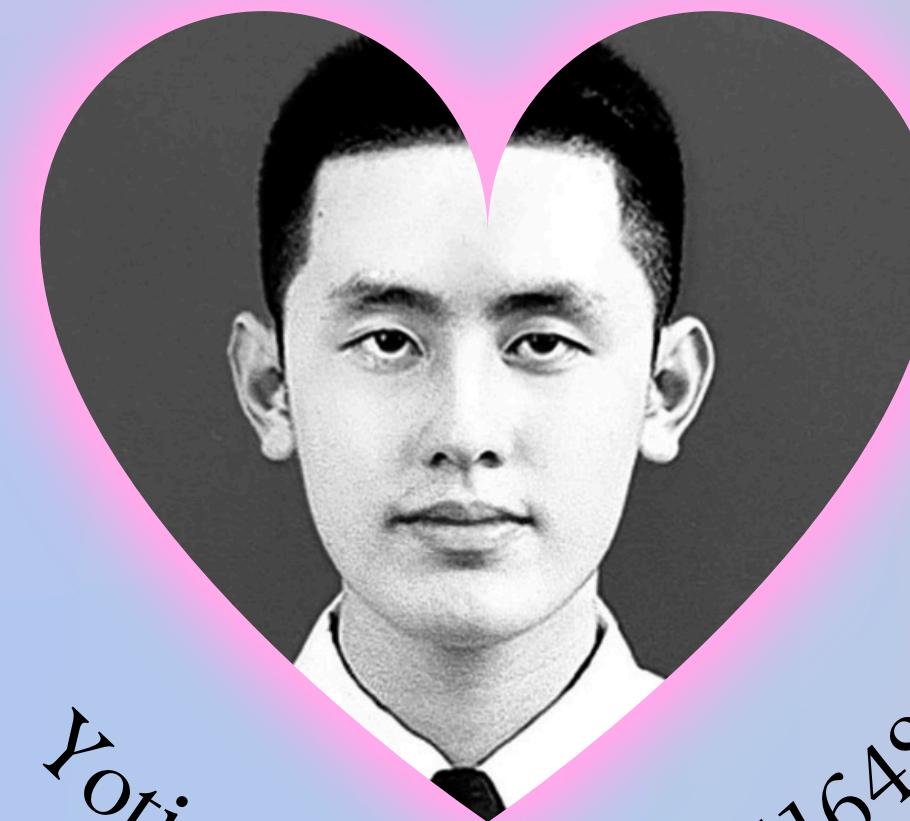


Team member



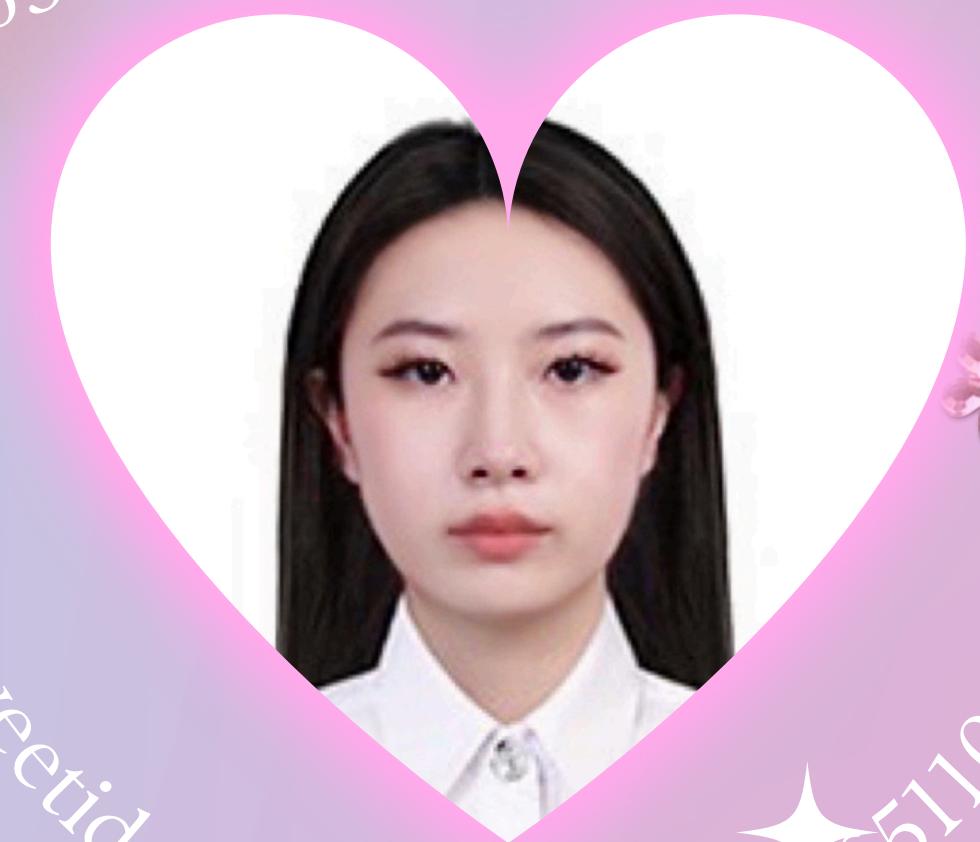
Ratchanon Nooraksa 65011505



Xotin Limyotin 65011648



Napat Chueyoo 65011376



Paveetida tiranatwittayakul 65110145

G30



Purpose

To apply knowledge from the first semester.

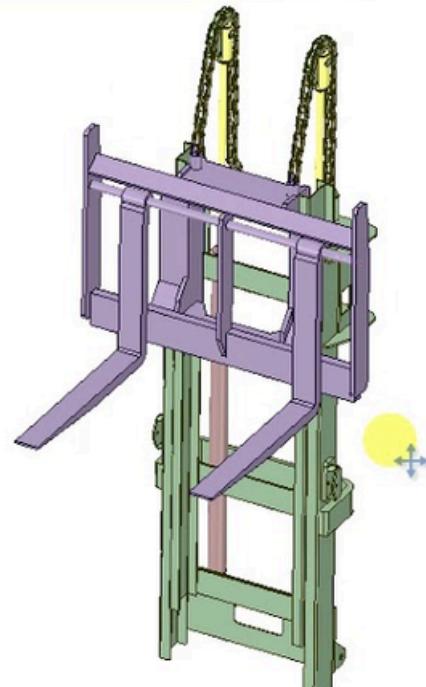
The integration between programming, physics, and drawing.

To learn new informations from the struggles that we will face as we go through the project.

Scope

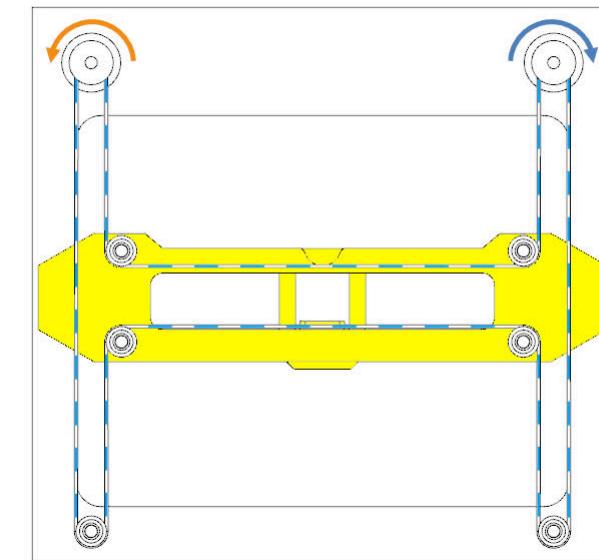
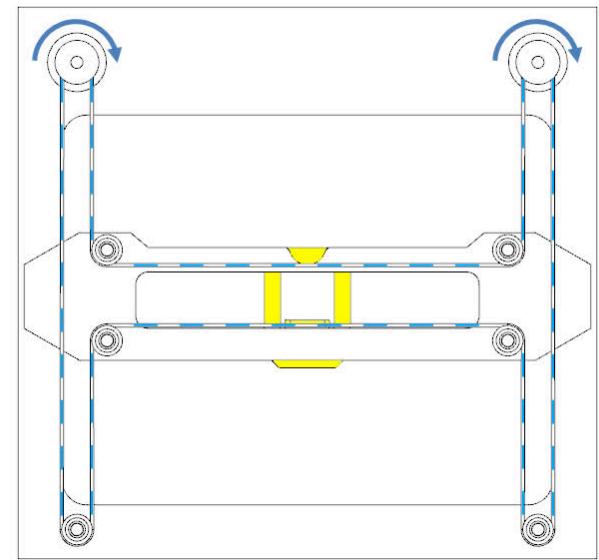
The scope of this project is to make the robot fully automated and able to follow commands. In addition, our manual robot must have a gripper that can grip the ball and drop it on the projectile launcher which is modify from a catapult and can shoot a ball. Finally, both robot should be combined with a knowledge of 3D design, programming and calculation of a projectile motion with a knowledge of physics from the first semester.

Background research



Forklift Mechanism

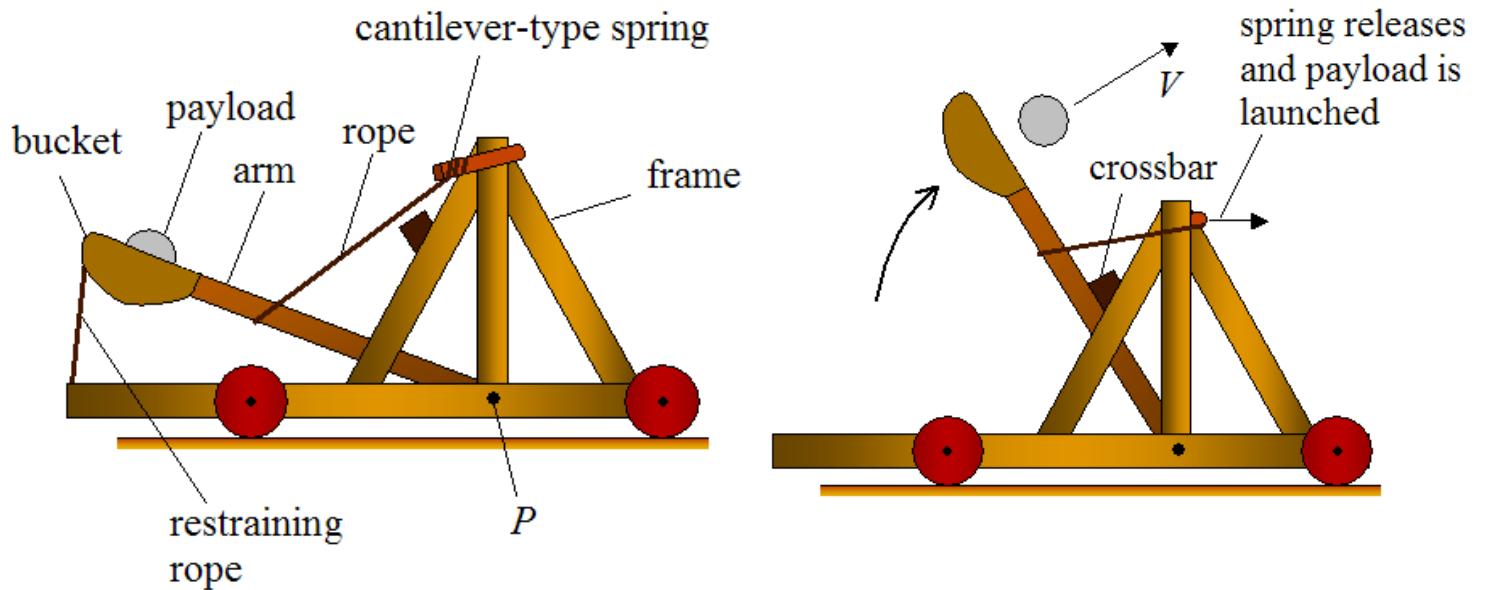
The forklift has a hydraulic system which is coupled to a Roller Chain Pulley System. The pulley's fulcrum is a gear on top of the mast that moves up when the gear rotates and lifts the fork.



Core XY Kinematics in 3D printer

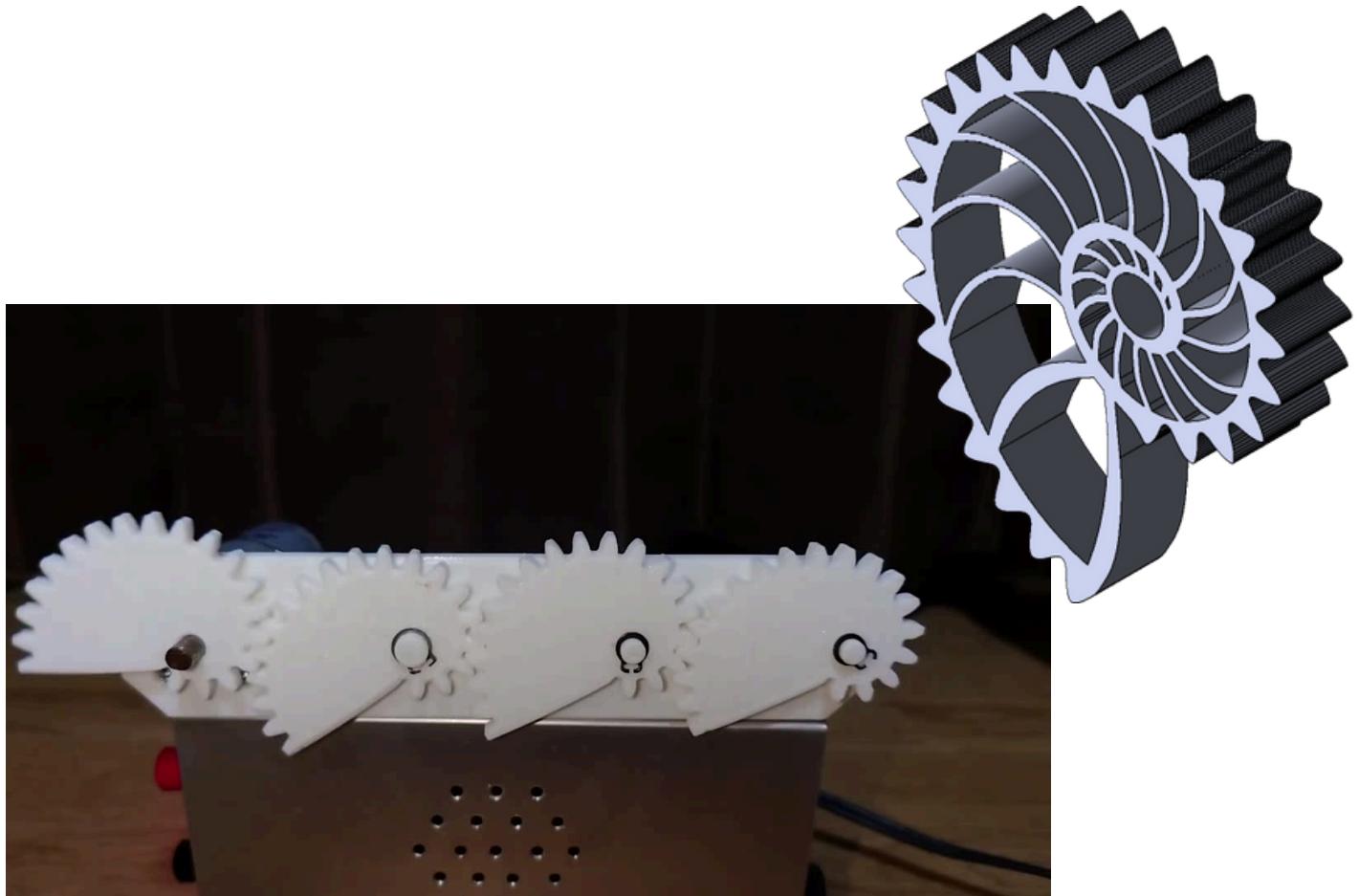
The working of Core XY Kinematics in 3D printer mainly relies on the operation of the motor coupled with the belt.

Background research



Catapult

Mangonel is one type of catapult. When we pull the restraining Rope attached to the throwing arm and released, it returns to its original length, causing the force and object on the throwing arm to move out in a projectile motion.



Nautilus gears

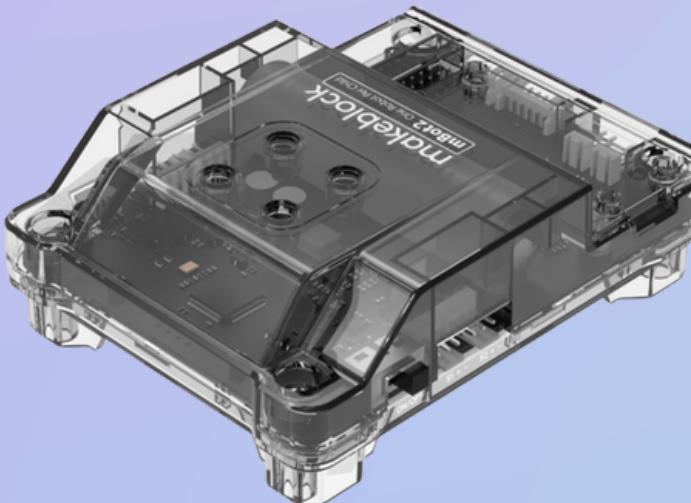
A nautilus gear has an unequal radius that will gradually increase exponentially. When the first gear reaches a point where their maximum radius is exactly in the same plane, the second gear spins free at a faster rate.

Methodology

manual robot

*L*ist of components

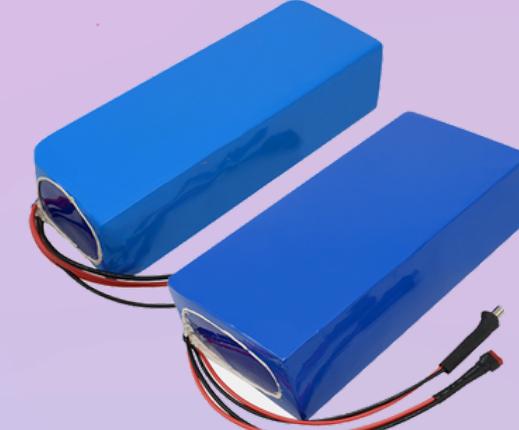
CyberPi



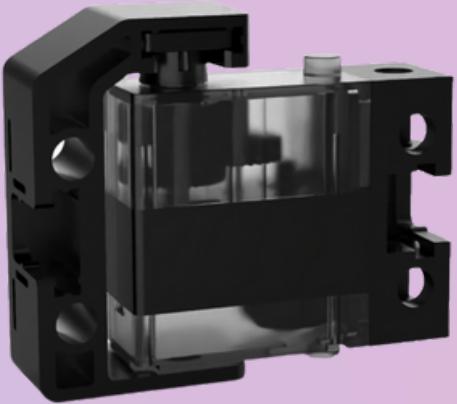
mBot2 Shield



3-6V Yellow DC
Gear Motor



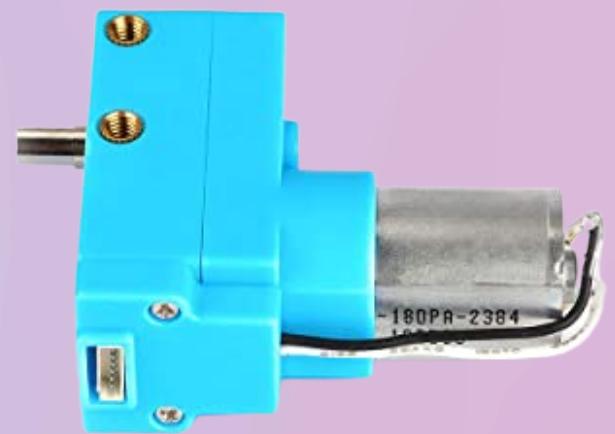
Li - ion battery



Servo MS - 1.5A



Makeblock
Controller

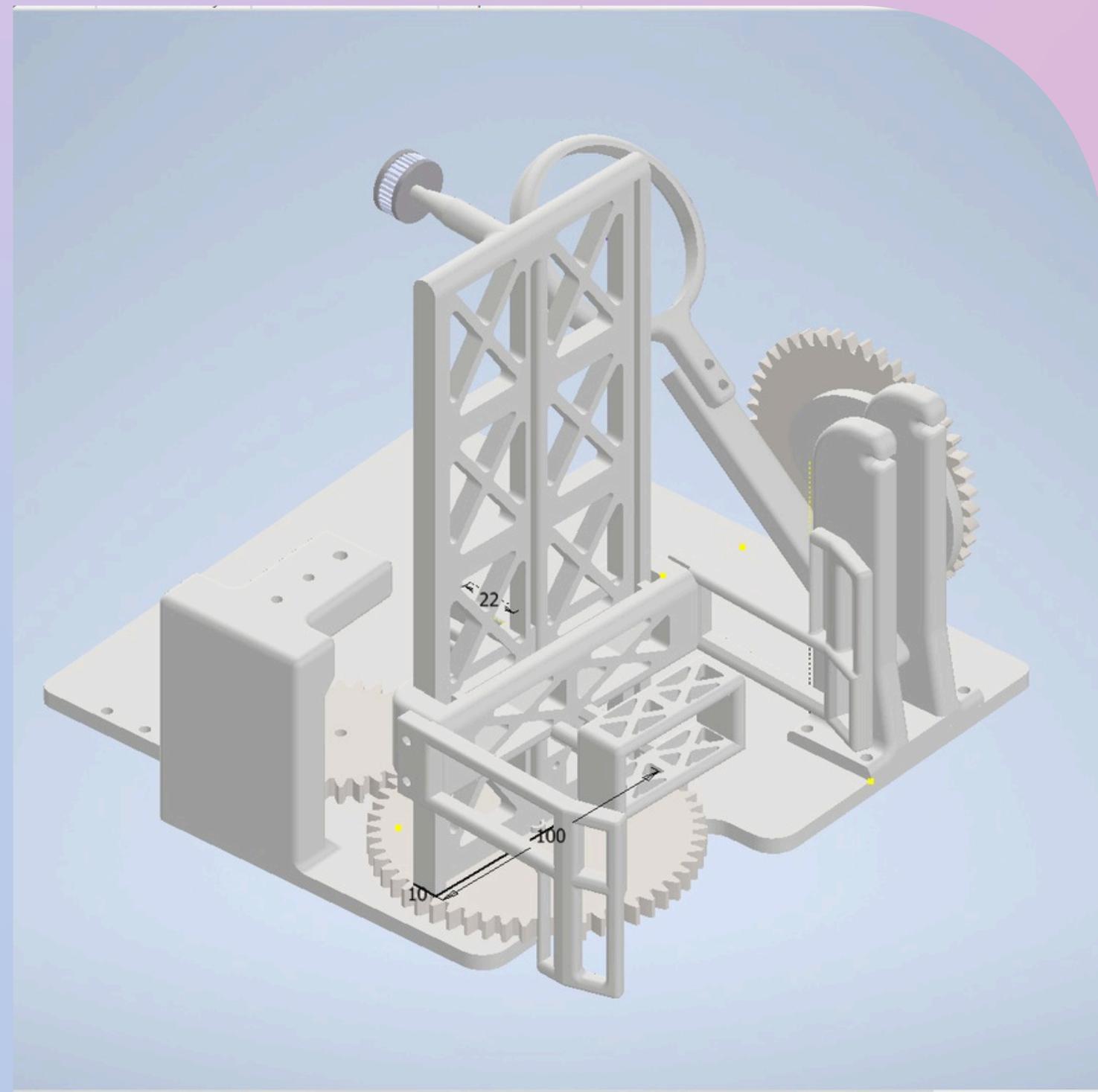
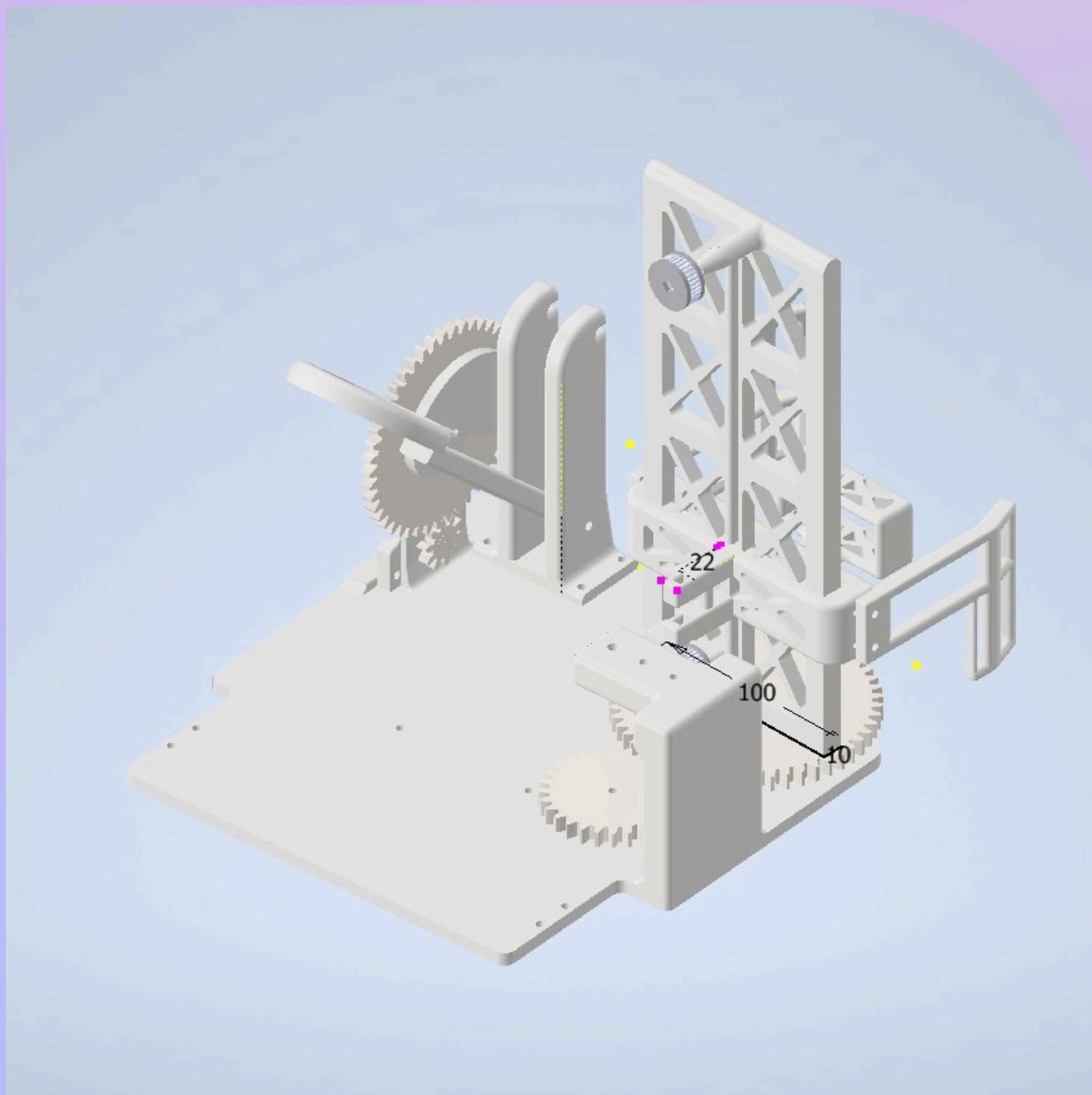


180 Encoder Motor

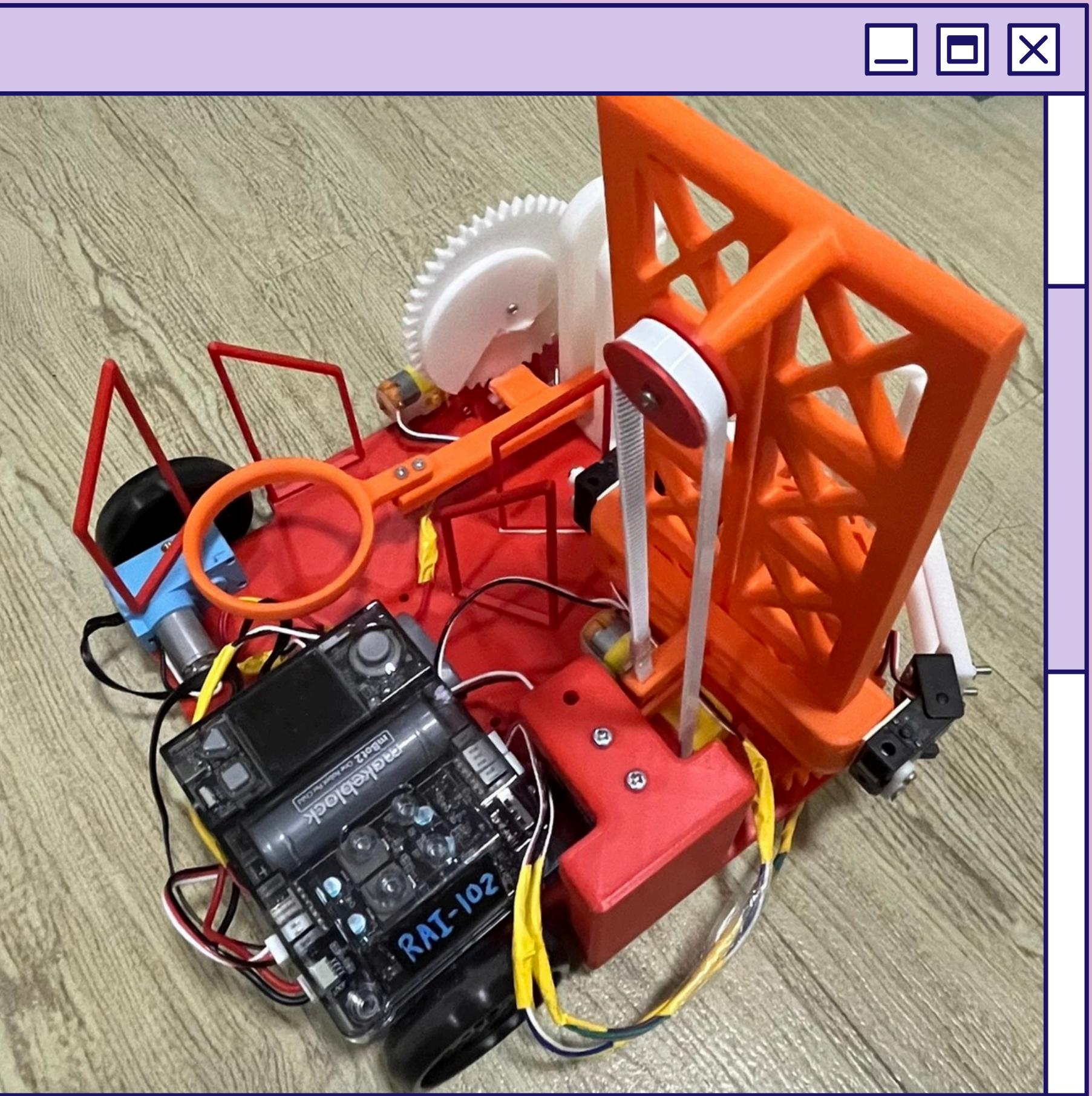


makeblock servo

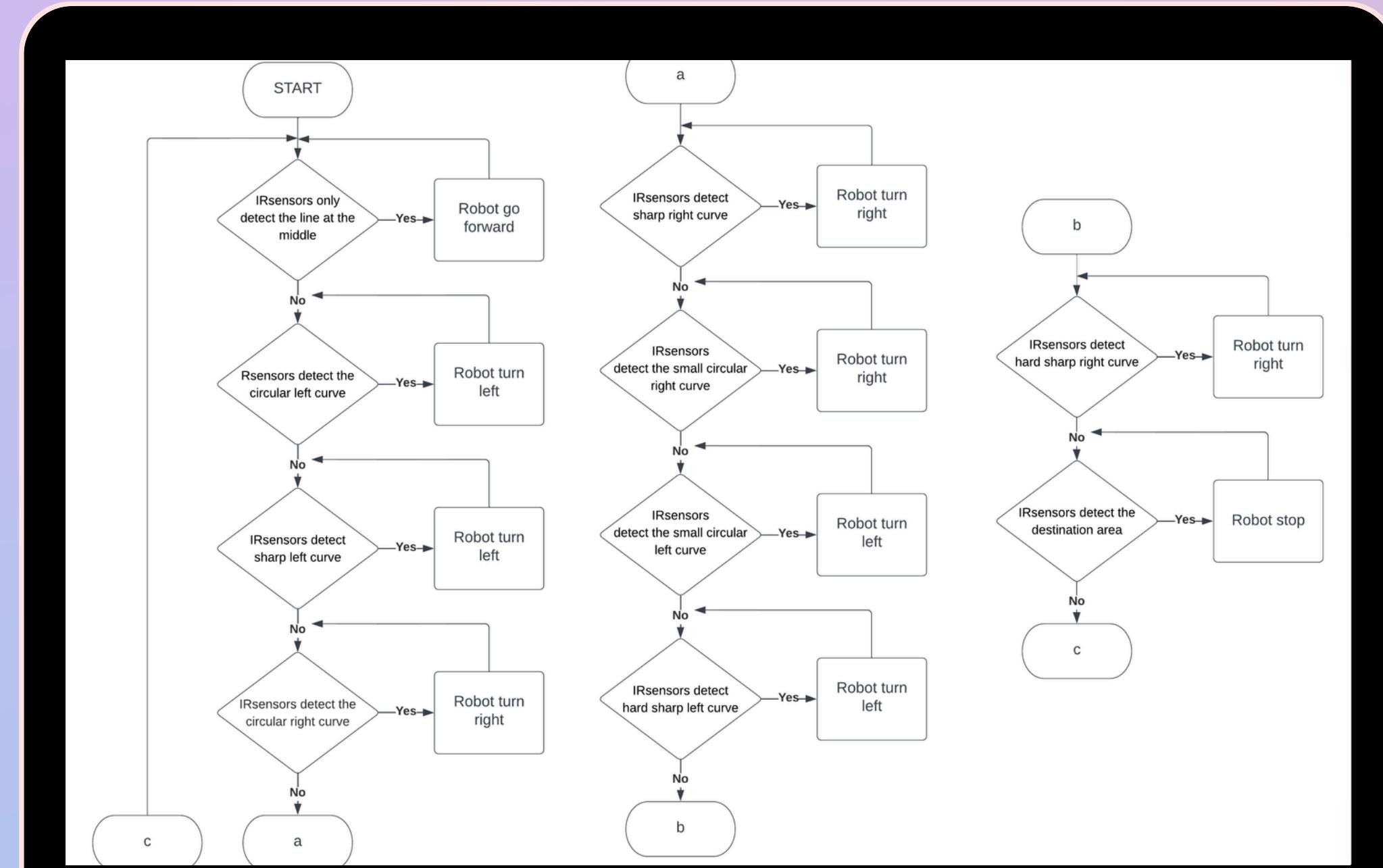
Design



Assembled



Programming



Programming

```
@event.start
def on_start():
    while True:
        if gamepad.is_key_pressed('R1'):
            mbot2.servo_set(105,"S1")
            mbot2.servo_set(75,"S2")
        else:
            # DO SOMETHING
            pass

@event.start
def on_start1():
    while True:
        if gamepad.is_key_pressed('L1'):
            mbot2.servo_set(45,"S1")
            mbot2.servo_set(135,"S2")
        else:
            # DO SOMETHING
            pass

@event.start
def on_start2():
    while True:
        if gamepad.get_joystick('Ly') > 20:
            mbot2.forward(100)
        elif gamepad.get_joystick('Ly') < -20:
            mbot2.backward(100)
        else:
            if gamepad.get_joystick('Lx') > 20:
                mbot2.turn_right(50)
            elif gamepad.get_joystick('Lx') < -20:
                mbot2.turn_left(50)
            else:
                if gamepad.get_joystick('Ly') == 0 or gamepad.get_joystick('Lx') == 0:
                    mbot2.EM_stop("ALL")

@event.start
def on_start3():
    while True:
        if gamepad.is_key_pressed('Up'):
            mbot2.motor_set(-60,"M1")
        elif gamepad.is_key_pressed('Down'):
            mbot2.motor_set(60,"M1")
        else:
            mbot2.motor_stop("M1")
```

```
@event.start
def on_start4():
    while True:
        if gamepad.is_key_pressed('Left'):
            mbot2.servo_add(2,"S3")
        else:
            if gamepad.is_key_pressed('Right'):
                mbot2.servo_add(-2,"S3")
            else:
                # DO SOMETHING
                pass

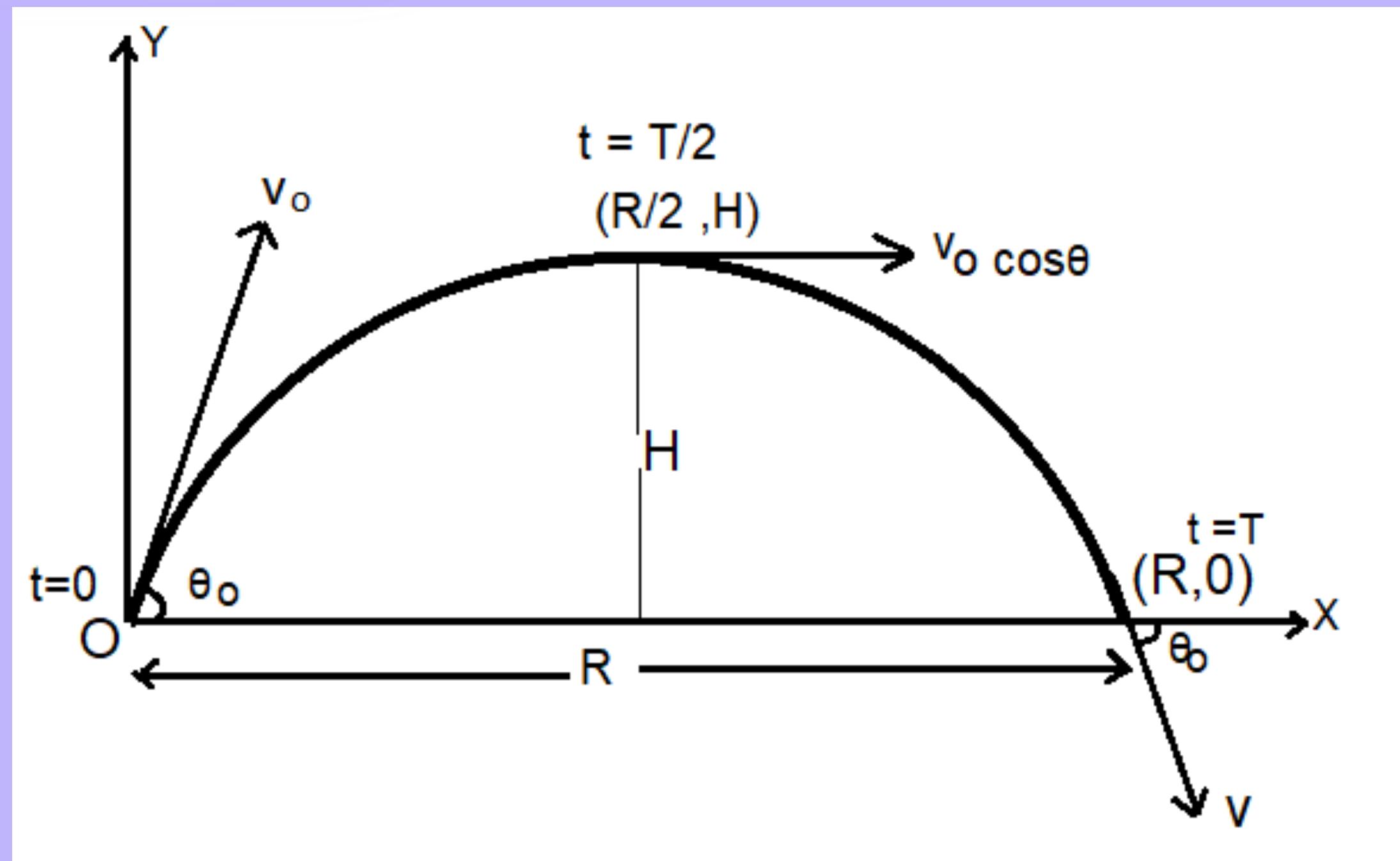
@event.start
def on_start5():
    while True:
        if gamepad.is_key_pressed('N4'):
            mbot2.motor_set(50,"M2")
        else:
            # DO SOMETHING
            pass
```

Testing



scan to watch manual robot testing

Calculation



Result

Trial	Small ball					
	Displacement (m)	Time (s)	X-axis initial velocity (m/s)	Relative error of X-axis initial velocity (%)	Initial velocity(m /s)	Relative error of Initial velocity (%)
1	1.30	0.33	2.20	24	2.87	48
2	1.34	0.34	4.34	42	5.66	31
3	1.21	0.32	2.95	47	3.85	32
Avg	1.28	0.33	3.16	38	4.13	22

Result

Trial	Big ball					
	Displacement (m)	Time (s)	X-axis initial velocity (m/s)	Relative error of X-axis initial velocity (%)	Initial velocity(m/s)	Relative error of Initial velocity (%)
1	2.67	0.38	8.42	48	11.00	51
2	2.48	0.34	7.32	44	9.60	49
3	2.13	0.34	6.29	33	8.21	39
Avg	2.42	0.353	7.34	41	4.13	46

Reference

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