COCOROBO

AI for STEM Competition

Asia Pacific STEAM_AI Technology Innovation Challenge

05 Barrel Firing (Part I)

CocoRobo

COCOROBO

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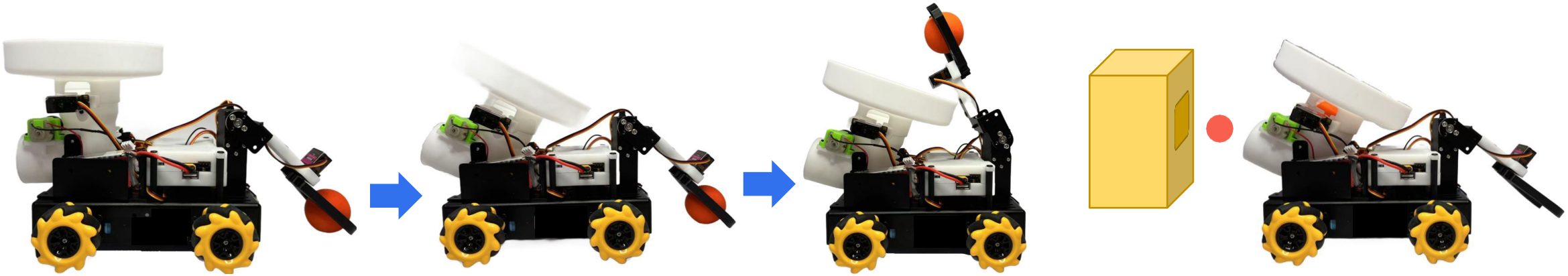
ONE.

Projection process analysis

CHAPTER ONE

Projection process analysis



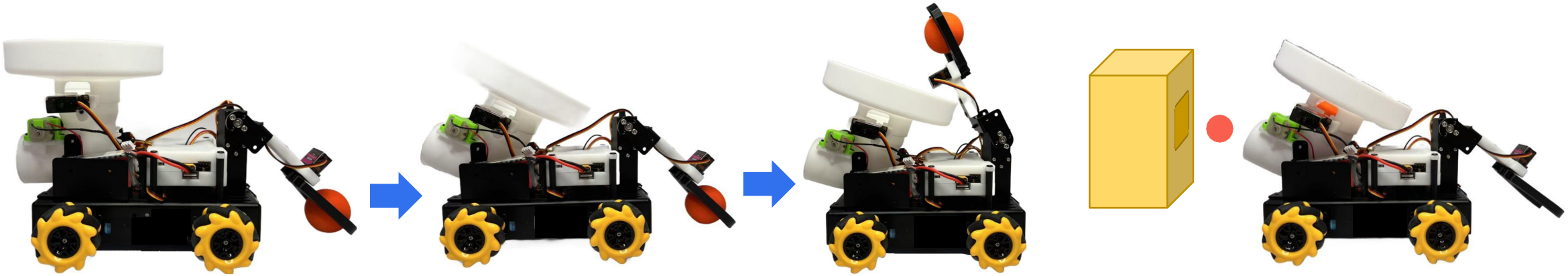
Take the ball

Drop the ball

Adjust the launch

Projection process analysis

Observing the following steps, which actuators are required to complete the corresponding actions?

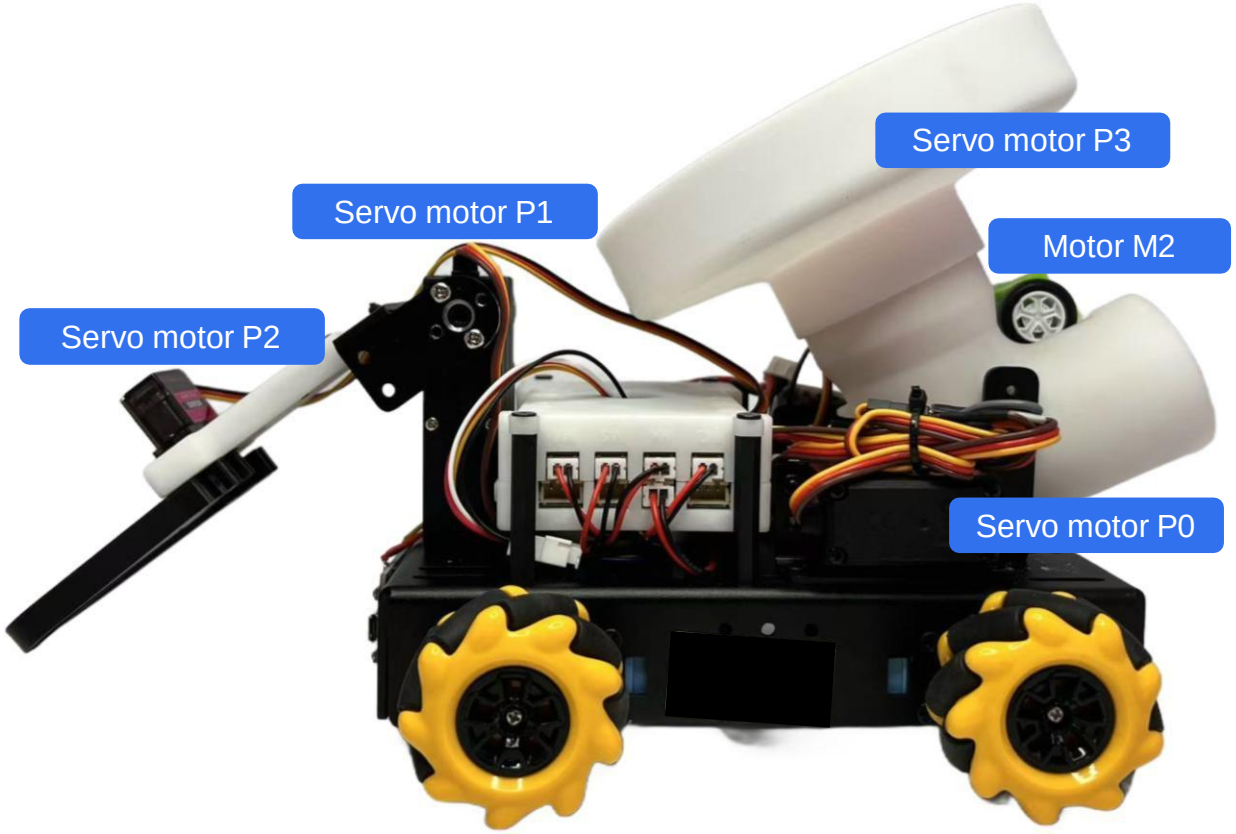


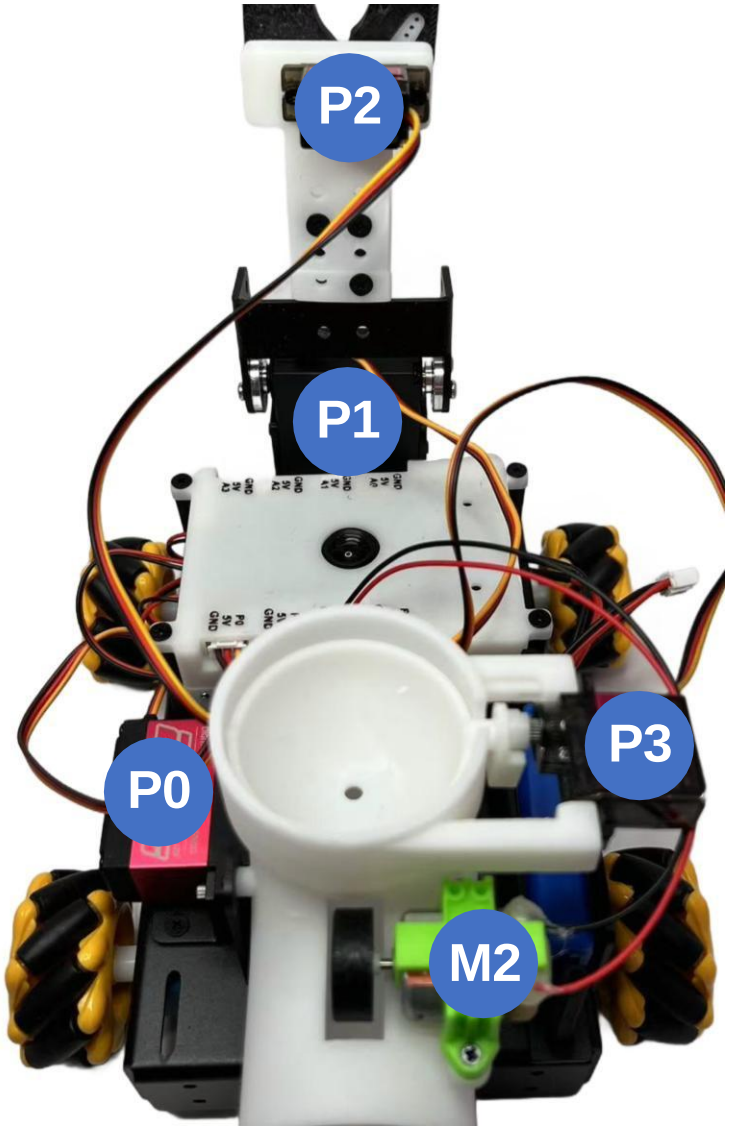
Take the ball

Drop the ball

Adjust the launch

Projection process analysis





COCOROBO

CHAPTER

P

O

W

E

R

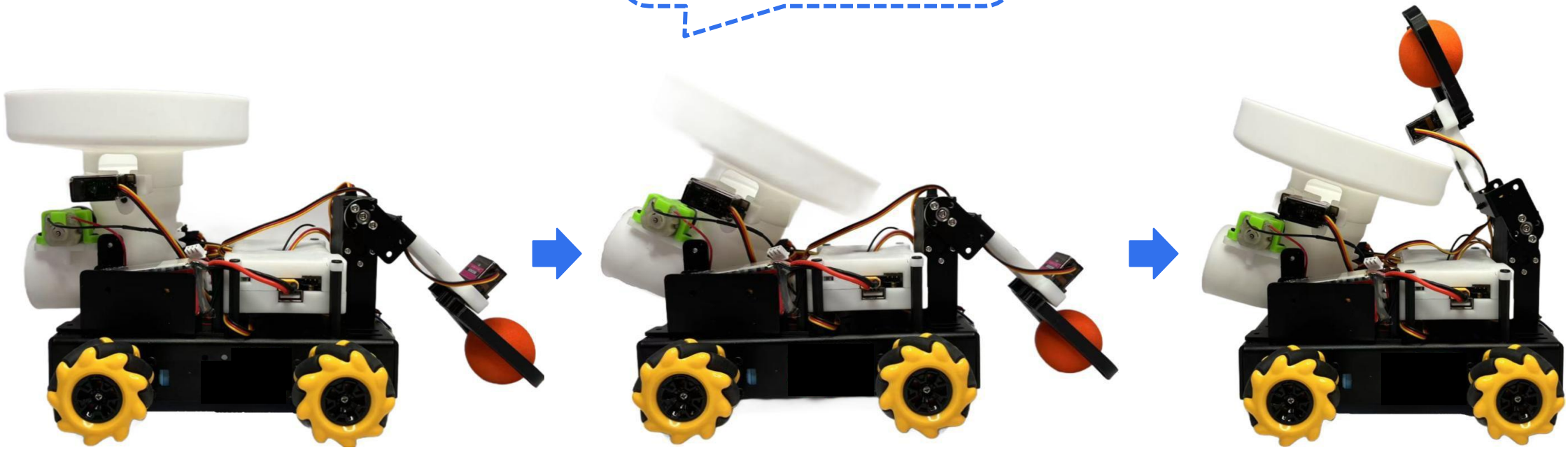
TWO.

Energy Ball Captured

CHAPTER

Energy Ball Captured

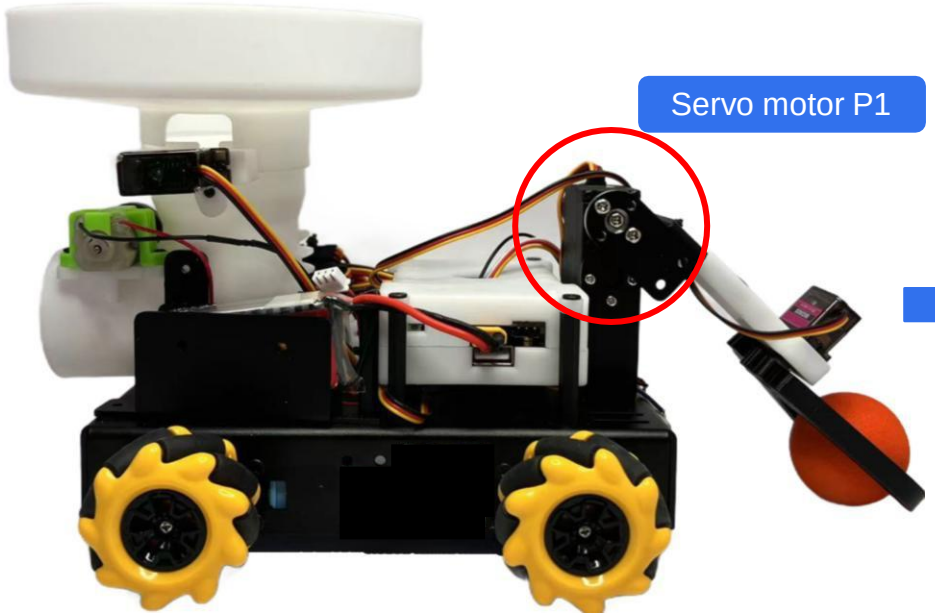
Observing this step, which institutions are carrying out the movement?



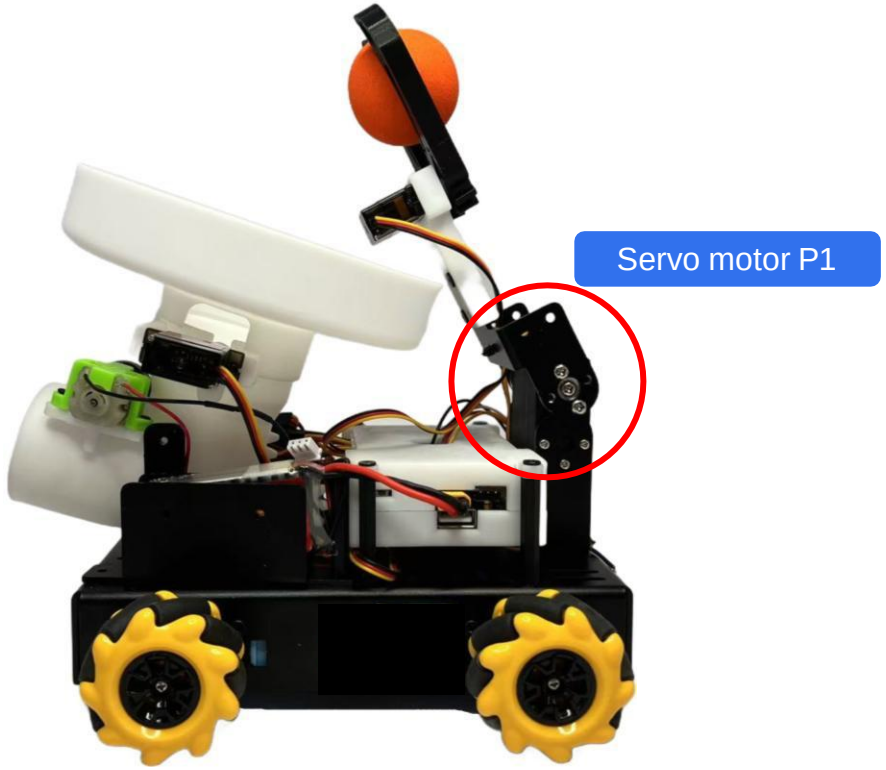
Take the ball

Drop the ball

Energy Ball Captured



Servo motor**P1** The angle is **14** degree



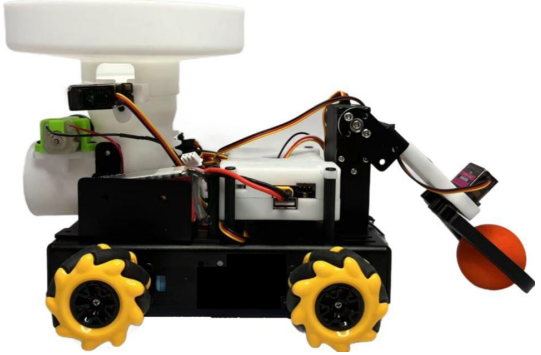
Servo motor **P1** The angle is **160** degree

能量球獲取

Task 1: On the basis of the previous lesson, press the UP button of the game hand button to rise up to fetch the ball;

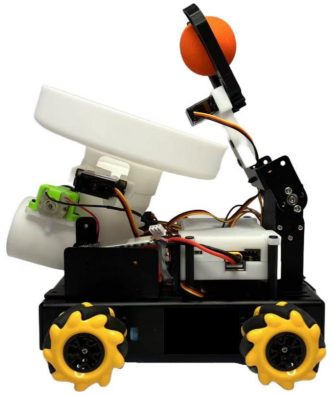
Press the DOWN button on the game switch and drop down to release the ball.

Send a message "UP"



When receiving "UP", set the angle of the servo motor P1 to 160 degree

Send a message "DOWN"



When receiving "DOWN", set the angle of the servo motor P1 to 14 degree

There may be some errors in the actual working angle due to the influence of installation

Energy Ball Captured

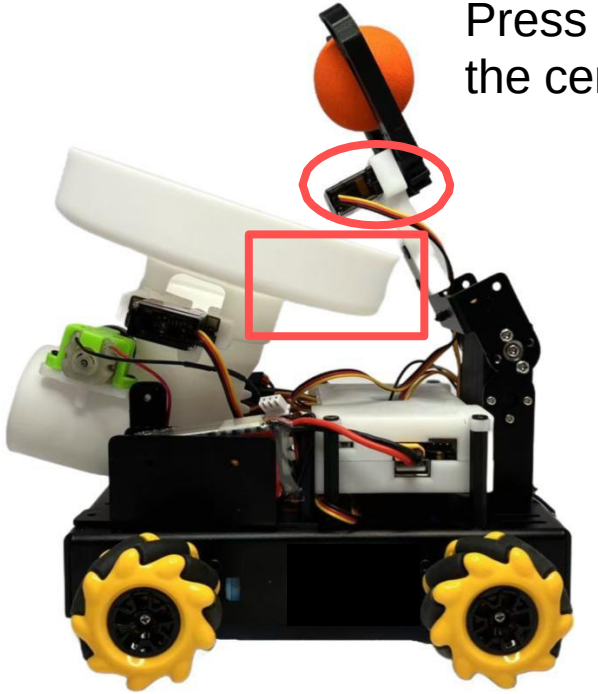
Task 1:

On the basis of the previous lesson, press the UP button of the game hand button to rise up to fetch the ball;
Press the DOWN button on the game switch and drop down to release the ball.

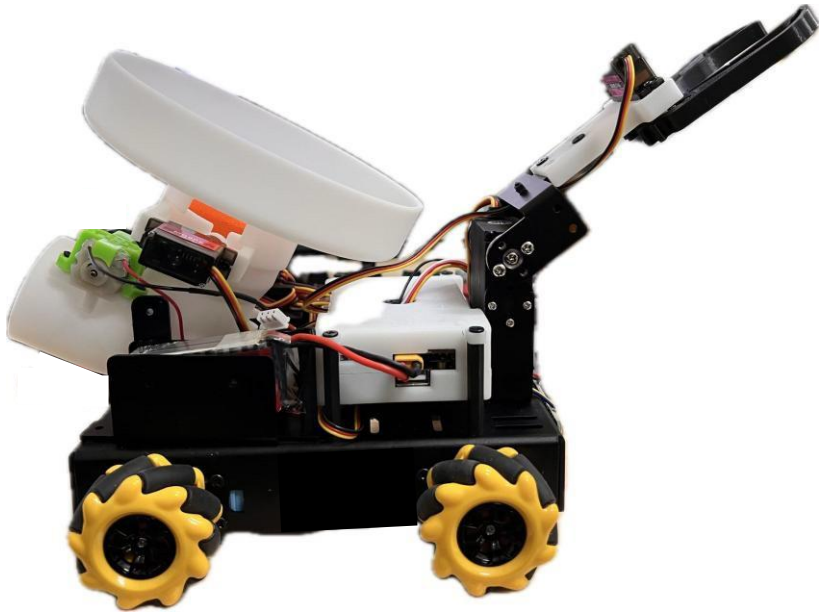
Reference

Energy Ball Captured

The servo motor of the mechanical claw will affect the angle adjustment of the barrel, so it needs to be reset, and the P1 servo motor needs to be increased by another angle: 90°



Press the LEFT button to reset to the center.



Servo motor**P1** The angle is **90** degree

Energy Ball Captured

Press the game button **LEFT**
The key is reset to the middle.

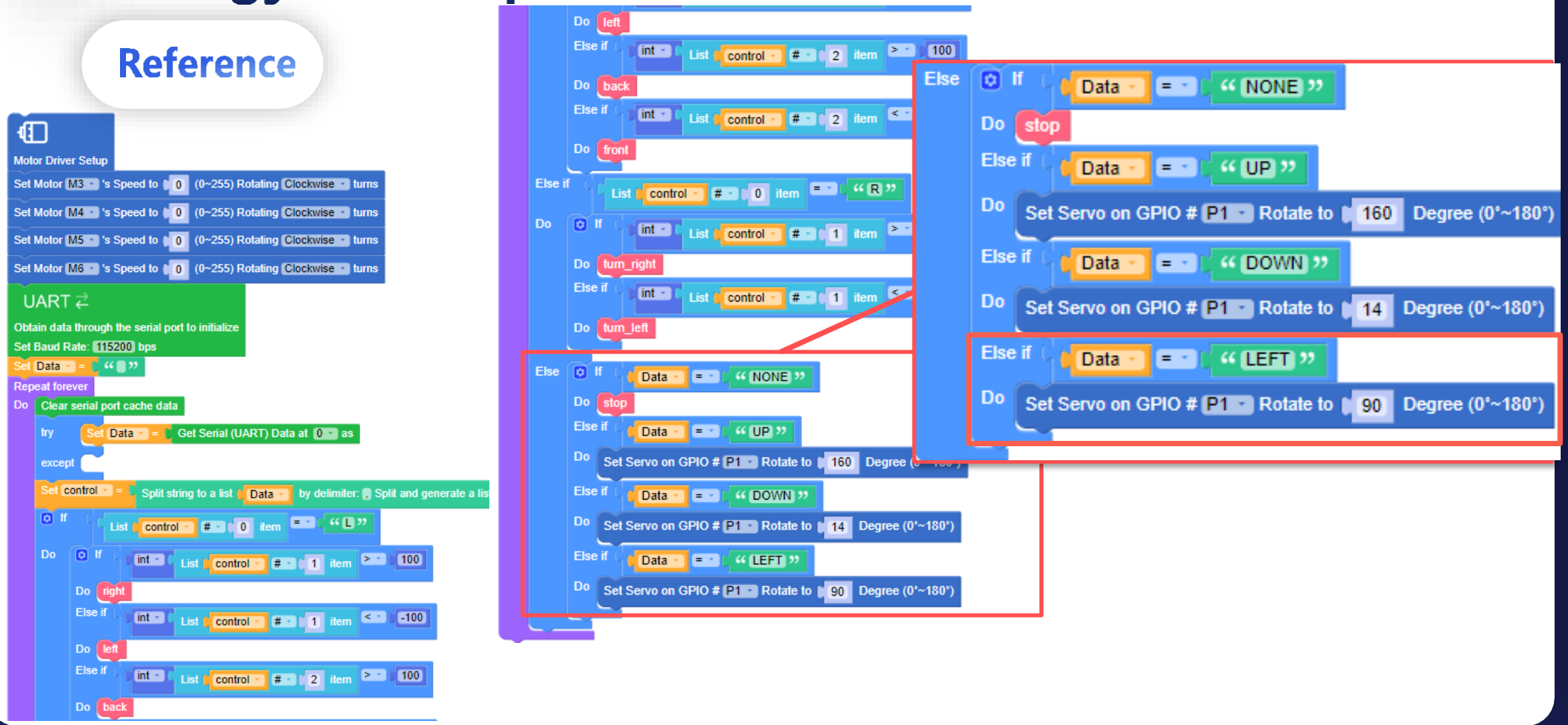
Send a message

"LEFT"

Upon receiving "Left", Set the angle of the servo motor P1 to **90** degree。

Energy Ball Captured

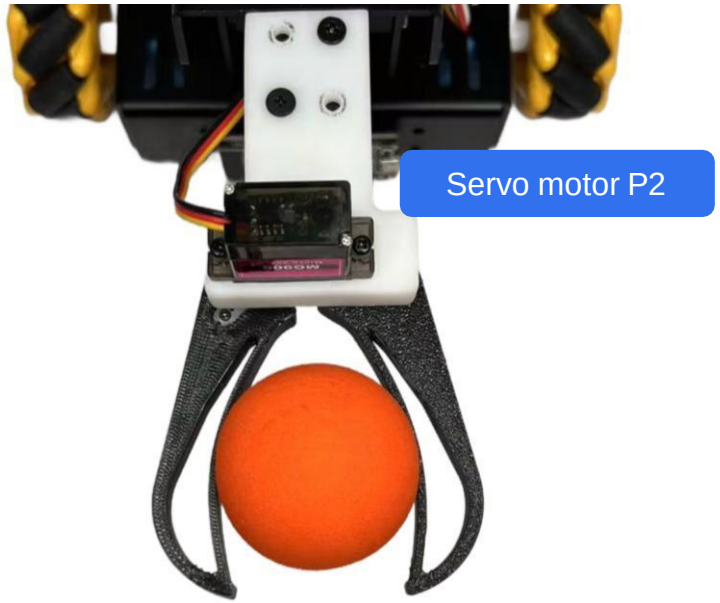
Reference



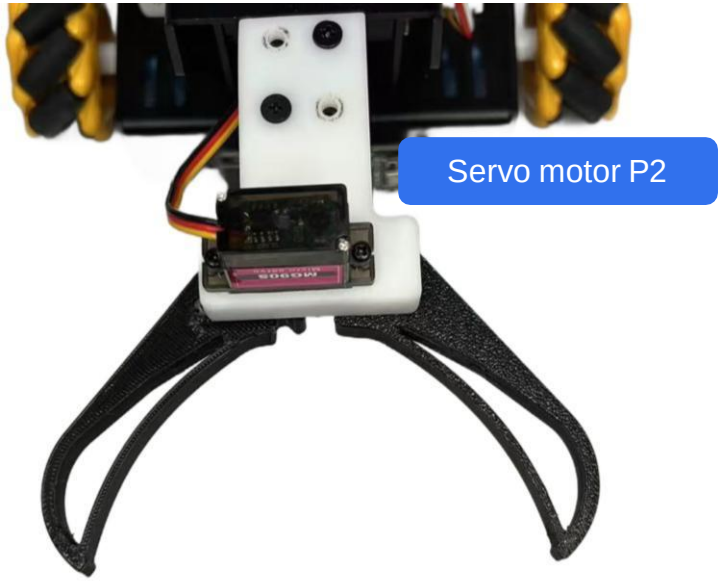
Energy Ball Captured

Observing this step, which institutions are carrying out the movement?

Energy Ball Captured



Servo motor **P2** The angle is **96** degree



Servo motor **P2** The angle is **120** degree

Energy Ball Captured

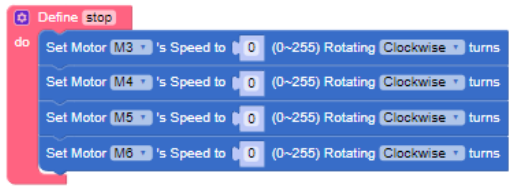
Task 2: On the basis of the task 1 program, press the L1 button of the game hand to open the mechanical claw;
Press the R1 button on the game switch to clamp the mechanical claw.

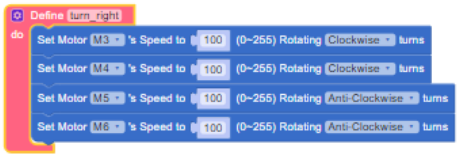
發送訊息
"L1"

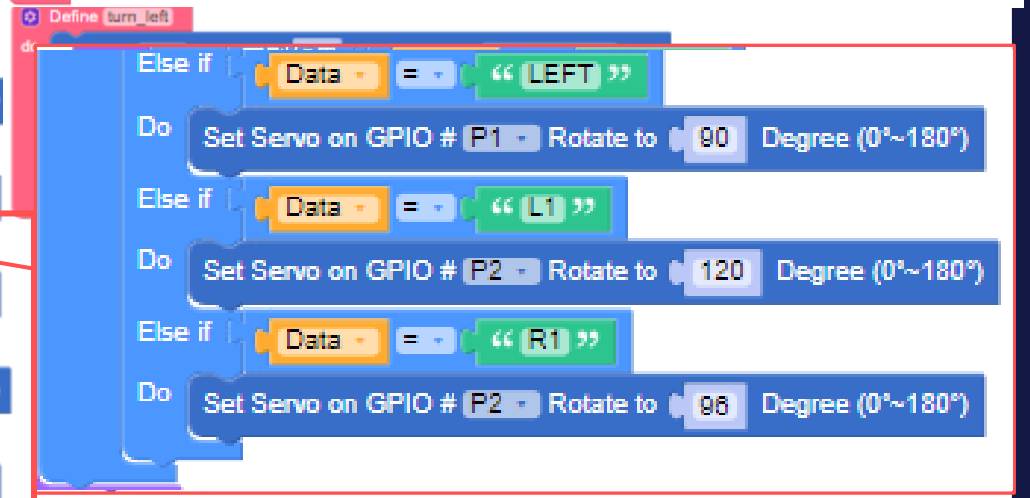
發送訊息
"R1"

Energy Ball Captured

Task 2 :







COCOROBO

CHAPTER

POWER

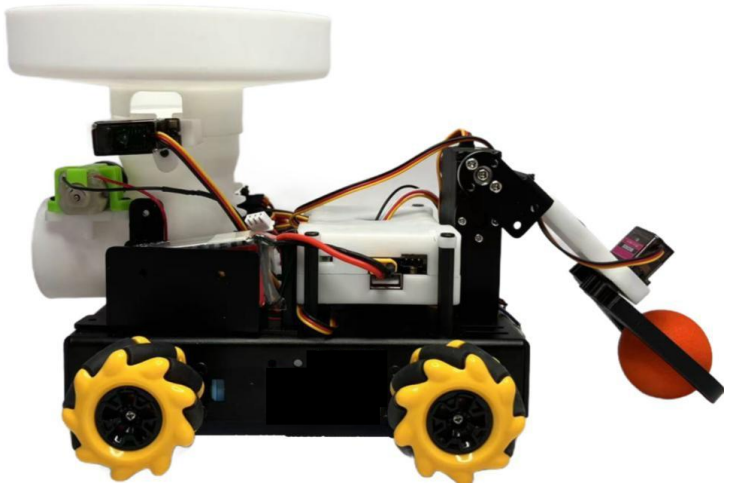
THREE.

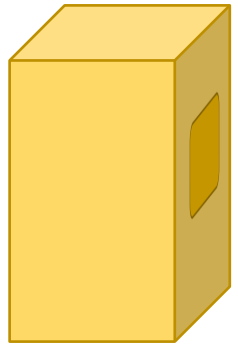
Energy Ball Launches

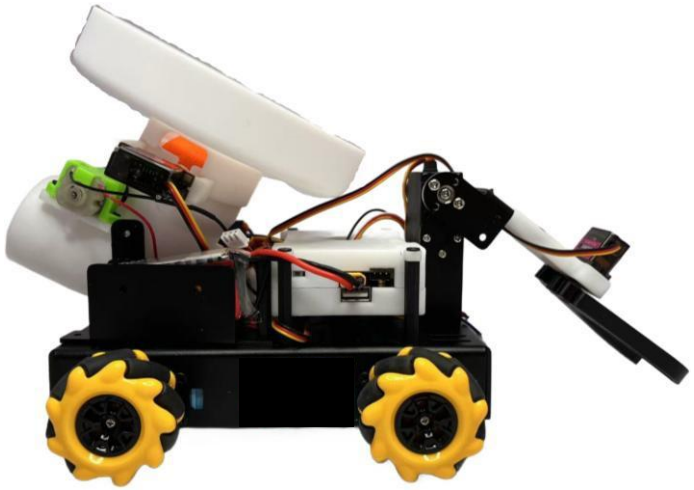
CHAPTER

Energy Ball Launches

Observing this step, which agency is carrying out the movement?



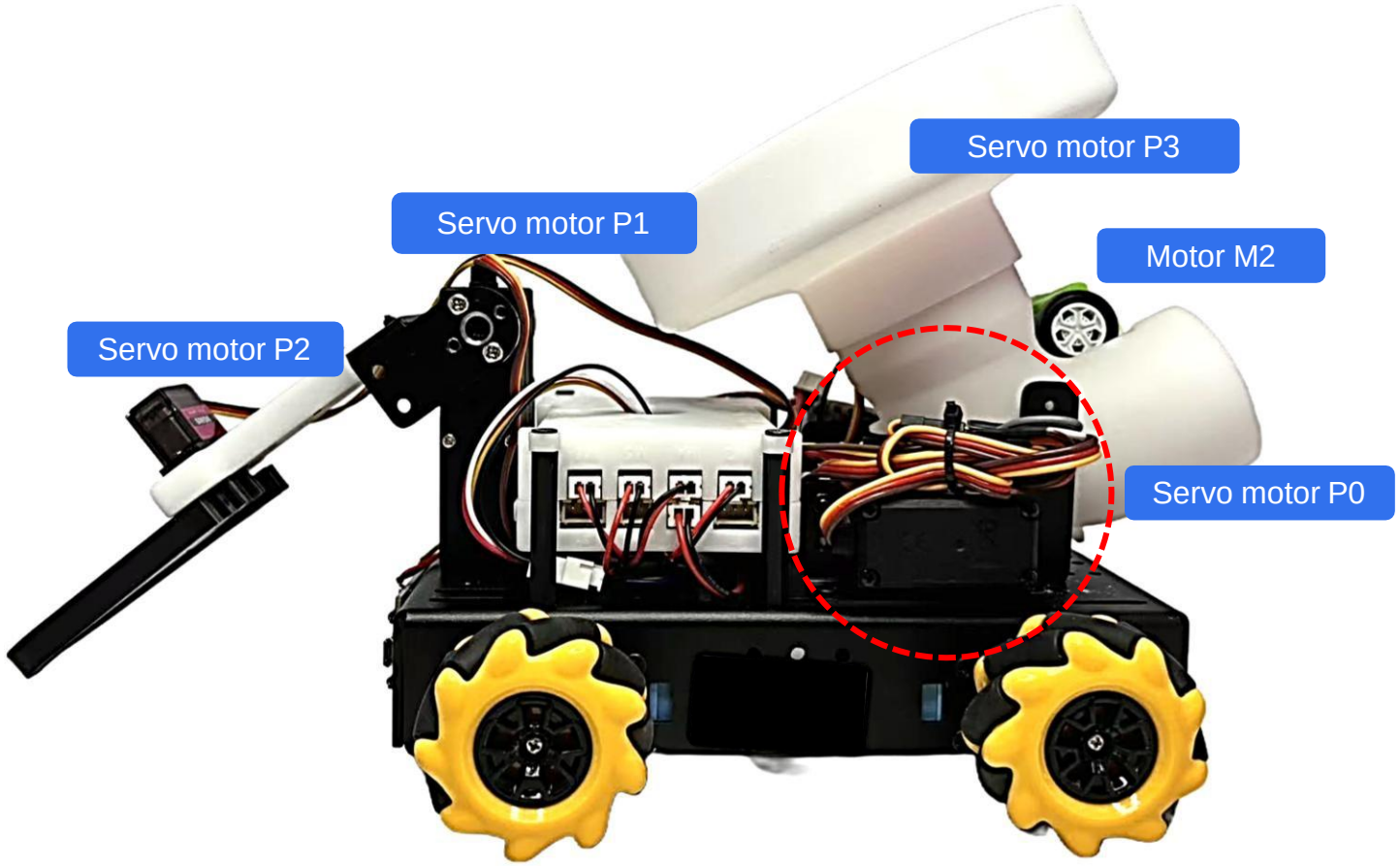




Wrap the ball

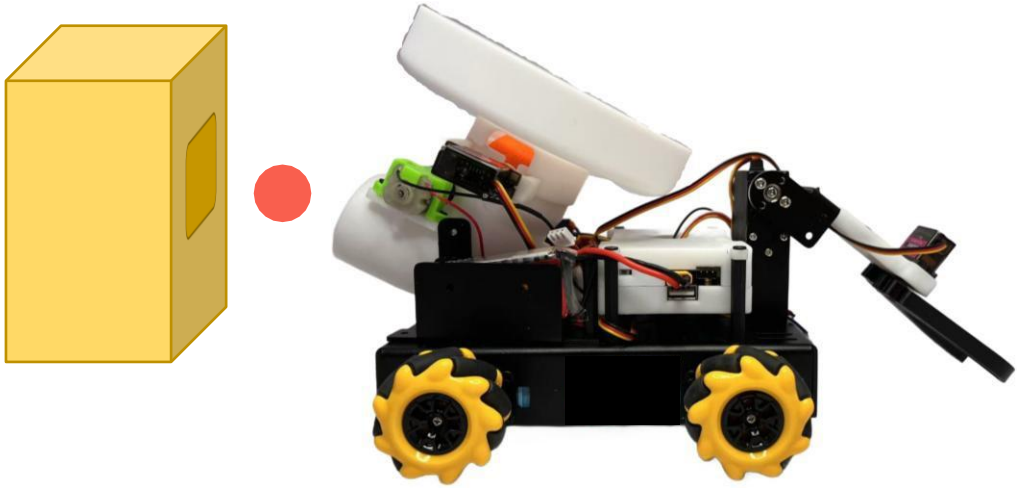
Barrel adjustment

Energy Ball Launches

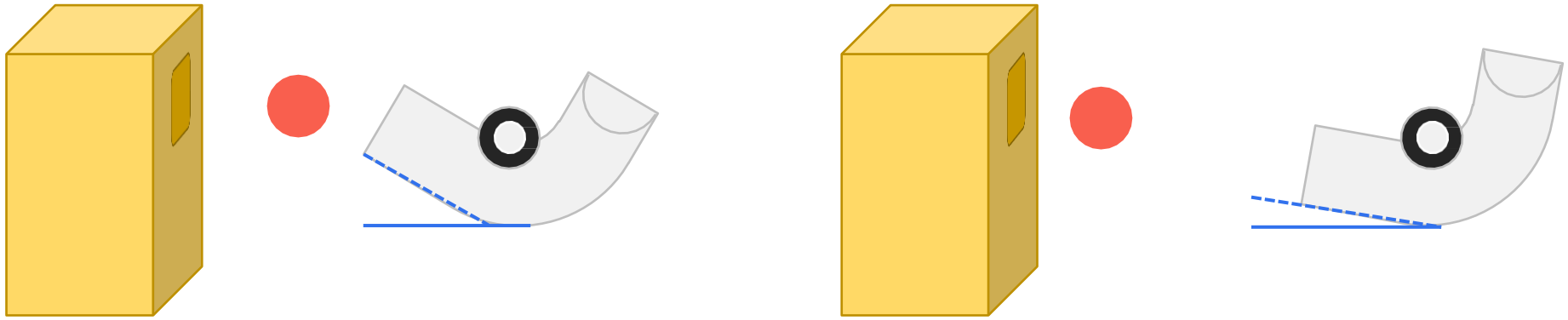


Energy Ball Launches

Think about it, every time an energy ball is projected, does the barrel rise to the same height? What factors affect the elevation?

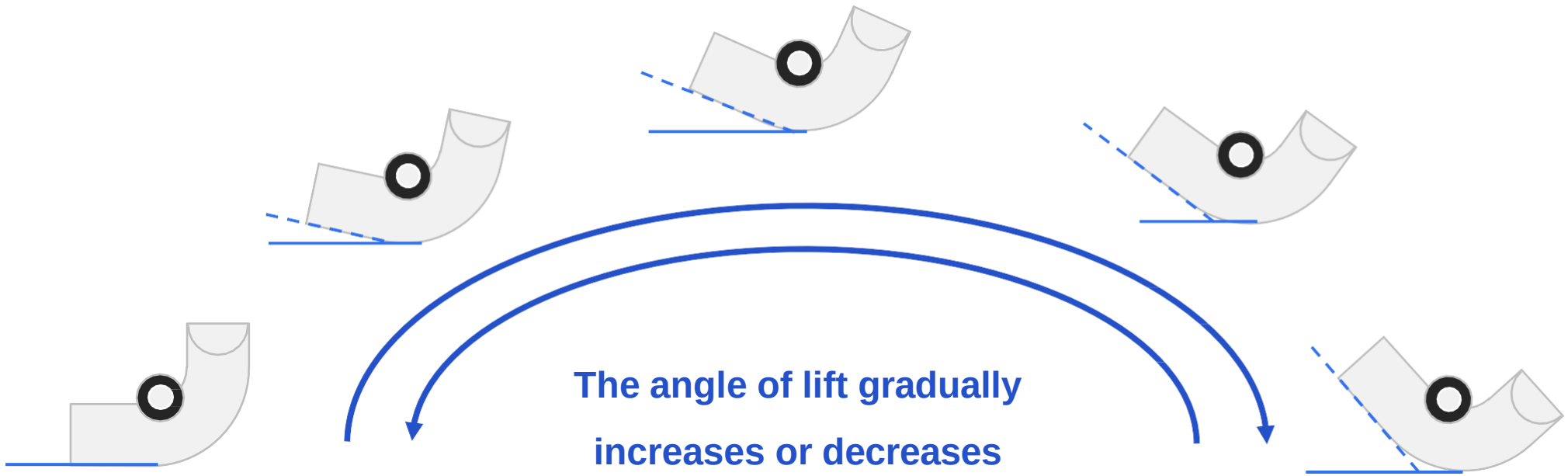


Energy Ball Launches



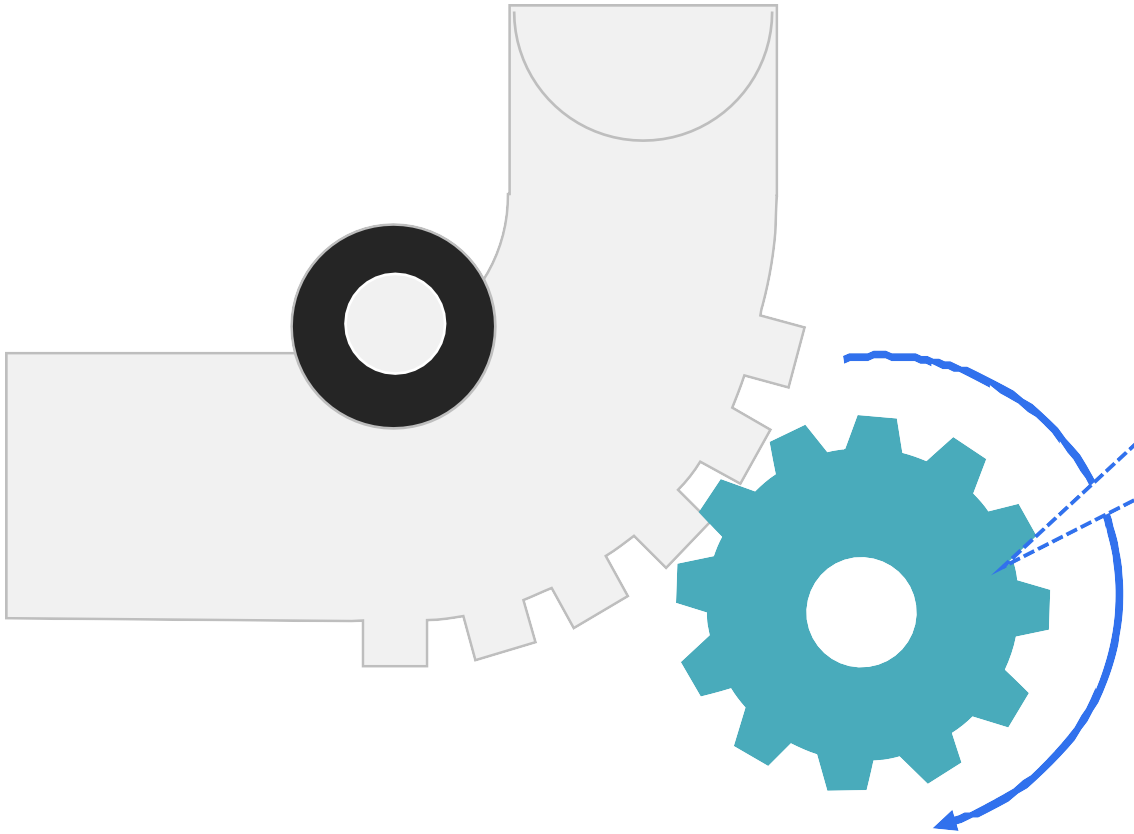
The closer you get to the tower, the higher the angle at which the barrel is raised; The farther it goes, the lower the angle at which the barrel is raised.

Energy Ball Launches



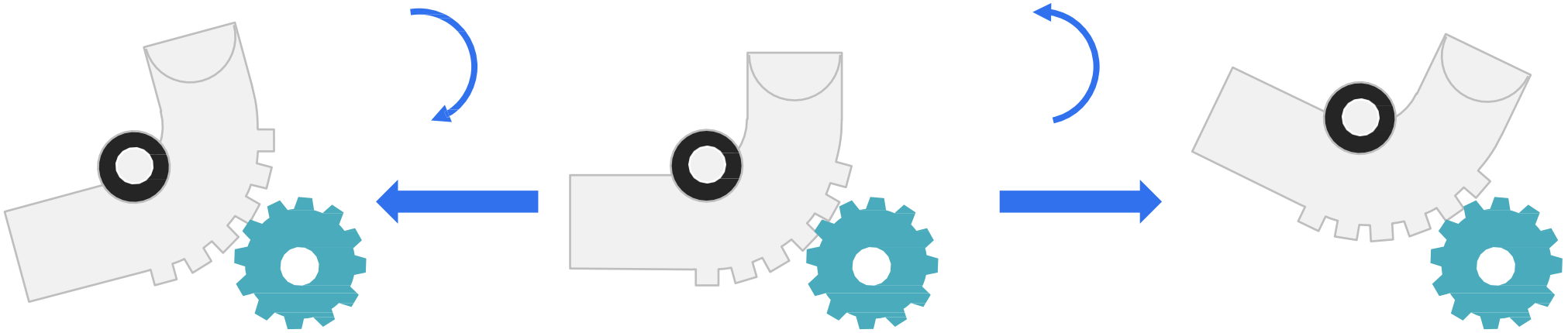
When controlling the barrel, it is necessary to make a subtle adjustment to the barrel angle every time.

Energy Ball Launches



Think about it, how does the barrel move (lift/down) when the gears rotate clockwise? Does the angle of the servo motor increase or decrease at this point?

Energy Ball Launches



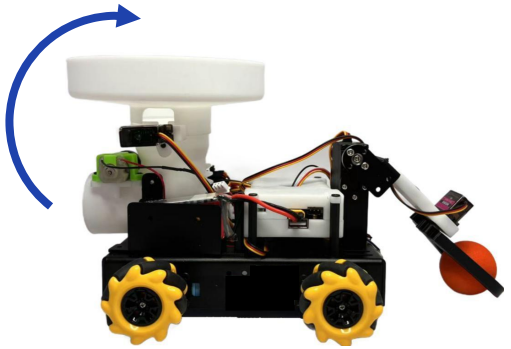
When the gears rotate clockwise, the barrel of the gun **Move down**, Angle of the servo motor **decrease**。

When the gears rotate counterclockwise, the barrel **Uplift**, Angle of the servo motor **increase**。

Energy Ball Launches

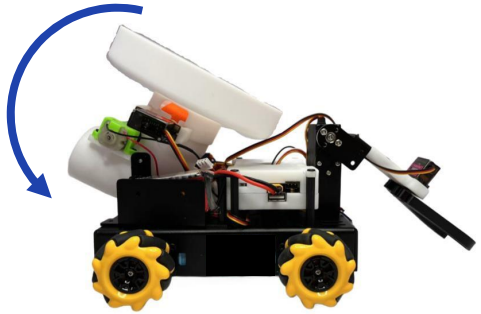
Task 3: On the basis of the procedure of task 2, the guerrillant is pushed to swing the right pole upwards and the barrel of the gun is raised;
Push the player to swing the right lever downwards and move the barrel downward.

Send a message "R,0,-128"



The message received is: "R,0,-128" , set the servo motor P0 angle each time increase 5 degrees

Send a message "R,0,127"

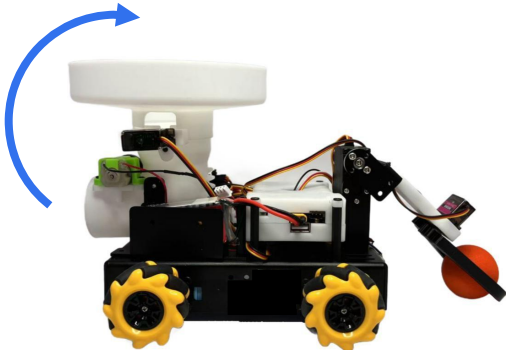


When receiving the message "R,0,127", set the angle of the servo motor P0 each time decrease 5 degrees

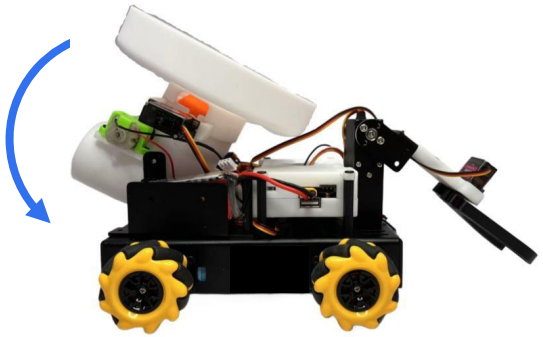
Energy Ball Launches

Task 3: On the basis of the procedure of task 2, the guerrillant is pushed to swing the right pole upwards and the barrel of the gun is raised;
Push the player to swing the right lever downwards and move the barrel downward.

Think about it, how to achieve the increase and decrease of the servo motor angle each time?



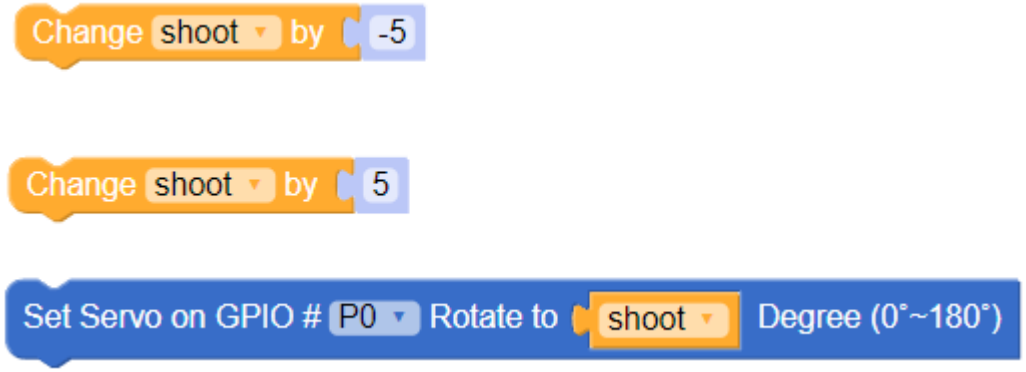
When the received message is "R,0,-128", set the angle of the servo motor P0 each time increase 5 degrees



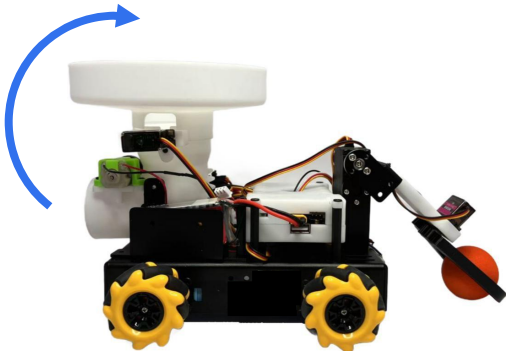
When receiving the message "R,0,127", set the angle of the servo motor P0 each time decrease 5 degrees

Energy Ball Launches

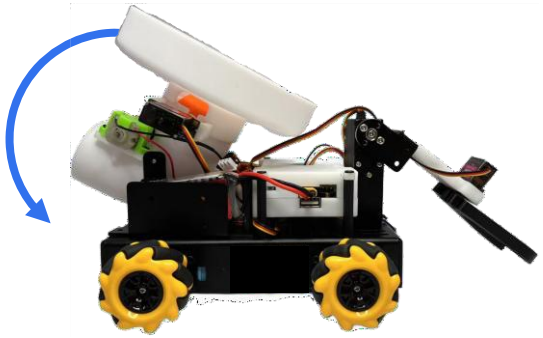
Task 3: On the basis of the procedure of task 2, the guerrillant is pushed to swing the right pole upwards and the barrel of the gun is raised;
Push the player to swing the right lever downwards and move the barrel downward.



Create a new variable shoot and set it to the angle of the servo motor P0.



When the received message is "R,0,-128", set the angle of the servo motor P0 each time increase 5 degrees

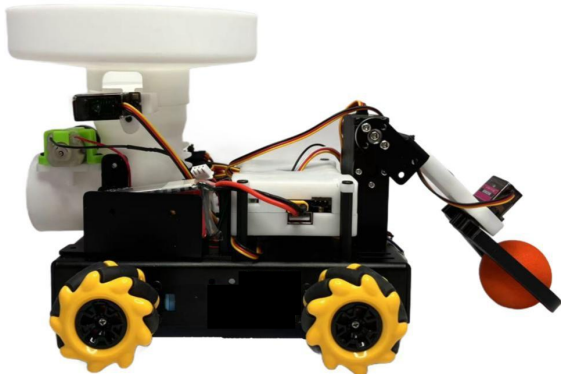


When the received message is "R,0,-128", set the angle of the servo motor P0 each time increase 5 degrees

Energy Ball Launches

Task 3: On the basis of the procedure of task 2, the guerrillant is pushed to swing the right pole upwards and the barrel of the gun is raised;
Push the player to swing the right lever downwards and move the barrel downward.

Think about it, how do you change the angle of a servo motor from 0 to 70?

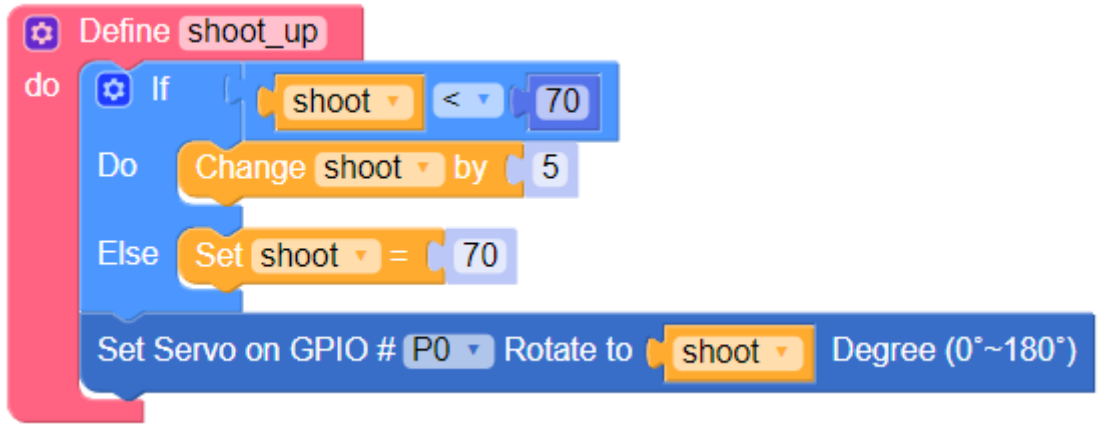


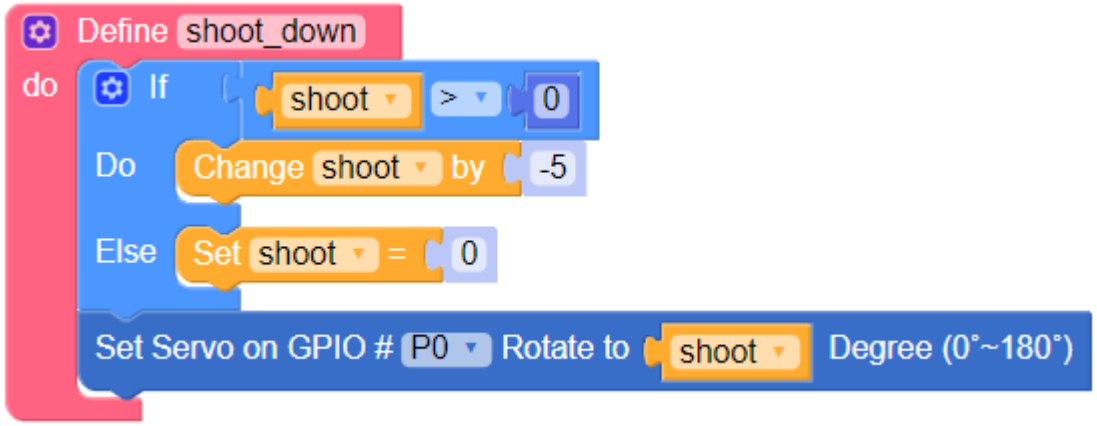
The servo motor P0 angle is 0 degrees

The servo motor P0 angle is 70 degrees

Energy Ball Launches

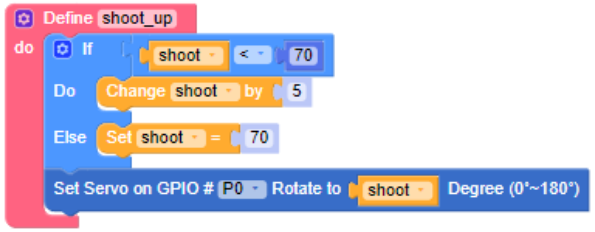
Task 3: On the basis of the procedure of task 2, the guerrillant is pushed to swing the right pole upwards and the barrel of the gun is raised;
Push the player to swing the right lever downwards and move the barrel downward.





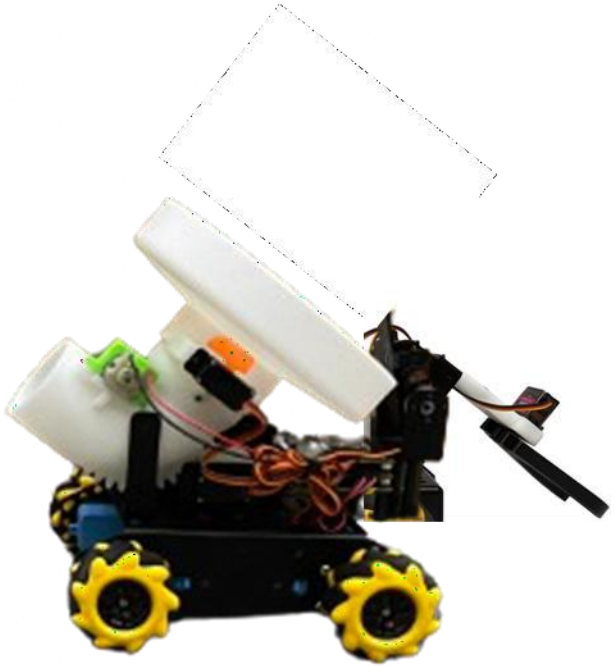
Energy Ball Launches

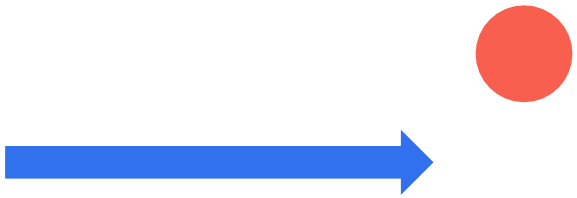
Task 3:



Energy Ball Launches

Which agency do you think is carrying out this step?





Barrel adjustment

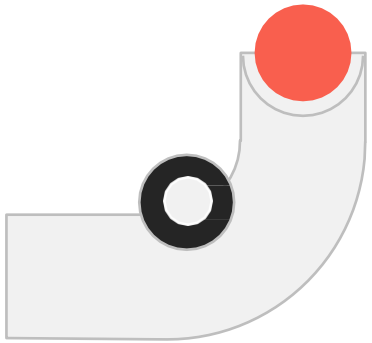
launch

Energy Ball Launches

Initial State

Servo motor P3

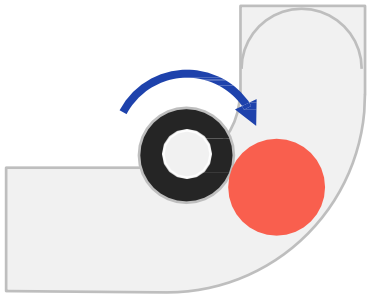
Angle 0 Degrees



launch

Servo motor P3

Angle 180 Degrees

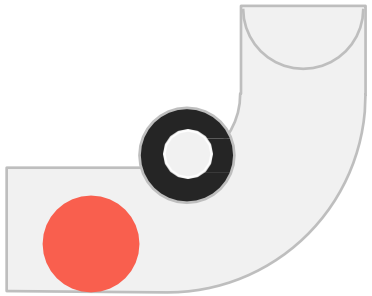


Motor M2 rotate 180 degree clockwise

The launch was successful

Servo motor P3

Angle 0 Degrees

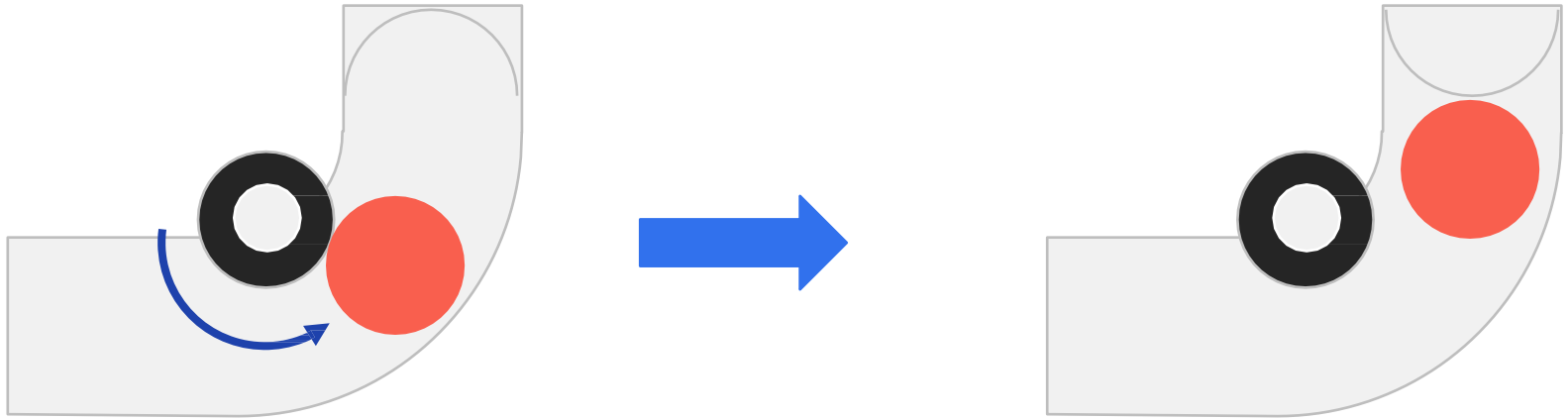


Motor M2 rotate 0 degree clockwise

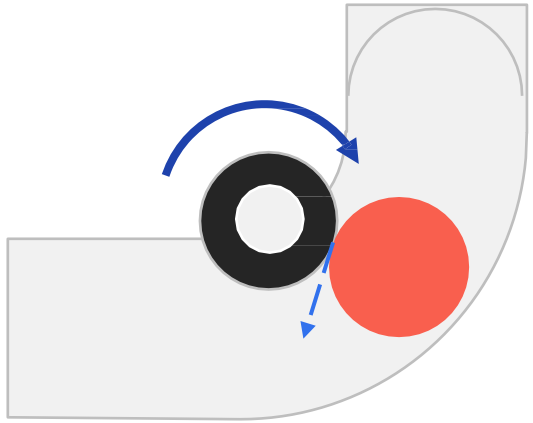
What happens if the friction wheel rotates counterclockwise at this point, and why?

Energy Ball Launches

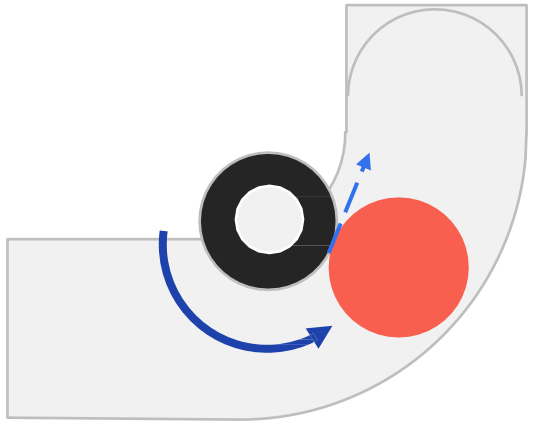
Why is that?



Energy Ball Launches



When the friction wheel rotates clockwise, the contact surface between the friction wheel and the ball will produce an outward force, and the ball will move downward and outward after being forced.

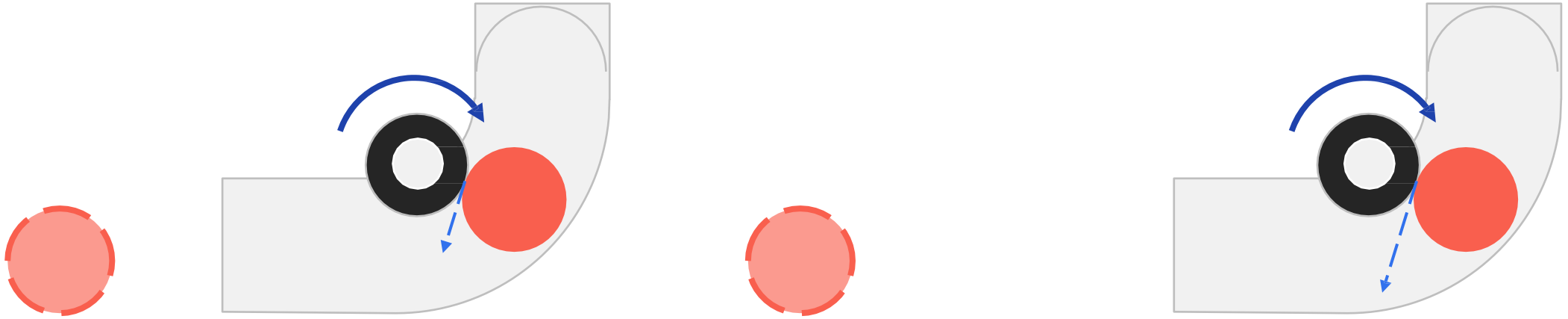


When the friction wheel rotates counterclockwise, the contact surface between the friction wheel and the ball will produce a backward force, and the ball will move upwards after being stressed.

Energy Ball Launches

Think about it, what is the effect of the different rotational speeds of the friction wheel on the motion of the ball?

Energy Ball Launches

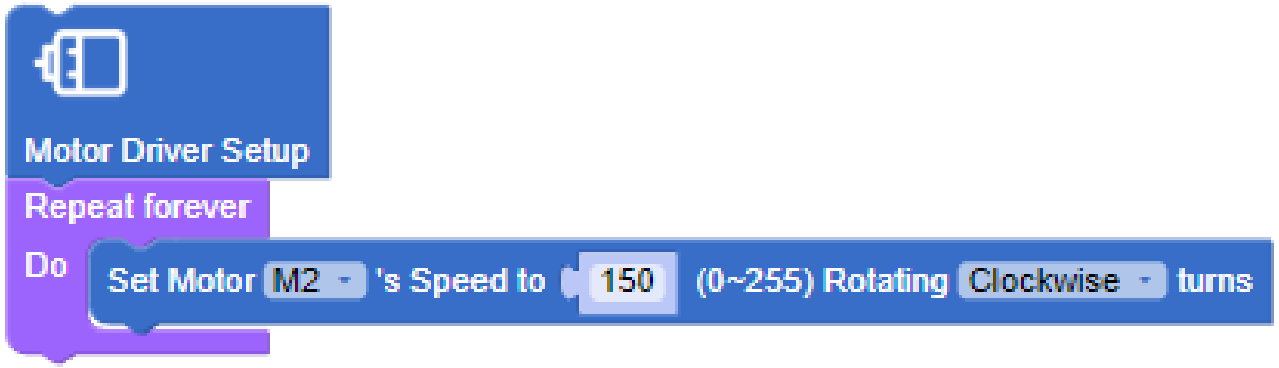


The greater the velocity, the greater the force on the ball and the farther it will be projected;

The lower the velocity, the less force the ball will experience and the closer it will be projected.

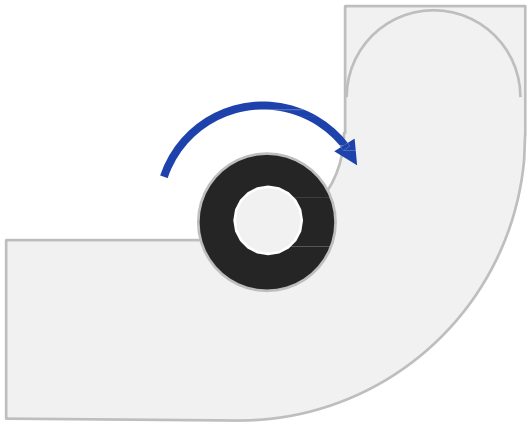
Energy Ball Launches

Test the direction of movement of the minicar Motor M2

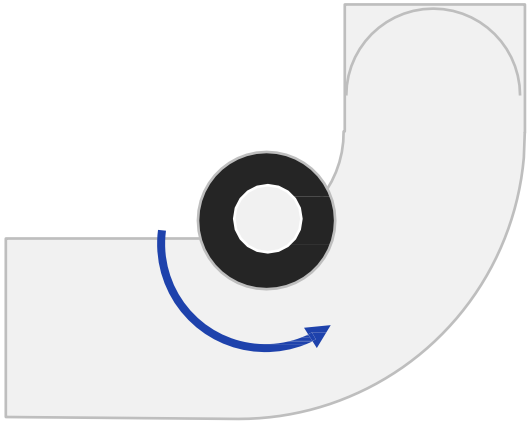


Observe how your trolley's friction wheels rotate at this point.

Energy Ball Launches



If the friction wheel rotates clockwise, the rotation direction of the motor M2 should be set to clockwise

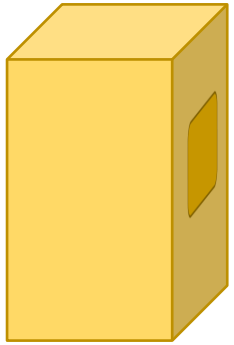


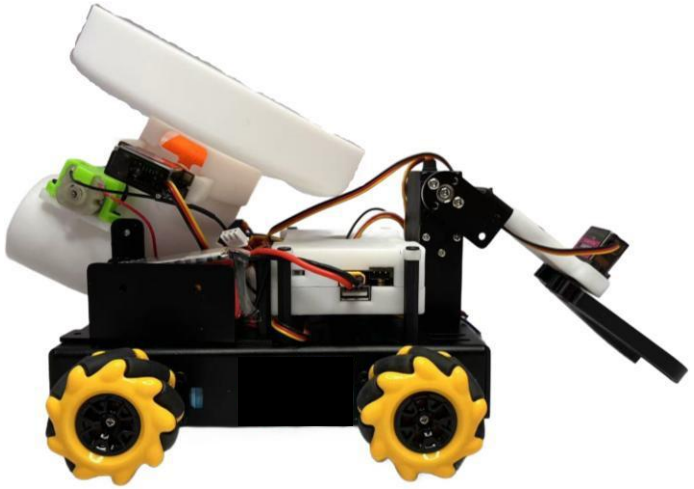
If the friction wheel rotates counterclockwise, the direction of rotation of motor M2 must be set to counterclockwise

Energy Ball Launches

Task 4: Press the button **TRIANGLE** Button, energy balls are fired.

Send a message "TRIANGLE"





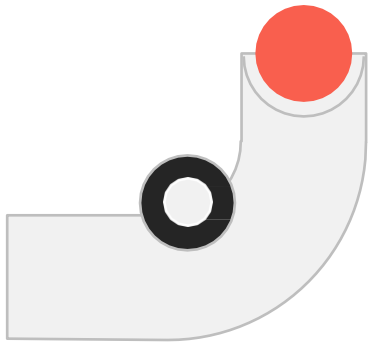
Energy Ball Launches

Task 4: Press the button **TRIANGLE** Button, energy balls are fired.

Process analysis

Servo motor P3

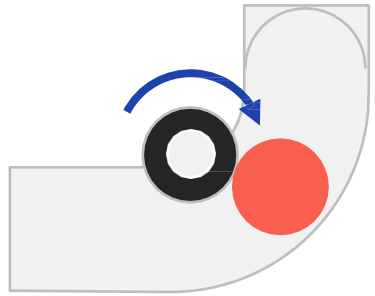
Angle 0 Degrees



Motor M2 rotate 0 degree clockwise

Servo motor P3

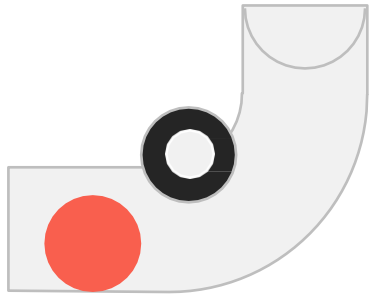
Angle 180 Degrees



Motor M2 rotate 180 degree clockwise

Servo motor P3

Angle 0 Degrees



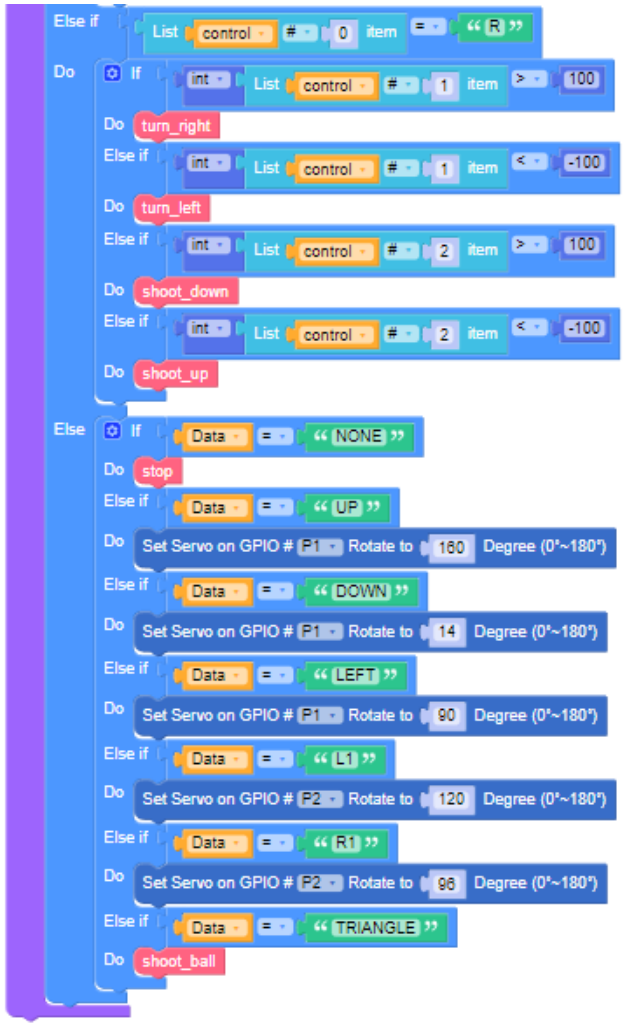
Motor M2 rotate 0 degree clockwise

Energy Ball Launches

Task 4: Press the button **TRIANGLE** Button, energy balls are fired.

Energy Ball Launches

Task 4:



Energy Ball Launches

Tests have found that sometimes pressing **TRIANGLE** button one time, the trolley will continue to fire several times in a row. How to solve this situation?

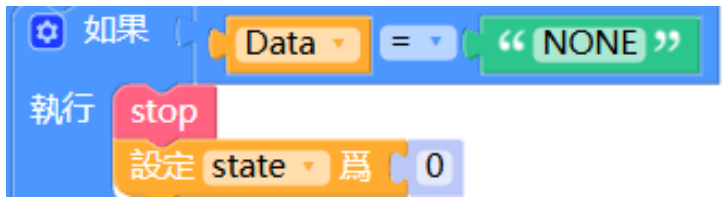
Energy Ball Launches

Although, the button was pressed for a short instant, the same input will be continuously read. As the shooter requires time to fire, it stops receiving new data during the fire sequence. After the action is complete, it reads the data stored in the cache during that time, which causes it to continue firing.

Energy Ball Launches

Task 4: Press the button **TRIANGLE** Button, energy balls are fired.

- Create a variable state, which starts at 0.
- When you press the TRIANGLE button to fire, you will determine the state at this time, and if the state=0 will be fired.
- Switch the state to 1 at the same time when launching
- When the key is not pressed (send NONE), the state is changed to 0.



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Energy Ball Launches

See you in The Next Session!

T H A N K S

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