Thesis Project Portfolio

From Classroom to Boardroom: An Internship Experience in FinTech

(Technical Report)

Ethical and Policy Challenges in Autonomous Vehicle Decision-Making

(STS Research Paper)

An Undergraduate Thesis

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

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Executive Summary

Technology advances and develops by the day. When it came time to pick topics for my undergraduate thesis, I found myself in two areas of the development of financial technology in my Capstone Project and the ethical implications of Autonomous Vehicles (AVs) for my STS research. The choice wasn't about finding topics that overlapped neatly but about diving into fields I find fascinating and seeing where they might connect. My internship experience heavily influenced my decision for the Capstone Project. There, I was thrown into the deep end of FinTech, working on software solutions for the banking industry. It wasn't just coding in a vacuum; I was part of a team making tools that people use every day to manage their money. This experience was eye-opening. It showed me how tech could directly impact user experience and efficiency in banking, making things faster, smoother, and better for everyone involved. On the other hand, my interest in Autonomous Vehicles didn't stem from hands-on experience but from a mix of curiosity and concern. Autonomous vehicles are a huge advancement in the world of transportation, but they bring up a lot of questions, especially around ethics. Those questions are tough, and they are not just theoretical; it's something that engineers and designers of AVs are grappling with right now. This dilemma, and the implications of AVs in our society, formed the core of my STS research.

The technical project grounded me in the realities of software development and its potential to improve lives in the financial sector. The STS project pushed me to think about the broader societal and ethical questions that come with technological advances. At the core of both is a shared theme: technology's ability to change our lives, for better or worse, and the importance of thoughtful, responsible development. Whether it's making banking more

accessible or ensuring that autonomous vehicles make ethical decisions, the underlying challenge is the same. It’s about creating technology that works for people, not the other way around.

For my Capstone project I was able to explore the finance sector, where the race to deliver secure, efficient, and user-friendly digital services is more competitive than ever, especially against the likes of technological advancements led by tech giants. The project focused on tackling this challenge head-on by enhancing the banking experience through technological innovation. Utilizing the computer science principles I have gained over the years, I played a key role in developing a dynamic backend system, leveraging advanced programming frameworks like RxJava for crafting event-driven applications, and Spring Boot for creating stand-alone applications capable of meeting production demands. The project started with a thorough evaluation of the existing solution to identify areas of improvement and focus points. Following this, we adopted an Agile development approach, allowing for quick iterations and refinements of features. Throughout the development process we prioritized the needs and experiences of end-users. Our efforts allowed for a system that was equipped to handle the current demands for digital banking solutions and also be able to adapt to future needs. Through the implementation of automated processes, we aimed to elevate the bank's operational efficiency and, most importantly, enrich the customer experience. As autonomous vehicles become more prevalent in transportation, complex ethical dilemmas arise, particularly in emergency decision-making situations. In this research, the intersection of technology, ethics, and societal impact is explored, with the question: "How does programming autonomous vehicles for decision-making in emergency scenarios raise ethical concerns, and what is the

resulting influence on public policy and legal frameworks?" This study explores the relationship between AV technology and societal norms using the framework of Social Construction of Technology (SCOT). Through a mixed-methods approach that incorporates ethical analysis, examination of policy and legal frameworks, discourse and qualitative analysis, the study aims to uncover the nuanced interactions between ethical decision-making and the broader implications of AV programming. The importance of this work lies in the fact that it stresses the importance of incorporating ethical considerations into technology development and regulation. In addition, it emphasizes the importance of incorporating these ethical and societal dimensions into engineering practices, enabling a more holistic approach to technological innovation.

In conclusion, working on both the Capstone and the STS research simultaneously offered a comprehensive learning experience, blending practical technological application with ethical and societal considerations. A lesson less apparent when approached separately. This approach not only enhanced my technical skills but also deepened my understanding of the broader implications of technology in society, emphasizing the importance of mindful innovation.