

Thesis Project Portfolio

D(r)ILL Pickle: An Automatic Pickleball Feeding Machine

(Technical Report)

Exploring the Technological Mediation of a Pickleball Launching Machine on Social Reconnection Among Seniors

(STS Research Paper)

An Undergraduate Thesis

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

University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Clara Li

Spring 2024

Department of Electrical and Computer Engineering

Table of Contents

Sociotechnical Synthesis

D(r)ILL Pickle: An Automatic Pickleball Feeding Machine

Exploring the Technological Mediation of a Pickleball Launching Machine on Social Reconnection Among Seniors

Thesis Prospectus

Sociotechnical Synthesis

Importance of User-Centered Design in Pickleball Feeding Machines to Foster Community

The popularity of pickleball has recently skyrocketed among young people, and it has become the fastest growing sport in the U.S. for the past few years. Walking by the Snyder Tennis Center at the University of Virginia immediately showcases the sport's popularity among college students. Numerous tennis courts have been converted to cater to pickleball, with the game now consistently attracting more casual players than tennis. Prior to its widespread adoption among younger demographics, pickleball was already heavily favored by an older generation. The sport's popularity among seniors was so significant that it even found its way onto the reality show "The Golden Bachelor" as a featured activity.

For the technical portion of my thesis, my team decided to capitalize on pickleball's popularity by creating an automatic feeding machine capable of shooting pickleballs across the court at adjustable speeds. My STS research paper expands on my technical project by investigating the efficacy of employing technological mediation through an automatic pickleball feeding machine to reduce senior loneliness. This machine would ideally serve as a resource to increase the breadth of their social activity and help foster a sense of community.

There were many design factors to consider throughout my technical project. My team was determined to create a feeding machine containing features comparable to those currently on the market, but at a much cheaper cost. Beyond typical customizations like speed and direction adjustments, we integrated features not commonly found in existing designs, such as the capability to modify the dispensing speed of balls. The inclusion of this feature allows the user to lengthen or shorten the period between each fed ball. Because our ball feeding machine was also

intended to be used by older adults, considerations were made surrounding user accessibility. We focused on enhancing the user experience when interacting with the machine, ensuring that customizations could be easily navigated using a joystick on the user interface. Additionally, we considered factors such as text size and color contrast to enhance readability. The final product of our technical project is shown below in Figure 1a and 1b.



Figure 1a. Front View of Pickleball Feeding Machine



Figure 1b. Back View of Pickleball Feeding Machine

My STS research pivoted away from the topic of my STS prospectus, which had a stronger focus on modifying public policy and infrastructure to increase the accessibility of pickleball to seniors. I wanted to more closely examine how technology within sports impacts the behavior of those who use it. To do this, I shifted to researching how engagement with a specific technology, like a pickleball feeding machine, effectively reintegrates seniors into their community. I placed an emphasis on the senior demographic due to the high prevalence of loneliness among the population, which has extremely detrimental effects on their health and can lead to a lower quality of life. By examining seniors' interactions with existing health

technologies like Fitbit and health tracking apps, as well as identifying common obstacles that impede the desired impact of these technologies, I am more aware of the specific concerns that must be addressed by technology designed for older adults. Seniors are often deterred from technology that have high perceived complexity and unintuitive designs, which serve as barriers for the technology to effectively inspire behavioral change.

My team and I began working on our technical project before I began research for my STS focus. While we made efforts to address user experience and accommodate an older audience, looking back, we realize there were numerous blind spots. My research has led me to realize the importance of co-design and involving the target users in the design process, which we did not originally consider doing. Responsible engineering involves acknowledging that technology isn't "one size fits all," and the expectations we initially had about user preferences may not always align with their actual desires. Future enhancements to our design process should involve gathering direct feedback from the target users instead of solely relying on the passive reviews of documented experiences or personal assumptions.