Thesis Project Portfolio

Autonomous Driving Simulator

(Technical Report)

The Future of Brain Cognitive Interface through the Lens of a Cell Phone

(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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Elon Musk's Influence on Engineering

"I think it's very important to have a feedback loop, where you're constantly thinking about what you've done and how you could be doing it better. I think that's the single best piece of advice: constantly think about how you could be doing things better and questioning yourself."

-Elon Musk

Elon Musk is an influential driver of engineering development. He has many projects across multiple disciplines. Two of his primary projects are Neuralink and Tesla, working on brain computer interfacing (BCI) and autonomous driving respectively. These two areas of study are what my research and technical projects have been centered around. This quote above shows Musk's drive for excellence in everything he does through an iterative process of constant checks and corrections. This thinking is essential to applying ethical practices in engineering.

In my STS research, I looked into Elon Musk's company Neuralink. I discuss what ethical implications arise with the adoption of BCI technologies. The invention of the cell phone has reshaped the way we, as humans, have evolved on a technical, cultural, and organizational level. My research uses the invention and adoption of the cell phone as a framework to discuss how BCI technology might reshape the world we live in. Specifically I focus on the therapeutic and military applications of BCI and how these sectors are developing.

The Technical portion of my Thesis was geared towards another, more well known, project focused on autonomous vehicles. Musk's company, Tesla is leading the way in consumer autonomous driving. My technical contributions are aimed at developing a driving simulator capable of running autonomous softwares currently being implemented in autonomous vehicles. This technology is essential to public safety because autonomous driving is a technology that relies heavily on artificial intelligence and machine learning, meaning the software gets better as it drives; but in order for it to get better it needs to rack up miles in which it makes mistakes and adjustments accordingly. My team's simulator allows the autonomous software to operate in a simulated environment, learning from its mistakes, without putting human lives into harm's way.

These projects have tested my engineering knowledge and development on different levels. My technical project has given me hands-on experience into the iterative and experimental process of engineering. It has allowed me to test my creativity and resourcefulness in the pursuit of my final design. My experience with professionalism and ethics under the guidance and teaching of Professor Kathryn A. Neeley has also greatly influenced my progression as an engineer. I have developed skills and knowledge towards generating and applying ideas that go beyond what is taught in my technical courses. Tracking back to the quote from Elon Musk: ". . . constantly think about how you could be doing things better and questioning yourself." This thinking is essential to being a successful engineer and having a meaningful impact on society. Striving to be a better engineer and individual is paramount in the ethical and technical development of future engineers.