Chittagong University of Engineering and Technology(CUET)

Chattagram-4349, Bangladesh

Final Lab Report On

CUET BUS TRACKER (android application)

Course No: CSE-326
Course Title: Internet Programming (sessional)
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1. Project Title:

CUET BUS TRACKER

2. Project APK:

cuet_bus_tracker

3. Objectives:

This project is all about an android application that has been motivated by the necessity of CUETains in their day-to-day life.

Here, our aim was to create an application to provide real-time location providing service of CUET university buses, so that students can easily track the running buses for their convenient uses.

4. Introduction:

CUET buses are an essential part of the students studying here. Again, there are some others buses for the faculties and staffs.

Every day, a lot of students, faculties and other staffs travel by these buses having separate buses. Individual person gets in a bus from the outside of campus to go towards the Chittagong city or coming to the campus. Most of the time, having no idea about the currently available buses in the streets, it seems to be very difficult to know the exact location of a bus and reach in time. This is a burning question to the CUET students, including faculty and other staffs. If there could be any way to somehow know or get an idea about the currently running buses and their locations, the miseries of missing buses in busy times might be reduced significantly.

Motivated by this issue, we had a plan to solve this and decided to create an android application which might be a great benison for the CUETians. The application interface could be kept simple for the users so that they do not get any hassle while using this.

So, our main goal is to provide the real-time location of a running bus after an individual seeks a particular one.

5. Description:

The application is being created to provide service to the CUETians only, so the number of users is kept in a limited space. Again, the authentic ID provided by CUET authority is mandatory to get facilities from this application.

There are some features to be mentioned:

- Bus drives need to be registered by the authentic ID (email ID) before using the application.
- Each user has also the same constraints.
- Each driver makes that their location (GPS) is turned on.
- Bus driver sends the location of the bus in which he is operating in.

- The bus location which has been tapped by the bus driver via the application will be loaded in a real-time database and kept in store.
- Each time the database is updated by the movement of a particular bus.
- User may have a search for a particular bus through the corresponding bus ID.
- Real-time update of the currently running bus is shown on the map in the user's interface.
- The location update of a particular bus concludes after the bus driver wishes to exit from his interface in the application.

6. System Requirements:

The hardware and software trade-off is an essential part of any project. As we are in an android application project, the theme is quite same. To keep the application as simple, the hardware and software requirements are being kept down low.

6.1 Hardware Requirements:

Components are executing the application flawlessly and manageable to each user are very significant in this task. As an android project is always heavier than some other projects, the hardware requirements are very much effective for this purpose.

These are including:

- OS: Android 5.0 (Lollipop) or more upgraded versions.
- CPU: Octa-core (2x1.8 GHz)
- RAM: 1 GB or above
- Display: 5.5 inches or above

6.2 Software Requirements:

The software plays an important role from build process to launch process. Perfect software use can be very much effective in terms of performance of a project. To complete the whole project, we were using such as:

- Android Studio 2020.3.1 (currently latest version).
- App testing device(phone): Samsung A30s, Walton primo NF4.

7. Implementation:

This is truly an android project with java environment, so we use the *JAVA* language to connect with the database (*FIREBASE*) and the front-end design is built with *XML* language. We need to introduce a term called activity which refers to the interface or deign of each page (to viewer).

Here are some of the descriptions of our contents which are being used for implementation purpose:

7.1 JAVA:

Java is a high-level, class-based, object-oriented programming language that is designed to have as few implementation dependencies as possible. It is a general purpose programming language. This language is used in many real world projects. We use it to we connect our android project with database and make the project more interactive.

7.2 XML:

XML (Extensible Markup Language) is a markup language similar to HTML, but without predefined tags to use. Instead, one can define his own tags designed specifically for his needs. Front-end or design part of our project is mostly based on this language.

7.3 FIREBASE DATABASE:

The firebase real-time database is a cloud-hosted NoSQL database that lets us store and sync data between our users in real-time. To store user information, authentication and location (latitude, longitude) of the bus in run-time, we use this database service.

This android project has a flow of activities and user or bus driver has different activities as well while using this one. We can divide the project activities into several parts:

a. User and driver authentication (Login, Signup)
b. Send Bus location and show the current location on map
c. Retrieve the specific bus location and all bus location
d. Different map views

A brief-in for each activity below:

a. Login and Signup:

We implement our driver login and signup page in Driver_Login.java and Driver_Signup.java. Again, we implement user login and signup page in User_Login.java and User_Signup.java which are truly java files. In this module we describe all the terms and conditions for login and signup including authentications and error raising tactics. In our driver signup activity, we use an extra field which is driver_ID and we use this for security purpose of the driver, as no unauthorized person have any way to use this application and hence safe journey is successful.

b. Send Bus location and show the current location on map

When driver does the login the app he views the interface (activity in specific) to send the corresponding bus location. If he enters the correct bus name and id the current location will save on database and redirect him on the *google map*. Then he is able to see his current location on the map and the application does the rest, means the update begins and continues in regular interval. When driver clicks the send button some module execute of the MapsActivity.java file which have some of the essential modules to handle the map view according to the current bus location. These are:

- requestSinglePermission(): Using this function we request to the user for giving the permission to access the location of the users device (mobile is specific).

- showAlert(): This function does the work to show a dialog alert box which will asked the user to turn on the device location.

- onMapReady(): When the map is ready and we get the latitude and longitude of a specific location and it shows the marker position on the map, for marker we use a picture of a car. And of these things are efficiently implemented inside this module.

- onLocationChange(): In this module, we implement the code to save the location in the firebase database. When driver enters the bus id and type send location button, the location is sent to the firebase and saved.

- startLocationUpdate (): Whenever we are able to detect the location, we call this module from onConnected(). Here we set the interval of time that sets the condition after how many seconds the location will be updated. Here we have used the FusedLocationAPI for update purpose of the location. Whenever the location is being updated, it shows a Toast on the map screen.

c. Retrieve the specific bus location and all bus location

When user does login into application and he sees the activity to find the specific bus location and he can also find an option to see all available buses on the map currently running (available). When user enters the button, some modules execute in the Retrieve_MapsActivity.java file. This file contains some important modules including:

- onMapReady(): This activates once the map is ready. Inside this module, we connect the database with our application. Here we connect the activity with the database and fetch the location of the corresponding bus.

To see all the bus with corresponding location on the map, we implement another map module called ALL_MapsActivity.java where we implement the program to show all running buses on the map.

d. Different Map Views

In our application, we add different map views in MapsActivity() module. When driver wants to see different types of map view, he needs to click on the MENU button and finds four options like *Normal Map*, *Hybrid Map*, *Satellite Map*, and *Terrain map*. Here, each map has a different view including buses.

Again, in the MapsActivity.java, we implement this into a method called onOptionsIteamSelected(). In this module, we define all the map view.

Now, we are going to represent the application interface along with it's working. For this, we have divided the whole process into two parts. These are:

1. Driver.
2. User.

So, let's start with the **Driver** portion first.

Driver have the several tasks to be followed accordingly:

i. Does login in the application
ii. Does registration if he is a new person.
iii. Selects the appropriate bus ID and name from the selection option.
iv. Sends the location of the currently running bus.
v. Observes different types of map tracing the bus location.
vi. Does save and exit from the application (and auto location will be updated) if he wants to stop the bus at any place.

Here are some figures representing the flow of tasks of a driver mentioned above.

Does login or register in the application

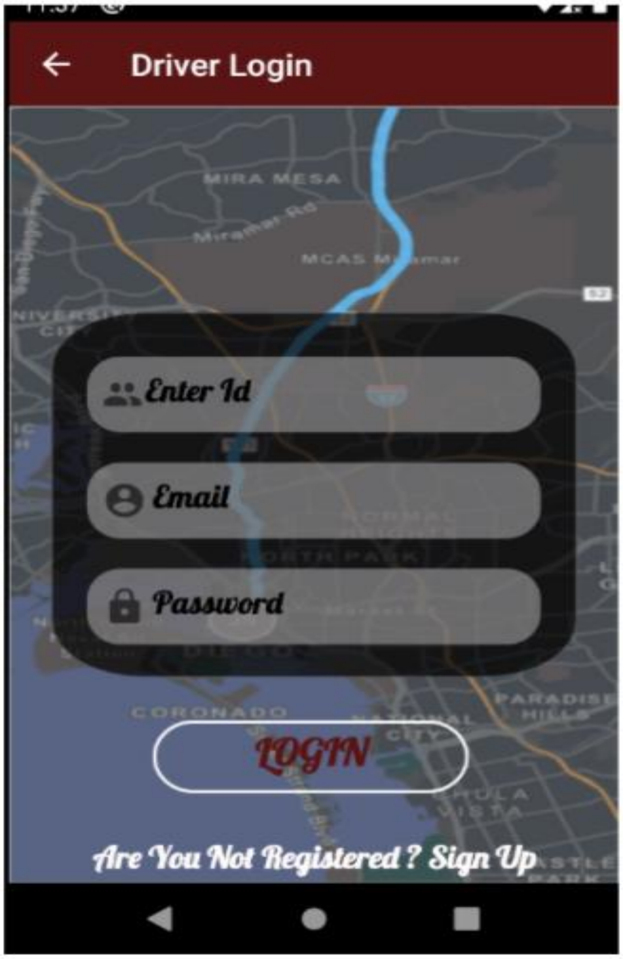


Fig- i

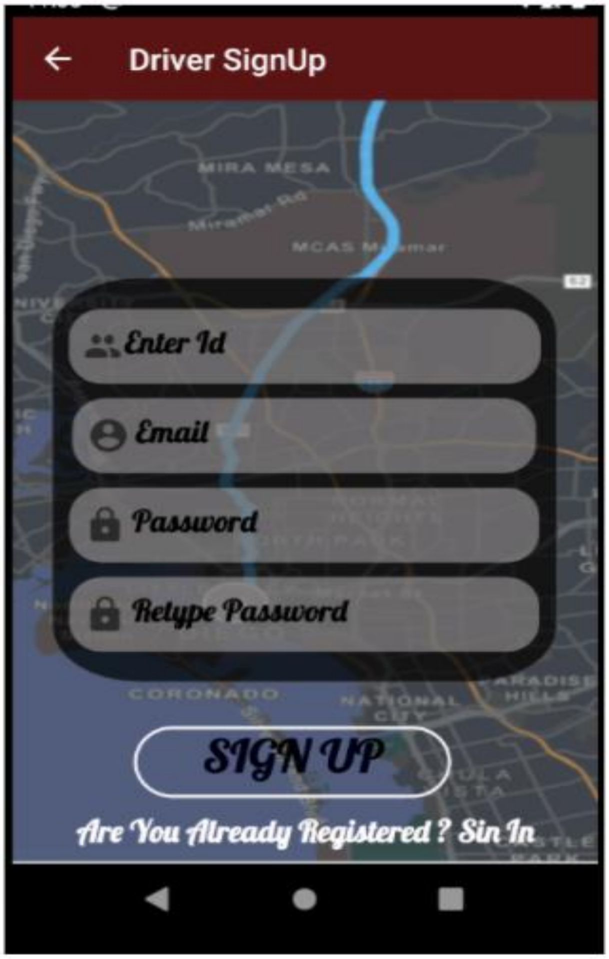


Fig- ii

Chooses bus id and name and clicks send button

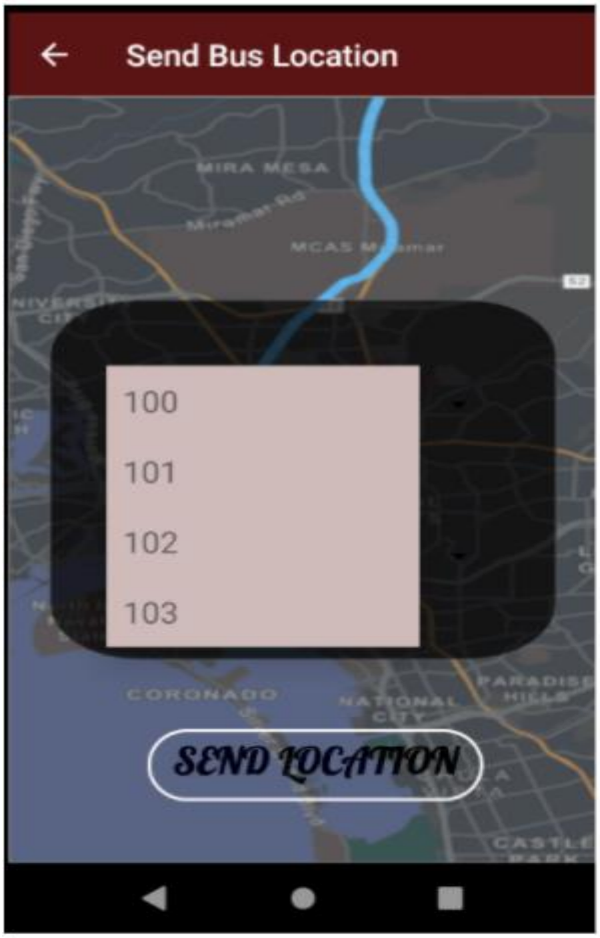


Fig- iii (1)

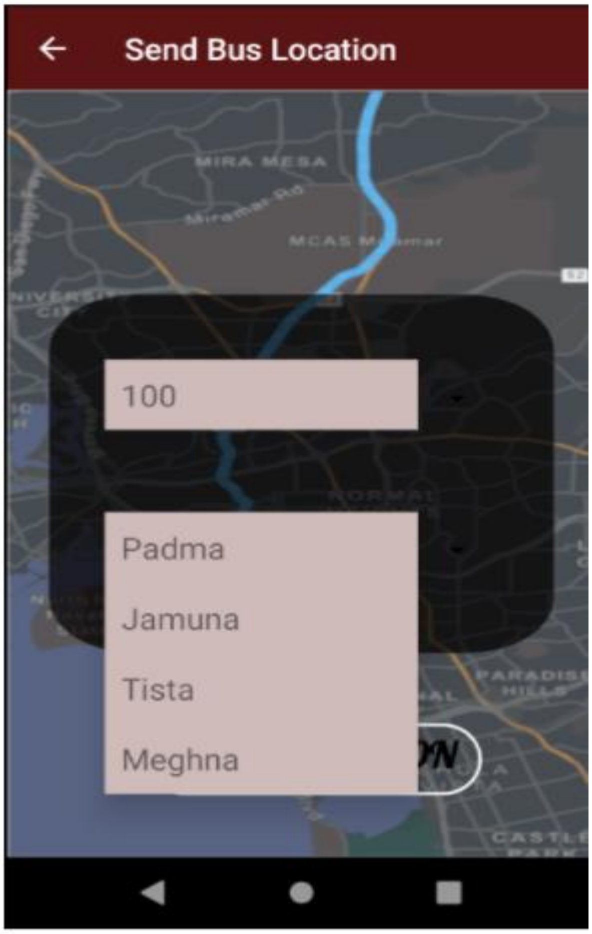
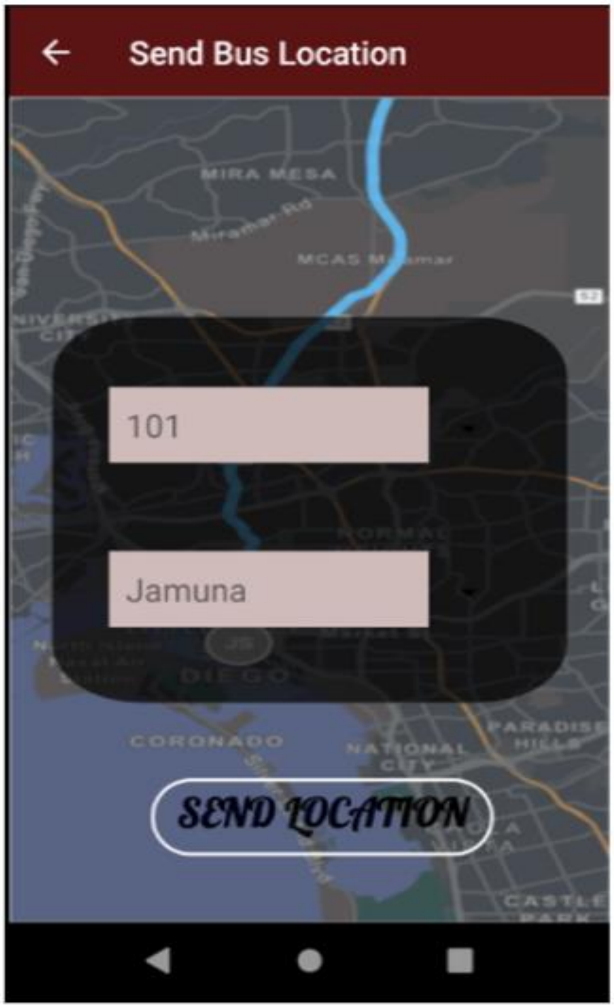


Fig- iii (2)

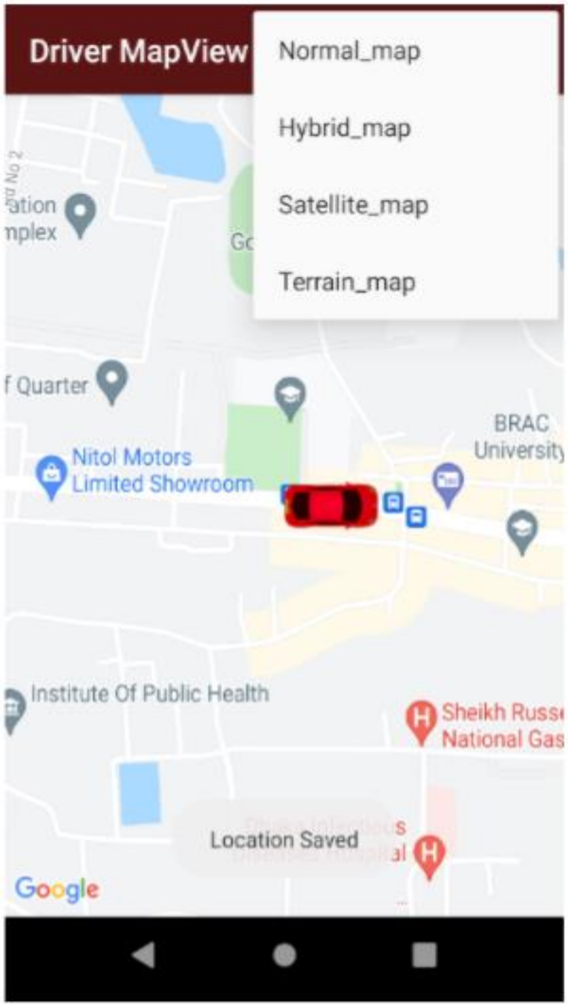
Observes different viewing options


Send Bus Location

101

Jamuna

Fig- iiv

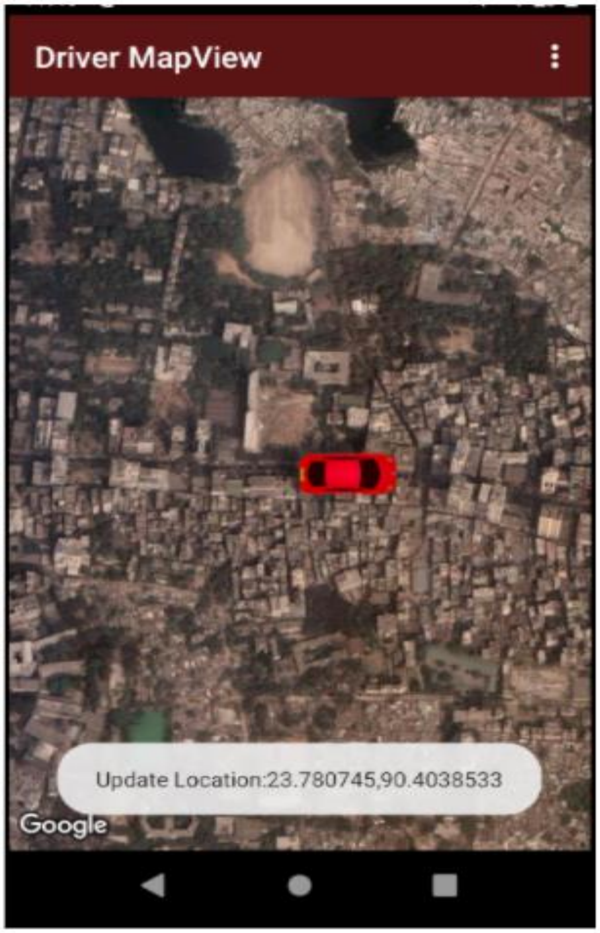

Driver MapView

Location Saved

Normal_map
Hybrid_map
Satellite_map
Terrain_map
f Quarter
Nitol Motors Limited Showroom
BRAC University
Institute Of Public Health
Sheikh Russe National Gas
Google

Fig- v (1)

Satellite view

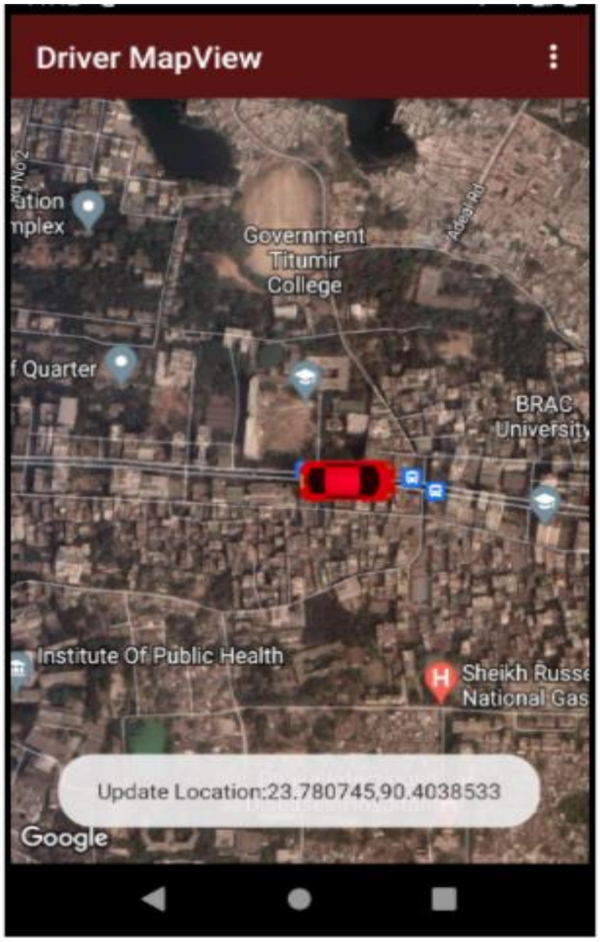


Driver MapView

Update Location:23.780745,90.4038533

Fig- v (2)

Hybrid view

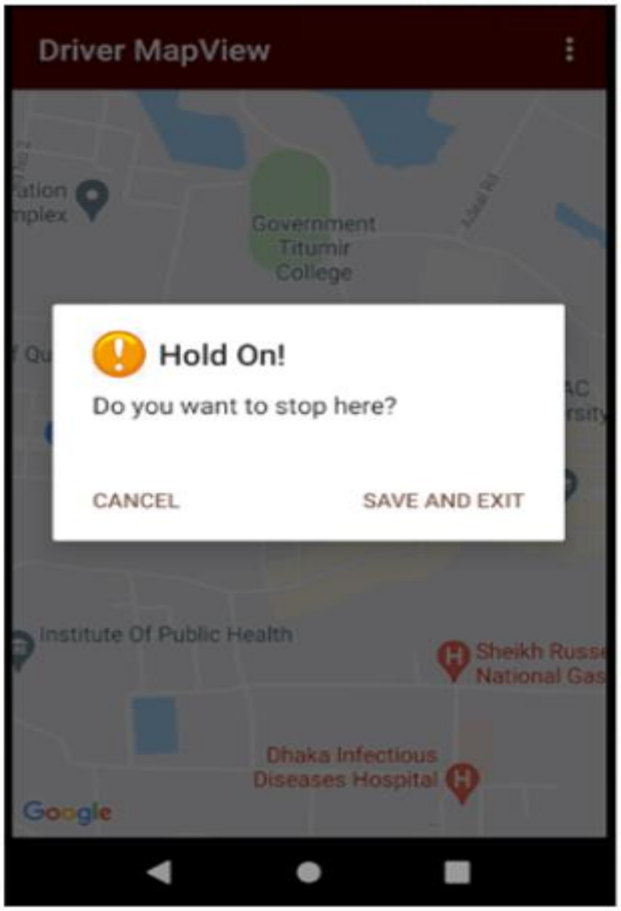


Driver MapView

Update Location:23.780745,90.4038533

Fig- v (3)

Does stop location updating and exits from his part


Driver MapView
Government Titumir College
Institute Of Public Health
Sheikh Russe National Gas
Dhaka Infectious Diseases Hospital
Google

Hold On!

Do you want to stop here?

CANCEL

SAVE AND EXIT

Fig- vi

Here concludes, the driver’s activities. Now, let us have a look on the activities of a user in this application.

User have the several tasks to be followed accordingly:

I. Does login in the application
II. Does registration if he is a new person.
III. Selects the appropriate bus ID from the selection option.
IV. Does click on the find bus button for a particular bus or click on the find all bus button to see all the available buses running along the streets.
V. Watches the bus location on map (single bus, all bus).

Here are some figures representing the flow of tasks of a user mentioned above.

Does login or register in the application

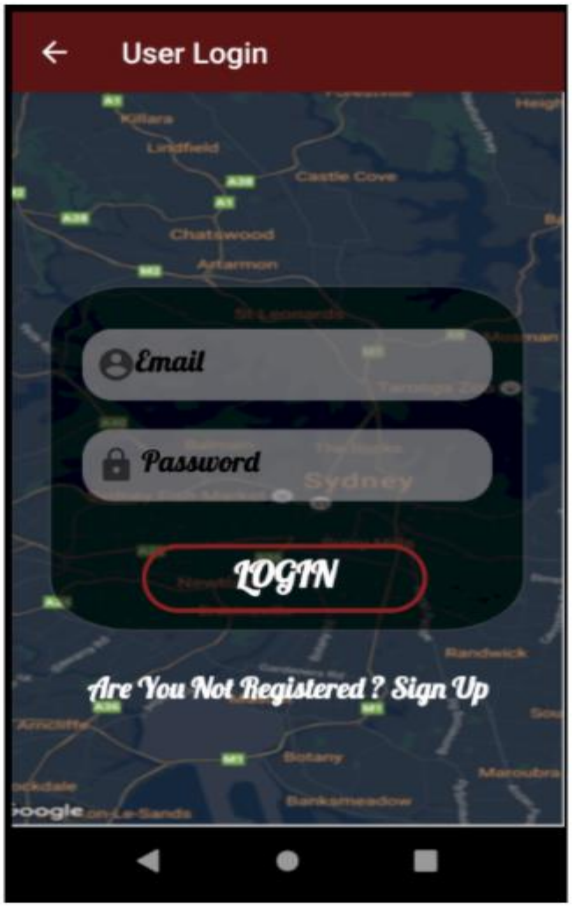


Fig- I

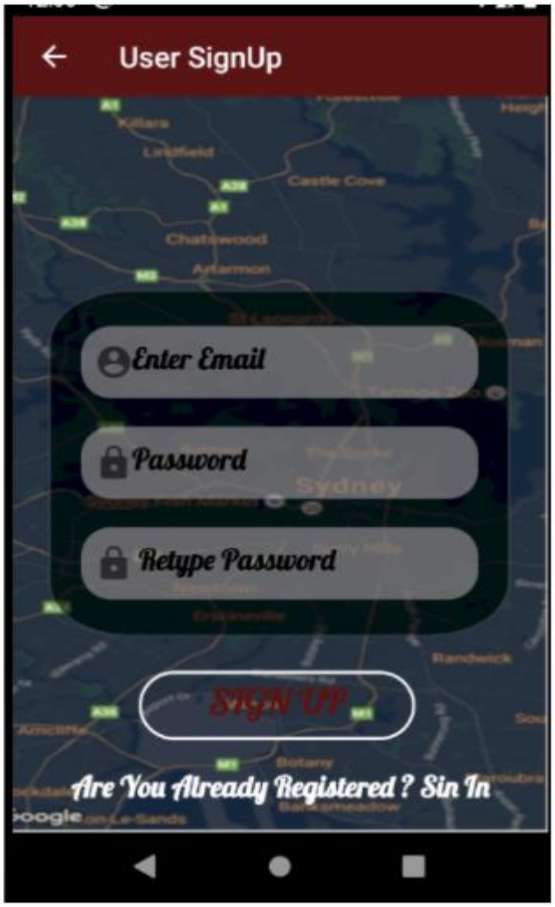
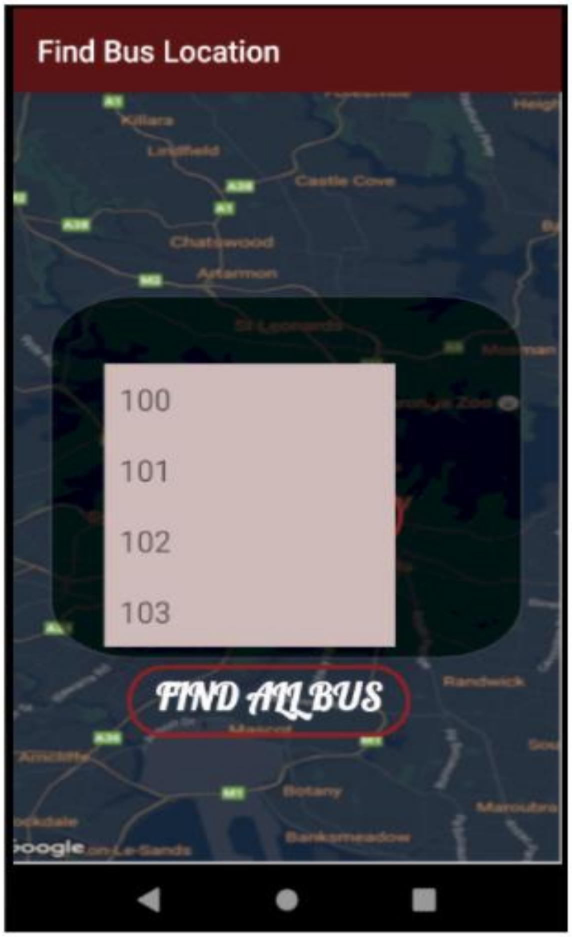


Fig- II

Selects the appropriate bus ID (single bus, all bus)



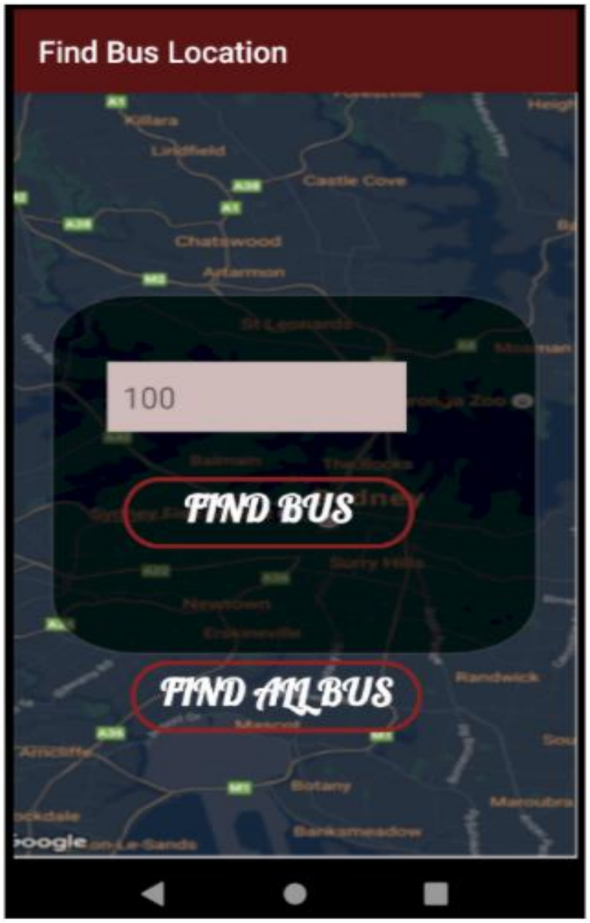


Fig- III

Fig- IV

Watches bus location on map

single bus

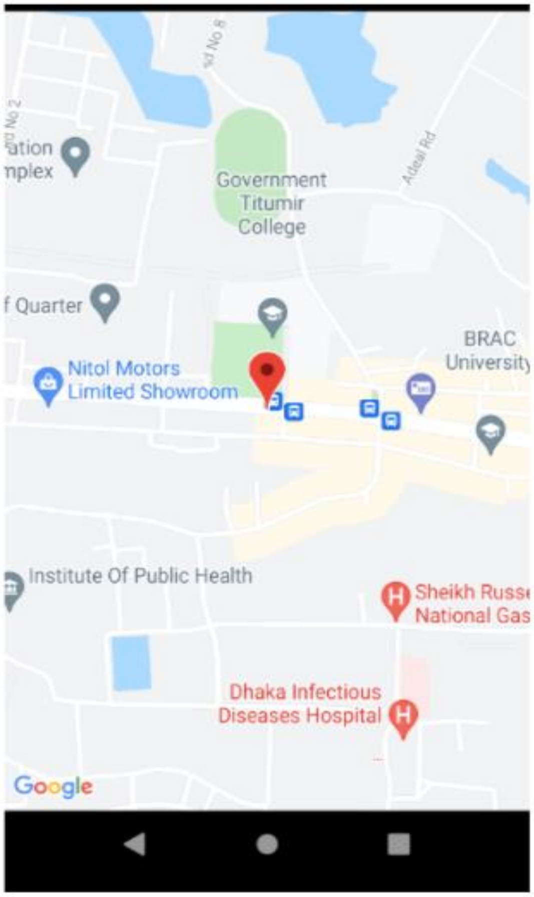


Fig- V (1)

all bus

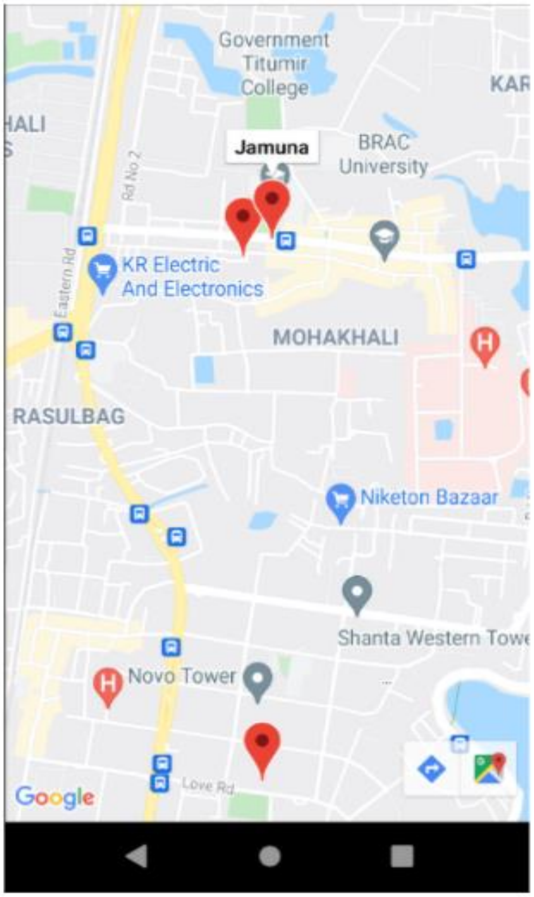


Fig- V (2)

This concludes the user part.

8. Limitations and Future Scope:

We have some drawbacks in our project, and we try to figure out the followings:

- Some unnecessary crash happens while installing from a device for the first time.
- Sudden location update freezes if location of a user is not On.
- Dragging to see map sometimes may not work properly.
- Android version 4.0 or less activated devices may not be able to process the application.

- Layout of the application is bound to the Android 10.0 pixel size and hence other devices may have an issue of weird view of interfaces.

Some future works and still have some options to improve we have found:

- Bus tracking interface may have an option to be improved.
- Tracking lines may be introduced for better intuition about exact bus location.
- Unnecessary crashes may be fixed.
- Layout constraint to other devices may have an option to be improved.

9. Conclusion:

This has been a charming joy, pleasure along with difficult challenges to turn this project into a real move. Technology is a benison for human beings, and we should have that much potential to deal with our necessaries by getting the cooperation of modern science and technology.

This android application was a motivation for this particular thought. Immense challenges can be in a great end when students will be using the application for their convenient purpose. Students, faculties and stuffs can play role to make this project purpose successful by using this application and any suggestion, opinion will be highly appreciated.

Consequently, we hope this application will be a part of a CUETians daily life and make his or her movement hassle free.