Thesis Project Portfolio

Solar Car Front End Suspension

(Technical Report)

[You Gotta] Fight For Your Right to Repair

(STS Research Paper)

An Undergraduate Thesis

Presented to the School of Engineering and Applied Sciences

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Bachelor of Science, School of Engineering

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Socio-technical Synthesis: Solar Car Suspension and the Right to Repair

My technical work and my STS research connect primarily through exploring how technological systems influence societal behaviors and relationships. Both projects engage deeply with concepts from science, technology, and society (STS), particularly focusing on technological momentum and technological politics. Yet, they differ significantly in scope and perspective. The technical project tackles engineering challenges of optimizing solar car suspension systems, while the STS thesis examines the ethical and social implications of repair rights within agricultural machinery. Together, these projects provide complementary views on how technology shapes and is shaped by society.

My technical project revolves around developing a highly optimized suspension system for a solar-powered racing vehicle. This project addresses specific engineering issues, such as reducing weight and enhancing shock absorption, to significantly improve vehicle performance in competitions like the American Solar Challenge. Our team designed, prototyped, manufactured, and rigorously tested a new suspension system, significantly improving upon previous designs that were heavy and ineffective. This technical endeavor showcases how targeted innovations can positively influence the efficiency and competitiveness of sustainable transportation technologies, underscoring the potential of solar power in automotive engineering.

Conversely, my STS research paper investigates a socio-ethical dilemma in modern agricultural technology: the right-to-repair movement. Specifically, the paper analyzes how John Deere's restrictive repair policies have disproportionately disadvantaged small-scale farmers, using Langdon Winner's theory of technological politics. Deere's implementation of proprietary software and complex hardware designs embeds political biases that benefit large industrial farms while marginalizing smaller operations. Through case studies and an analysis of recent

FTC legal challenges, the research emphasizes the importance of equitable technological access and the broader impacts of corporate control over repair practices.

Together, these projects explore critical intersections between technology, societal dependence, and ethical responsibility. The technical work highlights positive outcomes of thoughtful engineering: improved sustainability, efficiency, and user experience, while my STS research critically examines potential negative impacts arising from corporate strategies embedded in technological design. This juxtaposition illustrates the dual nature of technological systems in their capacity to empower or disenfranchise, contingent on ethical considerations and power dynamics.

Working simultaneously on these projects enriched my understanding significantly. The technical project reinforced my appreciation for detailed engineering practices and the tangible benefits of optimized technology. Concurrently, my STS research heightened my awareness of the broader implications of engineering choices and their embedded ethical values. This integrated perspective is crucial for future engineers, emphasizing that responsible design must account for both technical excellence and the social justice dimensions of technology implementation. Through this combined approach, I aim to contribute meaningfully to engineering practices that are both technically sophisticated and ethically responsible.