

Thesis Portfolio

Shake Power Bank
(Technical Report)

The Allure of the Mechanical Watch
(STS Research Paper)

An Undergraduate Thesis
Presented to

The Faculty of the
School of Engineering and Applied Science
University of Virginia

In Partial Fulfillment
Of the Requirements for the Degree
Bachelor of Science in Mechanical Engineering

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SOCIOTECHNICAL SYNTHESIS

SHAKE POWER BANK

with Adam Hershaft, Erika Davis, Emma Grossman, Samuel Varrieur, Tierra Peerman

Technical advisor: Michael Momot, Department of Mechanical Engineering

THE ALLURE OF THE MECHANICAL WATCH

STS advisor: Kent Wayland, Department of Engineering and Society

PROSPECTUS

Technical Advisor: Michael Momot, Department of Mechanical Engineering

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The overarching theme that encompassed both my Technical Report and my STS Research Paper was the use of old technology in modern society. In other words, a common question that was dealt with in both projects was: can older forms of technology remain integrated and utilized in society today? Understanding this question is important as the rapid introduction of innovative products and services results in the disappearance of older forms of those goods. This leads to a dangerous cycle where new technologies render their predecessors obsolete and thus underutilized or wasted. However, in some instances, we see antiquated technologies remain relevant in society. The two reports attempted to gain a better understanding of how these technologies can remain useful and popular, which they did in different ways. For example, my technical report took a practical approach. My group and I focused on developing a way to recharge batteries using mechanical means, or more specifically, human power. Human power was one of civilizations' original sources of energy; however, modern society has become reliant on automated machines to get work done. On the other hand, my STS project looked at the mechanical watch, focusing on the enthusiasts and how they feel towards this obsolete technology. Whether it was creating a product to test the viability of using human power as an energy source, or studying the mechanical watch and its continued success, both papers explore the possibilities of utilizing old technologies in a new world.

My Technical Thesis focused on solving a problem that is often encountered by outdoor enthusiasts. When hiking or camping, there is a lack of access to an energy source to charge the various devices that these outdoorsmen and women bring with them. Thus, my group was tasked with designing a product that could be used to charge a battery using mechanical means, like human power. To accomplish this, we created a shake-to-charge portable battery. Using our knowledge of Faraday's law, which states that a voltage is generated when the magnetic

environment of a coil of wire is changed, our device consisted of a magnet that would pass through a coil of wire to generate electricity when you shook the product, consequently charging the battery held within. We used CAD to make the prototype which allowed us to 3D print our various design iterations. Additionally, we tested the prototype, which included a drop test and a voltage test. We found that our design adhered to the parameters of the project, surviving the drop test without damage and generating an electric output that could charge the battery. Unfortunately, with the novel Coronavirus leading to an early departure from UVA, we were unable to complete full testing for our device and develop a final working product. With that said, we can conclude that our device successfully utilized human power to generate electricity and charge a portable battery.

The question that my STS Research Paper aimed to answer was: how can mechanical watches remain relevant when the technology they're built on has been greatly surpassed by quartz watches, smartphones, and smartwatches? By answering this question, we can understand the role that older technology can play in society. More importantly, we can begin to realize what our attitudes towards technology really are. Appreciating how we truly feel towards a technology and what we want out of it allows us to avoid falling into the misconception that the "newest new" is always better. To tackle this problem, I studied the main group that has a particularly passionate view on this form of timekeeping, the mechanical watch enthusiasts. Through my research, I found that the driving force for the attraction to mechanical watches is not practical in nature. Most enthusiasts are drawn to the technology due to deeper or intangible reasons, not practicality or efficiency. This means that an antiquated technology like mechanical watches can remain relevant because it offers us something that the "newest new" cannot, and it should urge us to rethink our definition of "better."

I am extremely happy with the results of both of my projects. I have learned so much about these subjects and I am glad I had the opportunity to help others gain a better understanding about topics I am passionate about. Unfortunately, extraneous circumstances impacted my Technical Research Project and I would have enjoyed making a final product. Regardless, I urge others to continue researching the viability of human power as an energy source. Additionally, I encourage people to take my understandings about the mechanical watch and apply them to other products or services to further expand our knowledge on the connection we have to technology.