

GreenImpact
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Submitted to
the Faculty of the School of Information Technology
in Partial Fulfillment of the Requirements for
the Degree of Bachelor of Science
in Information Technology

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April 2021

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ABSTRACT

Green Impact is the ultimate solution for users to have a better understanding of environmental problems and realize that everyone can contribute to solving environmental problems. Green Impact combines a feed of information, maps of locations of recycling centers, tracking of green activities, and a score feature for users to track progress. Based on the research of Pew Research Center surveys dating back nearly two decades, nearly as many Americans say protecting the environment should be a top policy priority (64%) as say this about strengthening the economy (67%) (February 2020). This paper discusses the work, development, and implementation of GreenImpact which is a mobile application to allow users to find new ways to have a better impact in their lives and in the community.

Introduction

There are many unique challenges presented to our society in today's day and age, and among the most significant of these challenges is the issue of climate change. This is an issue that everyone can play a part in improving, and many people are unsure how they can have an impact. Currently there is no platform for individuals to easily access information for improving your environmental impact and getting involved in community efforts to better the community. Traditionally individuals had to take it upon themselves to research green living tips. Our platform will present this information to the users in one convenient location so they can stop searching and spend more time having a better impact.

1.2 Problem

As scientists have begun to better understand climate change, the situation is becoming more and more urgent, as we continue to pollute and damage our environment. This issue affects everyone, as we all can have an impact on our community. If no action is taken, climate change will continue to damage our environment. More Americans than ever are taking an interest in climate change, in a 2018 study, it was found that seven in ten individuals were at least “Somewhat concerned” about climate change. Many of these individuals are left to feel helpless on the issue. This is an important issue to solve to protect our planet and ease the minds of the public.

1.3 Solution

Green impact is a mobile application that provides the user with a feed of information on green living tips and advice. In addition to the educational resources, users will also be able to view a map containing locations of recycling centers and community cleanup efforts along with

social welfare projects. The user will be able track their green activities and will be rewarded points for doing so. Users will be able to share what they find on our app on outside social networks, such as Twitter and Facebook, as well as being able to track their actions and see how they stack up against others in the community. The goal of our project is to show people that they can have a positive impact on their community and their environment in their daily lives. We believe that people will be able to put their minds more at ease, knowing that they will be making an impact. Letting everyone know and participate in environmental protection is the most important mission of our app and make people aware of the seriousness of environmental problems, but also realize that they can contribute to solving environmental problems.

1.4 Project Goals

The main goals for GreenImpact are to provide the user with a feed of information on green living tips and a diary feature so that users can track their progress. The other goals of the project are to show users recycling centers around their city as well as establishing a way for organizers to plan community improvement events. With these features, users will be able to find ways to have a better impact in their daily lives.

1.5 Overview

Throughout this final report, there will be information on how the project was completed. The report includes in-depth processes and includes the following sections: design objectives, methodology, budget, timeline, problems encountered, and future recommendations.

2. Discussion

2.1 Project Concept

The concept of GreenImpact is to exist as a social welfare application that will serve the community and help people better understand how their actions can affect the world around them. Users will be able to use GreenImpact everyday to find new ways to be more environmentally friendly. The application will also allow users to track their progress with an activity log and will be awarded a green score for their actions. Not only this, GreenImpact users will be able to see a map of their community with helpful information such as the location of recycling centers near them. GreenImpact is a tool that will help to help reduce worry related to climate change by showing users that they too can have an impact.

2.2 Design Objectives

In our initial brainstorm for this project, the team had many big ideas, some that were feasible, and some that were beyond what would be possible to accomplish. The basis of the program was a feed of information for the users. With this initial goal established, other potential features were discussed. One feature that was briefly discussed was for the app to have a messaging service for the users. The team decided that this might be a bit beyond our capabilities, so we had to move on from this feature. One of the main features that is being developed is the articles feature. This feature allows the users to post and view articles that have been written.

2.3 Methodology and Technical Approach

GreenImpact is designed as a mobile application with ease of use heavily considered in development. Our application currently has four main tabs for the users to use for navigation. The article tab contains articles that users posted. Users will be able to use this tab to review what they have posted. Next to that is the hot tab, where users can find articles that have been posted by other users of the application. With the find tab, users will be able to search through the articles and find a specific one that they may have been looking for. These tabs can be easily accessed on the bottom of the screen to serve as a navigation component for the application. The database for the application is made with Google firebase and MySQL, both are free tools that allow for the creation of the tables for the data. These tables consist of login, comments, and picture tables to store the user's info, what text they wrote within the app, and a table for images as well. Currently the application is running a local server using a free tool called Tomcat, to achieve connection between the local database and the application.

2.4 User Profile

User Profile breaks down the targeted audience of our application and the experience that we want to provide to these users. We will continue updating our user profile to ensure that the application meets the needs of our users.

Figure 1 User Profile

Basic User

Application: GreenImpact application
Used by: Standard User

Necessary Software Experience: Users should be familiar with social media sites like Facebook. Users should also have familiarity with google maps and google news feeds.
Similar Application experience: Google News, Google Maps, Facebook, Twitter
Task Experience: Users will scroll through the news feed, log their activities, view the community activity map, and compare their scores with others in the community.
Frequency of use: These users will use the application whenever they accomplish a task, search for an event, or want to check their progress against others
Key Interface Design Requirements: Users must be able to navigate throughout the application quickly and confidently. They will also need to know that their information is securely stored.

Developer User

Application: GitHub, Android Studio, Firebase database services, HTML, CSS
Used by: Development Team
Necessary Software Experience: Familiarity with GitHub and Android Studio. Users should understand the languages of development.
Similar Application experience: Prior work with HTML, Java, Kotlin required. As well as experience with repositories and database integration

Task Experience:

These users will need to combine various skills across applications to create a functioning product as described in the team contract.

Frequency of use:

Once the development of the product is complete, these users will be called upon as needed to aid in bug fixes, as well as maintain security compliance. These users may also implement features after development, should the need become apparent.

Key Interface Design Requirements:

These users must be able to understand and implement the tools for development, in order to create a successful product

Organizer User**Application:**

GreenImpact application

Used by:

Organizer User

Necessary Software Experience:

Users should be familiar with social media sites like Facebook. Users should also have familiarity with google maps and google news feeds.

Similar Application experience:

Google News, Google Maps, Facebook, Twitter, Facebook Groups

Task Experience:

These Users will have access to the same features that a basic user can see, plus the ability to create events for the community map.

Frequency of use:

These users will use the application just like the basic users would, with the added ability of being able to create a community event whenever they would like

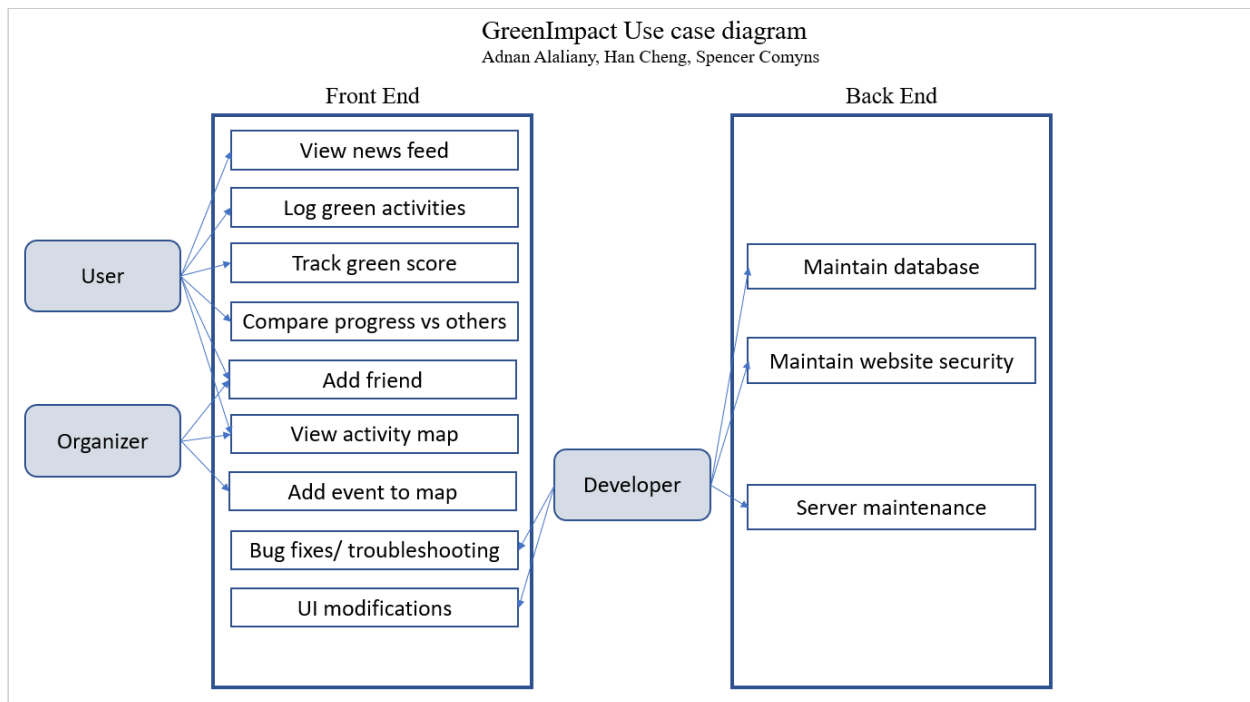
Key Interface Design Requirements:

Users must be able to quickly and confidently navigate throughout the application. They will also need to know that their information is securely stored.

2.5 Use Case Diagram

Use Case Diagram depicts each component of our application that users will interact with. We have outlined which components are going to be utilized by the basic users, developers, and organizer users.

Figure 2 Use Case Diagram



2.6 Technical Architecture

Our team strategically chose the technologies we would use for our project. These technologies cover the Mobile App, Database, and Server architecture. Though they all require training to use, many of them are easy to learn. To keep the technologies updated and relevant, the business owner will need to be able to understand them. This explains the reasoning behind our technical architecture.

The architecture of the mobile application is built from Android Studio. This is the most technical choice for our project, and it is maintainable for the business owner to manage at back end. Then, we have a few functions set up within our mobile application for users' functions. This includes posting their own articles and thoughts, reading information and news about Green and being environmentally friendly, and then users will be able to search old articles that they posted.

The architecture of the database is designed to work better with android studio. We are using Google's Firebase for database and authentication. Then, we will plan to upload the database and all the information to an online server to make sure that all the things are implemented correctly.

2.7 Scope and Objectives

The scope of Technology is divided into three parts: Mobile application, database, and server. The mobile application is built by android studio, and it is the front end that lets our users interact. The database is built by Google's Firebase to store data and authentication. The server is built by Tomcat. it connects with our mobile application and database. We will need to make

sure that it is working greatly and smoothly. The objective is to make sure the technologies we are implementing in the project are being used and can be maintained.

2.8 Budget

Budget illustrates the financial requirements of the GreenImpact application. When calculating the total cost of this project, we factored in the estimate of total time required for completion, and the average pay rate for young professionals in our given roles.

Figure 3 Budget

Project Asset Type					Funding Source (if applicable)				
Infrastructure					Self				
Our application will serve as a platform for people to find out informat					This application is being developed by the GreenImpac				
Risk Identification (See Risk Types tab)					Project Stakeholder(s)				
	Risk Rating* 1-5 (\$ is high)	Comments	Weight	Score	The project's only stakeholders are the development team.				
Work Effort (days)	4		40%	1.60					
Complexity	3		60%	1.80					
Project Risk Score:				3.40					
Estimate of Benefits									

2.9 Timeline

Table 1 Timeline

Major Project Timeline	
Fall 2020	
Project Initiation	8/24/20
Brainstorming	8/24/20
Team Contract Submission	9/1/20
Begin Research	9/7/20
Main Framework Building	9/25/20
Project Abstract for Tech Expo	10/12/20
Use Case/User Profile	10/19/20
3-Minute Elevator Speech	10/19/20
Login Page Created	10/23/20
Main page Created	11/06/20
Draft Report	11/09/20
Information Feed Page Created	11/20/20
Final Presentation	11/30/20
Final Report	12/07/20

Major Project Timeline	
Spring 2021	
Return from Break	1/11/21
Create Testing Plan	2/8/21

Find Database Solution	2/18/21
Begin Application Testing	3/1/21
Map Feature Implementation	3/1/21
Finalize Testing Phase	3/19/21
Present to Class	3/22/21

3.0 Test Plan:

3.1 Overview and Methodology

This part is designed to test details for Green Impact application. The testing methodology is divided into three sections: functionality testing, UI testing and database testing.

3.2 Scope and Objectives

The scope of the testing contains all aspects of the project: functionality, UI and database. The testing ensures the availability of the application, and enhancement based on the result of testing improve ease of use.

3.3 Functionality testing

Functional testing of the application is to ensure that the various functions of the application are running successfully, we do this by using test cases to each function of our application.

The functionality testing contains following parts:

1. Is the application can open successfully after installed?
2. Is the switch between the application pages smooth?
3. Is the login process correct?

4. When returning to the application from background, check whether it stays in the previous operation interface?
5. Is the location and camera services can be accessed normally?
6. Release information service allows the user to public information.
7. Map and location services display the map around the user.
8. Ranking list service displays the ranking list of user friends based on score.

Functionality Test Cases				
ID	Work Item Type	Title	State	Result
1	Test Case	Is able to run the application	Completed	Pass
2	Test Case	Is able to login the application	Completed	Pass
3	Test Case	Is able to switch between each pages smooth	Completed	Pass
4	Test Case	Is able to stay in the previous operation interface after returning to the application from background	Completed	Pass
5	Test Case	Is able to visit the camera service	Completed	Pass
6	Test Case	Is able to release information on content_new page	Completed	Pass
7	Test Case	Is able to display Map on Map page	Completed	Pass
8	Test Case	Is able to create, delete, modify and search spot on Map	Completed	Pass
9	Test Case	Is able to add friend, and display them on virtual_coin page	Completed	Pass
10	Test Case	Is able to change picture of the account	Completed	Pass

3.4 UI testing

Test the layout and style of the user interface, such as menus, dialog boxes, windows and other controls. Whether the text is correct, whether the page is beautiful, and whether the operation is friendly? Including user-friendly and handleability.

The UI testing contains following parts:

1. Is the navigation help accurate and intuitive?
2. Is the operation of each control convenient and unified?
3. Is the content of the input box description consistent with the system function?
4. Is the content of the input box description clear?

UI Testing Test Cases				
ID	Work Item Type	Title	State	Result
1	Test Case	Navigation help is accurate and intuitive	Completed	Pass
2	Test Case	Each control is convenient and unified	Completed	Pass
3	Test Case	Content of the input box description consistent with the system function	Completed	Pass
4	Test Case	Content of the input box description is clear	Completed	Pass

3.5 Database testing

Database testing is the process of elaborately designing a batch of test cases (input data and expected output results) according to the internal structure of the database and using these test cases to run the database to find errors and defects in the database.

The database testing contains following parts:

1. Is the database really recorded or updated after the user does something on the application?
2. Is the stored procedure fully functional?
3. Does the database input correctly accept and output the correct result?
4. Does the database add, update or delete data correctly?
5. Is the sensitive information such as passwords stored in clear text?

6. Does the application provide a cancel command before data deletion?
7. Do not corrupt or remove any content in the application without the express permission of the user.

Database Test Cases				
ID	Work Item Type	Title	State	Result
1	Test Case	Select * from think_article	Completed	Pass
2	Test Case	Select * from think_daily_user	Completed	Pass
3	Test Case	Select * from think_user	Completed	Pass
4	Test Case	Select * from think_user_friend	Completed	Pass
5	Test Case	Select * from think_impact_mapspot	Completed	Pass
6	Test Case	Can access the database	Completed	Pass
7	Test Case	Can add, update or delete data in think_article table	Completed	Pass
8	Test Case	Can add, update or delete data in think_daily_user table	Completed	Pass
9	Test Case	Can add, update or delete data in think_user table	Completed	Pass
10	Test Case	Can add, update or delete data in think_user_friend table	Completed	Pass
11	Test Case	Is able to add, update or delete data in think_impact_mapspot table	Completed	Pass
12	Test Case	The password column of think_user table is stored in ciphertext	Completed	Pass

3.6 Problems Encountered and Analysis of Problems Solved

One of the problems we encountered was scheduling. It can be very difficult to get everyone together to work at the same time. An important issue that the group has been able to overcome is the scheduling conflicts that prohibited our initial communication issues. The group realized that by scheduling time outside of the class periods to work we were able to be much more effective in communication and have a better understanding of the tasks at hand.

When working on a group project, having everyone on the same version can sometimes be tricky. Our group ran into some issues with version control on GitHub, making it difficult to proceed at times. The group had to quickly come together to make sure that all our versions were straightened out. This allowed us to be more productive and helped to get everyone on the same page.

3.7 Recommendations for improvement

There are some areas where improvements can be made. One big thing is that we could expand upon the map element to make that more intuitive. There are also some modifications that could be made so that users can share the virtual coin page on the news feed for others to see. There could be some work to be done as well in the way of the friends feature and creating more intuitive results on the news feed. There are many ways this could go if it is picked up for further development.

4.0 Conclusion

4.1 Lessons Learned

Throughout this semester, there have been many lessons to learn. A big lesson that was learned by the group is the importance of being active in communication. Making sure that every team member is on the same page is a vital part of putting together a project such as the one we are undertaking. Communicating your issues to the group allows for everyone to focus on the same issue and bring forth some solutions to the problems that have occurred.

This semester especially, it has been a challenge adapting to the new fully online mode of learning. Not being able to meet face to face can pose a unique set of challenges. Without all the group members being on campus it is difficult to find a time when all group members can get together to work on the project and share ideas. This separation can lead to difficulty when it comes to communication and scheduling, but our group has been improving in this manner.

4.2 Skills Developed Through Project

This project is a true test of combining skills learned from other classes and applying them all into one activity. One major area that the group has had to take on is that of documentation and project management. As is often the case in the development world, it can be difficult to document progress. This is a skill that has been very important in terms of showing what has gotten done. This is a valuable skill that is always useful no matter how big the project might be.

4.3 Future Plans

Going forward the group is planning on putting this project to the side for the time being. There are numerous ways that we could continue to improve upon our application, but the team has decided that we will take our experience that we gained from this project and use it for our

careers in the future, as is impossible to state the full impact of taking on and completing such an ambitious project like we have, especially in such tumultuous times.

References

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