Thesis Project Portfolio

ADC/DAC Swordle

(Technical Report)

Autonomous Vehicles: Society's Most Anxiety Inducing Potential Life Saver

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

(Executive Summary)

Autonomous Vehicles: Society's Most Anxiety Inducing Potential Life Saver

Every single day I complete the NY Times Wordle challenge. This served as the motivation for my technical project as I thought it would be cool to be able to play against my friends or have the computer guess a word, so I built a live-action form of the game with two additional modes. I recognized that finding an STS research project about a game would be a difficult task, but I found a clever connection to a relevant topic. At the time, Chat GPT had just been released by Open AI and I wanted to do my project on it, but with a twist. Many people were researching AI in some way, so I wanted to learn about AI model applications in developing autonomous vehicles. In turn, my STS research ended up being exclusively about autonomous vehicles as a whole and addressing societal fears about their implementation. The connection between my technical project and my STS research lies in the shared goal of increasing the level of comfort and trust in computer-controlled systems. One addresses this in a low-stakes context, while the other tackles the challenge in the face of the global implementation of autonomous vehicles.

The technical portion of my thesis produced a live-action version of the game wordle. The major technical components included a keypad, an LED screen, and a printed circuit board containing voltage regulators, microcontrollers, and data storage in the form of a serial flash player. This first involved developing a printed circuit board that would successfully power all of the components of our game through a wall outlet as well as connect the relevant pins of our microcontroller, keypad, screen, and serial flash player according to their respective data sheets. The next stage of the project once the electrical components were complete was to design an embedded software program that allowed for the

game to be played using the keypad and screen. The electrical component flow is shown below in Figure 1, and the game logic is displayed below in Figure 2.

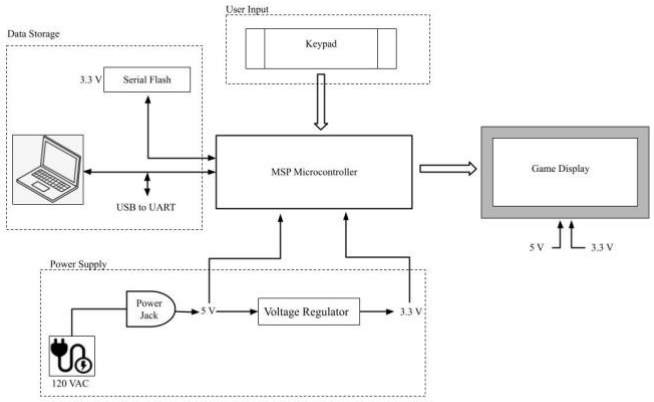

Figure 1. *Electrical Connections Overview*

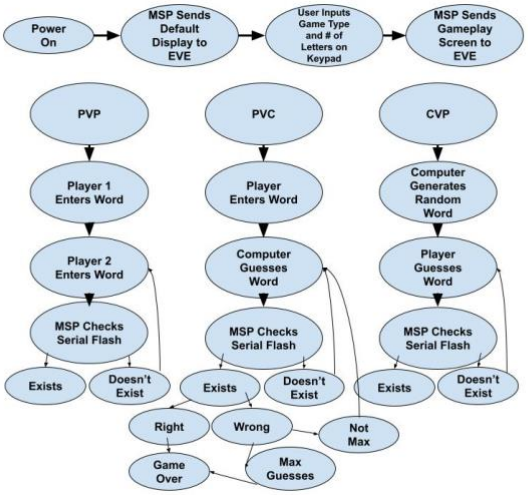

Figure 2. *Software Logic Tree Diagram*

This game allowed users to guess words chosen by their friends or the computer, or to select words for their friends or the computer to guess, providing a low-stakes opportunity for interaction with a thinking electronic system.

In my STS research, I originally sought to identify the implication of AI on autonomous vehicle algorithm development, and in turn the effects of autonomous systems on our current public transportation methods. I developed my prospectus with this goal in mind but quickly realized that the research scope was too broad and chose to focus on autonomous vehicles specifically. Motor accidents are a leading cause of death worldwide, and autonomous vehicles are poised to massively decrease these accidents, but a large sector of the US population holds great apprehension towards them. My research sought to compare and contrast autonomous vehicle concerns with those of prior technologies that experienced similar concerns to identify prior solutions that were effective in addressing similar fears and to understand the differences in scenarios. This led to the key differentiating factor of autonomous vehicles being the loss of autonomy over individual safety that comes with autonomous vehicle use. Understanding this will allow regulators to better target their efforts in alleviating public skepticism.

My technical project began before my STS research did, so I did not have an understanding of the intricate web that connects society and technology. I initially sought to simply create a fun game in my technical project, but I have since recognized throughout the process of completing my STS paper that there are much more ethically perplexing problems concerning technology that need to be addressed. By considering components of technological influence beyond that of technological capabilities, we view our designs and creations in an entirely new light. Our understanding of a complex situation is limited if we only look at it through the paradigm of technological feasibility, but if we observe a given scenario through cultural and organizational paradigms as well, we can see the entire picture as opposed to a sliver of it. This view allows us as engineers to use our knowledge to provide the world with what it needs, as opposed to what we are capable of creating.