

**Remote Access Banking Fraud Defense**

(Technical Paper)

**Autonomous Vehicles Impact on Accessibility to Transportation**

(STS Paper)

A Thesis Prospectus Submitted to the  
Faculty of the School of Engineering and Applied Science  
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In Partial Fulfillment of the Requirements of 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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## Prospectus

### Introduction

This prospectus contains two separate theses, one social topic, and one technical topic. The social topic addresses the idea of autonomous vehicles and their impact on accessibility to transportation. The technical topic expands upon research done to create a fraud defense mechanism for users of iOS applications.

Since the first automobile was created, there have been many issues with the safety of operating a motor vehicle. In 1925 the annual death rate was 18 per 100 million vehicle miles traveled, and it was not until the 1960s when systematic motor vehicle safety efforts began (Centers for Disease Control and Prevention, 1999). In recent years the idea of safety in automobiles has shifted from predominantly considering how protected cars keep their passengers in the event of an accident, to reducing the overall number of accidents that occur by automating the driving process. A study done by the National Highway Traffic Safety Administration (NHTSA) showed that 94% of serious crashes are due to human error (National Highway Traffic Safety Administration, n.d.). With this statistic in mind, autonomous vehicles will become more widely adopted due to their promise of increased safety, and many social issues will need to be addressed. These issues include impacts on accessibility to transportation, infrastructure design, and job displacement from the professional driving industry.

Fraud is an “intentional perversion of truth to induce another to part with something of value or to surrender a legal right” (Fraud | Definition of Fraud by Merriam-Webster, n.d.). There are many different forms that fraud can take. Each varies in the severity of the impact on people’s lives and general well-being. In the banking industry specifically, customers are

encountering fraudsters posing as tech support and remotely accessing the customers' accounts through screen-sharing technology. To address this problem, I designed a feature that checks whether the banking customer is currently screen-sharing or has screen-shared recently. The system takes notes once the customer begins screen-sharing, temporarily restricting risky transactions and monitoring the account for unusual behavior. This feature of the banking application could be expanded and used in a more general fraud defense mechanism for any iOS application that is worried about remote access through screen-sharing features.

## **STS Project**

Autonomous vehicles are revolutionizing how humans can travel. Humans naturally fatigue when operating vehicles. As we age, our senses become less sharp, which can lead to serious safety concerns. According to the National Safety Council, it is three times more likely that one will be in a car accident if one is fatigued (Fatigued Driver - National Safety Council, n.d.). By having computers process the world around us while driving, there can be significantly fewer factors that are overlooked. Naturally, having autonomous vehicles will allow for shorter travel times and provide more options for safe travel, but how will this impact accessibility to transportation?

With the widespread adoption of autonomous vehicles, numerous actors will be involved. Figure 1 lays out an extensive list of stakeholders in a mobility system to understand the interests of the various involved parties. This research will focus on the user and the regulator. From the user category, a group can be formed of those who under the current human-centered driving

system cannot drive independently, such as elderly, young, and disabled people. This group of non-drivers has to rely on public transportation, private ride-sharing, or walking. Relying on these various modes of transportation can be inconvenient and inaccessible in some places. The second stakeholder that is important to evaluate will be a combination of public transport and urban planning. These two will be tied together as urban planning can incorporate public transportation into the design. As autonomous vehicles become more widely adopted and public infrastructure needs repairs, it is important to design new means of public transportation and roadways that no longer are human centric. Autonomous vehicles can be used to automate public transportation, so that it could more easily service people at any hour of the day or reach out to more rural destinations where public transportation is not currently available.

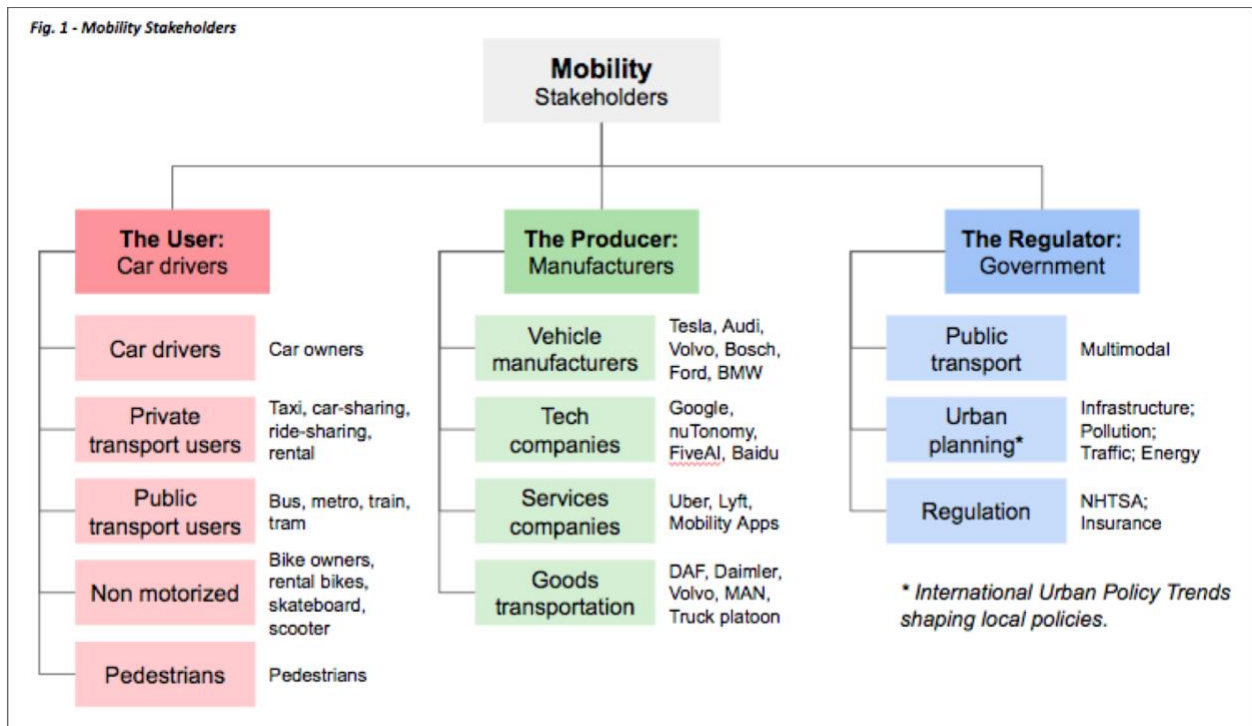


Figure 1 Mobility Stakeholders (Source: Abdulsalam et al., 2016).

Although autonomous vehicles can provide transportation to traditional non-drivers, there are several issues with their implementation. First, there is currently an issue of the public

trusting the technology. Two significant concerns acting as a barrier to adoption are privacy and security (Kaur & Rampersad, 2018). Without public trust, it would be difficult for widespread adoption since many people would opt for alternative means of transportation in place of autonomous modes. A study from AAA reported that 73% of American drivers would be too afraid to ride in a fully self-driving vehicle (AAA, 2018). It is also important to note that cutting edge technology and revamping public infrastructure comes with a large monetary cost. In the American Jobs Plan, a recently released infrastructure plan, \$621 billion was allocated to improve transportation infrastructure. The expansion of autonomous vehicles and reliable public transportation to rural areas would likely take a significant amount of time.

Using Actor-Network Theory (Crawford, 2020) will allow me to analyze the relationship between humans, vehicles and how these act in conjunction with public infrastructure. More specifically, actors that will be important in the analysis are urban design, the public transportation system, drivers, and non-drivers. Actor-Network Theory will allow for a thorough analysis of the impact autonomous vehicles will have on accessibility to transportation, as well as environmental consequences since Actor-Network Theory focuses on considering each factor in the network as equal.

## **Technical Project**

This summer I worked as a software engineering intern at Capital One where I was a part of the Consumer Identity team. The Consumer Identity team's goal is to ensure that when there is activity on the consumer's account, it is from the consumer and not an outside fraudster. A

particular area of fraud that I focused on was the exploitation of screen-sharing and remote control services provided through iOS devices. On iOS devices, there are numerous applications designed to be used for tech support to assist users. These applications grant an outside remote user complete control over the device. Input from the remote user is indistinguishable from the input of the person physically using the device.

Fraudsters impersonating tech support is a significant issue for consumers. Consumers grant permission to false tech support agents to allow tech support control over their iOS devices. Once the fraudster has control, they then conduct unauthorized transactions. My project's goal was to catch these fraudulent events and restrict the account from conducting risky transactions until their identity was verified. The added layer of security could save consumers thousands of dollars and mental strain over trying to recover from fraudulent activities.

To complete this project, I had to learn the programming language Swift and several other internal software development tools. By taking Introduction to Computer Science, Computer Organization and Architecture, and Data structures and Algorithms, I was confident in my ability to learn a new language because in these classes we learned the fundamentals of coding and were shown how they translate between various languages to solve problems. Additionally, Advanced Software Development Techniques was a significant help by providing me with the foundational knowledge to manage a GitHub repository. Although these courses provided me with a good foundation for the core computer science principles, soft skills like presenting your work to people who are not as deeply involved with the technology were learned through the internship. Another soft skill that I developed over the course of my internship was how to effectively communicate with a team. In my coursework at UVA, there have been very

few group projects that spanned a long duration and required members to work independently on smaller parts of the project to create something greater. Typically, most of the projects in my coursework were best completed in one or two group meetings with everyone focusing on a single task.

## **Research Question and Methodologies**

This project will explore the question of how autonomous vehicles impact accessibility to transportation. The Actor-Network theory will be used as a lens to evaluate how autonomous vehicles interact with humans and the public infrastructure they rely on to operate. Case studies will be examples for understanding human's trust towards autonomous vehicles. Additionally, examples of current challenges being faced with urban planning will provide insight into how the landscape will change as a move towards autonomous vehicles progresses.

## **Conclusion**

The STS project will analyze the impact that autonomous vehicles will have on passengers and the public infrastructure that it relies on. The analysis will be achieved utilizing the Actor-Network Theory to provide a holistic view of the various human and non-human factors that come with this new technology. The technical project will explain a fraud defense mechanism for iOS devices, as well as how UVA has prepared me to complete this project. This mechanism combats fraudulent tech support calls that take control of the customer's phone and conduct unauthorized transactions.

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