Thesis Project Portfolio

CS 3240: Advanced Software Development Techniques: An Evaluation and Proposal for Improvement

(Technical Report)

Driving on Trust: The Moral Responsibility of Tesla in the March 2018 Autopilot Crash

(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

While my technical report and STS research paper cover different domains, both share a common theme of critically examining the design of systems to ensure they effectively serve their intended purposes. In my technical report, I propose improvements to the design of UVA's CS 3240: Advanced Software Development Techniques course to better equip students with the skills needed to tackle a substantial software development project. My STS research paper, on the other hand, investigates Tesla's Autopilot system, and how deficiencies related to Tesla's communication and design choices, contributed to the fatal 2018 crash. Examining this case provided insights into the ethical responsibilities of technology companies when developing and marketing complex, safety-critical systems. Both projects highlight the importance of thoughtful design and clear communication in shaping the interactions between people and the systems they encounter, whether in an educational or technological context.

In my technical report, I propose enhancements to CS 3240: Advanced Software Development Techniques at the University of Virginia to address gaps I identified as a former student and teaching assistant. The key issues were insufficient in-class instruction on core technologies like Django, over-reliance on a basic tutorial, and lack of guided practice before starting the group project. To solve this, I recommend expanding Django training, incorporating graded assignments, and segmenting the project into smaller deliverables with regular instructor feedback. The goal is to provide students with the scaffolding to gain proficiency in skills essential for success in this capstone-style course.

In my STS research paper, I argue that Tesla bears significant moral responsibility for the fatal March 2018 crash involving its Autopilot system. Applying the framework of passive responsibility defined by Ibo van de Poel, I demonstrate how Tesla's actions meet the criteria of wrong-doing, causal contribution, foreseeability, and freedom of action that establish blameworthiness. Tesla overstated Autopilot's capabilities in its marketing and public statements, contributing to misperceptions about the system's readiness and safety. It also failed to adequately address known limitations with the technology that directly enabled the misuse leading to the accident. These issues were foreseeable by Tesla based on available information, and the company had the discretion to take a more responsible approach but did not.

Working on the technical report and STS research paper concurrently enabled valuable reflection on the responsibilities of technology creators toward their users. Redesigning the CS course underscored the importance of empowering students with a strong foundation in new technologies before tasking them to apply those tools in complex ways. Analyzing the Tesla case cemented how essential it is that companies are fully forthcoming about the capabilities and limitations of the systems they develop, especially when safety is at stake. In my future work designing technological solutions, I will prioritize the principles of solid technical grounding, clear communication, and proactive ethical consideration to maximize positive outcomes for all stakeholders.