Thesis Project Portfolio

Creating a User-Controllable Pickleball Serving Machine

(Technical Topic)

A Study on the Cause of Pickleball's Increase in Popularity and its Effects on the Surrounding Community

(STS Topic)

An Undergraduate Thesis

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

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Christian Bliss

Spring, 2024

Department of Electrical and Computer Engineering

Table of Contents

Executive Summary

The technical portion of this project focuses on creating a user-controlled pickleball serving machine. The purpose of this is to supplement the fast-growing nature of the sport. This ties hand in hand with the STS portion of the project, which studies the causes of the sport's growth and the effects on the communities surrounding it. Creating a machine which allows users to play without partners has potential to further the growth of the sport, as players can always play, whether or not they have somebody to play with. The serving machine falls into the category of infrastructure regarding the sport, which is an important component of the sport's popularity spike's various effects. The STS paper focuses more on the need for new courts, however a machine like this also classifies as infrastructure, and the organizations that produce machines like these will certainly be affected.

Pickleball is a rapidly growing sport in the United States, gaining popularity within communities of all age demographics due to its ease of learning and social nature. Studies have shown that adults experience numerous mental and physical health benefits when playing pickleball. Because improving one's pickleball skills and endurance without a partner is challenging, the goal of the technical portion of this project is to design a functional prototype of a pickleball machine that launches balls to the player from across the net. The machine launches balls at a wide range of speeds and oscillates horizontally and vertically. The horizontal oscillation range is large enough to ensure full court coverage from the left corner to the right corner of the baseline, and the vertical oscillation provides up to four feet of ball clearance over the net. The combination of the vertical and horizontal coverage means that the machine is capable of sending balls to every playable spot on the court. The machine also has an intuitive user interface, allowing the player to configure both speed, spin, and direction as well as select from pre-set drills.

This research paper will focus on the causes and effects of the increase in pickleball's popularity in the United States. The driving question to be investigated is how this increase has affected the elderly population of players, and secondarily, how it has affected the non-player community and the

infrastructure associated with the sport. The social construction of technology framework will be applied to answer this question. The expected results will hopefully shed light upon how these kinds of sports come to popularity, as well as how they affect their surrounding communities. Finding an answer to this question could potentially lead to the ability to manipulate these trends, directly affecting their outcomes. This can affect the field of STS in that science will be able to affect the health of certain populations, such as the elderly. By understanding the cause and effect of these trends, industries can manipulate them in order to yield a certain desired outcome. For instance, if there are shown to be generally positive effects from pickleball's rise, then more trends like this could be influenced to start, and vice versa.

Due to the nature of the STS and technical portions of this project, it was important to conduct them during the same time period. First, it was easier to conduct research on both aspects at once. By doing the bulk of the research at once, it became far more simple to understand both portions of the project and how they relate to each other. By creating a machine capable of acting as a portable pickleball partner, our group was able to understand what it means to create infrastructure for a growing trend. Because we created this machine in this specific time period, when pickleball is gaining popularity so fast, we were able to gain a deeper understanding of the Social Construction of Technology (SCOT) framework. We were able to spend a semester building something that served to fill a need created by society, which solidified our comprehension of the fact that society has a strong influence on the technology that exists within it. If this project were not conducted in tandem with the SCOT centered analysis of pickleball's rise and the resulting effects, we would not have been able to properly understand the connection between science, technology, and society.