



Robot Motion and Cleaning Action Simulation Mechanism

1.0 Objectives

- i. Demonstrate that robot can move efficiently.
- ii. Demonstrate cleaning action simulation by placing an object on top of the target.

2.0 Instructions

Before going to the lab: Build your robot's mobility system and the object placement system. Your object that you would be placing on top of the target is a ping pong ball.

Note: You are allowed to modify the structure of ping pong ball or do any necessary changes to make it stay on top of the target.

You can change the software on your robot between each of the tests below.

1. Your robot, on command, should be able to move in a straight line and (ii) turn 90 degrees. To complete this task, you must install two buttons on your robot and write software so that your robot performs the following actions:
 - When button 1 is pushed, the robot should move forward about 1 metre. The objective should be to keep the robot going straight not to accurately measure the distance moved.
 - When button 2 is pushed, the robot should turn about 90 degrees (or slightly more). If your robot has a minimum turning radius, it can move forward this required distance.
 - Your robot should avoid skidding as much as possible. Skidding is when the direction of motion differs significantly from the orientation of the robot's wheels or tracks.
2. Your robot should also be able to perform the object placement. When the proper software is installed on your robot, it should perform the following action:
 - When the target is properly positioned, the robot should be able to place the object on top of the target. That is, you can manually place your robot at the proper position with respect to the target and trigger the object placement activity.

During the lab session:

Demonstrate the following functions:

1. Robot movement under push-button control.
 - a. Robot moves forward about one metre when triggered by push button with a minimum distance of 75 cm.
 - b. Robot will turn approximately 90 degrees (say, from 45 degrees to 135 degrees) when another button pushed.
2. Operation of object placement under push button control.
 - a. When robot is properly positioned with respect to the target, demonstrate that the robot can place the object on top of the target.



Grading - *subject to minor adjustments*

		Marks
Robot Motion (Should be repeatable 2 times)		5
0 points	Robot does not move (both straight line motion as well as angular motion)	
1-2 points	Robot does not go the minimum distance of 75 cm, or cannot turn, or motion is very uneven/jerky.	
3-4 points	Robot deviates from straight line but meets the minimum distance requirement. Or robot turns less than 60 degrees or more than 120 degrees.	
5 points	Robot motion is both smooth and straight with no problems or small problems (e.g. small problem during only one trial).	
Construction quality		5
0 points	Robot construction is incomplete	
1-2 points	Robot construction is shoddy with loose wires impairing some necessary movements. There may be lots of unnecessary vibrations during motion.	
3-4 points	Robot construction is mostly of high quality with some problem areas such as a single loose wire or small vibration	
5 points	No problems seen with construction.	
Object placement mechanism (Should be repeatable 3 times)		5
0 points	Robot cannot place the object on top of the target.	
1-2 points	Robot object placement is unreliable. (e.g. object falls down from target on all trials but placement mechanism works on all trials)	
3-4 points	Robot object placement works for most trials with one major failure or design flaw (e.g. high impact on the target while placing the object).	
5 points	Robot successfully places the object with no or only minor flaws	
Total		15