Thesis Project Portfolio

OrChID-Bio: Organs-on-a-Chip with Integrated Detection of Bioluminescence

(Technical Report)

A Virtue Ethics Analysis of Robinhood's GameStop Short Squeeze Scandal

(STS Research Paper)

An Undergraduate Thesis

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

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Sociotechnical Synthesis

My technical project and my STS research are connected through the virtue ethics framework and their moral implications on the unexplored frontiers of technology. However, the two projects express virtue ethics in different ways. My technical work focuses on the application of virtue ethics in the context of organ-on-chips (OOAC) technology and medical devices as a whole, while my STS research explores the implications of virtue ethics through an economic perspective. OOAC is a new technology that simulates human organ functions on a microchip for drug testing and biological research. Despite these differences, both projects share a common focus on the ethical impact of individuals on new innovation.

My technical project investigates the ethicality of developing OOAC technology for drug research. My team and I created an improved medical device called Organ-on-Chips with Integrated Detection of Bioluminescence (OrChID-Bio) which can be used to enhance drug research. Our team improved on the lab's previous device model by implementing a new data-filtering code, doubling throughput, creating a mechanism to adjust mechanical forces experienced by the cultured cells, and generating the lab's first usable data sets. This device is technically designed with the intention to advance personalized medicine, reduce animal testing, and facilitate drug research. However, ethical concerns must also be addressed through the design process.

My STS project tackles virtue ethics, but from a different approach. My research highlights the function of virtue ethics in the age of a digitized economic market and its role in providing a framework to hold financial institutions, such as Robinhood, responsible for any immoral actions. Specifically, I utilized Michael Pritchard's list of engineering virtues, a subsect of virtues tailored for the field of engineering. Using this set of virtues, I claim that the lack of

virtuous characteristics demonstrated by Robinhood resulted in the aftermath of the GameStop short squeeze. My STS paper analyzes whether Robinhood conducted themselves ethically in its dealing with the GameStop scandal. More broadly, the goal of my paper is to contribute meaningful context and discussion regarding the responsibilities of financial institutions when adopting novel technologies.

Working on the two projects simultaneously helped me develop a more holistic view of ethical standards across industries. My technical work helped me understand the moral nuances of regenerative and drug research, and how all technical work has associated ethical concerns. Despite my STS research topic being drastically different from my technical work, I believe having a different perspective from an entirely dissimilar industry helped me see the bigger picture when providing context for my STS paper and vice versa. In conclusion, by working on both my technical and STS paper at the same time, I was able to approach each topic from multiple perspectives and the knowledge I gained from each project helped with the other.