

Thesis Project Portfolio

Developing an Autonomous Campus Vehicle

(Technical Report)

Autonomous Vehicles: How Societal Opinions can Affect this Technology

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

In 10th grade Chemistry class, one day my teacher decided to allow us to go outside and see a presentation on an electric BMW, the i3. I was fascinated, and soon made my decision to study mechanical engineering at the University of Virginia. When confronted with the options for my technical thesis project, the automobile option was calling my name. Professor Tomonari Furukawa has been working alongside Club Car for almost 5 years at Virginia Tech trying to develop more advanced golf carts. This year was the first year he decided to try to tackle full autonomy. In the past, students at Virginia Tech tried developing a leader-follower cart system, where the follower was driven electronically. The next step was to make the follower cart drive completely on its own, so this is the project Prof. Furukawa chose when he moved from Virginia Tech to UVa. I was very excited to study and work on an autonomous vehicle, so this was the technical project I chose. The team wanted to develop a Level 5 autonomous golf cart for use around Grounds. Although full autonomy was not achieved, our team laid the groundwork so that team's in the future will be successful in their quest for autonomy. We successfully set up actuation and sensor systems that can be used for an autonomous cart in the future.

The past few years, the STS Department has taught me all about the influence of society on emerging technologies. Technologies are rarely successful on their own, they need society's acceptance to truly succeed. Thus, when I was looking for an STS topic, societal opinions on autonomous vehicles, their influence on the technology, as well as the technology's influence on society seemed like a natural point to start. Cars play such an impactful role in society, and their advancement to be driverless will cause a vast amount of changes to life as we know it. Despite this, when researching this topic, I was surprised by the amount of people surveyed that feel wary, unsure, or completely against autonomous vehicles. More people held these feelings than

excitement across the country as literature showed. This sparked me to examine how those views could be influenced, and made me think about what researchers, along with companies developing this technology, can do in order to make people more comfortable with driverless cars. In order to do this, I had to conduct my own survey to collect such opinions for myself, used alongside other research. I used this research to see what, if anything, could sway these opinions to a more positive light. I believe that autonomous vehicles can have a very beneficial impact on society, so I wanted to examine how this impact could be reached. What details in the car or marketing strategies would need to be deployed in order to ensure autonomous vehicles meet their potential for benefitting society? Examining those opinions in tandem with that question was the main motivation behind my STS Research Paper.

Although full autonomy was not achieved, this was a successful Thesis project. Our team laid the stepping stones for such autonomy, and I was able to conduct research that could illuminate paths forward for autonomous vehicle researchers and companies. This would not have been possible without the help of Professor Tomonari Furukawa, who helped us along the way in development. Next, I would like to thank Art Ken Fontelera, JeeSoo Shin, Billy Smith, and Peter Wellman for their help in developing the cart. Also, I would like to thank Travis Elliot, who helped greatly with the writing of the STS Research Paper. Lastly, I would like to thank Owen Haines for his peer review of my STS paper and comments that helped push the paper further.