Lab 8: Imitation Learning Report

EECS 195 | Autonomous Systems
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Date: 6/10/25
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Objective

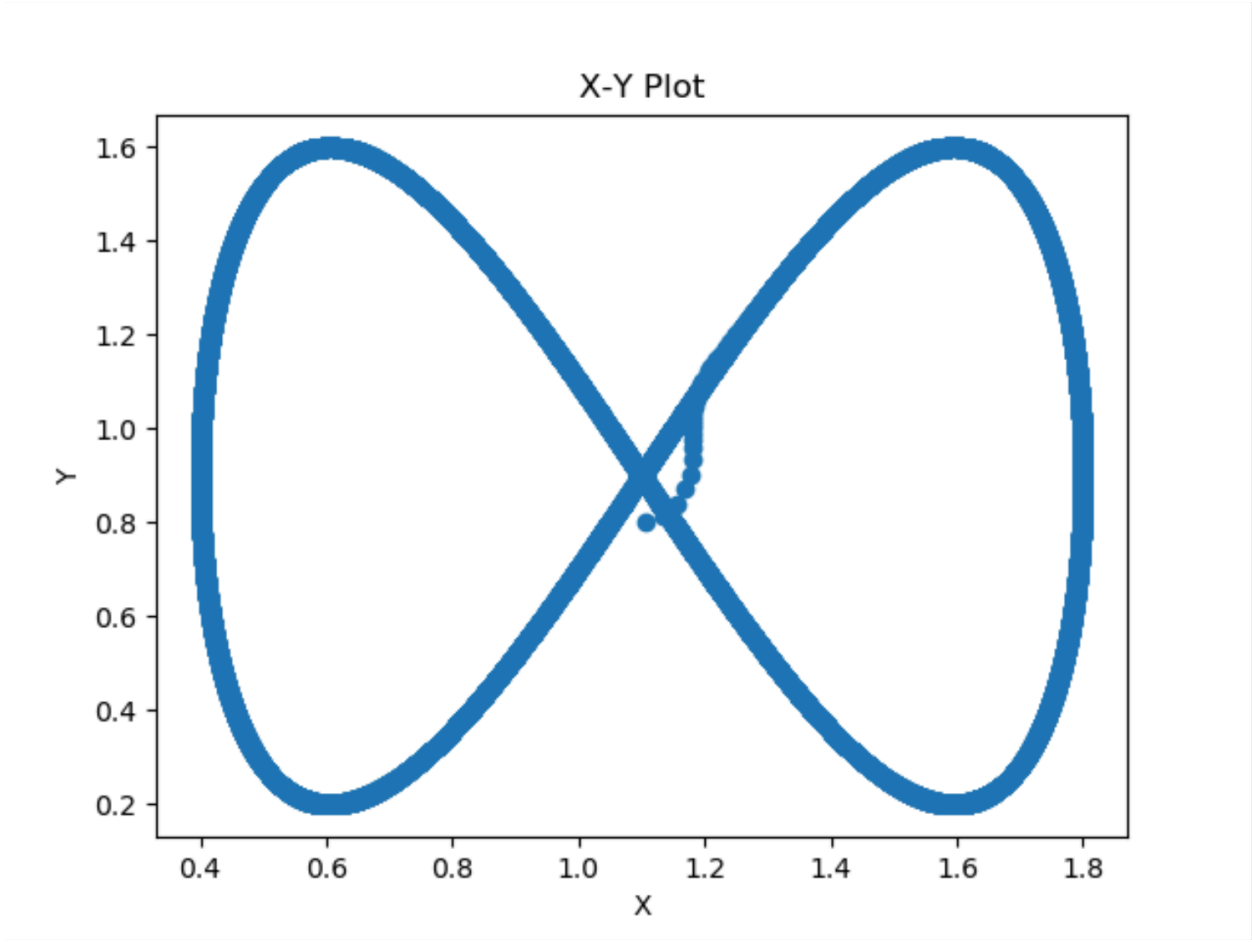
The objective of this lab is to understand and apply the concept of imitation learning. By using Python and Keras we can collect data and train a neural network controller. In parallel, we will utilize the RVIZ's 2D navigation goal feature and generate a detailed path of waypoints and guide the robot effectively via the controller.

Note

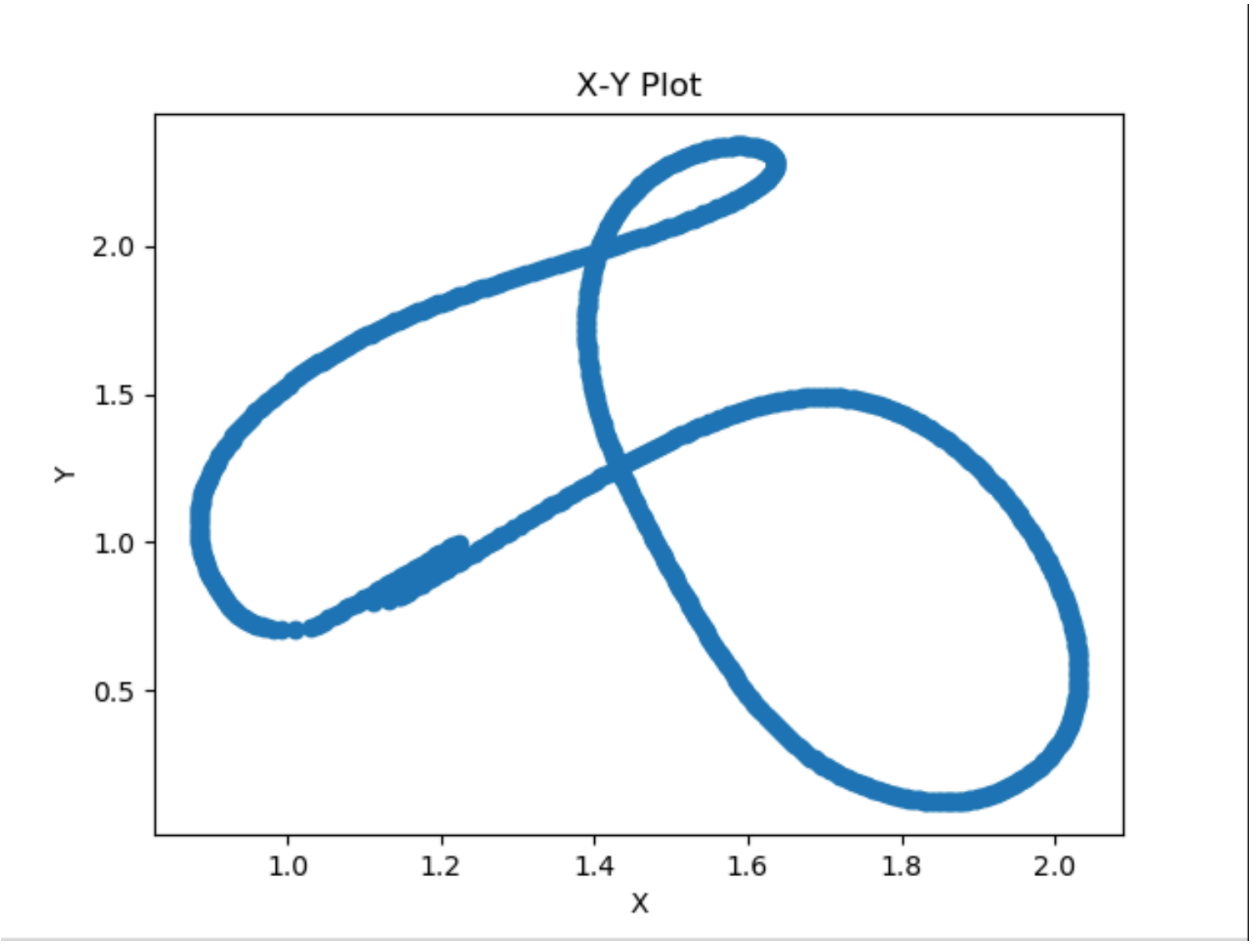
"convert.py" was the code given in the lab manual and then stored under 'src/src' and then from there the .csv was generated and moved under the nn_controller package under '/scripts'. Problem 1 is stored under 'src/src'.

Results

Problem 1

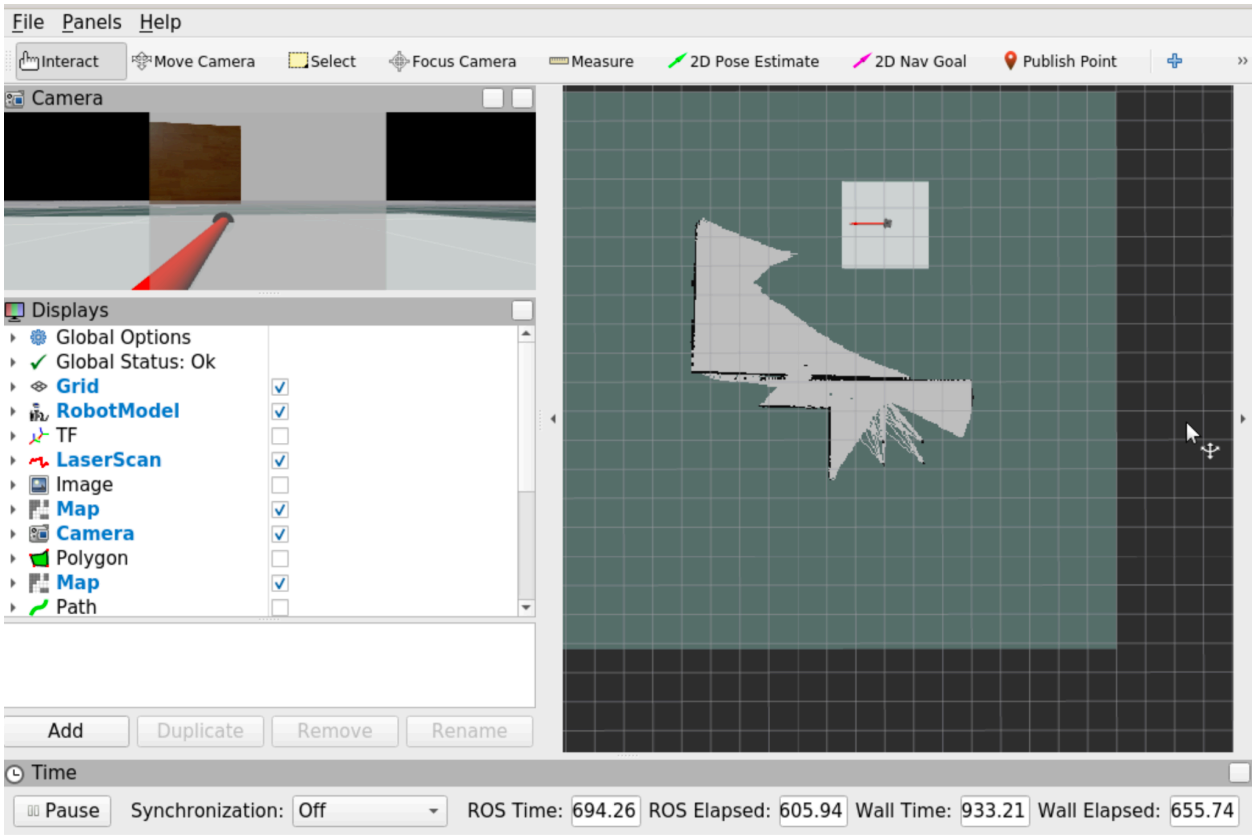


Here above is the trajectory of a differential drive controlled by an MPC.



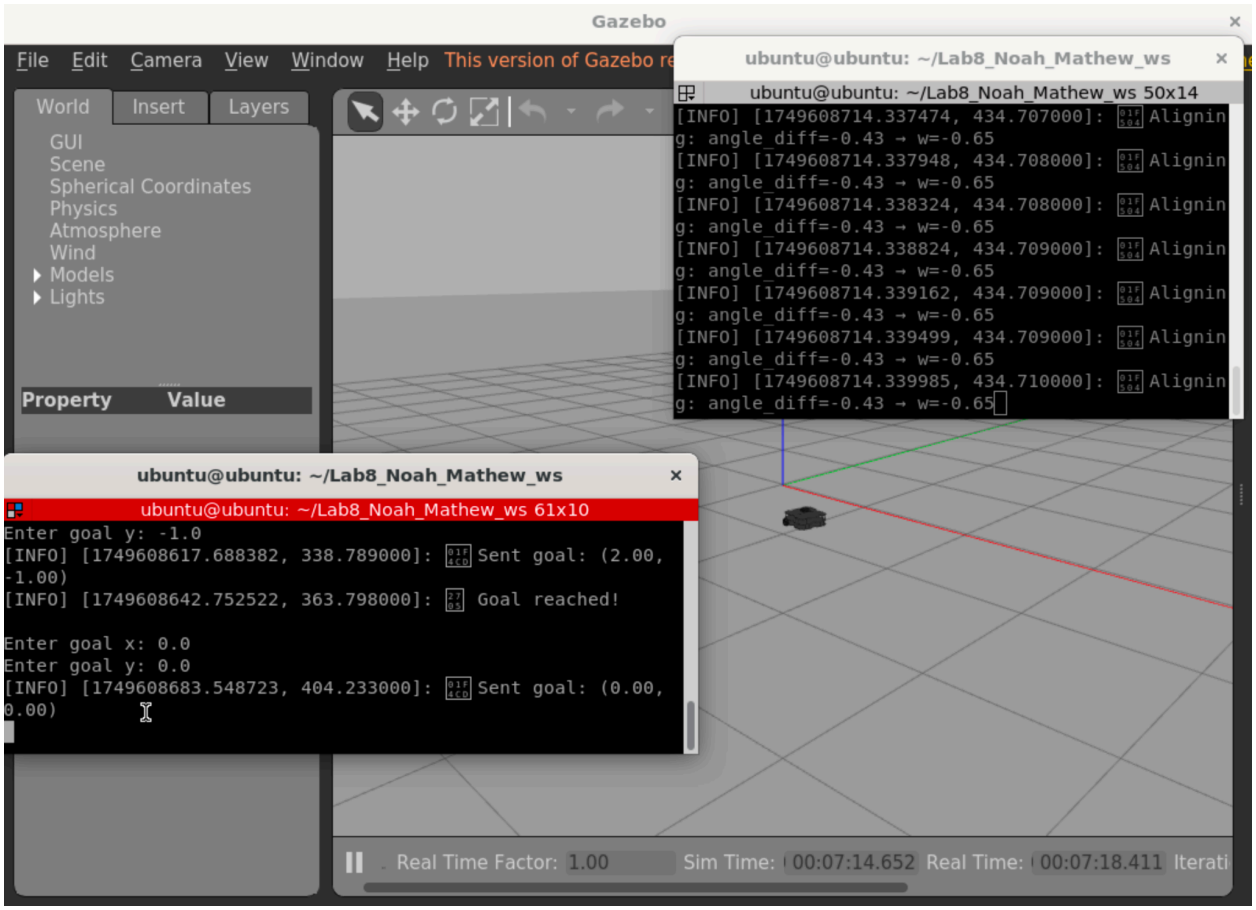
Here above is the trajectory of a differential drive controlled by a Neural Network controller.

Problem 2 Results



The above is a screenshot of using the 2D nav goal and setting some point for manual navigation in the rviz window. Then, I record the data using rosbag, and then convert it to CSV.

The above is my .csv that I get from converting my bag file.



After obtaining and training the data, we can use the motion planner to tell the turtlebot where to go. Then, the turtlebot uses the neural network to move to the destination.

MODEL LOSS PLOTS