Group 6 Final Project

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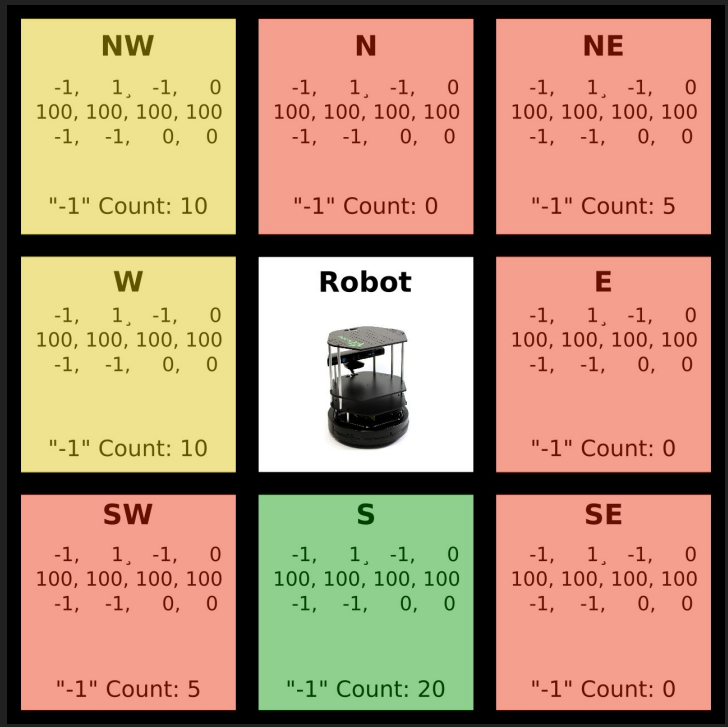
ROS Setup

- Custom nav_bundle setup for move_base and gmapping
- Adjusted obstacle avoidance distance, inflation
- Seems to provide slightly better obstacle avoidance for a slightly less accurate map

How the Algorithm Works

- 1D Occupancy grid -> 2D Numpy array
- Slice into eight directions
- Count unseen points in 2D slice
- Store centerpoint of slice for movement
- Choose direction with highest count (ignore counts under threshold)
- Send centerpoint waypoint after conversion to map coordinates
- Expand box if no valid direction

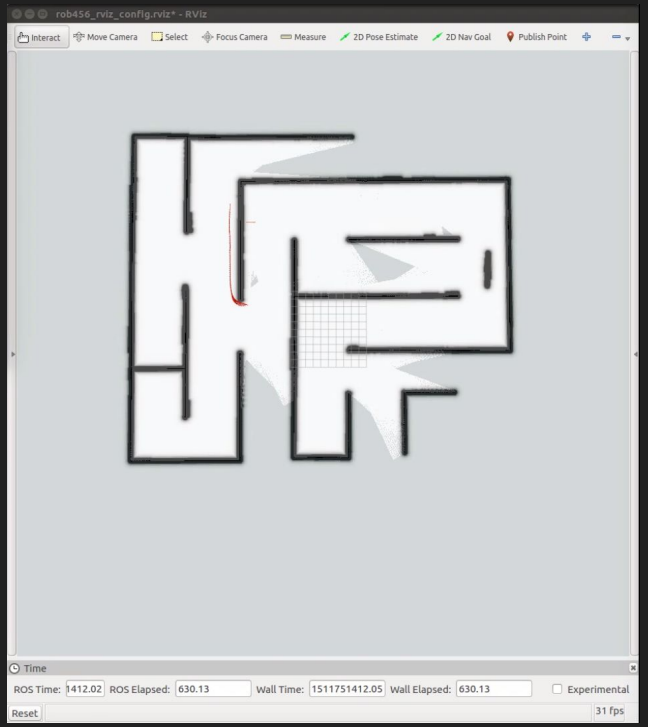


Edge Case / Error Handling

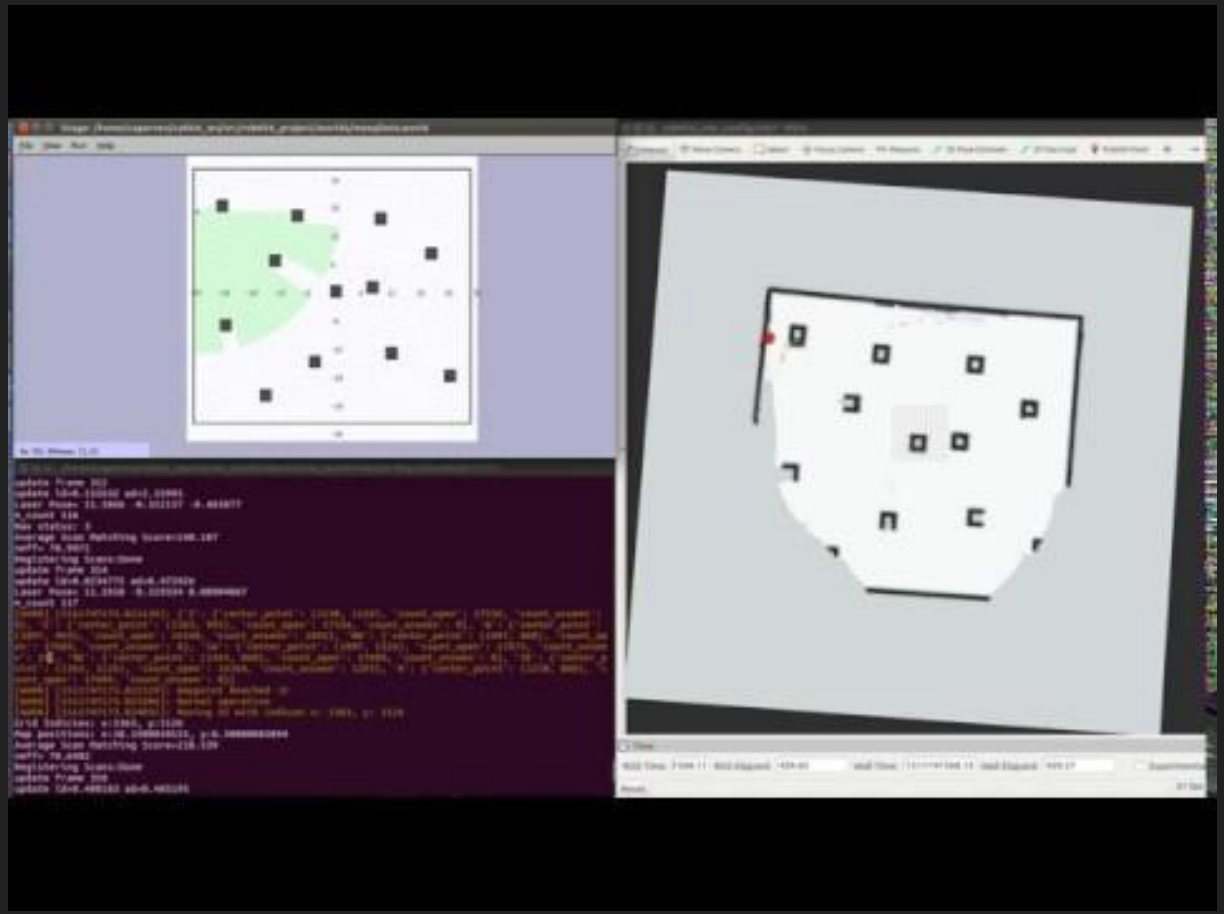
- Two retries per direction if waypoint failed
- Removes direction option after two fails
  - Eventually runs out of options if nothing valid
- Chooses random direction if out of options, to get to new area
- Watchdog runs when robot stuck, goal too far
  - Forces movement once expired
    - “/cmd_vel” vs “/move_base/goal”
  - Most likely happens when stuck or in complex map
  - Takes a long time to expire (60s)

Problems

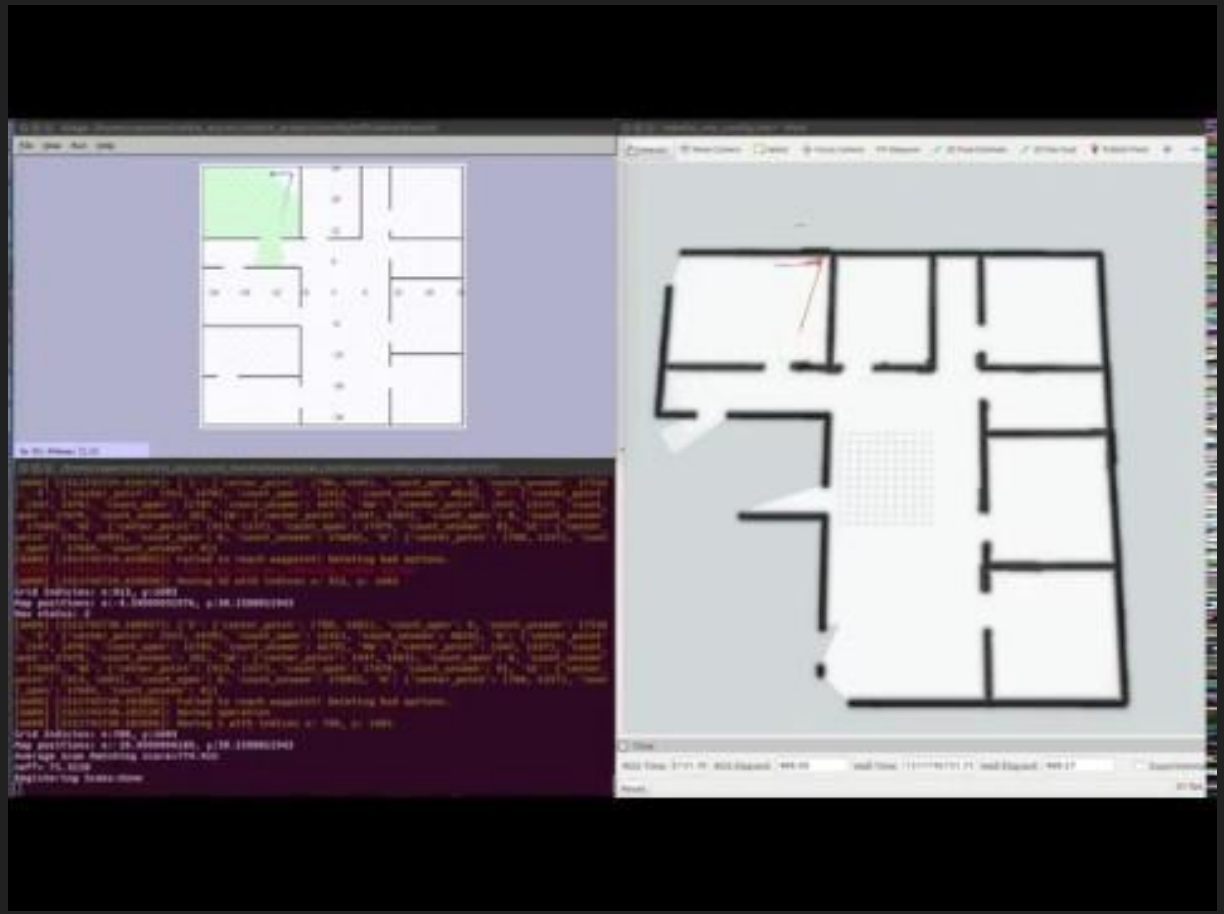
- Trouble with more complex environments like mazeWorld
  - Handles odom error badly as it builds up
- Waypoints often end up in walls
  - Crude point chosen, if intelligent direction-wise
- Has no understanding of outer walls
  - Can be helpful, but time intensive to escape
- Still doesn't avoid walls all the time
  - Clips on doorway edges
  - Slides against wall if point inside
- Relies on points outside of outer walls to complete map



manyDots Run



officeWorld Run



mazeWorld Run