

# Implementation of a Robot Behaviour Simulator

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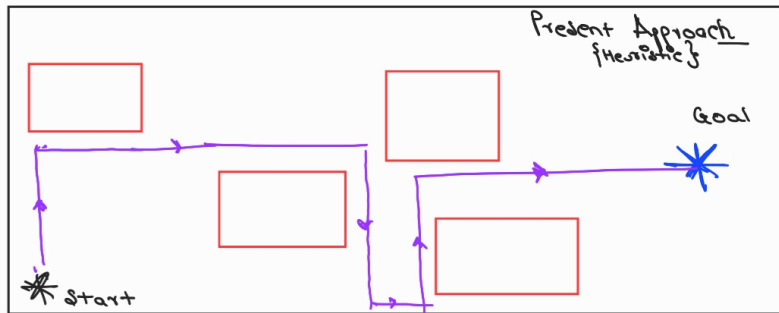
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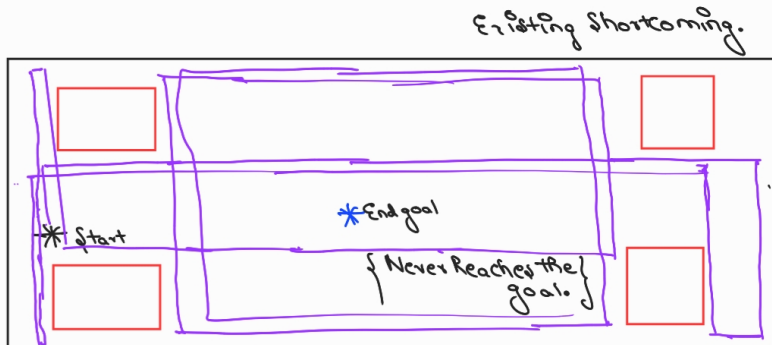
# Previous Method

In the previous method I demonstrated the method for 'Obstacle Avoidance' in a Gazebo World. The turtlebot was able to set the angular velocities according to the obstacle. The turtlebot would then move to another cell/part of the Grid next.

# Shortcomings of the Previous Method



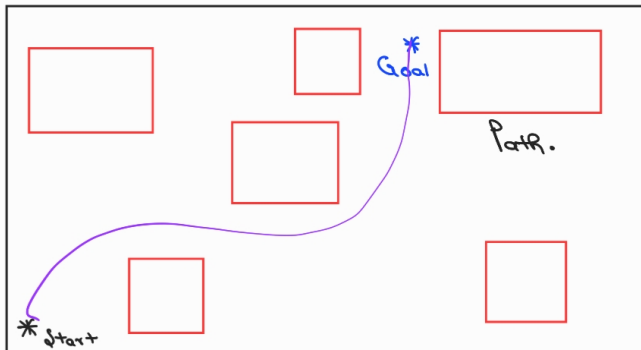
# Shortcomings of the Previous Method



# Solving the Shortcoming

- The problem should be solved with SLAM (Simultaneous Localization and Mapping)
- SLAM as I discussed in previous meeting is used for Localisation (deciding where the robot is) and Mapping (getting information about the Map World)
- But, pre-existing SLAM Method (go-to-goal) uses the most optimized algorithm. This will cause a problem in our application. I will explain it with a diagram in the next slide.

# Path Planning.



# Path Planning - Problems

- As it uses an optimized algorithm for path planning, the robot will employ various degrees of rotation.
- This practice is not useful for our application as we wish to employ just 4 MOVEMENTS not multiple.
- Thus, a planner node is to be written over the current SLAM procedure using either of these algorithms.
  - $A^*$ , or A algorithm.
  - RRT (Rapidly Exploring Random Trees) or  $RRT^*$  algorithm.
  - D or  $D^*$  Algorithm.

# Solution to Path Planning

- I have studied  $A^*$  algorithm in my Bachelor's Degree, and it is quite a common algorithm in Artificial Intelligence.
- I will try to employ the algorithm in a way to the present problem, it won't be  $A^*$  as maybe it won't be optimized.
- The way for path planning will be to write the movement and velocity with just 4 Movements.
- If the present algorithm is fine for the process. We will move with it, otherwise we will employ some other Algorithm.

# Next Goal

- Prepare a README.md file, elaborating the setup/basic things to setup a Turtlebot3 environment with a world in Gazebo in Professor Nida's Virtual Machine.
- Work on the planner algorithm for SLAM.

# Professor Mihaela's Comments.

I suggest in immediate time (this week, next week)

- - implement firstly a strategy (quite simple in  $90^\circ$  only but assuring that the goal will be reach in a finite time)
- - extract the logs. the logs have to be in a "cute format" (xml or json or other format semi-structured).
- - treat the logs to put in "Nida need format"
- - The logs will be analyzed with ML methods
- Than implement other strategies
- Data will be changed in *arff* format to be used in Weka.

Thank you for your time.