McMaster University

SmartServe

Software & Mechatronics Capstone

Project Goals

Authors:
Christopher McDonald
Harit Patel
Janak Patel
Jared Rayner
Nisarg Patel
Sam Hamel
Sharon Platkin

Professor:
Dr. Alan Wassyng

Teaching Assistants:
Bennett Mackenzie
Nicholas Annable
Stephen Wynn-Williams
Viktor Smirnov

Last compiled on October 5, 2017

Contents

List of Figures

Date	Revision	Comments	Author(s)
10/05/17	0	First revision of document completed	Christopher McDonald & Sharon Platkin

Figure 1: Revision History

1 Project Summary

When a player wants to improve their table tennis game, a typical solution is to hire a coach. However, this does not come without its challenges. These include scheduling, focusing on particular shots and receiving in-depth statistical feedback. Our solution to solve the above problem will consist of a shooting mechanism, a way to identify successful returns and a system to recommend different shots. Throughout the training session, the system must provide the user with feedback on the quality of their game. The system will consist of a electromechanical system to shoot the ball and a computer vision system to track the ball's location during flight. A server will also be added to store data, provide diagnostics and recommend shots given the user's past performance.

2 Success Criteria

The following items are required to be completed for this project to be a success:

- The system can detect the boundaries of the table to determine valid returns on the system's side
- The system can detect valid returns from the user with an accuracy of 90%
- The system can hit each square of a 4x4 grid with an accuracy of 75%
- The system can apply a reinforcement learning algorithm to aid in the shot decision
- The system can pause and resume operation
- The system can calibrate its position and orientation
- The system can adjust the shooting frequency

3 Mid-Level Goals

- The system can detect the boundaries of the table to determine valid shot locations on the user's side
- The system can hit each square of a 8x8 grid with an accuracy of 75%
- The system can calibrate its shooting parametres
- The system can notify the user of their performance after each shot is taken
- The system has multiple modes including 'single-shot' and random
- The system has leaderboards for all users

- The system's state persists after shutting down
- The system can apply spin to the shot on one axis
- The system can shoot at various speeds

4 High-Level Goals

- The system can hit each square of a 16x16 grid with an accuracy of 75%
- The system can apply spin to the shot on a combination of two axes
- The system can track the ball throughout the complete path travelled across the table
- The system can collect the balls returned by the user
- The system can shoot from different heights