

FWP – ROS
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Maze Escape using Turtlebot3

Milestone 1: Midway Presentation

Group 4:

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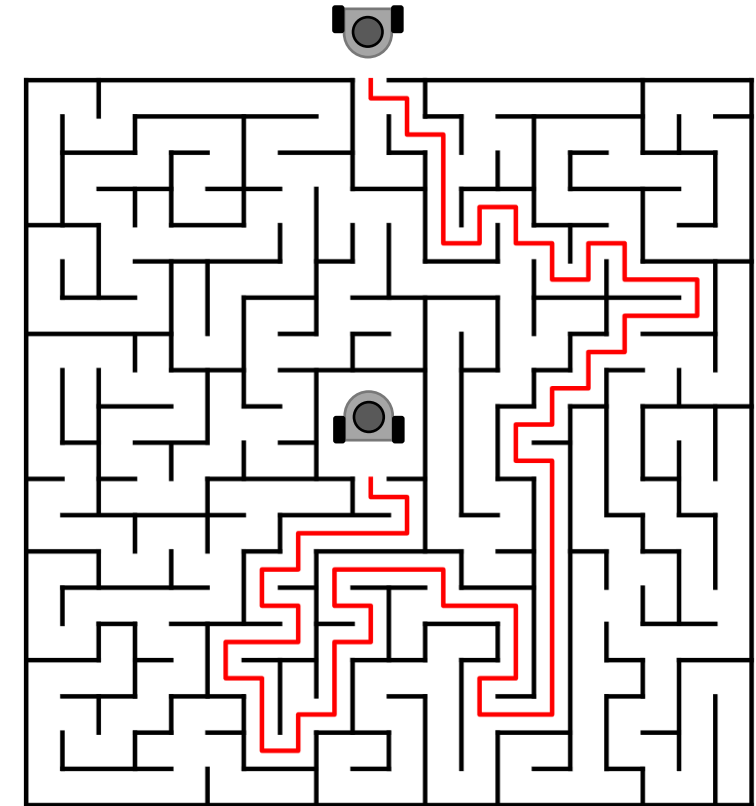
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1. DESCRIPTION

- The project aim is to develop and implement a search or navigation algorithm that lets the Turtlebot3 solve different kind of maze configurations effectively in a virtual environment.
- Scenario A)
 - “Random Exploration”
 - Robot has no information of the surrounding maze
 - Initial escape explores maze according to used algorithm
 - Second escape uses learned path to escape
- Scenario B)
 - “Goal Finding”
 - Robot has information about location of exit
 - Initial escape tries to minimize exploration and minimizes escape time
 - Second escape uses learned path to escape



1. OBJECTIVES

- a) Create an environment in Gazebo with a Maze that the Turtlebot3 can explore and solve.
- b) Defining a localization/mapping method to navigate the maze in an ordered behaviour.
- c) Implement a search algorithm for the Turtlebot3 so it can get out of the maze in the fastest way possible.
- d) Implement the same algorithm in a Real-world scenario, where a Physical Turtlebot3 is able to solve a simple maze.

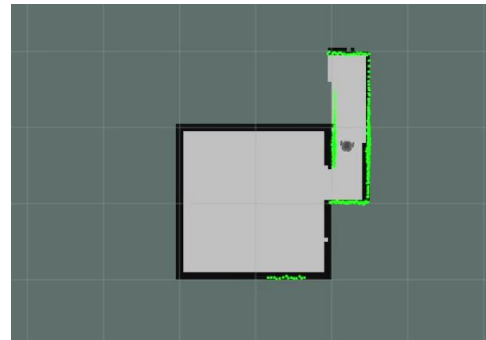
1. COMPONENT: MAZE CREATION

- Generation of random mazes using online generator
- Creation of multiple maze worlds using gazebo
-



2. COMPONENT: LOCALIZATION / GENERAL NAVIGATION

- Localization / Mapping using SLAM
- General Navigation inside maze
 - Ex. Staying in the middle of maze corridor



3. COMPONENT: ESCAPE ALGORITHM

- Scenario A) (Goal unknown)
 - a) Wall following
 - b) Dead-end filling
- Scenario B) (Goal known)
 - a) A* Path search

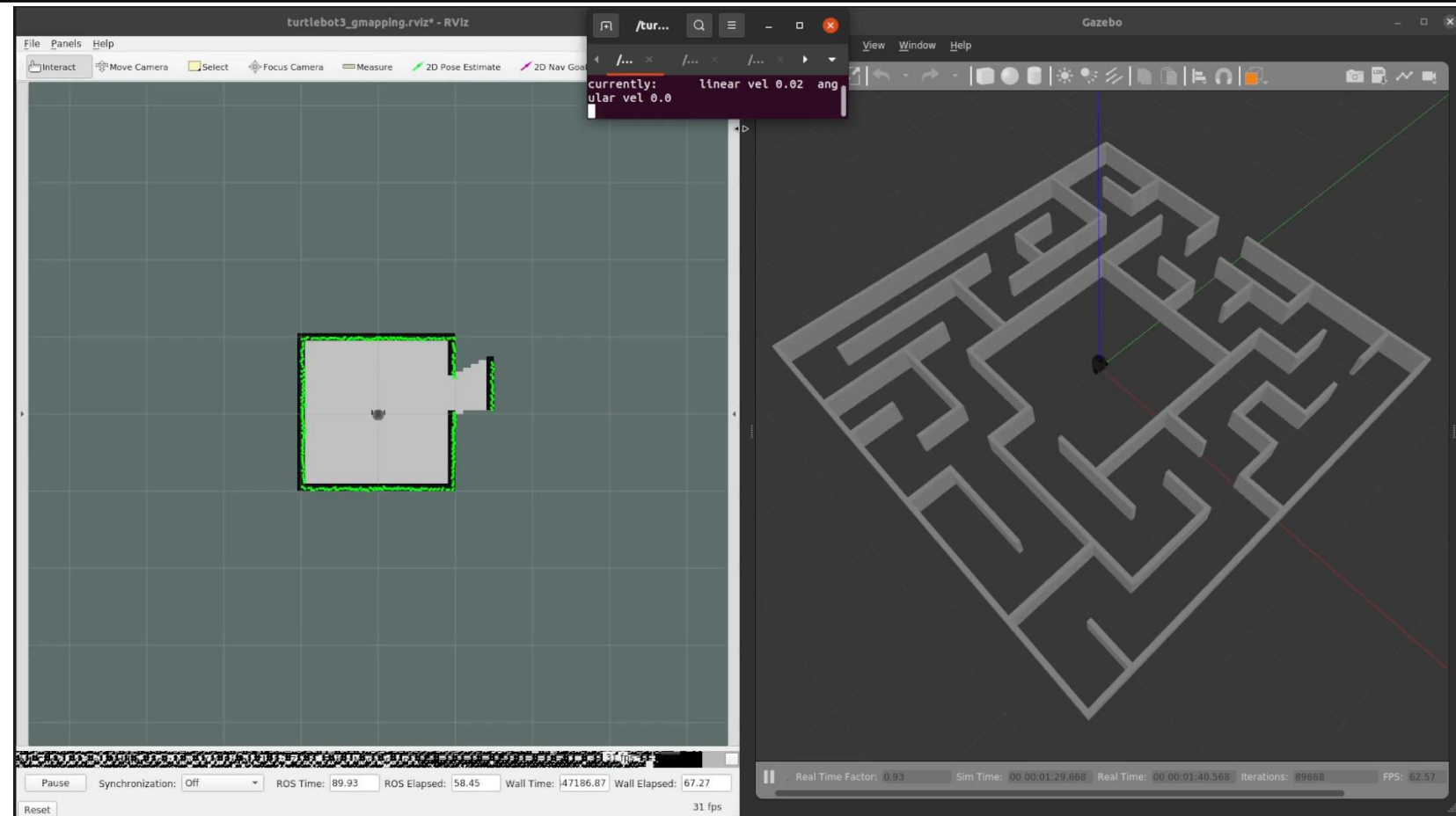


PROJECT STATUS

1. State 8.05.2023

a) Finished

- 2 Maze worlds are already created



THANK YOU!



1. A*
 1. <http://theory.stanford.edu/~amitp/GameProgramming/AStarComparison.html>
 2. https://algorithms.discrete.ma.tum.de/graph-algorithms/spp-a-star/index_en.html
 3. <https://qiao.github.io/PathFinding.js/visual/>

1. Midway Presentation: This first presentation is meant to tell the class about your project idea and showcase your initial work towards achieving your project goals. This presentation should include the following slides:
2. 1 slide: Team name & team members
3. 1 slide: Project topic (please make changes to reflect any changes in the project topic since the initial idea presentation)
4. 1 slide: 2-3 overarching goals that your team wants to accomplish through this project
5. For each major component of your project (e.g., the ML-based navigation project could be organized into three components 1) perception, 2) robot navigation and 3) the algorithm):
6. 1 slide: Description of the component
7. 1 slide: Your group's current progress on this component (gifs, screenshots, and/or videos encouraged) -- it's ok if you haven't started on a component yet
8. All team members are expected to speak during this midpoint presentation. Also, your presentation should take between 5 and 7 minutes (we will cut you off at 7 minutes).