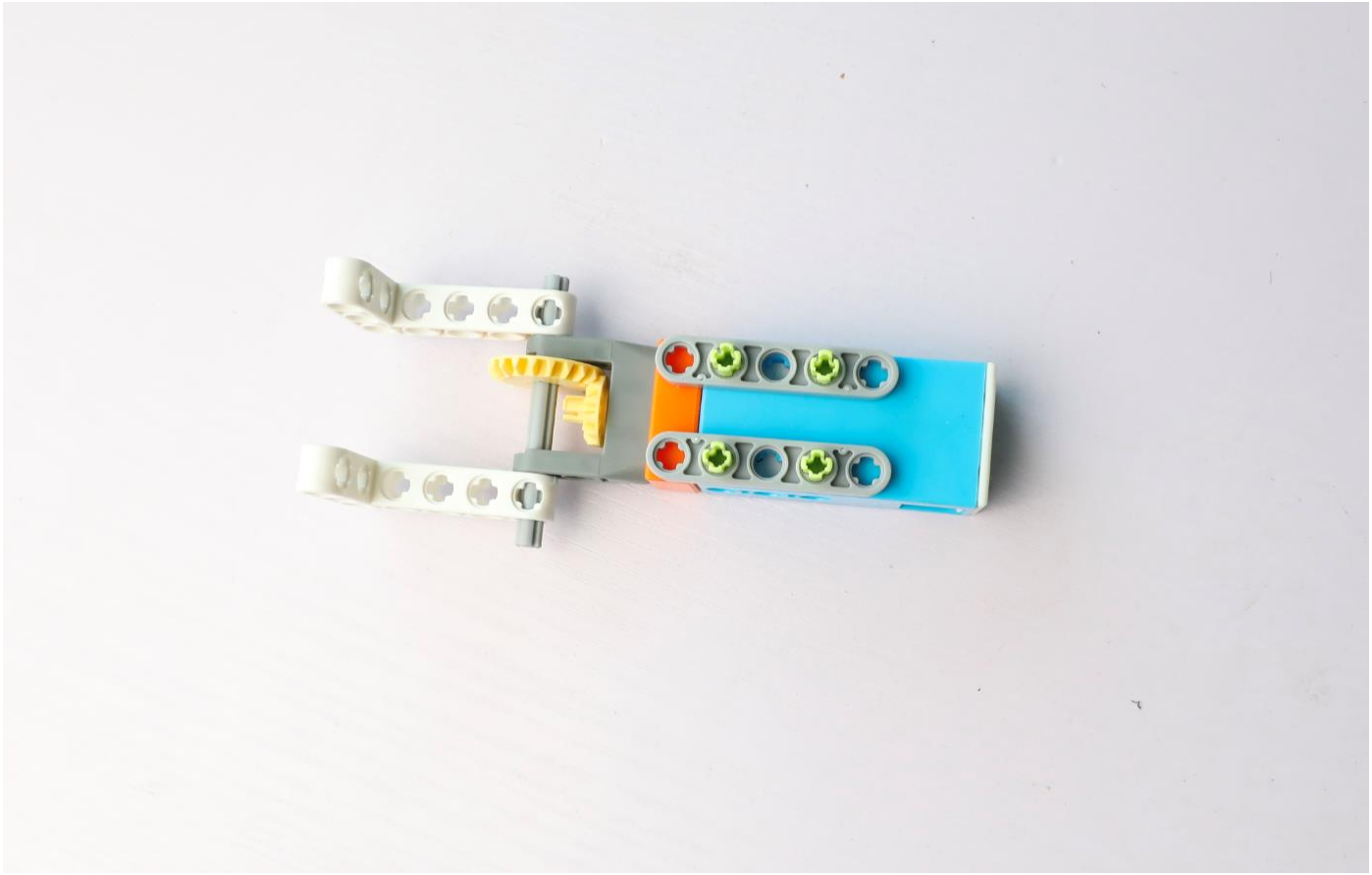
1. Horizontal bar support can be square beam or triangle structure.

2. The athlete's body is composed of two motors, with five-hole gray plates added in the middle

3. Select round or cross holes for the installation of arms and legs



3.Construction



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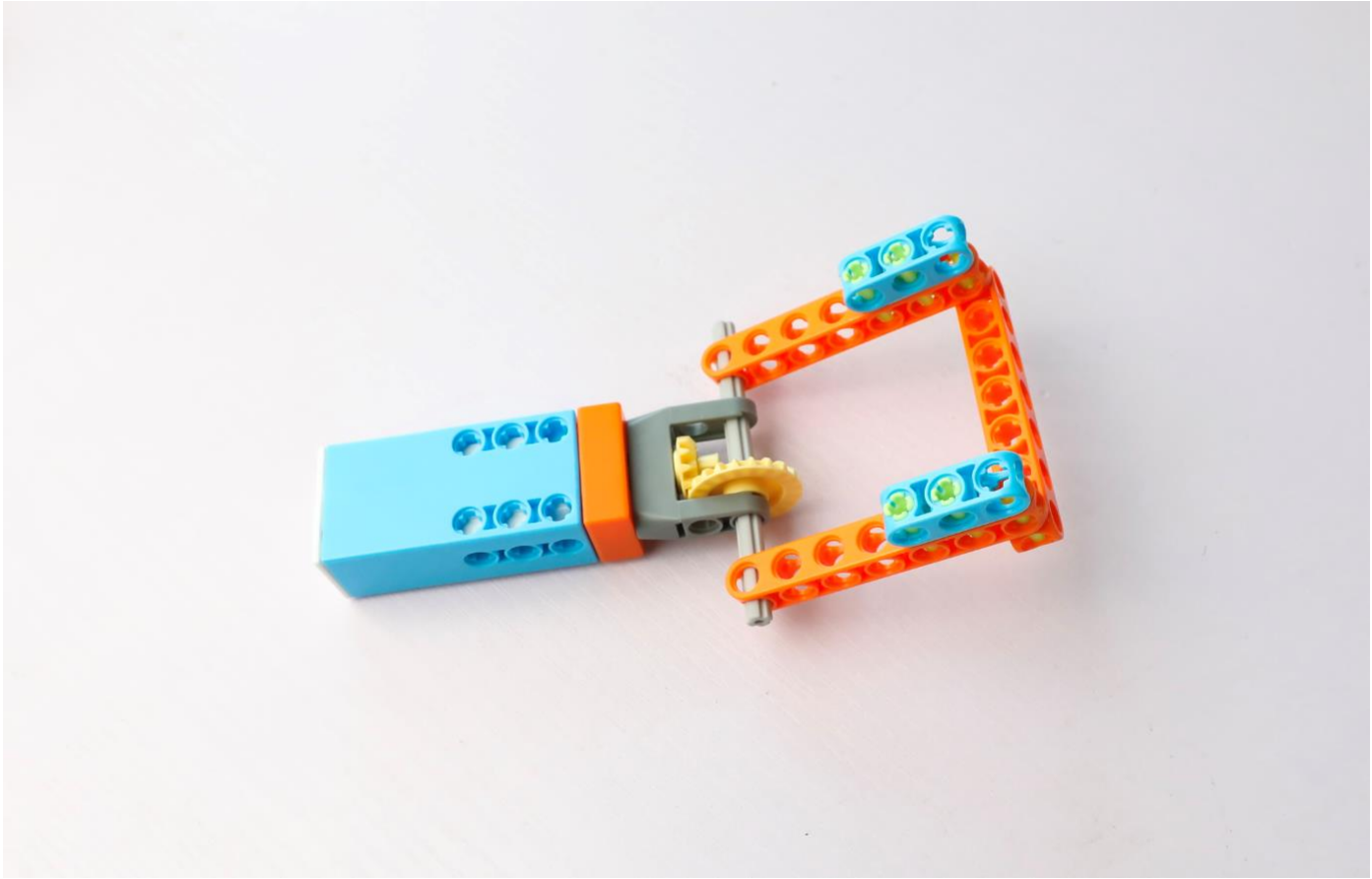

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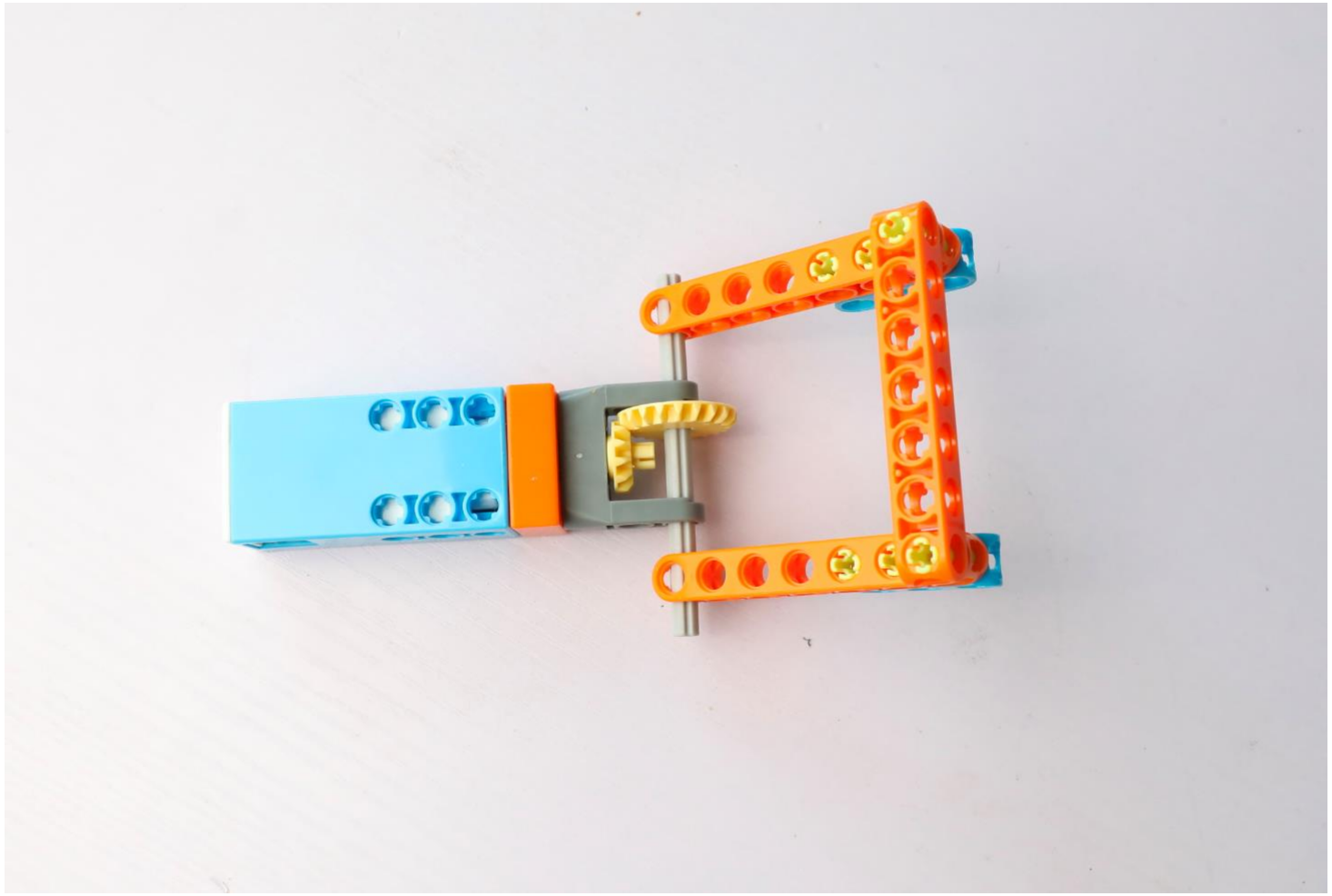

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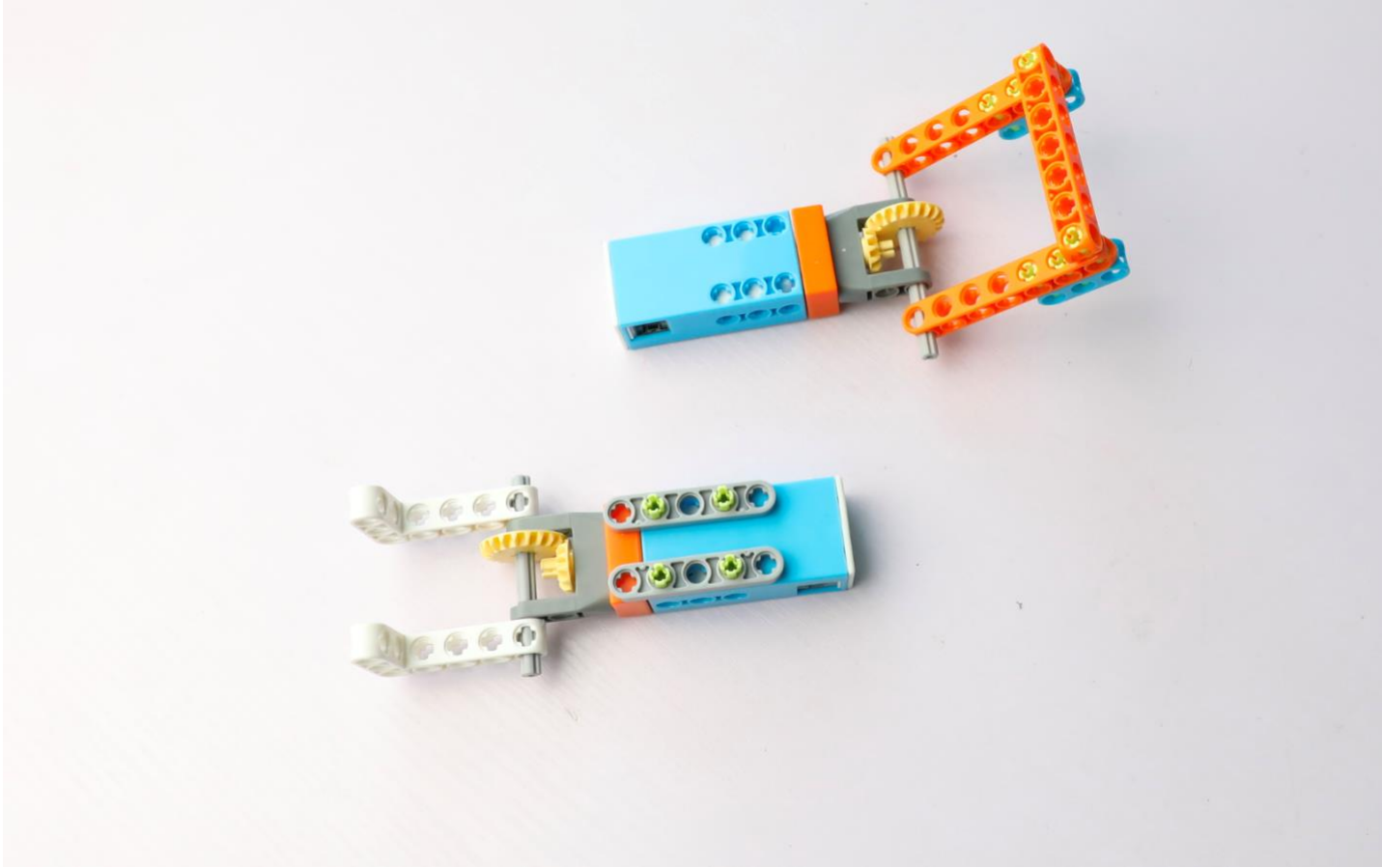

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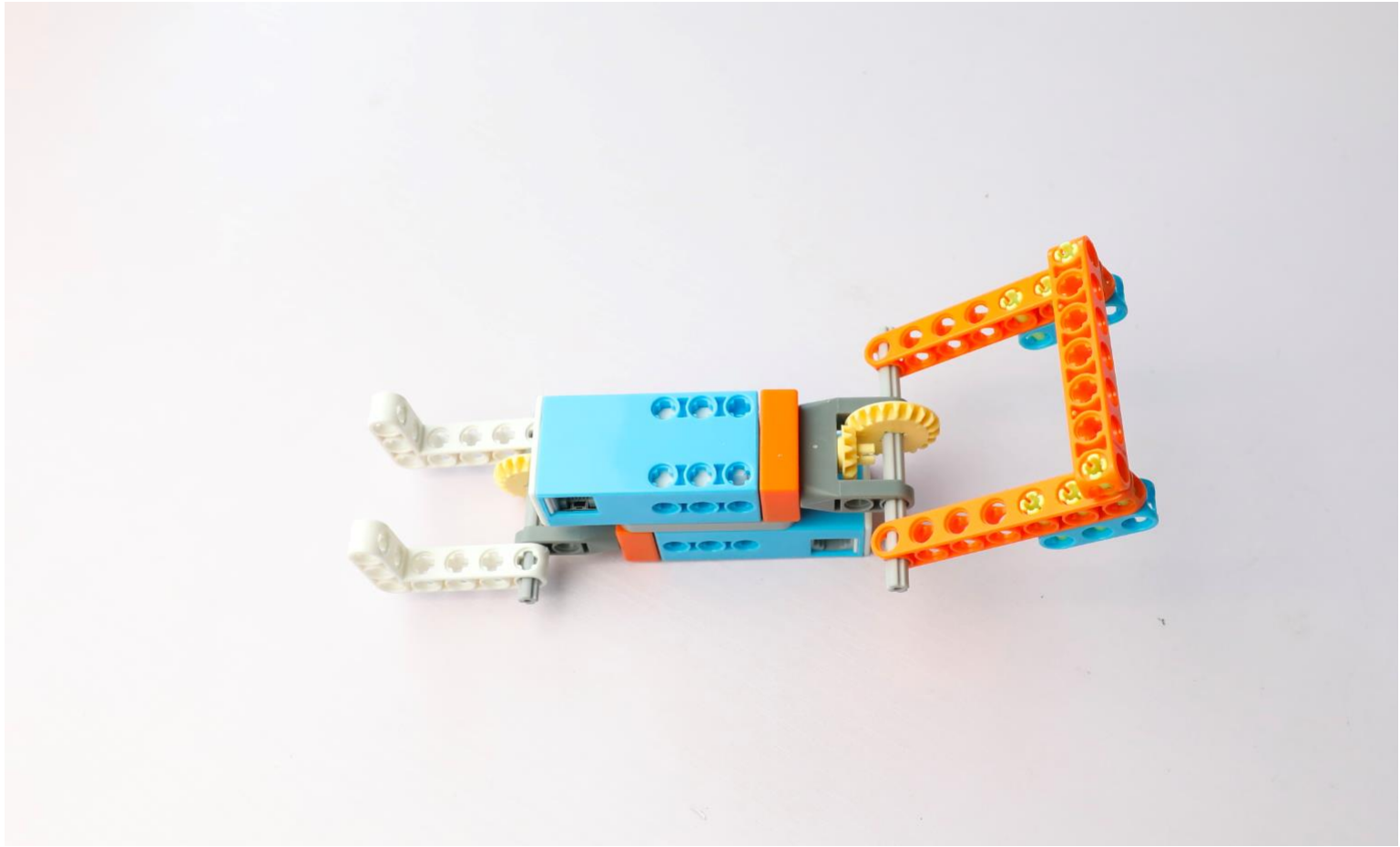

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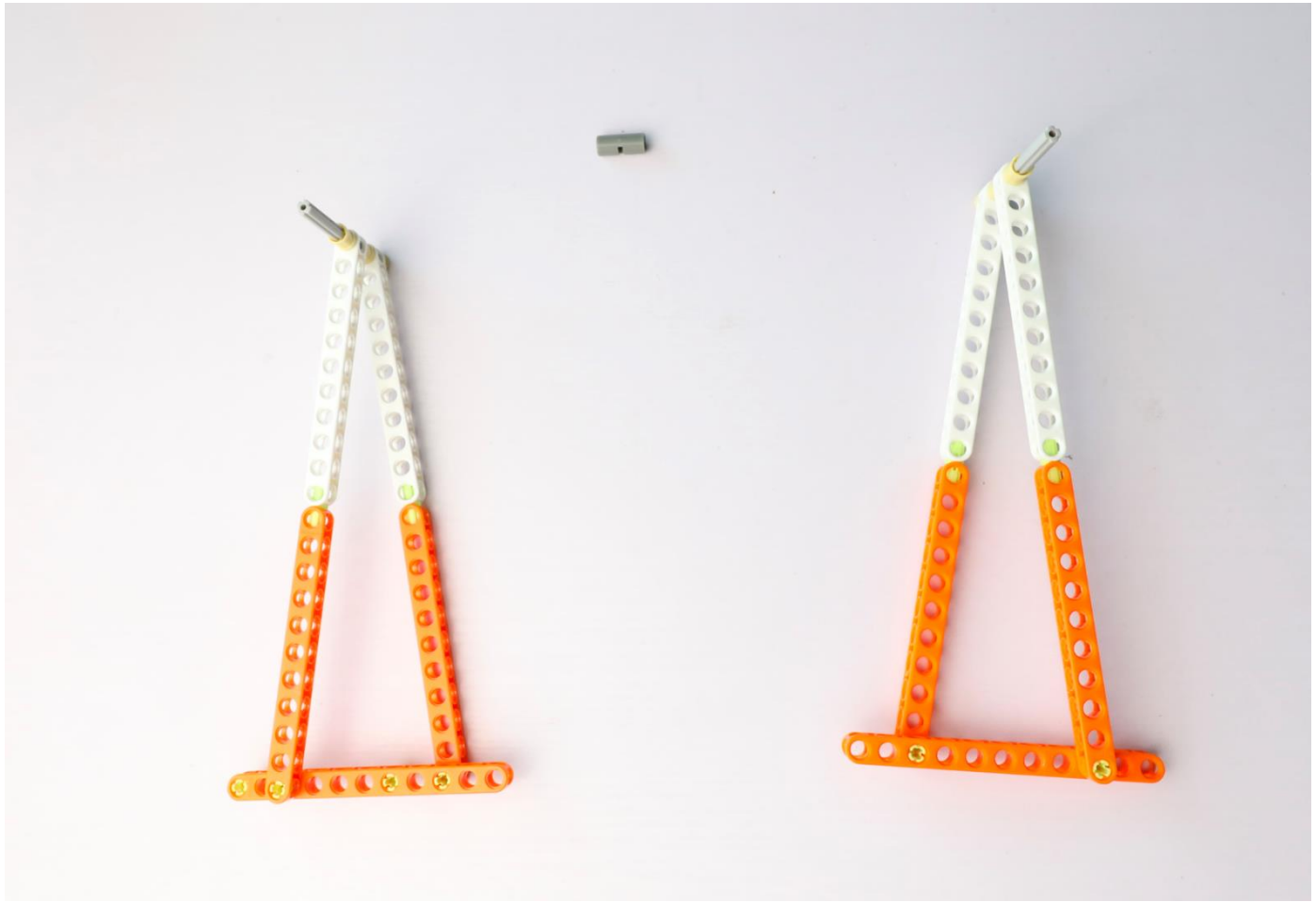

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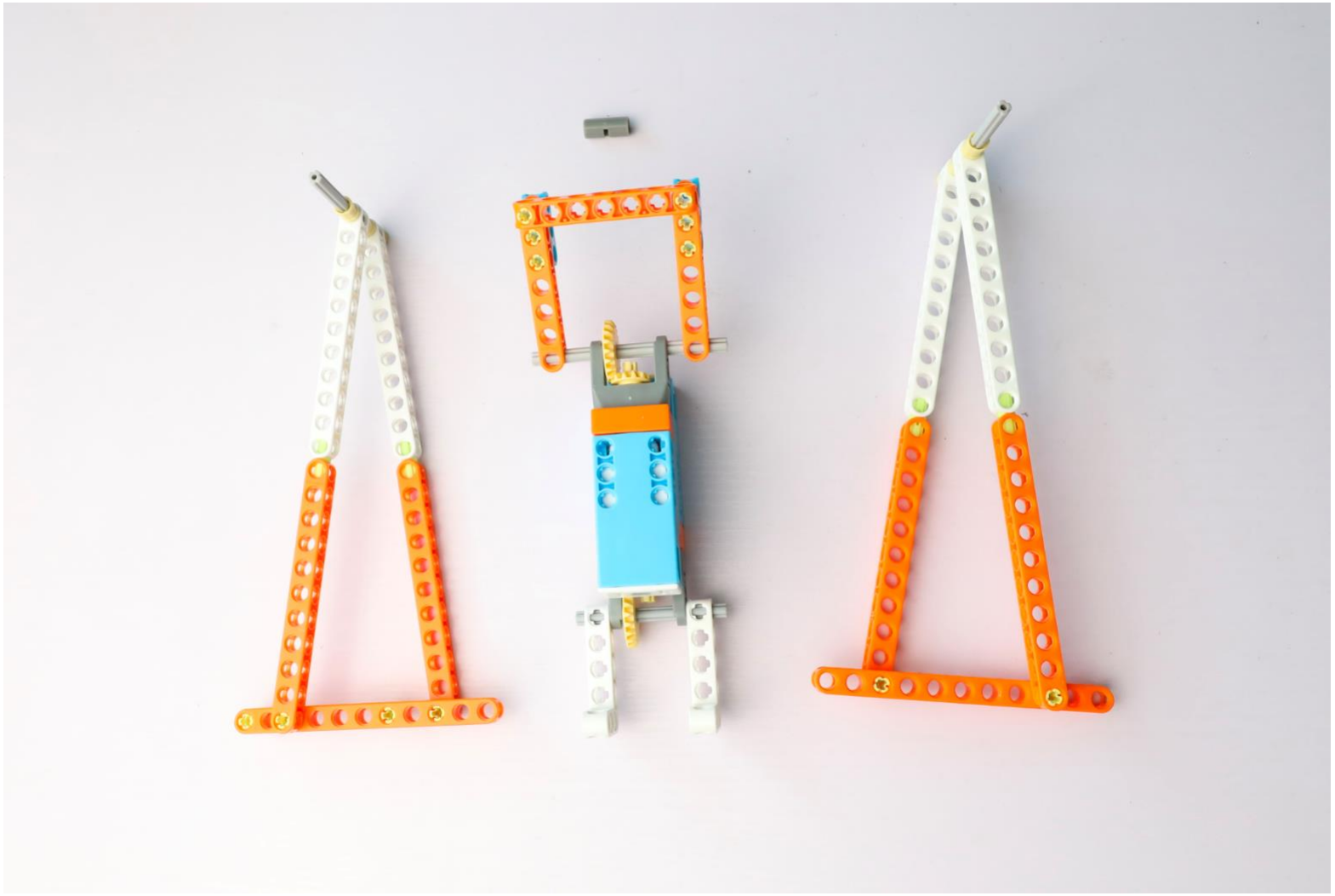

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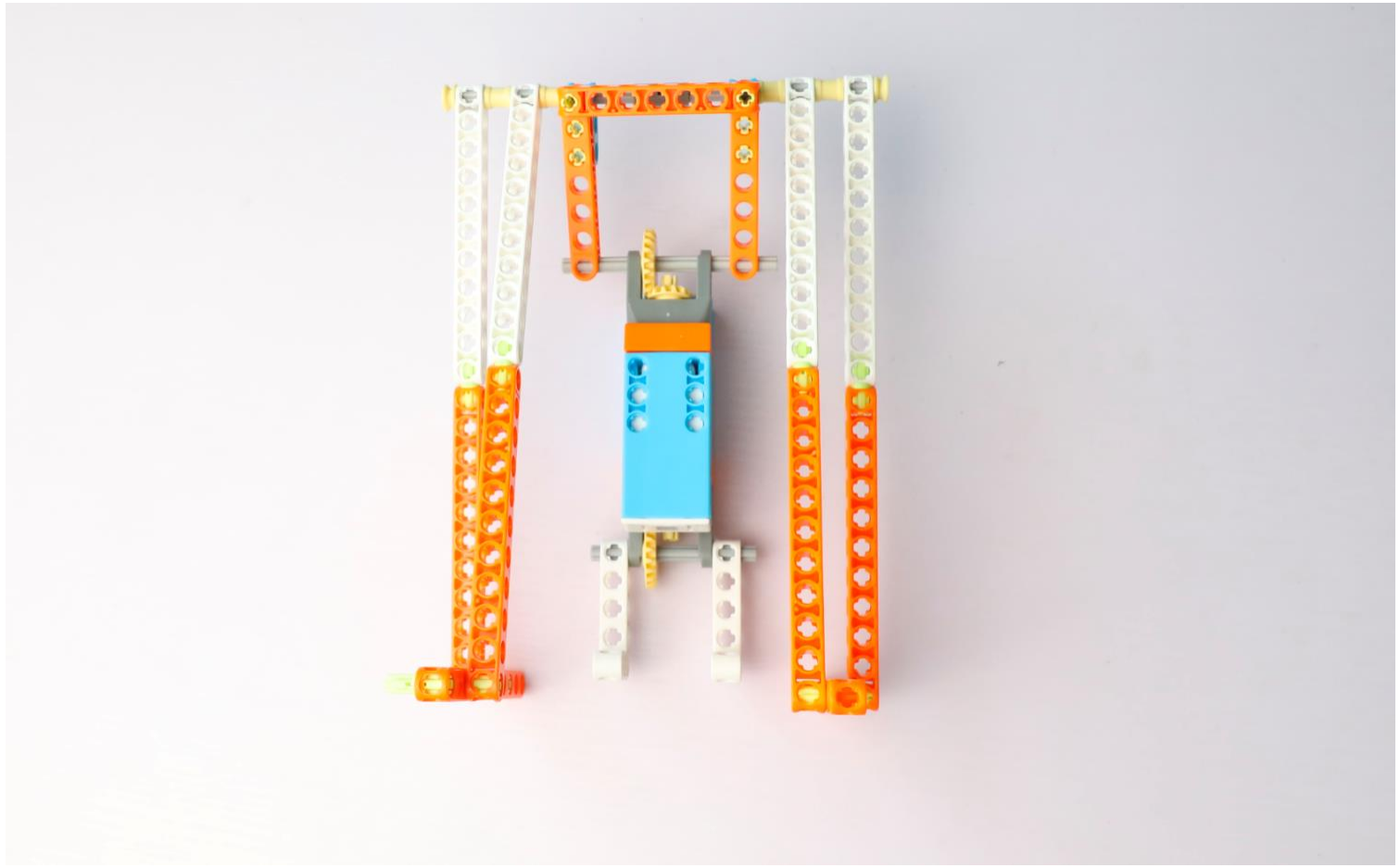

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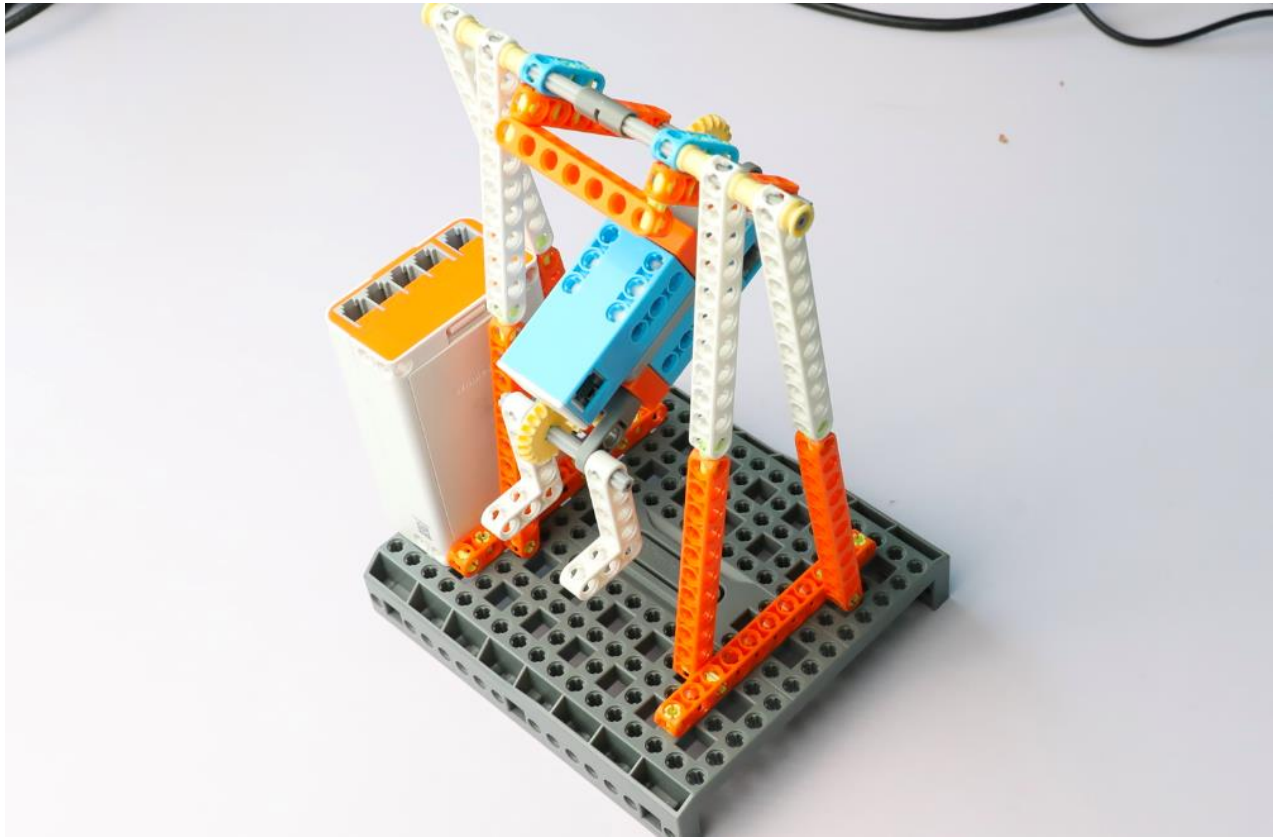


3.Construction

Please connect the two motors to ports A and B of the controller respectively

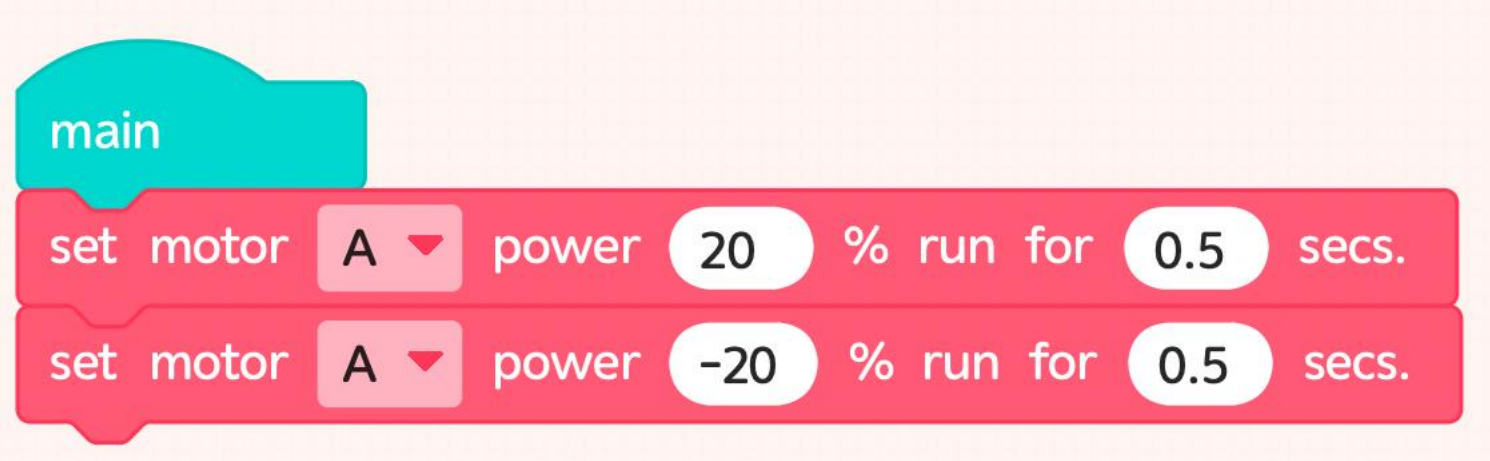


4.Coding

When the program starts, the athlete's feet move back and forth, leading our robot through a set of gymnastic movements.



4.Coding

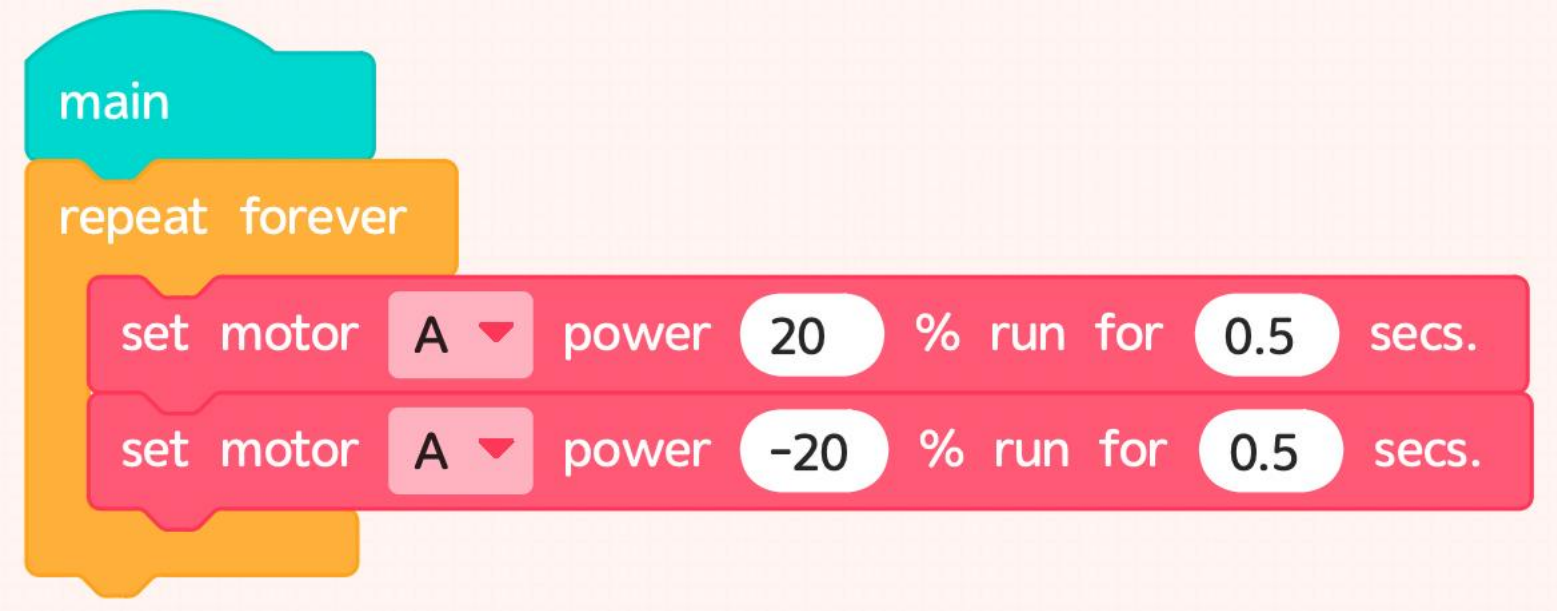

main
set motor A power 20 % run for 0.5 secs.
set motor A power -20 % run for 0.5 secs.

4.Coding

The athlete's foot swings once and then stops. How do you keep it moving?



4.Coding



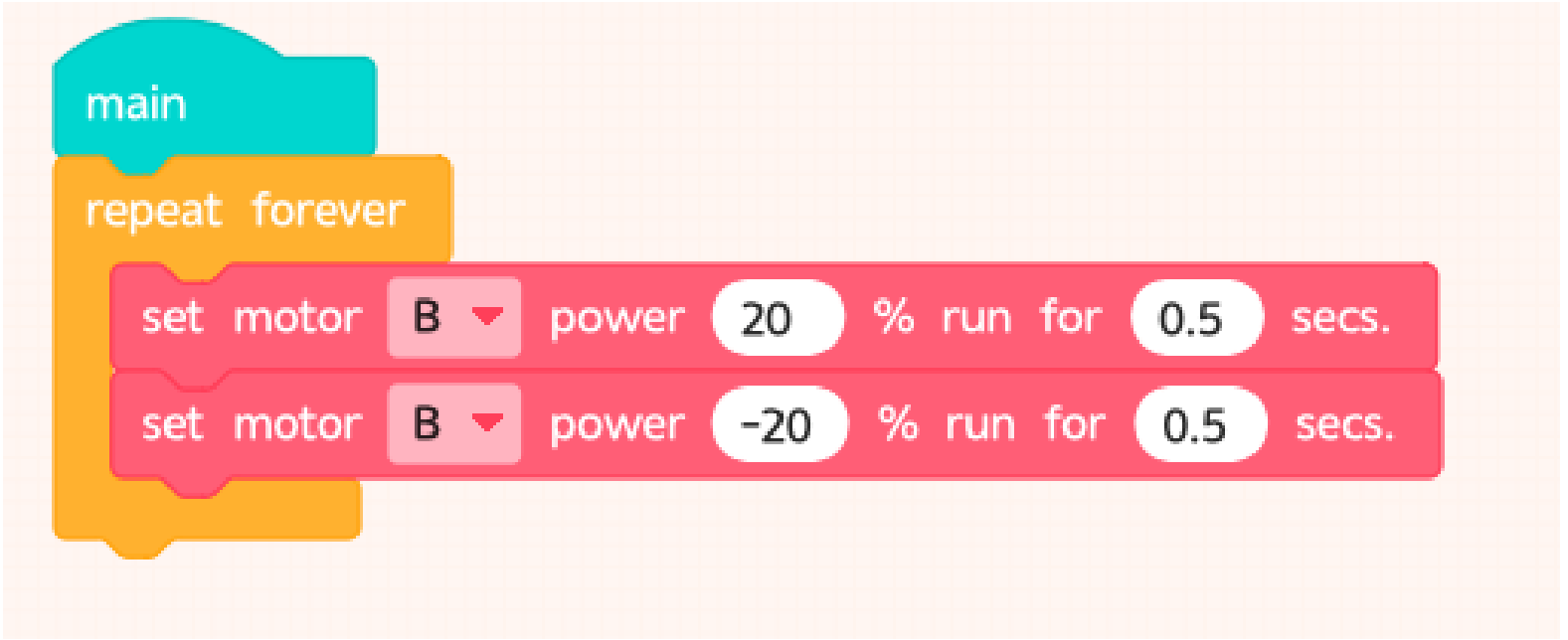
We can use the repeat forever module to wrap programs that need to be run more than once.

4.Coding

How to control athlete upper limb control body to make gymnastics movement?



4.Coding



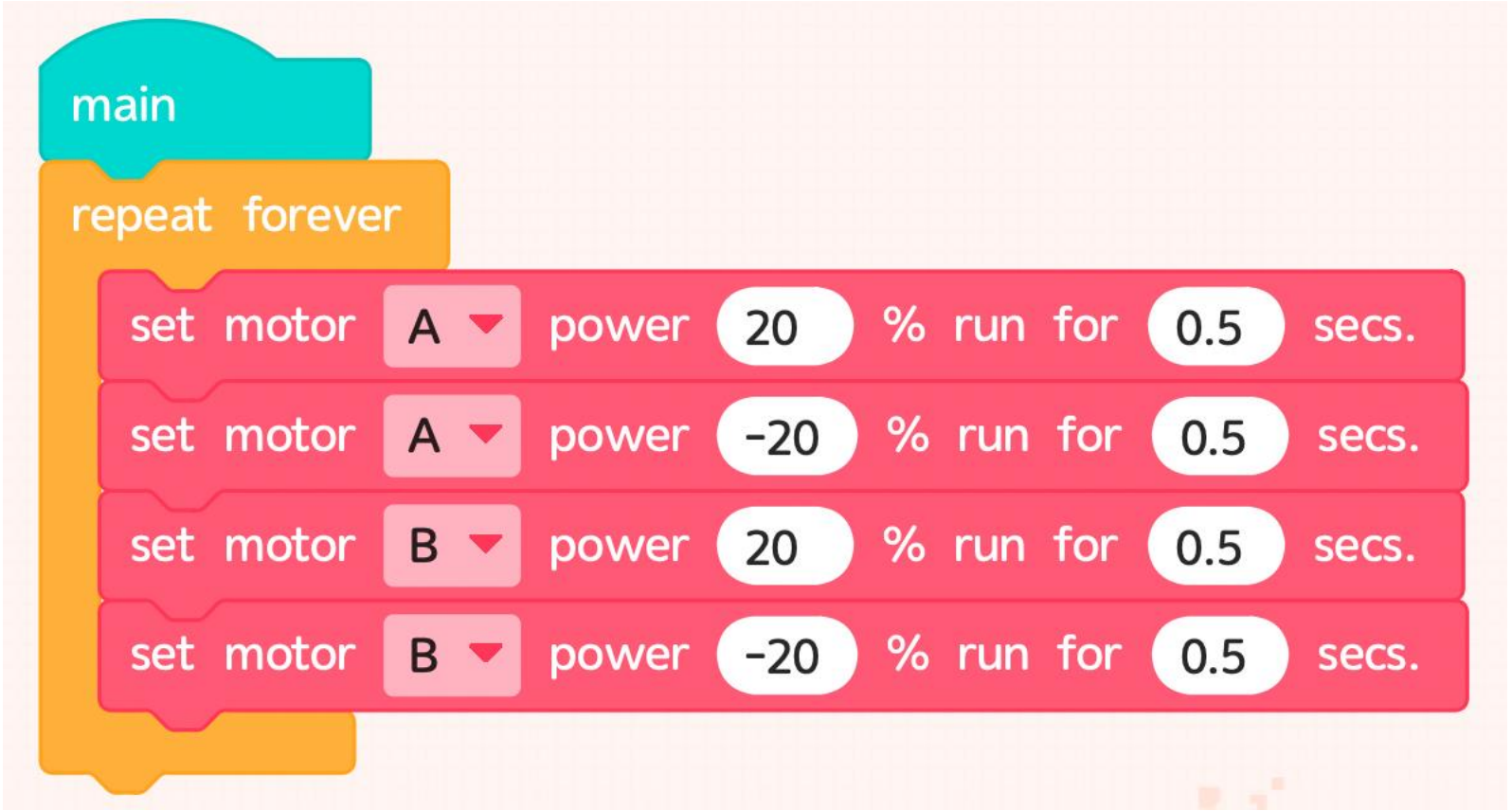
We just need to change the interface of the module to control the motor of the arm.

4.Coding

Combine the previous tasks, the coding for a set of gymnastic movements to be performed by our robot is completed.



4.Coding


main
repeat forever
set motor A power 20 % run for 0.5 secs.
set motor A power -20 % run for 0.5 secs.
set motor B power 20 % run for 0.5 secs.
set motor B power -20 % run for 0.5 secs.

5.Evaluation

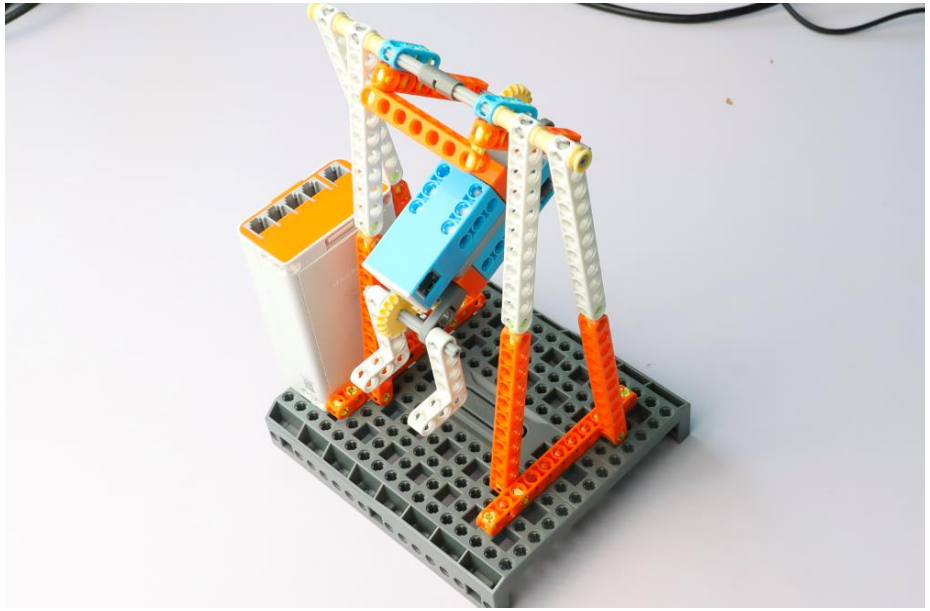
In order to ensure the structural stability of the horizontal bar, which structure can we use?

For the case of articulation, we can use a triangular structure.

For the case of rigid connection, we can also use the quadrilateral structure.



6.Challenge



Program your athletes to produce “wow” sounds and increase the movements time duration to more than 0.5 seconds.