CubiScan

Autonomous Event

Introduction:

The labyrinth to the National Treasure ain't easy, and definitely beyond our scope because it's entrapped in debris. Furthermore, the gate to the treasure is opened only by knowing the correct volume of blocks of specific physical characteristics, which perhaps shows skilled ancient architecture. We need to build up a bot on which this engulfing task can be assigned.

USP

- **Detecting dimensions of objects (Height & Width & Depth)**
- **Line following**
- **Dual axis traversal of sensor(s)**

PROBLEM STATEMENT

To build a robot capable of detecting the dimensions of the blocks to estimate their volume, and thus indicate the order of the blocks according to their increasing volume, while using line following for traversal.

General Description and Event Setup

- There will be blocks in the arena each of different height and width.The depth will also vary for the 2nd round. The bot has to measure the height and width of each blocks.(depth as well for 2nd round)
- A finish zone will be present in the centre of the arena where the bot has to reach at the end and show the increasing order of volume of the blocks by blinking LEDs present on the bot.

Arena (Round 1)-

Note- The red cross indicates that the bot is not allowed to enter that node.

Arena (Round2)-
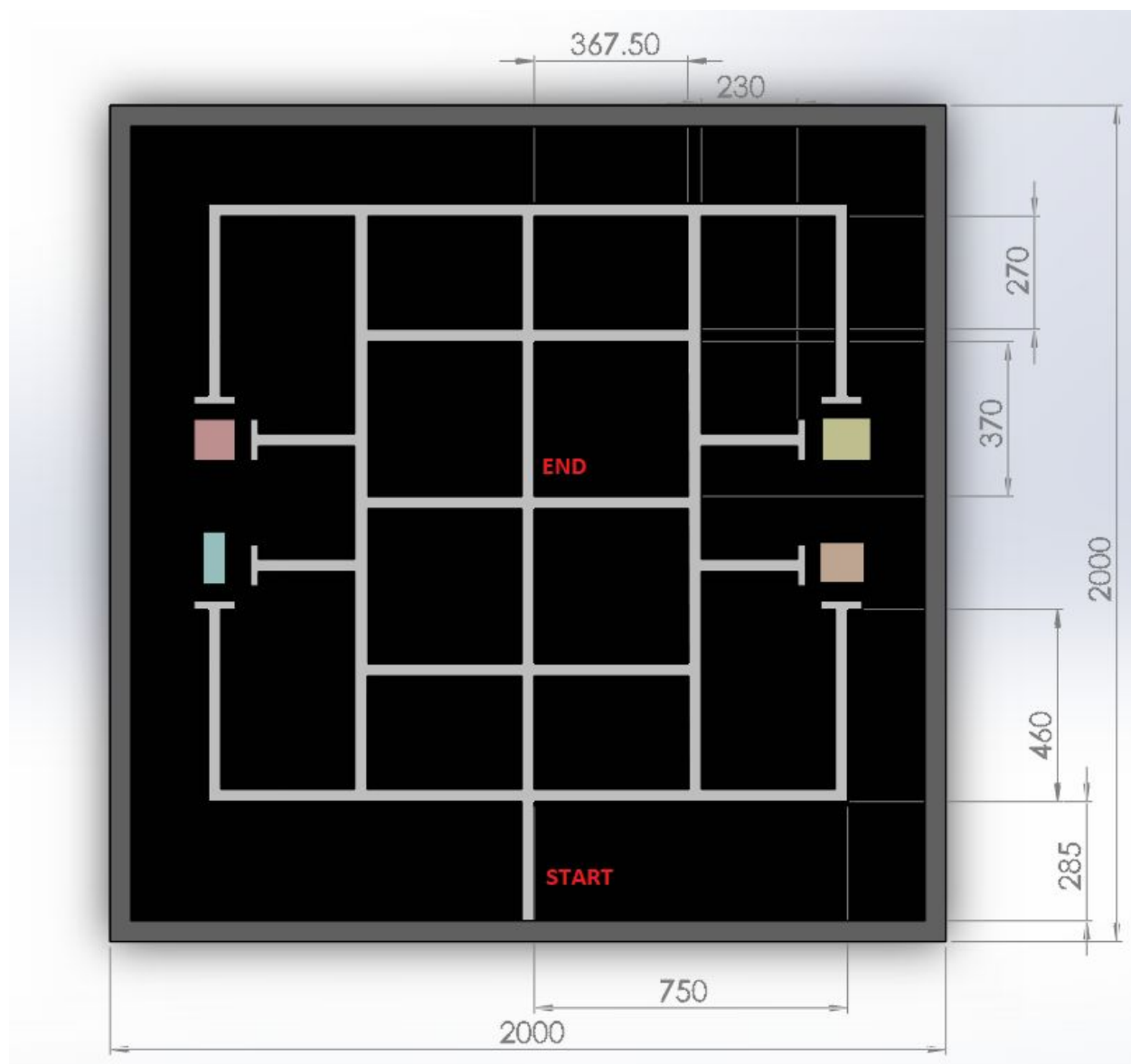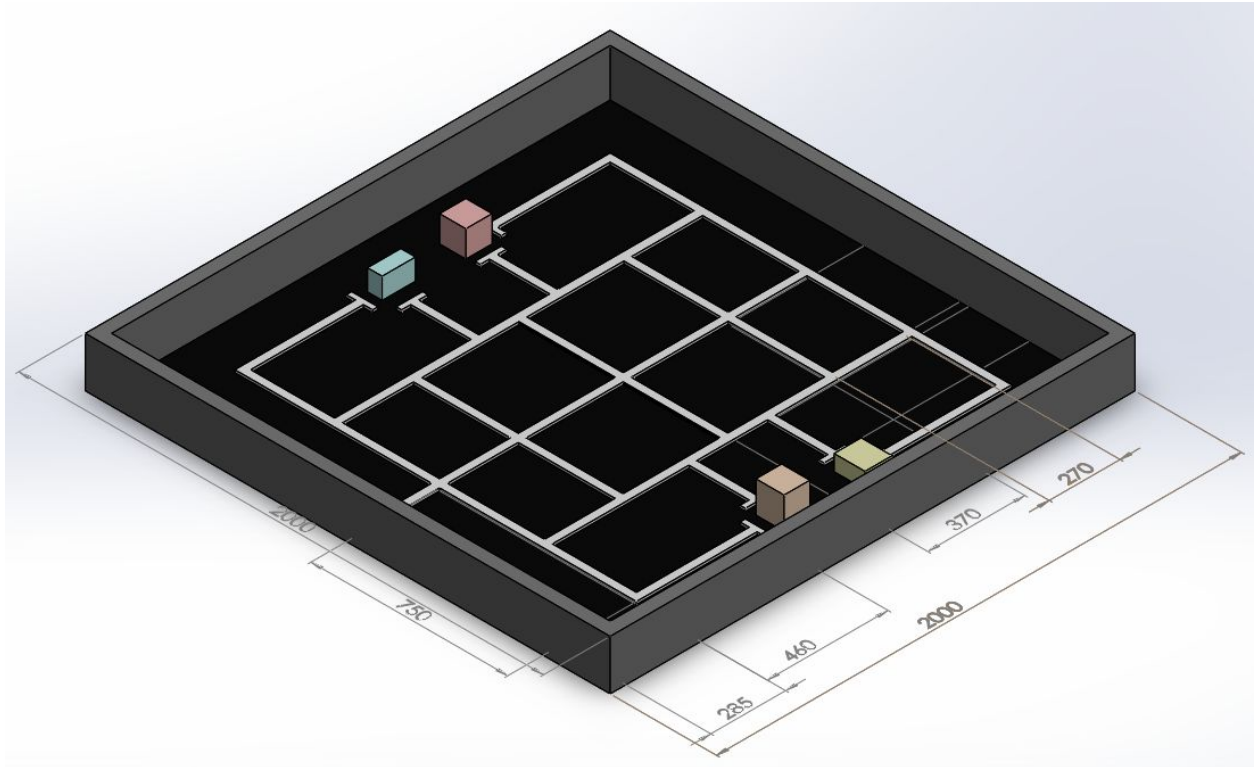
ARENA SPECIFICATIONS-

- The outer dimensions of the arena will be 200 x 200 cm.
- There will be a square at the centre.
- The width of the lines will be 3cm.
- Dimensions of the arena are to be considered with a maximum tolerance of 10%.

Block Specification-

- For the 1st round, depth of the blocks will be fixed to 10 cm, whereas the height and width will be variable.
- The dimensions of the blocks may vary from 4cm to 10cm.
- For the 2nd round,height, width and depth of the blocks will vary.
- The weight of the block will be around 100 gms.

Robot Specification-

- The robot must fit in a box of **25cm x 25cm x 25cm** with a tolerance of **10**% in the dimensions of robot.
- No part/mechanism of/on the bot should exceed the given dimensions before the commencement of the event. However the dimensions can change during the course of the run.

Event Rules:

- The robot should traverse the arena by using **line following mechanism**.
- Points will be awarded for **scanning the dimensions of blocks** during the run and **indication of the correct order of the blocks** according to the volume at the end of the run.
- Participants are **not** allowed to **touch** the blocks while scanning them. Negative points will be awarded for touching or displacing the block.

Restarts and Timeouts

- A maximum of **2 Timeouts** of **1 minute** each may be taken. **Penalty** will be awarded for each timeout and robot will start from its last position on the arena.
- The participant's robots can have a maximum of **2 restarts**. A penalty will be imposed on the team for every restart that they take.
- After the restart, the participant's robot will be set to its **initial** position. Timer will be set to zero and the run will start afresh with the addition of the **penalty** for **restart**.
- A timeout can be taken **anytime** at the user's discretion.
- A restart can **only** be taken if there is a genuine **technical** fault in the bot. Team ROBOTIX may refuse a restart if the reason is not genuine, and their decision will be binding and final.

Task-Round 1

- There will be four blocks.
- The bot has to traverse through the centre loop and go near each block.
- The bot has to estimate the height and width of the block.
- Thus by measuring the height and width, the approximate volume of the blocks will be calculated.
- Now the bot has to go to the central node of the arena and then blink the LEDs in the order of increasing volume.

Task-Round 2

- There will be four blocks.
- All the three dimensions of the block will be variable.
- Each of the blocks can be accessed from two nodes.
- Thus, the bot has to scan the block from each of the nodes and thus estimate its volume.
- After calculating the approximate volume, the bot has to go to the central node and blink the LEDs in the order of increasing volume.

Example-
For example, the dimensions of the blocks are as follows-
1st block : 5*5*10 , Volume = 250
2nd block : 10*8*8, Volume = 640
3rd block : 9*9*12, Volume = 972
4th block : 7*7*7, Volume = 343
Thus the correct order of increasing volume would be 1<4<2<3

Scoring-

Positives-
- Base Score : 200
- Reaching each node to scan the block : 50
- Scanning each block : 50 (100 points will be awarded for scanning from both sides in round 2)
- Completing all scanning and reaching centre node : 150
- Correctly indication of order : 200 (for each block)

Negatives-

- Displacing or touching the block : 100
- Incorrect indication of order : 100 (for each block)
- For each timeout : 100
- For each restart : 150

General Rules:

- Maximum number of participants allowed per team: **4 people**.
- The participants will be provided with **220 Volts, 50 Hz** standard AC supply.
- Participants will have to arrange for any other power supply required for their robot.
- Teams cannot tinker with their bots during the run.
- LEGO kits or its spare parts are not allowed.
  (http://en.wikipedia.org/wiki/Lego_Mindstorms)
- The decision of the Team Robotix will be **final** and **binding**.
- The rules are subject to change.

It is suggested that the participant try to make a wireless robot. In which case the wireless bot should be battery powered on-board.