



**Michigan
Technological
University**

MEEM 4707: Autonomous system

Spring, 2024

Lab - 2

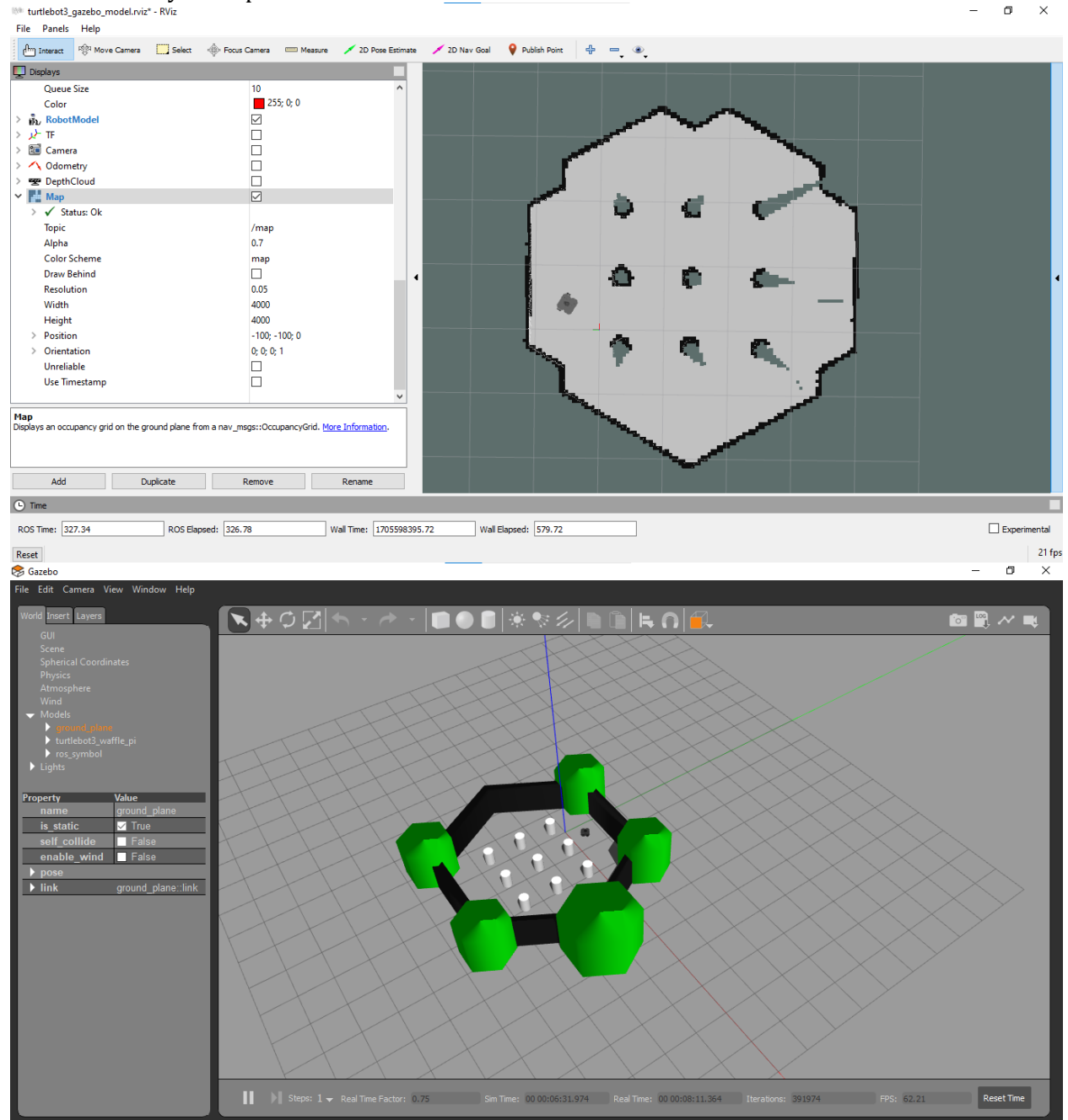
By

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Problem 1

Show the scanned map image and the actual Gazebo world image.

Mention the errors/mistakes/problems you faced and how you fixed them. You can include screenshots in your report.



Discussion from Lab2

- Objective

The objective of this lab is to get further familiarized with the ROS simulation environment, as well as the general usage of Selective Localization and Modelling (SLAM). Using teleop commands, we will move the robot around its environment and generate an estimated map of it.

- Approach to achieve the Objective

To achieve the objective, we first set up in the environment following the same steps as in Lab 1. Using the 'gmapping' script and 'turtlebot3_teleop' ROS node, we planned to manually move around the 'turtlebot3_gazebo' environment until the map was filled in.

- Challenges faced and countermeasures taken

While we did not have to deviate from our plan, it was more difficult to navigate using the rate-based teleop node than expected. The slight input delay combined with the control of rates using key events made it difficult to quickly navigate around the posts in the middle. As a result, there are areas of the map with more resolution than others

- The difference in strategy: Pre-lab vs. Lab strategy

No changes to the original strategy were necessary in this lab, though the pattern in which we drove around was inherently improvised.

- Observations and Learnings

It was interesting to see how ROS was able to simulate SLAM from an infrared sensor; while there are relatively few paths to trace on a low-resolution scanner, I still figured that this would be too computationally intensive to simulate in real-time. Reflecting on this, the input delay on the teleop while running the 'gmapping' script makes much more sense. I'm looking forward to automating this process in the future, as it should reduce the impact of input lag on the map's quality.