Department of Software Engineering SWE-431 Project /
Thesis Project Documentation

Risky Area - Dhaka (ANDROID)

Supervised By:

Dr. Md. Mostafijur Rahman
Assistant Professor
Department of Software Engineering
Daffodil International University

Submitted by:

Mahadi Hasan Joy
ID: 152-35-1207
Department of Software Engineering
Daffodil International University

Department Of Software Engineering
Daffodil International University

DECLARATION

I hereby declare that this project has been done by me under the supervision of **Dr. Md. Mostafijur Rahman**, Assistant Professor, Department of Software Engineering, Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

Mahadi Hasan Joy
ID: 152-35-1207
Department of Software Engineering
Daffodil International University

Certified by:

Dr. Md. Mostafijur Rahman
Assistant Professor
Department of Software Engineering
Daffodil International University

Acknowledgment

I express my deepest gratitude to 'Almighty Allah' for bestowing His blessings and being benevolent on me to enable me to accomplish this project. I would like to extend my gratitude to my respectful supervisors **Dr. Md. Mostafijur Rahman**. Without him, this project would not exist. His excellent guidance, motivational facilities and environment for doing this project. I would like to thank all of my friends and classmates who have worked closely with me at my University Lab. I would like to thank Head, Department of Software Engineering, **Prof. Dr. Touhid Bhuiyan** and all teachers for providing me with all the necessary facilities and valuable guidance for my undergraduate project. I would also like to express my sincere gratitude to my beloved mother for her selfless love, firm-backing, and support that has greatly helped me in accomplishing the project. Also, I would like to extend our sincere esteem to all staff in the laboratory for their timely support.

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Chapter 1: Introduction

This section provides an overall bird's eye view of the system. It defines what the system is Supposed to do and what the system will cover, as well as what the system will not include. It also includes a brief overview of the whole document.

1.1 Project Overview

"Risky Area" is an android application for general people, this will help users to easily navigate his location & find where the area is risky for a crime like theft, robbery, murder, rape, etc. It will be verified by local police and show the criminal record for that particular place on the custom map. There is also a circle on the map for road accidents where road accidents happened and people will become aware that they should be careful. It will also help people to find the nearest foot overbridge. If a user enters into a risky area, then he/she will get an alarm & push notification. Users can also customize the circle radius for getting notified.

1.2 Purpose and Scope

The special feature of the "Risky Area" is it helps people to find all risky and safe buildings. There are too many risky buildings in Dhaka city. For buildings, the situation of old Dhaka is so sensitive that even hitting a brick can lead to the collapse of a building. There are over 72,000 risky buildings in Dhaka city prone to earthquakes. Rana Plaza, an eight-story commercial building in Savar, is one of the deadliest (or highest) collapses of Bangladesh history that died nearly 1150 and injured about 2550. Not only Rana Plaza, but many other buildings are collapsing and will collapse as most of the building is vulnerable to disaster as the builder doesn't follow the proper structure of engineers. Even they don't maintain RAJUK requirements.

The general people should be careful about where they are, how dangerous is their residential constructions and how much dangerous area that they are living in.

So a mobile application can help the public to find or track the area that he stay is risky or not and I feel that it is a much-needed solution for the major problem. It will provide the whole Dhaka city map. Even before hiring or renting people can check the building status by searching on the map. If the building is safe then it will show a green marker, but if it is not safe then the marker upon that building will be red. Even before traveling or visiting any area people can search for any criminal record that happened in that area. It wills automatic track the users by GPS tracking and the user can check the real-time area and the building's status so that he can avoid those areas for life in or, very careful to travel.

When thinking about ways of improving safety, therefore, we have to be careful about choosing appropriate measures for the particular problems that exist in a particular country or region.

1.3 Stakeholders

In this project the stakeholders are
- General peoples

General peoples are the primary stakeholders of this application. They are the end-user of this system.

1.4 Project Schedule

To complete our project successfully, we need a proper project schedule. It tells which work needs to be done with the time frame. It also helps us to deliver a project on time.

1.4.1: Gantt Chart

Gantt chart is a production control tool. To develop software, the Gantt chart is a mostly used thing. It reminds us to complete a task within a certain period of time. Below is the Gantt chart of
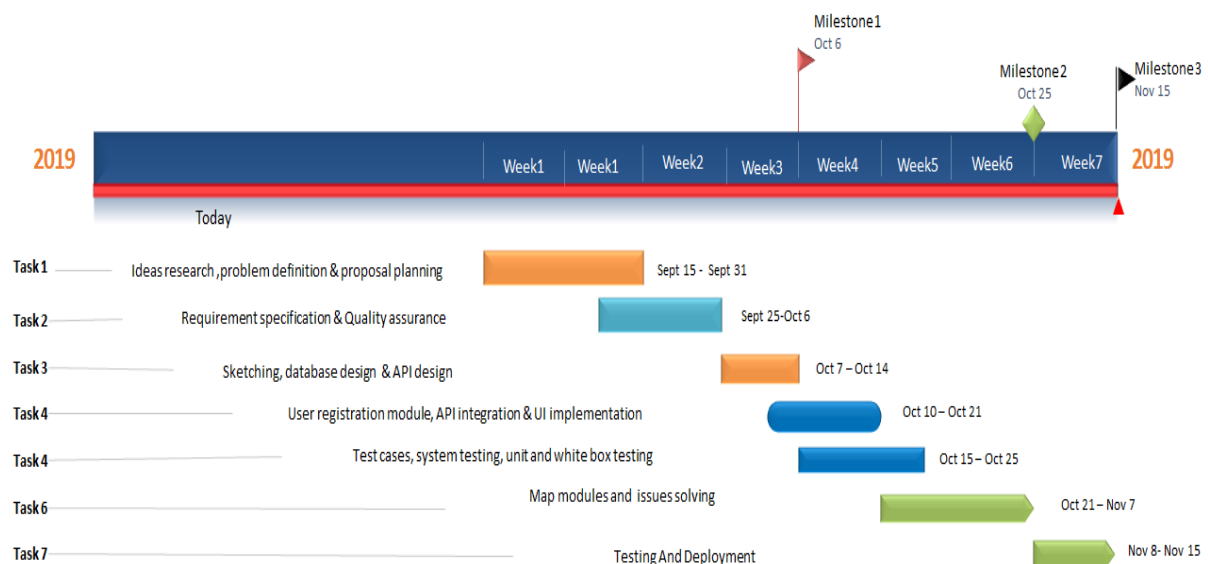
Fig1.4.2: Gantt chart

Task 1	Develop the expertise within the Accident Data Unit at Police HQ so that it can assume the coordination of the national accident reporting system

- The Accident Data Unit (ADU) at Police HQ should be managed and overview by this software.
- Improved data collection, entry and transmission procedures should be developed to ensure the accident database is accurate and comprehensive.

Task 2	Develop a custom map with the markup of Risky area in Dhaka City

- The custom map will indicate the risky area according to the previous records.
- Indication of the risky area in the map will decide by a scale of the measures about crime issues.
- Will show a red circle on that custom map.

Task 3	Develop a custom map with the markup of Over-bridge in Dhaka City.

- The custom map will indicate the nearest over-bridge of any area of Dhaka city.
- Indication of the Over-bridge in the map will help users to avoid crossing the main road with risk.

Task 4	Develop a custom map with the markup of risky roads/most accidental in Dhaka City.

- The custom map will indicate the accidental roads in any selective area of Dhaka City.
- This indication of risky roads will help users to be aware and use overbridge if there is any.

Task 5	Develop an alarming system.

- If the user enters into any risky/accidental area then the system will ring custom music to alarm users to avoid or, to be careful in that area.
- The user can change the alarm tone as he wants.

Task 6	Develop a notification system.

- Users will get a notification when the user enters a danger zone.
- If the user doesn't want notification then he/she can deny the permission of notification from this application.

Task 7	OTP validation.

- The user has to be validated by OTP when he registers.
- The user can validate OTP from both the email/phone that he provides to the system.

1.5 General Constraints

The general constraints on the development of the system are as follows:
The system will not be accessible to unauthorized users.
• All user-related data save to the central database.
• The system will be completed by the end of December 2019.
• This project is developed by following an Agile Methodology.

1.6 Goals

1. Finding the measures of road-accidental trends of a selected area.
2. Identifying recidivism of that selected area and show an authenticate the previous record in that area.
3. The main target is to the aware public before travel or visitor making the decision to live in any area that how much the area is safe or not.

Chapter 2: Software Requirement Specification

2.1 Functional Requirements

Functional requirements refer to the functions which are mandatory to the system. Functional requirements must be able to perform on the software system. Every system must have some functional requirements. Now, we are going to mention functional requirements associating with our project.

2.1.1 User Registration

Requirement 1	User Registration
Description	Users must need to log in with their email and password.
Stakeholders	Users

2.1.2 Switch Dashboard

Requirement 2	User Dashboard
Description	Users can check their recent activities and save any locational information.
Stakeholders	Users

2.1.3 Track locations

Requirement 3	Tracking location
Description	The system will enable to track users current location
Stakeholders	Users, System

2.1.4 Filter

Requirement 4	Filter with three scales
Description	After selecting an area of Dhaka city, the user can filter this area with the help of risky building scale, risky areas scale and accidental roads near the area.
Stakeholders	Users, System

2.1.5 Add Locations With Marker and Image

Requirement 5	Add report
Description	Users can add requests to add any crime or accidental report with image, date & time for a particular place.
Stakeholders	Users

2.1.6 Search location

Requirement 6	Search location/area
Description	Users can search location details through the map.
Stakeholders	Users

2.1.7 Show records

Requirement 7	Show records of incidents
Description	All records will be shown with date and time with all evidence.
Stakeholders	Users

2.1.8: Get a notification

Requirement 8	Get notification
Description	Users will get a notification while passing the risky zone, risky building, as a red sign and the safe as a green sign and also will be notified about the Over-bridge on current roads.
Stakeholders	Users

2.1.9: Get an alarm

Requirement 11	Get alarmed
Description	Users will get an alarm while passing the risky zone, accidental place or over-bridge.
Stakeholders	Users

2.1.10: Get map view

Requirement 10	Get map view
Description	Users will get a full map view of any area in Dhaka city and can see a custom markup on every risky ara and can see the details of an area according to its type. Besides that, the user can see the nearest overbridge on the map. Every part is differentiated by tabs.
Stakeholders	Users

2.2: Data quality requirement

Every information has to be valid and authentic. Admin will authenticate all data and then give permission to Store in the database.
- Users basic information
- Location Information
- Location wise overbridge records
- Crime records
- Accident Records
- Building status records
- Real-time response of data

2.3: Security Requirements

- SignIn with valid credentials.
- Get access as per role and privilege.
- Get OTP for user registration in mobile or email as the user chooses.
- Users can signup with google or facebook, but the system can't save users' confidential data in a local database.

2.4: Performance Requirements

Performance is one of the most important things in a system. To ensure the best performance of my system, I need to fulfill some requirements. And these are:

SLR-01	The system interacts with the user.
Description	The system should be smoother and real-time to respond when the user interacts.
Stakeholders	Users

2.5: Dependability Requirements

The term dependability is measured on four items. And these are;
● Availability
● Reliability
● Security
● Efficiency

2.5.1: Availability and Reliability Requirements

DR-01	The system available all time
Description	System available always when user send request
Stakeholders	Users

2.6: Maintainability and Supportability Requirements

It is very important to provide after-service support to the end-user. If we want to keep our system user-friendly, we will have to ensure the best end-user support for all the time.

2.6.1: Maintainability Requirements

DR-02	System help to update
Description	The system helps to update any information
Stakeholders	Users

2.6.2: Supportability Requirements

Supportability requirements may have related to some extent, such as:
● Testability
● Adaptability
● Compatibility
● Configurability
● Serviceability
● The Install ability
This application meets all the above requirements related to supportability

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Chapter 3: Requirement Analysis
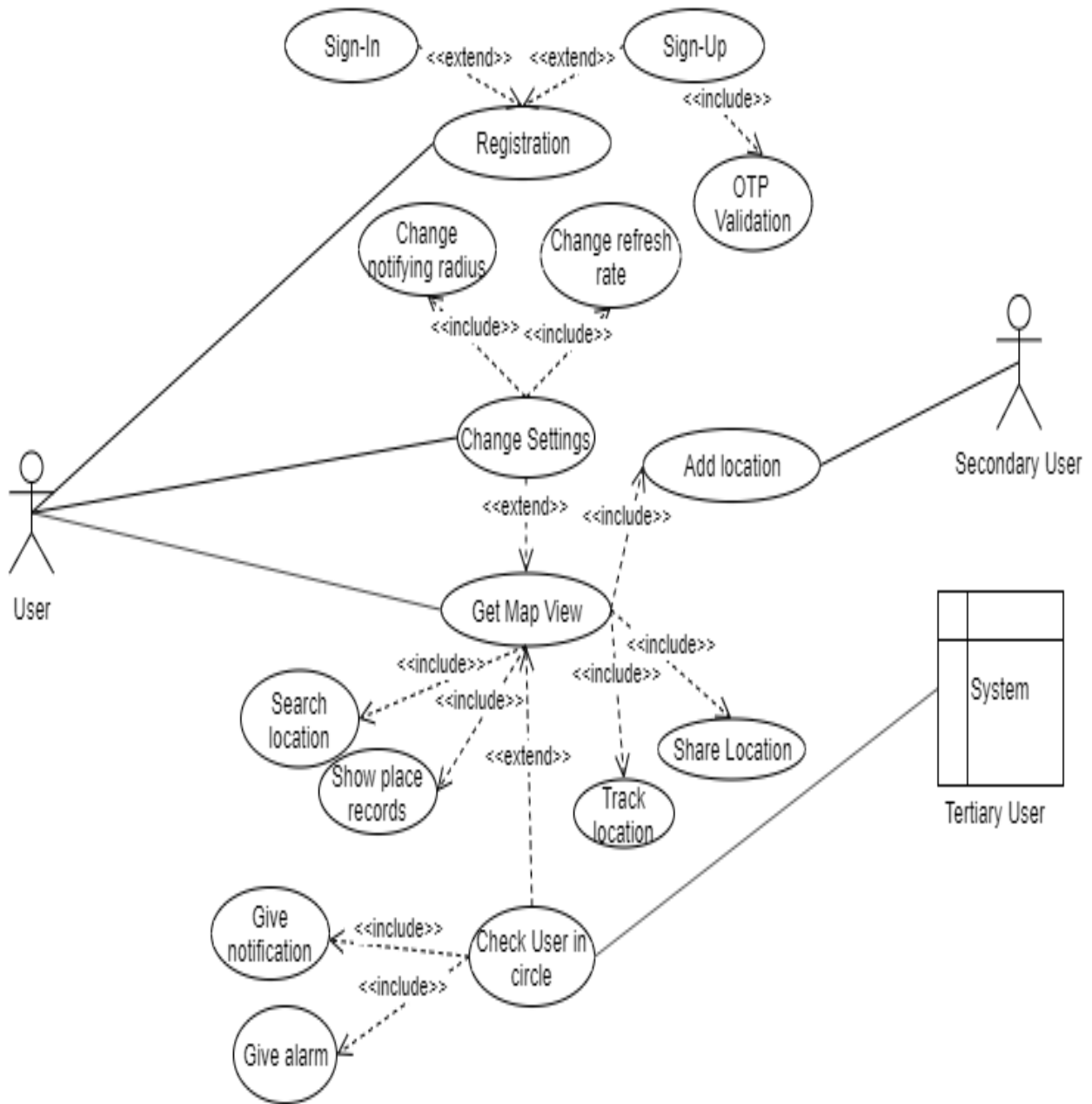
3.1: Use-Case Diagram

Fig3.1: Use Case Diagram

3.1.1 User Signup

Use case:	Signup
Goal:	Users can register to the system using valid and authorized email and phone numbers.
Pre-condition:	Users must need a verified email and phone number.
Success End:	Users can register to the system successfully.
Failed End:	Users can not register to the system.
Primary actor: Secondary actor:	User Admin
Triggers	The user pressed the signUp button and go to the MapView Activity.
Description/main success scenario:	1. Users will get a Successfully registered message. 2. The user will be redirected to the Switching Dashboard.
Alternative flows	1. This email is not valid. 2. This phone number is not valid.
Quality requirements:	Fast interact with the system when the user requests.

3.1.2 Track Location

Use case:	Track location
Goal:	The system will automatically track users' locations through the device.
Pre-condition:	1.users must need to have a mobile device. 2. Users must allow the pop up of "allow location info" from the device.
Success End:	The system successfully tracks user locations.
Failed End:	The system didn't track user locations.
Primary actor: Secondary actor:	Users system
triggers	Mark the user's current location on the map.
Description/main success scenario:	1. After allowing the pop-up, users can see the current location of their own. 2. Mark location as "you are here now" 3. Mark exact location with the area and all roads around the user.
Alternative flows	1. The user didn't allow the popup notification.
Quality requirements:	Easily interact with users and the systems about the location and automatically tracking will ensure the system real-time response activities.

3.1.3 Switch map view by tab

Use case:	Switch map with Tab
Goal:	The user's map view will be filtered with the three-tab that will help users to view different type of map view like accidental places, crime area or near over-bridges.
Pre-condition:	Users just need to select the scales of the measures.
Success End:	The user can filter and able to change his map view successfully.
Failed End:	Users can not filter and use the 3 types of map view.
Primary actor: Secondary actor:	User System
triggers	Three radio buttons will provide three different map views. (accidental roads, risky building, risky area)
Description/main success scenario:	1. Users will able to change the map view. 2. "Risky roads" filter the map with reports of a road accident. 3. "Risky building" filter the map with the poor construct of risky buildings. 4. "Risky area" filter the map with the previous report of the selected area faced any crime or not.
Alternative flows	1. No data found 2. A filter is not working. 3. The filter did not show any results.
Quality requirements:	Easily interact with the user's need for making a decision through the three scales that provide auto filtration with three types of a map view.

3.1.4 Add location

Use case:	Location add in map
Goal:	Admin can add any information or incidents of any area and also customize the marker, that will help to generate a report of conclusion about that area.
Pre-condition:	1. User must be login to the system 2. Users must fill all mandatory fields.
Success End:	Users request data will be submitted for approval.
Failed End:	The request submission failed.
Primary actor: Secondary actor:	Admin
triggers	Add location button will redirect to add places activity.
Description/main success scenario:	1. Users can fill all mandatory fields of data. 2.user can upload pictures. 3.user can give a description of the incidents. 4.user can choose the category of incidents.
Alternative flows	1. All the fields didn't fill. 2. The user didn't provide the category of the incident. 3. User is not a valid user.
Quality requirements:	No buffering on request submission.

3.1.5 Search location

Use case:	Search location
Goal:	Users can search for any location and get the selected area's full map view.
Pre-condition:	1. User need to register for searching location. 2. Users must need a data connection.
Success End:	The user gets the result for searching location successfully or, the user gets the message that no data found for the location user search.
Failed End:	1. Users can not search for location. 2. The map view is not clear.
Primary actor: **Secondary actor:**	Users
triggers	The search location button will give a search result of any location in the world.
Description/main success scenario:	1. User can see the map view 2. User has the search location 3. Users can type a location or area name. 4. Users can select a location from the drop-down menu.
Alternative flows	1. The device is not connected to the Internet. 2. The data connection is poor. 3. Unable to connect. 4. User is not valid.
Quality requirements:	Highly responsive touches, zooming in-out and indicate the location with markup.

3.1.6 Generate Marker with Area details

Use case:	Generate marker upon every risky area and show details.
Goal:	The system will generate marker with the help of data sorting so that users can get a clear and detailed conclusion.
Pre-condition:	User has to post and add request to a particular location and system need to store it for further data sorting.
Success End:	Generating report is successful.
Failed End:	Report generating is failed.
Primary actor: **Secondary actor:**	Users, Admin system
triggers	The generate report button will provide a clear picture of data categorization.
Description/main success scenario:	1. Users can see the reports of different evidence with date, time, pictures of the selected area.
Alternative flows	No previous reports on this location or area.
Quality requirements:	Auto generating reports will match with the stored data and give a quick response.

3.1.7 Get notification

Use case:	Get notification
Goal:	Users will get a notification about the nearest over the bridge of the current location, about the risky area while passing that area.
Pre-condition:	User has to give permission to the system that allows push notification.
Success End:	The user gets notifications.
Failed End:	1. The user didn't get any notifications.
Primary actor: Secondary actor:	User System
triggers	The user allows push notification once and notified always.
Description/main success scenario:	1. The user gets notification about risky areas while passing it. 2. The user gets notification about the nearest Over-bridge.
Alternative flows	1. The user didn't allow the push notification.
Quality requirements:	This auto notified system will make the system to relate with more real-time responsive.

3.1.8 Get map view

Use case:	Getting a map view
Goal:	To get a clear map view with chosen filters.
Pre-condition:	User has to allow to access location and GPS. Users must choose filters.
Success End:	User will successfully get a full map view with filtered data
Failed End:	The map will not be loaded or, map redirects to the wrong places.
Primary actor: **Secondary actor:**	User System
triggers	Get the map view button will provide a complete view with marking three filters.
Description/main success scenario:	1. Users can zoom in-out the map to see the closer result according to filter. 2. User can select view according to what view they need.
Alternative flows	1. Users didn't allow to access the map. 2. The user didn't allow GPS. 3. No internet connection.
Quality requirements:	This will ensure user- friendly view according to their needs.

3.2 Sequence Diagrams

3.2.1 Login Sequence Diagram
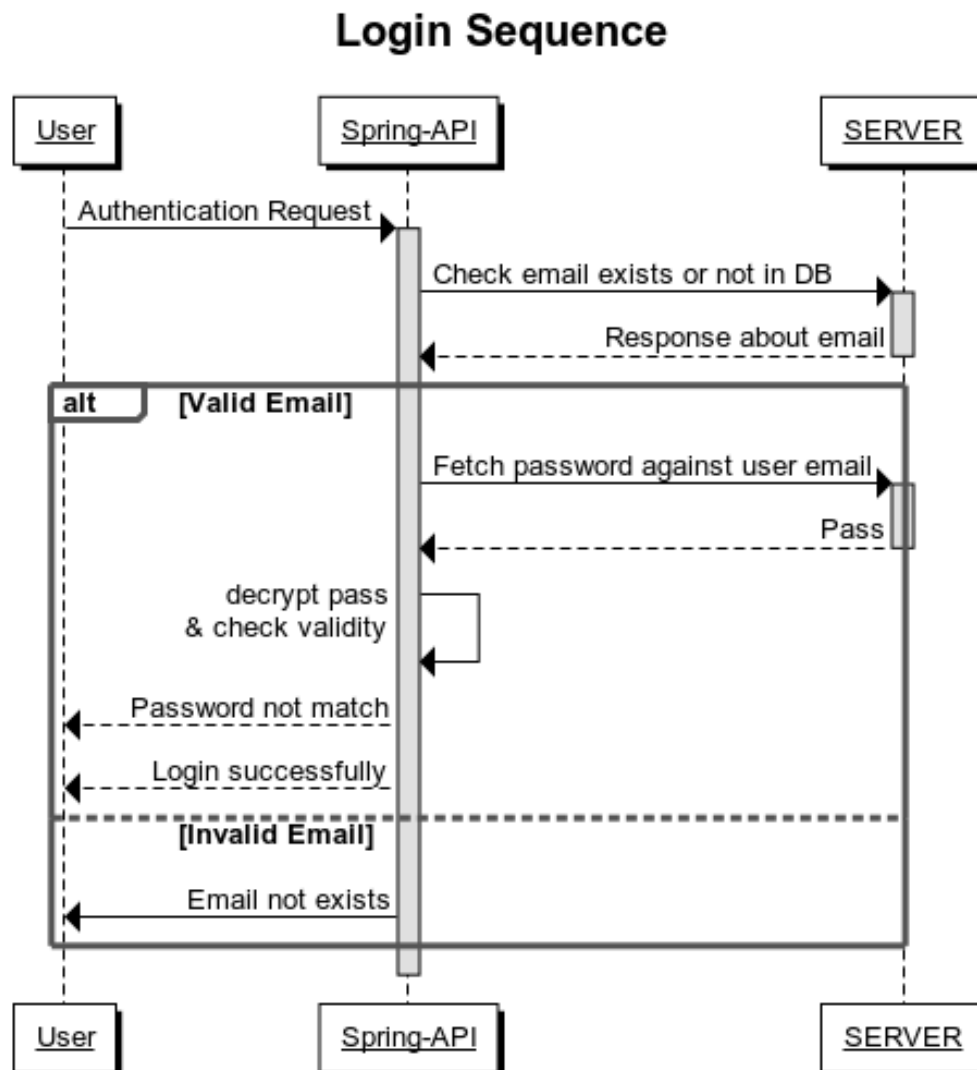
Login Sequence

Fig3.2.1: Login Sequence Diagram

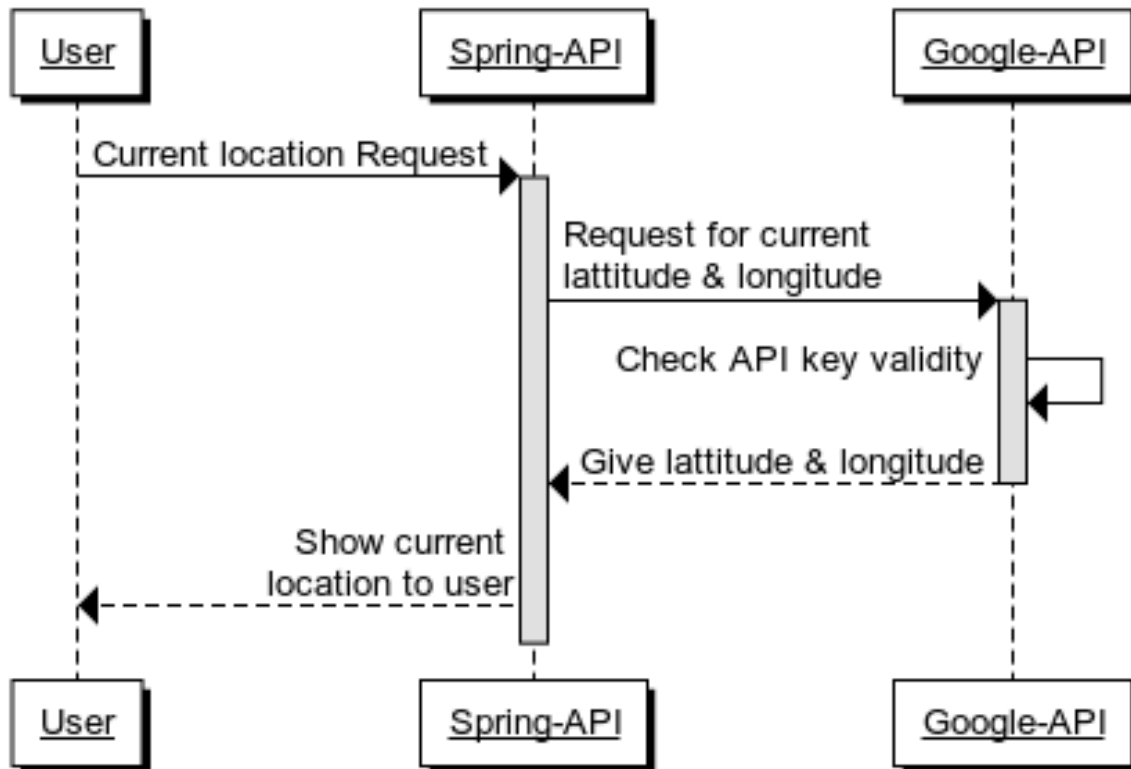### 3.2.2 Tracking Location Sequence Diagram

Tracking Location Sequence

Fig3.2.2: Tracking Location Sequence Diagram
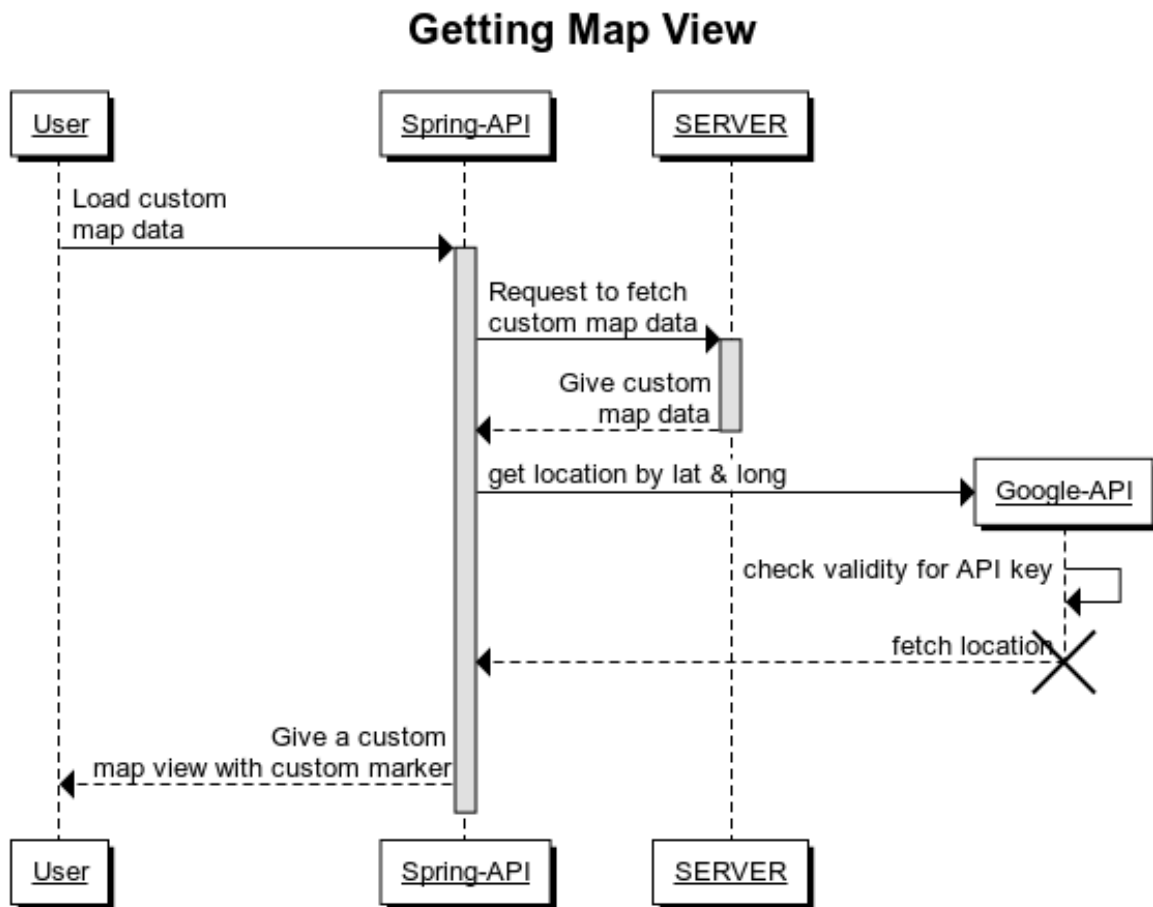
3.2.3 Getting Map View Sequence Diagram

Fig3.2.3: Getting Map-View Sequence Diagram

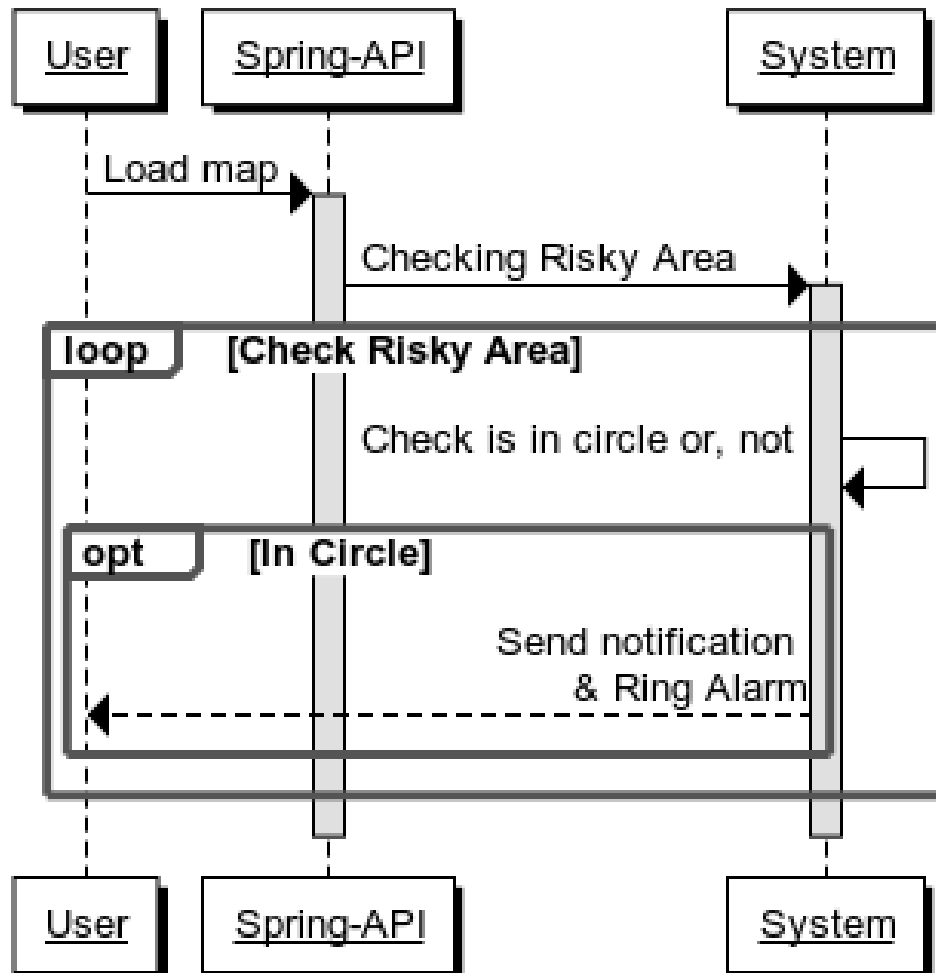**3.2.4 Getting Notification & Alarm Sequence Diagram**

Getting Notification & Alarm

Fig3.2.4: Getting notification & Alarm Sequence Diagram

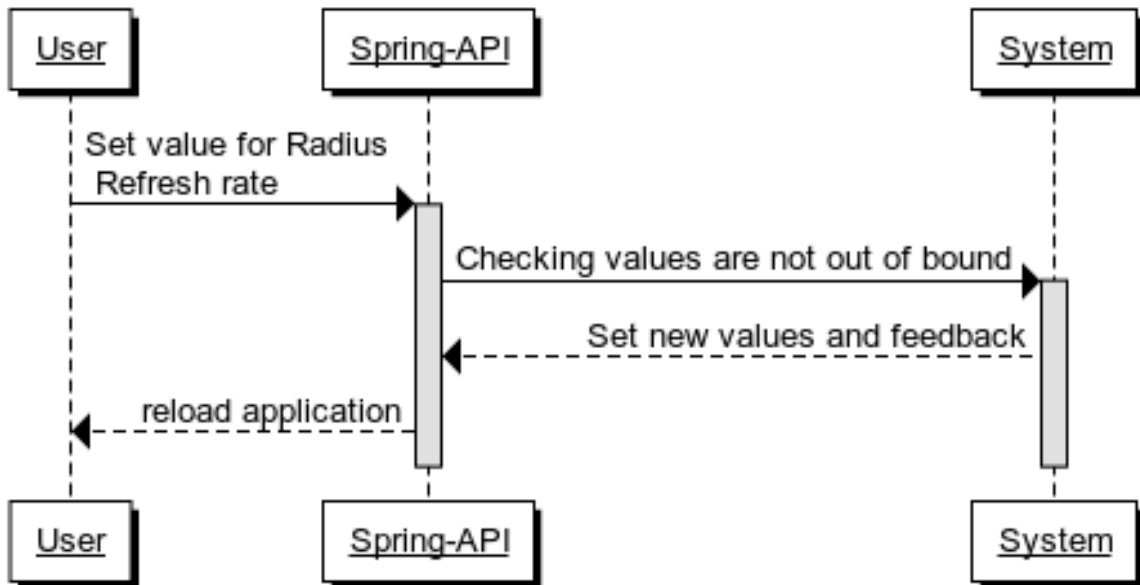### 3.2.5 Change Radius & Refresh Rate Sequence Diagram

Fig3.2.5: Change Settings Sequence Diagram

3.3 Activity Diagram

3.3.1 User Registration
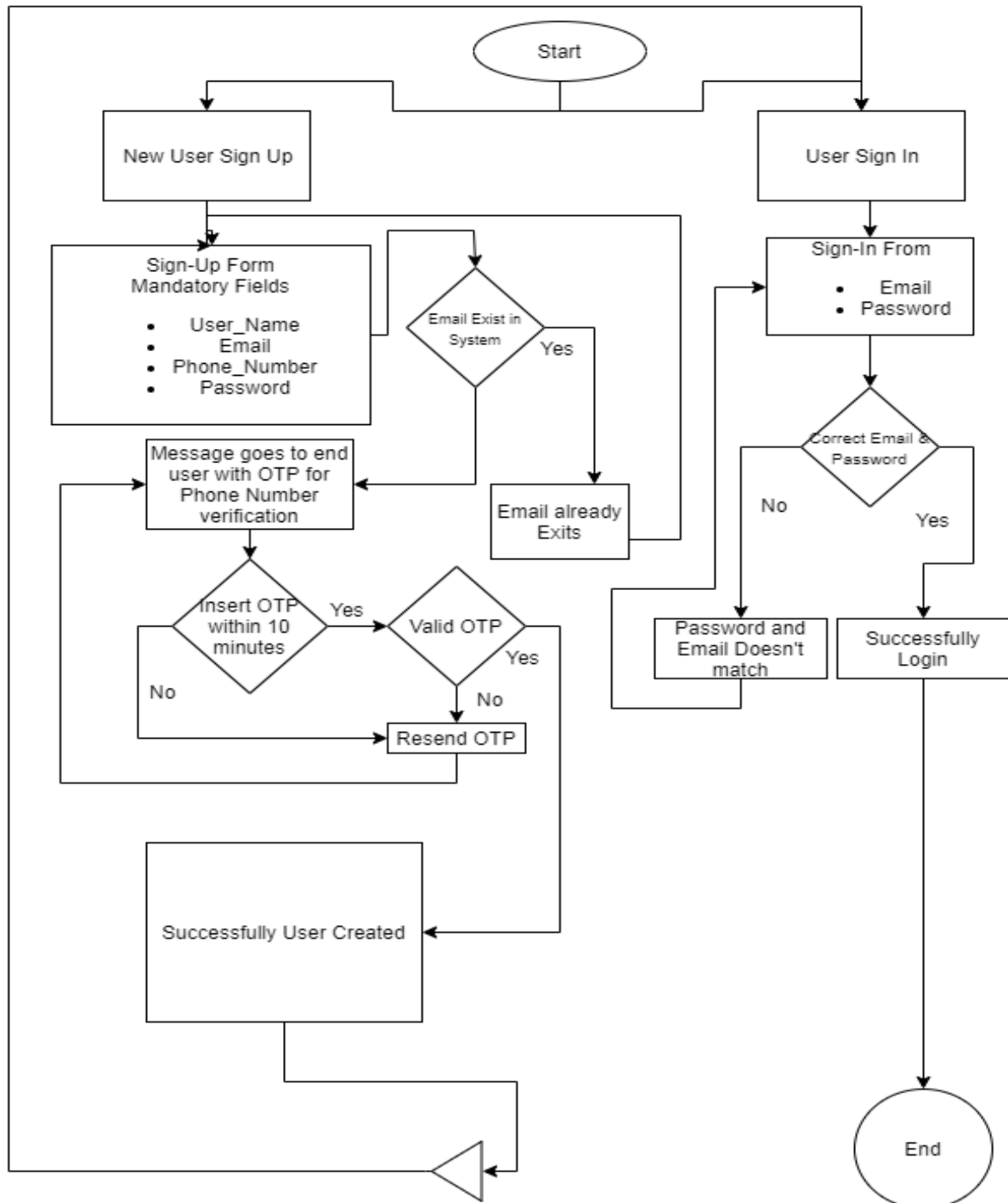

Fig3.3.1: User Registration Activity Diagram

3.3.1 Map View
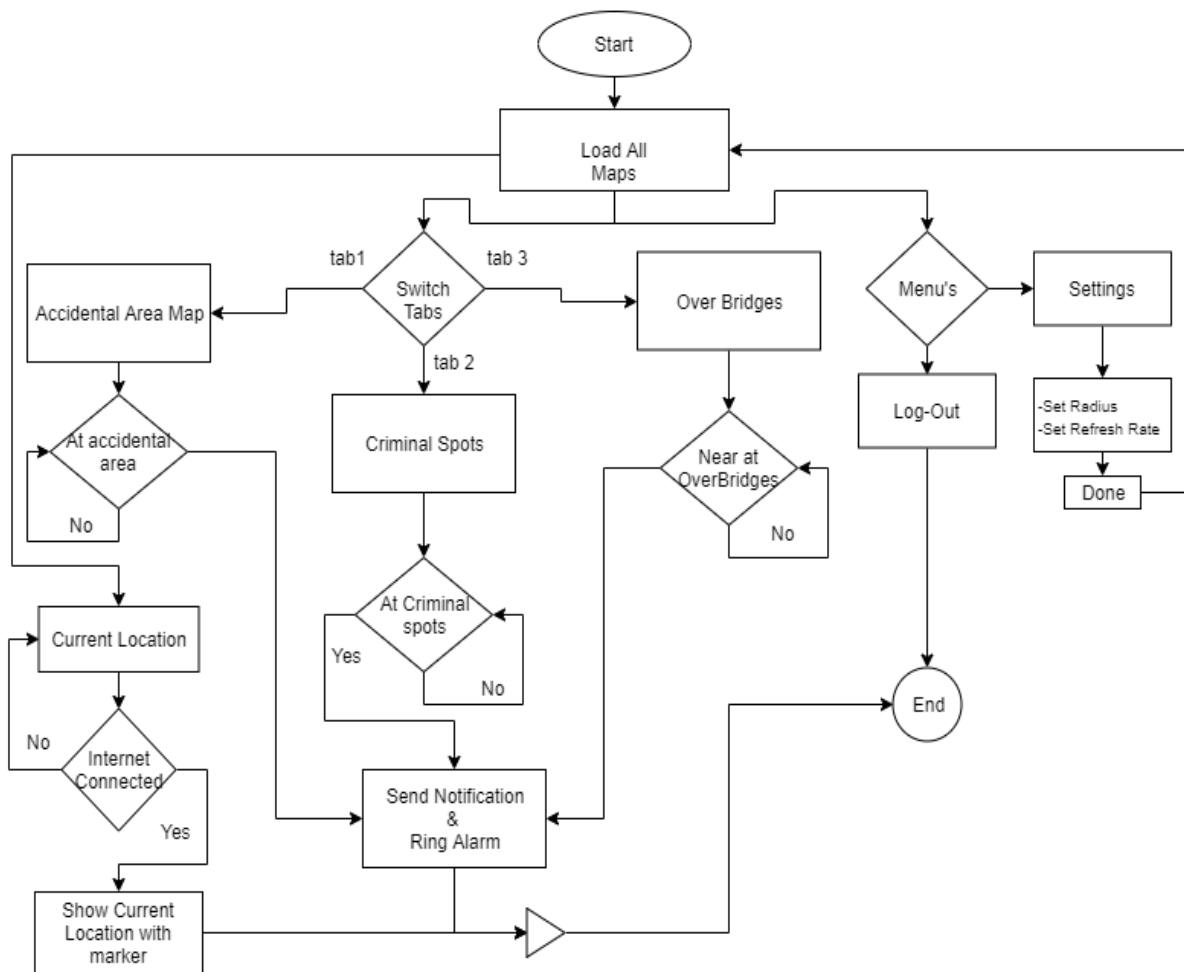
Fig3.3.2: Map View Activity Diagram

3.4 Class Diagram

Fig3.4.1: Map View Diagram

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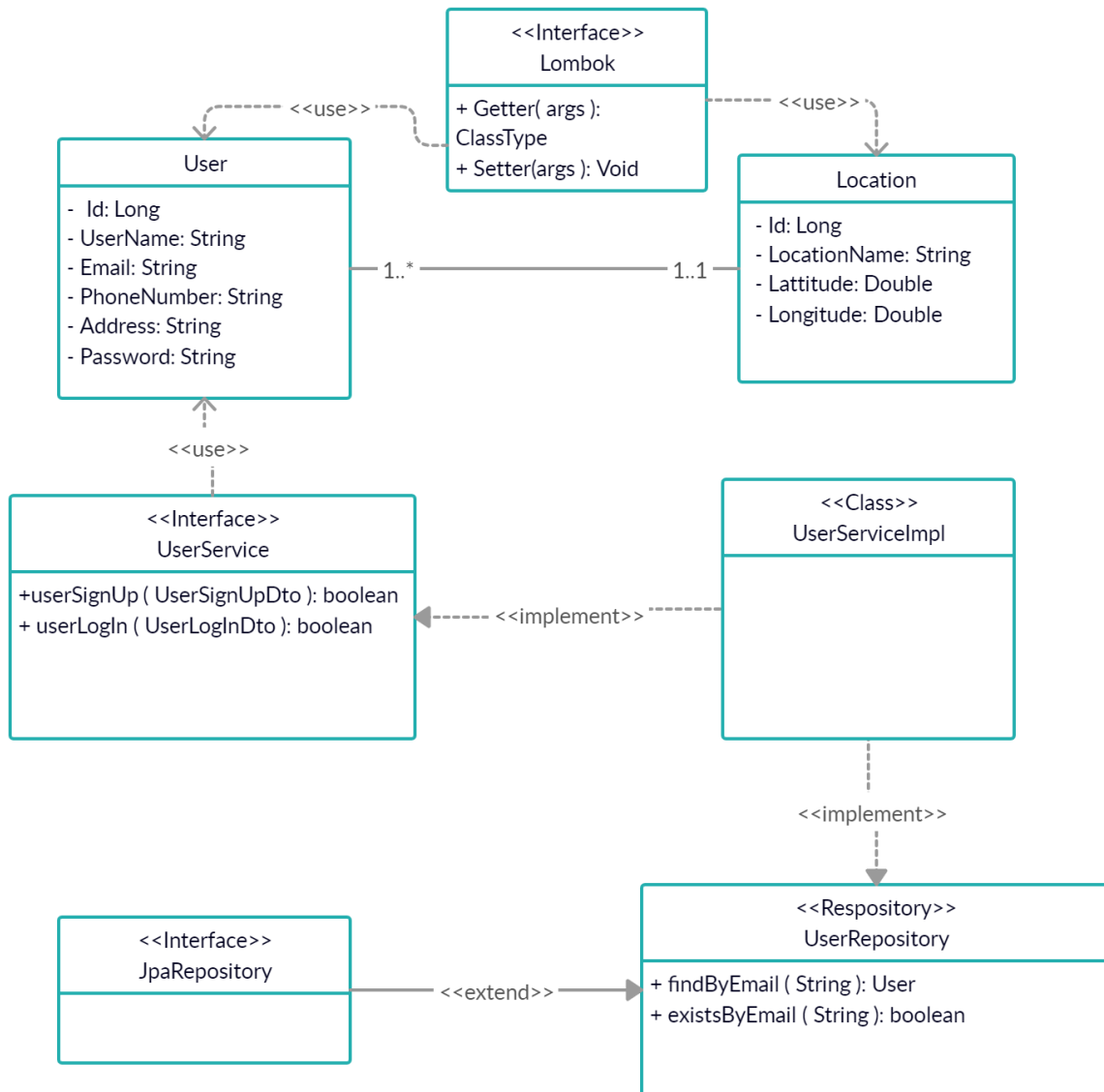
Chapter 4: API

4.1 Signup API

Method	URL
POST	http://{{baseURL}}/rest/user/signUp

- **Request Body**

Content-Type: application/json
```
{
        "name":"Mahadi Hasan Joy",
        "email":"mahadihasanjoy95@gmail.com",
        "phoneNumber":"+8801315898238",
        "password":"Babu1995@",
        "age": 24,
        "gender": "male"

}
```

- **Response Body**
```
{
   "Message": "User Added"
}
```

Code	Status	Message
200	OK	User Added
409	Conflict	Email Already Exists
404	Not Found	
400	Bad Request	

4.2 Login API

Method	URL
POST	http://{{baseURL}}/rest/user/logIn

- **Request Body**

Content-Type: application/json
{
    "email":"mahadihasanjoy95@gmail.com",
    "password":"Babu1995@"
}

- **Response Body**

{
  "Message": "Successfully Login"
}

Code	Status	Message
200	Ok	Successfully Logged In
403	Forbidden	Password Doesn't match
404	Not Found	
400	Bad Request	

Chapter 5: Tools & Technologies

I have used several tools and technologies to develop this project.

5.1 Programming language

In this project there is a two-part, one is mobile-based and another is web-backend. I use java & spring-boot framework for backend server and java & android environments for mobile applications. Java is a general-purpose programming language originally designed for development and a huge amount of library in java, so I use java for my project.

5.2 Code Editor

A code editor or IDE is a must for developed any application system. A source code editor is a text editor program that is designed specifically for editing source code. An editor is a fundamental programming tool. For android, I use the code editor that is called the android studio. It has some great features such as multi-select editing, Auto-completion, Syntax highlight, etc. For API development I use IntellijIdea and IntelliJ IDEA is an integrated development environment written in Java for developing computer software. It is developed by JetBrains.

5.3 Database & Quarries

For every database quarry and object mapping, I use hibernate. Hibernate ORM is an object-relational mapping tool for the Java programming language. It provides a framework for mapping an object-oriented domain model to a relational database.

Chapter 6: System Test

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Chapter 7: User Manual

Insert valid email here

Insert valid password for this email here

Press this button to log into the system

If you are new user then register first, click on this hyperlink

Fig7.1: Sign In Activity

Insert all valid information here

Press this button to Sign Up

Want to go sign in page? Then click on this hyperlink
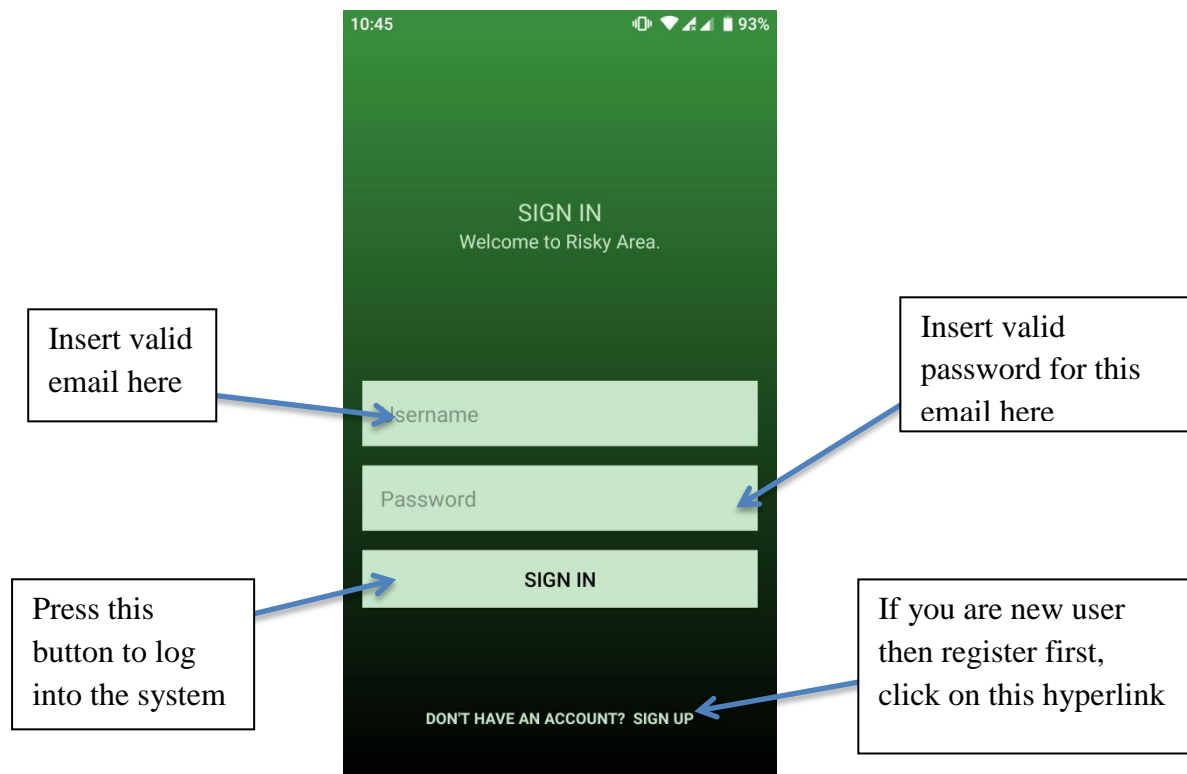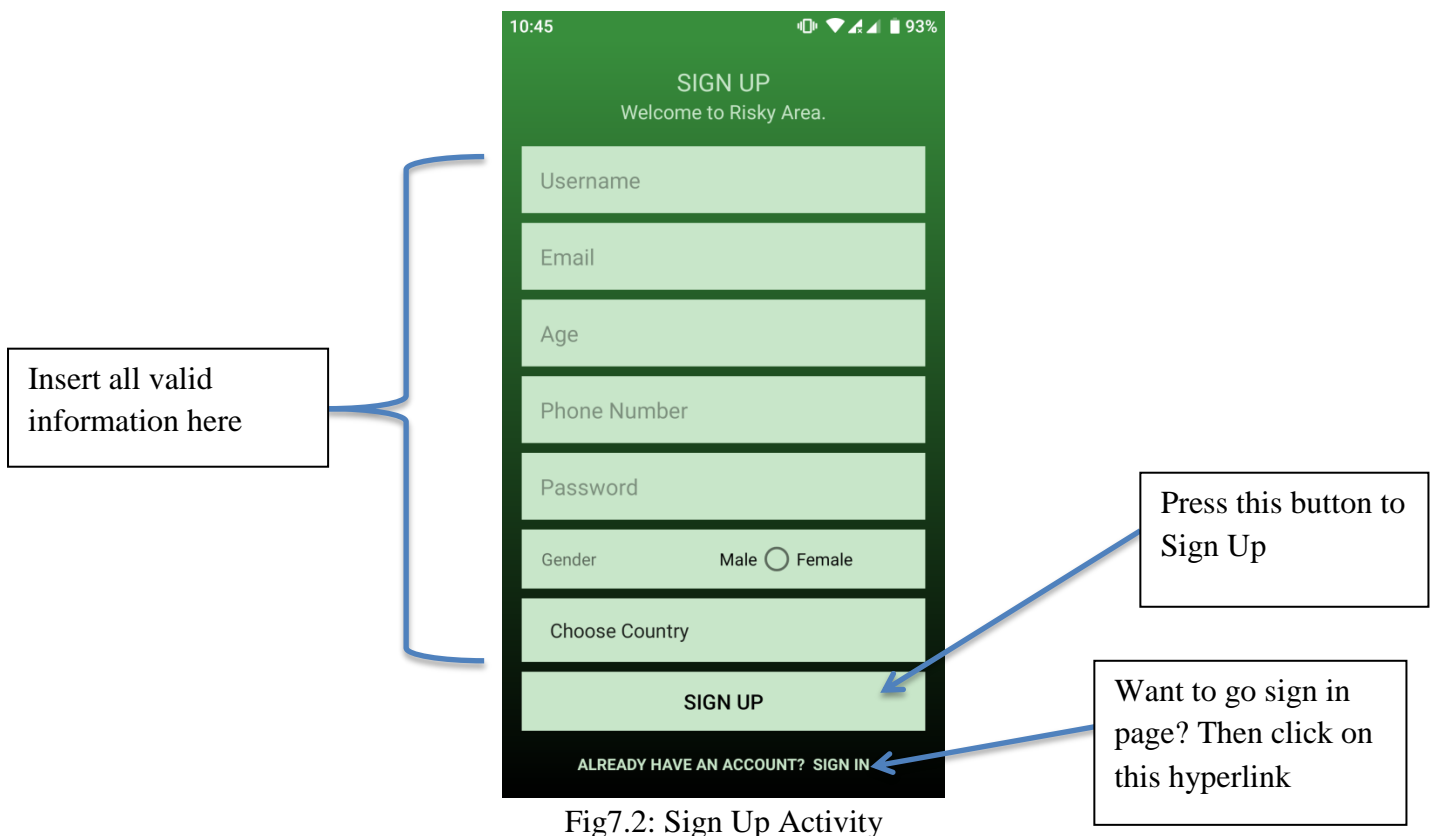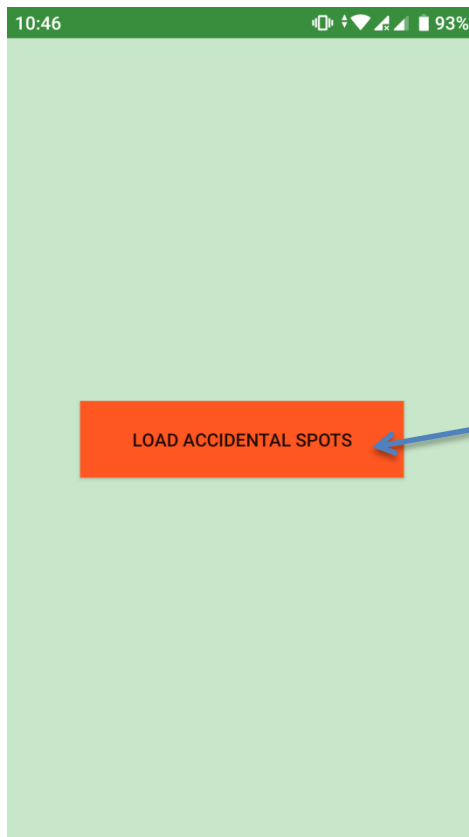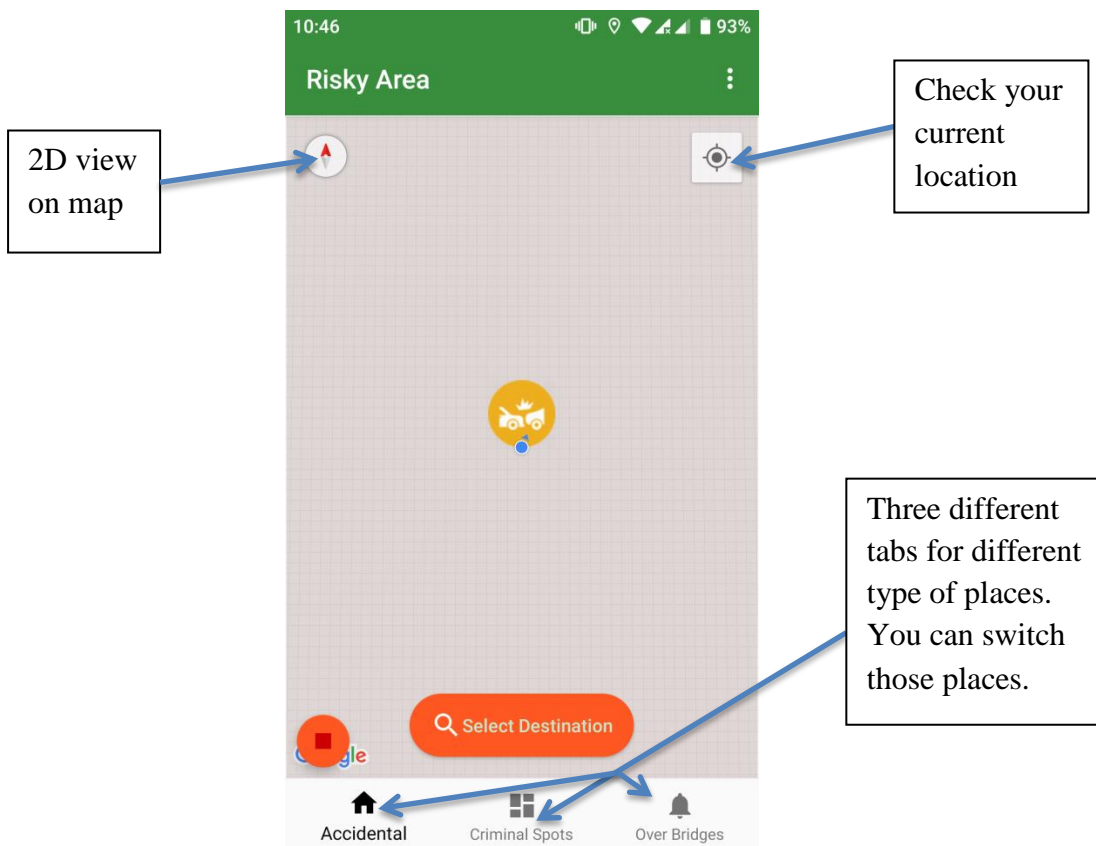
Fig7.2: Sign Up Activity

After login you have to click on load map and it set up and fetches all environments

LOAD ACCIDENTAL SPOTS

Fig7.3: Loading Map Trigger

Risky Area

2D view on map

Check your current location

Three different tabs for different type of places. You can switch those places.

Select Destination

Accidental   Criminal Spots   Over Bridges

Fig7.4: Map View

Risky area will show in a circle. If your locations inside any of circle then a toast, alarm and notification appear.

Current location inside a risky area so you will get a notification and alarm

Toast appear
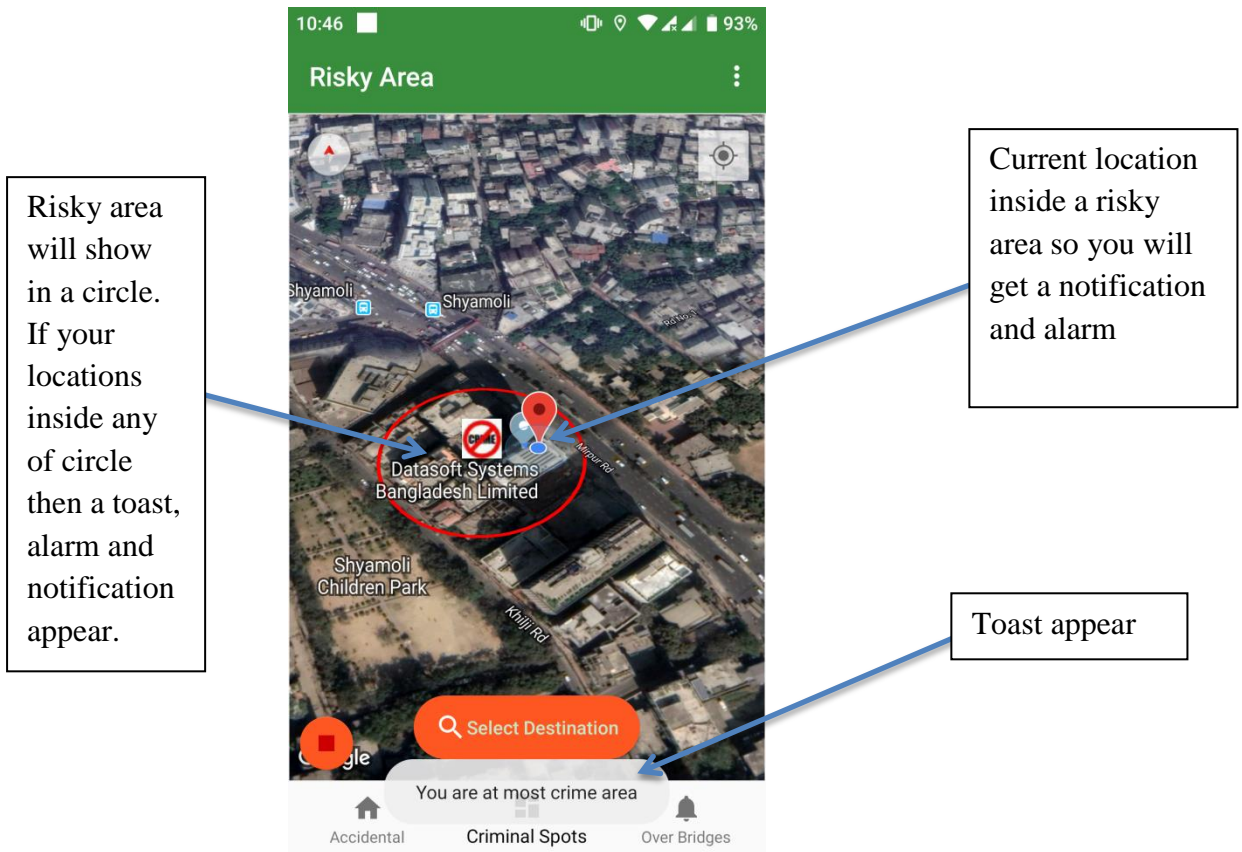
Fig7.5: Risky Area Circle View

Notification, because you are in a risky area
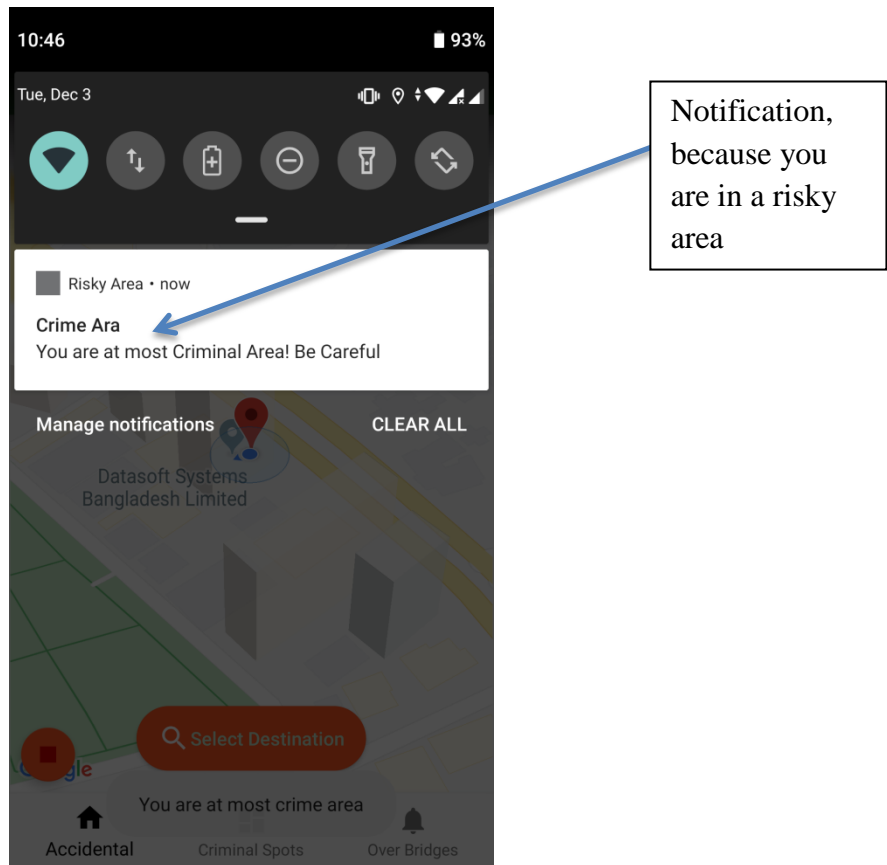
Fig7.6: Notification View

Custom location information

Custom image for indicate the location type
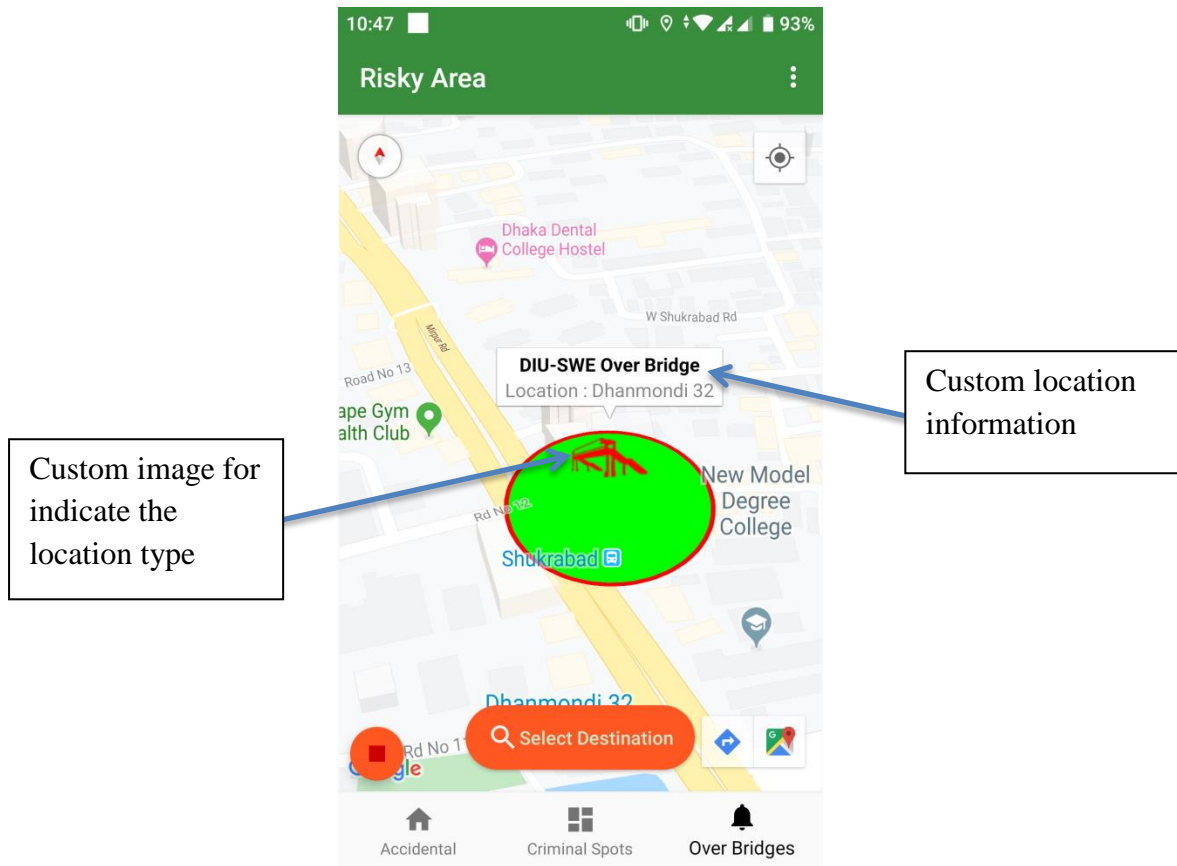
Fig7.7: Over Bridges Circle

Location distance in meter that I want to get notification for risky area

Time in second that will check the user in risky area or, not.

Done button to reset as user set values in settings.

Fig7.8: Settings View

Click on this 3 dot menu inside the app bar will show settings, profile or logout.

Menu's for profile, settings or logout.

Fig7.9: Select Menu View

Chapter 8: Version Control
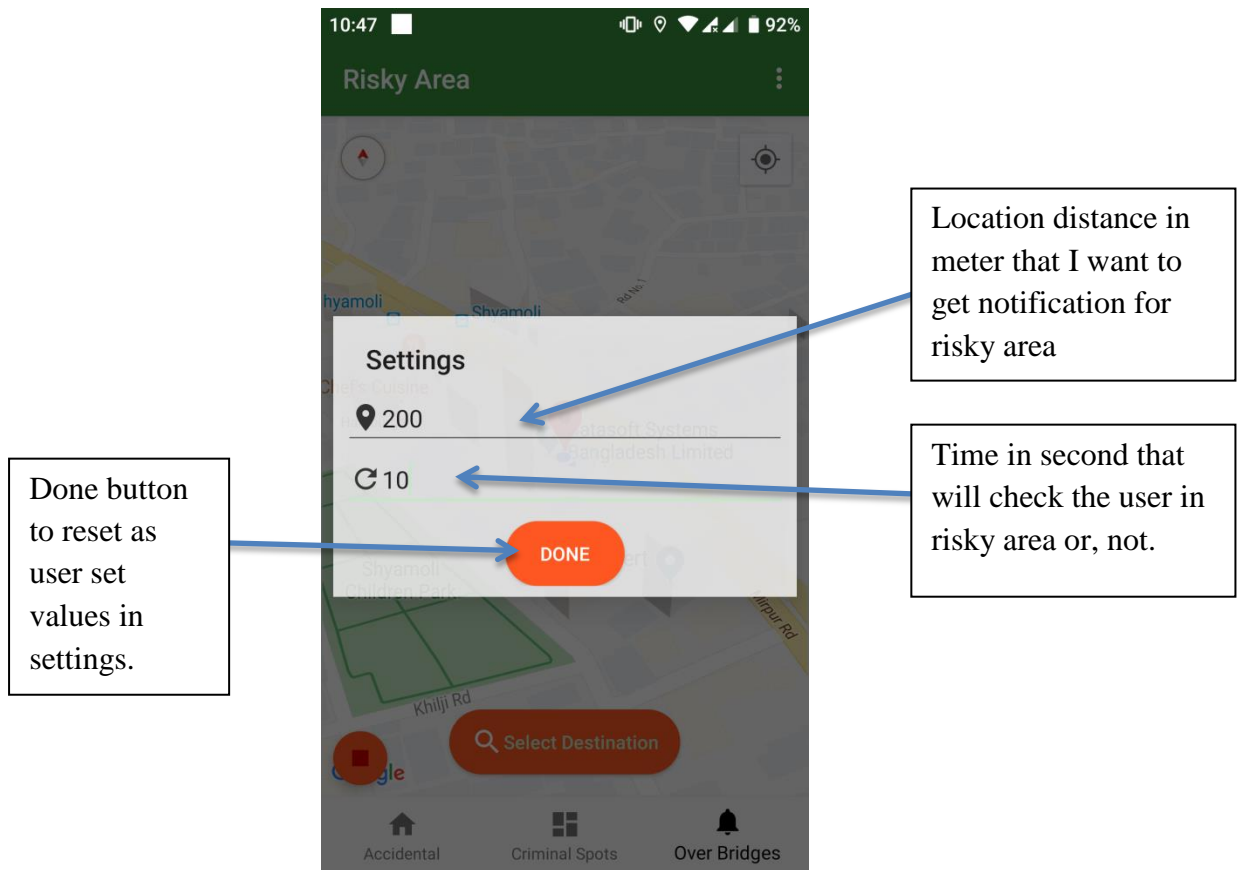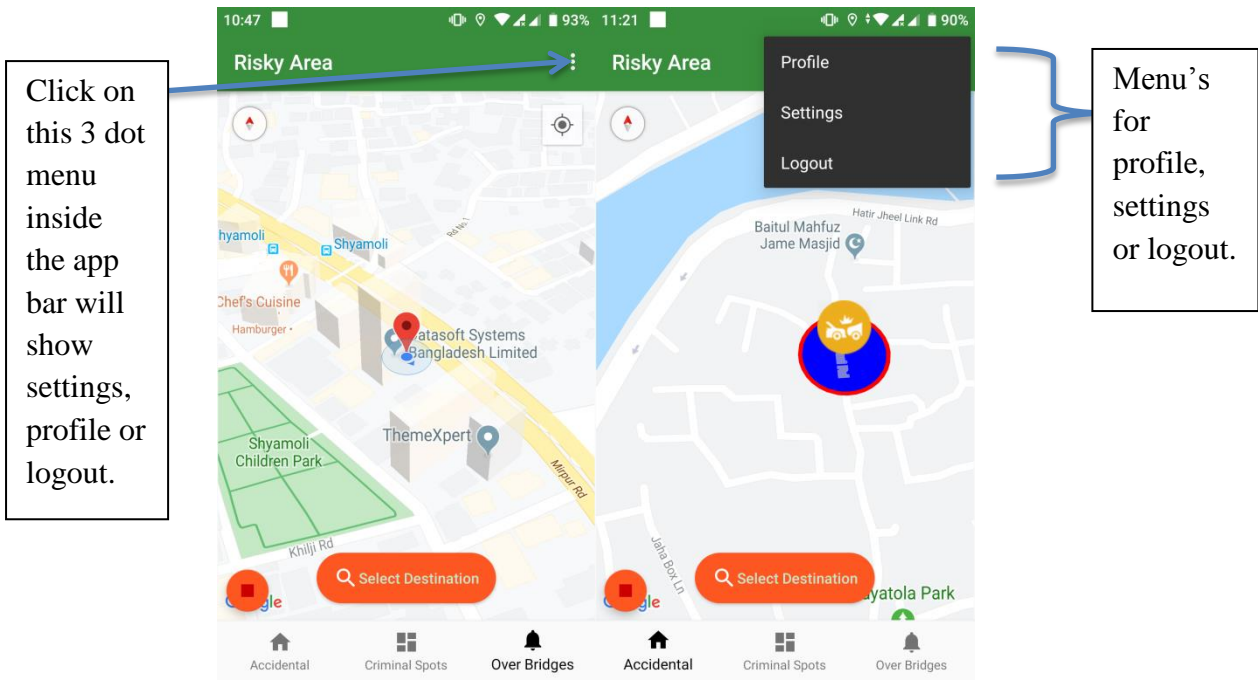
Git is a distributed version control system for tracking changes in source code during software development. It is designed for coordinating work among programmers, but it can be used to track changes in any set of files. Its goals include speed, data integrity, and support for distributed, non-linear workflows.

8.1 Android Repository

- https://gitlab.com/mahadihasanjoy/riskyarea-test1

8.2 Back-End Repository

- https://gitlab.com/mahadihasanjoy/riskyareaapis

Chapter 8: Conclusion

8.1 Project Summary

It was one of my dream projects and I have started to develop this project from September 2019. It was a really short time to complete this project and from the very beginning of this project, it demands hard work, patience, and persistence to meet all requirements. After completing all requirements and prioritization I have proposed my design and then started to design all the database and API. Besides I have complete lots of RND on google map and geofencing. After that, I have prepared the user interface and take their approval to continue to the next part. I can say, the interface of my application is very simple and easy to understand as the user required. After completing that, I have started to write the core functionality of the project.

This does not end actually, after completing the development I have to write test cases to meet all requirements & accuracy. This part is known as quality assurance (QA). I have assured the total quality of this project.

8.2 Limitations

For developing this project, I have faced some limitations. Now I will describe those in brief.

● Resource Limitations

Though it was a demo project I needed all accidental data and criminal records from DMP. But it wasn't possible to collect all the required data from them.

● Budget Limitations

Some of API like google places API and others are needed for my project, but as it was premium I have failed to purchase.

● Version Limitations

My system is only android-based but there are many other platforms that are popular such as iOS version, web version, etc.

● UAC Limitations

The user access control phase is not implemented in this version. So user can have only one role there. In the next version, I will add this feature, so that the user can easily switch his role.

8.3 Obstacles and Achievements

I believe if there are no obstacles to develop a project then actually there are no challenges. And we all know that challenges give us the opportunity to prove ourselves. So obstacles, challenges, and achievements are the path of success.
When I started this project I haven't any idea about google map API's and spring-boot framework or, rest API. Even I don't know the actual flow of the software development life cycle. By developing this project now I know how to gather all requirements and prioritizes. Besides I have learned a lot about git version control. Also, I learned how to integrate an android controller with the rest API. Sometimes, some features need to be changed or modified. Then I need to follow the reverse engineering process. And again, designed to meet the new requirements. It also made me frustrated sometimes, but my supervisor encouraged me. I'm really grateful to my supervisor, without him it was totally impossible to implement in this short time, he helps me a lot from the very beginning of the development of this project.

8.4 Future Scope

Risky Area of Bangladesh is a demo project by some demo data, it will be complete when we get real data from DMP or, RAJUK and this project can play a vital role to help the general people to avoid or aware about risky areas or, accidental places. Though only an application cannot be the proper solution if the people don't care about it. Because public awareness and government right steps can be the proper solution to this problem. But at least the minimum number of people can be aware of this application and that is the goal of this application.
I have learned lots about the android lifecycle and rest API's, especially the whole development lifecycle from scratch. Got involve me with different kind of ideas and new technology throughout the project time. I'm very thankful to all of them who give a suggestion or, discuss ideas and gave me some opportunities to make my product complete. It will help me to work with a similar type of project in the future also.

Chapter 9: References

- https://developer.android.com/guide
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- Spring in Action - Craig Walls