Table of Content

Table of contents 1

Abstraction 2

Introduction 3

Literature Review 4

System description 5

★ Component of Architecture 6

Task Analysis Question 7

Project Prototype 8

The abstraction Model 13

Evaluation of Prototype 15

Implementation 16

System design flow chart 18

Sequence Diagram 19

Work Done/Future wok 20

Conclusion 24

References 24

Abstraction

Considering most of our Universities that have a stationary campus map at their main entrance which in most cases is outdated; with a campus that is expanding in size and in its number of buildings, locating those buildings can be very tedious especially for someone new to the campus. Hence, this work addressed the issue of designing and implementing a mobile campus map guide application that aids navigation and location of landmarks within the campus. The work brought up a mobile campus map application which enables its user to locate himself or herself and landmarks within the University of Buea Campus. The system was designed with the view of providing maximum simplicity, quality user experience, great user interface and most importantly accurate data.

University campuses can be large, confusing, and intimidating for new students and visitors. Finding the campus may be easy using a GPS unit or Google Maps directions, but this changes when you are actually on the campus. There is no service that provides directional assistance within the campus itself. With the increase of buildings in a university, sometimes it becomes difficult to get directions to different campus buildings.

Though Google provides navigation among places, it doesn't always return the most reasonable route or get adapted to recent changes that happened around buildings. Therefore, it is significant to render optimized paths that are more practical to students on campus. The idea is that users share their path around the campus and then the campus GPS server receives these routes. Next time when other users request directly to a campus building, previous routes will be reused. This app is to better enhance time management for students. A couple of paths to a building are provided whenever requested by users. User can make comparisons among these server-returned paths and choose their favourite. Better user interface and friendly user experience also complete the aim of this app.

Introduction

The Yoruba has a proverb which says “Abere ona ki I sina” meaning he who asks for direction will not miss his way. That proverb is half true and half false as the determinant of that is the person that is being asked. With the ubiquity of today’s sophisticated mobile devices, and mobile phones having capacities that beats that of some desktops. Location guides have to exploit the advantage of a mobile smartphone to make navigation easier for users.

Mobile campus map guide is a component of presence technology that delivers information about a device physical location. The purpose of a mobile campus map guide is to make navigation and finding locations for freshmen and visitors easy. The use of static campus maps would be another useful option for the person but the use of static maps (unintelligent maps) can also be frustrating when the knowledge of map reading is unavailable.

Satellite view of map university of buea

Literature Review

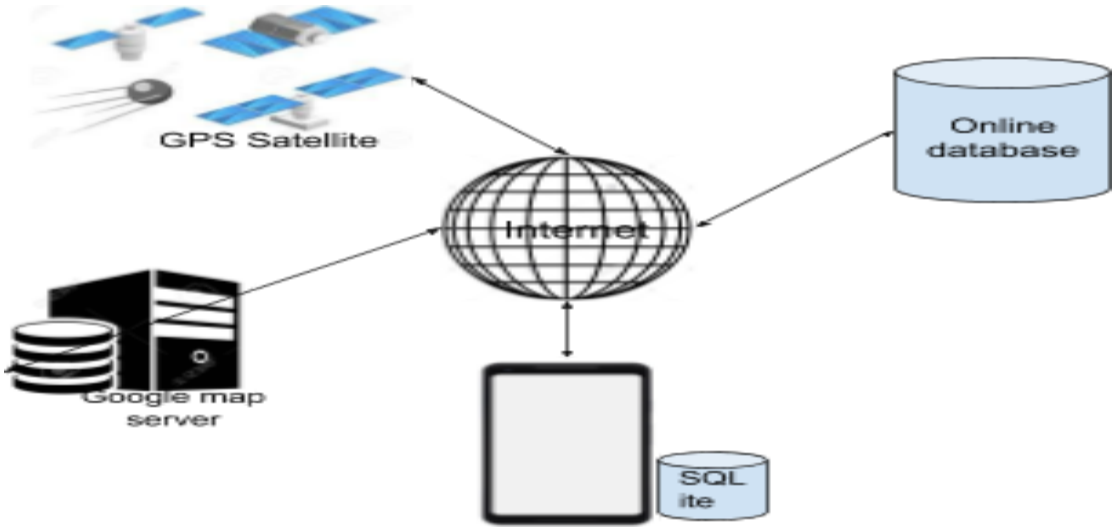
During the last few years, the mobile phone has gained significant progress in its development with respect to memory capacities, processing capacities and improved hardware features. Nowadays the use of mobile phones has become a basic necessity for people, with mobile phones having advanced features and being able to perform sophisticated things, we can refer to this era as the era of smartphones. Two important and major technologies have empowered users with computing power and network resource at hand as they move from one place to another, they are portable computers (mobile computers) and wireless communication. With the trend of computers shrinking in size and increasing wireless network bandwidth, more than ever this has enabled people to access files and data anytime and anywhere. **"Mobile computing refers to the use of any kind of computer in a moving environment"**. Context-aware computing, however, is a mobile computing paradigm in which application can discover and take advantage of contextual information such as user location, time of day, nearby places and activities and user's activity. Global Positioning System (GPS) was described as one of the technologies that are used in a huge number of applications today. One of the applications is tracking your vehicle and keeps regular monitoring on them. This tracking system can inform you of the location and route travelled by vehicle, and that information can be observed from any other remote location. It also includes the web application that provides you with the exact location of a target. A campus map application is a dynamic electronic map that guides individuals around a campus environment. It should have the ability to perform navigational functions, show the users current location and should be able to identify the user's point of interest (POI) and should be able to give a little description of those POI and most importantly, it must be user friendly. Campus map application includes mapping the location of objects and the map giving the location and or direction to such objects. GPS applications allow users to enter a destination and based on their current coordinates displays the fastest way to the destination. Google Maps and Google Navigation display navigation information. As technology evolves, it has begun to incorporate various types of navigation, such as bus routes, driving directions, walking directions and biking directions. Kincaid and Marissa in equally revealed that Google maps and GPS systems have become indispensable in recent years, with vast amounts of users relying on them for directions but according to their capabilities have not yet been fully applied to university campuses. Directions within campuses are not available using Google map application and as such this work is geared towards making provision for such on mobile devices due to the fact that emerging location-aware mobile technologies are being applied successfully and different technologies such as Radio-Frequency Identification (RFID), Wireless Fidelity (Wi-Fi) and so on are being applied to allow mobile devices to interact with the environment.

System Description

The current location is sent to the server along with the destination location when route requesting is performed. Users can either select a destination from a predefined list of buildings or can tap on the buildings to request routes. Once users get the returned routes, they can choose the one they want and start walking at their wish. Then users' paths will start to be recorded. After arriving at the destination, when users click stop, the recorded route will be uploaded to the server whenever the Internet connection is available. Next time if the routes are requested, the server will analyze possible usable paths and return a couple of best routes according to the algorithm formulated.

- The application allows a user to select source and destination locations and displays the shortest path.
- The user can select whether this is a walkable or drivable path. This feature is especially useful on campus since people often walk between buildings.
- The application provides navigation capabilities based on the user type. A user enters the destination location and based on the current location.
- The input can be done by typing in the text or by voice note.
- The application provides rerouting if the user departs from the projected path.

User Interface design We believe that for the user interface: the simpler the better. The minimal number of building block is arranged in the relative layout so that our app can display according to different size of devices. The colours used in our app are basically gold and black, which reflects the theme of the University of Iowa. Based on requirement analysis, our design has five activities. In order to let users have better user experience, choosing better and simpler styles, patterns, building blocks for each activity were applied.



System Architecture

The specific components of the architecture are:

I. Mobile Device: Is an android based device on which the application resides, this platform provides functional libraries that enable the app to work properly since it is a mobile application platform that makes it a best suit for this project.
II. Internet: The major component of this application requires the internet, the Google Maps API most especially requires the internet, and the internet is also required for pooling data from the server. Also for any GIS application/ system to work it needs the internet because a GPS dongle or device will not work if there is no internet for it to connect to the GPS satellite.
III. Database: This is the database that will hold the location data. For this application, there are two databases; the online database on the webserver and the local SQLite database on the mobile device. SQLite is an embedded Structured Query Language (SQL) database engine which does not have a separate server process; it reads and writes directly to ordinary disks. The reason for the choice of SQLite is due to its ability to run in minimal stack space and very little heap. Its performance is quite good even in low-memory environments.
IV. GPS satellites: They make it possible for the application to get the current location of the mobile device.
V. Google Map Server: It is the server from which Google map-related data is pooled from through the aid of the internet

Agile software approach was employed for the application development due to the fact that is it is an iterative incremental development where requirements for a system can evolve during the lifetime of the software. The approach is flexible and supports map application requirements which are liable to surface and evolve.

TASK ANALYSIS QUESTIONS

Who is going to use the system?

This system is meant for Student (new student) and visitors of the University of buea

What tasks do they now perform?

There is no existing system for university of buea but the system has been implemented in a different university with input from a keyboard and locates the user destination

What tasks are desired?

To implement the system for university of buea and include voice input method

How are the tasks learned?

Users do not need any training or special knowledge in order to use the application. Anybody can use the app.

Where are the tasks performed?

The system is expected to run on a mobile platform. Take user information on current location and destination. The system can also determine the user current location using GPS

What's the relationship between user and Data?

The user downloads the campus' map XML file from the Mapping Server using HTTP. Parses the campus map XML file and builds the campus map graph data structure. The history of the destination the user visited is stored for future usage or suggestion for other users.

What other tools does the user have?

There is no existing tools or similar system for the users in the university of buea

How do users communicate with each other?

The users can locate each other on the map but that will be done on the knowledge of both users.

How often are the tasks performed?

The task can be performed as often as the user desires.

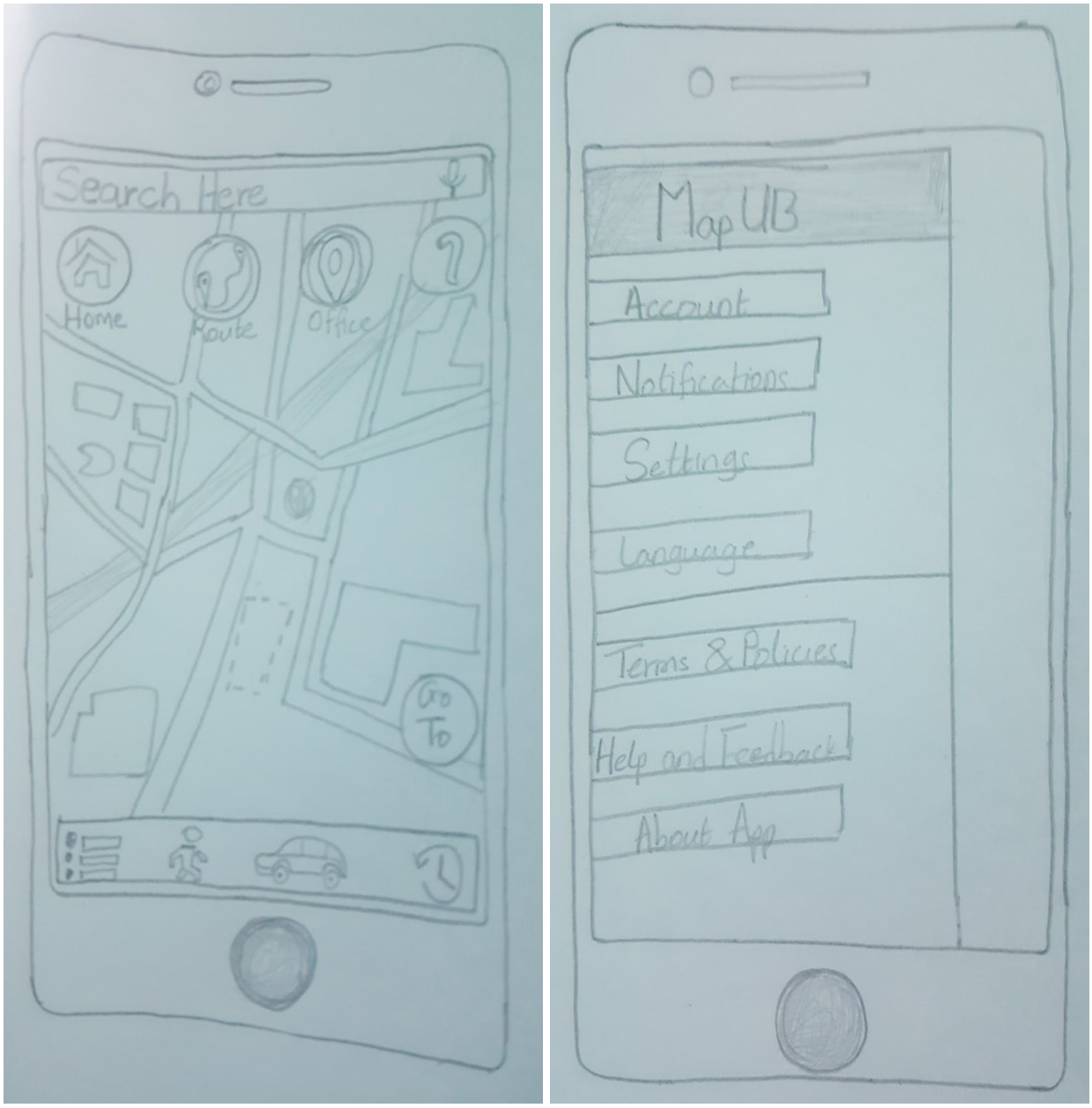
What are the time constraints on the tasks?

No time constraint on the task.

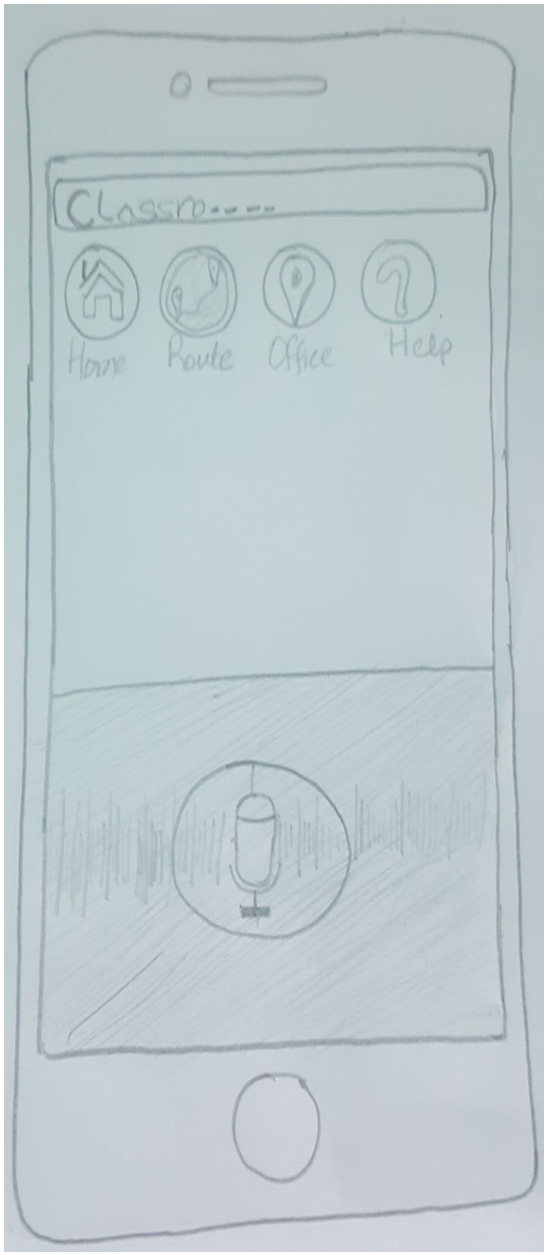
What happens when things go wrong?

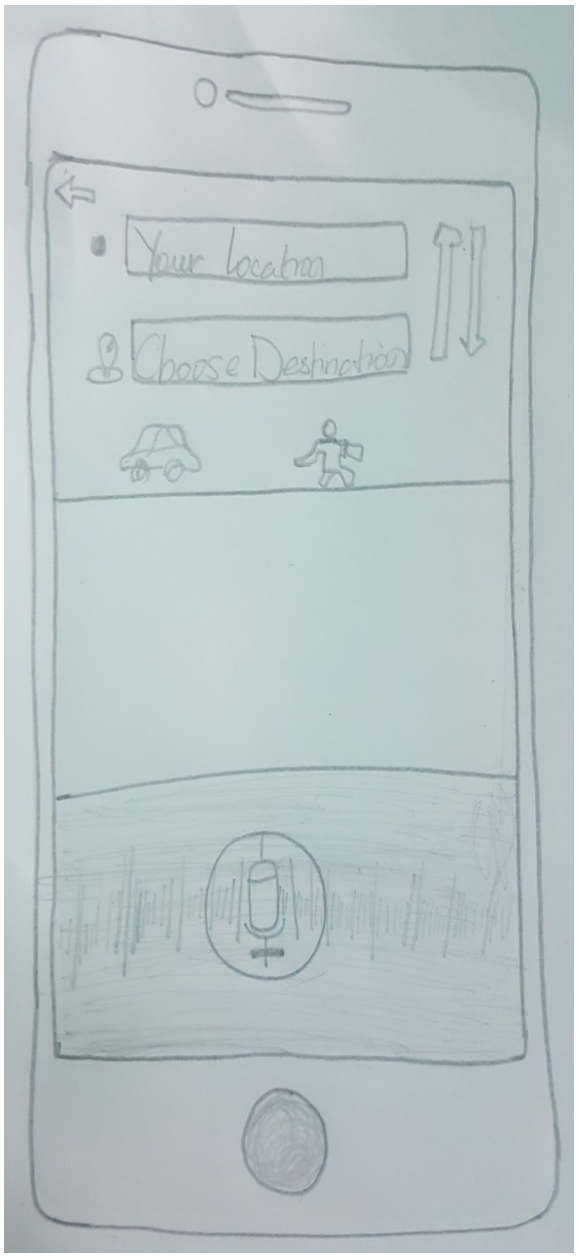
Users' information will be backed up and later use to reboot the system

PROJECT PROTOTYPE

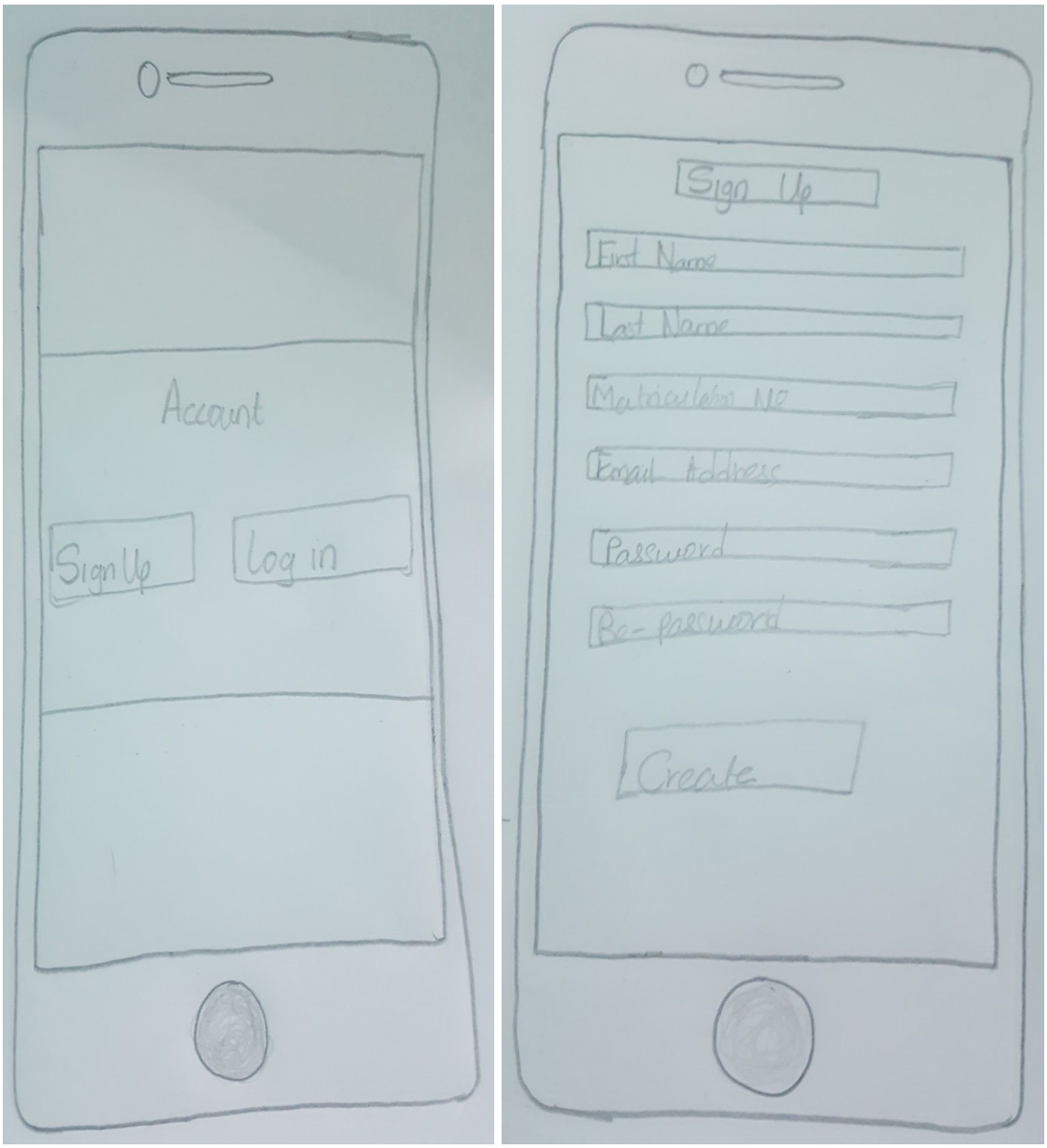


The Landing page of the mobile app and Home button options of the app.

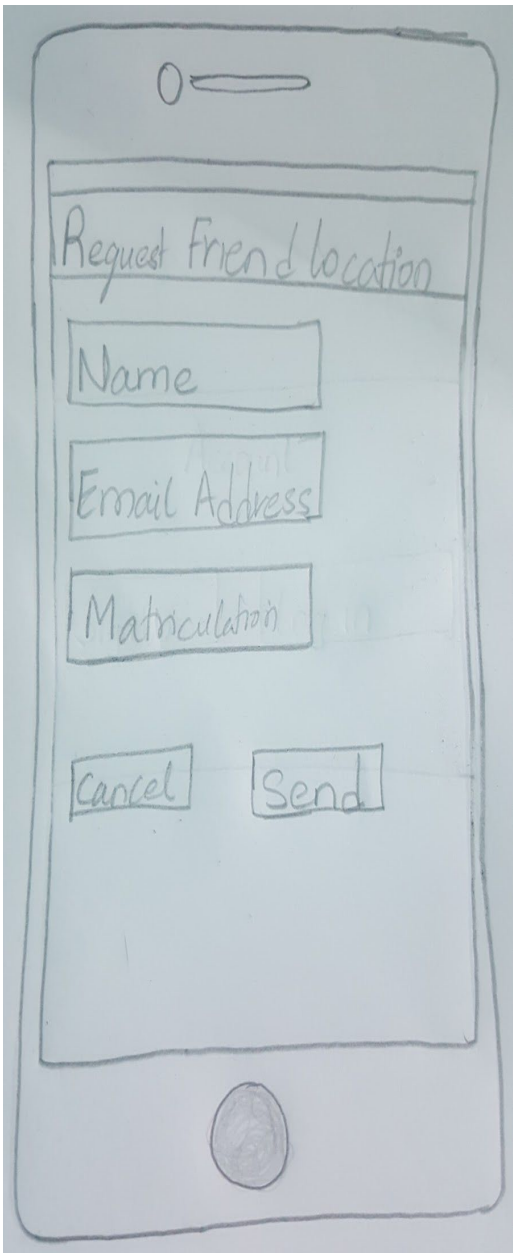


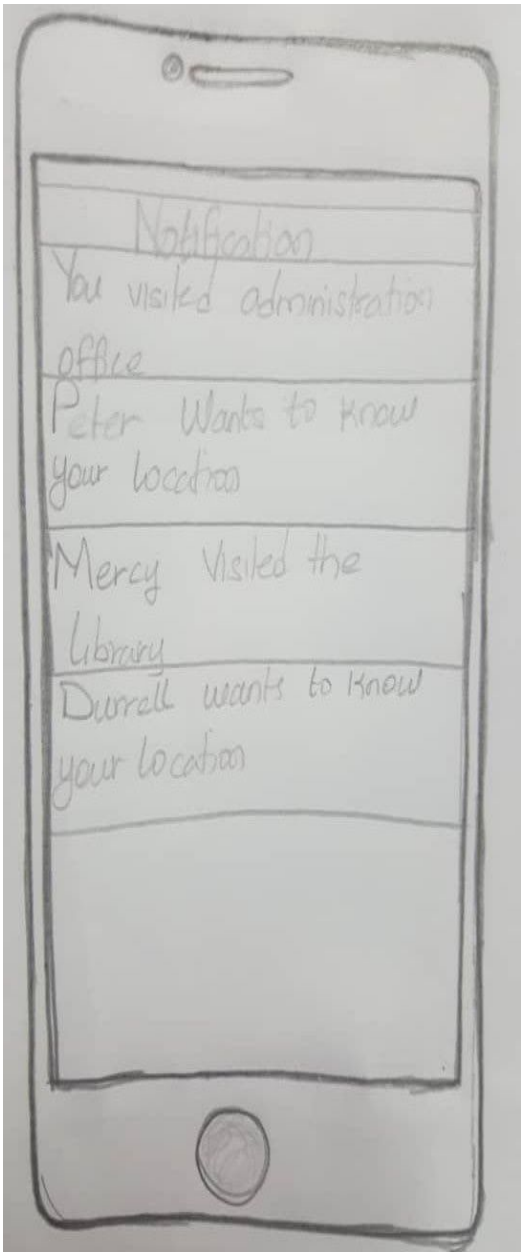


Take voice input from the user to search for a location and also for a direction to take

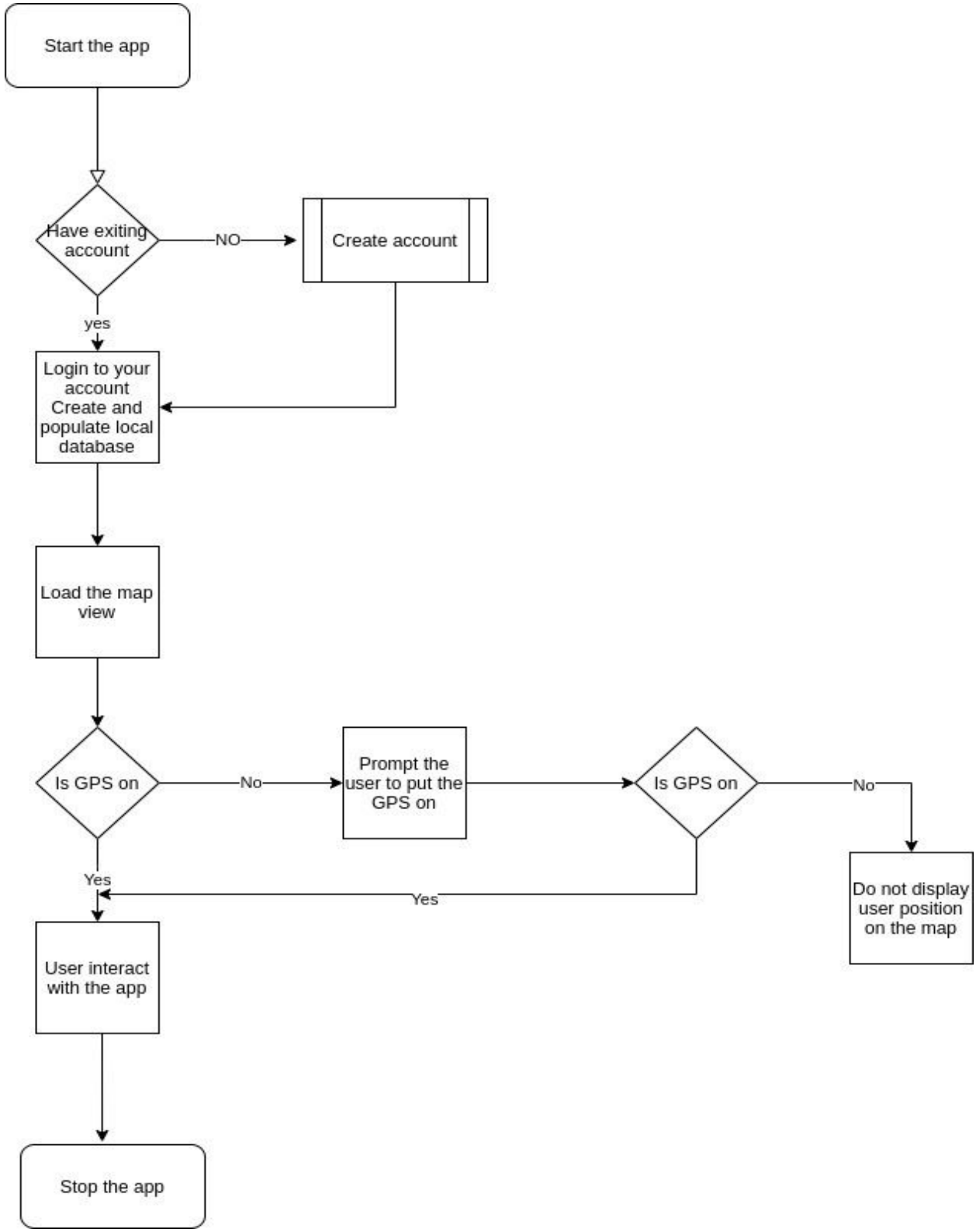


Creation of account in the app. User fill in the necessary filed in other to create account



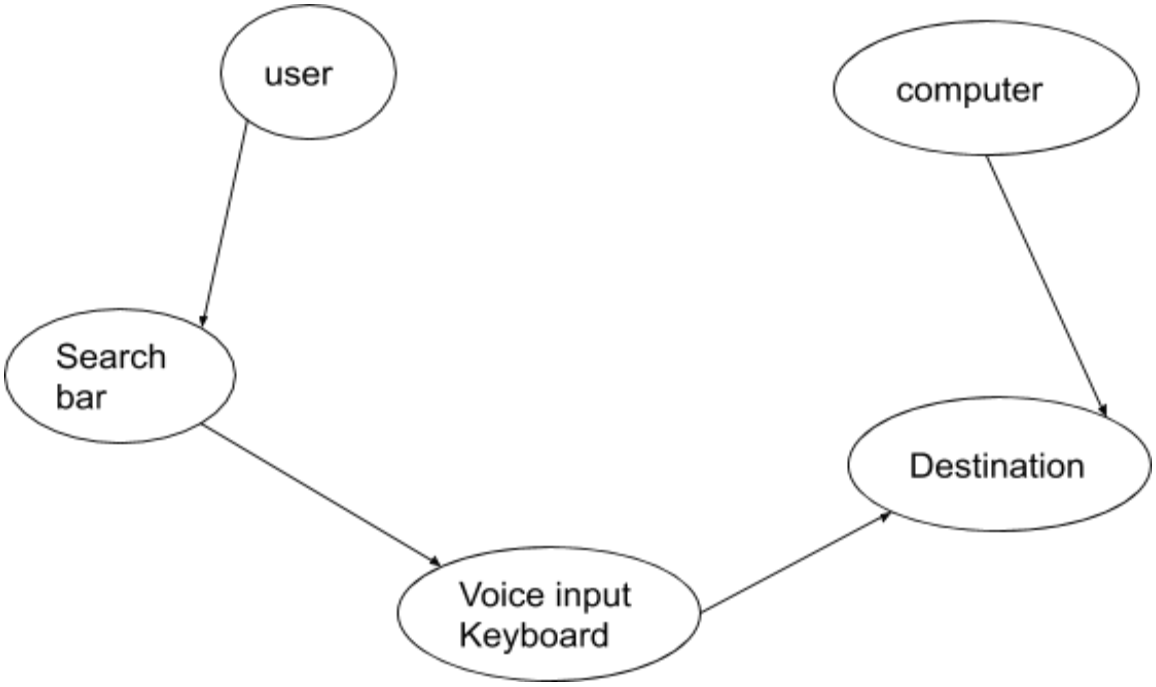


Request for your friend location on the campus and receive information about your friend, those that gave permission to do so.



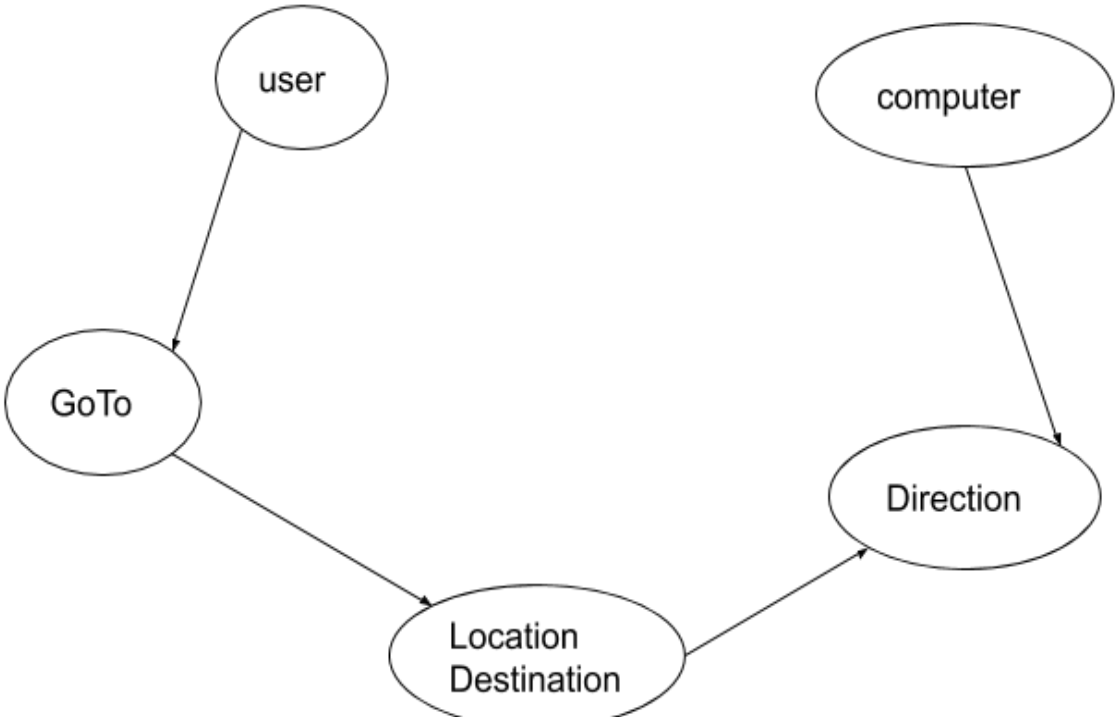
Flow chart of the app

Abstraction
Module 1



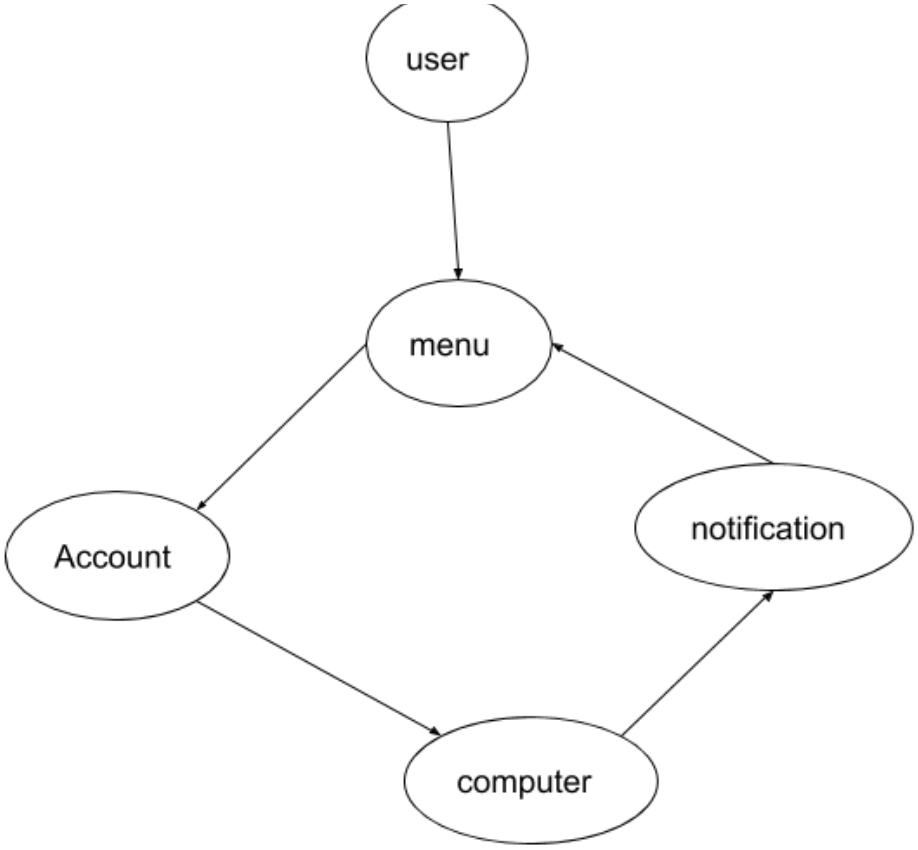
The user search for a part in the university and the application locate it and display

Module 2



The user enters his location and destination and the system displays the part it will take the user to get to his/her destination

Module 3



The user enters the menu and goes to account creation, the system creates the account using the information entered by the user and later display the user status in the notification and also display any changes in the system in the notification.

Evaluation of Prototype

Give the evaluation test of your prototype:

-Purpose of test

Testing the prototype helps to identify any faults, mistakes or future problem in development. It also helps the designer to find out different ways the projects can be designed and determine how successful it will be in the market. It brings out how the product looks like, works like or feel like.

-Problem statement/test objectives

- Use to determine if the design passes certain requirements
- To get customer feedback about the product
- To determine if the product needs improvement
- To evaluate the quality of the application

-Participant profile (inclusion/exclusion criteria)

The participant profile includes New students in universities, Old students, lecturers and also those are not students of the university to determine its simplicity of use.

-**Method/technique to be used**

Black box testing is used to test the functionality of an application based on the requirement specification. Questions determine which methods and indicators will be used to test the prototypes.

-List of tasks to be used

- Audio: it is one of the most frequently used media in any interaction between computer and user
- Graphic: It is a presentation of immovable images such as pictures, drawings, sketches, illustrations.
- Text: It is a basic element of conveying information. Put emphasis on the content you want to convey.
- Animation: It is a fast show of the sequence of 2-D or 3-D static images to create the illusion of movement.

-Test environment (field vs. lab) and materials (HW/SW, recorder and batteries, report forms, questionnaires)

Using a summative evaluation, the respondents were given a prototype to use and subsequently complete the assessment form.

-Experimenter's role (monitor, coach etc.)

Experimenter's role in the evaluation is to monitor the activities of different user and direct them in case if they are confused.

-Evaluation measures to be taken (qualitative vs. quantitative, subjective vs. objective)

Qualitative data is data concerned with descriptions, which can be observed but cannot be computed. That is data will be collected using a questionnaire and analyse it.

- Variables: Account creation details
- Independent variables: Either use a keyboard or mic to enter the destination.
- Dependent variables: search time, recording voice time limit
- Controls: Location of buildings and roads and personal information

Subjective data are information from the client's point of view including feelings, perceptions, and concerns obtained through a questionnaire. Every student at the University of Buea is free to use the application (old and new students) and also includes lecturers.

-Analyse content strategies

- Content in the project is directed to the students of the University of Buea
- The goal is to provide student directions around the campus
- Provide the student with important/useful information like an available class for study
- Student can navigate through the app with ease

Implementation

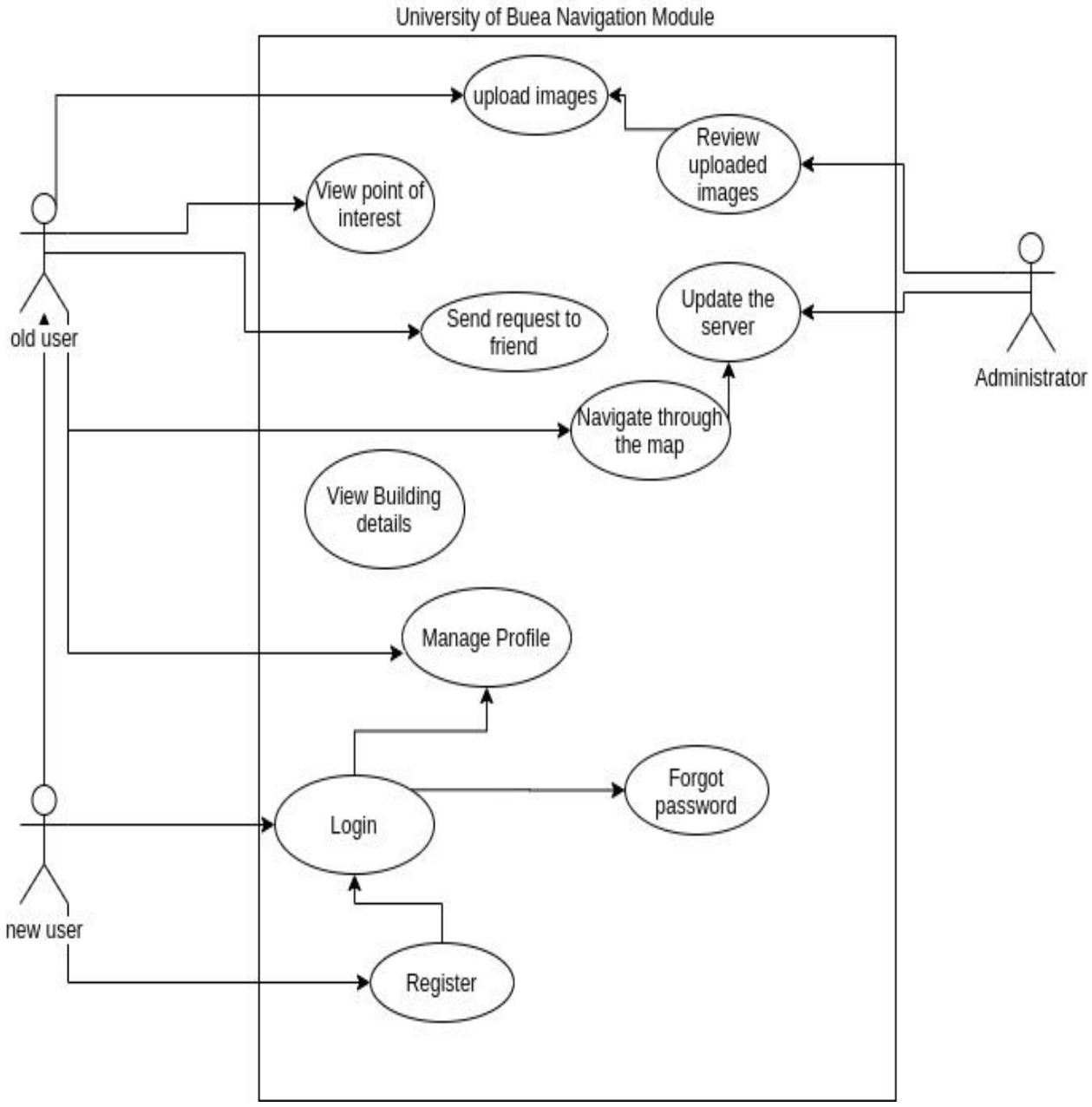
Requirement Specifications

Functional requirements

1. Users should be able to register and log in to the system.
2. User should be able to update his/her personal information.
3. Users should be able to view the map of the UB campus.
4. Users should be able to view his/her current location.
5. Users should be able to view or upload images to the photo gallery.
6. Users should be able to switch layers between building and point of interest.
7. Users should be able to view the buildings' information.
8. User should be able to flag an image that is inappropriate or abusive to be reviewed by the administrator.
9. User should be able to navigate from the current location to any buildings
10. User should be able to send a request to know his/her friend location
11. The administrator should be able to review flagged images.
12. The administrator should be able to unflag or remove flagged images.

Non-functional Requirement

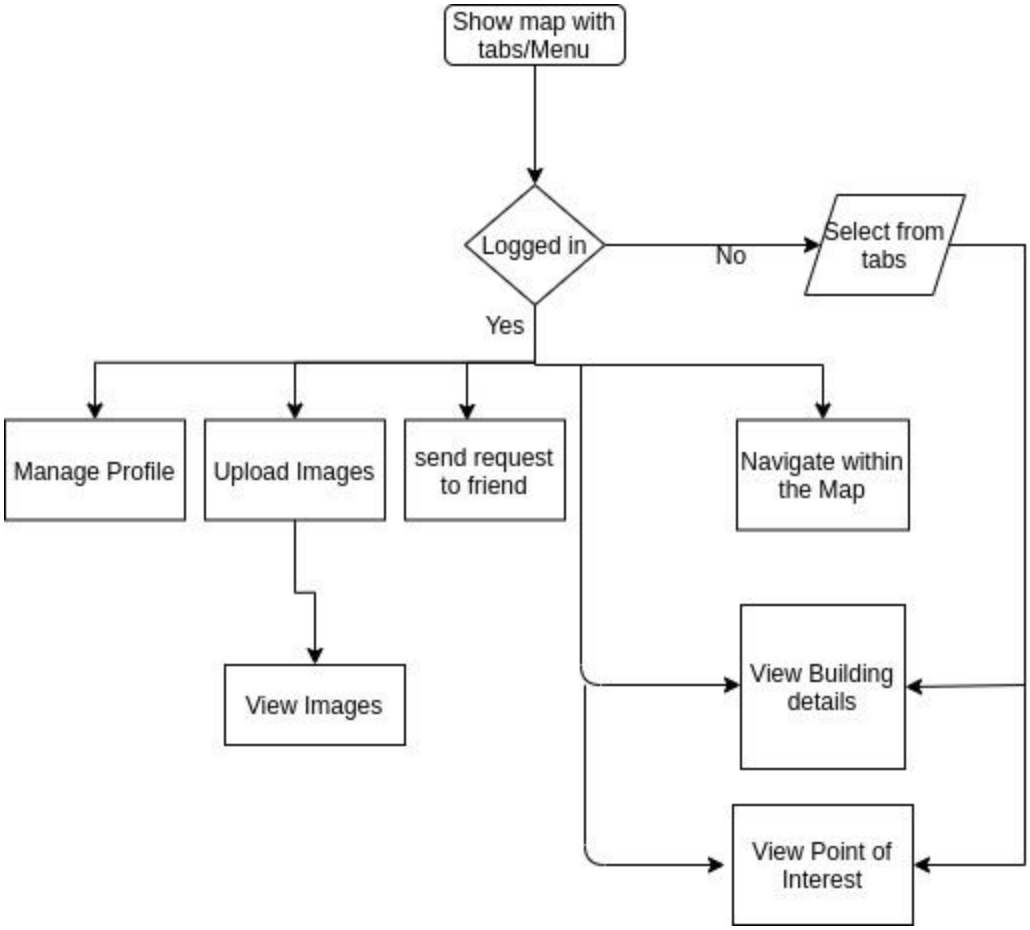
1. User data changes should be synchronised with the server in real-time.
2. All buildings' data should be stored in the database and not hardcoded in the application source code.
1. All uploaded images should be stored on the server and retrieved on demand.



A use case diagram for UB

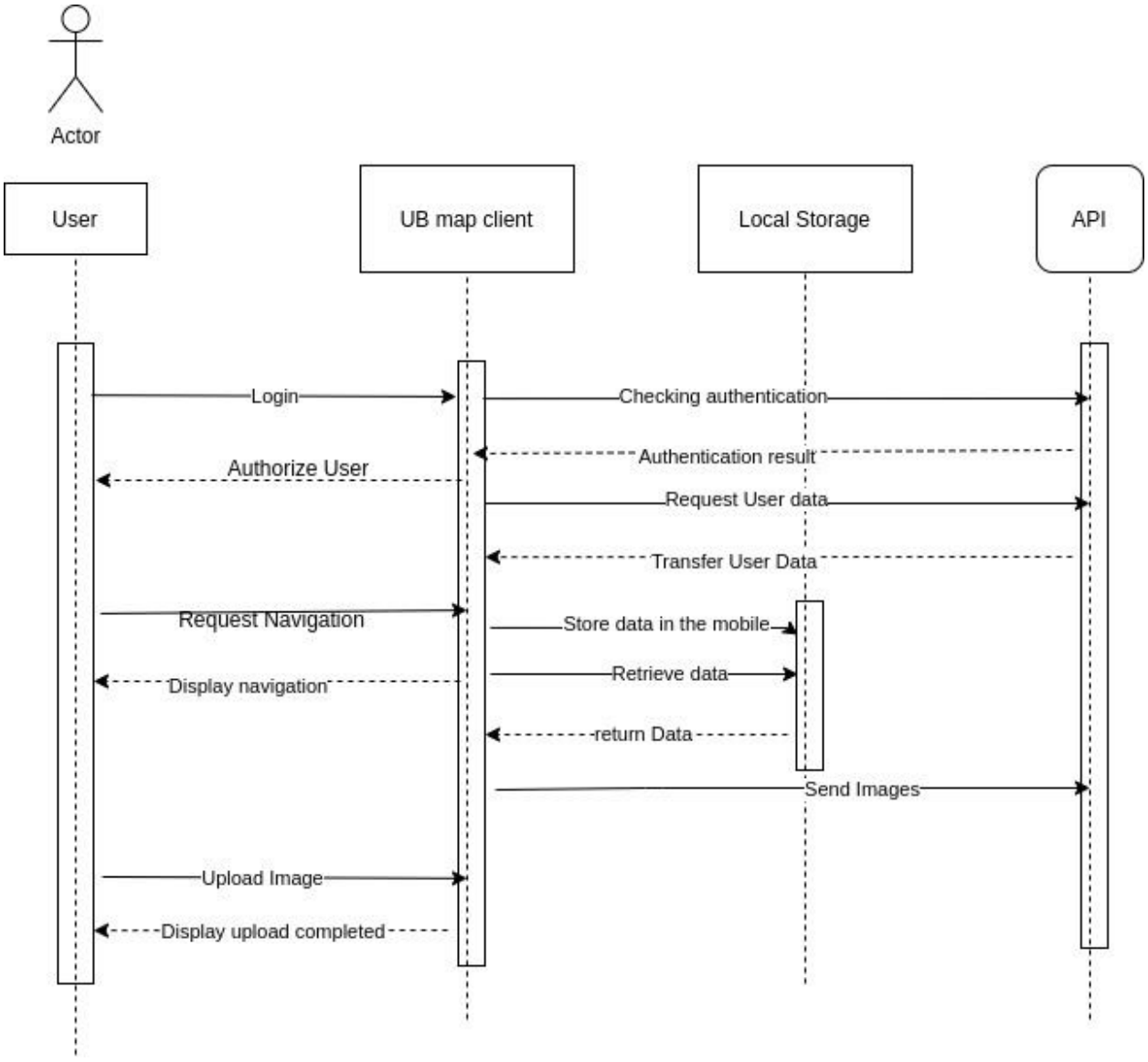
System Design Flow chart

The system flowchart of the campus navigation and interaction module of the system. When the users start using the mobile system, users are prompted to key in their username and password. After a login authentication being checked by the server, the main dashboard will be shown on the diagram below system. Users are allowed to skip the login page but some actions will be restricted.



Sequence Diagram

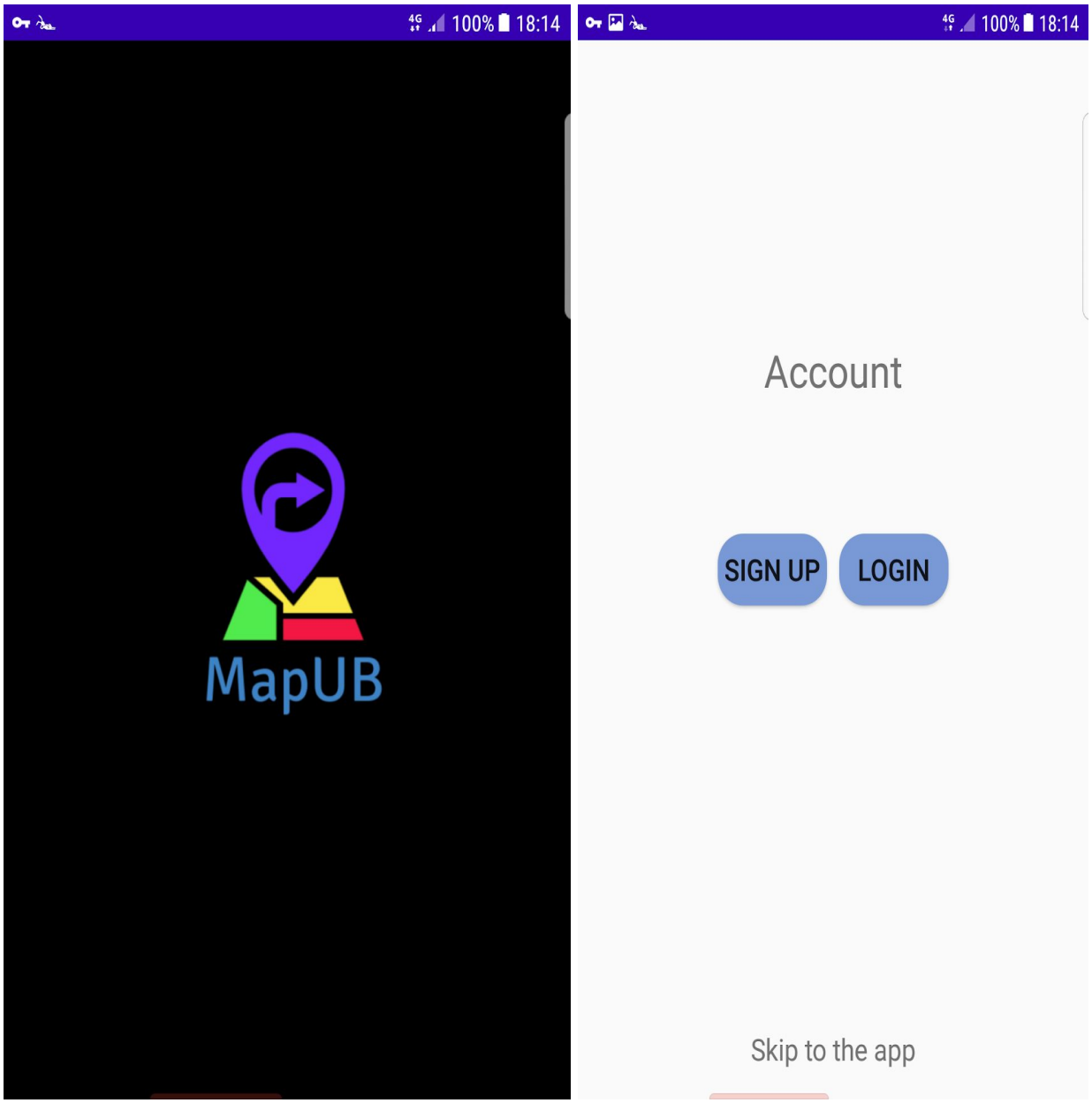
In order to login to the UB map system, users are prompt to key in their matriculation number and password to gain authentication result from the server. User information such as display image, username and etc. will be requested from the server after the system receive the authentication result and store into local storage.



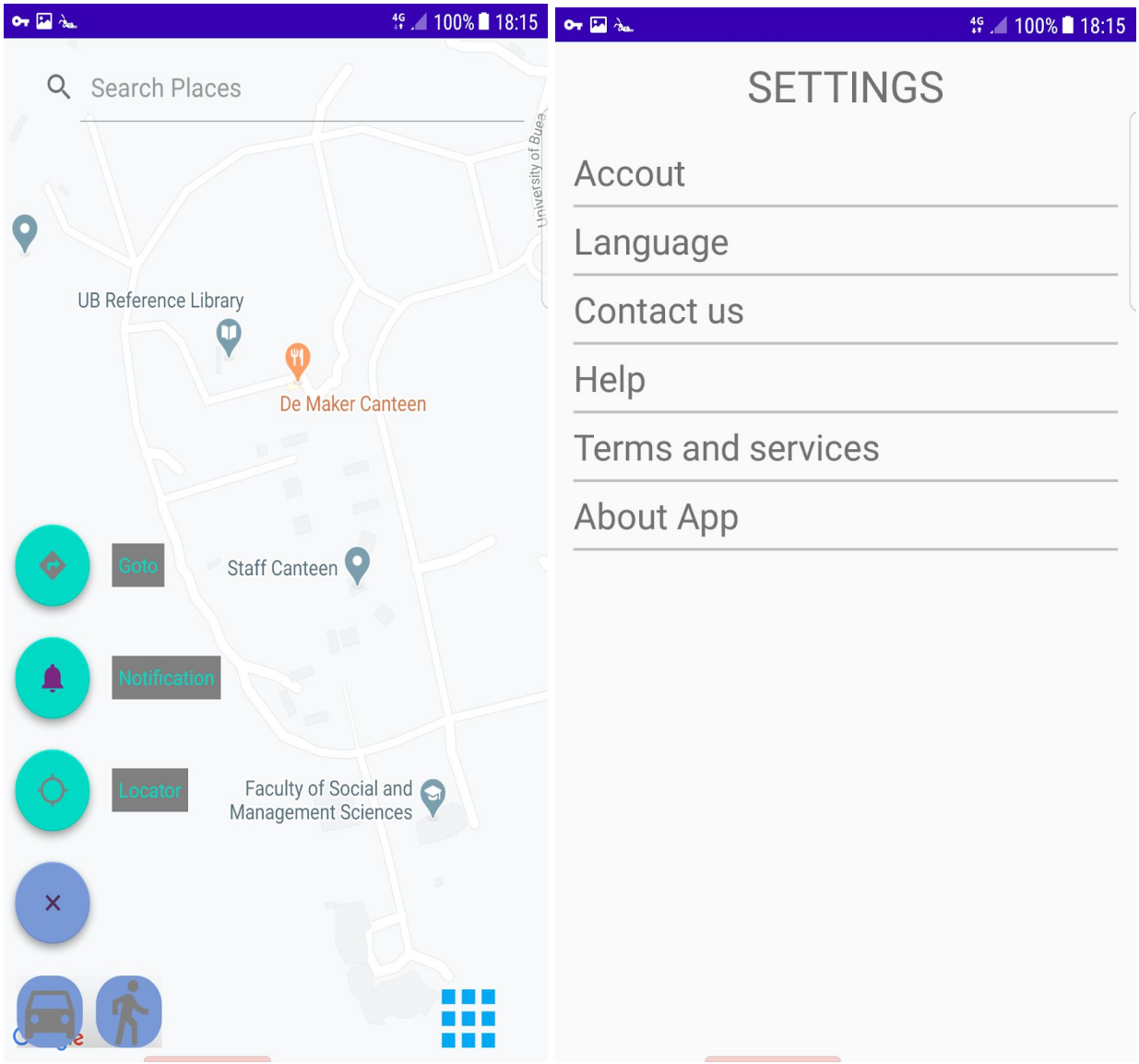
Sequence Diagram for navigation and upload of an image in the map system

Work Done/ Future Work

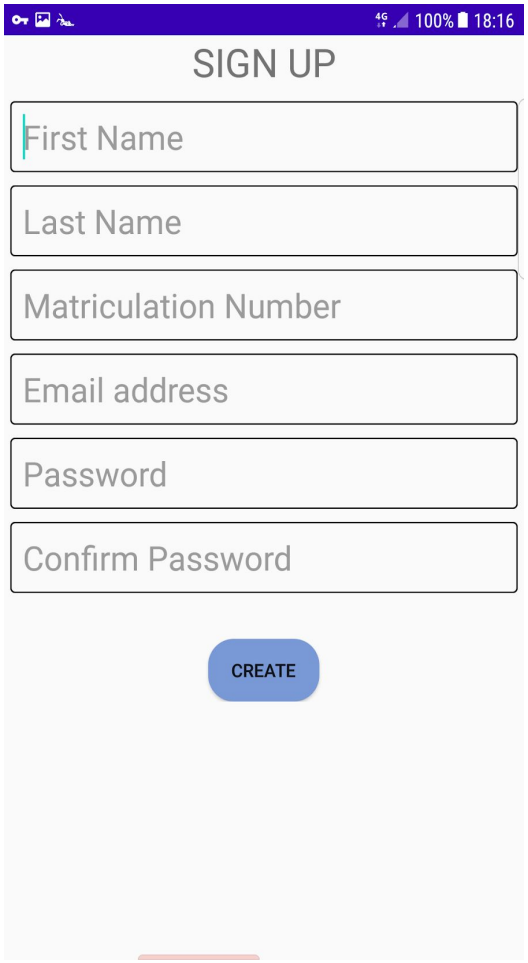
The front end of the project has been done and running. With the different interfaces needed for the project.

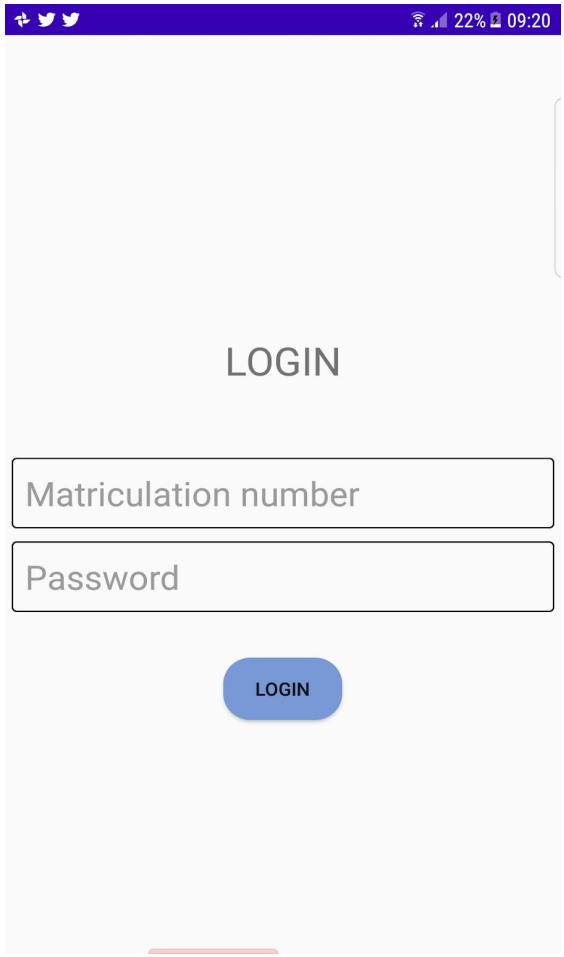


After clicking the application button, the fist screen will load and then lead you to the second screen.
It is either, you sign up, log in or skip to the app

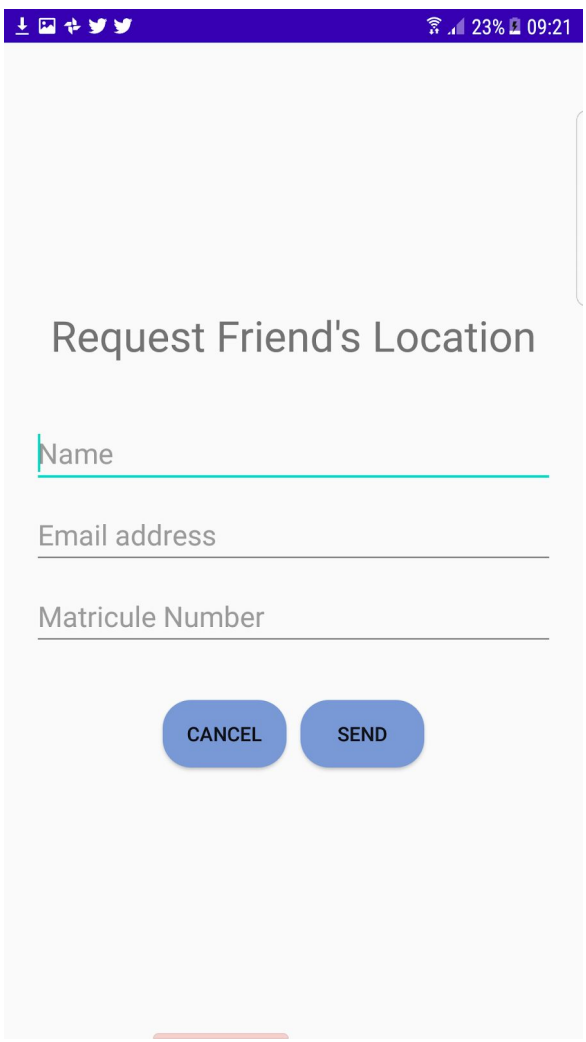


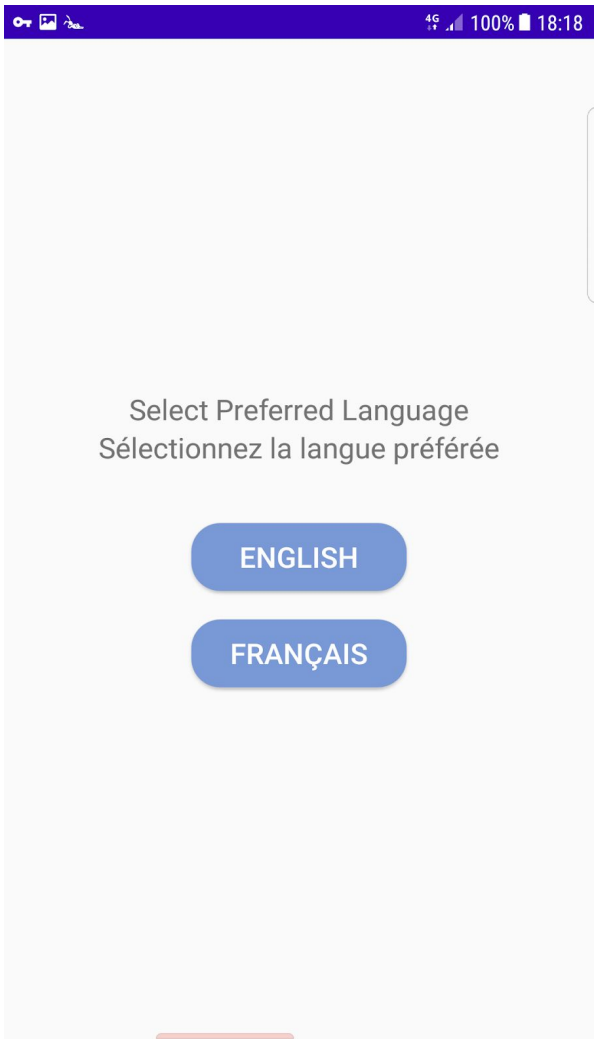
If the user clicked, on the "skip to the app", the user will be directed to the home screen but will not be able to make use of the whole function of the system. The user can later create the account by clicking on the Menu button which will bring a new screen as on the right image.





If the user clicks on the account, then the previous signup/Login screen will appear.
If the user clicks on the signup button, then the screen on the left image will display but if on the login button, then the login screen will appear as shown on the right image





After the user has logged in into the app, then he/she will have full access to the functioning of the system.

Future work

- The backend of the application and include the required functionality as specified on this document.
- More knowledge about cloud computing is the need for the hosting of the application server over the internet
- Improvement in the design of the application for user friendly.
- Integrating the Front end with the backend.
- The purchase of API KEY geolocation, searching, geo-positioning on the map is required
- Researching on building up a special map route that can not be based on Google API

CONCLUSION

The interface of the app needs to be adjusted to look attractive. The system will undergo some tests to know whether the problems of the existing campus map (if any) has drawn into a conclusion and objectives of the development of the app have been met and also, gather information on the outlook of the user about the design and functionality of the proposed system. When different users share a lot of their own traces, we want to define a better algorithm that dissects their routes and generate a new, shorter, and even reasonable route. Some of the enhancements can be made to the existing application. It could be to sync Google calendar to get alerts if you are near a building or share the shortest path on Facebook/Twitter to help your friends. This way, many people can get to know about our application. More the data, the better paths we get. Anyway, we are confident that this app is promising.

REFERENCES

[1]https://www.researchgate.net/publication/250376267_The_21st_Century_Campus_Map_Mapping_the_University_of_Wisconsin-Madison

[2]https://www.academia.edu/38787605/An_interactive_map_locator

[3]https://github.com/BabyShung/CampusMap

[4]https://github.com/tomtom-international/maps-sdk-for-android-examples

[5]http://eprints.utar.edu.my/1951/1/CN-2016-1104158-1.pdf

[6]https://www.lovelljohns.com/4-factors-university-campus-map/

[7]https://www.researchgate.net/publication/261049594_Campus_assistant_application_on_an_Android_platform