

**The Development of Self-Driving Vehicle Software via Autonomous Driving
Simulators**

An Analysis of the Development of Helicopter Egress Training Simulators

An Undergraduate Thesis Portfolio

Presented to the Faculty of the

School of Engineering and Applied Science

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science in Mechanical Engineering

By

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Socialtechnical Synthesis

My STS Research paper and my Technical Project are not directly correlated to each other, however each analyzes a different kind of simulator within our society and the ways in which they can be enhanced to improve their immersiveness.

For my capstone project, my group and I focused on designing an autonomous driving simulator. Our goal was to provide various car manufacturers with a mechanism to test the software systems within their autonomous driving vehicles. The simulator should be able to provide the training necessary for the software system to learn and improve its skills, and ultimately prepare it to operate on a real road. The central concept behind autonomous driving is that the number of driving errors made on the road can be reduced by transferring vehicle control over to a computer. A computer doesn't get distracted and tired, and in turn is more likely to avoid making the errors that tend to cause car accidents. However, autonomous vehicle manufacturers need a way to test their autonomous driving softwares without endangering other drivers and pedestrians. By utilizing a simulator, manufacturers could eliminate any risk their autonomous vehicles might present to society while their software is being tested. Their software would be able to learn and enhance within an environment where mistakes and failures have no catastrophic consequences. In turn, the cost of testing could be reduced significantly and the societal support they would receive would likely increase significantly.

For my STS Research Paper, I chose to focus on the U.S. Navy's development of Helicopter Egress Trainers (HUETS). HUET technology has developed over the last century as a way to train personnel on how to safely and successfully escape from a helicopter that has crashed into a body of water. I chose to target my research specifically on the current HUET

utilized by the U.S. Navy called the Modular Egress Training Simulator (METS). Based on my research, I was able to develop three enhancements that could be made to the METS trainer in order to increase its immersivity. The continued enhancement of HUET technology is necessary in order to ensure that military personnel are provided with the most realistic training available. Furthermore, these training technologies will trickle into the private sector over time, and in turn the military's technological development has a serious impact on the training provided globally.

Although autonomous driving simulators and HUETS serve very different purposes, they are both integral in enhancing safety within our society. The experience autonomous driving simulators create impacts the readiness of car manufacturer's autonomous driving software and in turn the likelihood of car accidents. The experience created by HUETS determine the level of training that U.S. Navy personnel receive and in turn their level of preparation in the face of an actual egress scenario.

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STS advisor: Richard D. Jacques, Ph.D. Department of Engineering and Society

Prospectus

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