Prospectus

Motion Induced Charging Forearm Sleeve
(Technical Topic)

Actor Network Theory and Childhood Obesity Prevention Through the Let's Move! Program
(STS Topic)

By

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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.

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Introduction

In the United States and globally, childhood overweight and obesity has been on the rise through the exit of the 20th and into the 21st century. Such physical conditions often follow children into adulthood and are tied with an increased risk of serious health conditions such as diabetes and heart disease. Under the Obama administration, Michelle Obama kicked off the Let's Move! program in 2010 in an effort to reduce childhood obesity rates through adjusted nutrition and physical education incorporation in schools around the country. The program encourages students to pause the television and get active every day. The technical solution to this issue, rather, would join technology and activity together rather than make them mutually exclusive. Such a solution would join the push for an increased active lifestyle with the quickly growing technology industry.

Despite the success that the Let's Move! initiative has achieved in decreasing the obesity rates among young children, sedentary behavior of high school aged students has been on the rise over the past decade as a result of the popularity of smartphones. Without properly understanding the effect of network connected devices on a sedentary lifestyle, which is a leading cause of overweight and obesity, the program has no way to evaluate the status of its own network. As a result, a technical solution is not adequate on its own to combat obesity. If we fail to understand the role smartphones have in the Let's move network, we won't be able to pin point the weaknesses and vulnerability of the program, and thus will see a limited level of success in achieving the goal of reducing overweight and obesity.

The goal of combating childhood overweight and obesity is an issue that is socio-technical in nature, and thus, demands a solution that concerns both its social and technical aspects. My technical project team will design a device that can charge any portable device

through human motion caused by walking, running, or weight lifting. As such, it will encourage children to become more active without having to choose between their own health and subscribing to a technologically based culture. I will also use the STS framework of actor network theory to study how smartphones and computers are acting as rogue actors in the Let's Move! network. As a result, the program is left vulnerable in its lack of ability to further increase program outreach and understand the status of its own network.

Technical Problem Frame

In North America, individuals on average are expected to own 13 network connected devices by 2021 (Martin, 2017). With the increasing number of electronic devices at our fingertips, there exists a demand for power supplies to follow us wherever we go so that we can have a charge anywhere at any time. Standard wall outlets have been the primary source of power for consumers, however with the growing need for a charge on the go, a market for portable chargers has opened up. Though wall outlets remain stagnant in their ability to meet the portability of the electronic user, power banks have innovated to the point that users can now charge multiple devices at once.

However, unlike a wall outlet, conventional power banks have a finite charge and ultimately require users to charge it at a wall outlet as they would have for their devices. Portable chargers that can be charged through gyroscopic wrist motion have begun to be developed (Horton, 2017), yet such a motion is unnatural and will ultimately fatigue the user to a point where a maximum level of power will be attained. Both charging methods restrict users to a limited technological experience, prolonging the mobility of their mobile devices until they are drawn back to the wall by the end of a charging cord like a dog on a leash. The development of a portable charger that can charge through the natural mobility of the user may allow for the

readjustment of what we truly consider the definition of "mobile" to be, and expand the radius which technologically networked consumers are bound to. Such a solution could also alleviate the pressure on power bank technology to improve in order to meet the demands placed by the projected increase in network connected devices.

The device we are developing will generate a charge through the cyclical motion developed in walking, running, or lifting weights. In utilizing motion to develop a charge, the device rewards individuals for using their mobile devices as intended. The proposed solution can act as a substitute for power banks or can be used as a means to recharge them. A human powered charger brings a new level of agency to consumers that they lacked with the existing solutions. With the way social networking and mobile devices have captured the day to day interaction and cognition of the user, a charger that at its core places the power in human hands, has the disruptive capability to tip the scale in favor of man over his attention commanding devices.

The current design depicts a forearm sleeve with a pocket for a tube containing a coiled wire and strong magnet. As users swing their arms through natural motion, the changing magnetic field produces an electrical current in the coil that can be used to charge a battery through Faraday's Law (Lucas, 2016). The goal of the design is to generate a significant amount of current and charge through a typical day of activity as well as to successfully output an appropriate current needed to charge a commonly owned network connected device. In testing the designed solution, we plan on developing a prototype and measuring the gained charge through walking to and from classes, running, and lifting weights. The design will be scored as well on its aesthetic appeal, ergonomics, and ease of setup.

STS Problem Frame

Marked as one of the most serious public health challenges in the 21st century by the World Health Organization, childhood obesity is one of the most prevalent issues facing a global community (World Health Organization [WHO], n.d.). Internationally, the number of overweight and obese children raised 9 million from 1990 to 2016. Left untreated, childhood obesity has been linked to higher risks of serious health issues, such as diabetes and heart disease (World Health Organization [WHO], 2019). Michelle Obama and the President's council on Fitness, Sports, and Nutrition has been tackling this issue by pinpointing physical education and nutrition in schools via the Let's Move! Program (The White House Office of the First Lady, 2013). In order to combat the diminishing physical education and recess offered by schools across the Unites States, the ex-First Lady is attempting to address the statistic that 1 out of every 3 children are active (60 minutes of physical activity) on a daily basis (The White House Office of the First Lady, 2013).

The Let's Move! program has received much criticism in the political, corporate, and education industries, however experts at the Center for Disease Control (CDC) have reported that obesity rates started to stabilize just 5 years into the program (Liptak, 2015). Despite the success seen by the program thus far, I argue that the program is vulnerable through its focus exclusively on adjusting behavior in primary schools. The existing outlook may improve the activity of youths in school; however, upon graduation many young adults are not required to continue physical activity and often times gain the responsibility of preparing their own meals. In this essence, the Let's Move! program provides extrinsic incentive to adjust behavior but fails to intrinsically motivate children and young adults to adjust their lifestyle away from sedentary behaviors. According to a 2016 study by Lamar University's Department of Health and

Kinesiology, sedentary behavior due to computer/smartphone screens has risen drastically among high school students from 24.9% in 2007 to 41.7% in 2015 (Joshi, Cole, & Overton, 2016). In this study, along with a 2016 study in the International Journal of Community Medicine and Public Health, overweight and obesity among teenagers caused by a lack of physical activity and a sedentary lifestyle is statistically significant (Kurdaningsih, Sudargo, & Lusmilasari, 2016). This information suggests that the Let's Move! network may be vulnerable. If we fail to take into account the independence of student behavior and decision-making outside of the classroom, we can never truly understand the status of the Let's Move! program, and will be unable to tell if it is achieving success towards its goal of ending childhood overweight and obesity.

I argue that the Let's Move! initiative is, in fact, vulnerable as a result of its negligence to understand the significant technological pull of smartphones and computers towards sedentary behavior. In my analysis of the Let's Move! program, I will utilize the science, technology, and society framework of actor network theory to explain the power dynamics exhibited in a heterogeneous network of human and non-human actors formed by a network builder to resolve a problem faced by the actors (Cressman, 2009). In such an analysis, I will discuss how Let's Move! as the network builder achieved initial success in the formation of its network but will have limited success without the maintenance of the network, a process Michael Callon calls translation (Callon, 1986). Smartphones and computer technology are currently acting as a rogue actor, disrupting the power dynamic between the Let's Move! program and teens. As a result, the network is at risk of collapse as the directors of the program will be unable to fully understand the status of the network, and may not be able to expand outreach needed to achieve full success of the network's common goal.

Conclusion

My technical project will provide for a new product that will allow for consumers to charge an electronic device through human-centric motion. This new charging concept will alter the current conception of the "mobility" of mobile devices and allow users to power their devices through their day to day motion. The STS research paper will provide valuable understanding of an already successful overweight/obesity reduction program. It will address how the Let's Move! program (network builder), created under the Obama administration, is susceptible to failure as a result of smartphone and computer technology (rogue non-human actor).

The product discussed in the technical report can help resolve the broader socio-technical goal of reducing overweight and obesity among children by incorporating physical activity in the use and charging of network connected devices, which currently have a pull towards sedentary behavior that leads to obesity. The STS research paper will also develop an understanding of the success of the Let's Move! program but will highlight how the network is vulnerable by the presence of smartphones and computers that influence the activity of teens. Through an understanding of the influence of such devices on the network, we can better evaluate the success of the Let's Move! program and the status of the overall network. By increasing the comprehension of the network's status, the roots of the broader sociotechnical problem of childhood overweight and obesity can be better identified and combatted.

Word Count: 1834

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