UNIVERSITY of BRADFORD

Faculty of Engineering and Informatics
Department of Computer Science

Mobile App Application

Semester 1 Mobile application Report

Mohammad Ismail sohail

UoB: 20011354

Link to Demonstration:

Mobile application Demonstration

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1. Abstract

The use of GPS-enabled mobile devices is one of the most practical ways that technology is used in our daily lives in the world we live in today. These gadgets not only keep us in touch with the outside world, but they also put a wealth of knowledge and services at our disposal. Locating oneself and finding local locations, including ATMs, banks, restaurants, and hospitals, is one such service. This essay will examine an Android app that makes use of GPS technology to let users determine their location and local points of interest.

2. Introduction/Overview/case study

2.1 *Intro*

This report will contain information that will give a deeper understanding of the mobile application that has been developed. The application will cover all of the requirements that have been given by the Module coordinator. The following requirements are what the app had to be abide by and include Here, you are to implement your design by developing an android app using Java language. The app should:

i. Comprise of good quality UI with at least two fragments separating all the components.

ii. Use the activity life cycle states through its various methods (such as onStart, onPause, onDestroy, etc.).

iii. Utilise at least one device location/ Google Maps/ Media player/ Camera/ microphone/ any native android apps, service, sensor, or sensor API.

iv. Use persistence data storage (e.g., SQLite, ROOM/ Firebase/Firestore, etc.).

v. Use MVC or similar (java-based frameworks such as MVP, MVVM, etc.) framework.

The app that has been created for this application I called “The Nearby Places application” and will be referred to by this throughout the entire report. The Nearby places app will be created within android studios. It will use java as the main programming language, while using MySQL as its database. There will also google maps implementation throught the entire app for multiple purposes. The application will also use the MVC framework

2.2 *Quick overview*

The application will have a simple login and sign-up function, followed by 3 fragments, which all have their own properties and work separately from each other.

The aim of the project is to create an Android application that uses the Android framework's fragment feature, adheres to the Model-View-Controller (MVC) architectural pattern, and incorporates a MySQL database. The user can move between three primary sections of the application, each of which serves a different purpose.

The first fragment- is a locator fragment that allows the user to choose any location on the map and get the coordinates for that spot. To do this, Google Maps will be incorporated into the programme, and the location services offered by Android will be used to retrieve the latitude and longitude of the chosen place.

The second fragment is a location fragment which will have a button that, when clicked, will allow the user to find their current location coordinates. This will be done by accessing the device's GPS and using the location services provided by Android to retrieve the user's current latitude and longitude.

The third fragment is a nearby places fragment which will have buttons that, when clicked, will allow the user to find nearby places such as ATMs, banks, restaurants, and hospitals. This will be achieved by integrating the Google Places API into the application and using the location services provided by Android to search for nearby places based on the user's current location.

2.3 *case studies*

Case Study 1: "The Use of the Nearby Places App for everyday use"

The Nearby places application could have a multitude of uses as it is essentially a map and links to the google maps API, meaning that anything done within the application can be connected to google maps and used together. However, the purpose of the app is to simplify the use for the end user. Making it easier for anyone of any age to use. One example of this could be not knowing where a certain place is. If the user is to go to the app and choose a point on the map that they would like to navigate to or know the location of, all they would need to do is tap that area on the map and the precise location was, which they can then simply copy and share with someone else, or use google maps to get directions to that place from their location.

Case Study 2: "The Use of the Nearby Places App in Professional Surveying"

For finding the coordinates of any location on a map, the Nearby Places app, which was created with Android Studios could be useful. The accurate and up-to-date information offered by this software could potentially help in the measurement and mapping of land and property, making it useful for people within the surveying field.

Without the need for expensive or complicated equipment, surveyors may quickly and easily find the coordinates of any site on a map with the Nearby Places app. As a result, a survey may take much less time and effort to conduct while yielding more accurate results.

Along with being helpful for surveys, the app's feature for locating nearby establishments like banks, restaurants, ATMs, and hospitals can be helpful for surveyors operating in remote or unfamiliar locations. This feature makes it simple for surveyors to find crucial facilities and services, which can significantly increase their safety and wellbeing while working. Professionals in the surveying industry can benefit from the Nearby Places app, which gives them precise and current location data that is very helpful for their work.

3. Problem definition

The project’s main purpose was to insight efficiency, in comparisons to apps like Waze, google maps or even Tom-tom, that are not designated to map viewing, this application is more focused on how a map app can be used to help a user to find out a lot more information about places to go I the surrounding area. These other apps are not dedicated to this function as they are a lot more useful in directions, so these features are a lot more overlooked and hidden behind menus or require a multitude of filters to be set to achieve the same result as it would take for this application to complete.

4. Analysis

The Nearby Places app is an Android programme that makes use of GPS technology to let users find themselves and nearby points of interest including ATMs, banks, restaurants, and hospitals. The Model-View-Controller (MVC) architectural pattern was used in the app's development, and a MySQL database was integrated. A map fragment, a location fragment, and a nearby places fragment are the three basic navigational fragments of the programme. Users can choose any location on the map and have its coordinates displayed using the map fragment, while using the location fragment to determine their current location's coordinates and the nearby places fragment to identify nearby locations depending on their current position.

The software offers real-time information and is user-friendly and simple to use. For experts working in the field of surveying and for everyday use in general, it is especially helpful. It was discovered in one case study that the app was a very effective and practical tool for finding the coordinates of any location in a formal surveying scenario.

5. Design

5.1 *Design and layout of mobile application*

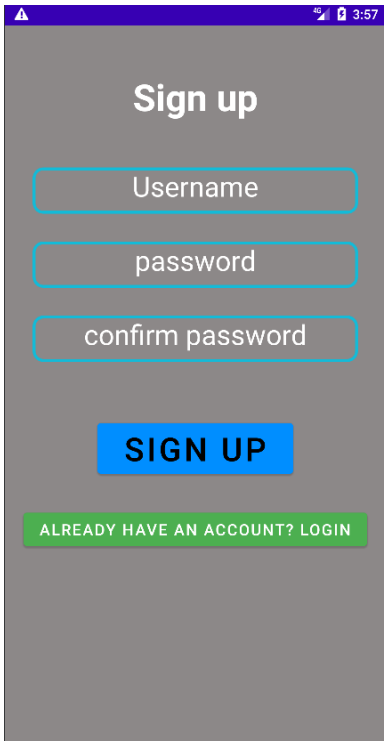


Figure 1

This is the first screen (Figure 1) that the user is greeted with when they open the app. The app has a simple layout, asking the user to input a username and the password twice. If no details are entered the device app will display the error message shown in (Figure 1.1). If the user enters a username that is already saved, due to it being stored in the MySQL database, it will also display an error message (Figure 1.2). and the final error message will appear if the user enters the repeat password in as something different to the first password (Figure 1.3). Once registered the user will be automatically signed in and shown the first fragment (Figure 4)

If the user has successfully registered the data is saved within a MySQL database, so if they were to logout or close the app, they could then go to the login page by clicking the already have an account button and that will take them to the login screen (Figure 2) where they can input their login details and sign in.

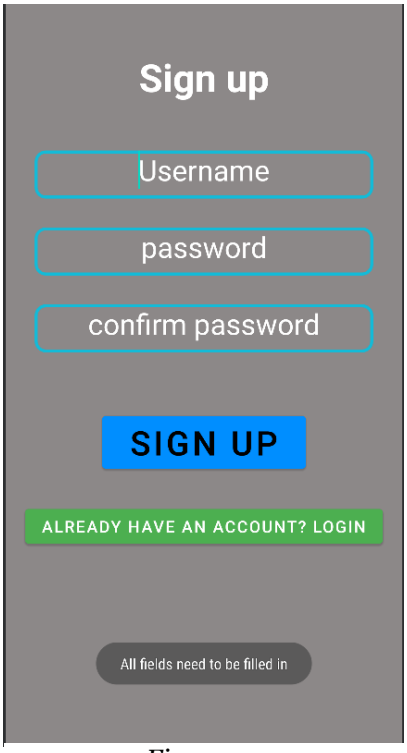


Figure 1.1

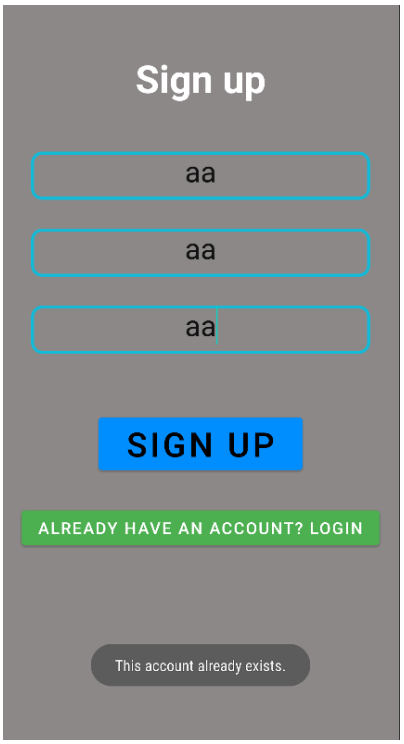


Figure 1.2

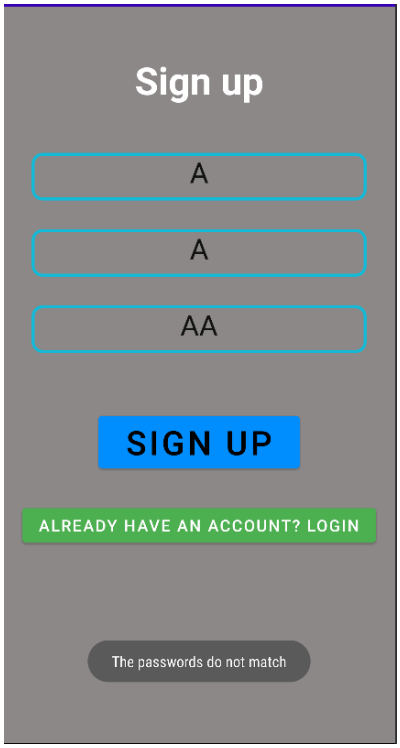


Figure 1.3

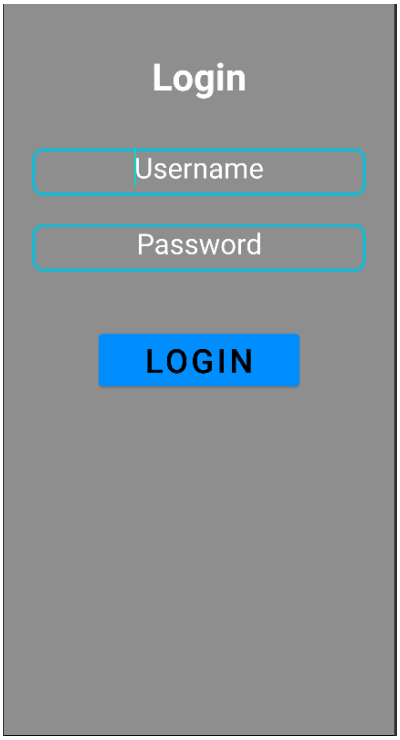


Figure 2

The design layout of the login page is simple. The only things that are displayed is the username and password filed and the login button. If the user has valid credentials that they have registered with before, they can log in with them here. If the credentials are not correct or have not been registered before an error message will display (Figure 2.1) telling them that their login has failed. It will also display a message (Figure 2.2) if the fields are empty and the login button is pressed. Similarly to the register page, this page will sign the user straight into the first fragment of the app (Figure 4).

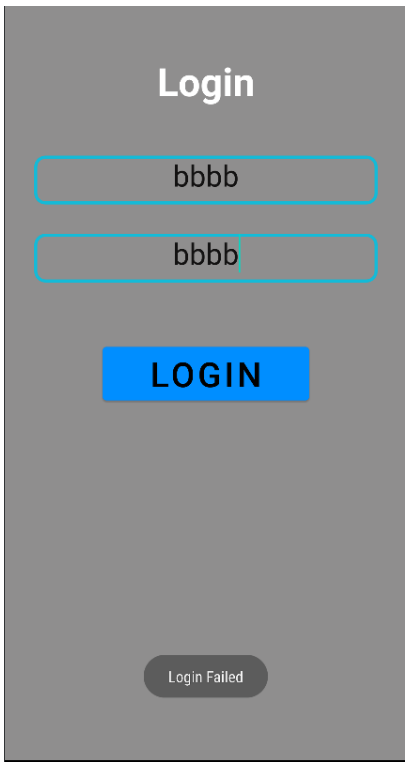


Figure 2.1

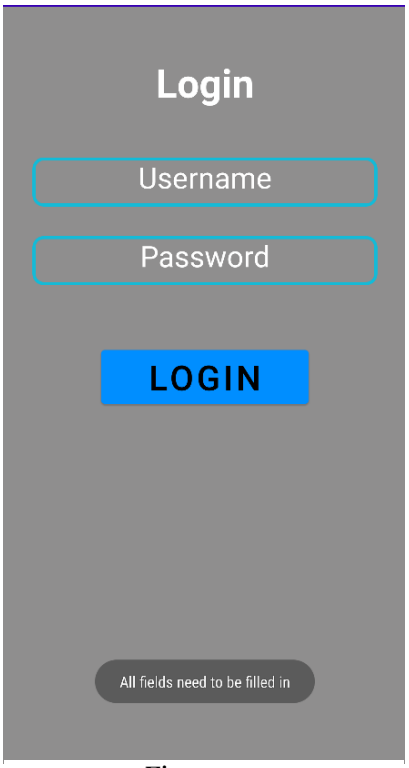
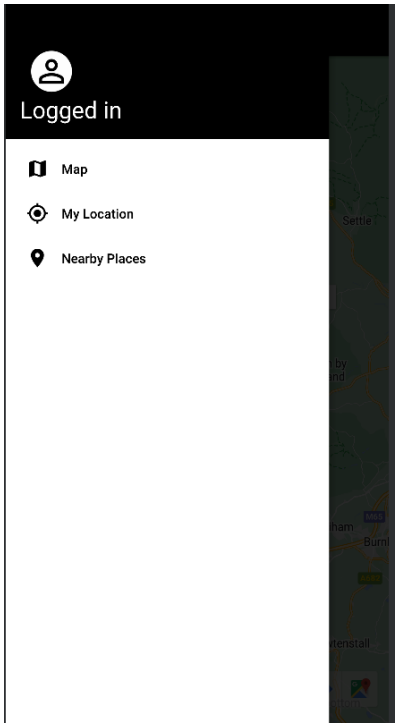
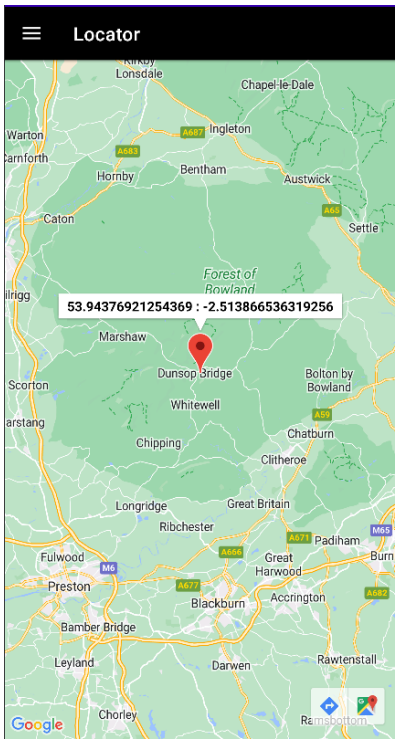


Figure 2.2



The navigation menu allows for the fragments to be connected. It displays all 3 fragments in a simple quick draw menu that can be accessed via the hamburger menu at the top right of the screen or from swiping from the left-hand side of the screen towards the right. It displays the header which shows login status of the user and has an icon for there profile picture. The 3 fragments are then displayed underneath, next to the icon that show what they are.

Figure 3



This is the first fragment the user will see once they have logged in. The only thing on the screen is the google maps API. If the user is to press a location on the map. It will zoom into that location and drop a pinpoint, displaying the exact longitude and latitude of that destination. This feature is implemented for users to know exactly where the location in which they are trying to find is. If they are to press the little directions button in the corner, the app will redirect them to google maps with directions to that location from their current location

Figure 4

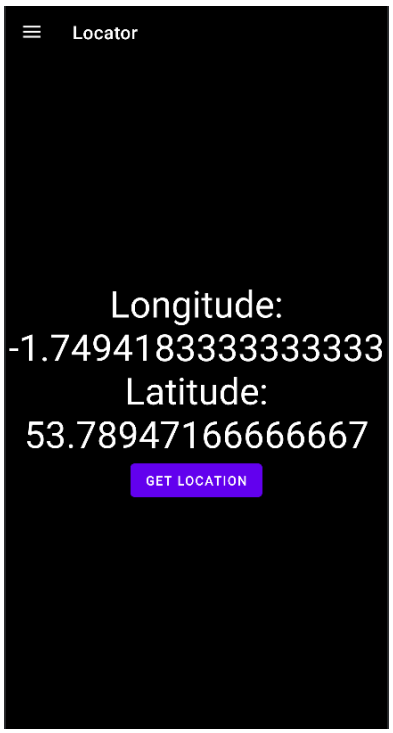


Figure 4

This screen is the second fragment of the app. It can be accessed through the navigation menu and is labelled “My location”. This part of the app allows the user to press the button on the centre of the screen which will in turn display the devices’ current location. The page has a very simple design layout to allow for easy understanding of the screen by users as it only consist of the text that prompts the user to press the button and the button. Once the button is pressed the text will change into the longitude and latitude of the phones exact location and will also update in real time if the user moves the phone.

If the app does not have any location service permissions granted when pressing the Get Location button, the app will display an error message stating that location permissions are needed (Figure 4.1)

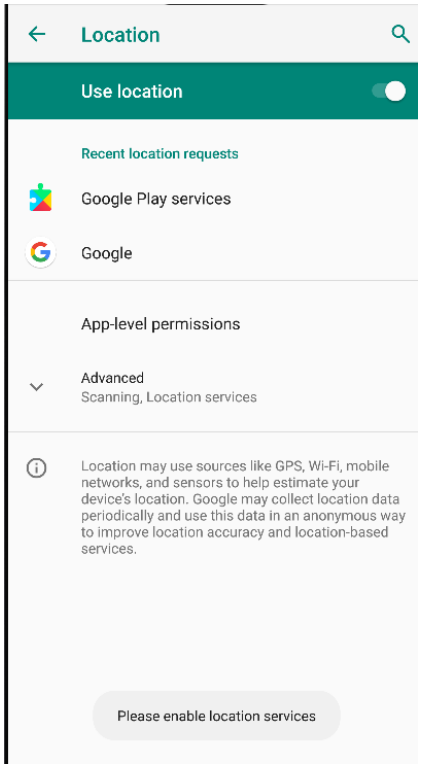


Figure 4.1

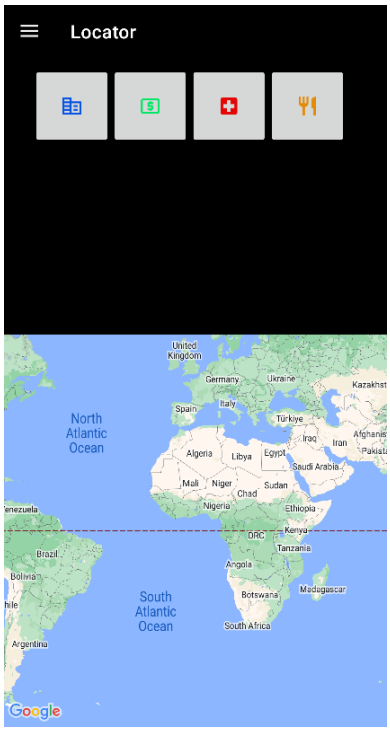


Figure 5

The final fragment consists of 4 buttons representing banks, ATMs hospitals and restaurants. It also displays a map at the bottom. Once the user presses one of them buttons it will display a pinpoint that will show the users current position Figure5.3-5.6) And will also show all of the restaurants, banks ATMs and hospitals in a 1000m radius. If one button is pressed, then another the first results will be cleared before displaying the next

If the app does not have any location service permissions granted when pressing any of the 4 buttons, the app will display an error message stating that location permissions are needed. It will then redirect you to the location services to enable them (Figure 5.2)

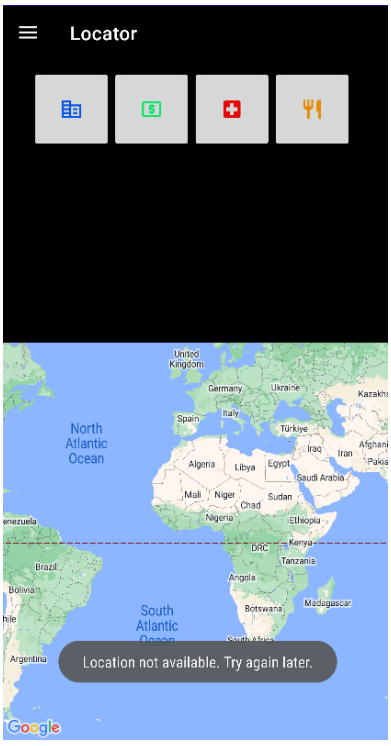


Figure 5.1

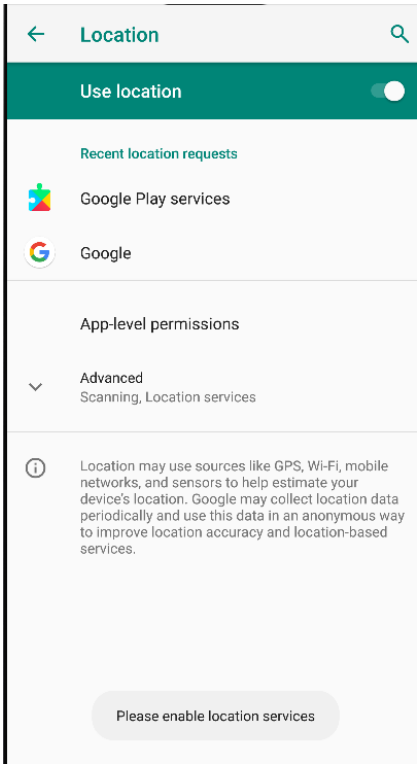


Figure 5.2

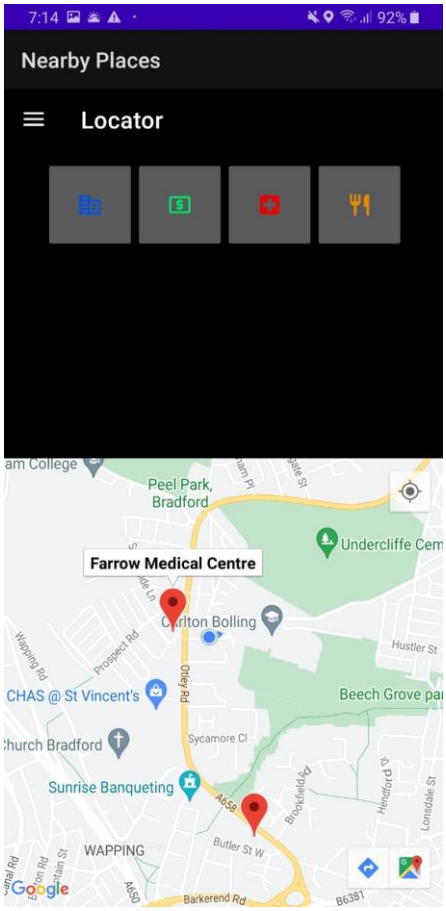


Figure 5.3

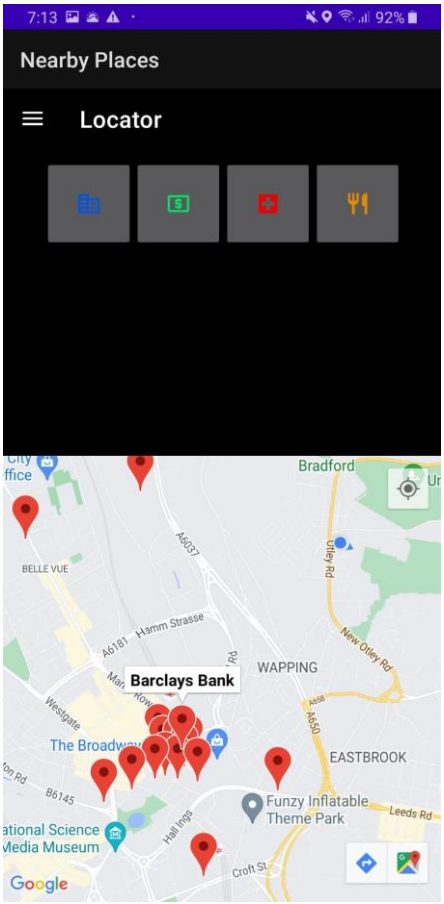


Figure 5.4

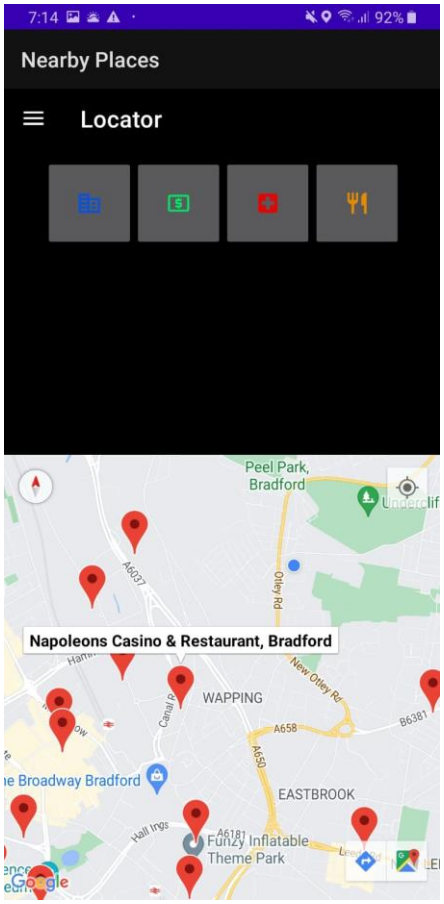


Figure 5.5

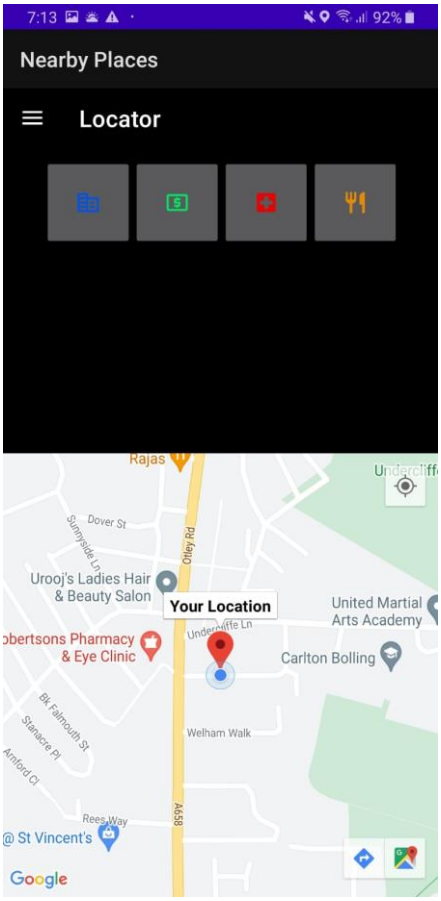


Figure 5.6

5.2 *MVC*

The model- handles data storage, retrieval, and manipulation while representing the data as well as the application's business logic. The database management solution in this instance was SQLite, enabling the model to effectively handle and store the data necessary for location-based services.

The view- displays how the user interacts with the application and its user interface. The map element of the app is an illustration of the view, which enables the user to engage with the app in a visual and natural way.

The controller- is in charge of managing communication between the model and the view, making sure that the model's data is faithfully reflected in the view. The controller was developed in Java, ensuring that the user's provided location data was processed and shown in the view appropriately.

The Android app can be divided into easier-to-manage components by using the MVC design pattern, which also makes it easier to maintain more reusable and testable code. Because of this, it becomes a high-quality, scalable, and maintainable application that is also easier to manage and extend.

The Nearby Places app divides the data, user interface, and control flow into many classes in accordance with the Model-View-Controller (MVC) architecture paradigm. The Model represents the application's data and logic, the View represents the user interface, and the Controller represents the user interface. The Controller controls communication between the Model and View.

The Google Maps and Places API integration and GPS location information retrieval will be handled by the app's Model class. It will also take care of data administration and storage using the MySQL database. The data display for the user, including the map, coordinates, and details about neighbouring locations, will be handled by the View class. The connection between the Model and View as well as user inputs and UI changes will all be handled by the Controller class.

The MVC pattern enables the application to divide its various concerns, improving its organisation, maintainability, and scalability. This makes it simpler to update and modify the app without having to change the entire codebase. The MVC approach also makes it simpler for numerous developers to work on the application concurrently and with fewer conflicts.

The MVC architectural pattern is used by the Nearby Places app to effectively handle the application's data, user interface, and control flow. This creates a more structured, maintainable, and scalable programme that is user-friendly and offers real-time information.

6. Implementation and testing

Test Case ID	Test Case Description	Test Steps	Expected Results	Actual Results	Status (Pass/Fail)
Login					
1	registering with non-matching passwords	Press the sign up after filling out the form while inputting 2 different passwords	Display error message	Display error message	Pass
2	registering with an existing account	Press the sign-up button after filling out the form with account details that are already within the database	Display error message	Display error message	Pass
3	registering with empty fields	press the sign-up button without filling out any of the fields	Display error message	Display error message	Pass
4	Registering with existing user	Press the sign-up button after filling out the form with account details that are not in the database	Display error message	Display error message	Pass
5	Logging in with empty fields	Press the login button while leaving bot fields empty	Display error message	Display error message	Pass
6	Logging in with non-registered credentials	Press the login button after filling out the form with account details that are not in the database	Display error message	Display error message	Pass
App feature					
1a	Using get location button without location services	Press the location button while location services are turned off	Display error message	Display error message	Pass
2a	Using get Bank button with location services	Press the Bank button while location services are turned off	Display error message	Display error message	Pass
3a	Using get ATM button with location services	Press the ATM button while location services are turned off	Display error message	Display error message	Pass
4a	Using get restaurant button with location services	Press the restaurant button while location services are turned off	Display error message	Display error message	Pass
5a	Using get hospital button with location services	Press the hospital button while location services are turned off	Display error message	Display error message	Pass

7. Conclusion

To conclude, the Application created is a very useful and well-rounded application that follows all the requirements set by the module coordinator. The application uses java fragments and has a login that saves its data within the MySQL database. It also uses the MVC architecture to make sure that the app follows a complete and structured layout. The app. The application has been made to a point where it would almost be completely usable for normal day to day use. It would only need a few adjustments to be suitable for consumer use.

To improve the application a few changes would have to be made. The first change would be to make a more secure login/sign up process and use encryption, 2 factor authentication and biometrics. Another improvement would be to add a query style page that would allow for users to search up certain places that they would like to know the location of by filtering their options.