

Thesis Project Portfolio

Pitch Controlled Pong

(Technical Report)

**The Zuckerberg Caricature: The Stereotypical Genius Computer Scientist And Its
Negative Effect on Corporate Behavior**

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science
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Bachelor of Science, School of Engineering

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“Move Fast and Break Things”

–Mark Zuckerberg, Unofficial Internal Facebook Motto. 2012

“Move Slowly but Still Break Things”

–The Lizard People, Capstone Design Group c. 2022

Modern tech companies undeniably have a powerful influence over both social structures and the world economy, which has only grown in recent years. The industry is composed of computer scientists and stem professionals, all of whom begin their careers as students in some capacity. This puts me in a unique position; I am surrounded by and constantly working with the population who will continue to compose this influential industry. As an engineering student working on technical design alongside other stem students, I can observe the traits and characteristics that I and my peers embody. As an STS researcher, I can analyze the traits and characteristics that the professionals in the tech industry embody. Together, I can enhance both my technical work and my STS research by grounding my academic discussion of stereotypes in the tech industry with personal experiences of these stereotypes in technical design.

My STS research project investigates the stereotypes that surround computer scientists and stem students and professionals in public discourse. Specifically, I identify the most relevant characteristics of the stereotypical image of a computer scientist, and analyze the degree to which they are present in the culture of big tech companies. Using personal testimonies and internal documents available through a large leak known as “The Facebook Papers,” I discuss how various details of Facebook’s culture demonstrate an influence of the most relevant characteristics of the stereotypical computer scientist. As we see these stereotypes present in the

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culture of Facebook, one can infer a mutual shaping between the behavior of the CS professionals composing these big tech companies, and the popular stereotypes about these individuals. In my STS research, I discuss how these conclusions can inform our approach to the way we interact with conceptions of computer science so that this effect can be leveraged to promote social good.

My technical project is a twist on the classic video game, Pong, enclosed in a custom aluminum game console. The twist is the input of controls. The user provides an audio input to the system's microphone, where the pitch of their voice is used to move a paddle up and down the screen. If their pitch is above a user defined threshold, then their paddle will move up, and if their pitch is below that threshold, their paddle will move down. The project includes signal processing through custom hardware to understand the user's vocal input, as well as programming and game design skills for the user interface. A high level block diagram of the system's input and output is shown below:

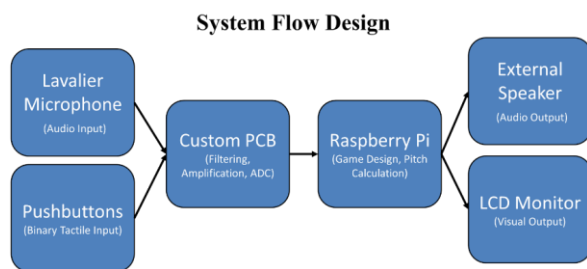


Figure 1: Pitch Controlled Pong High Level Block System

Here, the hardware and signal processing occurs in the PCB block, where the user's voice will be filtered, amplified, and passed through an analog to digital converter (ADC). While simple in scope, the relevant detail of the project is that it involved a personal experience of working with electrical and computer engineers on a technical project in a pseudo-professional context. In

working with colleagues in this capacity, we saw in real time the way that relevant problems could be approached and the way that interpersonal dynamics can unfold between professionals, specifically in the technology and computer science domain. In this way, my technical project was a personal meta exploration of my STS research project.

As I worked along other STEM students to complete my technical project, my STS research affected me to reflect on the way that each of us demonstrate the stereotypical characteristics of STEM professionals that I discuss. At times in our approach to problem solving, I took notice of when I or my teammates embodied traits of unnecessary competitiveness or asociality that I may not have considered in isolation from my STS research. In a similar way, my technical work provided a personal perspective for my STS research. I investigated big tech culture from an academic perspective, but my technical project team allowed me to see how these stereotypical traits could manifest themselves in technical decision making in real time. The insight from my technical project provided a practical grounding for the inferences I make in my STS research. Together, these projects demonstrate how STS considerations are necessary measures to enrich the technical design process. Through the reflection made possible by my STS research, I have seen how ethical engineering and successful practical design are inextricably linked.