IARC: International Autonomous Robotics Competition

In its efforts to fulfil the social obligation of serving the society along with technical advancement, IIT Kanpur, one of the premier technical institute of India and Techkriti, the annual technical and entrepreneurial festival of IIT Kanpur presents the International Robotics Competition, with a vision to motivate people all over the world to indulge in their passion for robotics.

Introduction

Prince Dastan is struck in a maze the exit gate of which is closed and can only be opened from the other end of the maze. Prince can remember all the paths taken and calculate the shortest path for return given that he has reached the end of the maze. But as soon as prince comes out of maze he discovers that things outside are not going well and his empire is under attack. He is unarmed, weak and can't fight, he has to avoid the enemy soldiers and reach the castle. Help prince Dastan in his mission and safe return to home.

Objective

The event focuses on solving a line maze via line following, one of the very basic yet extremely important concept of robotics, and calculate the shortest path in the maze. In addition to that bot has to negotiate with a arena full of obstacles. The event will test your analytical and coding skills, and will bring out the genius in you.

Participants from various countries would participate in a country specific qualifying round, and the winning teams from the countries would be given entry to the Grand Finale of the iARC to be held during Techkriti '14.

Any International team which missed the opportunity to participate in the national qualifying round of iARC, can also participate through the open-round, which will be held during Techkriti '14, in India.

Festival Coordinators

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Objective-National Round:

You will have to prepare a autonomous which can solve a line-maze via line following and return in shortest time (shortest path in the traversed area) to the start point.

Objective-Grand Finale:

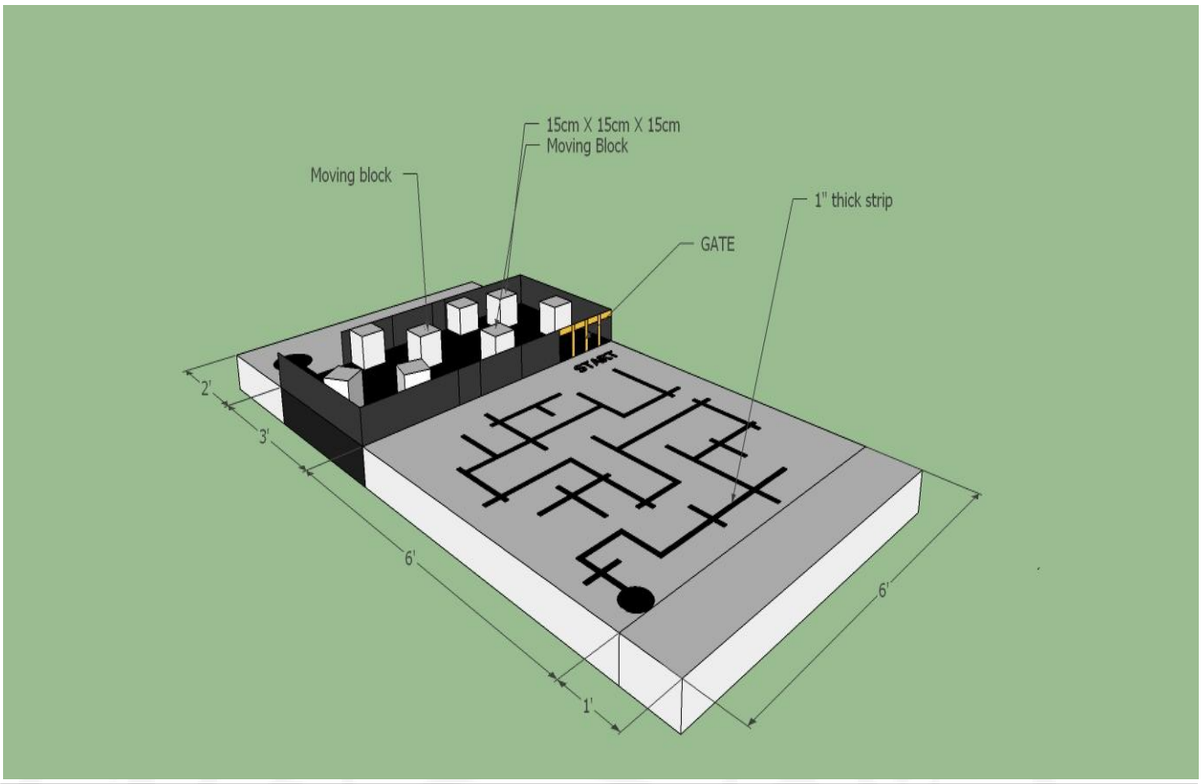
You will have to prepare an autonomous which can solve a line-maze via line following and return in shortest time (shortest path in the traversed area) to the start point.

Also this time robot needs to clear an arena with obstacles (moving as well as static) to reach to finish point.

Both arenas will be connected and robot needs to reach the finish point in one go.

Below is the arena and its specifications.

Arena Specifications:



Some important specifications:

Strip width: 1inch

Obstacle size: 15cm*15cm*15cm

Black circle diameter:20cm

P.S: This is just a sample arena and the arena provided will have a different maze and positions of obstacles. The size and dimensions however will remain the same.

General Rules:

· Each team can have a maximum of 4 participants.
· A team may consist of students from different colleges.
· For the qualifier round no abstract is needed.
· Certificates of Excellence will be awarded to the top three teams.
· Bots should not be disassembled until the results are declared.
· The organizers reserve the right to change the rules as they deem fit.
· Judges decision will be final.

Event Structure:

The event would be organized in two rounds-National Rounds and the Grand Finale. There will be time restriction for all the rounds.

Only selected teams from the National round are eligible to participate in the Grand Finale.

Bot Specifications:

· During the whole event the bot must fit within a square of 250X250X300 (lXbXh). Dimensions in mm.
· The Robot must be stable and able to move on its own. A bot not fulfilling these criteria will be disqualified.
· The bots should be able to follow the line according to event specifications. In addition to it, bot should avoid obstacles to clear the second arena.
· For obstacle avoidance team can use any short of technology/sensor as far as it fits in the dimension mentioned and also it should not be factory made or commercially available setup.
· The wire used to power/feed the bot should remain slack at all times.
· Each team has to bring its own power supply for its robots.
· The voltage difference between any two points on the bot must not exceed
24 volts.
· Teams are advised to use an on-board power supply. In case they are using external power supply they will be responsible for any problem created by entanglement of wires.
· Bot's code will be checked for hard coding before trail is allowed.

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Robot Controls:

· You can start the robot at the beginning of the trial and no human intervention is allowed thereafter. If human intervention is necessary, the ongoing trial will come to an end. Teams may go for another trial if they have sufficient time left.
· The judges can ask for an explanation of any mechanism on the bot and there would be an immediate disqualification of defaulters of any kind.

Gameplay

National Rounds:

· A total of 20 minutes would be given for two trials.
· The bot has to start from the indicated point and reach the end of the line-maze following line and following rules and return to the start point via the shortest path.
- Black strips on white background denote lines of the maze.
- No turn indicators will be given.
· End of task is indicated by returning to the start of the maze.

Grand Finale:

You have to prepare an autonomous bot which can solve a line maze, return via shortest path and can clear an arena full of obstacles (obstacles may be moving or static or both).
· First the bot has to start from the start point and reach the other end of the maze and return via the shortest path it can find following the given set of rules
· End of the maze is indicated by a black circle.
· After returning to the start point the bot should continue moving and enter the second arena which is full of obstacles.
· Now the bot has to clear the second arena and reach a end point denoted by a black circle and stop.

Point System:

National Rounds:

In the national rounds the point system are as follows:

Best of both trials will be considered.

Point=100/t1 +200/t2 +n*100;

where:

t1=time taken in the first traversal;

t2=time taken in the return to the start point.

n=number of correct nodes taken, will be counted only in the return path of the bot.

Nodes-The points in the maze which has multiple edges but only one leads to the correct (shortest) path.

Grand Finale:

In the grand finale the point system are as follows:

Point=100/t1 +200/t2 +n*100 + 300/t3 -x*100

where:

t1=time taken in the first traversal.

t2=time taken in the return to the start point.

t3=time taken to reach the end point from the start of second arena.

n=number of correct nodes taken, will be counted only in the return path of the bot.

x=number of obstacles bot collided with.

Nodes - The points in the maze which has multiple edges but only one leads to correct shortest path.