Human Power's Viability as
an Energy Source
(Technical Paper)

The Allure of the
Mechanical Watch
(STS Paper)

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Andrew Farruggio
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Technical Project Team Members
Adam Hershaft
Emma Grossman
Tierra Peerman
Erika Davis
Sam Varrieur

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Signature _____ Date 11/1/19
Andrew Farruggio

Approved _____ Date 11/20/19
Mike Momot, Department of Mechanical Engineering

Approved _____ Date 12/11/19
Kent Wayland, Department of Engineering and Society

General Research Problem: The Use of Old Technology in Society

Can older forms of technology remain integrated and utilized in society?

> An analysis of the history of technology shows that technological change is exponential, contrary to the common-sense "intuitive linear" view. So we won't experience 100 years of progress in the 21st century — it will be more like 20,000 years of progress (at today's rate). The "returns," such as chip speed and cost-effectiveness, also increase exponentially. (Kurzweil, 2001, para. 1)

This quote outlines the main concepts behind Ray Kurzweil's Law of Accelerating Returns, a theory that is centered around the idea that technology is growing exponentially. If Kurzweil is in fact correct with his presumptions, is there still room for older technologies to be utilized in society? With the rapid introduction of innovative products and services, the need for older forms of those products seemingly disappears. This results in a dangerous cycle where new technologies render their predecessors obsolete and thus underutilized or wasted. In some instances, however, we see antiquated technologies remain relevant in society. By studying these examples, we may find why and how this can be achieved. This paper aims to discover the possibility of integrating old technology into our current society.

Human Power's Viability as an Energy Source

Can human movement be used to generate energy to charge batteries?

My technical topic concerns designing a device to recharge batteries using mechanical means. The device has to have a mechanical way of generating electricity, preferably using human power (ex. hand crank flashlight). As society grows more reliant on machines and non-renewable energy sources, human power as an energy source seems to be left behind, even if studies show that it could potentially be a viable option. A major problem we face today is the protection of the planet from exposure to fossil fuels. Alternative ways of generating energy are being developed to decrease the use of these earth damaging fuels, however, not much research has been done on human power as an alternative. This is concerning as the potential advantages of using this type of energy source are numerous. For example, unlike solar and wind energy, human power is always available and its potential increases as the human population grows (De Decker & Smets, 2017).

In an attempt to test the viability of human power as an energy source, my capstone group will be designing a forearm sleeve that contains a battery that will be charged by the movement of the user's arm. The sleeve is meant to be worn when the user is performing any physical activity that emphasizes arm movement (running or jogging). Electricity will be generated 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 ("Faraday's Law," n.d.). In simpler terms, passing a magnet through a coil of wire will induce a voltage that can be used to charge a battery. The sleeve will contain a battery, tubes wrapped in copper wire, a magnet, and wires to connect

the components. The idea is that as the user's arm moves, the magnet located inside the wire-wrapped tube will move back and forth, generating a voltage to charge the battery. Once this battery is charged, it can be removed from the sleeve to then be used as a portable charger for any mobile device.

To test if this setup will work, we will be building and testing a prototype. To do this we will design the parts in Inventor, a computer-aided design software, and 3-D print the parts we need, as well as purchase other parts online. For testing, some of the categories we are aiming to address are longevity, durability, and ergonomics. Our goal is to have our device last a minimum of twenty minutes with continuous usage, be able to remain functional after a three-foot drop test, and be operational and comfortable for the wearer. In addition, the prototype we develop will hopefully be close to a finished product that could potentially be sold to the public. We want our device to be an indication that human power is indeed a viable energy source and can be used as an alternative. The research we conduct can help future designers who are also attempting to build human powered devices. Lastly, this connects to my STS topic because it shows that new technology might be turning back to the old approach of utilizing humans for power, similar to how mechanical watches are an older form of technology being utilized today.

The Allure of the Mechanical Watch

How do mechanical watch enthusiasts understand their attraction to the technology and how did they develop this attraction?

For this topic, I would like to research the mechanical watch to see why they have remained so popular even when newer timekeeping devices have made them technologically obsolete. Mechanical watches are powered by the carefully regulated release of energy from a wound spring and only use mechanical components to keep time (Quartz vs Automatic, 2012). I would look into finding out what drives people to love these watches, searching for patterns to see if there is a common thought amongst enthusiasts. Is it purely for the aesthetics, or is there something deeper that drives fans of this technology to hold onto an older form of timekeeping? I would be looking to discover how watch fans describe their attraction and the origins behind their use of the technology. In conducting this research, I seek to uncover how watch enthusiasts perceive their fascination in order to better understand how that conception conflicts with the idea that "new and improved is always better." If this conflict does indeed exist, we can conclude that there are other reasons that determine why certain technologies remain relevant, not simply because they are cutting edge or the "best."

Background and Theoretical Framework

In 1969, the Quartz, or battery-powered, watch was first introduced by the Japanese company, Seiko. This new breed of watch was more accurate than its older, mechanical sibling, and was cheaper to manufacturer and maintain. With the advent of the Quartz powered watch, the mechanical watch market almost dissolved into nothing; what the watch world refers to as

the Quartz Crisis. It was not until the 1990's that the mechanical watch made a comeback (Thompson, 2017). Fast-forward to 2018, and the global luxury watch market, which is dominated by mechanical watches, is valued at $6.9 billion, with optimistic expectations of growth in the coming years ("Luxury Watch Market Size," 2019). So, what has driven this demand? Currently, there has been no comprehensive analysis of the attraction to this technology, however, one can see that there is a strong following behind the mechanical watch. This is not only shown by the strong sales figures stated above, but also the plethora of online spaces where watch enthusiasts convene to discuss their passion. Countless blogs and forums are dedicated to the conversation of mechanical watches, including websites like Watch U Seek, TimeZone, and Hodinkee (which I will discuss in depth later). These sources indicate that there is indeed a subculture who demand these old-school timepieces; however, I intend to understand what drives this demand and that is the basis for my research.

As discussed earlier, despite the introduction of the Quartz watch, and the more recent development of smartwatches, mechanical watches have remained popular among a variety of groups. The most obvious group that I will conduct most of my research on are the self-proclaimed enthusiasts who eat, sleep and breathe mechanical timepieces. These W.I.S., or Watch Idiot Savants (a name they commonly refer to themselves as), all have unique stories on how they discovered the world of horology (the study and measurement of time) and why they are so infatuated with the technology (Shteyngart, 2017). Within this group, there is a diverse mixture of people from all different backgrounds that I would like to discover. By studying the people who are passionate about the technology, I will be able to understand if there are other unknown actants that play a key role in the success of the mechanical watch. For example, as I dissect the thoughts of these enthusiasts, I might discover a trend that links age, affluence or region and W.I.S. In addition to the main group of watch fans, there are other groups or actors that are important in truly forming a complete comprehension of this phenomenon. These include celebrities or athletes, who have potentially played a key role in producing a favorable image of the mechanical watch, as well as the major Swiss watch companies, who have a vested interest in this technology succeeding. I intend to specifically focus on Swiss watch companies due to their domination of the mechanical watch market and popularity among enthusiasts. By analyzing the way these groups are connected to the mechanical watch I will gain a better understanding of why this technology has not succumbed to obsoletion.

Evidence/Data Collection

To answer the question posed above, I will need to gather data that is focused on watch enthusiasts. This will include searching through blog posts to see what is being talked about within the community. As I do this, I will be searching for stories about how people in this group were introduced to mechanical watches, as well as how they describe the reasons behind their personal attraction to the technology. While going through these posts, patterns or common themes may arise that will aid me in forming a better understanding of the mechanical watch culture. In addition to blog posts, I plan on utilizing the website Hodinkee, which is the go-to

resource for watch enthusiasts worldwide. Hodinkee, a play on the Czech word *hodinky*, meaning wristwatch, describes itself as "the preeminent resource for modern and vintage wristwatch enthusiasts" ("Our Story," n.d., para. 1). This online magazine features watch related articles; however, I will mainly be focusing on their segment of Talking Watches, a video series in which they interview notable watch collectors, from athletes and musicians to tech innovators and business moguls (Clymer, 2013). In each video the celebrity being interviewed shares their collection and oftentimes the story behind each of their watches. This is where my research will be conducted; exploring the reasons behind these collectors' infatuation with mechanical timepieces. I will need to transcribe these videos, and in doing so search for patterns much like I will with the blog posts I stated above. Lastly, I would like to write to the founder of Hodinkee, Ben Clymer, and ask him a few questions that could provide further evidence to gain a better grasp of the ideas behind this culture. Mr. Clymer has been a pioneer in the mechanical watch industry, creating a location for watch enthusiasts to discuss their passion and read about everything going on in the watch world. For this reason, I believe that he can provide valuable information about the community that has formed around this technology. Three main questions that I would ask come to mind: 1. What is your origin story (first contact with watches)? 2. How do you describe your enthusiasm for mechanical watches? 3. In your opinion, why or how has the mechanical watch stayed relevant?

Data Analysis

My research will predominantly include analyzing qualitative data, in the form of blog posts, articles, and video transcriptions. To analyze this data effectively, I will code the data in an attempt to discover patterns. I will make preset categories and as I analyze my sources, I will add any emergent categories until I have exhausted the number of new themes that are present. To answer the question of how watch enthusiasts describe their attraction, some of the preset codes that I plan to use include: Aesthetics/Workmanship, Tradition (passed down), Movement, Sentimental Value, and Status. As I examine my data, I will mark these codes wherever they appear and eventually sort and organize them to identify patterns. Lastly, if certain patterns arise, I will use them to generate a conclusion to answer my research question.

Conclusion

After conducting my research, I hope to have a solid grasp of the driving forces behind the mechanical watch culture, including a complete comprehension of why watch enthusiasts are drawn to the technology. By gaining this knowledge, I will be able to understand how the idea that "new and improved is always better," is not the path taken by society in all cases. In addition, by exploring one example of how the mechanical watch has remained integrated in society, I will have a better understanding of the broader topic at hand which concerns the utilization of older technology, despite innovative alternatives. Lastly, the way the mechanical watch has remained relevant in society may differ from other forms of old technology and this is

where I see a continuation of my research, looking into more examples similar to the one discussed here.

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