

INDOOR NAVIGATION FOR OFFICE SPACES



GROUP 14

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INTRODUCTION

- In this application-oriented project, we develop an indoor navigation algorithm for office spaces and achieve navigation when start and end points are given.
- This project seeks to find a safe way to have a mobile robot move from point A to point B

APPROACH

- Our approach is to utilize the *Navigation*, *Visualization* and *Navigate to Pose* algorithms provided by ROS since it can be applied to any robot configuration and include wider applications.

SIMULATION ENVIRONMENT

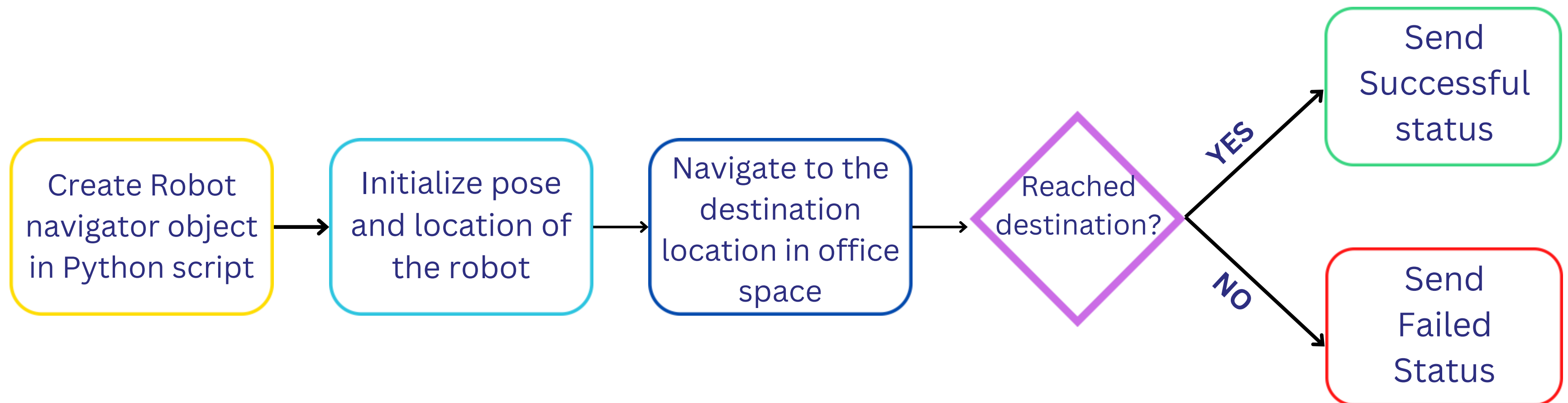
- We are achieving navigation with *ROS Navigation Stack* and using a pre-defined map of the office space.
- We are using *Gazebo* as the 3D simulator, while ROS will serve as the interface for the robot.
- We use *office world data set* which mimics a complete office environment which comprises common office objects and areas

SETUP



IMPLEMENTATION

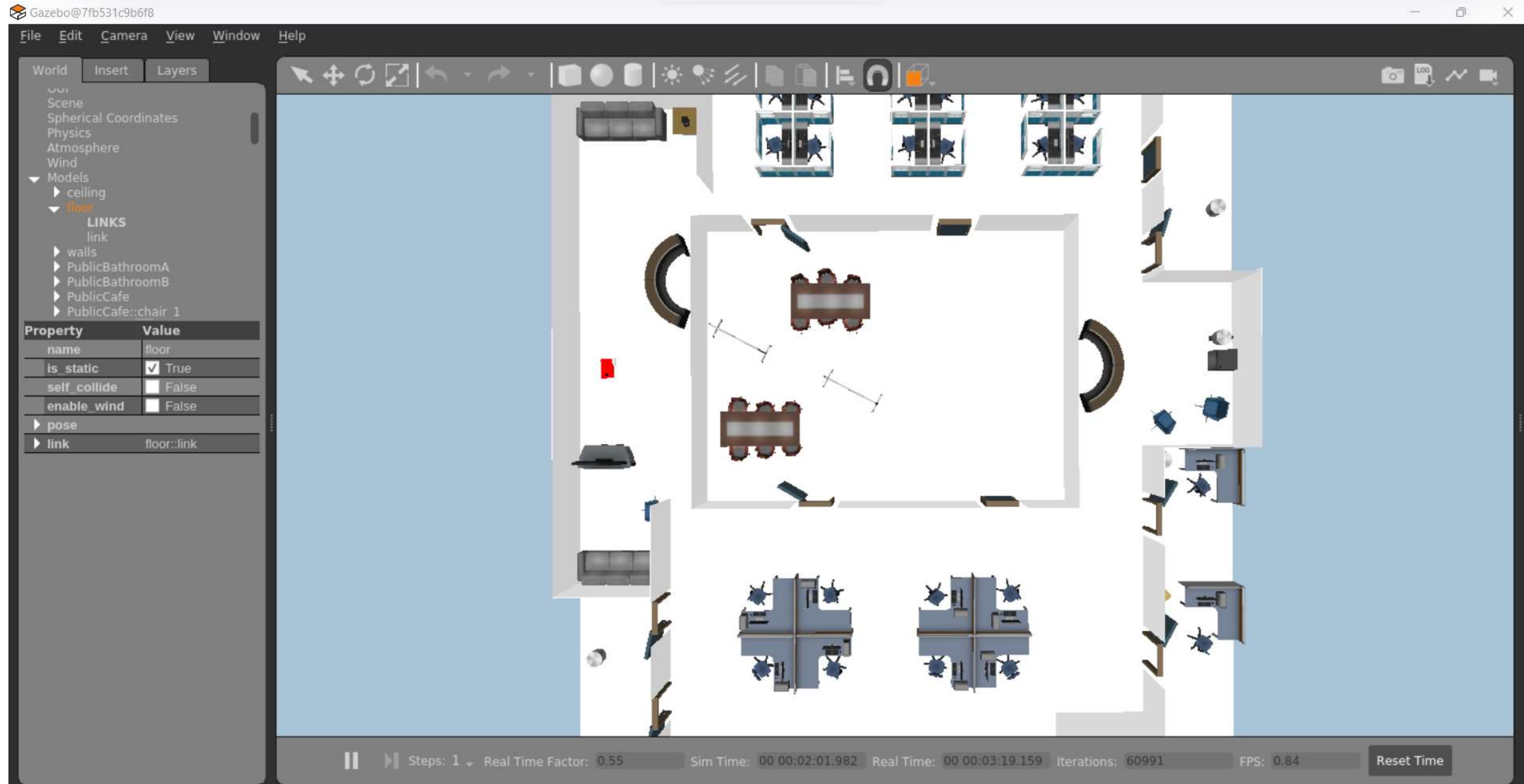
The code flow of our implementation looks as follows:



IMPLEMENTATION IN DEPTH

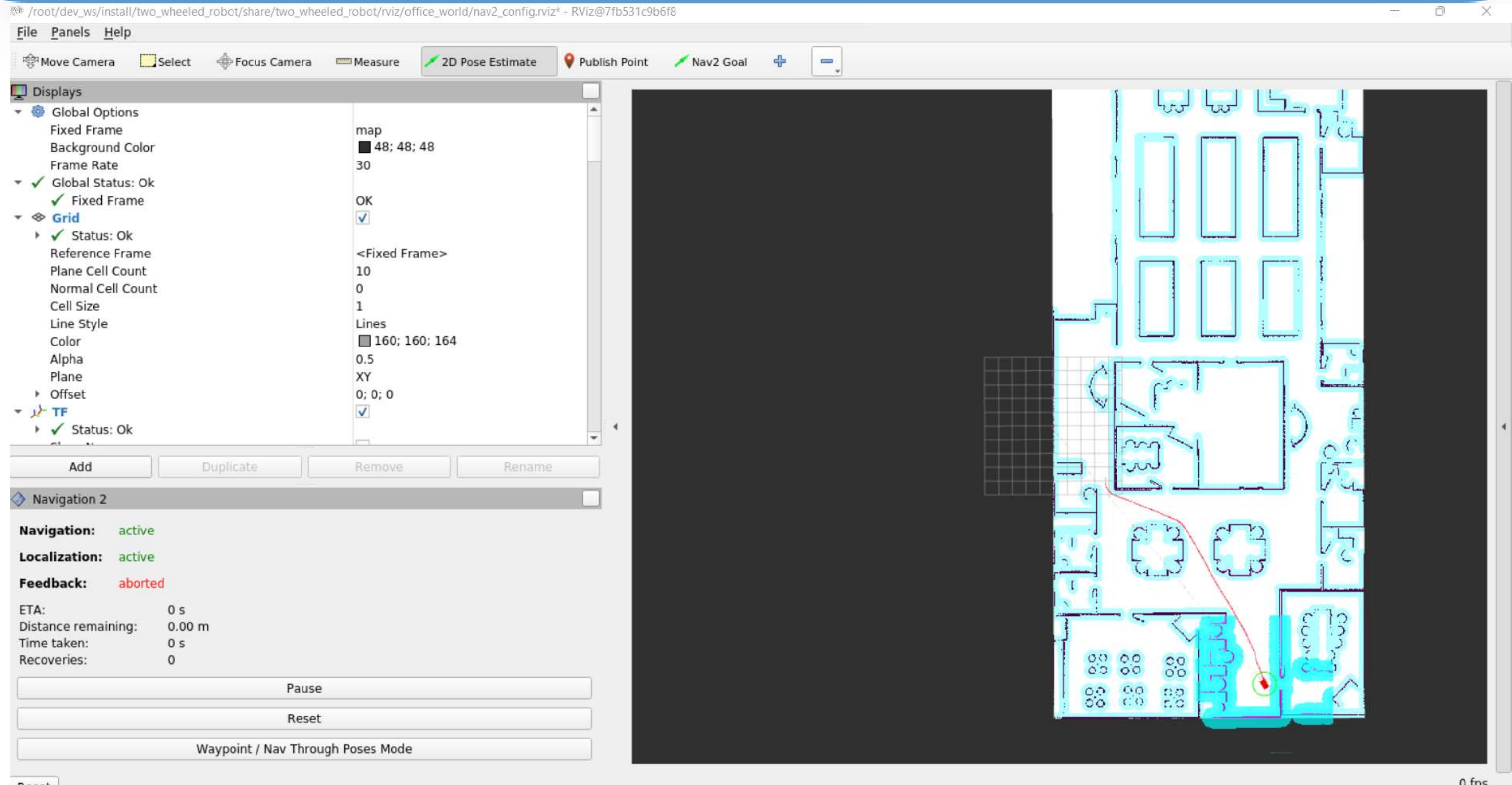
- In main class set initial pose and create an object of Navigator Class (this class contains all the methods we will need for navigation)
- Import all required modules from Nav2 and RCLPY
- Create a ActionClient using rclpy.action
- Use this client to Invoke function NavigateToPose from Nav2 to navigate to destination pose
- Set a goal future and use spin_until_future_complete from rclpy until we reach the destination goal.
- This goal future can be rejected by rclpy if goal is set to some obstacle in such cases we much choose another goal future.
- getResult method will return either: 1) SUCCEEDED 2) FAILED 3) CANCELLED (can occur if there is an incorrect goal future or aborted task)

GAZEBO INITIAL LAYOUT



DEMO

RVIZ FINAL RESULTS



APPLICATION

- Hotels
- Hospitals and Medical Centers
- Restaurants
- Warehouses
- Schools and Universities

Thank You