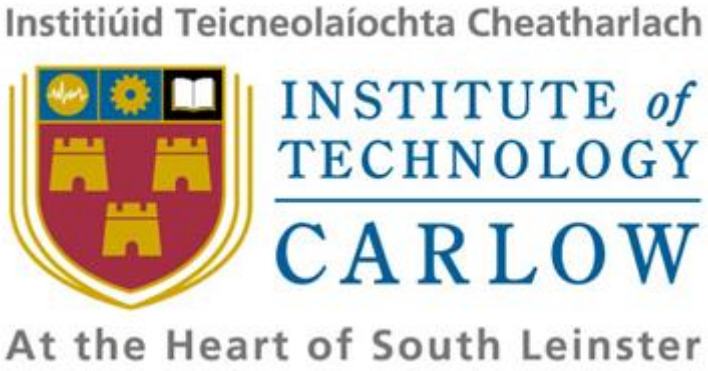

Final Year Project,
Final Report,
Gym and Analytical App/Dashboard.

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Contents

1. Introduction

With the creation of this document my final year project of creating a gym and fitness application which I called “Revolute Fitness” is coming to an end.

The purpose of this project which is outlined in more detail in the “Functional Specification” document was to create a gym and fitness app to help users track their fitness whilst also providing features personal trainers to interact with and manage their clients. Another part of the project was to research into the implementation of machine learning into areas of fitness which could further benefit the users.

With this report, I hope to portray how the project went for me overall by providing a description of the project, discussing how the project ended up following the functional specification outlined at the beginning of the project. What I learned personally and technologically throughout this project. A review of the project following some pre-defined questions. And Acknowledgements to all does who helped me throughout the project.

2. Project Description

So Revolute Fitness is an application which was designed to give the user a better fitness experience. In a day where technology is being used in so many ways to improve our lives, from home entertainment to portable computers known as smart phones which people do not release are more powerful than the computer that was on the shuttle that got NASA to the moon all that time ago. Even with all this technology today many people who want to keep track of their fitness, their workouts and their progress still are using paper. So, with Revolute Fitness the idea was to provide a user a centralised location in which they can manage their fitness regime.

To do this first the application needed to be mobile friendly and be supported by as many platforms as possible, due to the nature of the user using it they rarely will be in front of a computer screen when wanting to access this application that's why Ionic was used to make a friendly mobile app. With this the app needed to allow the user to create workouts to keep track of what they need to do in the gym, but also, they need to be able to track their progress so the ability to record workouts needed to be implemented as well.

With this a way for the user to truly be able to see how they were progression, weather to see if the workout they are doing is working or just being able to see their progress as a means of motivation it is a very needed feature. So, using various graphing technologies to visualise the users recorded workouts in the form of a graph where they can see where they were 3 months ago compared to now was also a big incentive.

With this application I also wanted to target the industry of personal training which is currently booming at this time with the ever-growing presence on social media and so on. So with this in mind The application was also developed to meet the needs of personal trainers by also allowing them to add their clients, manage their fitness regimes and view their progress all through the application, giving them a central place to manage all their clients, making their work easier and more effective.

Another area of interest investigated with this application was how machine learning could be implemented in the fitness area to aid and help users. This was merely a research side of the project and it had to do with image analysis and researching the viability of it when it came to fitness. So using image analysis on the app it can classify between squats and bench presses, proving with more investment in time and development it is possible to eventually get to a point where image analysis could be used to analyse how a person is completing an exercise and provide tips for improvement on form and so on.

3. Conformance to Specification/Design

So, with this project, it was worked on over the course of the college year beginning in September and subsequently ending in April, with this also including the design and planning phase, the actual application did follow the functional specification mostly.

So, the most focused on part of the specification was to provide a central place for a user to keep track of and record their fitness regime. This is fact was completed with the features on the app, minus one small section, the adding of similar features as the workout but in the area of nutritional management which was left out due to time constraints.

Also the implementation of the personal training features allowing them to interact and manage their clients was met, which was very important to this project as it was its unique selling point in which a lot of fitness apps today lack on and with it being an ever growing market I wanted to make sure this feature got in.

Another key design feature which was also outlined many a time in the functional specification was the use of a clean UI with simplistic and quick usability of the application and features. This was needed due to many people not wanting to spend time routing through an application trying to figure out how to use it and so on. So, the application was designed in such a way to be clean in look and simplistic in use.

Following on from that, the functional specification also outlines the research idea in what I hoped I could be done with machine learning. The idea itself was far-fetched for me to achieve by myself especially in these time constraints and if it were easy many companies would have developed the feature themselves to date. But I do believe through what I have developed as an image classifier, that I have proved that machine learning could have a place in fitness especially through the easy use of an app and could really benefit users.

4. Learning Outcomes

4.1. Personal

With this project and my 4 years in college altogether I feel I have learned a lot which will be extremely beneficial for me once I start in the workplace but also in my life in general.

I feel personally what I have gained the most during this project is a real experience in problem solving and getting things done no matter what. This project came with a lot of challenges, learning new frameworks, languages, using new technologies and so on and with this came a lot of sticking points and problems that needed to be overcome to complete this project. This skill of problem solving which I now have great experience with has given me the insight to be able to look at any problem objectively and programmatically devise a solution or a plan to tackle to problem and devise a solution. This was one of the more beneficial parts of the project.

Along with this time management was another skill which was truly tested throughout the duration of this project. From meeting deadlines of getting different documents completed and drafted at the beginning of the college year, to breaking up my time between the project itself and various other subjects which I also needed to give time too. Along with actual time management spent between the different features I wanted to complete throughout the application. Along with this time management also came with knowing when to give myself a break from all the work to recharge and get a better view on things as a whole, I often found when I'd get stuck into something that I would nearly get tunnel vision this meant when reaching a problem I could be stuck at it for hours when actually it had a simple solution but I didn't see it because I was to focused and tunnel versioned to notice it. So, learning when to step back from something and come back to it was a big achievement during this project.

4.2. Technical

With the technical side in mind, during this project I learned and got a lot of experience with new technologies and how to best apply them. With this project I learned about.

- Xamarin (which I choose not to use and will be discussed later)
- Ionic Framework (Xamarin's replacement)
- Angular
- Googles Firebase
- HTML5 and CSS
- Visual Studio Code
- Git
- Python
- Tensorflow and Open Computer Vision
- Flask
- Jupyter Notebook
- PythonAnywhere

So, with the beginning of the project the first framework that I tried with developing this application with was Xamarin. I had heard many good things about Xamarin during my placement during the summer and thought it was the perfect solution. Later I found out its design pattern for creating an application is not like one I have used before and so it became very difficult to try learn, following this I moved to Ionic after hearing about it from friends and the technologies it used were similar to those I had used before.

After trying Ionic which is built on web technologies it took a bit of learning, but I became comfortable in using it. With only having the basic JavaScript experience from second year in college using typescript, angular JavaScript language, was I a lot nicer and easier to use than native JavaScript itself. I learned well how to complete complex tasks using http requests and so on to integrate with my backend and used various modules to aid in the development process. All in all, I think it was a great framework to work with and very beneficial to learn.

Ionic itself provided very clean UI components which I could style to my own liking and again followed the principle of what I wanted my application to look like. Along with that it came with many resources online to begin learning the language and then had an very understandable format to deploy my app on weather that be a website as a web app or a mobile app through the Play Store for Android or the App Store for IOS.

Firebase was also completely new to me but through research I found that it integrates extremely well with Ionic, so I went with this as my back end. With this I used a real time database which I had no experience with before and meant that data would be stored in json format instead of using SQL like I was used to. This in turn was a bit to get my head around but I became comfortable with it and really enjoyed it.

One of my biggest fears for this project was the machine learning aspect, with machine learning being somewhat complex itself and only beginning to learn about it this year I felt a bit in over my head at the beginning with what I had taken on. But saying this through my learning in my Data Science class I became very interested in machine learning and enjoyed learning how to use Tensorflow which I used to create my model and machine learning feature in the application. Machine learning is very prominent in the industry today and I was glad to get experience with it.

5. Project Review

5.1. What went as planned?

With this project I am happy to say at the end majority of what I had planned went to plan, I have developed many of the features I discussed at the beginning had to leave out a couple due to time constraints and during the development of this project thought of many new things I would do with the application.

The first and only hiccup with this project was initially choosing to use Xamarin which cost me a lot of time at the beginning of the project. But with the change to Ionic I was able to quickly learn and develop the features I wanted.

With that in mind the application is in a place now where I can say I am happy with it and how it went according to plan and I am proud of how smooth it went. With that I think the project went a lot smoother than I expected and I am happy with it.

5.2. What difficulties were faced?

The first difficulty which I have briefly mentioned elsewhere was first deciding to use Xamarin as the framework, I feel I had tunnel vision, due to what I had heard about it and if I were to go back again I would have done more research at the beginning on how to use Xamarin so that I would have seen from the start not to use it due to its initial step learning curve.

The second difficulty I had was trying to find a way to deploy my machine learning model in a way that it could be used and utilized with my app. With mobile application only now starting to integrate with machine learning there are not many resources online on how to do this. I spent nearly two weeks trying to find a solution which was a lot of time that could have been spent elsewhere. Following this I decided PythonAnywhere was the best solution for me to use to deploy my model and make use of it from my application.

Also, one of the things I wanted to do with the application was bring it for user testing and get feedback. This was not possible due to the Covid19 crisis with all gyms closing and not being able to effectively communicate with people. If that were not the case, I am member of the IT Carlow Power Lifting team and I would have gotten other members to try out my app, test it and provide feedback on where to improve it.

5.3. What changed and why?

At the beginning I had decided I was going to make this app with Xamarin following a few months of trying to develop a login authentication system I knew I had chosen the wrong framework and that this should not have to be this complex to do. Following this I changed to Ionic after getting some recommendations to do so and after doing some research into it I decided to stick with Ionic as the main framework and was able to begin developing the functionality I wanted.

5.4. What advice could I offer someone attempting a similar project?

If someone was taking on this project or similar the first piece of advice I would give is make sure to put a lot of time in the beginning for your planning and preparation, I found a lot of problems I ran into could have probably been mitigated if I had spent more time researching and so on. As the famous saying goes “Failing to plan is planning to fail.”.

Also, I would strongly recommend user testing and getting feedback. This is viable because as a developer you are really biased in how this application works and feels so the feedback you can get from an unbiased source would be very valuable.

5.5. Did I make the correct technological choices?

I feel in the beginning the only technological choice I made that was incorrect was using Xamarin, but this was quickly mitigated by changing to Ionic. Ionic met all my requirements along with choosing firebase to go along with it. I feel these were the correct choices and I can say that has been proven with the completion of this project.

5.6. If I had two more months, what would I aim to achieve?

If I had two more months with this project ideally what I would aim to achieve is first more enhancements to the UI and UX along with the implementation of the nutritional tracking feature in which I talked about.

Also, user testing would be a big thing and I would try use that to gather some feedback on ideal features to work out on the application along with trying to find any bugs and mitigate them.

I would also like to do more work and research into my machine learning implementation due to my interest in the area and its overall benefit to the application.

5.7. Do I think the project is a success?

Overall, I do believe my project was a success, I completed what I set out to do in developing a fitness application where users could manage and track there fitness regime and also give personal trainers the ability to manage their clients and so on.

Not only was it a success due to this but also because of its meaning in the first place. The projects aim is to give the student a platform into developing a full industry standard project from start to finish giving us experience and knowledge in all parts of the development lifecycle, and also give us a chance to showcase what we have learned during our time spent in college and really show off our skills. Overall, I learned so much from this project and was glad of the experience with it.

6. Acknowledgements

Finally, I would like to thank everyone who helped me throughout the duration of the project and my years in college. From friends and supervisors having a look at what I have done and giving feedback, to discussing and developing ideas on features and problem, I am very thankful.

I am also very thankful to Greg Doyle who was my project supervisor who helped me plan out the idea for the project and was very beneficial in providing advice to what work to get done and with solving problems.

7. Appendix

7.1. Declaration

- I declare that all material in this submission e.g. thesis/essay/project/assignment is entirely my/our own work except where duly acknowledged.
- I have cited the sources of all quotations, paraphrases, summaries of information, tables, diagrams or other material; including software and other electronic media in which intellectual property rights may reside.
- I have provided a complete bibliography of all works and sources used in the preparation of this submission.
- I understand that failure to comply with the Institute's regulations governing plagiarism constitutes a serious offense.

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Date: 20/04/2020