

# Document History

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<b>AR Map 2Go! - Project Proposal-1.0.2.docx</b>	-Update Introduction and Background - Business Review - Technology Review - Development Tools Review	Draft	28/5/16	Advisor	PP
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<b>AR Map 2Go! - Project Proposal-1.0.4.docx</b>	- Motivation - Aim and Object - Architecture Review	Draft	30/5/16	Advisor	PP

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	Schedule and Milestone				
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**06 July 2016**

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# Abstract

Nowadays, there are a lot of Map applications provides a service for navigation and location tracking in the market. For example, Google Map application on Android provides features and experience with Google Play Services to satisfy this need. Even map applications in the market provide a good and sufficient features for the users but most of their interface is the old form of an interactive map as part of their user interface.

In the case of users with low user experience and capability level, this interface still difficult and more complex to use. Then we should find a new way to use map application easily and more interesting.

"AR Map 2Go!" is a mobile application are designed and provides a service to fulfill this problem with concept "scan, touch and go!". With Virtual Reality technology can make a new experience to display data and help users to explore and find the nearby locations on Map easily by capture the map photo and see the 3D pop-up objects via this application. Also, it allows users to interact with each location to get the direction as Google Map can do, but the user can click on each location to see more information and detail.

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# Chapter One | Introduction and Background

Todays, there are many applications about geo-tracking from big name companies in the mobile application industry to support and fulfill the customers expect on navigation and tracking location. Although there are many geo-tracking applications in the market but their functional capabilities don't provide anything difference too much. Commonly, the user should input the target location name to start route direction from the current location to any destination.

The problem is “If the user is the traveler who comes to visit for the first time, how can they know where is to go if they don't know anything?” Then we should have the best way that very easy to search and provide any POI (Point of Interest) locations on the map guide or search by keyword from the text title on the magazine for users with low user experience and capability level.

In term of data representation, almost map applications represent the result on the map view to the user in the same way. In 2-Dimension view as street, terrain or satellite view and 3-Dimension as a Google Street view or Google Earth. We should have another awesome way to display the result to the user by integrating the new technology tends on this project to make it more interesting and difference from the other application on the market. With new trend, the user looking for a new experience more than focus on application usability.

Today, the mobile technology and tools have been developed rapidly in the decade. We have the new way to represent data the user. Considering in “Amazing data representation”, “make it more interesting” and “very easy to use” then I have selected “Augmented Reality (AR)” and apply to this project.

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Augmented Reality (AR) is the term used to describe a three-dimensional, computer-generated environment which can be explored and interacted with by a person on the smartphone. The virtual scene generated by the smartphone is designed to enhance the user's sensory perception of the virtual world they are seeing or interacting with.

For this reason, my application is developed under the concept “scan, touch and go!” to support and fulfill the problem on above. This application can help users and travelers easy to explore and find the nearby location on a map by capture the map guide picture on any each province and the system will display all related POI locations in that province via interactive 3D-object to users. With the advantage of AR technology, the user becomes interactive virtual experience on Map application with a virtual object they are seeing or interacting with. In addition, users and travelers can search for direction and location’s information by keyword about location’s name on map guide or travel magazine also.

We decided to develop an application on the Android operating system. This application allows the user scans the camera on the map picture to get the nearby locations around the user in Virtual Reality view. Apart from that, this application uses Google Map API to identify the location with the map feature. So, the user can get the exact location and go without getting lost with correctness. With user-friendly's interface design makes this application easy to use for everyone.

The goal of this application is to help users and travelers easy to explore and find the nearby location on a map by capture the map picture or any keyword from magazine via this application by themselves. As well as helping them to know where to go to the place they need. In addition, it would be handier for the user to do it on a portable device like a smartphone, which can access at anywhere and anytime.

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# Chapter Two |

## Literature Review

### 2.1 Business Review

#### 2.1.1 Overview

Although, many map applications on mobile to support and fulfill the customers expect but most of all map applications have the common way to search the target destination by input the location name and looking for the result.

The application's functional provides the service to navigate the user and support the location tracking but it is all similar way to receiving data input and represent the result to the user in the old way via Map interface. It may not fulfill the customers with over expect and looking for something newly and more interesting. Now the media and technology just like a smartphone, the Internet, GPS (Global Positioning System), Geo Tracking and Virtual Reality (VR) had become more advanced. Then the user has many choices to use the application on the market to satisfy their desire.

I selected some of most well-known geo-tracking applications in the market to make a review show on their advantage, disadvantage to show how this project fulfill the new expect and difference from the other applications in the market.

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### **2.1.2 Target**

There are two main targets of this application are users who want to explore the POI (Point of interest) locations they want to go on the map guide and the administrator who manages the system and information on the server side via web-application.

**The user** can explore the POI locations nearby on the map by search on map guide photo or scan by using any location's text title. The user can be the traveler who comes from other country or another place which they want to travel but don't know anything about the destination information.

**The administrator** can add/edit/delete a 3D model object into the system via the web application. Also, an administrator can add and update new locations with location information into the system to make this application are up-to-date.

### **2.1.3 Benefit**

#### **2.1.3.1 The User**

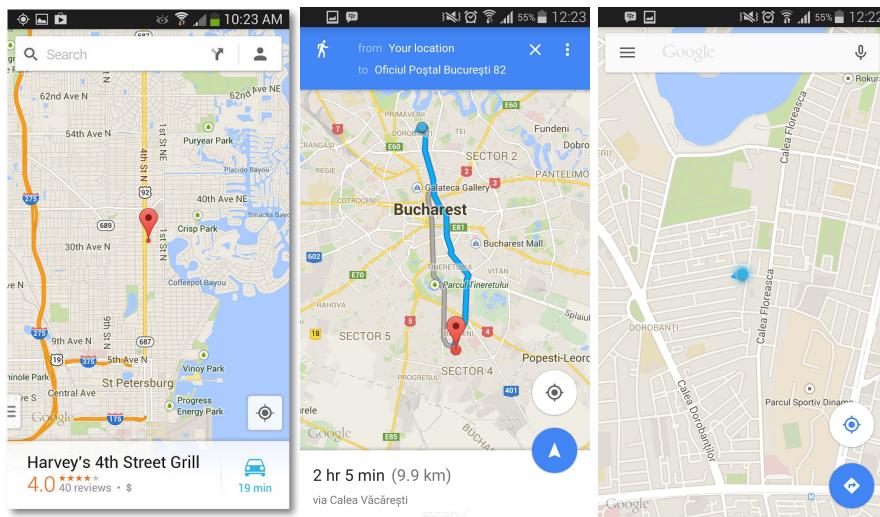
- The user explores the nearby location on the map picture by scan the mobile camera on the map picture via this application easily.
- The user easy to search the target location by scan the mobile camera on the location's title or keyword from magazine via this application.
- The user can save more time to find all nearby location on the map picture via this application.
- The user can see more information, detail and route direction on each nearby locations.

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## 2.2 Software Review

### 2.2.1 Google Map on Android

Google Map on Android is a mobile application mapping service developed by Google. It offers satellite imagery, street maps, 360° panoramic views of streets (Street View), real-time traffic conditions (Google Traffic), and route planning for traveling by foot, car, bicycle, or public transportation.



**Figure 1.1:** Google Map Graphic User Interface

#### Pros

- The application has more excellent search capabilities
- The application has a great additional features like aerial photos and traffic information.
- The application has maps include parks, airports, hospitals, malls, and other points of interest.
- The application has visually appealing maps.

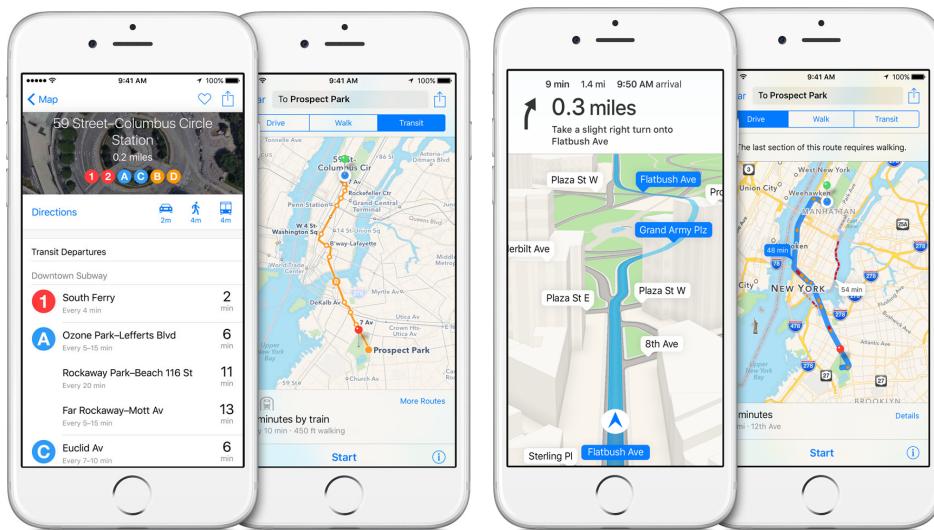
#### Cons

- Unattractive user interface.
- Hard to use for some people with low usable capability.

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## 2.2.2 Apple Map on iOS

Apple Maps is a mobile mapping application developed by Apple Inc. It is the default map system of iOS and watchOS. It provides directions and estimated times of arrival for automobile, pedestrian, and public transportation navigation. Apple Maps also features the unique 'Flyovers' mode, a feature that enables a user to explore densely populated urban centers in a 3D landscape composed of models of buildings and structures.



**Figure 1.2:** Apple Map Graphic User Interface

### Pros

- The application has impressive 3D views and layout.
- The application has accurate turn-by-turn navigation.

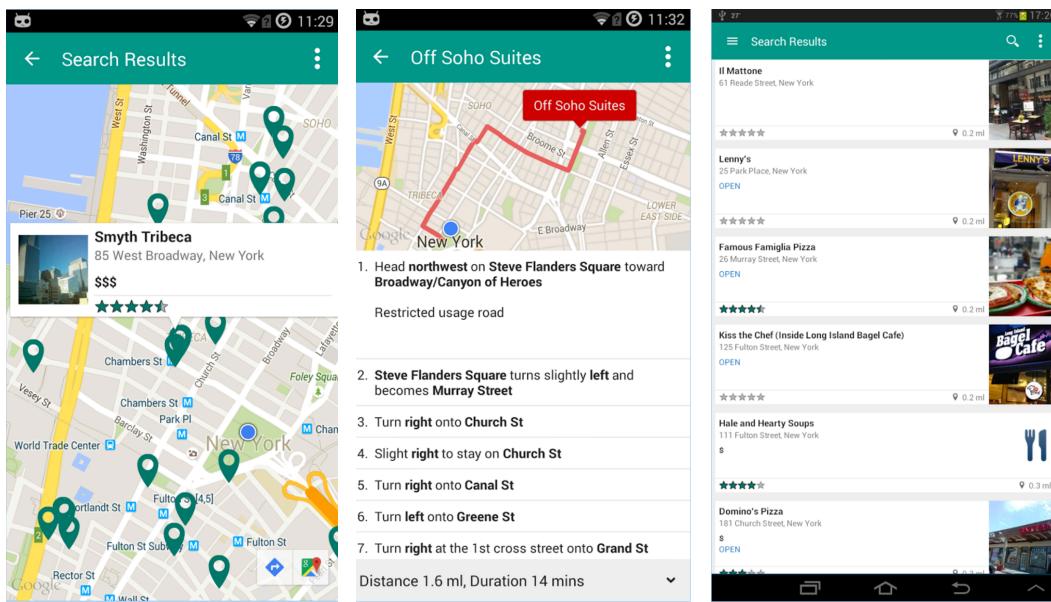
### Cons

- The application has drain the mobile battery when in use.
- The application search results could be displayed more efficiently.

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### 2.2.3 NearBy Me - Places

NearBy Me is mobile application helps you find new and fun places near your location, for you and your loved ones to spend some quality time together. Either it be dinner, coffee or even drink. NearBy Me is also a great navigation tool to take on a vacation as you can find your way around an unfamiliar city. Also calculates the route towards your selected destination, so that it will be easier to find.



**Figure 1.3:** NearBy Me - Places Graphic User Interface

#### Pros

- The Application provides nearby banks, bars, clubs, restaurants, food points, hotels, or any other place users want to search easily.
- The Application provides rating level for each place.
- The Application allows users add places to Favorite list

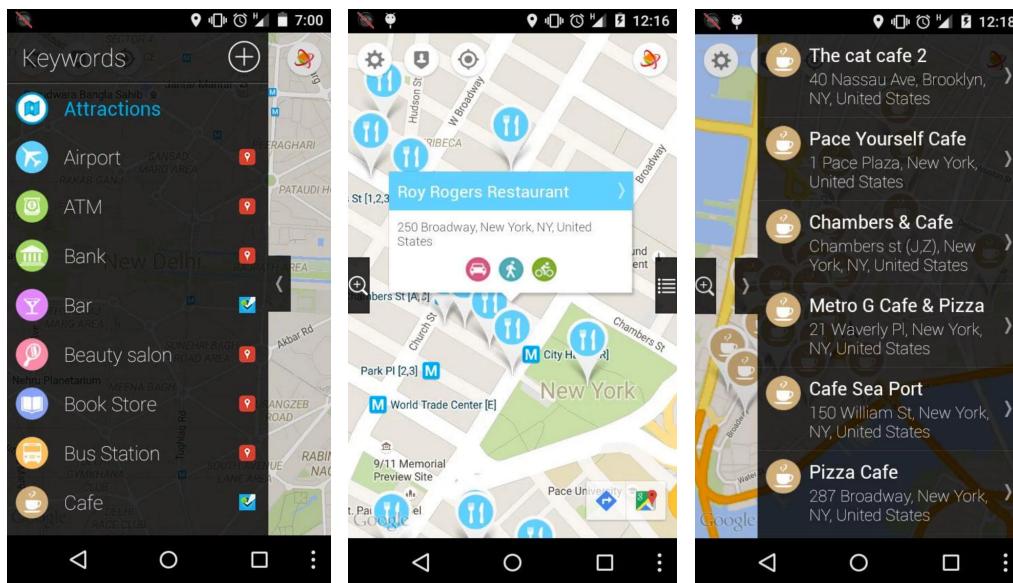
#### Cons

- Unattractive user interface.
- Search results based on the user current location.

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## 2.2.4 Find Near Me – Places Around Me

Find Near Me is an application which helps you find ATM, Bank, Gas Station, Restaurant, Bar, Café, Hospital, Hotel, Taxi, Movie Theatre, Beauty Salon, Wi-Fi spots or virtually anything near you. With this GPS-base locator on mobile, you can also search around any location across the globe and add them to their favorite search locations.



**Figure 1.4:** Find Near Me Graphic User Interface

### Pros

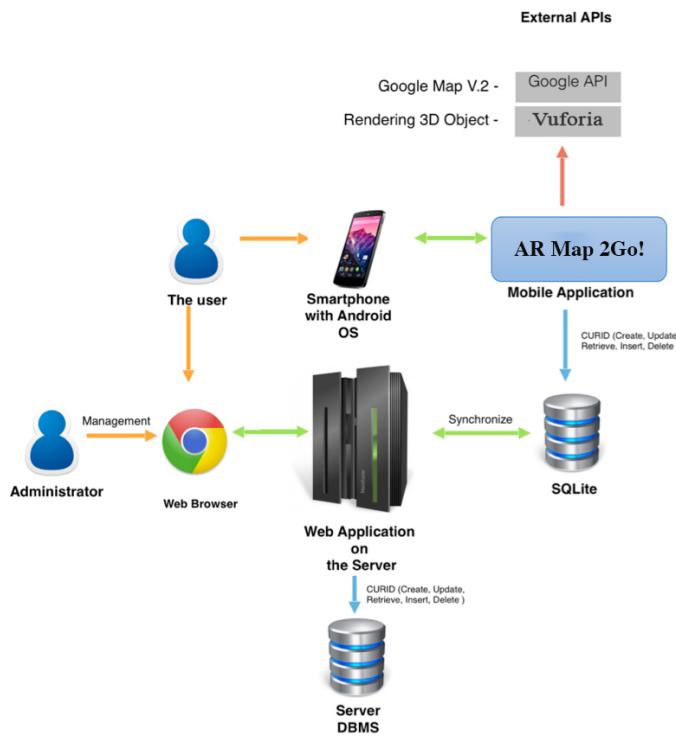
- The Application allows users Customize the distance units (kms/miles), map types and the ordering of how search results are displayed.
- The Application displays detailed information such as Ratings, Reviews, Opening Hours and Photos for places.

### Cons

- The system provides too many advertisements.

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## 2.3 Architecture Review



**Figure 1.5:** Architecture Review

This **figure 1.5** shows the system architecture of AR Map 2Go!. The mobile application has separated to two sides that are mobile application and web server. The user can access the application via using mobile. The application will transfer data between web servers via JSON and XML. The mobile application has build-in database (SQLite) to manage and maintain data between mobile application and the server.

The server has database system on the server side also. The server can synchronize the data and information between mobile application and web server each other. Administrator can access to manage and maintain the data into the server via using web browser (e.g. Google Chrome). The applications using external APIs are “Vuforia” library, to read and rendering 3-Dimension object model, Google Map API version 2.1

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## 2.4 Technology Review

### 2.4.1 Augmented Reality (AR)



**Figure 1.6:** Augmented Reality example

**Augmented reality (AR)** is a live, copy, view of a physical, real-world environment whose elements are augmented (or supplemented) by computer-generated sensory input such as sound, video, graphics or GPS data. It is related to a more general concept called mediated reality, in which a view of reality is modified (possibly even diminished rather than augmented) by a computer. As a result, the technology functions by enhancing one's current perception of reality. [5]

#### Alternative Tool

-

#### The selection of this technology

This technology is support with mobile device. Mobile application with AR makes more comfortable for user in order to transfer and receive data via network more than Personal Computer or Laptop. It is unique / different (for the moment) and the possibilities of augmented reality are only just being explored, and any new developments are likely to achieve further exposure.

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### **2.4.2 Android Operating System**

Android is operating system that develops on a Linux-based for mobile devices such as smart phone and tablet. Android is open source; it is free for everyone who are interested to develop. Because Android has developed by Google, so it has a lot of Google services supported such as Gmail, Google Calendar, and Google Maps. <sup>[1]</sup>

#### **Alternative Tools**

- iOS
- Symbian
- Window Phone
- BlackBerry OS
- WatchOS

#### **The selection of this technology**

Nowadays smart phones are very popular. For us we choose the Android OS because it is an open source operating system. It is free for developing and also support by many tools. It can directly be tested on the smart phones.

### **2.4.3 JSON**

JSON (JavaScript Object Notation) is a lightweight data-interchange format. It is easy for humans to read and write. It is easy for machines to parse and generate. It is based on a subset of the JavaScript Programming Language, Standard ECMA-262 3rd Edition - December 1999. JSON is a text format that is completely language independent but uses conventions that are familiar to programmers of the C-family of languages, including C, C++, C#, Java, JavaScript, Perl, Python, and many others. These properties make JSON an ideal data-interchange language. <sup>[2]</sup>

#### **Alternative Tool**

- Extensible Markup Language (XML)

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### The selection of this technology

JSON makes us be more easy to read and write. It is not extensible because it does not need to be. Moreover, it is not a document markup language, so it is not necessary to define new tags or attributes to represent data in it. We can use JSON to store and retrieve data between Web-Service and our application.

#### 2.4.4 Google Maps API

Google Maps is a web mapping service application and technology provided by Google, that powers many map-based services, including the Google Maps website, Google Ride Finder, Google Transit, and maps embedded on third-party websites via the Google Maps API. It offers street maps and a route planner for traveling by foot, car, bike (beta), or with public transportation. It also includes a locator for urban businesses in numerous countries around the world. <sup>[3]</sup>

#### Alternative Tool

- Bing Map

### The selection of this technology

There are a lot of information of Google Maps API provided, such as source code samples and tutorials on the internet. Also, there is a complete code of the Google Maps provided for us to apply for our projects. Therefore, we do not have to waste our time writing the whole source code for this part again.

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### 2.4.5 PHP

PHP, stands for "**Hypertext Preprocessor**", is a server-side, HTML embedded scripting language used to create dynamic Web pages. PHP offers excellent connectivity to many databases including MySQL, Informix, Oracle, Sybase, Solid, PostgreSQL, and Generic ODBC. <sup>[6]</sup>

#### Alternative Tool

- Perl
- Python
- ASP.NET
- JSP
- Ruby

#### The selection of this technology

PHP has many tutorials and examples of how to use it provided everywhere. Moreover, it is open source and does not too complicated to understand.

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### 2.4.6 *SQLite*

SQLite is the way to connecting between android and Database. SQLite is famous because it has small database size on the application with run on the smartphone. Working process of SQLite is standalone then it has a basic structure and easy to use with other application. Then SQLite has suitable for application that working on smartphone. This can solve the problem of the limited in hardware and memory usage on Smartphone. [7]

#### Alternative Tool

- Microsoft SQL Server Management Studio
- MySQL Enterprise Edition

#### The selection of this technology

It supports the mobile application with small size of database, reduce on the memory usage and work well with android application.

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## 2.5 Development Tools Review

### 2.5.1 *Android Studio*

Android Studio is Android's official IDE. Its purpose is to build for Android to accelerate your development and help you build the highest-quality apps for every Android device. It offers tools custom-tailored for Android developers, including rich code editing, debugging, testing, and profiling tools. It supports people in developing software with Java. It provides a simple and understandable user interface. Moreover, the developers also be able to download many different plugins to work with Android Studio. Further than that, it is free. <sup>[8]</sup>

#### Alternative Tools

- Eclipse with ADT
- IntelliJ IDEA

#### The selection of this technology

This is an Android's official IDE development tool from Google. Not only because it's free, but also because it is easy to set up and find various plugins to work with. In addition, it supports Android platform too. Therefore, we decided to use this software as a tool for our project.

### 2.5.2 *Vuforia SDK (AR library)*

Vuforia is an Augmented Reality Software Development Kit (SDK) for mobile devices that enables the creation of Augmented Reality applications. It uses Computer Vision technology to recognize and track planar images (Image Targets) and simple 3D objects, such as boxes, in real-time. This image registration capability enables developers to position and orient virtual objects, such as 3D models and other media, in relation to real world images when these are viewed through the camera of a mobile device. The virtual object then tracks the position and orientation of the image in real-time so that the viewer's perspective on the object corresponds with their perspective on the Image Target, so that it appears that the virtual object is a part of the real world scene. Moreover, it is free for required features on this project. <sup>[4]</sup>

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### Alternative Tools

- AndAR
- ARToolKit

### The selection of this technology

Vuforia SDK is enable and support a content creator to quickly build an AR experience from existing 3D content. It is easy to set up and find various plugins to work with Unity 3D Editor that I use in this project. In addition, it supports various mobile platform including with Android too. Therefore, I decided to use this development tool as a tool for our project.

### 2.5.3 MySQL

MySQL is an open source relational database management system which used by many users around the world. It can create both standalone and server database. It can integrate with other product such as MySQL Workbench, MySQL Notifier and MySQL Connector. It also supports many development tool for create application such as Eclipse, NetBeans.<sup>[9]</sup>

### Alternative Tools

- SQLite

### The selection of this technology

Due to our application needs to connect the database with the web server. From this point, MySQL does support our need for our application. Not only Android OS that it supports, but also in other different platforms. In addition, it's free. Apart form that, there are many people has been using it, so there are many tutorial introducing us the software on the Internet. Therefore, if we have any problem, we can immediately figure it out.

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### 2.5.4 GitHub

GitHub is a social network for programmers. Git is a distributed software management program created by Linus Torvalds, originally for the Linux Kernel Development. GitHub is a hosted Git repository. Github allows you to take part in collaboration by forking projects, sending and pulling requests, and monitoring development. <sup>[10]</sup>

#### Alternative Tools

- Dropbox
- Google Drive
- iCloud
- Sky Drive

#### The selection of this technology

We use GitHub as our repository to share and store our work. It provides free storage and also the history when there is something changed. The history will show all the details of the changes such as who changed it, what has been changed, when did it change and so on. More than that, it gives automatic version control too.

### 2.5.5 Aptana Studio 3

Aptana Studio 3 is build web applications quickly and easily using the industry's leading web application IDE. Aptana Studio harnesses the flexibility of Eclipse and focuses it into a powerful web development engine. It is an open source rapid development web application development for Web 2.0 and Ajax for use with a variety of programming languages (such as JavaScript, Ruby, PHP and Python).<sup>[11]</sup>

#### Alternative Tools

- Cake PHP Framework
- Notepad++
- Coda2

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### The selection of this technology

Aptana Studio 3 provides functions such as auto closes tags, code hinting, preview, which give ability for users to create a website easier. Moreover, this development tool can preview any web-plugin we use are support or not.

### 2.5.6 Unity 3D Editor

The Unity 3D Editor enables you to create 2D and 3D games, apps and experiences. The Unity Manual helps you learn how to use the Unity Editor and its associated Services. You can read the Manual from start to finish or use it as a reference.<sup>[12]</sup>

#### Alternative Tools

- 3D Max Studio
- Maya

### The selection of this technology

Unity 3D Editor supported the Augmented Reality SDK on Android development tools that allow the developer use many features and plugin e.g the VideoTextureRenderer on the ARCamera to create the 3D object model and easy to implement with Augmented Reality on mobile application.

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# Chapter Three |

## Quality Standard

### 3.1 ISO29110 for Very Small Entity (VSE)

ISO29110 is a guide applies to a Very Small Entity (VSE), enterprise, organization, department or project up to 25 people, dedicated to software development. The Guide provides Project Management and Software Implementation processes which integrate practices based on the selection of ISO/IEC 12207- Systems and Software Engineering — Software Life Cycle Processes and ISO/IEC 15289Software Engineering – Software Life Cycle Process – guidelines for the content of software life cycle process information products (documentation) standards elements.

#### ***3.1.1 Project Management Process***

The purpose of the Project Management process is to establish and carry out in a systematic way the tasks of the software implementation project, which allows complying with the project's objectives in the expected quality, time and cost.

##### **Selected process**

- Project Planning Process
- Project Plan Execution Process
- Project Assessment and Control Process
- Project Closer Process

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### ***3.1.2 Software Implementation Process***

The purpose of the Software Implementation process is the systematic performance of the analysis, design, construction, integration and tests activities for new or modified software products according to the specified requirements.

#### **Selected process**

- Software Implementation Initiation Process
- Software Requirements Analysis Process
- Software Architectural Design Process
- Software Construction Process
- Software Integration and Test Process
- Software Delivery Process

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# Chapter Four |

## Project Plan

### 4.1 Motivation

Today, there are a lot of map application provides a location-based service for users in the market (e.g. Google Map). There are provides good service and experience to satisfy this need to let them explore and search locations and give route planning for how to go into it.

Their functional capabilities and performance don't difference too much, but most of them still used in the same way to receive data input and display the result to the user in the form of an old interactive map as part of their user interface. Now, the new technology trend makes the user always keep looking for a new experience more than just focus the only usability. They tend to keep exploring new application comes with interesting ideas and easy to use.

As a result, although those medias seem to provide perfect and sufficient features for the users, there is another point that they did not concern. Except the data representation, the problem is some users with low capability pay for more time to learn and understand how to use the application.

Therefore, this project will help users to find out many nearby locations on the map easily with virtual reality view technology trends to enhance the user experience with 3D-object which can interact in the real world.

The reason we want to work on map application and present to the user with virtual reality in the real world is that it is becoming very popular for people who looking for the new technology trends. Apart from the usable purpose, it also helps people in the way of relieving from confusing and saving the time to learn when to install the new application, increase more concentration with new technology tends to make their life more easily.

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Moreover, technologies have become an essential thing for people. Apart from the web application that can be accessed by various devices, there is a popular technology like smart phones too. There are several operating systems developed to support them, one of those operating systems that are well-known is Android OS. Due to it is an open source, there are many resources provided to develop, and it is easy to learn.

From this software project, we expect to get more knowledge and experiences in processing in order to develop new software. On the other hand, also to get the experience of working for the good of our working life in the future.

## 4.2 Aims and Objectives

### 4.2.1 Aims

The aims of AR Map 2Go! the project is developing mobile and web application by implementing Augmented Reality technology with geo-tracking based application. This application allows users scan on the map picture or location text title to explore the Point of Interest (POI) locations and shows as the interactive real world object (3D) with virtual scenes technology. The administrator can manage the data and information on the server side via the web application to keep this application are newly and up-to-date. The development of this application will be done under the ISO 29110 software quality standard.

### 4.2.2 Objectives

- Develop an Android application using open source tools for the user.
- Develop a web application using open source tools for the administrator.
- Let the user scan on the map pictures via this application to find all related locations on the map.
- Let the user scan on the location text title via this application to get the information about the target destination.
- Let the administrator add more new locations by managing and providing the information into server database system.

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- Let the administrator add more 3D object symbols by managing and providing a new 3D model files into server database system.
- Be able to seek for locations' information and location
- Develop an Android application with Augmented Reality by Vofuria SDK.
- Apply the knowledge about JAVA programming language, Database, Web application, OOP, Software Component base (MVC) and mobile device technology into this project.

## 4.3 Deliverables and Limits

### 4.3.1 Deliverables

#### Progress Report #I

##### Feature #1: Registration and Authorization Management

**Description:** This features supports web-application management system for administrator.

##### Target: Users

- The user can register a new account.
- The user can delete an account.
- The user can login to the system.
- The user can logout from the system.
- The user can recover the password.
- The user can view the user profile.
- The user can update profile information.
- The user can change profile picture.

##### Feature #2: Web-Application and server Management

**Description:** This feature supports registration of users for using the system.

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### **Target: Administrator**

- The administrator can login into the web application system.
- The administrator can logout from the web application system.
- The Administrator can add the new location into the server.
- The Administrator can add the new 3D object symbol into the server.

### **Feature #3: Augmented Reality Management Management**

**Description:** This features supports about Augmented Reality management to show the 3-dimension object on the map.

### **Target: Users**

- The system can scan on the specified map picture.
- The system can scan on the specified text title.
- The system can show the 3D-object via camera view.
- The user can interact with 3D-object by click to get the action.

## **Progress Report #II**

### **Feature #4: Map and Navigation Management**

**Description:** This features supports map management system on mobile application.

### **Target Users**

- Develop Map using Google Maps API.
- The user can click on each 3D-object to get route direction planning.
- The system can navigate route direction via Google Map application.
- The system can show nearby locations related with the specified target.

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### Feature #5: Notification Management

**Description:** This features supports map management system on mobile application.

#### Target: Users

- The system can send the notification to the user when the system has been updated.

#### Progress Show Pro

Ensure that the system both of mobile and web-application are complete more than 90%

#### Final Progress

Ensure that the system and documents are complete.

#### Documents

- Proposal
- Project plan
- Software requirement specification
- Software design document
- Testing document
- Traceability record
- Software quality assurance document
- Demo of program
- Poster for presentation

#### 4.3.2 Limits

- The application requires Android OS with Google Play service.
- Internet connection is required for the application to perform.
- The AR scanning performance and corrective will depend on media shape and angle between mobile phone and those media.

## 4.4 Future Work

- The user can Group of nearby POI location that locate each other.
- The user can make a review on each location.

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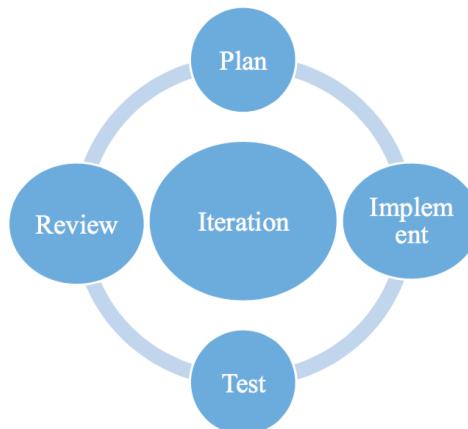
## 4.5 Software Process Model

### 4.5.1 Iterative Model

Iterative development model is one of the software development models which evolves from waterfall model. By changing process flow from step to step into iterative step. When the process flows into iterative, the process will start from the first step then go to the next step till the last. After that, the process will back to the first step and start again. The iteration will be repeat until all processes planned are complete then out from the loop and go to next main phase. [13]

**Document plan phase:** This phase is about document for planning and designs the overall system from requirement given by the user. Iterative all features: This phase is about separate system into many features and then iterative create all feature from the first feature till the final feature. For this phase, it will be divided into 4 phases. There are;

- **Plan:** Planning the method for creating and test each feature.
- **Implement:** Implementing and coding each feature.
- **Test:** Testing and fixing each feature.
- **Review:** Reviewing and maintaining each feature to meet the feature plan.



**Figure 1.7:** Iterative Model<sup>[14]</sup>

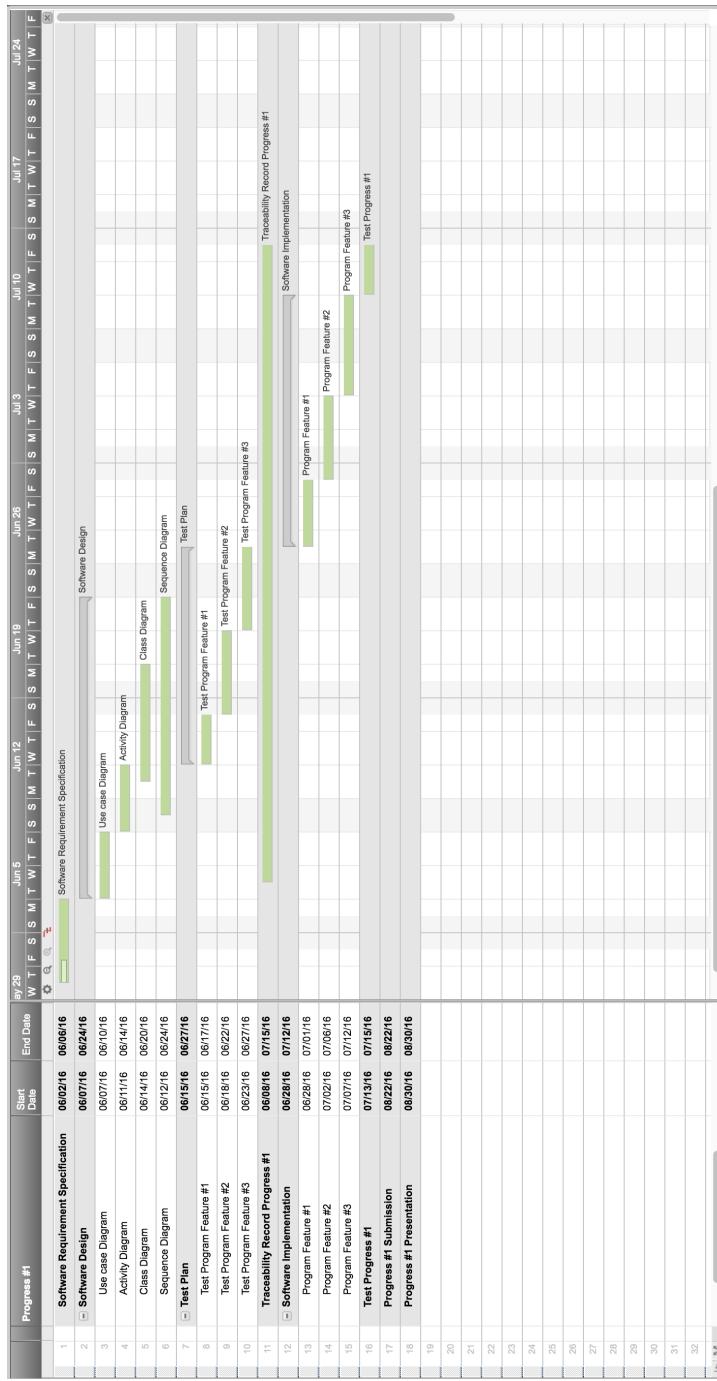
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## 4.6 Schedule and Milestones



**Figure 1.8:** The Milestone of Initial Project

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**Figure 1.9:** The Milestone of First Progress Report

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**Figure 2.0:** The Milestone of Second Progress Report

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# Chapter Five |

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**Source:**

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**Source:** [http://en.wikipedia.org/wiki/Iterative\\_and\\_incremental\\_development](http://en.wikipedia.org/wiki/Iterative_and_incremental_development)

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