THE LAST HOPE

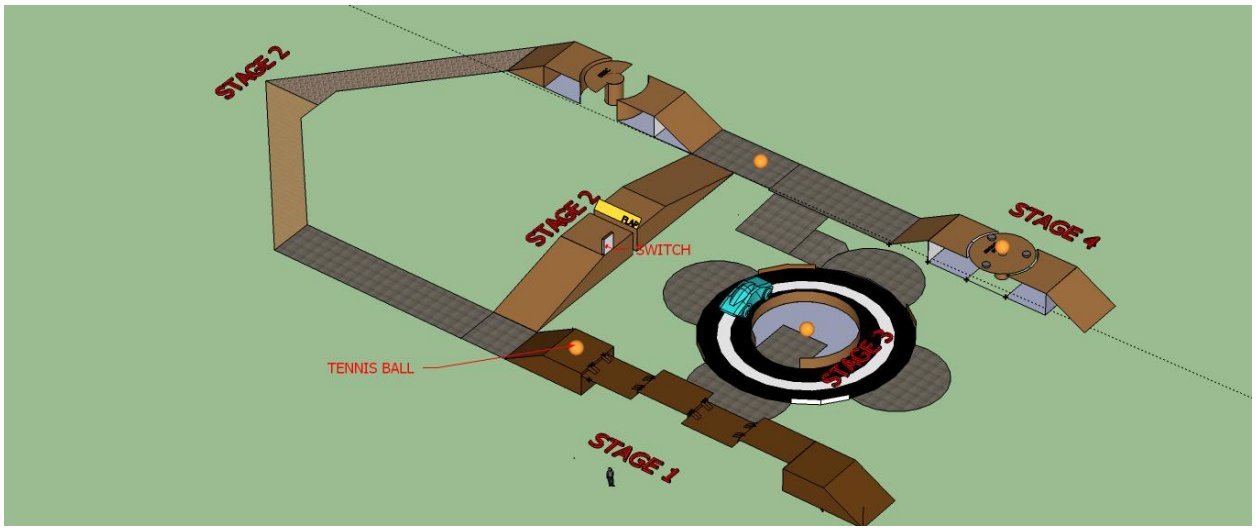
A PROBLEM ON MANUAL ROBOTICS

Welcome agent, to the department of robotics!!Aliens have attacked the earth with a motive to end the very existence of human lives. Their mission is to take control of the earth and start a new life by driving out humans. In their hunt for success, aliens have carried out attacks in different parts of earth. But the humans have fought back hard to deal with the nuisance created. But this time aliens have come up with a secret weapon which requires only robots as the bomb is of radioactive type that restricts human access.

TASK

So put on your thinking caps and foil the attack. You have to make a bot which breaks all the barriers presented in its path. Carry out a rescue mission to SAVE THE EARTH!!

ARENA



1. The arena consists of four stages.
2. STAGE 1
    - In stage 1 there is a wooden structure consisting of four planks at different levels connecting two inclined planes.
3. STAGE 2

- Stage 2 consists of two paths :
    - **a.** Smart path
    - **b.** Trivial path
- Smart path will be shorter but difficult to traverse. It consist of inclined plane with a gap in between.
- Trivial path is obviously longer than smart path.

4. STAGE 3
    - Stage 3 consists of circular path as shown attached arena.

5. STAGE 4
    - Stage 4 consists of two inclined plane having in between a constantly rotating circular disc.

GAMEPLAY

The whole game is divided into four stages. At the end of first three stages, the bot will get a table tennis ball. So the bot has to develop a storage mechanism to store three balls.

1. **Stage 1:**
   The bot will start from the start position and will move up the inclined plane. It has to pass through the different wooden blocks lying at different levels. Finally, it has to complete the stage 1 by going down the inclined plane. Here, the bot will get his first ball.

2. **Stage 2:** Stage 2 can be completed in using either of the two ways: Smart Path and Trivial Path.

   In smart path, the bot has to cross through an inclined plane followed by a level plane. In between, there is a break in the path. To get through the break, there is a flap at the other end which is inclined at the angle of 10 degrees approximately. By using some mechanism, the bot has to rotate the flap towards its side to fill the gap. Then it can traverse the rest of the path easily.

   In trivial path, there is a smooth road in the starting which will be followed by sand and stones. Then the bot has to cross through another hurdle. There is a semicircular disc which is initially at rest. The bot has to first to initiate the disc by pressing the switch lying at the smart path near the break. After pressing the switch, the semicircular disc will start rotating. Now, the bot has to cross through that rotating semicircular disc.

   After the end of 2^{nd} stage, the bot will get his 2^{nd} ball.

3. **Stage 3:** 3^{rd} stage consists of a circular track which is guarding a tennis ball. There is an autonomous robot which is guarding that ball. The bot has to get that ball without colliding with

the autonomous guard. To save itself from the autonomous guard, there are four hideouts provided to the bot. The bot has to use them and has to reach the centre of the track to get the ball.

4. **Stage 4:** After collecting the three balls, the bot has to clear stage 4. There is a bomb lying at the center of the circular rotating disc guarded by three guards. The bot has to kill the guards and secure the bomb. The disc will be constantly rotating and the bot has to shoot each of the three guards with the balls it has stored in the previous stages. But the bot has to make sure that the bomb lying at the center should not be hit. After killing the guards, the bot has to secure the bomb and come to down the inclined plane to complete the stage as well as the game.

GAME RULES:

1. **Bot Specifications:**
   The top view of the bot has to fit within the rectangle of dimensions 30 cm x 25 cm (length x breadth).

2. **Scoring Criteria:**
   Stage 1 - 100 Points for successfully completing the stage. If the bot falls in between, it will be placed at same place but it will incur a penalty of 20 Points every time it falls.

   Stage 2 - 300 Points for successfully completing the stage. If the bot falls in between, it will be placed at same place but it will incur a penalty of 20 Points every time it falls.

   Stage 3 - 200 Points for successfully completing the stage. If the bot touches the autonomous guard, it will incur a penalty of 40 Points and the bot has to resume its operation from the starting of the 3rd stage.

   Stage 4 - 400 Points for successfully completing the stage. 100 points each for killing the guards.100 points for crossing through the rotating disc and completing the stage. If the bot hits the bomb, it will incur a penalty of 20 Points every time it hits the bomb. The bot will be provided with extra balls (maximum five) in case it is not able to complete the stage in three balls and no penalties are incurred for this.

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