Thesis Portfolio

Design and Construction of an Autonomous Golf Cart

(Technical Report)

Analyzing Case Studies of Transitioning from Human-Driving to Self-Driving Vehicles

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

As of 2021, there is a drastic shift in the automobile industry, where society is starting to see more instances of cars on the road that can drive themselves. The topic of autonomous vehicles becomes more relevant as time goes on, since its technology advances at a faster rate each year. There is a wide range of practical uses for autonomous vehicles, especially for the transit industry. The inspiration of the STS research paper is to discover, and rediscover, different viewpoints and attitudes towards autonomous vehicles. The goal is to come to a clearer understanding of society's outlook on the subject. Being a sensitive subject, there are conflicts and ethical dilemmas that arise. Accountability is the main theme of the research paper, and it is important to note that, since autonomy is relatively new, there are only a few precedents that stakeholders can apply to decide who is responsible for a given situation. Another motivation for exploring the topic is to serve as a collection of analyses for readers to use in the case that there is an attempt to understand a dilemma thoroughly. Essentially, it can assist in organizing the way in which an analyzer approaches the ethics of autonomous vehicles.

For the technical project, the team is tasked with automating a golf cart. The development of the golf cart will add to the fabric of autonomous vehicle research, as well as serve as an exhibit for the University of Virginia Mechanical and Aerospace Engineering Department. The project will also assist in Club Car, the sponsor of the project, to begin the development of automation with their own vehicles. The project was chosen to give students the opportunity to exercise their knowledge of mechatronics, programming, and designing. Since there are a wide range of numerous engineering skills that need to be covered, students are also able to divide tasks and experience how their work comes together synergistically. The nature of the project, being technically complex and time-consuming, also places project team members in a situation

where there is little to no advising. It will be up to the team to formulate an approach to reaching autonomy.

The STS research paper and technical project are direct complements to each other. There is a clear correlation. The STS research paper informs students participating in the technical project to think more critically about the technology they are developing – deciding how the technology interacts with users, the risks involved, as well as the impression the technology can give to consumers. Having the technical project add to the fabric of autonomous vehicle research, there is also a great responsibility for the students to properly carry out and inform readers their contribution. There will also be guests that will eventually test drive the automated golf carts, and the students will be held accountable for any ethical situation presented. It is important for the students, through STS knowledge, to be prepared and possess the vocabulary for that conversation.