

**Education Tool for Students**

(Technical Report)

**An analysis of Uber's self-driving software:**

**The case of the first ever self-driving car accident**

(STS Research Paper)

An Undergraduate Thesis Portfolio

Presented to the Faculty of the  
School of Engineering and Applied Science  
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In Partial Fulfillment of the Requirements for the Degree  
Bachelor of Science in Computer Science

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### Socio-Technical Synthesis: Efficient and Effective Education

My technical work and STS research project are connected through the impact of software technologies. From that, we understand how critical it is to be in the shoes of end-users, and it is my responsibility as a software engineer to consider all the actors, and I should be aware that I will have an impact on the end-users. My technical work focuses on tools or applications that allow users to learn more efficiently and effectively. On the other hand, my STS research paper explores the importance of the relationship between different actors as well as the responsibilities of each actor. Therefore, while my technical work and STS research project approach computer software from different perspectives, the theme of what software technology can impact is consistent throughout both projects.

My technical work offers a suite of tools for users to learn more efficiently and effectively. The tools include Q-dispatch, word assistant, and practical-exam. First, Q-dispatch is an office hour website. In order to increase the efficiency of online office hours, my project partner and I built a queuing system that allows seamless integration of multiple platforms from communicating between teaching staff and the students to the grouping system where students with similar problems will be grouped together to save time for both teaching staff and the students. Secondly, word assistant is a mobile application that allows users to expedite the process of reading by taking a picture of a page in a book, shows the definition of each word within the page, and allows users to save the words to the word directory. The last tool,

practical-exam is a website for users to review exams easily by allowing students to navigate through different questions or answers from exams easily. The goal of our tools is to increase the accessibilities and efficiency of education. In the future, we also hope to offer a more complete suite of online learning tools for students to have a great experience of learning virtually.

My STS research paper explores the bigger picture. My research focuses on the first-ever self-driving car accident, and with Actor-Network Theory, I demonstrated the importance of a balanced network, which can be achieved if the power dynamics between different actors are well-balanced and the responsibilities of different actors are carried out. I further analyzed how Uber, the self-driving technology company, had too much power over other actors including the car manufacturer, Volvo, and also how the last layer of safety, test driver, failed to accomplish her duty and that the software developers were also responsible due to the flawed design of the interface that communicates between the vehicle and test driver. The goal of my research paper is to analyze how a network destabilized and what were the factors that caused it.

Working on both my STS research paper and technical report at the same time added value to both because they complement each other. My technical work allows me to implement software and with the help of my STS research paper, I realize the importance of the user experience and how I should consider important actors that I will impact. Likewise, the STS research paper helped me to understand the importance of relationships between actors and their duties, and through the technical work I was doing simultaneously, I learn the importance of the role of software engineers. To sum up, working on STS research paper and the technical project in tandem has helped me not only to learn to analyze elements within the bigger picture but also

have the opportunities to implement the software that I truly believe will impact the users positively in the future.