

# Design Document

## The mechanism for picking discs and balls

Two options considered:

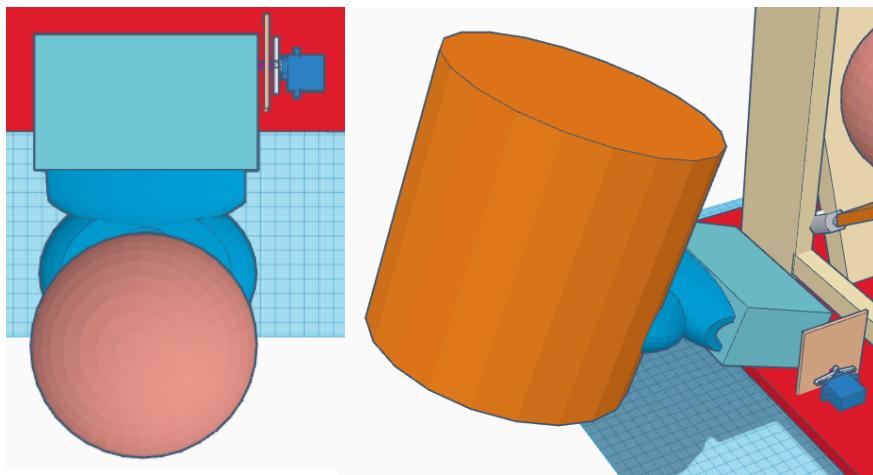
1. Dragging disks to the pot holes

This option was considered as it was a simple yet efficient method however the friction acting on the object posed an issue. This could decrease the accuracy as well as the speed of the robot.

2. Using a robotic arm and a gripper to lift the disc

We considered this method so that we could lift, grip and drop the ball and discs easily into the holes with less friction acting on the discs and pot balls.

## Justification



We chose the robotic arm and gripper mechanism because we thought this method was more accurate as the disc and ball could be gripped properly and lifted, preventing much friction from acting on them. We also plan to add sandpaper to the gripper to increase the friction between the gripper and the object to increase the strength of the gripper.

## Shooter Mechanism

Three options considered:

1. Robotic arm that hits the ball



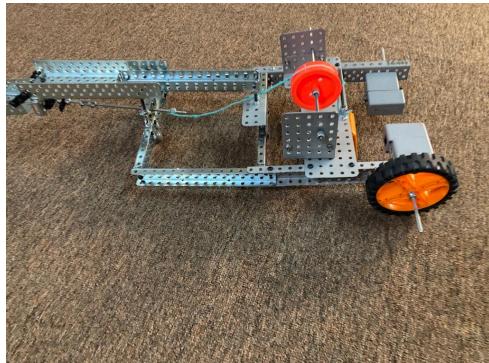
This method was considered as it had the capacity shoot the ball with a good amount of force as the arm would move 360 degrees before hitting the ball.

## 2. Simultaneous movement of two wheels in different directions to launch the ball



This required high speed of the wheels which required a complex gear mechanism to comply with the voltage requirements. It would also launch the ball in projectile motion which required detailed calculations leaving a relatively larger margin for error. In accordance with our ambition to make a simple yet efficient robot, we decided to find a better alternative.

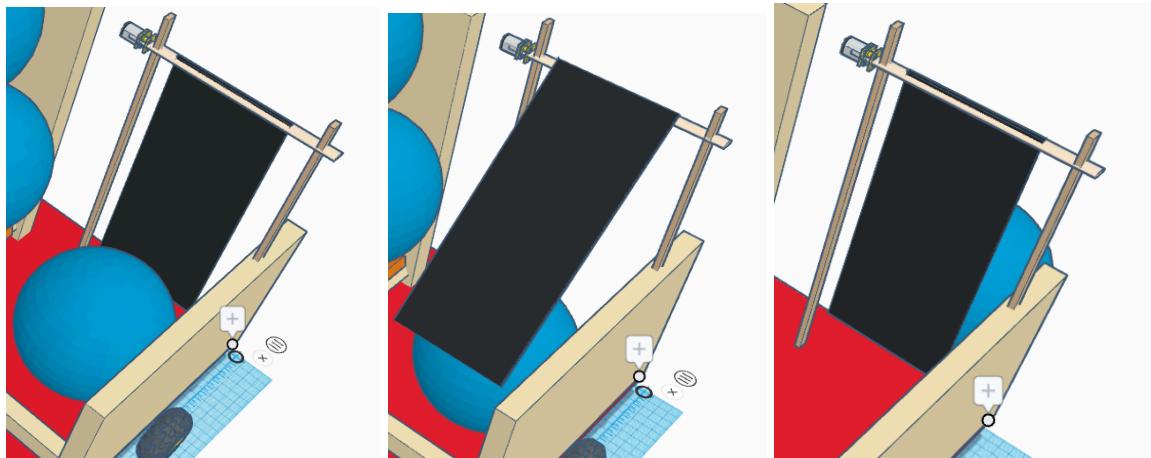
## 3. Ball shooter using elastic mechanism



This was a method where we decided to test shooting the ball by making use of the elastic property of rubber band or spring. We also used the pulley mechanism to stretch the rubber band. However, this was rather unpredictable and required a large amount force.

## Justification

We chose the robotic arm because the method was simple, fairly accurate and powerful. Our experiments with 2 and 3 did not give us promising results.

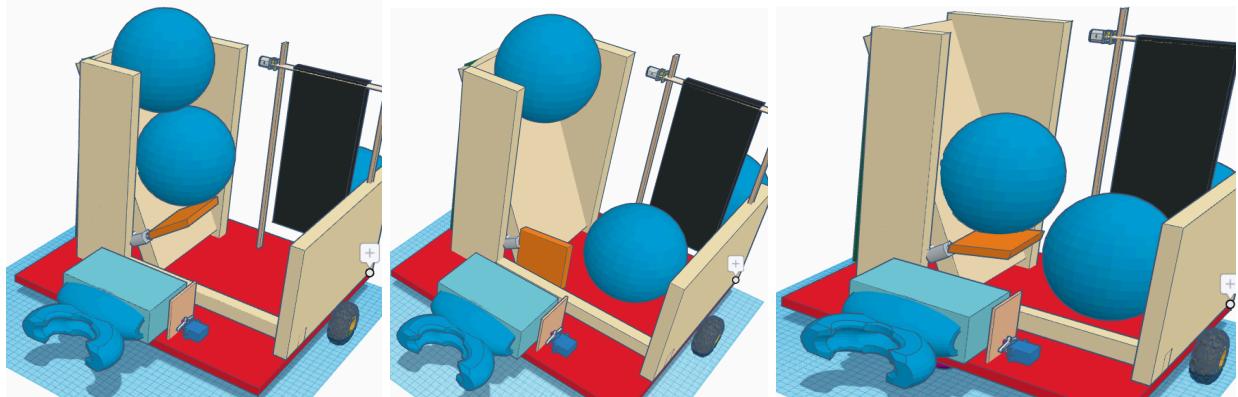


## Loader Mechanism

A slant loader along with a stopper to navigate the motion of shot balls (i.e. one at a time). Two balls will be placed in the loader while the third one will be directly placed behind the shooter.

## Justification

We chose this option because this was the simplest way to make judicious use of the space provided while showing good probability of delivering accurate results.



## Robot Design (All units are in mm)

