

Sociotechnical Synthesis

Autonomous vehicles represent one of the most promising emerging technological fields in both the transportation space and the overall landscape of engineering research. While the promise of the technology is immense, autonomous vehicles have the potential to bring about tremendous positive change in society, specifically through accident reduction and improved environmental sustainability. Before any of this change can occur, the technology must be widely integrated into the transportation industry. For this level of market penetration to occur, individual consumers will need to trust the technology enough to willingly give up part of (and eventually all of) their autonomy on the road to an artificially intelligent system.

To address the question of passenger trust of autonomous vehicles, I worked with a research group in the SEAS Department of Computer Science conducting experiments with human volunteers and a driving simulator. One particular feature affecting trust that the study focused on was alarms for oncoming hazards, which the group hypothesized would be a statistically significant factor in affecting trust. The trust of each individual in the system was measured by a running numerical rating ranging from 1 (least trust) to 5 (most trust) that the participant could change based on the behavior of the vehicle. Physiological measurements such as heartrate and eye position were also measured in order to measure trust. After the study concluded, we found that the absence of an alarm for oncoming hazards was a significant factor in affecting the volunteers' numerical trust of the system, however the physiological data was too noisy to be considered statistically significant as a further measurement of trust.

In order to investigate the possible environmental effects of autonomous vehicles, I conducted a review of scholarly sources on the subject in order to determine and measure the relationship between autonomous vehicles and environmental sustainability. At the outset of my

research, I hypothesized that autonomous vehicles, when fully realized, would have a net positive effect on the environmental impact of cars. I based my hypothesis on the synergy of AV technology with battery technology, as well as a decrease in vehicles on the road at any given point in time due to a movement toward shared—rather than individual—use of AVs in the future, among a series of other factors.

Ultimately, I am satisfied with the results of both my technical and STS research projects. In my technical work, the experience of collaborating with a team to design an experiment from the ground up was a worthwhile challenge. While the results of the study had not been as significant as initially hoped, the experimental design created went on to be iterated upon and improved in many meaningful ways to reach greater results. In my STS research, while I was not able to make predictions of the future of transportation with a large degree of certainty, it was fulfilling to confirm my belief that self-driving vehicles do indeed have a significant entanglement with environmental sustainability.