

Disc Golf App By

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Abstract:

The UC Disc Golf App is the definitive solution for both new and experienced players to optimize their experience while on the course. With the use of GPS the app allows real-time mapping and visualization of any disc golf course. The UC Disc Golf App allows users to track flight distance for each throw as it happens. The app also provides users with the luxuries of detailed scorekeeping, social media integration, a virtual Disc Bag, and a comprehensive PDGA rulebook. The creators of the app are avid disc golf players looking to lift the sport through passion and innovation. The team planned to integrate a GPS chip into each disc and develop a companion website for the app to optimize the implementation of all its features.

INTRODUCTION

Problem Statement:

According to the Professional Disc Golf Association (PDGA) there are over 7,000 disc golf courses in the United States. The number of active PDGA members grew from 6,320 in the year 2000 to over 30,000 in 2016. This growth rate does not include the number of casual disc golf players, which has grown at an equally fast rate.

With interest in the sport increasing each year, the need for technological assistance also grows. Data regarding course layouts (elevation, length, etc.), score recording, throw distance, and more are vital to a successful round but not easily compiled. Lost discs, player-specific tendencies/habits, and repeated mistakes can compound the already high learning curve of the game. There is a void that can be filled with a companion app capable of mitigating each of these issues through the collection of meaningful data and useful features.

Solution:

The Disc Golf App is a feature-rich application that will provide performance tracking tools, social media integration, course information, disc tracking via GPS, and more.

Course information data will include course layout, elevation, and distance. Users will be provided a chance to record not only their scores, but also disc size and landing zones for future use on repeat course visits. Scorecards will be shared and collated with others on various social media platforms.

GPS tracking will be possible with the addition of small chips that can be placed on each disc to prevent loss on inaccurate throws in heavily wooded areas. GPS tracking can also increase the accuracy of user recorded data as it makes flight paths available in addition to distance and landing zones. The GPS feature can help the player in correcting their throws. Implementing the GPS tracking can help the user and player achieve maximum distance as well as flight paths. This feature can also help a player know what disc to throw and when to throw it.

Disc Golf Discs typically have four numbers on them. A very popular disc for example would be an Innova Destroyer. Most Innova Destroyers would feature numbers 12|5|-1|3, however some discs do not always come with their flight numbers on them but can be found online. These numbers mean 12 speed, 5 glide, -1 turn, and 3 fade. A person throwing a Destroyer would need to throw with a speed of 12 to achieve a flight that is accurate to these numbers. The 5 glide just describes the disc's ability to maintain its flight. If the person is throwing right hand backhand, the -1 turn means the disc will turn some to the right. The 3 fade means that the disc will fade back to the left and will finish overall slightly to the left. A person throwing right hand forehand would just simply flip the direction of where the -1 and 3 would go. So, the right-hand forehand would have a -1 turn to the left and a 3 fade to the right.

Goal:

The objective for the project is to develop a mobile companion app to enhance the experience of Disc Golf players through a combination of data compilation, social media integration, and GPS tracking.

The Disc Golf App will include the following features:

- Aerial view of course layouts
- Tracking/recording flight path, disc usage, distance, and landing zones
- Scorekeeping and social media integration/collation
- GPS chip pairing to reduce disc loss and improve flight path tracking
- Detailed round history/results compilation for course revisits

Overview:

The remainder of this report details how the project was completed. The report has the following sections: Concept, design objectives, approach, budget, timeline, problems encountered, and recommendations.

DISCUSSION

Project Concept:

The concept for UC Disc Golf App was presented to us by Andrew Yochman. There is a growing need and desire for an app that helps track your disc throw on a more accurate level. The only offering now where the throw was started to where the disc ended. We strive to create an app that will let the user judge the throw by speed, height, and distance. We have studied numerous other disc golf apps and discovered all apps are missing this feature. We will create an app that not only tracks the disc, but also lets users keep scores, communicate with other users, and see maps and pictures of courses around the country.

Design Objectives:

We wanted to make our design as user friendly as possible. We looked into many different options from coding the entire app from scratch as well as using different software packages to do the heavy coding for us and allow us to better implement the features we wanted. We started this process using AppyPie. Appsheet was great in the features it included for design and ease of use. However, we discovered there was no way to implement our GPS tracking or scorecard features into this. We made the switch to AppSheet which offers much more on the way of implementing these two features.

Methodology:

Mobile App

The goal for the app was that it needed to be user friendly for all skill ranges of disc golfers. Our team met and conducted research to determine which platform would best suit our needs. We first decided to use AppyPie but the further we progressed, the more challenges we faced when trying to add different features. After further research, we decided to use AppSheet. AppSheet is an intelligent no-code platform that creates apps to transform your workplace. AppSheet allows us to create a mobile app without having to have prior coding knowledge.

Data

Currently our data is stored in Excel spreadsheets and Google Sheets. Our team has decided to eventually transition this data to a database. Our database will consist of course information such as: course name, details, address, and images. Our database will also contain customer/user information, scorecards, prior disc tracking information, and users' discs if they choose to add them.

Security

AppSheet comes with basic security for their Premium Package. Their Pro and Business packages come with enhanced security features such as:

- Security filters and private tables
- Dynamic table update modes
- Secured media files
- On-device encryption

- Secure user roles

User Profile:

There will be 3 different types of users. The first user profile will be for our administrators/developers. Their roles are to maintain and keep the app functional and secure. The second user profile will be for our Partnered Disc Golf Companies. They will serve as a vehicle for Quality Assurance (testing the accuracy of GPS tracking and synching ability before the discs are sold). The third user profile will be for the Disc Golf players. They are our end users and will use the app while playing Disc Golf and supplying locations of courses in the surrounding area to be added by the Admins/Devs.

Table 1 - User - Administrators/Developers

User Profile Form 1
Application: Appsheets
Potential Users: Administrators/Developers
Software and Interface Experience: The administrators and developers will be working with Appsheets which does not require any coding language. They will be fluent and familiar with the different features it has to offer.
Experience with Similar Applications: Not much experience is needed with similar applications. However, some of the best free applications that are somewhat similar to Appsheets would be: Bubble, BiznessApps, AppyPie, and BuildFire. Appsheets is unique in that it is a no code mobile app builder.
Task Experience: Using the different features that Appsheets has to offer. They should also be able to release updates and push the app to be live.
Frequency of Use: Currently, the app/website are still under construction. Their current use will be making updates to existing features and adding new ones. Once the app and website are live, their use will be to keep it live and release frequent updates/upgrades/patches and bug fixes.
Key Interface Design Requirements that the Profile Suggests: The users will simply need to be fluent with Appsheets. The more they are aware of how Appsheets works, they will be able to maintain and release fixes properly.

Table 2 - User - Disc Golf Companies

User Profile Form 2
Application: UC Disc Golf App
Potential Users: Disc Golf Companies
Software and Interface Experience: Fluent in testing design and functionality of apps and GPS tracking. Knowledge of disc golf rules and typical player experience.
Experience with Similar Applications: UDisc, Disc Golf GPS Course Directory, iDisc Golf Scorecard, Waze, Apple Maps, Google Maps
Task Experience: They should be able to use other apps that are disc golf and/or GPS related. Checking the accuracy of the GPS tracking, ease of use, and functionality as well as any other UI aspects that may help/hinder the user experience.
Frequency of Use: Monthly, Quarterly, and Yearly. Anytime a new major feature is to be added to the disc/chip or app they will test the functionality for durability and accuracy.
Key Interface Design Requirements that the Profile Suggests: They will need to be experienced in Disc Golf so they can best relate any needed changes to the developer team.

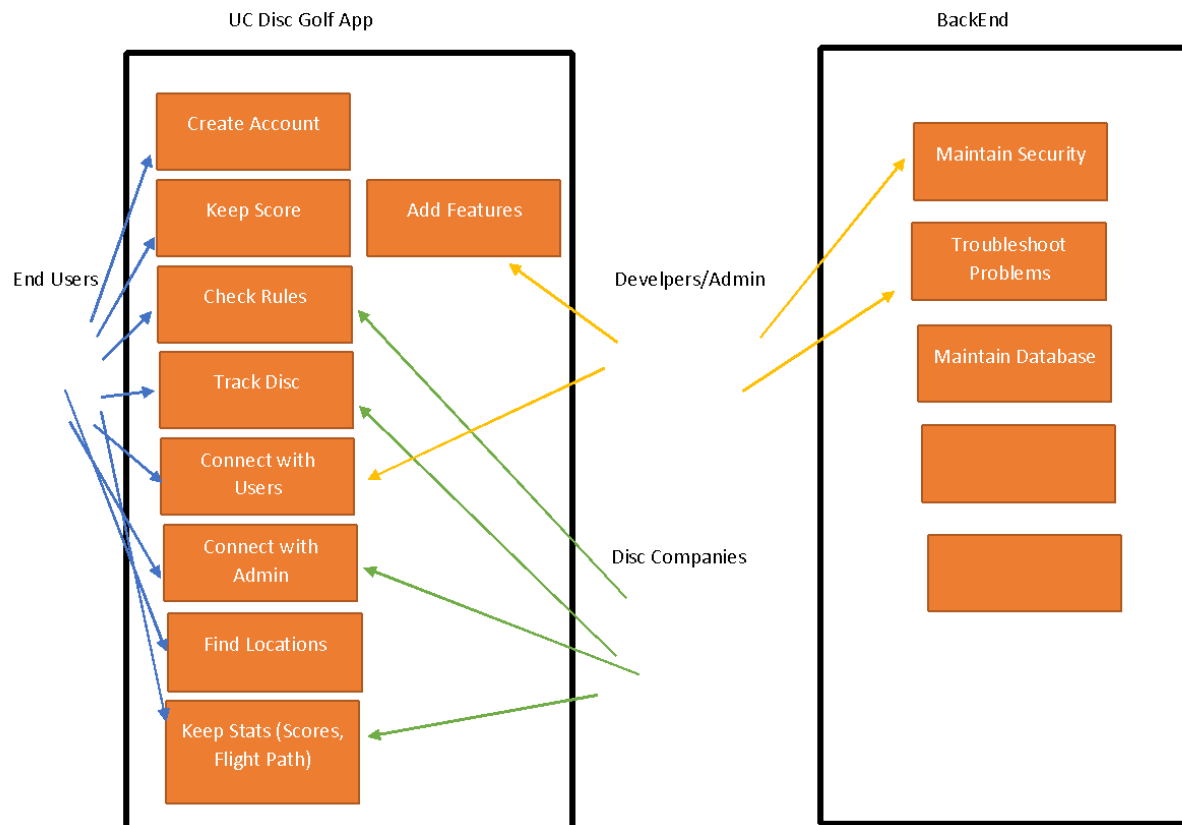
Table 3 - User - Disc Golf Players (End Users)

User Profile Form 3
Application: UC Disc Golf App
Potential Users: Disc Golf Players (End Users)
Software and Interface Experience: Users should have experience with the internet, mobile apps on Android and iOS systems, social media websites, and maps.
Experience with Similar Applications: Google Chrome, Firefox, Microsoft Edge, Safari, Facebook, Instagram, UDisc, Google Maps, Apple Maps
Task Experience: Web page interactions. Account creations (Username/Password). Basic data input (inputting their scores). Use of touchscreen for mobile apps. Looking up physical addresses and directions to locations (finding courses).
Frequency of Use: Whenever the user wants to use the app (at home, on the course, traveling, etc.). This could be multiple times throughout the day.
Key Interface Design Requirements that the Profile Suggests: The UI needs to be easily accessible and designed in a way that a user with any type of experience can use and navigate easily.

Use Case Diagram:

The Use Case Diagram shows how different users will interact. End users, admins, and disc companies will all have different ways to interact with the app. End users will be able to access all front end aspects while disc golf companies will only need to access some features. The developers and admins will focus on the back end and providing updates.

Figure 1: Use Case Diagram



Technical Architecture:

The technologies we used focused around AppSheet. AppSheet is the main software used to help create our app. AppSheet uses Microsoft Excel and/or Google Sheets to row and column creations as well as the data that was kept. It lets the creators take this data and design the user interface. All data that a user enters is then saved into the sheet so their records can be viewed at any time. Webhook is used to create the automatic connection and posts to a user's social media accounts. The creators will need to learn how to use these technologies to help the app function properly and create the best user experience.

Testing:**Methodology and Approach**

The methodology of our testing included taking the app out into the field. Our plan was to manually test the tracking function, scorecard function, social media function, as well as the reliability and ease of use in recording all data.

Test Plan

Our plan involved all of the app creators to go to a local disc golf course and play a round to determine the functionality of the app. Each hole on the course was tracked via the tracking feature to determine if there were any flaws or adjustments that needed made. We also used both the individual and group scorecard features to test the ease of use as well as the database's ability to effectively record the results. The final part of the test was to input our final score and allow the webhook to automatically post to social media.

Test Results

Our testing resulted in the conclusion that the major part of our three features were functioning but did need adjusting. The tracking distance feature worked with no issues found. The user is able to effectively track their throw with a very small margin of error. It was determined that the scorecard would need some updates. To make the app easier for the user, formulas were created to automatically add the users score as well as compare that score to the course par to determine a final score. The user no longer had to take the time to do this. A drop down menu was also added to allow the user to select the course played instead of typing in their own. If the course was not a part of the system, the user could still type in a new course.

Finally, the webhook worked great for Twitter. While it did work for Facebook, Facebook did remove the account associated with our app for unknown reasons. We were unable to resolve this issue in our timeframe.

Budget:

The budget for this includes the monthly subscription for AppSheet, costs for playing on local courses and the average cost of the disc.

BUDGET	
Appsheets	\$5/month
Course Fees	Varies
Disc Cost	\$5-20

Project Timeline:

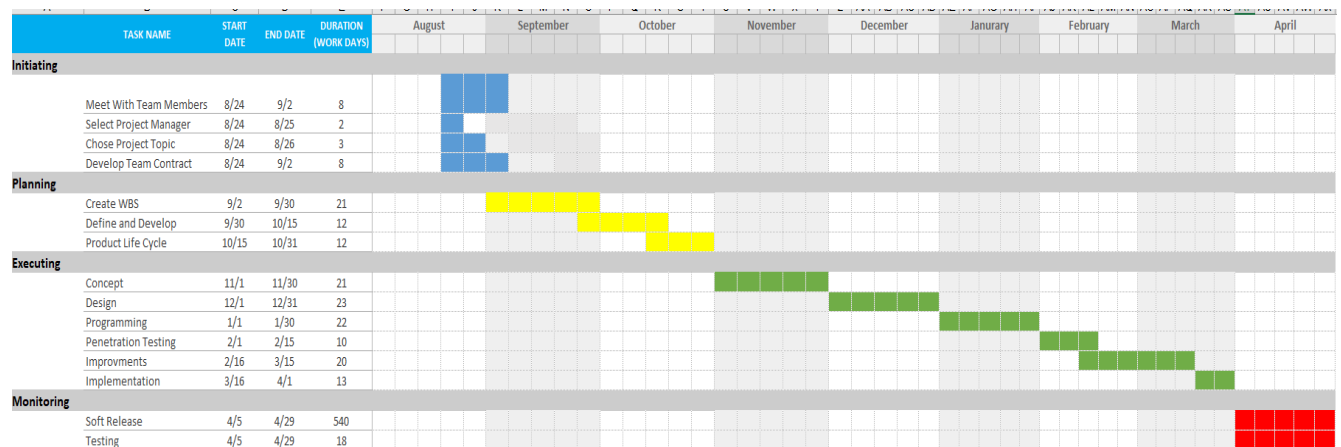
The project timeline will consist of 4 main phases. Initiating, planning, executing, and monitoring. Our timeline begins on August 24th and will end on April 29th. The planning and design will be focused on in the fall semester and the final programming, testing, and release will occur during the spring semester.

The final oral presentation is March 29th, 2021

The Final Report is April 12th, 2021

The I.T. Expo is April 13th, 2021

Figure 2: Timeline & Gantt Chart



Initiating - 8/24 to 9/02 - Blue

Planning - 9/2 to 10/31 - Yellow

Executing - 11/01 to 4/01 - Green

Monitoring - 4/05 to 4/29 - Red

Problems Encountered:

One of the biggest problems we discovered was trying to implement the tracking feature into our app. Our original plan to use AppyPie did not work due to various issues with the platform's structure and lack of support. We researched alternatives and found AppSheet, which allowed the use of Google Maps to achieve satisfactory distance tracking. Considering this is the metaphorical heart of the app, this was a major hurdle for us to overcome. We adapted and adjusted accordingly, and the process was fairly smooth from then on.

Another issue we faced was the social media implementation aspect of the app. A webhook was created to help automatically post round data once a final score was entered by the user.. The integration to Twitter worked great. Facebook, however, was not as cooperative. After one post, the UC Disc Golf App account was banned for unknown reasons and we never got a response from Facebook about why that happened. We will continue to attempt to resurrect that feature.

There were also some issues regarding the scorecard. We wanted to make it as user friendly with as many features as possible. Unfortunately, some of the features we wanted to add did not go according to plan. After much trial and error, a final solution was found.

Analysis of Problems Solved:

The discovery and use of AppSheet was a major step in our goal to add in distance tracking. With distance tracking being our most prominent feature, it was vital that we have the right tools to properly implement it. Looking ahead, AppSheet also provides us with the possibility of

embedding a GPS chip inside the disc in the future. Getting the chip into the disc was just not something that could be done in our initial time frame. Currently with AppSheet and the feature as it stands, users can still track their throw within a very small margin of error.

In the process of creating the scorecard features, we determined it was best to have two different scorecards the user could interact with. The first being a group scorecard that allows the user to input the scores of themselves as well as the players they are playing the round with. While this was a great first step, we felt it needed more. We then began to add the single player scorecard that had more detail about the users round of disc golf. This allowed us to include the course played, course par, hole scores, final scores, an optional picture, and a great spot for the social media implementation.

This led into us solving the social media integration issue. We now found a great spot where the users could upload their Twitter handle and share their results with players from all over the country. This will lead to a more enhanced experience for the user. We want to create an entire community of players and this was a great way to start this feature.

Future recommendations/Recommendations for Improvement:

If we could start from the beginning, Appsheet would be our first choice for creating the app. This would have given us more time to work with the software and potentially enhance or even add in more features to the app before the deadline, specifically enhancing the GPS tracking feature. The embedding of a GPS chip into the disc is the primary objective we would have liked to achieve if we had more time. We feel that would have had a tremendous impact on the overall user experience. It just was not feasible with the time and budget we had.

The feedback we received mainly focused on ease of use of the app as well as greater social media integration. We do plan to make the app as user friendly as possible as well as try to get a Facebook webhook working. This would be in addition to Instagram and other platforms. These are all ideas that, once complete, would greatly improve the usability of the app. Future plans for the app include a soft release to the public, as well as creating our own database to store all of the data, giving us greater flexibility in design and control. We would also like to see if the general functionality of the app would translate to other sports. We feel it would likely be useful for golf and see various uses in football, as well. We plan to continue to improve this app and our desire is to fully release it down the road.

CONCLUSION

Lessons Learned:

We have developed a deep appreciation for how hard it is to design and develop an app. This is not a task that can be done without planning, testing, failure, and an ability to adapt. While we have made great strides towards our ultimate goal, we still have much to achieve. It seems the more we work on the app, the more ideas start to flow. With so many potential routes, deciding what to focus on is sometimes difficult. Because we were forced to make some concessions, we did get better at prioritizing our focus. The end result of the semester's work was a functional app with a foundation that can easily be built upon.

Skills Developed:

We learned much about the planning aspect of creating an app, or any type of technological project. The coursework leading up to this point helped us understand the methodology of planning, but this project has given us firsthand experience on how to create a plan and execute. We have also developed skills in working with app creation software such as AppyPie and AppSheet, constructing and implementing webhooks, managing data, and much more.

Plan to Continue Project:

Our plan moving forward is to simply continue trying to improve the app and its core features. One of our biggest goals is to implement a small GPS chip into the discs. This will allow for improved breadth and accuracy of data when it comes to the throw distance, speed and other attributes. This is also something that no other disc golf app on the market has. This feature would completely set our app apart from current competitors. We would also like to further expand the social media aspect, taking full advantage of numerous platforms in addition to Twitter. We want our users to be able to connect with each other all over the country and beyond.

REFERENCES

AppSheet. (2020, November 08). From www.appsheet.com

Appy Pie. (2020, November 08). From <https://www.Appsheet.com/>

U Disc. (2020, November 08). From www.udisc.com