

Human Powered, Illuminated Running Vest
(Technical Report)

Heartland Payment Systems: A Case Study in Unethical Behavior
(STS Research Paper)

An Undergraduate Thesis Portfolio

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Socio-Technical Synthesis: Self-Charging Light Up Running Vest and Data Security

My STS research paper and technical capstone project are connected by the concept of data security. Data security is an important concept as many people are confused about what their data is, and do not want their data to be given to any corporations or criminals. Data security may not seem like it would be involved in a self-charging light-up running vest. However, when designing our vest, we had to think about how we would collect users' data. If we created an app that collected data or allowed users to track their data through our vest, then we would be required, as morally sound engineers, to keep their data secure. We had to decide whether we would collect data at all, and if we decided to collect and use it, how we would keep it from being stolen.

My capstone group was tasked with creating a device that used mechanical means to recharge an electrical component. With this problem statement, my group decided that we would design a running vest that would light up as a runner uses it. Our group designed the vest to charge lights using the vertical motion that occurs during jogging. The user does not need to recharge the vest after every run, and the user will be able to run without worrying that the vest will run out of battery during use. The overarching goal for our group was to create a safer running environment for people who prefer to run at night. We were close to finishing the final product of the design, but due to COVID-19, our project turned theoretical.

My STS research paper focused on the Heartland Payment Systems data breach, which allowed millions of people's credit card data to be stolen from the Heartland Payment Systems server. The research focuses on the fact that the engineers who designed the system have not been held accountable. The case has been taught in law classes and has been cited as a reason why standards are not always the pinnacle of safety for personal data. I argue that the engineers

who design the system need to be held accountable, according to Pritchard's list of eleven "Virtues for Morally Responsible Engineers" (Pritchard, 2001). My paper analyzes the engineers' decisions and explores the engineers' morality. My paper was written to stimulate discussion of how and when engineers need to be held accountable for flaws in their design.

Working on these two projects alongside each other allowed me to see how important user data can be, and how engineers need to be morally responsible when designing systems. The STS research paper helped me understand that after an engineer designs and releases a product into the world, the engineer is responsible for any aftermath due to the release of the product. In the case of the Heartland data breach, the engineers were responsible for millions of individuals' credit card data being stolen. This helped my group realize when designing the vest, we should not collect data at all in order for our users to be safest. My group would be acting immorally if we designed our vest to collect data, and allowed the data to get in the hands of those who are not supposed to see it. Working on these two products in conjunction has allowed me to design my capstone project in a more ethical way.