AUTONOMOUS DRIVING SIMULATOR

THE IMPACT OF AUTONOMOUS TECHNOLOGY ON SAFETY PROTOCOLS

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Autonomous vehicles have been a milestone that the automobile industry has been trying to reach for decades now and with new software progressing our technology faster than ever before, this goal may be reached quite soon. In order to aid the development of these vehicles, the technical project focuses on simulators which allow researchers to design and test the cars and software within a safe environment. This technical topic works to assist the engineers in development, showcase the software for investors, and persuade the general public through safe trials. While there is technical work to be done to finalize the design of an autonomous vehicle, it is important to also understand what factors from society deter the progression of these vehicles. The science, technology, and society (STS) topic provides a framework through which to analyze what is blocking the development of these technologies, and how different groups and their ideals play a factor in this halt of development. The tightly coupled technical and STS topics describe the process of designing an autonomous vehicle and simulator, as well as the social consideration of each group that influences the design and diffusion of autonomous vehicle technology.

The technical report outlines the development of an autonomous driving simulator designed in order to emulate the environment and behavior of what an actual autonomous vehicle would feel like. Because autonomous software relies mostly on machine learning, it is dangerous to test these vehicles on the roads, endangering other drivers. This proposed simulator employs driving software along with a real vehicle interior on top of a motion based platform in order to replicate the driving experience within a safe enclosure. This simulator takes in physics data from the driving software to send to the motion based platform in order to replicate realistic car movements. The autonomous features can then be tweaked with onboard sensors in order to gauge the software before implementing it into the real world.

Several iterations of the simulator have been tested, but the final design included the CARLA driving simulator, a Subaru interior, a MOOG motion system, and several projectors. Because of time and location constraints, the simulator was functional but did not feel fully realistic because of the unstable flooring and the harsh movements of the motion system. However, this project is meant as a multiyear long project and the foundation of the system is working.

The research question of this project was to understand and delve deeper on the prevention of autonomous vehicles. While there are inherent physical safety risks that come with this invention, there are also factors that are less apparent such as human behavior, laws and liability concerns, and ethical dilemmas that arise with this software. Bijker and Pinch's Social Construction of Technology theory was used to create a framework in outlining the ideals and views of several social groups and how these wants may clash and prevent the development of autonomous vehicles. This framework was developed through a collection of surveys, scientific experiments, ethical experiments, and writings on human psychology in order to explore how several groups' desires intersect.

While the original research focused on physical safety, it led to deeper meanings on how humans behave towards change. The obvious reasoning for resisting is because of physical safety but this reasoning acts as a shroud for the true reasoning in which any life altering technology will receive opposition. There are also ethical concerns with liability as there is no set person or group that will take all blame leaving a gray zone for lawmakers, and also for manufacturers as this software will inevitably be put into a dilemma scenario. In conclusion, physical safety is the main reason for the prevention of automation technology, but there are many underlying reasons that are not as apparent in the media.

There has been significant development in autonomous technology and companies are on the final steps of completing these cars. However, in order to make them integrate as seamlessly as possible, simulators are needed to ensure they operate as expected. With simulators, not only does it solve the data issue, but helps society as they provide a non-technical benefit of persuading the people.

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