Catholic University Institute of Buea (CUIB)
THE ENTREPRENEURIAL UNIVERSITY

DESIGN AND IMPLEMENTATION OF A NAVIGATION BASED SOCIAL MEDIA MOBILE AND WEB APPLICATION USING GOOGLE MAPS

A SENIOR YEAR PROJECT

BY

LUKU NGUEMALEU GERAUD

15SI-002174

SUBMITTED TO THE SCHOOL OF INFORMATION TECHNOLOGY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE (B.Sc.) IN SOFTWARE ENGINEERING

SUPERVISOR   **July 2019**

Mr. Achankeng Peter

DECLARATION

I declare that this project on "DESIGN AND IMPLEMENTATION OF A NAVIGATION BASED SOCIAL MEDIA, MOBILE AND WEB APPLICATION USING GOOGLE MAPS" is an original work done by me under the supervision of Mr. Achankeng Peter of the School of Information Technology at the Catholic University Institute of Buea.

CERTIFICATION

This is to certify that, this project titled "DESIGN AND IMPLEMENTATION OF A NAVIGATION BASED SOCIAL MEDIA MOBILE AND WEB APPLICATION USING GOOGLE MAPS" was carried out by student Luku Nguemaleu Geraud registration number 15SI-002174, an undergraduate senior year student in the school of Information technology of the Department of Software Engineering, Catholic University Institute of Buea.

Luku Nguemaleu Geraud   …………………………………………

    (Student)   (Date)

This certification is confirmed by:

Mr. Achankeng Peter   …………………………………………..

    (Supervisor)   (Date)

DEDICATION

I dedicate this project to God Almighty my creator, my strong pillar, my source of inspiration, wisdom, knowledge and understanding. He has been the source of my strength throughout this program and on his wings only have I soared. I also dedicate this work to my family and all my friends; who have encouraged me all the way and whose encouragement has made sure that I give it all it takes to finish that which I have started. To my Dad (Jean-Marie) and bereaved mother (Ma Pau), I am so blessed to have had amazing parents like you in my life. Thank you so much for your immense contribution to my lifelong success, and for always being there for me.

ACKNOWLEDGEMENT

TABLE OF CONTENT

Contents

LIST OF TABLES

LIST OF FIGURES

ABBREVATIONS

Admin	Administrator
App	Application
API	Application programming interface
VoIP	Voice over Internet Protocol
Info	Information
UI	User interface
SRS	Software requirement specification
GPS	Global Positioning System
Snack-bar	The Snackbar widget provides brief feedback about an operation through a message at the bottom of the screen.
Ad	Advertisement
Base station	A short-range transceiver which connects a cordless phone, computer, or other wireless device to a central hub and allows connection to a network.
SOS	International Morse code distress signal
Crowdsourcing	The practice of obtaining information or input into a task or project by enlisting the services of a large number of people, either paid or unpaid, typically via the Internet.
JSON	JavaScript Object Notation is an open-standard file format that uses human-readable text to transmit data objects consisting of attribute–value pairs and array data types.
GeoFire	GeoFire is an open-source library for Java that allows you to store and query a set of keys based on their geographic location
ER Model	Entity–relationship model

ABSTRACT

The research paper aims at creating a mobile and administrative web app platform. The mobile app will serve as a social media platform where users can chat, create and share stories with friends and also make internet calls with them. Particularly, the mobile app will be based on Google maps web service to help solve the back-draws of the above by providing the user with the power to create and share custom locations with their friends on their map, they will also be able to draw routes to custom created locations on the map and also track friends by getting the current locations of the above periodically.

 In this project we will also be creating a web administrative platform where companies and businesses from restaurants to corporate organizations can register and be able to create and push messages automatically to mobile app users around their location. This will help in solving the location based marketing issue companies have.

This project will be divided into various subsections, the first been the background which will introduce the concept of navigation using localization by satellite imagery, problems found in this implementation and the solutions which this paper will provide. Next will be the methodology employed for the building of both platforms, the schedule of the project and product specification. The end of this work will contain the results of the developed applications.

Chapter 1

Introduction

1.1 Background

Navigation is a field of study that focuses on the process of monitoring and controlling movement from one place to another, it has land navigation as one of its main categories. In broader sense it can refer to any skills or study that involves the determination of position and direction which includes orienteering and pedestrian navigation.

The first circumnavigation of the earth was completed in 1522 with the Magella-Elcano expedition, a Spanish voyage of discovery led by Portuguese explorer Ferdinand Magellan and completed by Spanish navigator Juan Sebastian Elcano.

Basic concepts are latitude and longitude, with latitude of a place on earth been its angular distance north or south of the equator (An equator is an imaginary line around the middle of a planet or other celestial body.) And latitude of a place on earth has been its angular distance east or west of the prime meridian. They are both expressed in degrees with latitude ranging from 0 ° to 90° and longitude from 0° to 180°

Most modern navigation relies primarily on positions determined electronically by receivers collecting information from satellites or other modern techniques like line crossing (positions either a line on a chart or line between the observer and an object in real life).

Now in the 21st century, with the rapid increase in technology especially in the technology that drives mobile devices, has improved a lot since those days, and especially in the last ten years. Mobile gadgets have gotten smaller, more powerful, and very useful. They are everywhere and play increasingly greater roles in the lives of almost everyone. Availability of mobile devices is rapidly spreading throughout the world and making significant improvements in many lives. They are packed with tons of interesting features like GPS that was not possible to have on a small and portable device. We can be in touch with those we need to reach, whether work-related or personal in nature. The most widely used and available map navigation service is Google maps which makes good primary use of mobile devices especially smartphones.

Google Maps is a web mapping service developed by Google. It offers satellite imagery, aerial photography, street maps, and 360° panoramic views of streets, real-time traffic conditions and route planning for travel. While most other imagery is from satellites, much of the available satellite imagery is no more than three years old and is updated on a regular basis.

It began as a C++ desktop application and later launched on the web in 2006 when it started offering an API that allowed it to be embedded in third party applications. Google maps for

Android and IOS was released on September 2008 and featured turn by turn navigation. In august 2013, it was determined the most used application on smartphones with over 54% usage.

Now our day's localization has become part and parcel of social life especially in social media and social media marketing, bringing people together.

Social media are interactive computer-mediated technologies that facilitate the creation and sharing of information, ideas, career interests and other forms of expression through virtual communities and networks. Social media facilitates the development of online social networks. Users typically access social media services through mobile based technologies on smartphones and web based media services through desktops and laptops

Networks formed though social media change the way groups of people interact and communicate. Social media can help to improve an individual's sense of connectedness with real or online communities and can be an effective communication or marketing tool for corporations, entrepreneurs, nonprofit organizations, advocacy groups, political parties and governments.

Social media marketing is a form of internet marketing that involves creating and sharing content on social media networks in order to achieve your marketing and branding goals. Social media marketing includes activities like posting text and image updates, videos, and other content that drives audience engagement, as well as paid social media advertising. Social media marketing is a powerful way for businesses of all sizes to reach prospects and customers. Your customers are already interacting with brands through social media, and if you're not speaking directly to your audience through social platforms, you're missing out! Great marketing on social media can bring remarkable success to your business, creating devoted brand advocates and even driving leads and sales.

Finally after this long but brief introduction about the terminologies and technologies used in my research project, I will now be introducing my project application.

It is an application that makes use of all the above mentioned terminologies and technologies building a mobile application. The mobile part will be a social media application based on the Google maps v2 (version 2) API for android, where users can track their contacts location real-time, share their activities of the day (stories like Instagram, Snapchat, Whatsapp etc.), chat and perform VOIP internet calls with their contacts. The users will also be in complete control and customization of their virtual map by been able to extend it by adding custom locations of places or areas to be shared with their contacts, use the power of Geocoding to create geographical boundaries around custom location to monitor user activities in that area not forgetting the use of Google Directions API to draw routes to specific locations to help with navigating around areas. The web part will be a platform where third parties will be allowed to register their business in the application so it can be viewed by the mobile users. This will help

them to promote their business since social media marketing is what makes a business successful more these days.

1.2 Problem Statement

The world has become a global village to an extent that it has become absolutely necessary to not just communicate with people, but also know their locations including their surrounding environment. Below are the leaks that I have studied and come across as far as the existing solution (Google Maps) has been operating;

1. Not all countries are supported / localizable in Google maps and for those supported; a majority of them have very little or no low-level accurate localization details.

Google maps has over 220 countries and territories mapped and hundreds of millions of businesses and places registered but that doesn't make all of them in the world registered and even the countries and territories registered still lack low-level details of the areas which could make navigation simpler. Third world countries are not fortunate enough to make use of Google maps as it is because it is very sketchy and lack low level details not forgetting that third world countries considering that about 90million people are added to the world population every 12 months and out of every 100 people added to this planet, 97 are born in the third world countries. So how do we expect to have better navigation with all this population and technological advancement if their localities are not navigable through Google Maps?

2. Tracking contacts in real time without a third party application is quite the difficulty level for just normal day to day users of mobile devices.

It is of true fact that every smartphone has a built tracking system that makes use of GPS technology in case of emergencies but without a more profound technical knowledge no normal user can make use of that feature to track an individual's device so the function is rarely used.

3. Google maps on your mobile device yes but do you really use its functionalities on a day to day basis?

Everyone has Google maps but few really use it in third world countries and the rest of the globe as a daily driver because it is not a fun and social experience to use. The world youth population (ages 15-24) is projected to rise to 1.4 billion in 2050 from 1.2 billion now, with Africa's youth population rising to 35% of the world's youth total in 2050, from 20% today. This is more reason to take advantage of this rise in youth population for marketing. Like for example what the CEO of Facebook Mark Zuckerberg is planning to do, lure Africa with free internet.

1.3 Proposed Solutions

Facing the three problems stated above, the android mobile application and web platform will focus on;

Firstly, the mobile app will provide users with the power to create/add locations that are not present on the map, giving details about it and share with their contacts.

Secondly, it will provide every user the power to easily track their contacts in real time if so allowed by them with a single click anywhere around the globe provided the user has an active internet connection which is a must have in this Era.

Thirdly, for fun and interaction the users will be able to chat and make VOIP calls with their contacts and also have a live story feature like other modern social media platforms like Instagram and Whatsapp. Not also forgetting all other Google maps utilities like Directions, Geoboundries and Geocoding.

Finally, the web app will serve as a facilitator for companies to carry out location based marketing by been able to register their business location in the app and targeting users in vicinity sending them Ad messages through push notifications. The mobile users will be able to receive these messages and then choose to subscribe to the sending company to receive their daily newsletters and add their location on their map. This will boost a company's popularity.

Chapter 2

Literature Review

2.1 Introduction

The increasing availability of Global Positioning System (GPS) enabled mobile devices can utilize position to provide a tracking environment allowing vulnerable people to continue with their daily activities, as much as possible. People are travelling to many different places and they are unknown about directions and the route to be followed. Without knowing the directions, this may cause to get the wrong way. To avoid this situation, many mobile applications are developed to help people to get the right directions. Recently, mobile operating systems have started to incorporate means to offer contextual information derived from measurements of multiple sensors. A phone can be aware of whether it is transported in a vehicle or carried on foot. Unfortunately, most online mapping applications don't support many important features like add or delete some locations (hospitals, schools, restaurants, etc...) or also creating custom geo-fences on map and drawing route directions to a particular location.

In this section, I will be reviewing related articles to my project that have tried in their own way to add more value and flexibility on the already existing Google Maps using its APIs. The goal of this literature review is to compare different articles and the techniques/ways they used Google Maps and it's APIs for online mapping and adding user interaction to it not forgetting their association for a better society. I will separate the articles into 3 categories and below each of them review research papers.

2.2 Survey of Wireless Geo-Location Techniques

The Global Positioning System (GPS) is a satellite-based navigation system that was originally designed in the early 1970s for the United States (US) military by the US Department of Defense.

GPS provides location and time information anywhere on Earth where there is an unobstructed line of sight to at least four GPS satellites among a constellation of 31 satellites currently orbiting the Earth. This is made possible through the precise radio signals that the satellites are transmitting which consist of the satellite's position and the time they transmitted the signals. The signals can be easily received by GPS receivers, allowing the calculation and determination of the accurate location, speed and time information. Using the information, GPS receivers are able to triangulate data and pinpoint user location.

Geo-fencing is a feature in a software program that utilizes GPS or radio frequency identification (RFID) to define geographical boundaries. A geo-fence is a virtual barrier.

Applications or programs that feature geo-fencing allow notifications or triggers to be set up so when a device enters or exits the boundaries defined by the administrator, a series of event can be executed such as a notification being delivered to user, a text message or email alert is sent, or

a trigger to perform specific functions on the mobile device. Many geo-fencing applications incorporate map services such as Google Maps and Apple Maps, allowing administrators to create boundaries on top of a satellite view of a specific geographical area. Boundaries can also be defined by using longitude and latitude.

Ana-Maria Roxin, Jaafar Gaber, Maxime Wack, Ahmed Nait Sidi Moh presented a research paper about location algorithms and positioning techniques that can be used for wireless Geo-localization(Roxin, Gaber, Wack, & Nait-Sidi-Moh, 2007). Although GPS based location is accurate, it is not reliable indoors and in urban regions. Below are few techniques with the aim of wireless Geo localization. A wireless Geo localization system has three major components;

- The location sensitive device to determine relative position of mobile device.

- Positioning algorithm used to estimate position of mobile device.

- The display system which displays geographical location of device.

The paper talks mainly about non-dedicated localization techniques because dedicated ones are expensive and non-common. The paper is sectioned into two, Localization techniques and positioning methods.

There are two fundamental principles used in traditional localization techniques; Trilateration and Triangulation.

Trilateration uses the distance between a base station and a mobile device. It requires 3 base stations and the mobile device is located by the intersection point of the 3 base stations.

Triangulation on the other hand is based on the estimated distance of arrival of a signal from the mobile device that has been located (Angle of arrival).

Under Triangulation there are other methods present. Radio maps build a signal strength model. It is made of two principles;

- The Off-line phase where during this phase radio frequency signals are collected from predefined access points.

- The On-line phase where the mobile device location is estimated using deterministic or probabilistic techniques.

Deterministic techniques uses scalar values of measured RSS from Access points, the three main techniques are:

Probabilistic techniques use RSS distributions received from every Access Point. The main idea is to assume that RSS distributions are similar to Gaussian probability distributions. In the off-line phase, for each Access point a mean and a variance value are computed for the RSS distribution. The probability is then computed for each predefined location and the most probable location is estimated as the location of the considered mobile device.

2.3 Google Maps and its APIs for Alert Escalation

First article under alert escalation using Google Maps was written by Natalie Carr, Paul McCullagh on investigating the technology options for alert escalation. The aim was to provide a safety net, without triggering unnecessary alarms. The escalation procedure involved initial speech alert to the user, then a speech and vibrate alert to the user as a reminder; this is followed by a text message to an identified carer if the user has not entered the safe zone. Parameters for alert escalation can be tuned to individual circumstances. The user can seek help at any time by getting directions from the current position to home or by calling a carer (Carr & McCullagh, n.d.).

Management of dementia increases burden on people taking care of them with one of the most demanding behavior to cope with is wandering (dementia patients have hypertension and feel a strong urge to walk) roughly 40% of them get lost. Using mobile phone technology, it is technically possible to provide a safer environment for the person and assist their carers by automatically contacting them in case of loss. Using GPS technology, GPS-enabled devices can use position information to provide a safer tracked environment.

It is an android based app developed in Java with additional development tools including Google Maps API, Directions API, Android Preference API, and Android Plot API. Communication through the Internet utilizes HTTP requests and JSON responses.

The Geo-fence has variable size and the app locates the user every 30 seconds due to power consumption constrains. The system triggers events on exiting and entry of the Geo-fence. On exiting, if the user does not re-enter the geo-fence in some specific time intervals, certain actions will occur;

- Time_1: uses speech alert to warn the user

- Time_2: speech alert and additional vibration alert is used to warn the user

- Time_3: sends text message to mobile number present in settings

The user can also press a button to draw a route from his/her current location to home if lost. A further SOS button allows user to call a designated emergency contact. Users can also scan QR codes and share activity on social media for reassurance.

Another paper under this topic was written on Development of Auto-Notification Application for mobile devices using Geo fencing Techniques(M.S.I., Sazali, Isa, & M.Isa,

2015).. This paper talks about utilizing the power of geo fencing in mobile phones to created virtual boundaries around areas, when a user enters the particular place, the application will detect that the users mobile device has crossed the virtual boundary and will automatically notify the user to turn on the silence mode on the device. The opposite process will happen when the user crosses the boundary to exit the place. This is done by utilizing the current location of the user based on the Global Positioning System (GPS) data provided through the device.

In this paper, the development of auto-notification application for mobile device using geo-fencing technique has been presented. The application is developed on Windows Phone platform. The application helps to remind the user to make sure their mobile device is in silent mode operation whenever they are entering places that require silence such as mosque, library, cinema, and meeting room. The location information of the places such as latitude, longitude and radius will be stored in the database. This information will be used to determine whether the device has crossed the virtual boundary or geo-fence. If the device has crossed the geo-fence, a notification will be displayed automatically on the device to remind the owner to turn on the silent mode.

2.4 Google Maps for Social and Urban Tourism/Navigation
A paper(Rinne & Törmä, n.d., June 2014) talks about using the various sensors in a mobile phone to derive information about available parking places in the absence of parking sensor infrastructure, testing the method with a dedicated mobile client connected to a network server.

The subject of the study was whether smart phone sensor data could be utilized to automate the process of aiding drivers in finding vacant parking places. According to the crowd-sensing parking place availability algorithm, if the success or failure of a parking attempt can be detected, then other drivers can be informed about parking space availability

- A successful attempt indicates that there is probably a free parking space still available.
- A failure attempt means the parking spaces are full.
- When a driver drives out of a parking space it indicates free space availability.

The various sensors and API's used in android for this research are;

- Geo fencing API which allows the specification of geographical areas and generates entry and exit events when a device crosses the border.
- Activity Recognition API which detects the activity state of a device (still, walking , in vehicle or on bicycle)

The various patterns of succeeded and failed attempts are;

- Succeeded: enter r – in vehicle – on foot – exit r.
- Failed: enter r – in vehicle – exit r.
- Release of free parking space: enter r – on foot – in vehicle – exit r.

Were r is the geo-fence. The accuracy of this algorithm relies heavily on the stated sensors above.

Due to the importance of sensor input and activity recognition, the client software was implemented as a native android application. Mobile client uses Google cloud services for sign in, Google maps and destination searches. Mobile user and sensor input data are sent and stored on the server through HTTP. Push notification from the server to the client is sent through Google Cloud Messaging. To test this application 138 parking areas location were saved.

The mobile client consists of a map view showing with info text of selected parking area in three colors green, orange and red depending on the state of the parking area. The other client features include destination search, map window centering to current GPS location, favorite list management with up-to-date display of parking area status, one-click activation of Google Maps navigation to selected destination or parking area and provision of end-user surveys.

Another paper (Ibrahim & Mohsen, 2014) talks about implementing a client / server architecture android application providing the users with the power to add, remove and review specific location on an on-line map and also presents basic navigation operations like path and distance between two points, all this using Google Maps API, PHP, JSON and MySQL.

It presents a method to build an on-line interactive navigation map based on Google Maps by using a centralized database MySQL that exists on a server and client. The android phone serves as a client while the server is composed of two parts: MySQL and PHP API scripts acting as a link between the mobile client application and the MySQL database. Three main functions of the PHP API scripts are:

- Accept read and write requests from the client.
- Run and manipulate the request to MySQL database
- Formatting the outputs as JSON

The database consists of a single table containing 8 fields (Longitude, Latitude, Zoom Level, Place Name, Place Information, Place Rating and Place Category) for each specific location on map.

There are 4 major operations applicable on the map; Adding, deleting, displaying and drawing direction route to a specific marker.

2.5 Conclusion

The purpose of this review was to show/view the different technologies used in geo localization together with their application in solving daily problems with the limitations of popular online maps like Google Maps. I reviewed these articles in relation to the project am defending to show their similarities with my subject matter and also show how it will come to improve other created solutions not also forgetting to show how each of them are lacking behind.

Each of the above reviewed methods has their own advantages and inconveniences. For all the above methods their main advantage was that of presenting a user with more power than stock online mapping services like Google Maps provide by using GPS-technology and existing Google Maps APIs to tweak the online maps and present the user with the ability to create, add,

view, and delete custom locations on existing online maps. It also presented a user the ability to create geo-fences around custom locations depending on the user's choice allowing the user the ability to monitor that zone by setting triggers to run a particular function/do a particular action depending on the activity in the area by other predefined/know users.

The above reviewed articles also presented users with the ability to draw optimal route/path from and to custom locations predefined by the user calculating the time and duration of the journey. All these articles showed how online mapping services could be used for a wider variety of applications in fields like medicine, parking, tourism and many more by using just mobile phone sensors and geo location services, considering that all the above are not possible with the current online mapping services like Google Maps.

Looking at all the above advantages we may consider the above applications where perfect and have no defect by that not true. Despite all these, the implementation had some issues and limitations.

Firstly, one of the draw backs of these methods where the huge power consumption level that they use on the mobile device. If your app is power-hungry, you are bound to get negative reviews from your customers. In some cases, they may end up deleting your app altogether.

Secondly, all the above had good implementations of Google Maps APIs but all of them lacked an appealing user interface that will bring a curious user to check out the application. A good user interface is very attractive for the user. A beautiful thing is often very enjoyable.

Thirdly, the above research papers used slow and non-optimized technologies (referring about the MySQL database and PHP as server) to store and process location information of the user. SQL has always been proven to be better with relational data but in this particular application of geo localization there is better need for a No-SQL database. It is designed for operational needs — real-time applications that often interface with customers or parties external to the organization.

Finally, none of them tried to build these solutions for a wide commercial use by including marketing development techniques into them so it can be a product that the active segment of the community can use on a daily basis to increase their productivity.

In regards to all the above limitations, the project application corrects them as follows.

With the project mobile app, users will be able to create, add and delete new locations on Google Maps and it will be added to user client map and stored in the firebase real-time database

Firebase is a mobile and web app development platform that provides developers with many tools and services to help them develop high-quality apps, grow their user base, and earn more profit.   It provides a real-time database and backend as a service. Data is stored as JSON and synchronized in real-time to every connected client.

Before anything, since the project application is a social one, users have to be authenticated to continue with using the service. The users will be able to create an account and authenticate themselves using only the phone number where a code will be sent to their mobile phone for verification.

Users will also be able to create and monitor geofences using the Geo-Fire library. GeoFire is an open-source library for Android/Java that allows you to store and query a set of keys based on their geographic location. Its main benefit is the possibility of querying keys within a given geographic area - all in real-time. GeoFire uses the Firebase database for data storage, allowing query results to be updated in real-time as they change. GeoFire selectively loads only the data near certain locations, keeping your applications light and responsive, even with extremely large data-sets.

With the help of Google Directions API users will be able to draw routes from current location to any other location on the map, the user will be asked to choose the traveling method (walking, driving, and bicycling) and then an optimal path will be drawn on the map to the location, not forgetting a snack bar showing the time and distance of the journey.

Users will be presented with the option of tracking a user when pressing a user's marker location on the map. If chosen, the user will be able to pay close attention and receive the users real time updated location.

Users will be able to stay in contact with their friends by having their phone numbers in their phone book. If a contact in the phone book uses the app also, the contact will be added to the user's friends list.

Users will be able to make internet calls using the well optimized Sinch API. The Sinch API gives mobile developers a way to add communication into their apps. The platform lets developers integrate voice and messaging into their app in minutes with a few lines of code.

All these functionalities will be wrapped with a beautiful and simple user interface familiar with the user to ease the application user experience, also the application will be developed in native android using android studio IDE and Java because the app will work directly with native hardware components on the mobile device.

Finally, for marketing purpose and adding another user level, the project will have an online administrator platform where businesses and other third parties can register their businesses location, advertise their business and monitor user activity around it. They can add advertising messages or promotions which will be sent automatically by the system to the users in their vicinity, making more users aware of their business and promotions.

Chapter 3

Methodology

The waterfall model is a sequential design process, often used in software development processes, in which progress is seen as flowing steadily downwards (like a waterfall) through the phases of Analysis, Requirement Specification, Design, Implementation, Testing and Integration and Operation and Maintenance.

If in the beginning of the project failures are detected, it takes less effort for this error. It is believed that the phases are correct before proceeding to the next phase. In the waterfall model, emphasis is laid on documentation. It is a straightforward method. The way of working ensures that there are specific phases. This tells you what stage it is. One can use this method of milestones. Milestones can be used to monitor the progress of the project to estimate.

In the Project, all the requirements are clear and well known and the project is large. All the activities in our project are carried out in below-mentioned phases of the waterfall model.
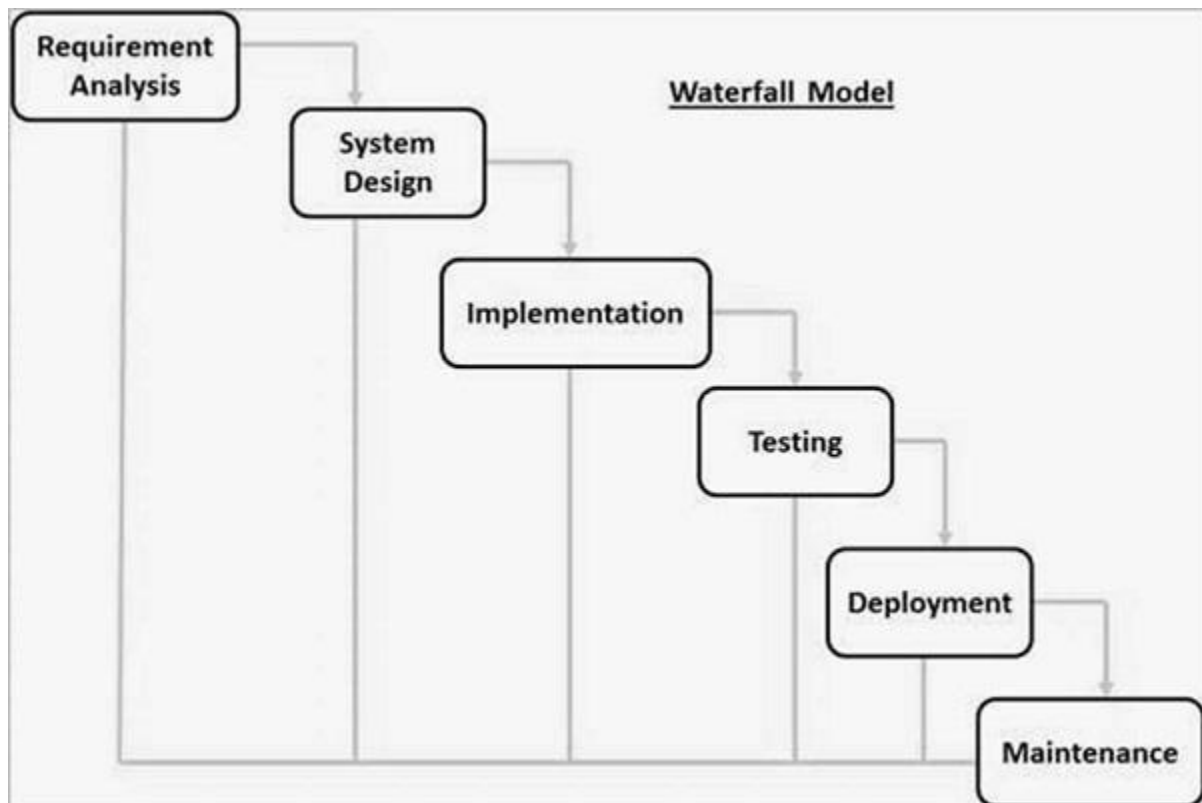

Figure 3.1 Waterfall Model

3.1 Software Requirements Specifications

3.1.1 Introduction

This section gives a scope description and overview of everything included in this SRS document. Also, the purpose for this document is described.

Purpose

The purpose of this document is to derive a way of using an online mapping service specifically Google Maps and its related APIs and other third party APIs to build a more feature rich version of the already existing Google Maps. It will illustrate the purpose and complete declaration for the development of system. It will also explain system constraints, interfaces and interactions with other external applications. This document is primarily intended to be proposed to a customer or any other third party for its approval and a reference for developing the first version of the system for the development team.

Intended Audience and Reading Suggestions

This document is intended for all reader types' including developers, business owners, students, marketing staff, users, testers and documentation writes. This has been implemented under my project supervisor. It will be useful to anyone especially anyone into social medias and companies interested in marketing their products digitally. This document is designed for people most familiar with android development and Google Maps.

For non-software development familiar readers, I suggest they start reading from the beginning and end before software requirements and finish reading with the non-functional requirements of the app. The rest of the software development familiar readers should read the entire document specifically the functional requirements of the application.

Product Scope

The project android mobile navigation based social media app based on Google Maps and its related APIs (Directions API, Geocoding API) together with other third party APIs (Sinch, One Signal, Stripe, Firebase) which will provide users with the power to create and add places on the map, draw direction routes to locations and also contain social interaction facilities allowing interaction with other users by been able to track friends, chat and also call app to app VoIP, all in one map. The user will also be able to create geo-fences and monitor other users' activities around a particular boundary. It will also provide third parties (Businesses etc.) with an admin web platform app which will allow them to register their business branches locations and make use of location based marketing and geo-fencing to send promotion messages about their products to subscribed users or mobile app users who dwell around their business branch for a predefined time interval.

It will provide mobile users with more power and usability with the Google Maps online mapping service. It will help mobile users connect and also help them in navigation, not

forgetting the benefit of it to third party businesses making both them and their products/services more known to the public through location based marketing.

3.1.2 Overall Description

This section will give an overview of the whole system. The system will be explained in its context to show how the system interacts with other systems and introduce the basic functionality of it. It will also describe what type of stakeholders that will use the system and what functionality is available for each type. At last, the constraints and assumptions for the system will be presented.

Product Perspective

This product is a follow on or rather an extension of the already exiting Google Maps online mapping service. It will provide more flexibility and usability over the original Google Maps. This system will consist of two parts: one mobile application and one web portal. The mobile application will be used to create and add places on map, connect with friends and navigation while the web portal will be used by businesses to market their products.

The mobile application and web portal will utilize their integrated GPS module to find the location of the users. The GPS will provide the mobile application and web portal with locations of both the user and created places and the distance between them, but it will also provide maps and the functionality to display the application's data on the map. The functionality provided by the GPS will be embedded into the application in order for the user to be able to use the functions in the application in a seamlessly manner.

Since this is a data-centric product it will need somewhere to store the data. For that, a database will be used. Both the mobile application and web portal will communicate with the database. Both the mobile application and web portal will add and delete data into the database.

User Classes and Characteristics

There are two types of users that interact with the system: users of the mobile application and administrators. Users of the app should be able to modify and perform actions on Google Maps with/using location information. The mobile users should be able to interact with Google maps and the Admin users would make use of geo-fence triggers.

The mobile user should be able to-do the following:

- Create and add locations on the map
- Get location and created locations of friends
- Track a particular friend
- Share stories with friends
- Make VoIP calls
- Create geo-fences with enter and exit triggers
- Draw directions routes from current location to another one

- Chat with friends using instant messaging
- Receive, view and subscribe to business promotion notifications

The Admin users have the following functionalities:

- Register business
- Add different business branch locations together with a geo-fence around them
- Trigger a send promotion message event on user entrance and exit of the branch proximity
- Send promotion message to subscribed users
- Check subscribed users
- Create and add promotion messages

Operating Environment
Operating environment of the app is as follows:

- Centralized database (Firebase real-time database)
- Client/server architecture
- Operating system: android marshmallow and later also any web browser
- Mobile hardware must be GPS enabled
- Platform: Java/AngularJS

Design and Implementation Constraints
- Implementing the database schema for accurate queries.
- Query commands performed by the application.
- Number of reads and writes made available daily by the Firebase Real-Time database, Google Maps APIs and Sinch telecommunications and cloud communications platform.
- Software version of the device.
- Hardware limitations (timing requirements, memory requirements, GPS).
- Programming standards.

Assumptions and Dependencies
One assumption about the product is that it will always be used on mobile phones and computers that have enough performance. If the devices dont have enough hardware resources available for the application, for example the users might have allocated them with other applications; there may be scenarios where the application does not work as intended or even at all.

Assuming that the users mobile device or computer meets minimum requirements for the app to run on it and all the library used are maintained and bug free, assuming the third party APIs used are also in good functional state and the browser used to login into the Admin platform is HTML and JavaScript supported, the app will run without any issue or bottlenecks.

Another assumption is that the GPS component in all phones work in the same way. If not, the application needs to be specifically adjusted to each interface.

3.1.3 External Interface Requirements

This section provides a detailed description of all inputs and outputs from the system. It also gives a description of the hardware, software and communication interfaces and provides basic prototypes of the user interface.

Hardware Interfaces

Since neither the mobile application nor the web portal have any designated hardware, it does not have any direct hardware interfaces. The physical GPS is managed by the GPS application in the mobile phone and the hardware connection to the database server is managed by the underlying operating system on the mobile phone and the web server.

Software Interfaces

Operating system	Android because its free and open source, it also has the most market population
Database	Firebase real-time database because of its fast query speeds and No-SQL architecture and also very developer and startup friendly
Java	It is strongly typed and its native mobile functions
Map	Used Google Maps because it's the most detailed online mapping service out there and makes all its API usable to developers
Sinch API	Because of its quality VOIP quality
Stripe	It is the best software platform for running an internet business.
OneSignal	It is a high volume and reliable push notification service for websites and mobile applications.
AngularJS	This front end tool for the web is equipped with robust components to help developers write readable, maintainable and easy to use code.

Node.JS	It is a platform built on chromes JavaScript runtime for easily building fast and scalable network apps. It is event driven, non-blocking

Table 3.1 Software interfaces for app

Communications Interfaces

- Firebase communication will be done over HTTPS and authenticated using a JSON file present in the project folder
- Google Maps communication will be done over HTTPS and authenticated with an Api key. The key will be gotten from the Google Cloud platform after activating Google Maps API
- LatLng format will be used for communication between the GPS and the client app.
- All other third party API will communicated over HTTPS

3.1.4 System Features

This section includes the requirements that specify all the fundamental actions of the software system.

Mobile Registration

Description and Priority

In the registration section of the app, a user will be able to register to the app using his/her phone number. This function is of high priority.

Stimulus/Response Sequences

- The user is sent to the registration activity
- The user is prompted to enter the phone number for registration
- The user enters a valid phone number and waits for a verification SMS
- The app automatically scans the verification code from the received SMS and verifies it
- The app signs in the user

Functional Requirements

REQ-1: get phone number of any country from user

REQ-2: send a verification SMS to phone number

REQ-3: automatically detect message and get verification code

REQ-4: automatically sign-in user

Get User Friends

Description and Priority

This function will read all contacts from the user phone and return a list of all the contacts that are users of the mobile app. This function is of high priority.

Stimulus/Response Sequences

- App reads all contacts from phonebook
- App checks if contact uses mobile app
- App returns list of contacts that use app

Functional Requirements

REQ-1: get all contacts from mobile device

REQ-2: return a list of app users from contacts

Add Location to Map

Description and Priority

This function will allow user to create a custom location on the map by filling in some information prompted. This function is of high priority.

Stimulus/Response Sequences

- User long clicks on any map location
- App prompts user with alert dialog options
- User selects add place option
- User fills in the information (name, description, image, category) and submits
- App saves information in the database

Functional Requirements

REQ-1: prompt user with alert dialog to select add place function on long click of map

REQ-2: prompt user to enter name, description, provide an image and category information of location

REQ-3: store location information in the database

Load Custom Location Markers on Map

Description and Priority

This function will fetch and load custom locations of the user and friends on the map with markers from the database. This function is of high priority.

Stimulus/Response Sequences

- App gets created places of the user and friends from database and displays them with markers on the map
- User creates a new place
- App gets created places of the user and friends from database and displays them with markers on the map

Functional Requirements

REQ-1: fetch created places of user and friends from database

REQ-2: display all fetched places on map

Load Friends Location on Map
Description and Priority

This function will load the updated location of all the user's friends on the map after every five minutes. This function is of high priority.

Stimulus/Response Sequences

- App gets user friends location and displays it on map
- After every 5 minutes interval app refresh user friend's location on map

Functional Requirements

REQ-1: fetch updated location of user's friends from database after every 5 minutes

REQ-2: display friend's location on map

Create Geo-fence
Description and Priority

This function will prompt the user to create a geo-fence when the user long clicks on any location on the map. This function is of high priority.

Stimulus/Response Sequences

- User long clicks on the map
- App prompts the user with a create geo-fence option
- User agrees to create a geo-fence
- App gets location coordinates from map, creates and stores the geo-fence location in database
- Else error dialog is displayed if creation limit is exceeded

Functional Requirements

REQ-1: prompt user with alert dialog to select create geo-fence on long click of map

REQ-2: function shall get coordinates of clicked map location

REQ-3: function shall create geo-fence with coordinate and store information in database.

Query Geo-fences

Description and Priority

This function will get list of geo-fences after load geo-fence function and for each of them listen for any entrance and exit event of users friends in a 5 minutes interval. This function is of high priority.

Stimulus/Response Sequences

- App loads geo-fences of user
- App stores geo-fences in list
- App passes geo-fences list in geo-fence query function
- Function loops through each geo-fence location and query boundaries in a 5 minutes interval in the background
- If user friend enters/exits geo-fence
- Function notifies user with a notification

Functional Requirements

REQ-1: get list of user geo-fences from Load Geo-fences function

REQ-2: loop through and query location of each geo-fence in a 5 minutes interval.

REQ-3: alert user in case of entry and exit of geo-fence by friends

Hide/Show user location

Description and Priority

This function will permit the user to stop/continue uploading his/her updated location to the database. This function is of high priority.

Stimulus/Response Sequences

- User clicks on the hide/show location toggle button
- Depending on if its hide/show, the function will start or stop user location update to the database

Functional Requirements

REQ-1: stop updated location upload of user to the database

REQ-2: resume updated location upload of user to database

Track friend
Description and Priority

This function will provide users with the ability to track the location of a selected friend marker on the map in real time with little or no delay. This function is of high priority.

Stimulus/Response Sequences

- User selects friend marker
- User selects track option in info window options menu
- App starts tracking the friend by getting his/her updated location from the database in real time
- User cancels function
- App stops tracking the friend

Functional Requirements

REQ-1: get selected friend's real-time location from database

REQ-2: update friend's marker location on map using location

Draw route to location
Description and Priority

This function will provide users with the ability to draw an optimal route from current location to another selected marker location on the map. This function is of high priority.

Stimulus/Response Sequences

- User selects marker
- User selects draw route option in info window option menu
- User selects traveling method
- App gets current location of user and location of selected marker
- App draws best route between the locations
- App displays snack-bar displaying route info (duration and journey time)
- App displays cancel route button
- User cancels routing
- App removes cancel route button, snack-bar and route from map

Functional Requirements

REQ-1: get user current location

REQ-2: get location of selected marker

REQ-3: prompt the user to select a travelling method

REQ-5: draw route from current location to location of marker

REQ-6: allow user to cancel route

REQ-7: display snack-bar with distance and journey time info

voIP
Description and Priority

This function will provide users with the ability to make phone calls using their internet connection with their friends. Users will be able to make and receive phone calls to and from their friends. This function is of high priority.

Stimulus/Response Sequences

- User selects friend's marker/User starts new chat with friend
- User selects call option in marker info window of friends marker/ User selects call option in app bar of chat with friend
- App opens outgoing call activity
- App loads friends info (image, name, call state)
- App starts/requests call with the friend
- Friend accepts call
- Conversation begins
- App updates call state and starts chronometer
- User or friend ends call
- Update call state and stop chronometer
- Close activity
- User receives call request from a friend
- App opens incoming call activity and loads callers info (image, name)
- User accepts call by pressing accept button/User declines call by pressing decline button
- App sends user to outgoing call activity and loads callers info
- Conversation begins
- App updates call state and starts chronometer
- User or friend ends call
- Update call state and stop chronometer
- Close activity

Functional Requirements

REQ-1: function shall request call with friend

REQ-2: open outgoing call activity on call request

REQ-3: load friend's information (image, name) on outgoing call activity

REQ-4: listen to incoming calls in the background

REQ-5: prompt user to accept or decline incoming calls

REQ-6: load information of caller on incoming call activity

REQ-7: start connection with friend on accept

Instant Messaging
Description and Priority

This function will provide users with the ability to start conversations with their friends and chat with them using instant messaging, exchanging text and also media (image, video). This function is of high priority.

Stimulus/Response Sequences

- User selects friend's marker/User clicks on chats button in bottom sheet layout
- User selects chat option in info window options
- App sends user to chat activity with the friend
- App loads friends info (image and name) in the app bar
- User sends and receives messages and media with/from friend
- User closes chat with friend
- User selects chat from list of chats in Chats activity/ User selects friend from list of friends
- App opens chat in chat activity
- User receives new message notification from chat
- User clicks on notification and is sent to chat activity

Functional Requirements

REQ-1: show list of chats

REQ-2: start chat on friend select, marker option or chat selected in chat list

REQ-3: display new chat notification

REQ-4: open chat activity on click of message notification

REQ-5: get and send message and media to user

REQ-6: display all messages and media of a chat

REQ-7: receive new messages

REQ-7: load chat info in chat

Stories

Description and Priority

This function will provide users with the ability to create stories by using the camera to take photos and videos. Users will also be able to view their friend's created stories in the navigation bar. This function is of high priority.

Stimulus/Response Sequences

- User opens navigation bar in map activity
- App presents the user with a list of friends that have posted stories and a view to create a story
- The user clicks on the create story button
- The app sends the user to the camera activity
- The user presses button to take video or picture
- Or user selects a media from a list of recent pictures in the camera activity
- Or user presses gallery button to open the gallery and select a media
- The app gets the media selected by any of the above methods and sends the user to the media preview activity
- The activity shows the media selected/captured by the user
- The user enters the description of the photo/video if he/she wants
- The user presses post button
- App prompts user if location should be shared
- The app creates a new story by uploading the information (media, description and location) into the database
- App closes activity
- The user selects a friends story in the list of available stories
- The app opens a full screen view and shows the media found in the friends story
- The user swipes through the stories
- User closes the navigation bar

Functional Requirements

REQ-1: display all available friends' stories

REQ-2: open and display all stories in full screen view

REQ-3: permit user to swipe across every media of selected story

REQ-4: create new story

REQ-5: camera activity shall display camera

REQ-6: allow user to record video and capture photo

REQ-7: allow user to select media from gallery

REQ-8: allow user to select media from list of recent pictures

Admin Platform Registration
Description and Priority

This function will provide a web portal for admin to register their business. This function is of high priority.

Stimulus/Response Sequences

- Admin visits registration URL
- Browser presents admin with registration page
- Admin fills in the information
- Admin validates info
- App prompts registration fee
- Admin fills in bank details
- App validates bank details and subtracts fee
- App creates new admin account
- App sends admin to dashboard

Functional Requirements

REQ-1: get admin account info

REQ-2: get credit card/bank account details

REQ-3: charge account with registration fee

REQ-4: create new admin account

REQ-5: send admin to dashboard

Add Branch
Description and Priority

This function will provide the admin with the ability to add a new branch location of the business to monitor. This function is of high priority.

Stimulus/Response Sequences

- Admin selects to add new branch

- App prompts admin with dialog to enter branch info
- Admin fills in branch info
- App saves info and creates branch
- App starts monitoring branch surroundings

Functional Requirements

REQ-1: get branch details

REQ-2: save branch info

REQ-3: create geo-fence around branch

Load Branch
Description and Priority

This function will display all admin created branches on the map. This function is of high priority.

Stimulus/Response Sequences

- Admin opens dashboard
- App gets all branches from database
- App displays branches on map

Functional Requirements

REQ-1: get branch from database

REQ-2: display branch on map

Add Promotion Message
Description and Priority

This function will provide the admin with the ability to add a new promotion message for automatic delivery to nearby users. This function is of high priority.

Stimulus/Response Sequences

- Admin selects to add new message
- App prompts admin with dialog to enter message
- Admin fills in message
- App saves message
- App starts monitoring branch surroundings and sends messages when triggered

Functional Requirements

REQ-1: get message

REQ-2: save message

View Promotion Messages
Description and Priority

This function will provide the admin with the ability to view all users that have subscribed to a particular branch. This function is of high priority.

Stimulus/Response Sequences

- Admin opens dashboard
- Admin clicks on branch marker
- App shows all subscribed users

Functional Requirements

REQ-1: get branch marker click

REQ-2: get all subscribed users

Send Promotion Messages
Description and Priority

This function will send available promotion messages of a particular branch when a user enters the particular branches' geo-fence. It will also send promotion messages only to subscribed users. This function is of high priority.

Stimulus/Response Sequences

- Mobile user enters branch location
- App gets branch promotion messages
- App sends message to user
- Admin selects send promotion message
- Admin enters message
- Admin selects send
- App gets all subscribed users and send message to each

Functional Requirements

REQ-1: get user on entrance of the branch geo-fence

REQ-2: get branch promotion messages

REQ-3: send branch messages to user

REQ-4: get message

REQ-5: send message to subscribed users

3.1.5 Other Nonfunctional Requirements

Performance Requirements
Normalization: The basic objective of normalization is to reduce redundancy which means that information is to be stored only once. Storing information several times leads to wastage of storage space and increase in the total size of the data stored.

If a database is not properly designed it can give rise to modification anomalies. Modification anomalies arise when data is added to, changed or deleted from a database table. Similarly, in traditional databases as well as improperly designed relational databases, data redundancy can be a problem. These can be eliminated by normalizing a database.

Software Quality Attributes
- Availability: The map and user information should always be available
- Correctness: The app should show the accurate location of markers and the geo-fence queries should be accurate.
- Scalability: the property of a system to handle a growing amount of work by adding resources to the system.
- Usability: The app should easily be usable for the users 24/7

3.2 Project Plan

3.2.1 Cost Analysis and Estimation
In this section I will be listing the various software environment technologies that will be made use of in building the project. Under each technology, I will be discussing about their various pricing strategies and why I choose the various technologies. At the end of this section I will give my own estimated budget of running the app for a start.

Firebase
Firebase is an online database facility, it helps to lower the costs of operating an mobile application or a website. It has 3 plans, there is a free plan which is the Spark Plan, a Flame Plan which has a fixed fee and a Blaze Plan which is a pay as you use.

- Free Spark plan for a database with 1GB stored data and 100 simultaneous connections; 5GB stored data with 20k uploads and 50k downloads per day; 1GB hosting storage; 10k/month Phone Auth - US, Canada, India and all other countries and 15 Test Lab test per day

- $25/month Flame plan for a database with 2.5GB stored data and unlimited connections; 50GB stored data with 100k uploads and 250k downloads per day; 10GB hosting storage; 10k/month Phone Auth - US, Canada, India and all other countries and 15 Test Lab test per day
- Pay-as-you-go Blaze plan with $5/GB/month database storage; $0.026/GB/month file storage or hosting; $0.06/verification Phone Auth - US, Canada, India and all other countries and access to Google Cloud Platform

Sinch

    Sinch is a VoIP system that makes it easy to add voice, messaging, and Short Message Service (SMS) to apps. Sinch pricing details vary across its different products, which are priced according to usage.

Products	Pricing*
SMS Messaging	Starts at $0.01/message
Data Calling	$0.002/minute (app-to-app) $.01/minute (landline & mobile)
Phone Calling	$0.004/minute (inbound) $0.01/minute (outbound) $0.8/month (outbound mobile)
Video Calling	$0.003/minute

Table 3.2 Sinch API Pricing

OneSignal

    OneSignal is an entirely free application that allows user to send unlimited push notifications to unlimited subscribers. The software is capable of delivering a huge number of notifications in a very quick time.

Free Plan	Pro and Premium options
Free Features - unlimited mobile push - web push up to 30000 subscribers - unlimited segmentation - delivery scheduling - Emojis and images - localization - A/B Testing - Real-Time Analytics	$99/Month Starts at $99 per Month Features - includes features of free plan, plus - superior speed and support - send up to 15million messages per minute - talk to a dedicated support team with 24/7 options - export messages to analyze campaigns - control your user data for GDPR

Table 3.3 OneSignal API Pricing

Its software allows individuals and businesses to make and receive payments over the Internet. Stripe provides the technical, fraud prevention, and banking infrastructure required to operate online payment systems.

Stripe takes a simple approach. They charge you a flat rate of 2.9% + 30¢ per successful charge as long as you're doing under $1 million in volume per year. This rate varies country to country, but it's always flat. They don't disclose any special high volume rates.

Service	Stripe
Transaction fee	2.9% + 30¢
Charge cards from your website	Free
Chargeback	$15
American Express	Same flat rate
Micropayments (less than $10)	Same flat rate
Refund	Fees not returned
International cards	Free
Authorize card	Free
Recurring Billing	Free
Advanced Fraud Protection	Free
Accept Apple Pay	Free

Table 3.4 Stripe API Pricing

Google Maps APIs

Google Maps is a web mapping service developed by Google. Below is a table of Google maps and its APIs that will be used together with their various pricing.

SKU	$200 monthly credit Equivalent free usage	Monthly volume range (Price per thousand)		
		0—100,000	100,001-500,000	500,001+
Mobile Native Static Maps	Unlimited loads	$0.00	$0.00	
Static Maps	**Up to 100,000 loads**	**$2.00**	**$1.60**	
Directions	**Up to 40,000 calls**	**$5.00**	**$4.00**	
Geocoding	**Up to 40,000 calls**	**$5.00**	**$4.00**	
Geolocation	**Up to 40,000 calls**	**$5.00**	**$4.00**	

Table 3.5 Google Maps API Pricing

Looking at all the above pricing ranges for all the software technologies i will be using, i will use the following pricing for each of the above software for a start;

Service	Pricing/Plan

Firebase	Spark Plan
OneSignal	Free Plan
Stripe	Pay as You Go
Sinch	$0.002/minute (app-to-app)
Google Maps	$200 monthly credit Equivalent free usage
Approx Total a month	**$Free/monthly**

Table 3.6 Project App Pricing Decisions

3.2.2 Project Schedule

Task	Start Date	Duration (days)
Introduction	7-Apr	3
Literature review	10-Apr	5
Project schedule	15-Apr	1
Methodology	16-Apr	14
Software requirement document (SRS)		3
Cost analysis and estimation	16-Apr	1
Analysis-Use-case models	19-Apr	3
Design Document	20-Apr	7
Implementation	23-Apr	32
User authentication and registration	30-Apr	5
Map view and functions		7
VOIP and Sinch API integration	30-Apr	3

Chats module	5-May	6
Administrator Platform	12-May	7
Input specification	15-May	2
Output specification	21-May	2

Table 3.7 Project Schedule
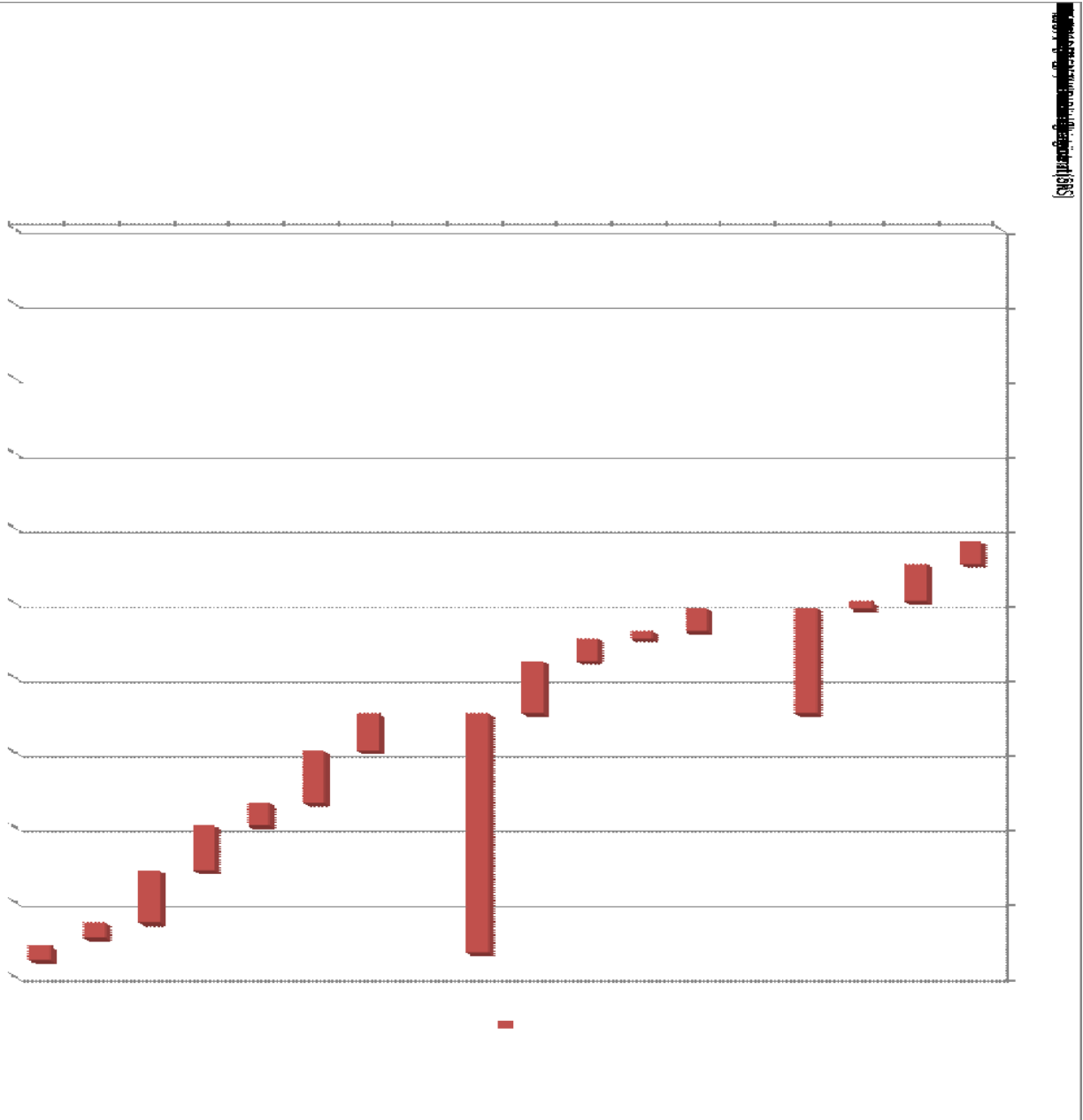
Figure 3.2 Gantt chart
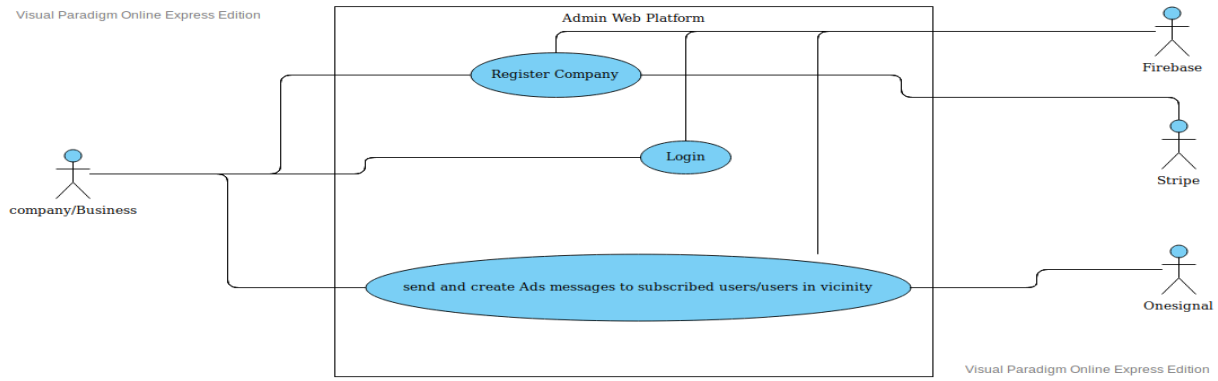
3.3 Analysis-Use-Case Models

Admin Web Platform

Register Company

Login

send and create Ads messages to subscribed users/users in vicinity

company/Business

Firebase

Stripe

Onesignal

Figure 3.3 Admin Platform Use-case diagram

Mobile Application

Create/View locations of places of/and friends

Route and navigate to locations of places/Friends

Call friends

Instant Mesaging

View and share stories

Login/Register

Create and monitor geo-fences

Receive Ads, subscribe and view location of/to company

User

Firebase

Google Maps

OneSignal

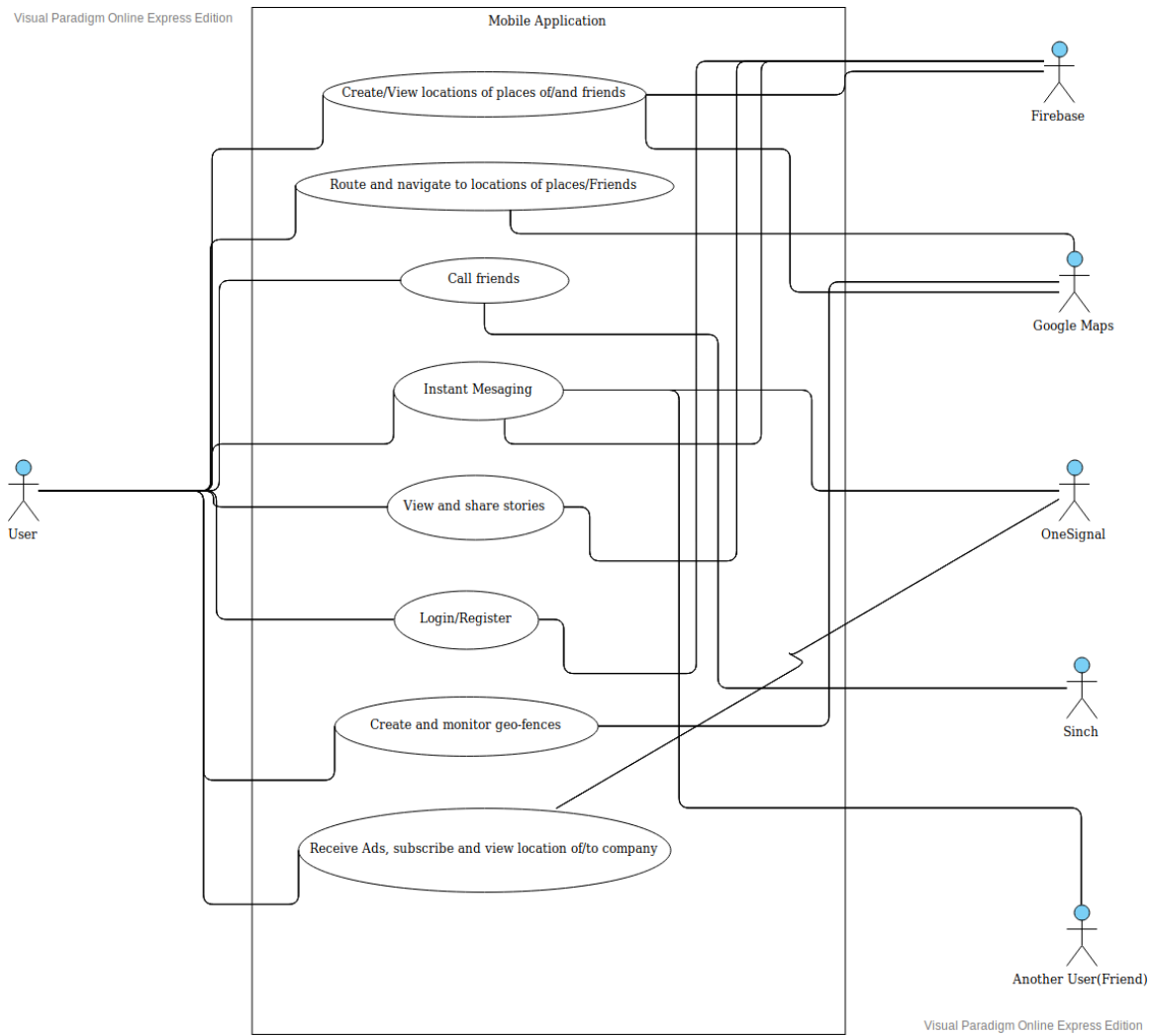Sinch

Another User(Friend)

Figure 3.4 Mobile app Use-case diagram

33

3.4 Design

3.4.1 Sequence Diagrams

Figure 3. SEQ Figure * ARABIC 5 Mobile App Sequence Diagram

Figure 3. SEQ Figure * ARABIC 6 Web Application Sequence Diagram

3.4.2 Class Diagram

Figure 3. Class Diagram
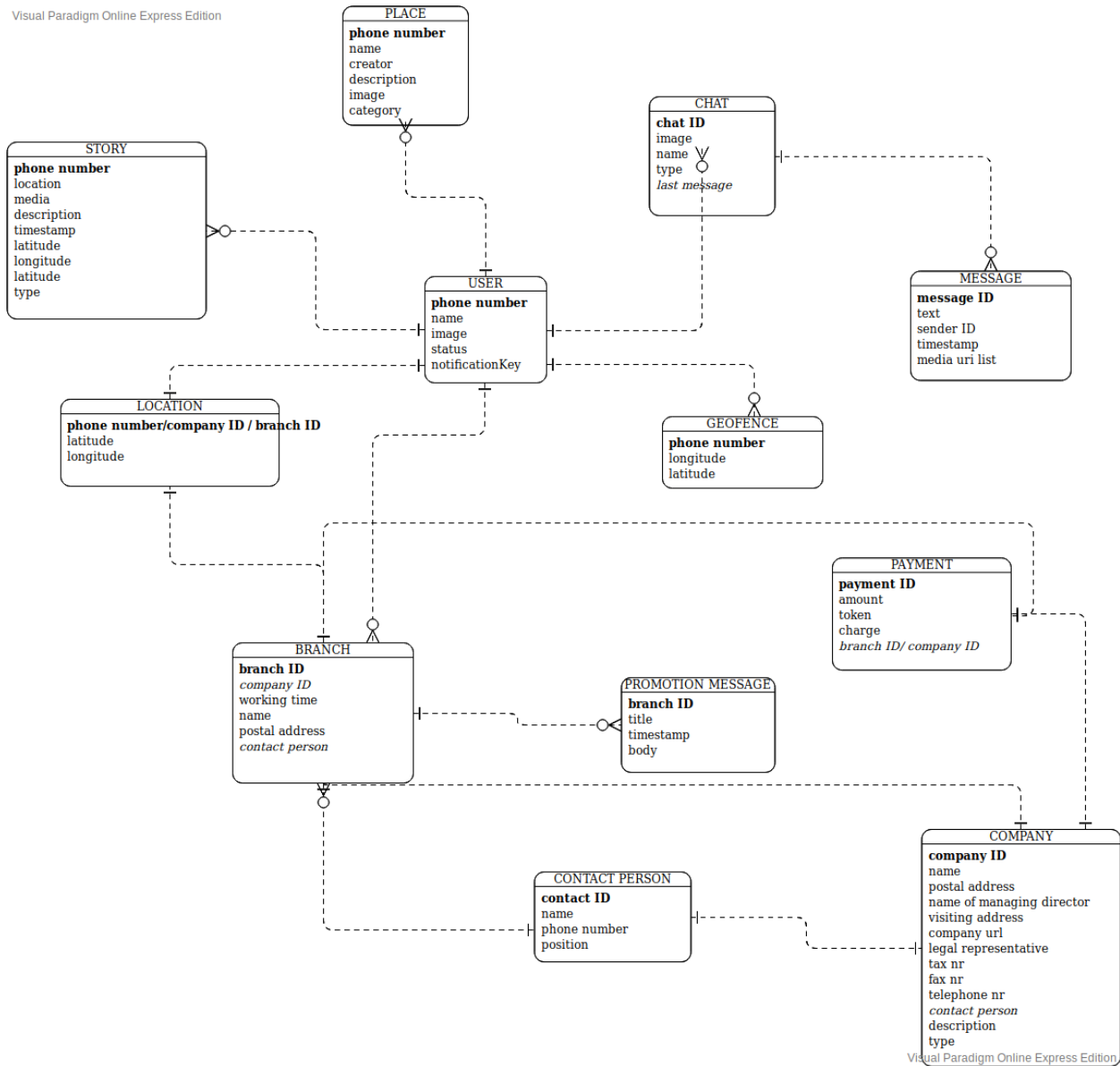
3.4.3 Database Design

ER Model

PLACE

phone number
name
creator
description
image
category

STORY

phone number
location
media
description
timestamp
latitude
longitude
latitude
type

CHAT

chat ID
image
name
type
last message

USER

phone number
name
image
status
notificationKey

MESSAGE

message ID
text
sender ID
timestamp
media uri list

LOCATION

phone number/company ID / branch ID
latitude
longitude

GEOFENCE

phone number
longitude
latitude

PAYMENT

payment ID
amount
token
charge
branch ID/ company ID

BRANCH

branch ID
company ID
working time
name
postal address
contact person

PROMOTION MESSAGE

branch ID
title
timestamp
body

COMPANY

company ID
name
postal address
name of managing director
visiting address
company url
legal representative
tax nr
fax nr
telephone nr
contact person
description
type

CONTACT PERSON

contact ID
name
phone number
position

Figure 3.8 ER Model

Chapter 4

Implementation

4.1 Input Specification

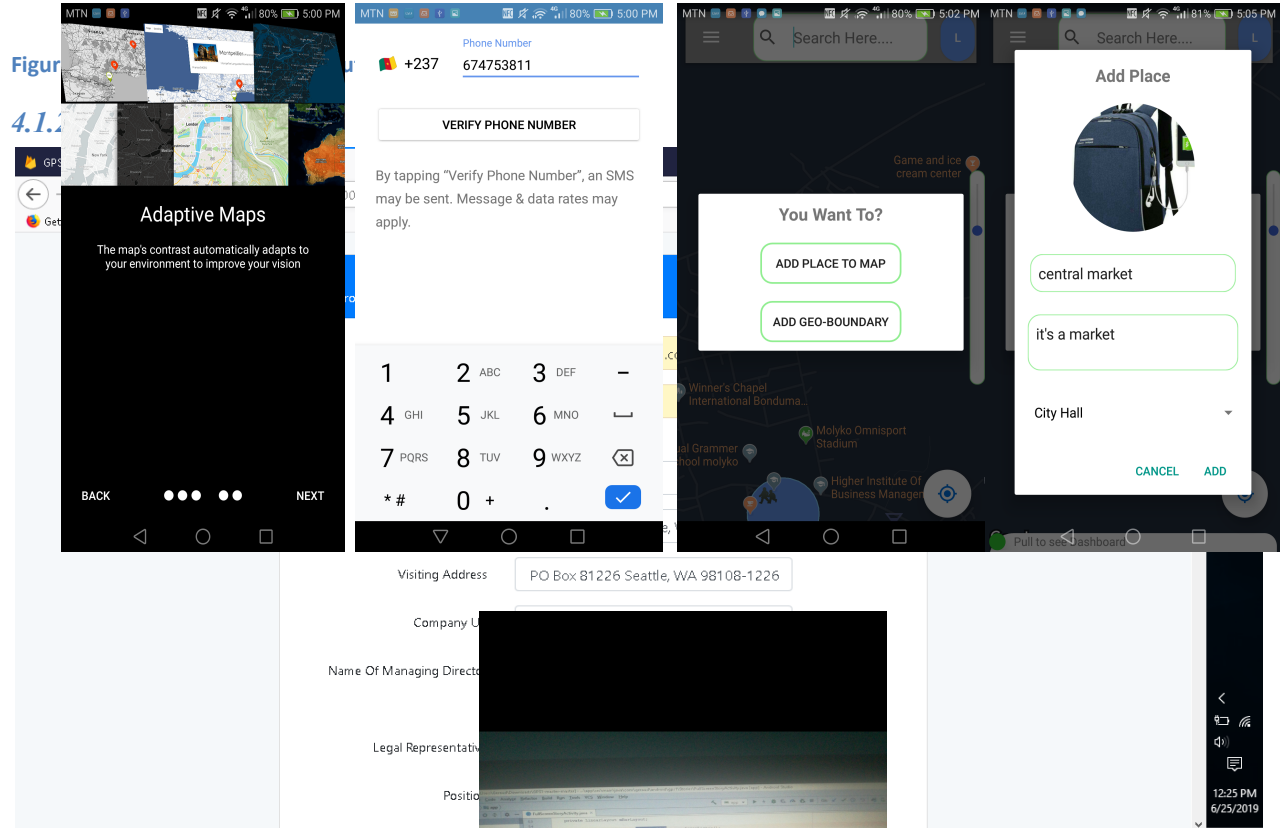#### *4.1.1 Mobile Platform*

Figur

4.1.2

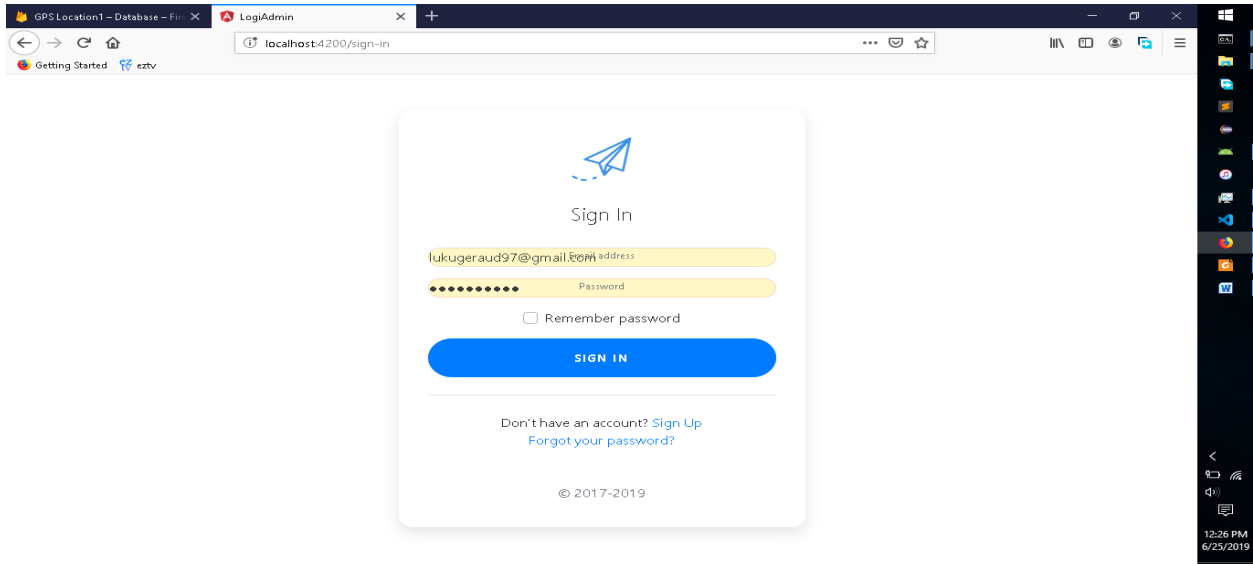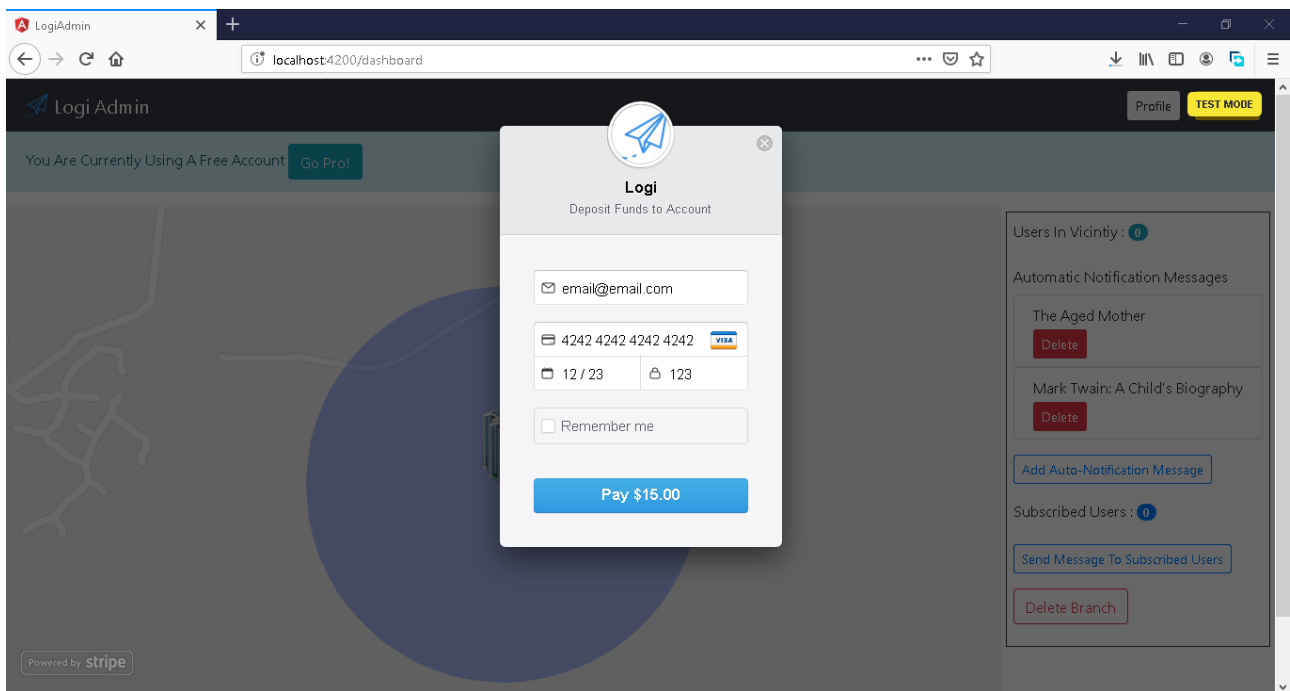**Figure 4.2 Registering Company**

38

Figure 4.3 Sign In

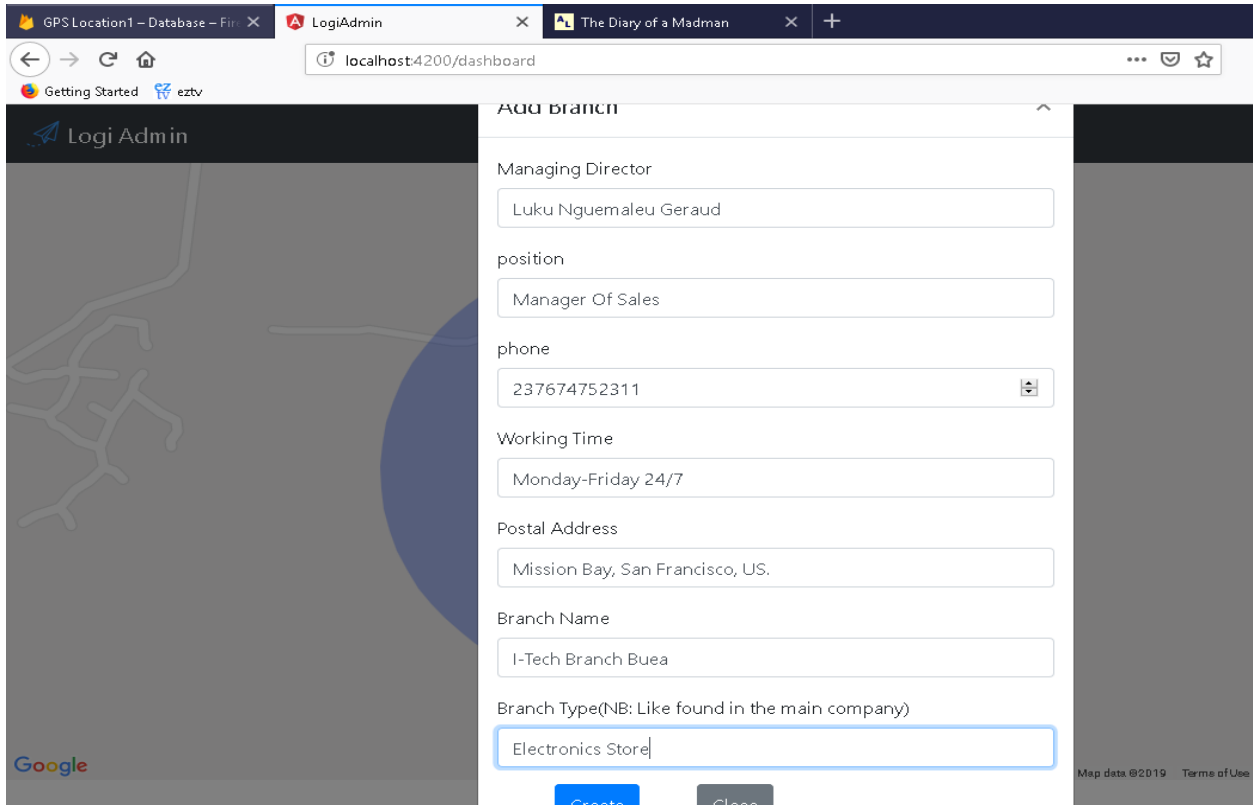**Figure 4.4 Creating Payment**

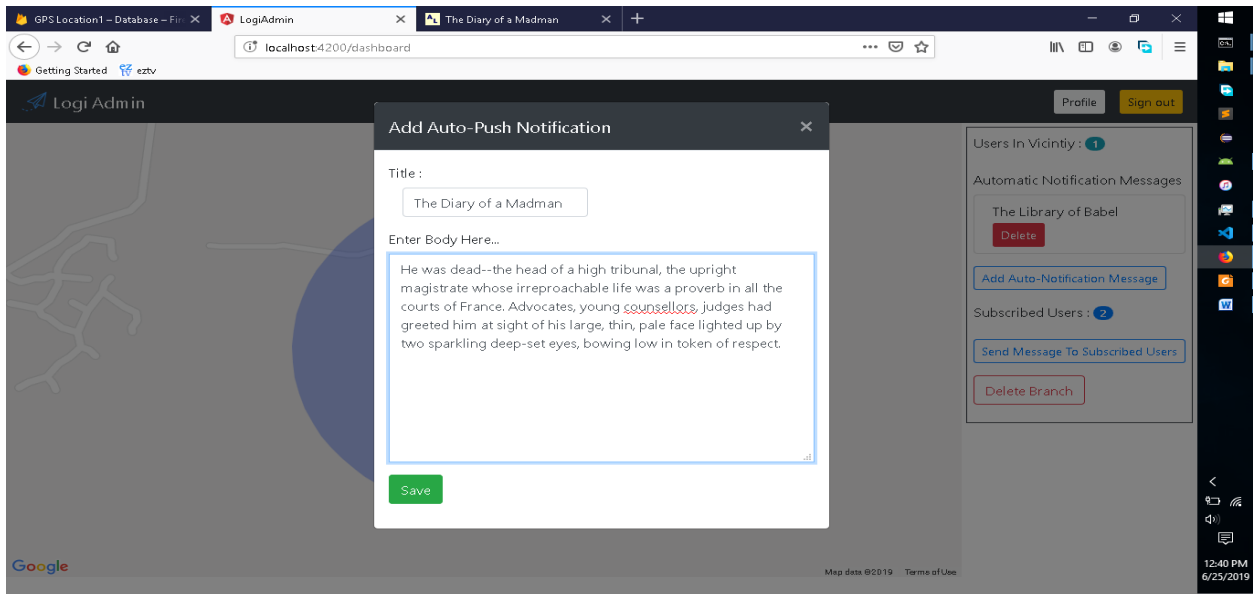**Figure 4.5 Adding a Branch of Company**

Figure 4.6 Adding Auto-Notification Ad
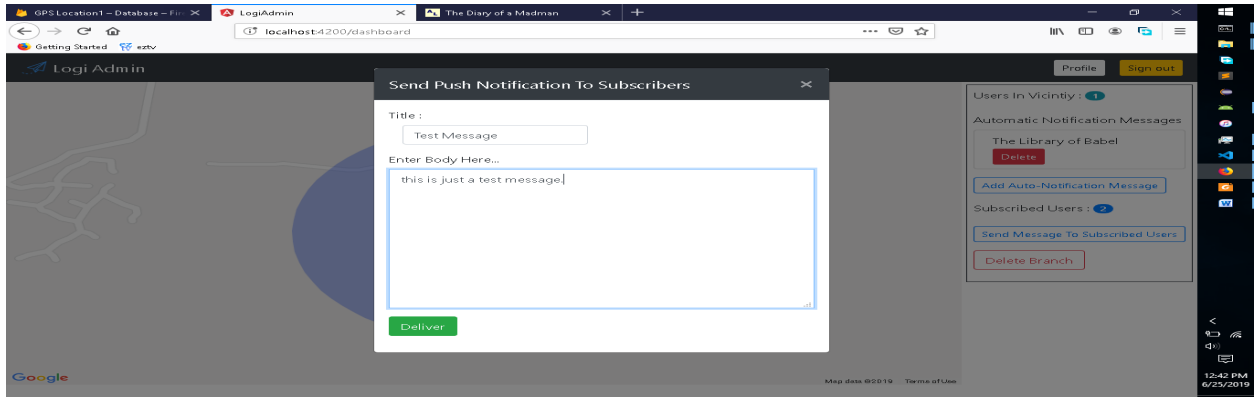
Figure 4.7 Sending Message to subscribed Users

4.2 Output Specification
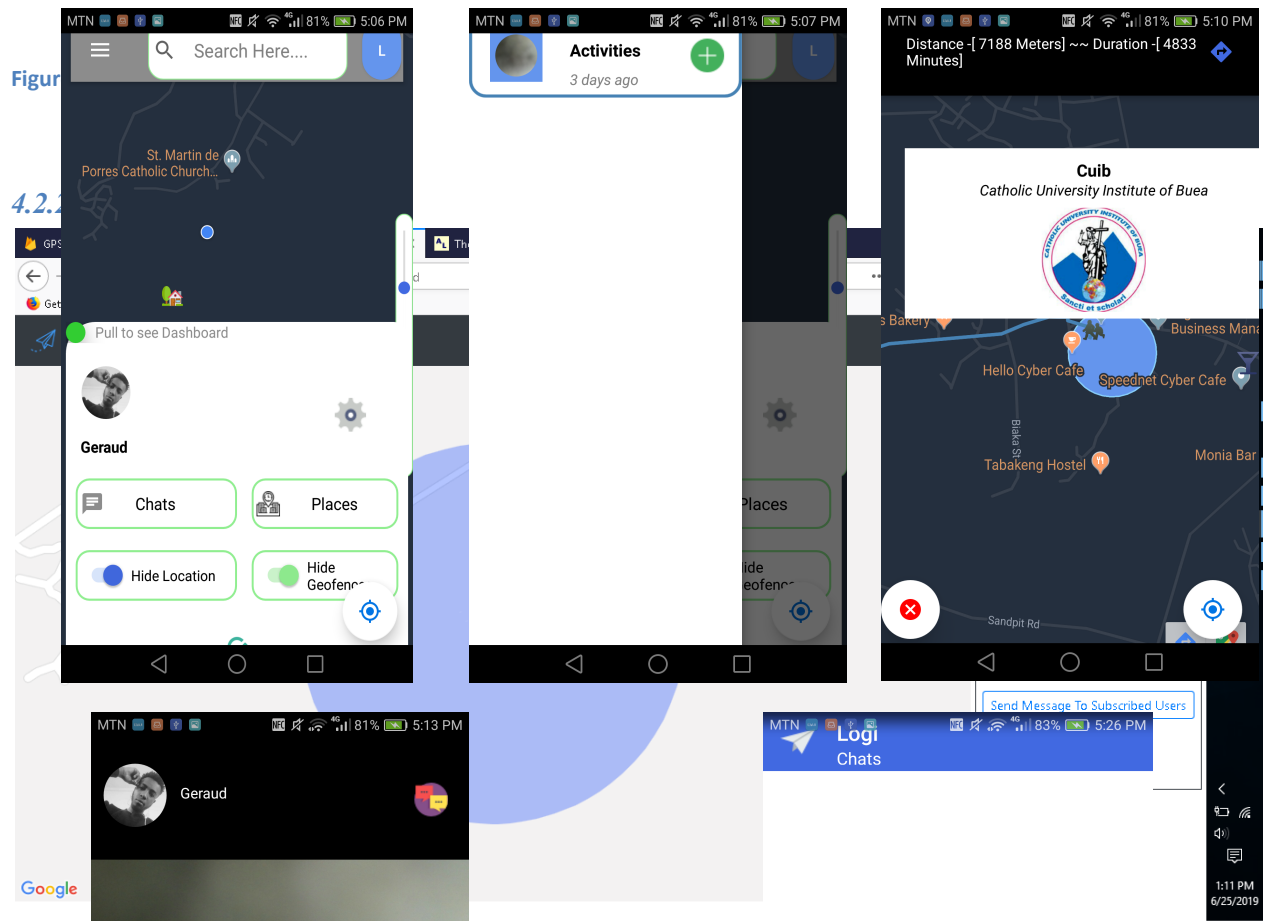
4.2.1 Mobile App Platform

Figur

4.2.

Figure 4 ... n on map, geo-fence, number ... ed users etc.

41

Chapter 5

Ethical Perception

5.1 Purpose/Objective

Catholic social teaching covers all spheres of life – the economic, political, personal and spiritual. With human dignity at its center, a holistic approach to development, founded on the principles of CST, is what Pope Paul VI called 'authentic development'. It is the Catholic doctrines on matters of human dignity and common good in society. The ideas address oppression, the role of the state, subsidiarity, social organization, concern for social justice, and issues of wealth distribution. The Catholic Church proclaims that human life is sacred and that the dignity of the human person is the foundation of a moral vision for society. This belief is the foundation of all the principles of our social teaching. This chapter takes into account the ethical implication of this research project on the society/community with the principles of catholic social teachings as its main reference or focal point.

5.2 Aims/Objectives

Users will also be in complete control and customization of their virtual map by been able to extend it by adding custom locations of places or areas to be shared with their contacts, use the power of Geocoding to create geographical boundaries around custom location to monitor their contacts activities in that area not forgetting the use of Google Directions API to draw routes to specific locations to help you with navigation around areas. Third parties will also be allowed to register their business in the application web Portal so it can be viewed by users. This will help them to promote their business since social media marketing is what makes a business successful more these days.

5.3 Ethical Analysis of Findings

5.3.1 Common Good

Every person should have sufficient access to the goods and resources of society so that they can completely and easily live fulfilling lives. The rights of the individual to personal possessions and community resources must be balanced with the needs of the disadvantaged and dispossessed. The common good is reached when we work together to improve the wellbeing of people in our society and the wider world.

The project app is based on extensive cooperation among diverse parties or companies and, is in many ways consistent with the Catholic vision for economic activities that promote the common good. Pope John Paul II wrote in his encyclical **Centesimus Annus** that a business should act not as a "society of capital goods" directed solely toward the attainment of financial goals, but rather as a "society of persons" that serves the common good of *everyone*. He called specifically for economic activities that bring producer, business owner and consumers together in a "progressively expanding chain of solidarity" that not only leads to each party's fulfillment, but also creates additional value for society.

5.3.2 Subsidiarity

All people have the right to participate in decisions that affect their lives. Subsidiarity requires that decisions are made by the people closest and most affected by the issues and concerns of the community.

The principle of subsidiarity holds that no one should perform any function that can be handled more effectively at a lower level by people who better understand the issues involved. Pope John Paul II identifies worker ownership as a leading form of economic subsidiarity in his encyclical *Laborem Exercens*: "Each person is fully entitled to consider himself a part-owner of the great workbench where he is working with everyone else. A way towards that goal could be found by associating labor with the ownership of capital."

The app will reflect this because it will allow users to choose between been online, another user seeing his/her location. The user will also be able to decide places to add and view on the map. In summary the user will have full control of his/her data both incoming and outgoing not forgetting the one been stored.

5.3.3 Solidarity

Everyone belongs to one human family, regardless of their national, religious, ethnic, economic, political and ideological differences. Everyone has an obligation to promote the rights and development of all peoples across communities, nations, and the world, irrespective of national boundaries. We are called by the principle of solidarity to take the parable of the Good Samaritan to heart (Luke 10:29-37), and to express this understanding in how we live and interact with others.

More than ever before, the choices we make as consumers here in Cameroon have a direct impact on the lives of people around the world. In our global economy, most of us never meet the

people who create the things we buy and few of us know anything about the social and environmental conditions under which they were produced. That's why Logi will build direct relationships between us. So when we online using the application, we enter a network of human relationships that we can feel good about that respect human dignity, also promote economic justice, and cultivate global solidarity.

5.4 Conclusion

With the little knowledge I had on catholic social teaching, I have try to blend in some of the most important principles that can match with social media technology in our today's society. Even though it wasn't easy to do but by his grace I push through till the end.

5.4.1 Recommendations

While the Church promotes the social media throughout this conciliar decree, the Council Fathers simultaneously alert children, youth, parents, teachers, pastors and bishops to be vigilant in the use of mass media and social communication. They likewise challenge "public authorities" to offer authentic moral leadership while stating that "a special responsibility for the proper use of the media of social communication rests on journalists, writers, actors, designers, producers, exhibitors, distributors, operators, sellers, and critics." Appealing to the good will of professional media outlets, the Council Fathers also requested "respect for the moral law," reminding these professionals that a great many of "their readership and audience are young people."

Conclusion

The project was to create and application, mobile and web. mobile part will be a social media application based on the Google maps v2 (version 2) API for android, where users can track their contacts location real-time, share their activities of the day (stories like Instagram, Snapchat, Whatsapp etc.), chat and perform VoIP internet calls with their contacts. The users will also be in complete control and customization of their virtual map by been able to extend it by adding custom locations of places or areas to be shared with their contacts, use the power of Geocoding to create geographical boundaries around custom location to monitor user activities in that area not forgetting the use of Google Directions API to draw routes to specific locations to help with navigating around areas. The web part is a platform where third parties will be allowed to register their business in the application so it can be viewed by the mobile users. This will help them to promote their business since social media marketing is what makes a business successful more these days. My results do support my hypothesis.

I think the tests I did went smoothly and I had no problems, except when I went down to power optimization and functioning with multiple third party APIs. An interesting future study might involve adding more functionalities and optimization to the applications.

References

Carr, N., & McCullagh, P. (n.d.). *GeoFencing on a Mobile Platform with Alert Escalation – technical development*. 4.

Ibrahim, D. O. A., & Mohsen, K. J. (2014). *Design and Implementation an Online Location Based Services Using Google Maps for Android Mobile*. 7.

M.S.I., M. Z., Sazali, M. A., Isa, A. A. M., & M.Isa, M. S. (2015). *Development of Auto-Notification Application for Mobile Device using Geofencing Technique*.

Rinne, M., & Törmä, S. (n.d.). *Mobile crowdsensing of parking space using geofencing and activity recognition*. 12.

Roxin, A., Gaber, J., Wack, M., & Nait-Sidi-Moh, A. (2007). Survey of Wireless Geolocation Techniques. *2007 IEEE Globecom Workshops*, 1–9. https://doi.org/10.1109/GLOCOMW.2007.4437809

Ververidis, C., & Polyzos, G. C. (n.d.). *MOBILE MARKETING USING A LOCATION BASED SERVICE*. 12.

Firebase. (n.d.). Retrieved July 11, 2019, from Firebase website: https://firebase.google.com/

Online payment processing for internet businesses - Stripe. (n.d.). Retrieved July 11, 2019, from https://stripe.com/en-se

Overview | Maps SDK for Android. (n.d.). Retrieved July 11, 2019, from Google Developers website: https://developers.google.com/maps/documentation/android-sdk/intro

Product Overview. (n.d.). Retrieved July 11, 2019, from https://documentation.onesignal.com/docs/

Voice Calling. (n.d.). Retrieved July 11, 2019, from Sinch | Enriching Engagement website: https://www.sinch.com/products/voice/