

# Lab 3. Wall Follower

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# Challenge & goals:

1. Implement a  
wall-following algorithm

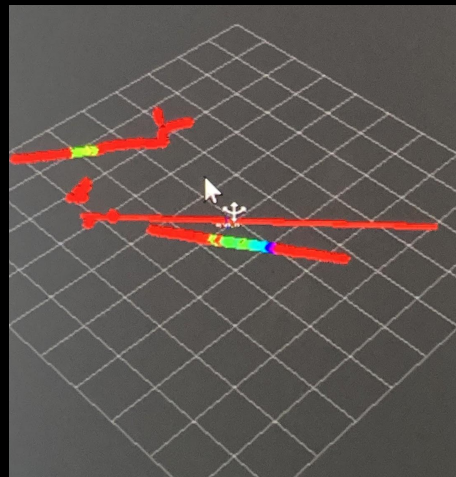
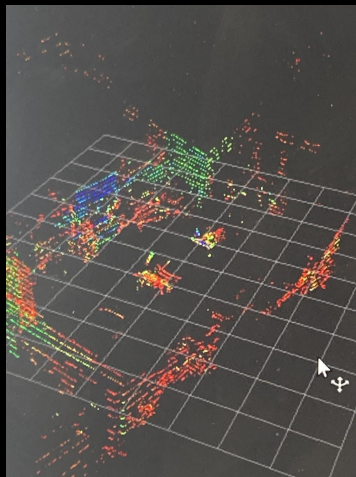
2. Design a safety  
controller

3. Design features for  
development & measure

# 1. Wall-Following

# Robot is blind. We convert Velodyne Lidar scans from velodyne 2D scans to 2d LaserScan Data!

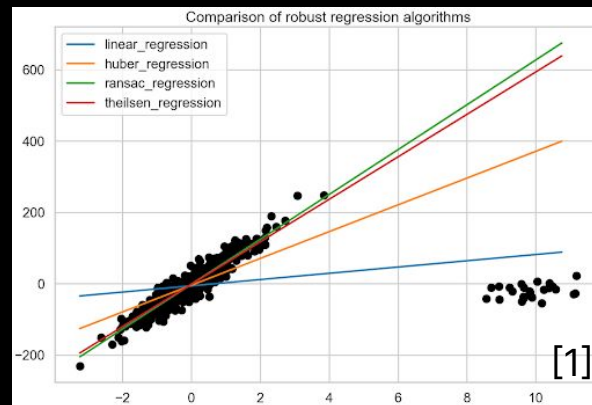
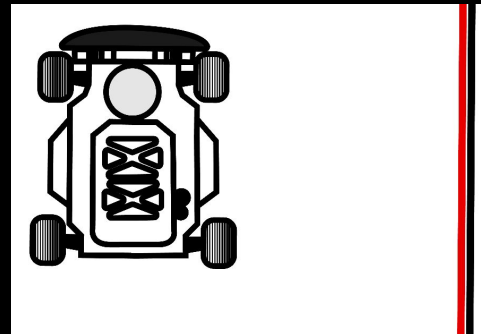
- This requires patching two datasets from the velodyne puck together, which can be done using numpy arrays!



1. Wall-following

# How to Determine the Distance from the Wall.

- By taking all the data on a given “side” the wall follower can perform a linear regression on the range data and turn that into a given line that represents the wall!
- While outlier objects (such as people, chairs, etc.) can distract the model, other regression methods can perform better wall detection in future labs



# Real-Time Wall Follower Implementation



1. Wall-following

## 2. Safety Controller

# Safety Controller Considerations

- The safety controller must:
  - Respond to external stimuli
  - Intercept the existing drive command
  - Publish a killer drive command.



# 3. Development & Measure

# Recording Sensor Data

We want to record the sensor data being used by the robot:

- Take the re-formatted data because that is what the robot actually uses
- Record it into a bag file to visualize in rviz again later
- Only record data 3 times per second (to save space)

# Recording Perception and Error

We want to record the error data of the robot:

- Take the error published directly by the robot to measure robot's perception of error
- Can be compared to rviz data to check 'actual' error vs perceived
- Record it into a txt file to visualize the data as a graph or other chart

# Citations

- [1] NVIDIA : 3 robust linear regression models to handle outliers. NVIDIA Technical Blog. (2022, October 19). Retrieved March 10, 2023, from <https://developer.nvidia.com/blog/dealing-with-outliers-using-three-robust-linear-regression-models/>

# Appendix