INDOOR NAVIGATION
FOR OFFICE SPACES

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• 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
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.
• 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

Create ROS Workspace & Packages

Load Robot model in Rviz & world model in Gazebo

Add Python scripts & executables for Implementation

Build and Launch the Robot in Gazebo World

Test using random Start and End points
IMPLEMENTATION

The code flow of our implementation looks as follows:

1. Create Robot navigator object in Python script
2. Initialize pose and location of the robot
3. Navigate to the destination location in office space
4. Reached destination?
   - YES: Send Successful status
   - NO: Send Failed Status
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
APPLICATION

• Hotels
• Hospitals and Medical Centers
• Restaurants
• Warehouses
• Schools and Universities
Thank You