

The Lonely Robo: An Automated Word Search Solver
(Technical Report)

A Duty Ethics Analysis on the Facebook–Cambridge Analytica Scandal
(STS Research Paper)

An Undergraduate Thesis Portfolio

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Bachelor of Science in Computer Engineering

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Socio-technical Synthesis

While my technical and STS projects are only loosely related, working on each of the projects allowed me to cover a breadth of topics that greatly contributed to my learning as an engineer. In my technical work, I dove deep into the integration of software, mechanics, and electronics to create a useful end product. In my STS prospectus, I explored smarter methods for waste management, taking into consideration newer, more technologically advanced techniques to intelligently optimize how we collect waste. These techniques often involved the same level of interdisciplinary integration required in my technical work. In addition to covering the methodology, I also touched on the privacy and security implications that those techniques may bring. Finally, in my research paper, I analyze the morality of the actors involved in the Cambridge Analytica scandal, which thematically, also touches on issue of consumer privacy.

In my technical work, I utilize software components to parse, solve, and direct a robotic system to word search puzzles. As part of a larger system, these software components have to tightly be integrated in order to work well. The literal problem of solving word search puzzles has little practical benefit to society, but the Computer Vision techniques and methods used to solve this specific problem can be applied to many similar problems that have greater societal value. The electrical components were custom designed for the robot and the mechanical components were adapted from an XY table design. Overall, the aim of the project was to embody the cross-disciplinary nature of Computer Engineering and to create something that was fun to show off to others.

My STS prospectus portion covers the topic of municipal waste management, particularly in novel ways which utilize new and emerging technologies. The interactions between these technologies and the communities in which they were placed were analyzed to predict the

effectiveness and impact they would have on said communities. In the STS research portion, I argue that key actors involved in the perpetration of the Cambridge Analytica scandal, Kogan and Nix in particular, acted immorally in the context of duty ethics. I show that the categorical imperative was violated, thus making their actions, in spite of arguments that the effects of their actions were unforeseeable, immoral.

While these projects were not done in tandem, my technical project was thoroughly challenging and engaging, providing a look at how the process of building a system end to end works. In this end to end process, I had to consider many more aspects of design than I would have had to if I were simply building a proof of concept. In a similar way, my STS research takes into consideration the intersection of society and technology, where engineering decisions actually affect how society in real ways. The sort of broader thinking required by an interdisciplinary technical project made it easier to think about the bigger picture when it came to my STS paper. Overall, working on the technical project before the paper allowed me to generate a deeper analysis of my case study than had I not.