

Gesture Watch
(Technical Paper)

Technological Fixes: A Catalyst for Social Discrimination
(STS Paper)

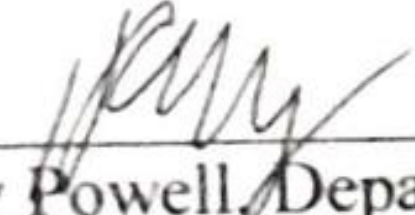
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On my honor as a University Student, I have neither given nor received
unauthorized aid on this assignment as defined by the Honor Guidelines
for Thesis-Related Assignments

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Introduction

A technological fix is often viewed as a panacea to all of society's problems. It is a fix that attempts to use engineering or technology to solve a problem (Cook, 2009). Technological fixes are synonymous to a technological advancement in regards to their attempt to solve a societal problem. The first major technological fix that society developed was farming. It introduced a tremendous shift from the existing migratory hunter-gatherer society to a sedentary city-based society. The introduction of farming can objectively be viewed as a technological fix that did a lot more good than harm, but this is not always the case. While some fixes may have merit, a good amount of them have unintended negative effects on society. Every technological fix affects the social, political, economic, or environmental aspects of society (Newberry n.d.). However, the technological fixes that do not account for these aspects should be regarded more as shortcuts rather than fixes. It is said that the fundamental difficulty with technological fixes—or shortcuts—is the inherent incompatibility between problem and solution (Newberry n.d.). These shortcuts can cause a lot more harm for society especially in the realm of social discrimination. It is my firm belief that technological fixes serve as a catalyst that enables people to unleash their innate human quality of discrimination. This belief is what motivated my technical topic. My STS topic will focus on the potential technological fixes that, when deemed too great a threat to society, are outlawed altogether. My technical topic will serve as a technical resolution rather than a fix. The difference being that it will offer new technological knowledge as well as have little to no negative societal implications and serve mainly to make life easier and more efficient rather than solve a major societal problem. It will consist of a gesture based watch that is able to perform gesture commands such as move through a presentation as well as tell

time through an LED module. There will also be a feedback system that indicates when a gesture is successful.

Gesture Watch

Project presentations can be a chore for those that are constantly on their feet and moving around. The problem I seek to solve is one that inconveniences those that do these very presentations. My capstone project is a gesture watch that will pair via Bluetooth 5.0 (Bluetooth Technology, 2019), a wireless technology standard for exchanging data between fixed and mobile devices, to a device and be able to perform commands based on the registered gesture. Our project consists of making a simple wearable device that is completely enclosed and can act as a motion controller. The watch will contain an MSP430F1611 microcontroller and be able to connect to either an iOS or Android device via Bluetooth. The main functionality of the watch will be gesture-based controls, a feedback system that notifies the user when an action is registered, and a rechargeable battery that allows the watch to last throughout the day.

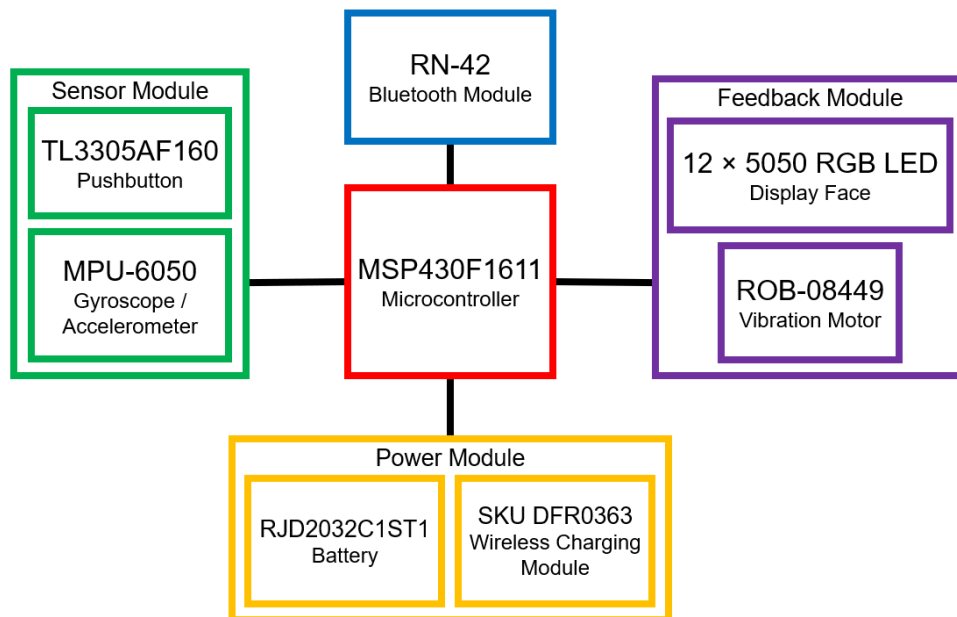


Figure 1.1: Gesture Watch Subsystems

To achieve this, we will require 4 main component subsystems (shown in Figure 1.1), the MCU/communications module (i.e., MSP430 and Bluetooth adapter), the feedback system (i.e., vibration motor and LED display), an actuator input (pushbutton), and a power module (i.e., battery and charging module). This watch will also be designed in a form factor small enough to fit comfortably on a user's arm during use.

The main differentiating feature of our smartwatch is the ability to interpret complex gesture controls in an intuitive and responsive way. The gesture watch will have a gyroscope, which is a device used for measuring or maintaining orientation and angular velocity (Hiller, 2019), and is intended to be able to move through a presentation slide by either swiping left or right with a sweeping hand motion. It will also be able to skip through music using the same gestures. There are currently products that solve the inconvenience of having to be next to a device when presenting such as wireless presentation mice; however, my capstone project offers a more seamless way of achieving this task as it is a product that straps onto the wrist and does not require the user to carry the device around by hand.

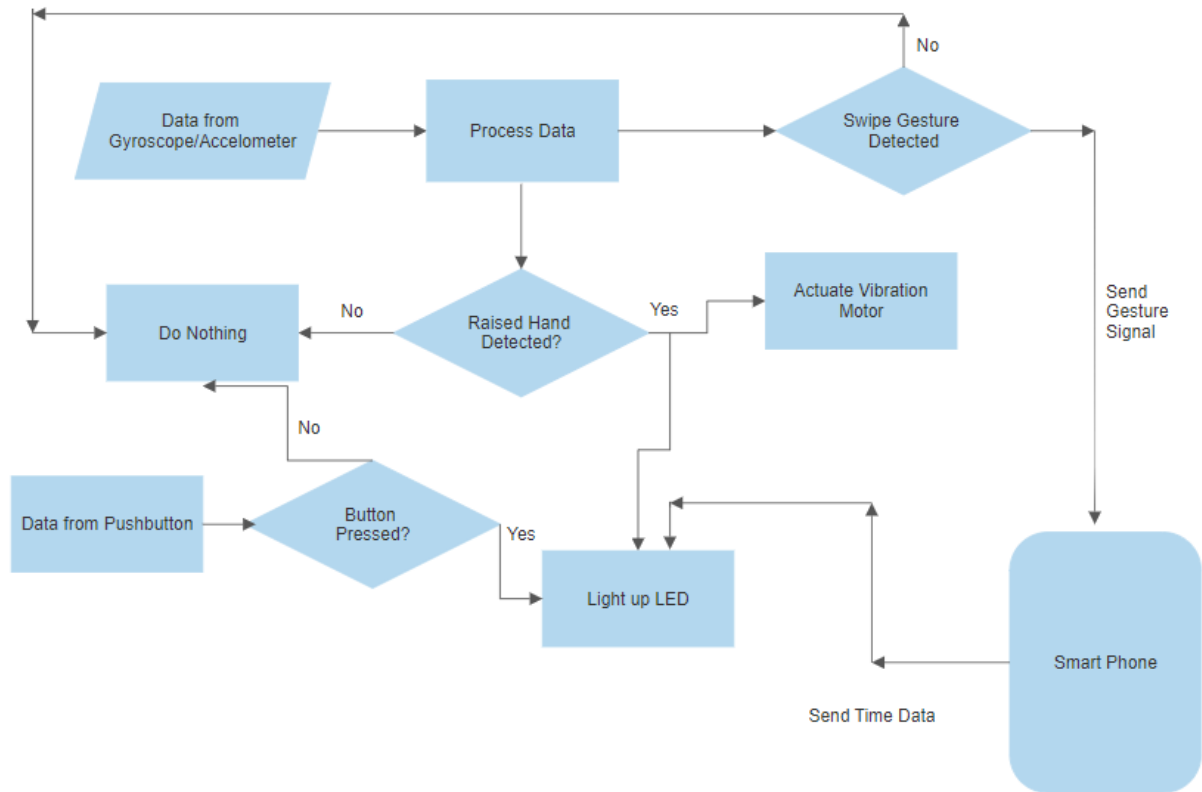


Figure 1.2: Gesture Watch Functional Diagram

Figure 1.2 shows the planned functional behavior of the watch. Motion data will be taken in from the gyroscope/accelerometer whenever a gesture/hand raise is detected. The vibration motor will actuate, and the LED ring display will light up to show the time on the watch. An alternative feedback from the pushbutton may also be used to light up the LED display. In the event that a swipe gesture is detected, data will be sent to the smartphone or other connected device and perform a corresponding command. As mentioned before, an example of a successful gesture control command that we want to implement is the advancement of a presentation slide when a swipe is detected.

I will be working with fellow fourth year Computer Engineering students Julian Nguyen and Edward Ryan. Resources such as Multisim and Ultiboard, which are circuit simulation and

PCB creation software respectively, will be used. A virtual bench, a device used to measure circuit signals, will be used in order to aid with testing. The preliminary schematics of the watch will be done starting September 9th, 2019, testing will be done throughout the semester and a fully working product will be delivered on December 11th, 2019.

Technological Fixes: A Catalyst for Social Discrimination

Technological fixes have been around since the beginning of man and their effects on society have been controversial to say the least. The STS theories that my project will serve to examine come in the form of technological fixes and how they eventually give way to technological determinism. Critics of technological fixes such as Dane Scott, an ethics professor at the University of Montana, argues that “technological fixes in developed societies occupy a paradoxical status: while the term is used as a derisive label, industrial societies typically demonstrate an overriding preference for technological fixes. As philosopher Paul Thompson observes, the “social bias in favor of technology is a social fact that should be recognized. Industrial societies are organized in ways that institutionalize the bias favoring technology” (Thompson, 2017). Technological Determinism is the belief that “changes in technology exert a greater influence on societies and their processes than any other factor” (Roe 1994). Critics of technological determinism argue that what counts more than technical features are “social and political issues concerning: the circumstances of production, modes of use, values, purposes, skill, style, choice, control and access” (Alawode 2014). Or as Ruth Finnegan, an emeritus professor at the Open University, UK, puts it, “who uses it, who controls it, what it is used for,

how it fits into the power structure, how widely it is distributed” (Finnegan 1988, p 41: cf. pp. 176-7).

The problem that motivates me for this STS Research Paper is the negative societal implications that technological fixes can have. I was inspired to write about this after watching the technological effects on society in the movie *Gattaca* (Nicoool, 1997). The movie foreshadows potential unintended social discrimination that could be produced as a result of technological fixes. This problem is prevalent in fiction as well as in modern society. Over the past century, our society has battled the effects of automation on the unskilled working class (Denise, 1962). In 2016, the National Highway Traffic Safety Administration officially recognized "software" as a driver of self-driving cars, thereby putting the nation's 4.1 million paid motor vehicle operators—drivers of taxis, trucks, buses and Uber—on notice (Newsweek, 2019). Because of this threat, many local governments have even taken action against technological fixes in order to mitigate potential social injustice. An example of a more recent example of this can be seen when the city of San Francisco banned its local government from using any type of facial-recognition technology (CNN Business, 2019). This was mainly due to the fact that the technology allows people to be classified into different groups according to some properties drawn from their facial features, for example, gender, race, age, and sexual orientation (Wang, 2018). Time and time again, from literacy tests, to bridges meant to impede traffic, to automation, we see that humans use technology as a catalyst for social discrimination.

My topic will be about how technological fixes will always serve to cause some form of social discrimination. The paper will explore how technological fixes serve to exacerbate discrimination in any society. Humans rarely think about how their actions affect and influence

others. Technology makes it so that humans can be more expressive, and thus, enables them to be more discriminatory. We could easily see this in *Gattaca* (Nicool, 1997) where the upper and social class was defined by how perfect a person was. This strive for perfection was made possible only by technological fixes. All these things will be explored, and work on my thesis will start from early January 2020 and continue throughout the year up until June 2020.

Research Question and Methods

The question that my thesis will answer is “do technological fixes cause changes to society that inevitably catalyze discrimination when it comes to race, gender, and social class?” Thorough research will be done to address the possible arguments and counterarguments of whether technological fixes cause social discrimination. The question will be answered by looking at historical examples of technology and its impending effects on society. It will look at the current day society mainly in the area of automation and extrapolate the effects that current technological developments could have on future ones. My methodologies will consist mainly of historical case study analysis and wicked problem framing, a method in which evidence is meant to reveal indirect and hidden connections between symptoms and root causes of an issue (Rittel, H.W.J. & Webber, 1973). To do this, I will analyze evidence such as quantitative level of happiness and general quality of life around the world in underdeveloped and developed countries. It will be done by using survey responses and the cumulative frequency distribution to summarize the happiness in a certain area, which is characterized by the “cumulative distribution function (cdf)” of the measured happiness in a sample (Kalmijn, W., & Veenhoven, R., 2005). This cdf is a step function with the same number of steps as the number of response options of

the primary scale of measurement (Kalmijn, W., & Veenhoven, R., 2005). This will explore if there is a hidden connection between being a society that employs many technological fixes and social discrimination. I will also delve into possible viable solutions that might serve to limit the negative social discriminatory impacts of technological fixes without inhibiting the advancement technology altogether.

Conclusion

The problem with technological fixes and developments in general, is that they often fail to think of the possible consequences on society. My gesture watch capstone project will seek to remedy this fact by acting as a technological advancement rather than fix, and a fully functional gesture watch will be delivered on December 11th, 2019. There is merit in the fact that all technological problems set out to do good by solving society's problems, but viewing a technological fix as a means of fixing every problem more often than not leaves the society in a worse off state. In almost all cases, technological fixes produce some kind of social discrimination. Is there a viable solution to stop this social discrimination? We can see throughout history that in some cases, when technological fixes are deemed a great threat to society, the technology was outlawed altogether. Our society as a whole should take more preventative measures to ensure that technological fixes are not abused, certain societal standards are upheld, and stop looking to technological fixes or shortcuts as a panacea to all problems.

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