LAB 3: WALL FOLLOWING IN TESSE

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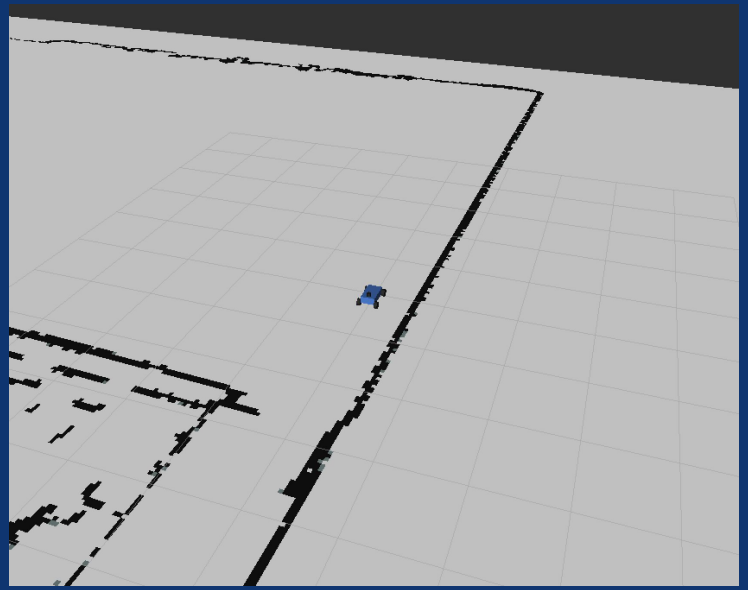
01

INTRODUCTION

Set Up & Goals

MODIFIED A WALL FOLLOWING CONTROLLER SUCCESSFUL IN 2D ENVIRONMENT TO FUNCTION IN 3D.

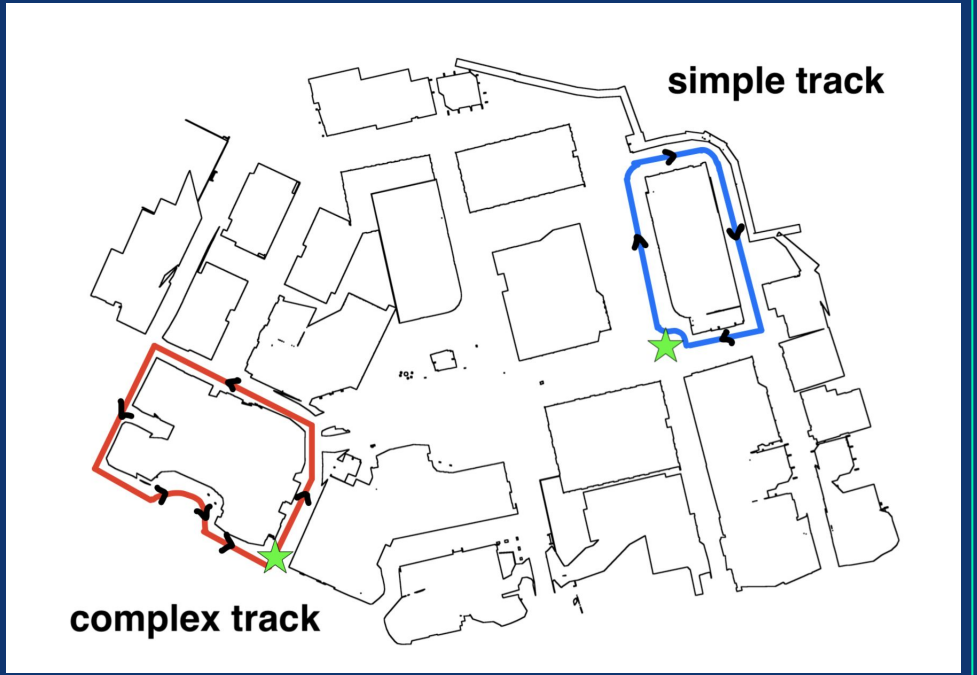


2D Environment from Previous Lab

3D Photorealistic TESSE Environment

THE GOAL

- Complete two tracks autonomously without collision



https://github.com/mit-rss/wall_follower_tesse

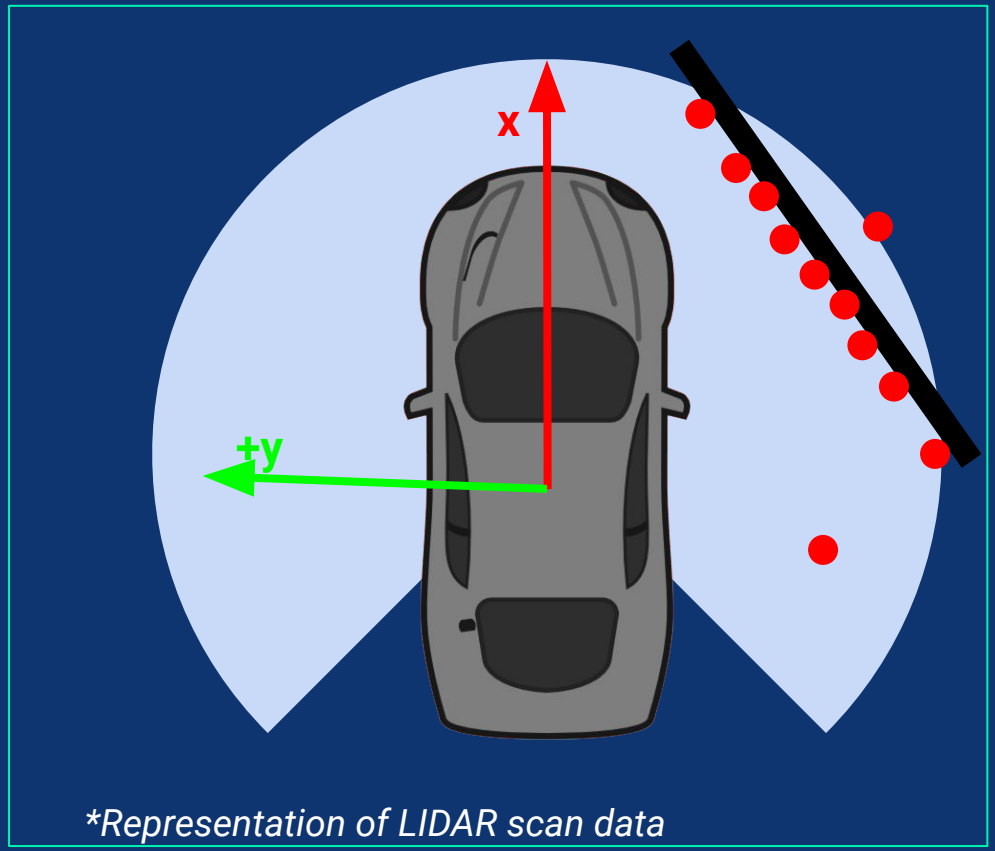
02

TECHNICAL APPROACH

Scan > Identify > Control

SCAN AND WALL ID

- Slice laser scan in half
- Filter outliers
- Least Squares Linear Regression

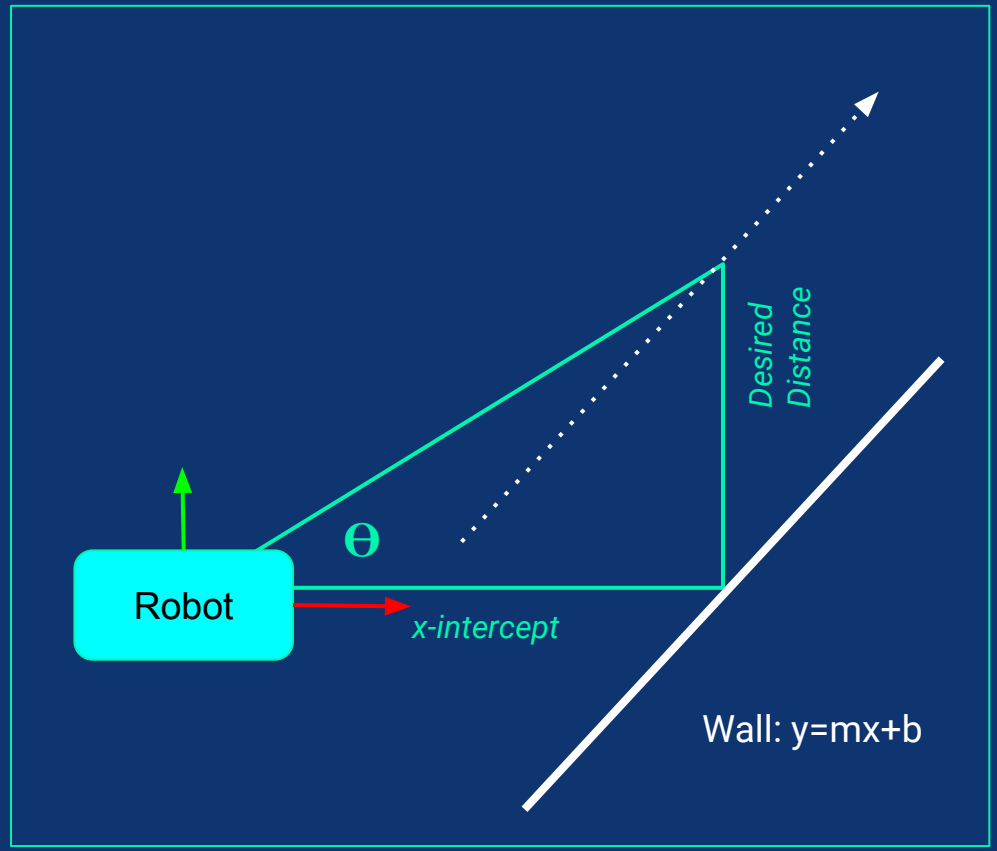


*Representation of LIDAR scan data

CONTROL

PID Control: proportional, integral, differential

- Input: Distance vs Angle
- Output: Steering Angle
- Timestep



*Look-Ahead Method

03

EXPERIMENTAL EVALUATION

EXPERIMENTAL RESULTS

TRACK

Only tested on the simple track

SUCCESSFUL RUNS

Successfully completed 3 runs

STABILITY

Large oscillations with minor mistakes

CURRENT PROGRESS

Currently we are trying to tune and revise our PID controller for the complex track

04

CONCLUSION

Current Lab Takeaways & Future Plans

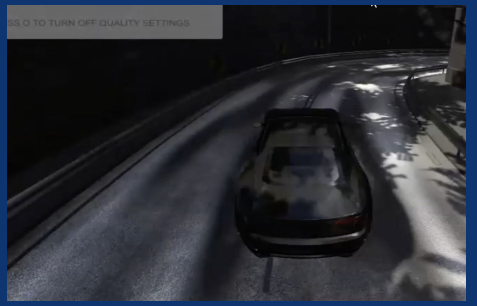
LESSONS / STRATEGIES LEARNED

- Pursue bite-sized problems before more complex ones

- “Theory” doesn’t always translate to real-life lab conditions

PLAN FOR FUTURE ACTION 🛠️

- Continue tuning PID
- Design “look-ahead” code for complex track / atypical turns
- Program in track-specific features



QUESTIONS?

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