

Team Name: SSMA-2

School Name: Saturday Science and Math Academy

Area of Science: Energy and Transportation

Project Title: The Advantages of Self-Driving Cars Regarding Green Transportation

Problem Definition: With the looming threat of global warming and climate change, more people are leaning towards green transportation. However, we need an alternative means of transportation that is widely available to everyone. Even though train travel can be more efficient than car travel, it lacks popularity. Plus, the U.S.A. currently doesn't have the infrastructure to support large scale train travel. Also, the advantages to train travel can be negated by the frequency of stops, the travel to and from stations, and the number of people using the train. However, there is an alternative. Currently, there is research being done on a unique means of green transportation: fuel efficient self-driving car trains. These self-driving cars would operate by traveling in a train-like fashion that is 20% more fuel efficient than driving alone. This caravan of cars would incorporate some of the aerodynamic advantages of a traditional train, plus the comfort and convenience of a personal car. This would offer efficiency and convenience. However, there is limited knowledge about the actual efficiency, safety, and convenience of the self-driving car train.

Computational Plan: We hope to create several computer models using NetLogo to show the efficiency, safety, and convenience of the self-driving car train. More specifically, we plan to create models that compare the advantages of self-driving cars to regular cars. This data could help educate more people about the efficiency of a self-driving car train. Plus, it offers a new more efficient means of travel that will be available for average Americans without requiring new infrastructure.

Progress to Date: So far, we have created two NetLogo models to show the difference in reaction times between a self-driving car and a regular car when an obstacle suddenly appears in front of them. The first model incorporates two traffic lanes, one with self-driving cars and the second with regular cars. The cars start with a random speed and then adjust their speed to the cars around them, just like cars today. Then, an obstacle will appear a set distance from one of the cars, and the cars must react. Humans have a two second reaction time. This reaction time is eliminated with the self-driving cars, which have an instantaneous reaction time.

The second model is like the first except it starts with all the cars having the same speed as if they had been driving together for a long time, such as on a highway. Then they drive through the model and both the self-driving cars and the regular cars drive up to an obstacle. They both must react to the obstacle, just like in the first model. The only difference is that the self-driving cars have wireless communication between each other. When one car is close to an obstacle it will send out a wireless signal to tell the cars behind it to stop even though they might not be close enough to see it.

Expected Results: We expect that the self-driving cars will perform better than the regular cars because they have a much faster reaction time. Plus, the self-driving cars will avoid more crashes because they have wireless communication between the cars. Plus, in further models we will try to show the fuel efficiency of the self-driving cars versus regular cars. Overall, this project is going to show the advantages of self-driving cars with respect to regular cars.

Team Members: Akshay Jain and Joaquín Madrid Larrañaga

Mentor: Wayne Witzel

Sponsoring Teacher: Debrah Johns

Sources:

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