

UVA Automated Course Advising Assistant Research Project
(Technical Report)

An Analysis of Apple's "Batterygate" Controversy using Kantian Duty Ethics
(STS Research Paper)

An Undergraduate Thesis Portfolio

Presented to the Faculty of the
School of Engineering and Applied Science
University of Virginia, Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in Computer Science

By

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Socio-technical Synthesis: Abstract and Practical Views of Software Engineering

My technical work and my STS research this year are connected through the topic of software engineering. Both projects concern the process of engineering software for a relatively large group of users with limited opportunities to communicate with these future users. As expected, the projects differ in practicality. While my technical work is more of a practical application of software engineering, my research focuses on the ethics surrounding the high-level design decisions of software engineers. Although these projects differed in their levels of abstraction, they both complemented each other for this very reason.

My technical work provided me with a firsthand experience with software engineering. My capstone research team created an automated course advising assistant to help students create their long-term course plans at UVA. This website provides an interface for students to plan what courses to take in each of their remaining semesters. Students can specify their constraints by setting the maximum course loads of their semesters and by pinning courses to specific semesters, and the website will shuffle the remaining courses around attempting to satisfy all of their constraints as well as the prerequisite constraints of the courses themselves. Students can also upload their SIS transcripts to filter courses they have already taken out of the process.

My STS research examines the ethics of a decision Apple made in early 2017, with the release of iOS update 10.2.1. The update limited the processing speed of iPhones with older batteries to prevent unexpected shutdowns, but little information was given to users about the

purpose of the update. My claim is that Apple's lack of transparency during the release of this update and in the fiscal year following was unethical according to Kantian Ethics. My paper explores how Apple's actions violated both formulations of Kant's Categorical Imperative.

The difference in the level of abstraction for my technical work and my research proved to be a feature, not a bug. When examining the ethics of the high-level decisions of Apple, it was easy to point fingers and reduce the situation to something deceptively simple. Having firsthand experience with software engineering from my technical work allowed me to feel more empathy for the incredibly complex situation Apple was in, boosting the fairness of my argument against them. In my discussion of their transparency, I recognize that being completely transparent in the software industry would not be feasible or desirable. On the flipside, as a benefit to my technical work, examining high-level design decisions served as a reminder to continuously take a step back and reevaluate what I was doing. When in the trenches of programming, it is easy to get bogged down with the complexity of a task and forget to ask whether or not you should do the task at all. Overall, working on both my capstone project and my STS research paper this semester provided a tour of the levels of abstraction in software engineering.