Thesis Project Portfolio

Development of an Autonomous Campus Vehicle Platooning System

(Technical Report)

Jesus Take The Wheel: Exploring Public Perceptions and Attitudes Towards Autonomous Vehicles

(STS Research Paper)

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Executive Summary

In an era marked by rapid advancements in artificial intelligence (AI), the integration of autonomous vehicles (AVs) stands as one of the most imminent and pivotal points in modern society. My technical project is centered around the development of an autonomous platooning system designed to enhance transportation within the University of Virginia (UVA) campus. The project utilizes autonomous follower golf carts as an alternative transportation option throughout campus. The sociotechnical dimension of this research is deeply rooted in the investigation of how different groups perceive AVs and the determinant factors that influence them. Since the acceptance of AVs is a critical factor that influences its successful integration, it becomes crucial to understand the dynamics of trust, perception, and skepticism surrounding new AI technology. Simultaneously, the technical and socio technical aspects of this research strives to ensure a more seamless and responsible integration of AVs into society. By bridging the gap between societal perceptions and technological advancement, autonomous technologies will enable safer, more efficient, and more accessible innovations for the future.

The problem that this technical project seeks to address is twofold. Firstly, the existing UVA bus system is not as reliable for serving certain locations or routes. Secondly, the project addresses inclusivity by recognizing that some members of the university community, such as individuals with disabilities or the elderly, may face additional challenges when using existing transportation options. With the increased range of mobility of these golf carts, users are able to be dropped off at optimal locations without the extra distance. The platooning system will also be manually led with emergency stops or autonomous disengagements to prevent accidents. With these safety methods in place, this technical project addresses problems regarding transportation, accessibility, and safety concerns within autonomous transportation systems.

The results of my technical research demonstrate significant progress towards the development of an autonomous platooning system for golf carts at UVA. By reevaluating customer needs and work done by previous capstone teams, several upgrades were made to create an autonomous platooning system. The final design uses camera sensors to track AR tags, an emergency stop button for disengagement, and a platooning algorithm to actuate the follower carts autonomously. By utilizing safe and efficient platooning methods, this technical project offers a practical, reliable, and accessible transportation solution impacting the way individuals travel across campus.

At the core of my socio technical research is a combination of fundamental research questions: How can individuals be made more accustomed to, or accepting of, AV technology? What are the determinant factors that influence a person's perception of AVs? These questions aim to uncover the hindering factors in promoting the future of AVs while understanding what could be done to help both sides. This will then pave the way for the acceptance and future supported integration of AVs and other AI technologies in society. To navigate the complexities of this socio-technical issue, a comprehensive methodology is adopted consisting of case studies, analysis of regulations, and survey data.

The literature review begins with a pivotal case study discussing Joshua Brown's fatal accident while using Tesla's autopilot. This was followed by a personal anecdote from Myrna Peterson, a member of the disabled community, who highlights the potential benefits of AVs for her community. Lastly, regulation disparities were made apparent with discussion about its effect on AVs today. While skepticism regarding AVs persists, AVs not only improve transportation but also improve quality of life. Hence, in order to make individuals more accepting of AVs, it is crucial to educate society about its benefits while integrating AV technology in small increments.

Ultimately, the determinant factors that influence an individual's perceptions may not be apparent to the individual. However, by recognizing biases and level of education on AVs, individuals can have informed perceptions helping to ensure a more seamless and responsible integration of AVs. As other AI technologies continue to emerge and advance, this approach may be used to facilitate its integration into society with concerns and skepticisms alike to AVs.