SkillCourt Backend

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## Legal Notices

## Abstract

With athletic training comes a lot of variables, science, and theories. These come to professionals with relative ease, but for the layman, it is extremely rare. The current system for training is primitive, usually involving a coach and a physical field for playing. There is little to monitor progress outside of a person’s intuition and results for live games. The primary objective of SkillCourt is to revolutionize how training for sports is done for everyone. The system will digitalize players’ physical capabilities and track their progress in order to be able to share, compare, and visualize achievements.

With the functionality and portability that SkillCourt offers, the users can create personalized regimens for improving their skills; thus, SkillCourt offers an overall improvement to both the training and playing experience for athletes of all levels.

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## **Introduction**

### Problem Definition

As it stands, training for soccer can be a very cumbersome feat for the average person to endeavor unaided. Without proper guidance, progression dwindles and a person may not feel obliged to continue. With so few places to turn outside of professional help, a new method is needed to fill the void.

SkillCourt is both a new method and an aid to soccer coaching. Offering the routines for honing the cognitive skills one needs for soccer, SkillCourt can be an all-in-one self-trainer for anyone. While SkillCourt alone can be a great method for training, coaches can also join and receive information vital to furthering their players progression.

### Background

When it comes to sports, most people rely on actually playing for practice; few go out of their way to receive proper training. Thus, there are very few platforms that offer a similar experience to what SkillCourt offers. Most of our research for the system comes from our Product Owner who is also a soccer coach. Gummi’s knowledge on the subject and passion for the sport has allowed him to create a vision for the system that will work for both a player and a coach.

Using this knowledge, our aim for this project is to implement this vision with as many features as we can accommodate in the time given. This product will then be used as a base for the final SkillCourt implementation.

### Definitions, Acronyms, and Abbreviations

* **Pad Simulator**: A virtual device which will take the place of physical SkillCourt pads for testing showcasing purposes. This device offers all of the features a SkillCourt Arena will offer.
* **SkillCourt**: A system which uses SkillCourt Pads and a player interface for training soccer.
* **SkillCourt Arena**: A 20’x20’ room with SkillCourt Pads on the walls used for SkillCourt routines.
* **SkillCourt Pad**: A physical device with a flat surface that can measure and transmit when and how much pressure it received.

### 1.4. Overview of Document

Section two of the document is a feasibility study beginning with a description of the current system in section 2.1, moving onto the purpose of SkillCourt in section 2.2. After that, section 2.3 goes into a high level definition of the user requirements. Section 2.4 and section 2.5 contain alternative solutions to the requirements of our system and give recommendations to those systems respectively. In section three we will introduce the project plan. This is divided into the Project Organization in section 3.1 and Identification of tasks, milestones, and deliverables in section 3.2.

The final sections of the document are the appendices and the references. The appendix is divided into 4 parts. The first part is a schedule of the project which will break down the product’s creation into separate parts allowing for a progressive result. Appendix B and C contain a Feasibility and Cost Matrix respectively relaying what each part of the system will be and providing a cost of implementation. Lastly, Appendix B is a diary of the meetings we’ve had so far. Finally, section 5 lists references used for our project for research, planning, and coding.

## **Feasibility Study**

### 2.1. Description of the Current System

Currently, soccer training involves a lot of on-field practice, but offers no physical way to track progress. In fact, most sports do not offer a guided methodology for tracking progress or attempts to offer skill specific training. This lack of guidance and visuals for improvement creates an environment which makes it hard to progress without professional help.

### 2.2. Purpose of New System

As an attempt to overhaul this outdated method, SkillCourt will create an environment which will monitor players’ progression and offer an arena for furthering their capabilities as soccer players. By adding features such as personalized progress analysis and specialized skill training along with the ease of access and portability that SkillCourt pads offer the consumer, SkillCourt will bring a whole new level of training for soccer, and possibly even more sports.

SkillCourt saves data from a player’s interaction with the system and analyzes it to present a visual representation of a player’s strengths, weaknesses, and progress throughout their training. These allow a player to be able to focus on what they need to offering the conditioning required to become an overall better player.

Along with customized user-defined training, SkillCourt will also feature cognitive skill training. SkillCourt’s specialized skill training will offer users access to routines designed to train specific skills for soccer. Along with the analyzed data, a player can choose skills they feel they need to improve upon. Ranging from Accuracy to Speed, a user will find a plethora of cognitive skills related to soccer being offered by SkillCourt.

### 2.3. High Level Definition of User Requirements

This project will consist of creating the back-end for SkillCourt. This includes, but it not limited to, developing a mobile application for SkillCourt, creating a website for SkillCourt, creating programs that SkillCourt players will use for training, parsing data from games to create statistics for player review, and creating a storage database for all data related to SkillCourt. Also, since the pressure sensitive pads for SkillCourt are still in development, we will need to create a pad-simulator which will simulate the pads for testing and showcasing purposes.

The pad simulator is a virtual device which will take the place of SkillCourt pads for testing and showcasing purposes. These pads will replicate the functionalities of the physical SkillCourt pads currently in development. The pad simulator will be able to connect to the SkillCourt mobile application and website, interpret data from incoming pressure, and send the data to the user device. Although not within the scope of our project, when the time comes, the pad simulator will be replaced by physical pads.

The programs created for SkillCourt training will provide users an activity to develop skills and offer training needed for real life soccer situations. These programs will be developed using knowledge from the Product Owner whom has experience with coaching soccer. They will allow for the gathering of data required for determining player analysis and producing progression visuals for the user.

The mobile application will provide the user with access to a large majority of what SkillCourt has to offer its players. Player data and routines as well as access to the game make the mobile application the most vital portion of the project. Without this, players will have no access to the game and therefore will not be able to obtain any data.

Lastly, the SkillCourt website will be the final piece of the user experience. The website will allow players to access their data, but most importantly will provide an interface for coaches to interact with SkillCourt. As the mobile application is strictly limited to player access, coaches will only be offered access to SkillCourt through the website.

### 2.4. Alternative Solutions

The following are a list of the alternative solutions to SkillCourt. We will list solutions what solve the problem SkillCourt was designed for. This is, largely, to offer an alternative to traditional Coach/Player on-field training.

#### 2.4.1. Description of Alternatives

1. Pay for a professional trainer. This will involve locating and paying for a trainer who is highly skilled and is within a reasonable distance from the customer.
2. Self-training through online resources and videos. This will involve researching online and watching videos regarding specific training methods for soccer. Then training yourself with your new-found knowledge

#### 2.4.2. Selection Criteria

In order to be considered a best alternative, we need to find out what best fits the needs of the consumer. The following categories are taken into account for the selection criteria:

1. Cost – How much money the consumer will spend
2. Time – How long it will take for the consumer to see the results wanted
3. Effort – How much effort must be exerted by the consumer to begin the program
4. Travel – The distance the consumer have to go for the training
5. Convenience – How can this alternative method fit into a consumer’s schedule

#### 2.4.3. Analysis of Alternatives

Points are considered on a scale of 1 (Worst) to 10 (Best)

Profesional Trainer:

Cost: 1

Time: 3

Results: 10

Travel: Varies (on average 5)

Convenience: 2

Total Points: 21/50 = 42%

Online Research and Training:

Cost: 10

Time: 2

Results: 2

Travel: 10

Convenience: 10

Total Points: 34/50 = 68%

SkillCourt:

Cost: 7

Time: 5

Results: 6

Travel: 10

Convenience: 10

Total Points: 38/50 = 76%

### 2.5. Recommendations

As the chart above shows, SkillCourt is able to deliver the most consumer-friendly product while still offering a similar level of opportunities for growth as a player. Being both low cost and extremely convenient for its users allows SkillCourt to take an edge over its competition.

## **Project Plan**

As part of our project’s development process, we have created a detailed plan to organize our work throughout the semester. By following it, we will be able to keep track of both the project’s progress and our performance according to our requirements. This plan includes our individual roles, the personnel organization, and the hardware and software resources needed. It also includes a description of our tasks, milestones and deliverables.

### Project Organization

This section discusses the roles of all team members as well as the technologies that will be used to develop the SkillCourt system.

#### 3.1.1. Project Personnel Organization

This section lists the main role of each of the 2 team members working on the project.

Figure . Project Personnel Organization

#### 3.1.2. Hardware and Software Resources

This section describes the hardware and software resources that will be used during this project

Figure . Description of Hardware and Software requirements

### Identification of Tasks, Milestones and Deliverables

Table . Description of tasks, milestones, and deliverables

|  |  |
| --- | --- |
| Tasks | Task Dependencies |
| 1. Collect User Stories | **None** |
| 1. Requirement Analysis | **None** |
| 1. Create Product Backlog | **None** |
| 1. Setup Development Environment | **None** |
| 1. Initial Feasibility Study | **None** |
| 1. Initial Project Plan | **None** |
| 1. Initial System Design | **None** |
| 1. Initial Object Design | **None** |
| Milestone: Initial Documentation Completed |  |
| 1. Begin App Design | **None** |
| 1. Begin App Logic | **None** |
| 1. Begin Database Design | **None** |
| 1. Begin PHP Scripting (App->DB) | **10 + 11** |
| Milestone: Initial App Completed |  |
| 1. Begin Web Design | **None** |
| 1. Begin Web Logic | **None** |
| 1. Begin PHP Scripting (Web->DB) | **11 + 14** |
| Milestone: Initial Web Completed |  |
| 1. Begin Simulator Design | **10** |
| 1. Begin Simulator Logic | **10** |
| 1. Begin Simulator connection (App -> Simulator) | **10 + 17** |
| Milestone: Initial Simulator Completed |  |
| Milestone: Entire System Working |  |
| 1. App Finalization | **9 + 10 + 11 + 12** |
| 1. Web Finalization | **13 + 14 + 15** |
| 1. Simulator Finalization | **16 + 17 + 18** |
| Milestone: SkillCourt Version 1 Complete |  |
| 1. Documentation Finalization | **19 + 20 + 21** |
| Milestone: Submit Final Document |  |

## **Appendix**

### Appendix A - Project schedule

Figure . Gantt chart showing project schedule

### Appendix B – Feasibility Matrix

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Feasibility Criteria | Weight | SkillCourt | Alternative 1 | Alternative 2 |
| Operational Feasibility | 30% |  |  |  |
| Functionality: To what degree does the candidate solution benefit? |  | Fully supports required functionality | Fully supports required functionality | Fully supports required functionality |
|  |  | Score: 100 | Score: 70 | Score: 50 |
| Technical Feasibility | 20% |  |  |  |
| Technology: An assessment of the maturity, availability, ability to acquire, and desirability of computer technology is needed to support this candidate |  | Android and Computer supported | No Technology needed | All smartphones and computer platforms supported |
| Expertise: An assessment of the technical expertise needed to develop, operate, and maintain the candidate system. |  | Medium level of expertise in database, HTML, Java required | None | Very low level computer knowledge required |
|  |  | Score: 50 | Score: 100 | Score: 95 |
| Non-Technical Feasibility | 10% |  |  |  |
| Sporting expertise: An assessment of the level of knowledge required for the candidate system. |  | High level of expertise in coaching and sporting. | High level for coach | None Required |
|  |  | Score: 50 | Score: 50 | Score: 100 |
| Economic Feasibility | 30% |  |  |  |
| Cost to develop |  | Database Hosting: Self Maintained/Schools Resources  Hardware Requirements: Arduino microcontroller, Pad research and development | High cost to pay for coach | None |
| Payback |  | High, although may take time to achieve profit | None | None |
|  |  | Score: 90 | Score: 30 | Score: 50 |
| Schedule Feasibility | 10% |  |  |  |
| Assessment of how long the solution will take to design and implement |  | Over 1 year | Finding coach | Research required |
|  |  | Score: 50 | Score: 95 | Score: 80 |
| Ranking | 100% | 77 | 65 | 67 |

### Appendix C – Cost Matrix

Table 2. Cost Matrix

|  |  |  |  |
| --- | --- | --- | --- |
| Item | Description | Quantity | Cost |
| Human Resources | Team members working on the design, development, and testing processes | 2 | $ 0.00 |
| Hardware Resources | Personal computer | 2 | $ 0.00 |
| Localhost Server to host website | 1 | $ 0.00 |
| Android mobile devices | 1 | $ 0.00 |
| Arduino Pad Controller Device | 1 | $25.00 |
| Bluetooth Module | 1 | $15.00 |
| Pad Hardware and Research | X | Unknown |
| Software Resources | Software (All open source) | - | $ 0.00 |
| Total |  |  | $ 40.00+ |

### Appendix D - Diary of Meetings

|  |
| --- |
| **Meeting 1: Monday 1/19/15** |
| **In attendance:** Andy Martinez, Matthew Santiago |
| **@8:57pm**  Meeting on Mingle starts  **@9:08pm**  Arranging possible meeting times for Requirements Elicitation:   * Tuesday 1/20 9:00 pm * Wednesday 1/21 before 2:00 pm * Wednesday 1/21 after 7:30 pm   **@9:23pm**  Chose for Andy Martinez to be Scrum Master for the first sprint  **@9:28pm**  Sent message to @Product Owner for their preferred meeting time:   * Awaiting reply… * **1/20 @10:43am** Reply Received, Meeting Tuesday 1/20 at 9:00 pm confirmed   **@9:33pm**  Meeting Dismissed |

|  |
| --- |
| **Meeting 2 (Backlog): Tuesday 1/20/15** |
| **In attendance:** Matthew Santiago, Andy Martinez,  Jaime Borras, Gummi Traustason |
| **@9:00 pm**  Conference Call Started  **@9:02 pm**  Introductions  **@9:12 pm**  Stories:   1. Skill development (accuracy, speed, intensity)    1. User chooses skill to train from Android App    2. Measure pressure, time    3. 3 colors red blue green    4. Change to red when underperforming    5. Ball should take 5 seconds to hit the pad, turn red if user takes too long 2. Tracking and analysis    * accuracy, speed, intensity, reaction time 3. Single Player/2 Player    * Social Media Connection 4. Mapping a game  * Pad light up, hit pad with ball in proper time, another pad lights up, hit with ball in proper time, continue until you make goal (certain number of successful iterations) * Beginner, Intermediate, and advanced levels  1. Simulator (simulate a pad)    * Android application? 2. (Backend look at particular game (real game) and simulate a player or play within that game)   **@9:32 pm**  To Do:   * + Meeting with Gummi on 1/21 at 11:00 am in GL 693   + Set-up stories on Mingle   + Set-up tasks for stories   + Set points for tasks/stories   + Review/update stories with Product Owners   + Decide on stories for first sprint   **@9:38 pm**  Meeting Dismissed |

|  |
| --- |
| **Meeting 3: Thursday 1/22/15** |
| **In attendance:** Matthew Santiago, Andy Martinez,  Jaime Borras, Gummi Traustason |
| **@9:00**  Conference Call start  **@9:07**  Review stories  Predetermined Routines:   * Separate Goal Simulation into its own story   Performance Statistics:   * Add statistics about specific game   Competition Mode:   * Separation of social media into a new story is good * Have different routines for single and multiplayer   Custom User Routine:  Pads Simulator  Real Game Simulation:  Social Media Sharing:  Website:   * (Differentiate between coach and player?) * Webpage access   **@9:46**  Meeting Dismissed |

|  |
| --- |
| **Meeting 4: Tuesday 1/27/15** |
| **In attendance:** Jaime Borras, Andy Martinez, Matthew Santiago |
| **@ 6:30 pm**  Meeting starts  In attendance: Jaime Borras, Andy Martinez, Matthew Santiago  **Github upload schedule:**  Matthew upload from 10:00pm - 10:59pm  Andy upload from 11:00pm - 11:59pm  **Weekly in-person meeting:**  Thursday between 2:00pm - 6:00pm to prepare for weekly meetings with project owners  **Coding standards**  */\*\**  *\* Comment goes here*  *\* and here*  *\*/*  *fun()*  *{*  *// random code*  *}*  **Indentation:**  1 tab per pair of curly braces  **Variable names:**  private camelCase;  **Reports:**  **Matthew:** Feasibility report & Initial System Design  **Andy:**  Project Plan & Initial Object Design  **Read up on:**  Android Bluetooth library  Java Databases |

## **References**