THE WAVE EQUATION

Robotics Challenge Rules

WarHacks
IEEE Concordia
https://warhacks.ca

Introduction

The basic goal of the game is to navigate from one end of a line to its end, however there will obstacles along the line which your robot will have to avoid. Your robot will be scored based on the time it takes to reach the end of the line, the difficulty multiplier and the hardware that you are using. You will also be penalized if you have to interfere with the robot, the robot is not following the lines or if it collides with an obstacles during the challenge.

The Board

The challenge area consists of a white board with 4 black lines running from the start zone to the finish zone. Each line is about 2cm thick. Obstacles of various shapes ($\approx 10 \times 10 \times 10$cm) will be placed on the paths. The number of obstacles will be determined based on the difficulty multiplier you select. At the beginning of the each run, an official will randomly select one a path for your robot to start on and you will have 30 seconds to adjust your code accordingly (*think variables*).

Goal

Your robot will be placed in the starting zone at the base of one of the lines. The robot must then navigate autonomously, without colliding with any obstacles, to the end zone corresponding to the path from which they started.

Available Hardware

Each team will be given some basic materials to start their robot. The basic electronics (Arduino) and necessary additional components (batteries and cables) are provided. In addition, a basic wheelbase and tools are provided.

Teams will be able to purchase supplies with a budget of 100 ฿.

Items	Max Quantity	Price per Unit
Structural Material	-	5฿
Ultrasonic Sensor	2	20฿
Light Sensor	3	10฿
Motor and Wheel	4	20฿
Castor Wheel	2	5฿

Table 1: Custom items will be priced on a one-on-one basis.

You will receive an additional 30 seconds time penalty if you go over budget.

Points

Scoring will be done throughout the scoring period. An official will supervise all scoring runs. During the scoring period, each team will be able to attempt the challenge as many times as they would like (priority will be given to teams that have not attempted the challenge yet). The top score for every team will be recorded (lower scores are discarded).

Scores S are calculated as follows:

$$S = 150 + (30 \times \text{Difficulty}) - (\text{Time}_s + \text{฿}_{\text{spent}})$$

The difficulty is the number of obstacles the team decided to place on the board (up to 5). A staff member will place the desired number of obstacles on the board after the code is flashed.

A 30 seconds penalty will be added for interfering with the robot, for obstacles getting hit or for robots that are not following lines.

Once the scoring period has ended, the top 5 teams will have one try to set down their best time. The winner will be decided as the team with the shortest time.

We reserve the right to attribute point deductions if we judge that the robot is not following lines and or for unsportsmanlike conduct