Thesis Portfolio

Comparison of Connected Automated Vehicle to Pedestrian Interaction Systems to Reduce Vehicle Waiting Times
(Technical Report)

Social and Cultural Hurdles in Design Implementation of Autonomous Vehicles
(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

Andrew Taylor
Spring, 2021

Department of Systems and Information Engineering

Table of Contents

Sociotechnical Synthesis

The technical project portion of this thesis explores what tools can be used to supplement and/or replace current systems used by autonomous vehicles to identify pedestrians. It explored the use of a mobile notification platform that would serve as a communications bridge between pedestrians and an autonomous vehicle. The project involved creating three different systems where varying levels of pedestrians would request to cross a crosswalk using the app with some pedestrians acting as confounding variables that would also cause a vehicle to slow down or come to a stop as it processed the pedestrian's intentions. During the project I found that the system where the vehicle relied only on the app to tell it when pedestrians were planning on crossing the street had the lowest passenger and vehicle traffic times compared to systems where the vehicle relied on only obstacle detection or a mix of both. This was important to explore due to the increasing number of semi-autonomous vehicle systems and the increasing push to fully autonomous vehicles. With this increase, there are bound to be more incidents between pedestrians and vehicles and thus vehicle manufacturers and policy makers must identify ways to improve pedestrian safety as passenger safety as improves. One of these ideas has been to use vehicle to infrastructure communication platforms that monitor road and sidewalk conditions and constantly shares that with vehicles that then can be aware of the situation around them without needing expensive and sensitive equipment on the vehicles themselves.

The STS research paper explore the various societal hurdles that autonomous vehicles face in their journey to become mainstream. The main issues that were discussed were the lack of awareness and education around the various autonomous systems and what each system can and cannot do. The other topic discussed was general mistrust in autonomous vehicles especially

considering various incidents involving pedestrian and vehicle accidents. These areas were important to investigate because they showed why autonomous vehicles cannot become mainstream without addressing theses issues. The STS research paper ties into the technical project because both explore in what ways can pedestrian safety be improved to also improve consumer and societal trust in autonomous vehicles. The technical report explores a specific tool that can be used to build a society's trust in these autonomous systems which will only increase consumers desire for these vehicles knowing that they provide an improvement in safety for themselves and those around them.

The results of the technical project and the STS research paper highlight the growing pains that autonomous vehicle will have to overcome before gaining a foothold in the consumer market. By further exploring how the infrastructure around roads as well the devices we use daily can be used to communicate with these vehicles, we can be sure to make great achievements in innovation and safety.