DESIGNING A "DO NOTHING" MACHINE AS KINETIC ART

**INVESTIGATION OF SPECIFIC SOCIAL MEDIA FEATURES THAT EXACERBATE
USER ENGAGEMENT**

A Thesis Prospectus
In STS 4500
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

By
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August 8, 2022

On my honor as a University student, I have neither given nor received unauthorized aid
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The prevalence of technology in everyday life is growing at an unprecedented rate, and as a result the expectations associated with that technology are growing just as quickly. The evolution of the telephone exemplifies this. What began as a clunky, single purpose device dedicated to transferring audio data in real time has grown into an ultra-portable computer that allows users to "send and receive text messages and emails, take photos and videos, access the internet, listen to music, and play games, among many other functions" (Tecno, 2020, "Function" section, para. 5). By the year 2025, the majority of smartphone users expect that their mobile device will be capable of completely autonomous home control, serve as government issued identification, and feature unlimited cloud storage as common features (Mihai, 2017, "End user expectation for technological evolution." section, para. 3-4, "End user expectation for smartphone features." section, para. 8). Smartphones are already vastly more capable than they were just ten years ago, and as they have simultaneously become cheaper and more functional, they have become deeply ingrained into society. The increase in expectations has spread past the smartphones themselves into society in the sense that nearly everyone is expected to own a smartphone, to the point that not owning a smartphone is itself a barrier to many common facets of modern everyday life, such as QR codes, navigation, and social media (Wasserstein, 2021, para. 1).

Both the technical project and the STS research address the modern-day obsession with features, but from different perspectives. The objective of the technical project is to convince people that less functionality does not necessarily render a product useless. The project is meant to improve passersby's understandings of the origins of modern technical devices, as well as the struggles that were overcome and the level of innovation required to bring them to fruition. This will be done via the construction of a "do nothing" machine; a device that, although it is

constantly working and moving, does not serve an overt physical purpose. Conversely, by exposing people to the harmful nature of social media features that they likely use often and may even revere, the STS research aims to convince people that the inclusion of more features does not necessarily mean a better product. Both the STS research and the technical project will be completed in their entirety during the Fall 2022 semester.

DESIGNING A "DO NOTHING" MACHINE AS KINETIC ART

With the advancement of technology, many previously rudimentary objects are now expected to come with abundant features and functionality. This has led people to undervalue objects and devices that are simple, outdated, or single-purpose. People forget how far technology has progressed and lose appreciation for how much goes into certain innovations. Now more than ever technology allows people to "do more while understanding less about what [they] are doing" (Coopersmith, 2017, para. 3). The kinetic art piece will challenge this trend by requiring the viewer to have some background knowledge of modern technical devices such as microcontrollers, sensors, and DC motors in order to fully appreciate what is happening. It will combine various aspects of the following machines, all of which are depicted in Figures 1-3 below, respectively: a pseudo-perpetual motion machine, which features a ball that rolls down a ramp, loops back up to its starting position, and continuously repeats the cycle with seemingly no outside input; an analog do-nothing machine, which commonly consists of multiple pegs that sit in slots and are attached to a crank that, when turned, simply moves the pegs around in the slots; and a pinball machine, which has multiple complex obstacles and routes for a marble to follow.

Figure 1: Pseudo-perpetual motion machine. The steel ball rolls down the ramp, then is launched off the end back to the top so that it can roll down the ramp again. As true perpetual motion is impossible, a battery-operated electromagnet is hidden in the base to accelerate the ball down the ramp. The technical project will feature multiple balls that roll down various ramps and pathways, and eventually end up back at the top to repeat the cycle. (The Awesomer, 2021).

Figure 2: "Do-nothing" machine, also commonly known as the Trammel of Archimedes. As the crank arm is turned its rotational motion is converted into linear motion of the pegs in the slots. While the technical project will not require any manual input, it will feature the same concept of constantly moving, yet not accomplishing anything. (criticalEYEfinds, 2022).

Figure 3: Pinball machine. This also features a steel ball that rolls down a ramp; in this case the housing of the pinball machine itself acts as a single ramp. There are also various different tubes and rails that the ball can travel along on its way down; the technical project will share this aspect. However, pinball machines require a person to pull back and release a spring-loaded pin in order to energize the ball. (Flaherty, 2012).

This artwork will be displayed in the Mechanical Engineering Building at the University of Virginia for several reasons. Part of the reason is because this capstone course is exclusive to mechanical engineering students; but more importantly, the Mechanical Engineering Building is notoriously dark and dreary. Several students who have participated in this capstone course in the past have created kinetic art pieces to help liven up the Mechanical Engineering Building. For example, Katherine Ellis (2020) created a kinetic art weather display in order to "bring creativity and light to the Mechanical and Aerospace [Engineering] Building basement, a space where students and faculty spend significant time, but however lacks windows and natural time indicators" (p. 1). A major difference between Ellis' project and this one is the function; her project displayed information that would be otherwise difficult to obtain, and therefore, served a direct purpose. The significance of this project, however, is that it lacks a direct purpose. Another reason for this piece of artwork to be displayed in the Mechanical Engineering Building is that engineers in particular can greatly benefit from the lesson this artwork will attempt to teach. While the idea of using things without fully understanding them applies less to engineers

than many other groups, engineers are a very purpose-driven group of people who often fall victim to undervaluing less functional objects. Although practicality is often a very important aspect of their work, it is not the only aspect. Aesthetics may not make or break a product in terms of accomplishing a task, but, as Angel Fernandez, associate professor of art at Tarrant County College, put it, "art makes life more manageable, tolerable and enjoyable" (para. 3). This artwork is perfectly suited for engineers because they understand the mechanics of what is happening better than most, yet they need reminding of the importance of art more than most.

This project will be completed entirely within the semester-long Machine Design capstone course under the supervision of Gavin Garner, a professor of mechanical engineering in the Department of Mechanical and Aerospace Engineering at the University of Virginia. It will be documented in the form of a technical report. Available resources for the construction of this project include the Mechatronics Innovation and Learning Lab (The MILL), the 3D printers at Robertson Media Center, and CAD software provided by the University of Virginia.

INVESTIGATION OF SPECIFIC SOCIAL MEDIA FEATURES THAT EXACERBATE USER ENGAGEMENT

The objective of the STS research is more straightforward than that of the technical project; however, to better understand the STS research regarding social media, it is important to consider the nature of human communication. Communication is undoubtedly one of humanity's most valuable characteristics; it is what makes the propagation of knowledge and ideas possible. According to Mark Pagel (2017), it is quite possible that "language has played a more important role in [humanity's] recent (circa last 200,000 years) evolution than… genes [have]" ("Abstract"

section, para. 1). The importance of the ability to communicate can be better understood by considering its evolution. In the earliest humans, body language and symbolic drawings could be used for the transfer of basic ideas. The development of spoken language allowed humans to share more specific and complex concepts between individuals and small groups and could be passed down through generations. Written language greatly exacerbated the transfer of ideas, allowing them to be spread across the world and through generations without adulteration due to human biases. Finally, in the modern age, social media has allowed for the transfer of ideas to nearly any location on the planet almost instantly.

SHIFT IN INCENTIVE FOR EXPANDING COMMUNICATION

Humans have an evolutionary inclination to communicate with one another, and until recently the development of communication technology has been based around this inclination. However, as developed societies become increasingly more devoted to technological and economic advancement, the driving force behind the development of social media has shifted from a pure desire for sociality to a desire for generating profits. This shift from social construction of technology toward technological determinism can be analyzed through the framework of technological momentum as described by Thomas Hughes. Hughes (1969) states that as a system becomes larger and more complex (i.e., as it gains momentum), it becomes "less shaped by and more the shaper of its environment" (p. 8). This time-dependent relationship is depicted below in Figure 4.
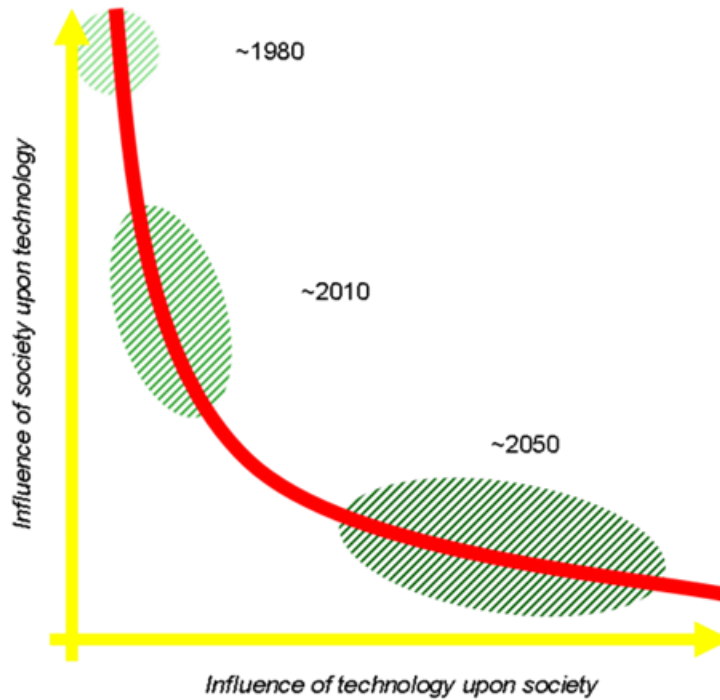
Figure 4. The increase of technological momentum over time. This curve indicates a shift from society having influence over technology, to technology influencing society. (Adapted by Julian Dixon (2022) from Justin Firuz Dowhower (2010)).

The relationship between a technological system's size and its level of determinism becomes clearer when considering the process through which the technology is disseminated. As shown below in Figure 5, Bernard Carlson's Handoff Model depicts this process as linear; the technology originates with a single group, then is passed along to another, then another, until it finally reaches the end users. Social media is no different; the process begins with the birth of the idea via a single actor. Often times the original innovator might not have the technical prowess needed to bring the idea to fruition, so they are forced to pass their technology on to developers and technicians. These new actors almost never develop the technology exactly as the innovator imagined due to creative differences, physical constraints, or a multitude of other reasons. At this stage the technology will struggle to grow without funding, and thus must be passed along again

to another group, investors. Since the continuation of the technology's development hinges on

this funding, the investors have leverage to force changes onto the technology as they see fit.

Even after all of this, the technology cannot succeed if the target population is not aware of its

existence; therefore, it is necessary for marketers, yet another actor in the dissemination process,

to enact changes in the technology. By this point the technology is ready to be adopted by the

end users; however, so many different actors have influenced the technology in so many

different ways that it may not reflect the goals or values that the original innovator intended.

Even though the final product is almost certainly not what the innovator anticipated, having input

from this many actors is necessary for the technology to reach its target audience. Furthermore,

as the size of the target audience increases, so does the number and size of the actors influencing

the technology—and frankly, so does the associated cost. As the process of developing and

disseminating the technology becomes more expensive, the changes imposed by different actors

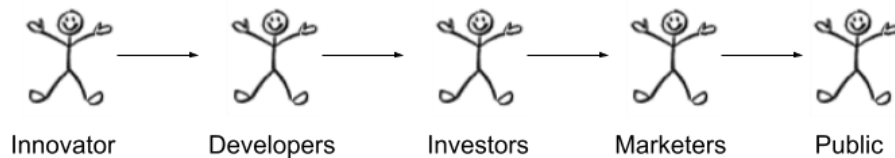all tend to converge on increasing profits.

Figure 5. The Handoff Model of technology dissemination. This model depicts the technology dissemination process as linear with a set beginning and end.

Much of the allure of social media comes from the size of the system; the combination of

the physical reach of the internet with the level of reliance humans have on communication

demonstrates the immense momentum that this system carries. Now, rather than social media

evolving to meet the needs of its users, companies attempt to alter the behavior of the users to

further develop the product. Figure 6 below contains a cyclical flow chart depicting categories of

Instagram features that work together to keep the user returning to the app. As with many aspects of human nature, the desire to be social is taken advantage of by these companies looking to make money, and the size of the system makes this conduct feasible. From the perspective of these companies, the more time users spend on their websites, the more profitable the products become; therefore, the companies implement specific features that "effectively function to keep users engaged and scrolling through content, and by extension advertisements, for as long as possible" (McCluskey, para. 2).

Investment—Requiring you to invest your time and energy creating content, which makes you more invested in the product and also sets up more External Triggers for you to start the cycle again.

External Triggers - Push notifications and emails that are perfectly optimized to trigger you into opening the app.

Variable Rewards—The unpredictability of how many likes, followers, comments, and DMs you receive, which keeps you consistently checking your app.

Internal Triggers—Conditioning your behavior to the point where you don't need to receive notifications in order to unconsciously reach for your Instagram consistently.

Action—A brand that effectively gets you to believe that using Instagram is an important/noble/valuable thing to do in life.

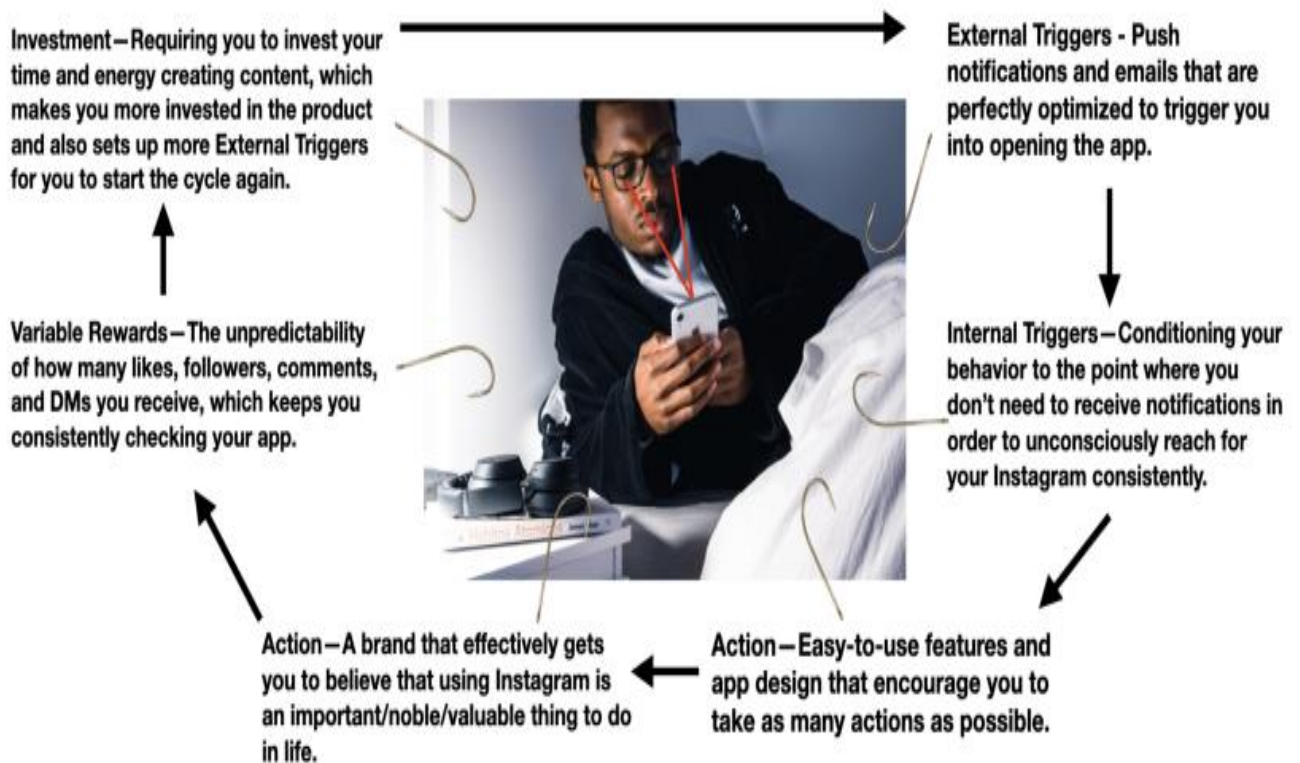Action—Easy-to-use features and app design that encourage you to take as many actions as possible.

Figure 6. The cyclical nature of habit-forming design. This chart depicts specific design aspects of Instagram that influence users to use the app as often and for as long as possible. (Eduardo Morales, 2022).

SIGNIFICANCE OF INCREASED SOCIAL MEDIA USE, BOTH INDIVIDUALLY AND AS A SOCIETY

Social media addiction as defined by Addiction Center "is characterized as being overly concerned about social media, driven by an uncontrollable urge to log on to or use social media, and devoting so much time and effort to social media that it impairs other important life areas" ("What is Social Media Addiction?" section, para. 2). There are striking similarities between this definition and the previously stated goal of companies to maximize users' time spent on social media platforms. Based on data from Big Village, people are largely aware of the shadiness of social media companies; in a survey of users of eleven of the top social media platforms, Facebook and Instagram, both of which are owned by Meta, scored the lowest and second lowest net ethical scores, respectively ("Ethical Levels by Brand" section, para. 7). However, in many cases the users either underestimate or are completely unaware of the addictive nature of these features. In either case, social media addiction is just like any other addiction where simply being aware of it may not be enough to avoid it. Social media use has continually grown since 1996, and with nearly 4.5 billion users worldwide, the issue of people falling victim to the predatory tactics of social media companies will continue to grow as well (Backlinko, para. 1).

The data collected through this STS research will take the form of a scholarly article that explicitly states and discusses specific harmful features of Instagram. By increasing their awareness of the efforts by these companies, in this case Meta, to keep them locked into their smartphones and other devices, and how these efforts may be causing them harm, this research will encourage users to reconsider their level of social media usage.

UNDERSTANDING THE IMPACT OF FEATURES

Society has become increasingly technologically deterministic, and as technical devices have increased in complexity and capability, they have taken on larger and more important roles in everyday life. The trend toward technological determinism is addressed by both topics, but in different ways. While the connection between the technical project and STS research may seem loose, it is important to note that both of them concern people placing value in features of modern technical devices without fully understanding them. The technical project addresses features in a broad sense and seeks to instill, or perhaps restore, appreciation for things that observers of the art piece may consider simplistic or antiquated. The research topic exposes readers to specific harmful features of social media websites that they likely already use and encourages them to reevaluate their relationships with social media. Both of these ideas implore people to look past the perceived necessity for more features in order to better understand the implications of modern technology, and to appreciate the situations that made this technology possible.

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