McMaster University

SmartServe JARED RAYNER

Software & Mechatronics Capstone

Project Goals

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Date	Revision	Comments	Author(s)
10/05/17	0	First revision of document completed	Christopher McDonald & Sharon Platkin
10/06/17	1	Second revision to add more sections and text	Christopher McDonald & Nisarg Patel & Harit Patel
10/06/17	2	Third revision to strengthen the context, proof read and refine the context	Christopher McDonald & Nisarg Patel
10/06/17	3	Fourth revision of document to set realistic goals, remove extra goals to ensure the total number of goals is less then 15	Christopher McDonald & Nisarg Patel & Janak Patel & Jared Rayner & Sam Hamel

Figure 1: Revision History

1 Team Vision

The SmartServe team envisions to provide Table Tennis enthusiasts with an effective training solution which enables any player to improve their game with the help of modern technology and data analytics.

2 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.

3 Success Criteria

To judge how well the system meets the problem described above, several aspects of the system will need to be measured. The first major part is the accuracy and precision of the shooting mechanism with respect to how well it shoots the ball. The second will be how many degrees of freedom can be applied to a shot to vary its characteristics. Lastly, including features in order to better solve the problem in areas like usability, performance and quality. However, for the project to be deemed successful in solving the problem, only the low-level goals will need to be satisfied.

4 Goals

4.1 Low-Level Goals (P0)

The following items encompass the low-level goals of the system:

- 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 implements reinforcement learning algorithms
- The system can shoot a variety of shots
- The system can provide feedback to the user based on their performance

4.2 Mid-Level Goals (P1)

The following items encompass the mid-level goals of the system:

- The system can hit each square of a 8x8 grid with an accuracy of 75%
- 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 can support multiple user profiles
- The system can apply top spin to the ball

4.3 High-Level Goals (P2)

The following items encompass the high-level goals of the system:

- The system can hit each square of a 16x16 grid with an accuracy of 75%
- The system can apply top and side spin to the ball
- The system can track the ball throughout the complete path travelled across the table
- The system can shoot from different heights