

McMASTER UNIVERSITY

SMARTSERVE

SOFTWARE & MECHATRONICS CAPSTONE

Requirements Document

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Date	Revision	Comments	Author(s)
10/06/2017	0	Made Template, added sections and comments	Christopher McDonald
10/13/2017	1	Added Overview and reviewed	Christopher McDonald & Sharon Platkin

Figure 1: Revision History

1 Project Drivers

1.1 The Purpose of the Project

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 will 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.

1.2 Stakeholders

1.2.1 The Client

The client for this project comprises of the development team since both the idea and the execution of the project will be preformed by them. It is also important to note the the project advisor, Dr. Alan Wassyng as well as his teaching assistants, will also be involved in the execution of the project to provide guidance and critique the work done by the team.

1.2.2 The Customers

The primary customers of this project are table tennis players. The system should adapt to many playing styles and proficiencies, so segmenting those players down further is not necessary. They are more likely to play competitively, but could also play recreationally with friends or within a club focused around the sport.

The secondary customers of this project are table tennis coaches. Although this system could replace a coach, a coach could find value in using this system to aid in training and assist more than one trainee at one time. The system will provide analytics which can be very useful when training someone over a long period of time.

1.3 Mandated Constraints

The first constraint placed on the project is time. The deliverable dates and presentation dates have been set, with the last day commencing on April 28, 2018. There is also a budget constraint of \$750 for any parts needed to build the final product.

1.4 Naming Conventions and Terminology

The following terms and definitions will be used throughout this document:

- **System:** includes both the hardware and software aspects of the project
- **Team:** all members noted in the *Authors* list
- **User Side:** the side of the table where the user is standing
- **System Side:** the side of the table where the mechanical system is placed

1.5 Relevant Facts and Assumptions

The regulation table size, as stated by the International Table Tennis Federation (ITTF), is as follows: 2.74m long, 1.525m wide and 0.76m off the ground. The table must be a uniformly dark colour with a 2cm-thick white line along the edge of the table, as well one running parallel to the 2.74m side in the middle of the table. The net in the middle of the table must be 15.25cm high. A 3D representation can be found in Figure 2.

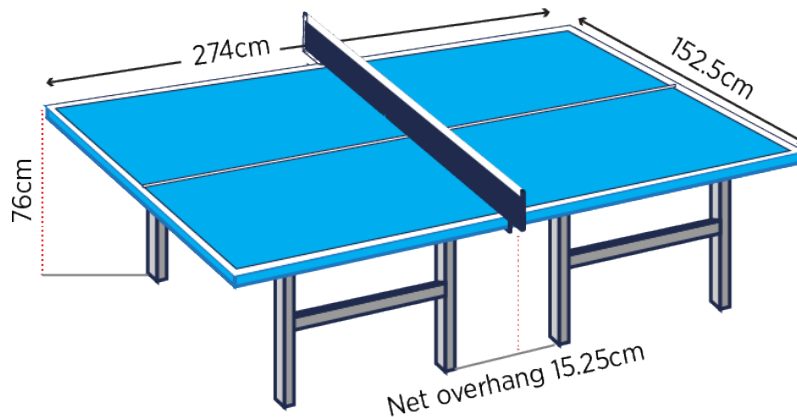


Figure 2: 3D Tennis Table with Dimensions

A valid serve must hit the server's side first, and then bounce once on the other player's side before being returned. After that is done, a valid return would be when the ball is hit by a player, after bouncing exactly once on their side, and bounces at least one time on the opposing player's side. If a serve touches the net and lands on the opposing player's side, it is a *let*. No points are allocated and the turn must be re-served.

2 Functional Requirements

2.1 The Scope of the Work and the Product

2.1.1 The Context of the Work

2.1.2 Work Partitioning

2.1.3 Individual Product Use Cases

2.2 Functional Requirements

3 Non-Functional Requirements

3.1 Look and Feel Requirements

3.2 Usability and Humanity Requirements

3.3 Performance Requirements

3.4 Operational and Environmental Requirements

3.5 Maintainability and Support Requirements

3.6 Security Requirements

3.7 Cultural Requirements

3.8 Legal Requirements

3.9 Health and Safety Requirements

4 Project Issues

4.1 Open Issues

4.2 Off-the-Shelf Solutions

4.3 New Problems

4.4 Tasks

4.5 Migration to the New Product

4.6 Risks

4.7 Costs

4.8 User Documentation and Training

5 Anticipated Changes

6 Appendix

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6.1 Symbolic Parameters