

# CSCI 5551-Intro to Rob

## Group #01

## Dynamic Obstacle Avoidance

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## Introduction:

Our objective was to move a robot from a start position to a goal position in an environment with static and dynamic obstacles.

## Input-output:

### Input:

Map with various static cylinders + 2 dynamic cylinders with randomized velocity, start & goal poses.

### Output:

Motion controls to avoid obstacles and reach the goal position.

## Method/Framework details:

**Frameworks:** Ros2 Humble, Gazebo

### Components:

- Particle Filter
- Movement Controller
- Obstacle Avoidance
- Dynamic Obstacles

## Objects/Maps/Robots information:

**Robots:** Turtlebot3

**Obstacles:** Dynamic and static cylinders

**Worlds:** BARN Dataset

## Experiment Details:

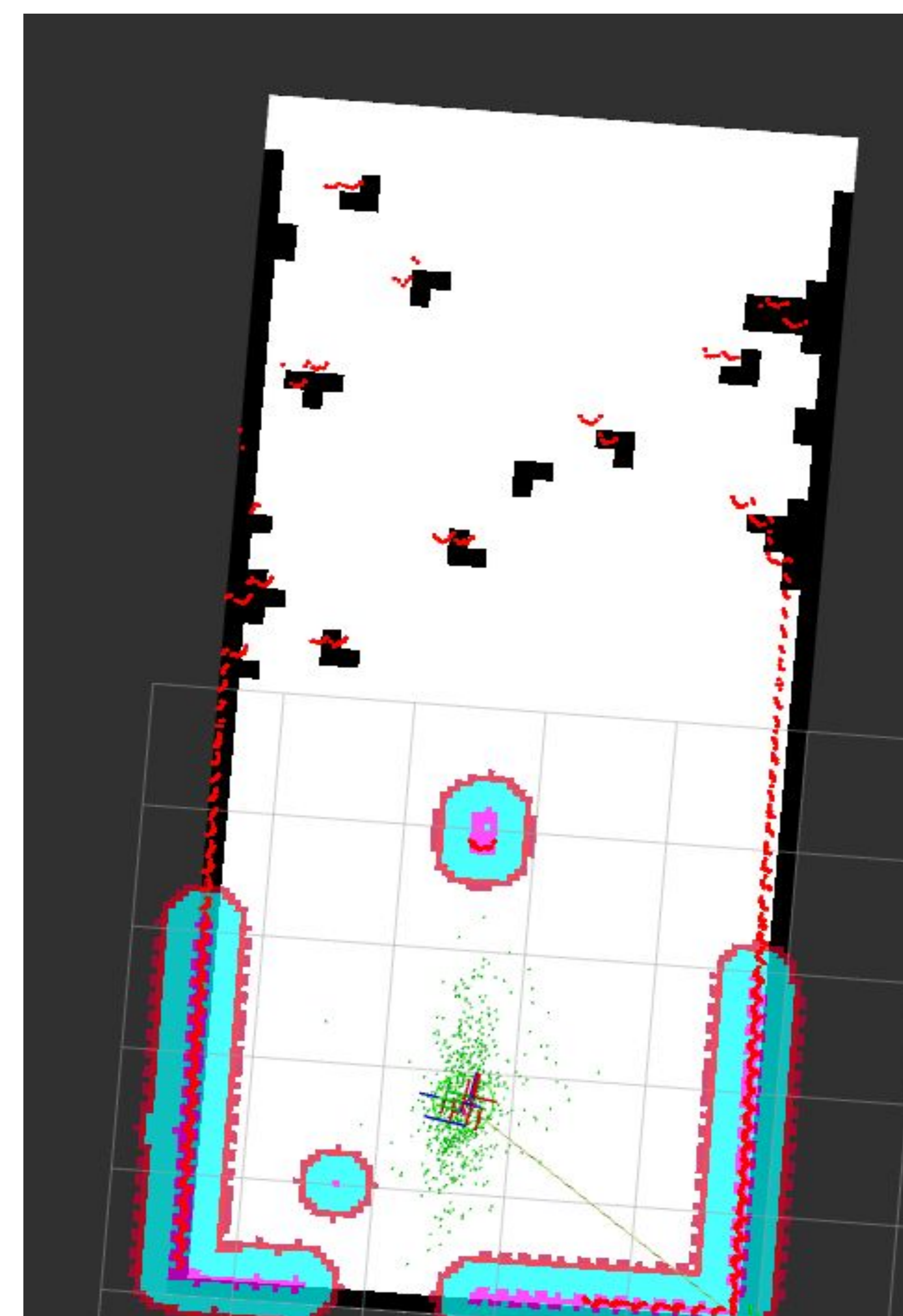
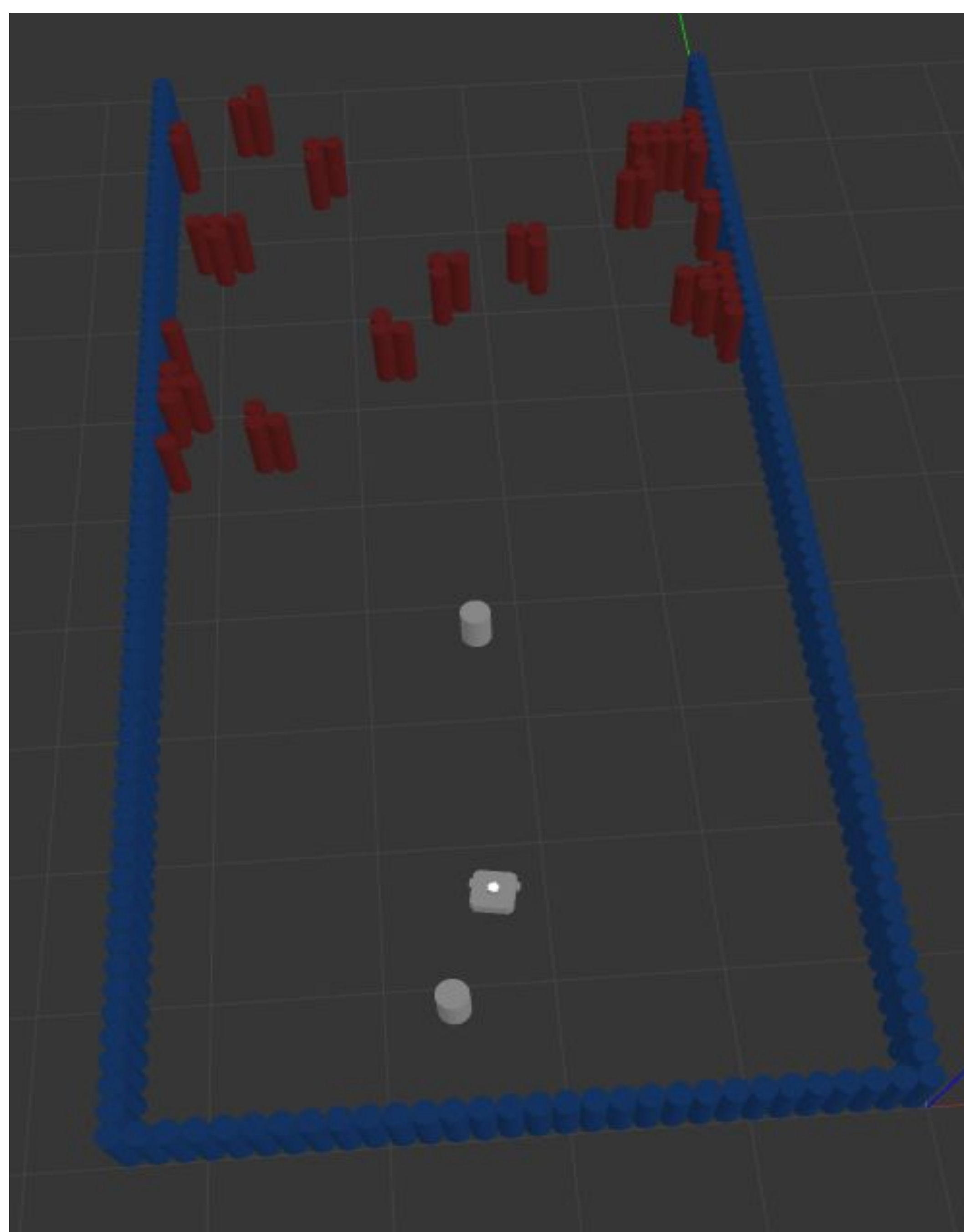
We tested our dynamic obstacle avoidance on 6 maps of varying difficulty from the BARN dataset. On each map, we ran 8 tests, each with randomized initial velocity for the dynamic obstacles. We recorded the count of times the robot:

- Made it to the goal without collisions
- Made it to the goal with collisions
- Did not make it to the goal

## References:

- Class Notes
- Gazebo/Ros2 setup guide
  - <https://emanual.robotis.com/docs/en/platform/turtlebot3/simulation/#gazebo-simulation>
- Ros2 Docs
  - <https://docs.ros.org/en/humble/index.html>
- Kabilankb. (2024, June 22). Building a simple ROS2 object avoidance robot using Python. Medium.  
<https://medium.com/@kabilankb2003/building-a-simple-ros2-object-avoidance-robot-using-python-962f5b8485d7>

# “Navigating a Dynamic Environment”



## Goal Navigation Success Rate vs World Difficulty

