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WorkoutBuddy

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HNR 499 Final Report

Project Overview

WorkoutBuddy is an iPhone and Apple Watch application to improve safety during outdoor workouts by providing a virtual buddy system. To use the application, a user first sets their planned route for an outdoor workout using a map on their iPhone. Then, during the workout, the application uses the cell phone and GPS capability of the Apple Watch Series 3 to record location data, share it with the user's iPhone, and check whether the user has stayed on their planned route. If the user goes off of their route, their phone sends a text message to a trusted friend to inform the friend that the user has left their route.

Work Completed Summary

The work completed during this project was a proof of concept, meaning that features were implemented in a way to prove that they work but are not necessarily ready for deployment or public consumption. Approaching the project in this way allowed me to spend more time on the research and implementation of the project than the user experience and design of the application.

The first step of this project was to create a way for the user to set a route for their workout. This was completed by using the GoogleMaps SDK (software development kit) to display a map on which the user could drop pins to show what route they planned to follow during their workout. A view of this can be seen in *figure 1* below.

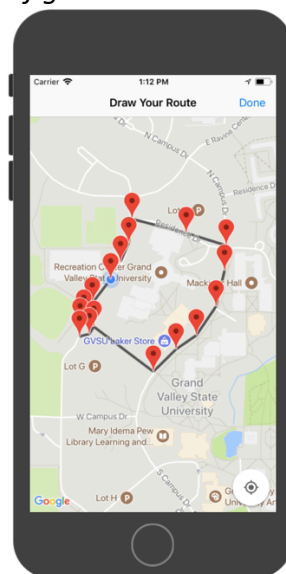


Figure 1: A map view allowing the user to set their route before a workout

After completing the map view, the next step was to get location tracking working on the Apple Watch. This ended up being a fairly trivial problem, as the same code that works for location tracking on an iPhone works on the Apple Watch and I had done location tracking with iPhone apps before. The next problem, however, was not so easy. I needed to determine how to tell if a user had stayed on their route. During some of my earlier research, I found a function in the

GoogleMaps SDK that did exactly this for me, so I planned to use that to implement my solution. However, at the time I did not realize that the GoogleMaps SDK worked only for iPhone and not for Apple Watch as well.

To address this problem, I decided to find a way to share the user's location from the Apple Watch back to their iPhone so I could use the GoogleMaps function. My initial implementation of this required a Bluetooth connection between the Apple Watch and the iPhone, which defeated the purpose of using the Apple Watch Series 3 for this problem. At the suggestion of my advisor, I decided to try communicating from the Apple Watch to the iPhone using a cloud storage database instead. This workaround did provide a fix, so now the Apple Watch sends its location to the cloud database and the iPhone application pulls that information down from the database and uses it to compute whether the user is on route.

While this current solution would not be viable for a production-level application due to security and performance restraints, it was important to proving that this app was still a viable option and that the Apple Watch portion can be used independently of the iPhone. Given more time to work on the project and armed with the knowledge that the GoogleMaps SDK is not a solution for WatchOS, I would look into different solutions for calculating whether the user is on route that worked on the Apple Watch's hardware. This would cut out the database as the middle man and eliminate the need to communicate between the watch and the phone while a user was doing their workout.

Once location tracking ability was enabled, I needed to place in the final piece where a user's buddy would get notified if the user left their route. This step provided another unexpected hurdle during the project. While initially this seemed like it would be a straightforward task, it turns out sending a text message programmatically is surprisingly difficult. Most vendors want the user to explicitly click send, so they don't allow messages to be sent behind the scenes. After much research and several failed attempts (including Gmail, WhatsApp, Facebook Messenger, and Telegram), I came across Twilio, which allows a user to send a text message programmatically. After spending some time working through their documentation, I was able to get this working and successfully send messages to a buddy when the Apple Watch user left their route.

Reflection

The chance to work on the WorkoutBuddy application was a very exciting one for me. This is an idea that I have had in my head for several years, but only recently did the hardware become available to make it a reality. The idea for the app came to me as I was heading out for a run one day. None of my roommates were home and as I started my run, I realized that nobody knew where I was headed or to keep an eye out for me. If I got injured or lost, nobody would know to come find me, and I do not like taking my phone running with me so it would not be easy to call somebody for help. At the time, I owned an original Apple Watch that I used for my runs and wondered if there was a way to turn this into a safety mechanism during my workouts.

When Apple announced their Series 3 watches in the summer of 2017, I was excited to realize that my app idea had become a possibility. Working on this project has forced me to grow my development skills in the Swift programming language. I faced a lot of interesting challenges along the way during this project, and they stretched my knowledge and programming abilities for iOS. This was also my first time working on watchOS development. I found that the Apple Watch presented a unique challenge because it is a device with very limited capabilities and development libraries. I had to be careful not to bog down the watch side of the application during my design process, which forced me to think very differently from my previous iOS design experience.

One of the biggest takeaways I had from this project was a greater ability to perform self-directed research and project work. While I was able to meet with my faculty advisor every few weeks, it was my responsibility to get the work done on the other weeks when there were no deadlines. One of the toughest parts about this for me was learning to think about problems in new ways without depending on a peer or advisor to be a catalyst for new ideas. If I was not able to implement something the way I had hoped, I felt that it was my job to show up to meetings with my advisor well-prepared with an explanation of why the solution did not work and with well-researched options for other solutions. This forced me to think outside of the box without depending on my advisor to solve my problems for me. While this was a difficult part of the project, it was also very rewarding. It gave me the opportunity to identify a weakness in my professional knowledge and to begin working to grow in this area.

There is no future work officially planned for WorkoutBuddy, but I would like to continue spending time on it as a personal project. I hope to eventually work out a better solution for tracking a user's progress on the Apple Watch that would be secure and scalable. Once this occurs, I would plan to revamp the structure and design of the frontend application to be user-friendly so that perhaps I could share it with some friends to test out for me and, maybe, launch to the App Store in the future.

Working on this project was a wonderful experience and I was very excited to see the future possibilities of an application like WorkoutBuddy begin coming to life. The research I performed this semester gave me valuable knowledge that I can carry into future work on this project, but it also allowed me to grow as a professional. As I graduate and move into a career as a software developer, I am excited to take the lessons that I learned on this project with me as I continue to grow and learn more in the tech industry.

Acknowledgements

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semester, and the lessons and skills I learned during the project are valuable ones that I can carry into my future career. Thank you for your continuing support of student research efforts at GVSU.