

# Introduction to Mechatronics

## Term Project

### 2022-2023 Fall

## Project Description

As discussed in class, you are expected to build a robot that can sense and knock down cylindrical objects placed on a circle 40 cm away from the robot. The objects will be placed only at one half of the circle. While designing the robot, keep in mind that you must use at least one sensor, one actuator, and one controller. The following 4 tests will be carried out:

### Test 1

The robot will be placed at the center of the circle, as it will be the case in all tests, and the objects will be placed at  $45^\circ$ ,  $90^\circ$ , and  $135^\circ$  angles. Then, an input will be given to the robot to indicate the order in which to knock the objects. The bottles will be numbered in the counterclockwise direction. For example, if the objects are supposed to be knocked in the order  $45^\circ$ ,  $135^\circ$ ,  $90^\circ$ , then the input is "132".

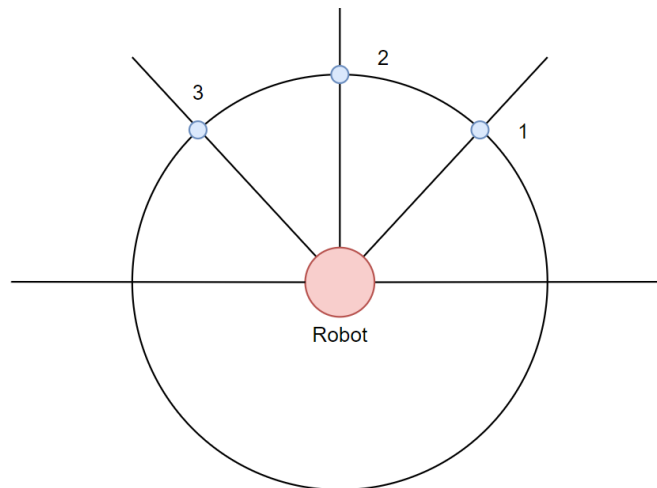


Fig. 1: Setup for the first test

### Test 2

This time, the objects will be placed at random angles on the circle. In this test, the robot will be allowed to scan the scene and then, report the number of objects in the scene to the computer. For the configuration given in Fig. 2, the robot is supposed to output "4".

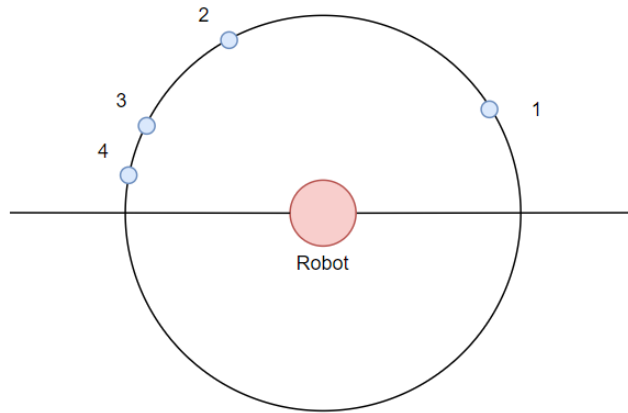


Fig. 2: Possible setup for the second test

### Test 3

For this test, like the first test, the robot is supposed to knock the randomly placed objects in the given order. Keep in mind that the maximum number of objects is not limited to 4. The time it takes for the robot to complete the task will be measured.

### Test 4

In this test, the distance between two adjacent objects will be very small. If the robot completes the task successfully, the distance will be reduced, and the test will be repeated until the robot fails. This way, the smallest distance between the objects the robot can handle will be determined. In Fig. 3, the objects numbered 3 and 4 are intentionally placed very close to test the robot.

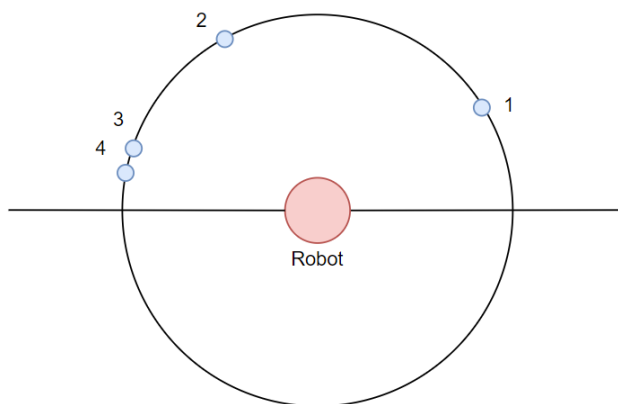


Fig. 3: Possible setup for the fourth test