Robotic System Performance

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OVERVIEW OF WHAT'S COVERED

Objective

Outlining the goals of the project.

Implementation

Describing the method taken to achieve the goals.

Color Tracking

An in-depth look into the color tracking node.

Obstacle Avoidance (OA)

An in-depth look into the obstacle avoidance node.

Testing & Results

The methods used to test the implementation and the outcomes.

Conclusion

A brief summary and analysis of the project.

1

OBJECTIVE

Describing the goals of this project

OBJECTIVE

A complex idea can be conveyed with just a single still image, namely making it possible to absorb large amounts of data quickly.

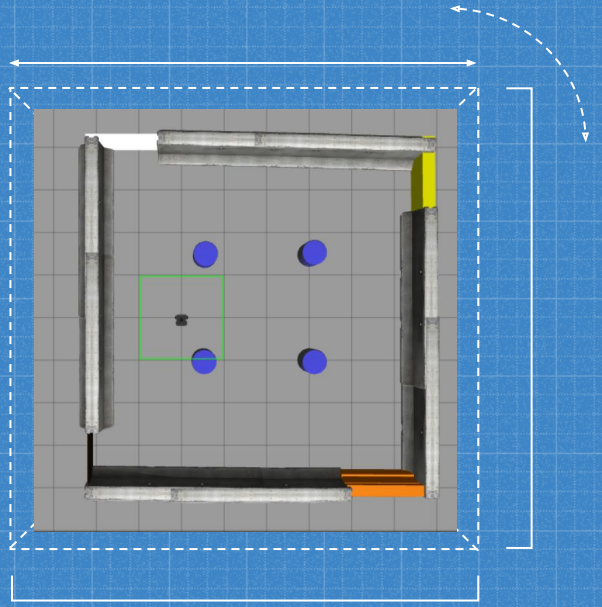

Image of the environment from a top-down perspective

2 Implementation

The method towards fulfilling objectives

THE IMPLEMENTATION OF REACHING COLOR TARGETS

Color Tracking Node

Is the color of milk and fresh snow, the color produced by the combination of all the colors of the visible spectrum.

Obstacle Avoidance Node

Is the color of ebony and of outer space. It has been the symbolic color of elegance, solemnity and authority.

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COLOR TRACKING

The method of identifying targets

COLOR TRACKING - TOPICS

Topics Included

- MotionTopic
- ImageTopic
- HeadingTopic

Publishers

ImageTopic: TrackNode deals with iterating each color target communicating with the OA node to move around obstacles and stop the robot a given distance away from color target

Subscribers

- MotionTopic: used to help identify when the robot should stop moving or move around when sees target or obstacle
- HeadingTopic: created topic between CT node and OA node. Sends the linear and angular velocity needed for the proper heading

PSEUDOCODE FOR COLOR TRACKING

```
Function trackNode ():
while rospy is not shutdown
    Show the turtlebot camera
    Get the current image shape
    Angular velocity and linear velocity are set to default values 0.3 and 0
    if m[‘m00’] > 0:
        delta x, angular velocity, and distance are calculated
        if target in range:
            Text output on screenshot
        end-if
    Publish image message
end-trackNode
```

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OBSTACLE AVOIDANCE

The means of navigating
to the target

OBSTACLE AVOIDANCE- TOPICS

Topics Included

- MotionTopic
- LaserTopic
- PoseTopic
- HeadingTopic

Publishers

MotionTopic: OA node handles all of the movement between the two nodes.Sends linear and angular velocity to robot for navigation.

Subscribers

- LaserTopic: used to determine whether the object is too close to an obstacle
- PoseTopic: used to help identify the robot’s location in the environment
- HeadingTopic: created topic between CT node and OA node. Sends the linear and angular velocity needed for the proper heading

PSEUDOCODE

```
function OA_Node ():
while rospy is running:
     wait for lin. And ang. vels from color node
     if linear velocity = 0
          spin in place to help CT look for target
     else
          smoothed_vels = potential field algorithm()
          set new linear and angular velocity to smoothed_vels
     end-if
     Publish motion message
end-while
end-OA_NOde
```

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TESTING AND RESULTS

Let’s start with the first set of slides

TESTING AND RESULTS

No testing was able to be done since the nodes did not communicate with each other.

Without testing no results were obtained, but if the nodes were able to communicate with each other it would behave ideally as follows:

- **The robot would go to each color target, stop, and take a screenshot of the color target**
- **The color target, location, and time elapsed would be recorded in the screenshot**
- **The robot would move on to the next color target**

6

CONCLUSION

Reflecting on the Project

CONCLUSION

Despite a system designed for tracking color and avoiding obstacles, the nodes did not work properly.

No results were able to be obtained, however a general idea for solving the solution was developed.

QUESTIONS?
COMMENTS?

Thanks for listening!

Please let us know your feedback.

Presentation Recodring

1. Title slide: Give your implementation an appropriate name. You should also list team member names.
2. Overview of the presentation: bullet list of topics you'll cover
3. The problem: One slide that describes the problem with a graphic of the simulated world.
4. Solution – System overview – describe the two nodes, their individual functionality, how they communicate, and the resultant system functionality
5. CTrackNode: ensure you say how it sequences the targets, and your choice for the angular velocity and linear velocity control laws – explain how you got any constants (may link to item 7 below). Explain how you handle loss of target and searching for a new target. Explain any innovative choice you made that improve functionality.
6. OANode: ensure you explain how it detects left and right targets, what action you do in each case. Explain any innovative choice you made that improve functionality.
7. Explain how you tested the system so you have confidence it will work no matter where the robot is started. Explain how you tuned the performance of the system based on trial runs. If you have any graphs or measurements you made (just like the lab assignments) that help you tune the software, present them here.