TRANSPORTATION MODELING

Autonomous Vehicle Routing in Congested Transportation Networks.

INTRODUCTION

- Vehicles are evolving into a mobile platform that can communicate and connect with others. With the continuing prevalence of transportation, research on autonomous vehicles has become particularly important, especially with regards to easing congestion and improving road safety. Our focus with autonomous vehicles is to integrate relevant sensing technology and autonomous control technology into the vehicle so that it can choose the optimal path to its destination without input from any passengers. While this autonomy may be convenient, safety is an important concern as well.
- The purpose of this project is to provide speed and other data relevant to congestion by simulating autonomous vehicles traveling on a transportation network. By creating a simulation that uses these connected autonomous vehicle (CAV) models, we intend to study the way they react and coexist with other models representing human-driven vehicles.
- With this project we hope to deliver a working simulation of autonomous vehicle models onto a transportation network, rendered onto a GUI for the user to see. Additionally, we aim to create relevant and insightful data of autonomous vehicle trajectories and how the addition of these vehicles affects the motion of other vehicles on the transportation infrastructure.

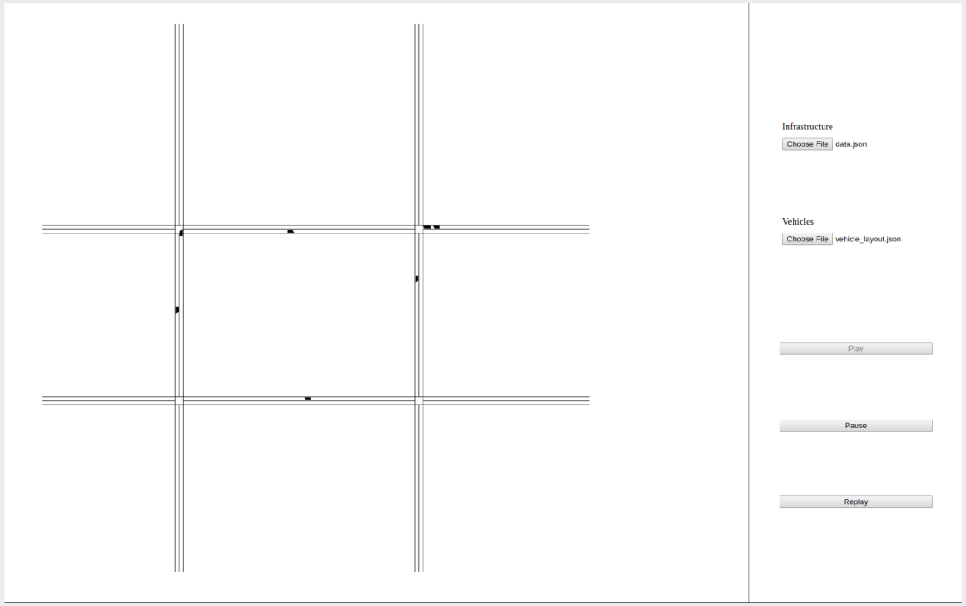

Fig 1: Display of working simulation run on GUI.

VEHICLE VELOCITIES

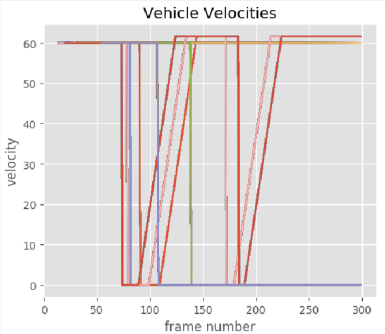

Fig 2: Graphical results of the average velocity of CAVs and HVs per frame.

RESULTS

- By connecting with other vehicles, CAVs have more information that they can use to determine their optimal routes. CAVs will spend less time making decisions such as choosing their optimal routes.
- By re-evaluating their optimal destination routes, CAVs spend less time than HVs to arrive at their destinations.
- By being aware of other vehicles' speeds, a CAV can better optimize its following speed and distance, as well as its stopping time.
- The simulation accurately depicts vehicle speeds over time as they approach their destinations, and can accurately simulate congestion due to the number of vehicles on the network.

PROJECT DESCRIPTION

- This project offers a practical solution to the inclusion of autonomous vehicles into transportation network models and discusses how they will not only create optimal paths but coexist with human-driven vehicles. By introducing connected autonomous vehicles (CAVs), vehicle autonomy and the overall infrastructure of transportation may be restructured positively to include multiple intelligent agents. Additionally, this project will explore the impact of CAVs relative to transportation congestion by using a Python-based framework and vehicle models to create data on how CAVs behave on a transportation network. This project will display how CAVs navigate their environment as they determine their destinations, as well as consider how navigation among other intelligent vehicles will be handled.

TEAM MEMBERS

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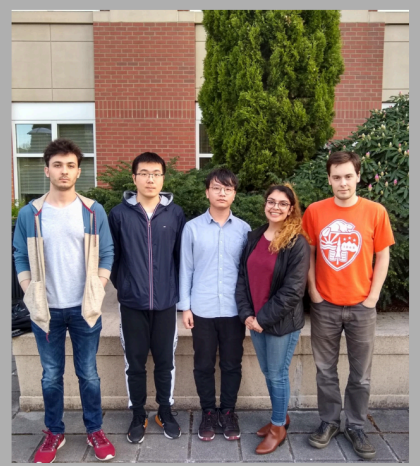

Fig 3: Photo of the team.

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