GOVERNMENT POLYTECHNIC, PUNE

(An Autonomous Institute of Government of Maharashtra)

DEPARTMENT OF COMPUTER ENGINEERING

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Project Report On

"TapNGo – Bus Tracking Application"

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UNDER THE

GUIDANCE OF

Mrs. P. K. ZADE

(COMPUTER ENGINEERING DEPARTMENT)

GOVERNMENT POLYTECHNIC, PUNE

(An Autonomous Institute of Government of Maharashtra)

CERTIFICATE

This is to certify that,

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of class Third Year (2021-22) have successfully completed Project on **"TapNGo – Bus Tracking Application"** under the guidance of "**Mrs. P.K. ZADE**" in parallel fulfilment of requirement for the award of Diploma in Computer Engineering from Government Polytechnic, Pune.

Mrs. P. K. ZADE	**Dr. S. B. Nikam**	**Dr. V. S. Bandal**
(Project Guide)	(H.O.D)	(Principal)

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We wish to thank my parents for financing our studies and helping us throughout our life for achieving perfection and excellence. Their personal help in making this report and project worth presentation is gratefully acknowledged. Last but not the least we thank the Almighty for continuous strength we were bestowed for completion of this project.

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SYNOPSIS

Title of the Project: TapNGo – Bus Tracking Application

Domain Name: Android Application Development

Problem Statement: Design and develop an Android application for Live Bus Tracking (Public Bus Transport) and also include other management systems in an application.

ABSTRACT

Nowadays, reliability in public transportation is very important. People who use public buses wastes quality amount of time in waiting for buses in bus stops by without knowing the current status of bus. In day-to-day life, movement of bus is affected by many of the factors such as traffic or irregular dispatching time of buses. If users get the bus information such as bus location and time of the bus arrival based on normal traffic conditions, the passengers count would increase the trustworthiness for people in the public transport system.

There are buses made available for passengers travelling distances, but not many passengers have complete information about these buses. Complete information namely the number of buses that go to the required destination, bus numbers, bus timings, the routes through which the bus would pass and most importantly, track the current location of the bus. The proposed system deals with overcoming the problems stated above. The system is an Android application that gives necessary information about all the buses travelling in Pune.

The platform chosen for this kind of system is android, reason being Android Operating System has come up on a very large scale and is owned by almost every second person. Also, Android is a user friendly platform, thereby enabling ease of access for all the users. A number of applications made for the Android Operating System is increasing on a large scale ever since its advent Android is an open source mobile software environment.

Our paper proposes an android application for tracking public bus. The location of bus can be tracked by users using Android application. Our app includes the details of bus like bus number, bus routes, bus stops, bus arrival timings, dispatching timings, etc. This system is implemented on Internet so that passengers are able to view the information through Internet access devices.

01. INTRODUCTION

1.1 Problem Statement:

Among all public transportation services, bus service is the major transportation used by public. Especially in a busy town or city, bus is the most easy, convenient and cheaper transportation. Various reasons that people take bus instead of driving own vehicle such as traffic jam, heavy parking fee and lack of parking slot in destination.

However, bus transportation service has very poor transportation information system nowadays. Bus user do not know the exactly arrival time for a bus, but only know the scheduled arrival time. Compare to train or flight transportation system, bus transportation service does not have a proper system to track all buses position and the actual arrival time in every bus stops. These problems occur because current bus service system did not apply real time tracking technology to track on each bus on the road.

In order to solve these problems and enhance current bus service system, real time bus tracking system has to develop and implement. With real time bus tracking system, bus position data is connected real time and transmitted to a central server for processing and extracting transit information.

1.2 Project Overview:

Bus Tracking System is a system developed on Android platform using Java programming language. It is based on client-server technology along with the use of database. One Android user (Driver/Conductor) sends real time location of the bus to the server. The information provided by that user is stored in the database of the server. And other android users can get the information through the server. User can search for the particular bus on the map. Users get updated on the bus location at certain time interval so that they don't have to wait for the bus being unknown whether the bus is coming or has gone.

So in summary our system handles all the data about current location of bus and this information is then given to remote user who want to know the real time bus information. For development purpose some technologies like GPS (Global Positioning System) and Google maps are used. The system includes server-client based application which gives real time location of bus on Google Maps.

The developed bus tracking system will able to provide bus users a real time platform to check on updated bus information, for examples current bus location, bus timetable, bus routes, etc. Besides, this system also able to reduce workload for bus management team and provide a platform to handle buss pass forms, helpdesk and timetable.

The users can get flexibility of planning travel using the app, to decide on which bus to take or when to catch the bus. Simple mode of communication is the key feature of the Bus Tracking system. This application can be easily extended for central tracking system to keep track of all the public vehicles. Our main focus is to provide the user with such a system which will for sure reduce the waiting time and will provide the user with all necessary details regarding the arrival time of the bus, its exact location and routes of the bus.

Bus Tracking Application:

System Architecture:

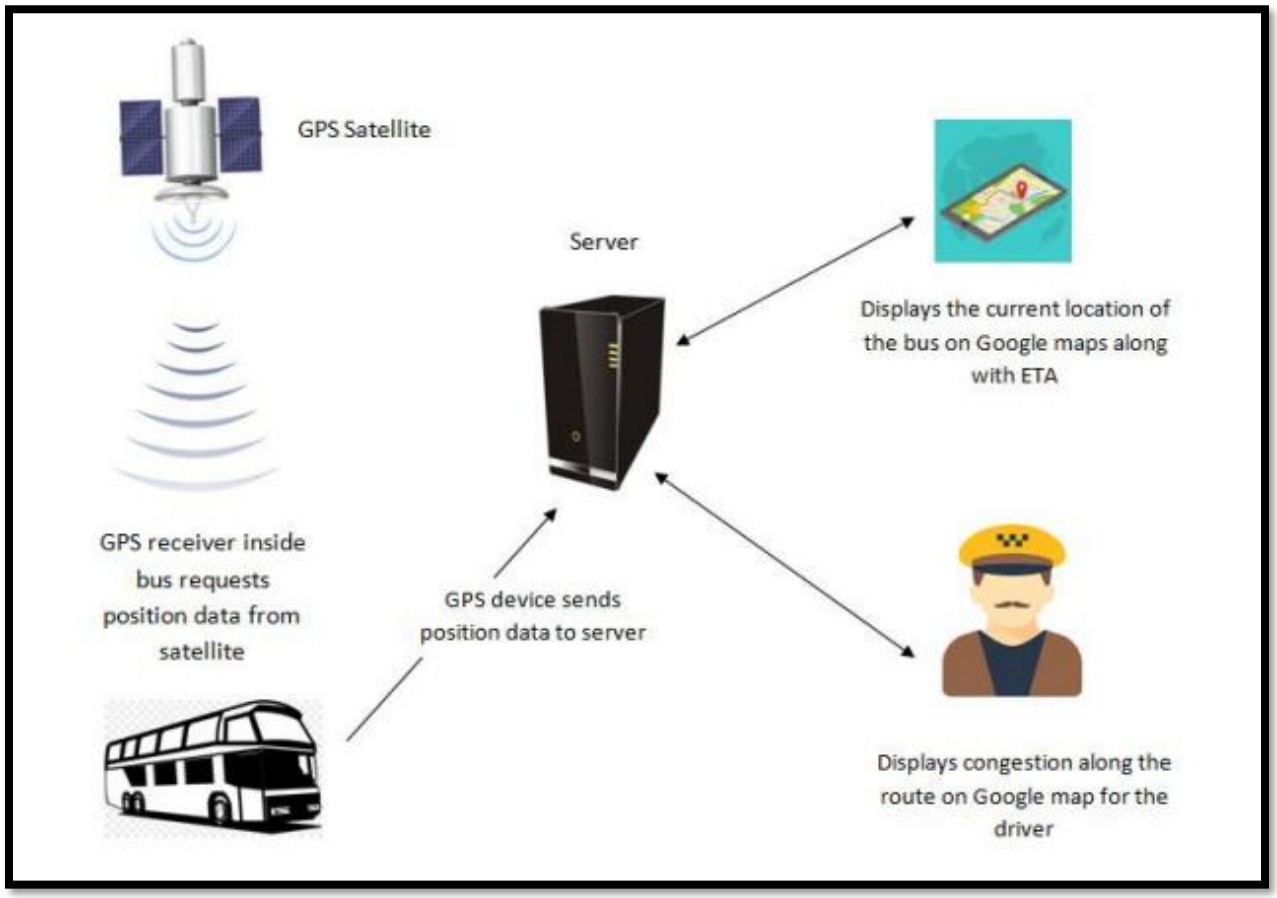


Fig 1: System Architecture

1.3 Project Scope

Many cities have found that GPS tracking system not only improve the efficiency of city bus operation, but also encourage commuters to take the advantage of city bus system. Many city bus system have discovered that GPS tracking system which allows to monitor the location and arrival time of their bus actually increase the number of people using city buses for routine communing.

The application is a user friendly one that anyone can access for free of cost. The basic idea for this project was to guide the bus travelers with the routes, all the possible stops that come on their way to the destination and moreover, display maps and track bus locations. The aim is to overcome all the drawbacks faced in all the previous applications and generate fast and accurate results.

1.4 Objectives

- To make the public transportation system more efficient.
- To eliminate paper work and increase the level of accuracy.
- To increase speed of service with the use of technology.
- To develop smartphone application to check on the destination of the tracked bus.
- To design a fully functional real time bus tracker system and the application is user friendly to passengers.
- The user should be able to see the real-time bus movement if he taps on the particular bus number in the map.

02.PROJECT PLAN

A target schedule is a project management tool that is used as a supplement to the approved baseline schedule. It takes into account the fact that variations in resource availability and other circumstances may sometimes affect the completion timeline of various activities. The baseline specifies the planned start and finish dates and the durationof each activity based on information gleaned from initial schedule network analysis. Target dates typically focus on the completion of individual tasks and may deviate from the baseline dates as needed to provide additional flexibility in project management. However, the original baseline data is still retained for historical reference regardless of any changes that occur during the lifecycle of the project.

A project timeline is a visual list of tasks or activities placed in chronological order, which lets project managers viewthe entirety of the project in one place. A project timeline typically takes the form of a horizontal bar chart, where each task is given a name and a corresponding start and end date. A project timeline provides an in-depth overview of the entire project from start to finish. You can see when a task starts and when it's due—and importantly, whether or notit's dependent on another task. A project timeline can be priceless for a project team, butthey can be challenging to make by hand or even in Excel.

Work Flow:

22 March 2022:Finalized Project Problem Statement : **TapNGo - Bus Tracking Application**

- 1st Week : Requirement Gathering , Scope Analysing And Project Plan
- 2nd Week : Hardware and Software and Other Project Requirement Installation And Project Design Finalization And Module Divisions
- 3rd Week : Development of project i.e., coding and developing different modules.
- 4 th to 6th Week : Development of the User side, Conductor Side and Admin Module.
- 7th Week : Development of the other modules.
- 8th Week : Testing of the project and Other Documentational Work .
- 9th Week : Presentation Of TapnGo

03. PROJECT REQUIREMENTS

3.1 Requirement Analysis

Requirement Analysis is the first phase of software development process. This phase focuses to understand the problem. Requirement Analysis is on identifying what is need from these systems, not how the system will achieve its goals. In this phase often at least two parties are involved in Software Development-a client and a developer. The developer has to develop the system to satisfy the clients' needs. The developer and client arrange a meeting and discuss his/her own views. The developer asks the clients for his/her needs. After a meeting the developer understands what the requirements of the client are. Before starting of the development process, the developer analyses, test the requirements which are given by the clients. According to those requirements the developer starts development process. Hence the developer needs a user's problem.

In the software requirement we are dealing with the requirements of the proposed system, that's the capabilities of that system, which is yet to be developed, should have. The software requirement specification (SRS) is a document that completely describes what the proposed software should do without describing how the software will do it. So, the basic goal of Requirement Phase is to produce the SRS, which describes the complete external behavior of the proposed software.

The basic aim of problem analysis is to obtain the clear understanding of the needs of the clients and the user, what exactly described from the software, and what the constraints on the solution are? This involves a meeting of user and developers.

The developer may ask the following questions to users-:

- Who will use the developed software?
- What types of characteristics may have the software?

In this system we have gathered the requirements from each and every user using this software. By interacting with them we came to know what exact they want from us. Then we collect all the requirements and keep the track of the requirement in a specified manner by using SRS (Software Requirement Specification).

3.2 Functional Requirements

In the development process we have ensured that the software will work under the condition that if any new student gets enrolled it will get a unique registration ID which will be used as id and password throughout the system. The software achieves the capability that the users interacting with this system is an authorized user.

3.3 User Requirements

The main requirement of the user is that the system should be used by the Users and administrator for proper maintaining. The developer can face a number of requirements given by the user. So, the software should have a number of facilities. According to the User Requirements the system is built in the way that it provides the number of facilities to the users and administrators. The user may require the followings:

1. Correctness:

Correctness is the degree to which the software performs its required function. The extent to which the software satisfies its specifications and fulfils the customer's mission objectives. This system adapts the degree of Correctness by achieving the facilities and the User requirements. The software is correct in all the manner because the testing is done in each unit of the system. Thus, we can say that our system to be Correct system as it meets all the requirements of the users.

2. Performance:

The main motto of the degree of performance is that the developed system should perform all the tasks the user has specified. The performance of our software is measured on the basis of response time taken to display the record of the particular student. All the requirements of our software directly relates to its performance. The software response is measured on the basis of execution of the program constraints. In the Performance, the software "process all the operations quickly". So, the performance of our system is measured by throughput, efficiency, response time and the processing speed.

3.User Friendly:

The developed software is user friendly by which the user can understand the software easily. It provides a good interface thus it is said to be user friendly. Our software is developed in GUI rather than CUI, therefore the developed software is friendlier. The Base of our system is developed by using the HTML/CSS as a user interface and the background using SQL. The software provides integrated and consistent information.

4. Maintenance:

The user wants that the software must be maintained properly before accepting the software. Thus, the software provides the maintenance to the users. Software needs to be maintained not because some of its components wear out and need to be replaced, but because there are often same residual errors remaining in the system that must be removed as they are discovered. The Maintenance of the software is given to the user by using the maintainability. The maintainability is ease with which a program can be corrected, if an error is encountered. The maintenance depends on the user's requirement because there are many kinds of maintenance. Thus, the user requires maintenance because, maintenance involves understanding the software (code and related modules), understanding the effects of change, making new change. Because often during development some needs are not kept in mind. Thus, by considering all the above points we can say that our system adapts the degree of maintainabilit.

The requirement from different user is stated below:

4.3.1 Bus user

- While waiting in bus stop, user must be able to access bus tracking system with mobile device instead of using computer to access.
- The system is provided real time bus tracking system with mapping feature, which mean user able to view the bus position with a map.
- With this mapping technique, user able to know where is a bus position based on the map in real time.

4.3.2 Bus Driver

- Bus driver is the second important user of this system. Bus driver is able to update bus status accordingly in order to inform bus users about immediate situation.

3.4 Performance Requirements

- **Portability:**

  The system portability should be taken care of without any interventions. Portability means the capability of the software to be transferred from one environment to another. Thus, our system provides the portability that it can run on any machine with backward compatibility.

- **Security:**

  The system should be secured from unauthorized access and should be password protected so that no other user can access it. Thus, our system provides the security by applying password as a security parameter.

- **Efficiency:**

  The system should be capable of providing the required performance related to the number of resources of the organization.

- **Reliability:**

  Our system is capable enough to maintain the level of performance.

3.5 Hardware and Software Specifications

3.5.1 Hardware Requirements:

The hardware requirements are the requirements of a hardware device. Most hardware only has operating system requirements or compatibility.

Sr no.	Requirements	Description
1	Operating System	Windows 10, 64 bit
2	RAM	Adequate memory depends onapplications and data(8GB)

3	Graphics card	Choosing good graphics card willincrease productivity and make interaction with software smoother andquicker
4	Processor	Our application program will run on any processor
5	Monitor	Choosing good monitor will increase productivity. We are using latest laptop/desktop for better performance
6	Android Device	Choosing good android device will increase the productivity and efficiency. We are using the latest version devices for better performance.

3.5.2 Software Requirements:

Software requirements specifications describes how software will be expected to perform. Also it describes functionality.Below are its specifications-

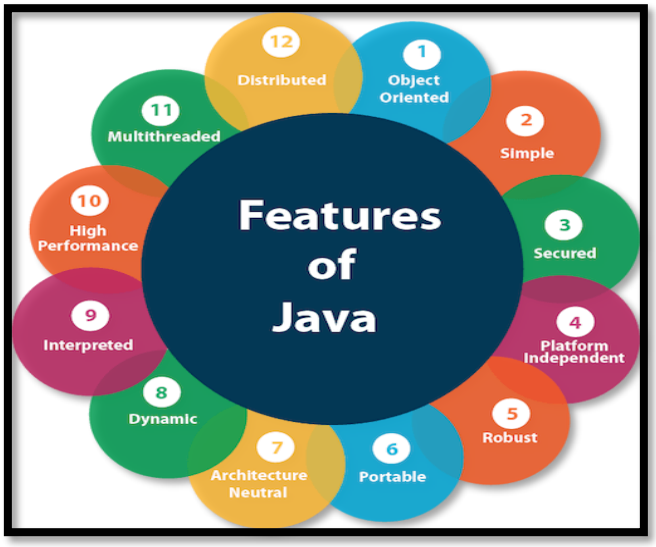
Sr.no	Requirements	Description
1	Android Studio IDE	For Coding and app development in android.
2	Emulator	For Testing the output.
3	Language SDKs	Android Programming, Java, XML

04. TECHNOLOGIES USED

4.1 Java Programming Language

Fig 2: Java Programming

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 intended to let programmers write once, run anywhere (WORA), meaning that compiled Java code can run on all platforms that support Java without the need to recompile. Java applications are typically compiled to bytecode that can run on any Java virtual machine (JVM) regardless of the underlying computer architecture. The syntax of Java is similar to C and C++, but has fewer low-level facilities than either of them. The Java runtime provides dynamic capabilities (such as reflection and runtime code modification) that are typically not available in traditional compiled languages. As of 2019, Java was one of the most popular programming languages in use according to GitHub, particularly for client–server web applications, with a reported 9 million developers.



4.2 Android:

Fig 3: Android Programming

Android is a mobile operating system based on a modified version of the Linux kernel and other open source software, designed primarily for touchscreen mobile devices such as smartphones and tablets. Android is developed by a consortium of developers known as the Open Handset Alliance and commercially sponsored by Google. It was unveiled in November 2007, with the first commercial Android device, the HTC Dream, being launched in September 2008.

Most versions of Android are proprietary. The core components are taken from the Android Open Source Project (AOSP), which is free and open-source software (FOSS) primarily licensed under the Apache License. When Android is installed on devices, ability to modify the otherwise FOSS software is usually restricted, either by not providing the corresponding source code or preventing reinstallation through technical measures, rendering the installed version proprietary. Most Android devices ship with additional proprietary software pre-installed, most notably Google Mobile Services (GMS) which includes core apps such as Google Chrome, the digital distribution platform Google Play, and associated Google Play Services development platform.

Android began its life as a Palo Alto-based startup company called Android Inc., in 2003. Originally, the company set out to develop an operating system for digital cameras, but it abandoned those efforts in lieu of reaching a broader market.

Google acquired Android Inc. and its key employees in 2005 for at least $50 million. Google marketed the early mobile platform to handset manufacturers and mobile carriers with its major benefits as flexibility and upgradability.

4.3 XML:

Fig 4: XML

XML stands for Extensible Markup Language. XML is a markup language much like HTML used to describe data. It is derived from Standard Generalized Markup Language(SMGL). Basically, the XML tags are not predefined in XML. We need to implement and define the tags in XML. XML tags define the data and used to store and organize data. It's easily scalable and simple to develop. In Android, the XML is used to implement UI-related data, and it's a lightweight markup language that doesn't make layout heavy. XML only contains tags, while implementing they need to be just invoked.

Extensible Markup Language (XML) is a markup language and file format for storing, transmitting, and reconstructing arbitrary data. It defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. The World Wide Web Consortium's XML 1.0 Specification of 1998 and several other related specifications—all of them free open standards—define XML.

The design goals of XML emphasize simplicity, generality, and usability across the Internet. It is a textual data format with strong support via Unicode for different human languages. Although the design of XML focuses on documents, the language is widely used for the representation of arbitrary data structures, such as those used in web services.

Several schema systems exist to aid in the definition of XML-based languages, while programmers have developed many application programming interfaces (APIs) to aid the processing of XML data

4.4 Android Studio IDE:

Fig 5: Android Studio IDE

Android Studio is the official Integrated Development Environment (IDE) for android application development. Android Studio provides more features that enhance our productivity while building Android apps.

Android Studio was announced on 16th May 2013 at the Google I/O conference as an official IDE for Android app development. It started its early access preview from version 0.1 in May 2013. The first stable built version was released in December 2014, starts from version 1.0.

Since 7th May 2019, Kotlin is Google's preferred language for Android application development. Besides this, other programming languages are supported by Android Studio.

Features of Android Studio

- It has a flexible Gradle-based build system.
- It has a fast and feature-rich emulator for app testing.
- Android Studio has a consolidated environment where we can develop for all Android devices.
- Apply changes to the resource code of our running app without restarting the app.
- Android Studio provides extensive testing tools and frameworks.
- It supports C++ and NDK.
- It provides build-in supports for Google Cloud Platform. It makes it easy to integrate Google Cloud Messaging and App Engine.

4.5 Google Firebase:

Fig 6: Google Firebase

Firebase is a Backend-as-a-Service (Baas). It provides developers with a variety of tools and services to help them develop quality apps, grow their user base, and earn profit. It is built on Google's infrastructure.

Firebase is categorized as a NoSQL database program, which stores data in JSON-like documents.

Key Features of Firebase:

1. Authentication

It supports authentication using passwords, phone numbers, Google, Facebook, Twitter, and more. The Firebase Authentication (SDK) can be used to manually integrate one or more sign-in methods into an app.

2. Realtime database

Data is synced across all clients in realtime and remains available even when an app goes offline.

3. Hosting

Firebase Hosting provides fast hosting for a web app; content is cached into content delivery networks worldwide.

4. Test lab

The application is tested on virtual and physical devices located in Google's data centers.

5. Notifications

Notifications can be sent with firebase with no additional coding. Users can get started with firebase for free; more details can be found on the official website.

4.6 Google Maps API:

Fig 7: Google Maps API

Google Maps API is a set of application programming interfaces that lets us talk to its services. It will allow us to build simple apps to very sophisticated location-based apps for Web, iOS, and Android. The Google Maps API is one of those clever bits of Google technology that helps you take the power of Google Maps and put it directly on your own site. It lets you add relevant content that is useful to your visitors and customise the look and feel of the map to fit with the style of your site.

4.7 Google Positioning System(GPS):

The Global Positioning System (GPS) is a satellite constellation supporting highly accurate positioning, navigation and timing (PNT) measurements worldwide. As one of the first satellite positioning systems, GPS has become integral to work done worldwide, including precision agriculture, autonomous vehicles, marine or aerial surveying and defense applications.

How does GPS work?

The GPS space segment includes over 30 satellites in orbit operated and maintained by the U.S. Space Force. These satellites broadcast radio signals to control and monitoring stations on Earth and directly to users requiring highly precise satellite positioning.

The U.S. Space Force also oversees the GPS control segment. It includes master control and backup control stations, dedicated ground antennas and several monitor stations located worldwide. These stations work to ensure GPS satellites are healthy, orbiting in the correct locations and have accurate atomic clocks on board. These stations are integral to the overall health and accuracy of the GPS constellation.

The user segment includes everyone relying upon GPS satellites for PNT measurements. From a mobile phone providing directions to autonomous vehicles requiring lane-level positioning accuracy; from a farmer tracking planting and harvesting routes year-over-year to a UAV mapping a rainforest, many applications use GPS for high precision positioning and accuracy around the world.

05. PROJECT DESIGN

5.1 Feasibility Study:

A feasibility study is an evaluation of a proposal designed to determine the difficulty in carrying out a designated task. Generally, a feasibility study precedes technical development and project implementation. As name suggests feasibility study is the feasibility analysis or it is a measure of the software product in terms of how much beneficial product development will be for the organization in a practical point of view. Feasibility study is carried out based on many purposes to analyze whether software product will be right in terms of development, implantation, contribution of project to the organization etc.

Types of Feasibility Study:

The feasibility study mainly concentrates on below five mentioned areas:

1) Technology and feasibilty study:

The assessment is based on an outline design of system requirements in terms of Input, Processes, Output, Fields, Programs, and Procedures. This can be quantified in terms of volumes of data, trends, frequency of updating, etc. in order to estimate whether the new system will perform adequately or not. Technological feasibility is carried out basically to determine whether the company has the capability in terms of software, hardware, personnel and expertise to handle the completion of the project. HCL fulfilled all the above requirements for the efficient working of web application.

2) Economic feasibility:

Economic analysis is the most frequently used method for evaluating the effectiveness of a new system. More commonly known as cost/benefit analysis, the procedure is to determine the benefits and savings that are expected from a candidate system and compare them with costs. If benefits outweigh costs, then the decision is made to design and implement the system.

3) Cost-based Study:

It is important to identify cost and benefit factors. Cost and benefits can be categorized into the following categories. Basically, it is an analysis of the costs to be incurred in the system and benefits derivable out of the system. In a broad sense the costs can be divided into two types:

1. Development costs
2. Operating costs.

4) Time-based Study:

Contrast to the traditional system management it can generate any information of data just by single click and it saves user time .No extra time is being provided to deliver application.

5) Operational feasibility:

It is a measure of how well a proposed system solves the problems, and takes advantages of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development. This project provides interactive interface to generate report as per the requirements and also user can update the information efficiently. Most of the staff in NIC is computer literate hence the user would be able

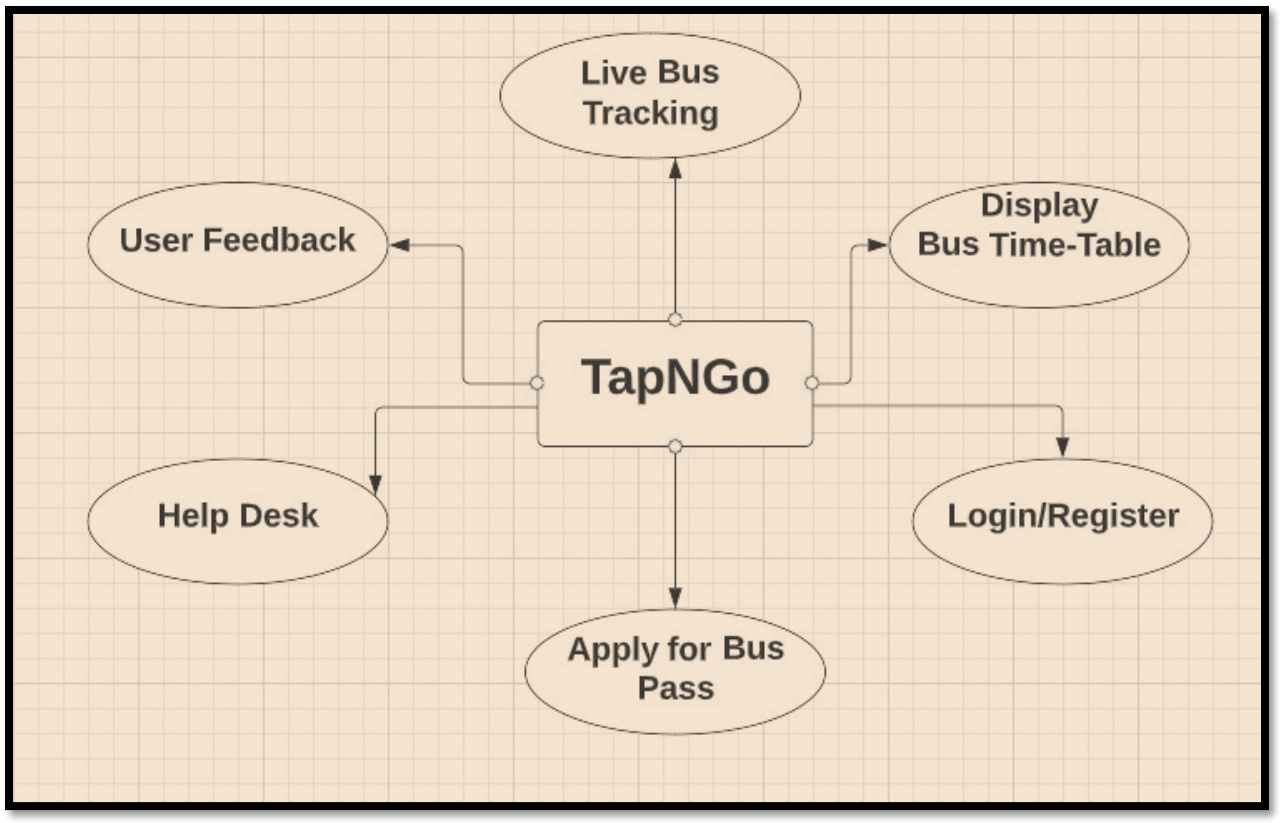
to use the system. Further NIC also have trained manpower who can keep the system operational and upgrade it if needs arise. “Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases”.

5.2 Data Flow Diagram:

A Data Flow Diagram (DFD) is a graphical representation of the “flow” of data through an information system (as shown on the DFD flow chart Figure 5), modeling its process aspects. Often it is a preliminary step used to create an overview of the system that can later be elaborated. DFDs can also be used for the visualization of data processing (structured design) and show what kind of information will be input to and output from the system, where the data will come from and go to, and where the data will be stored.

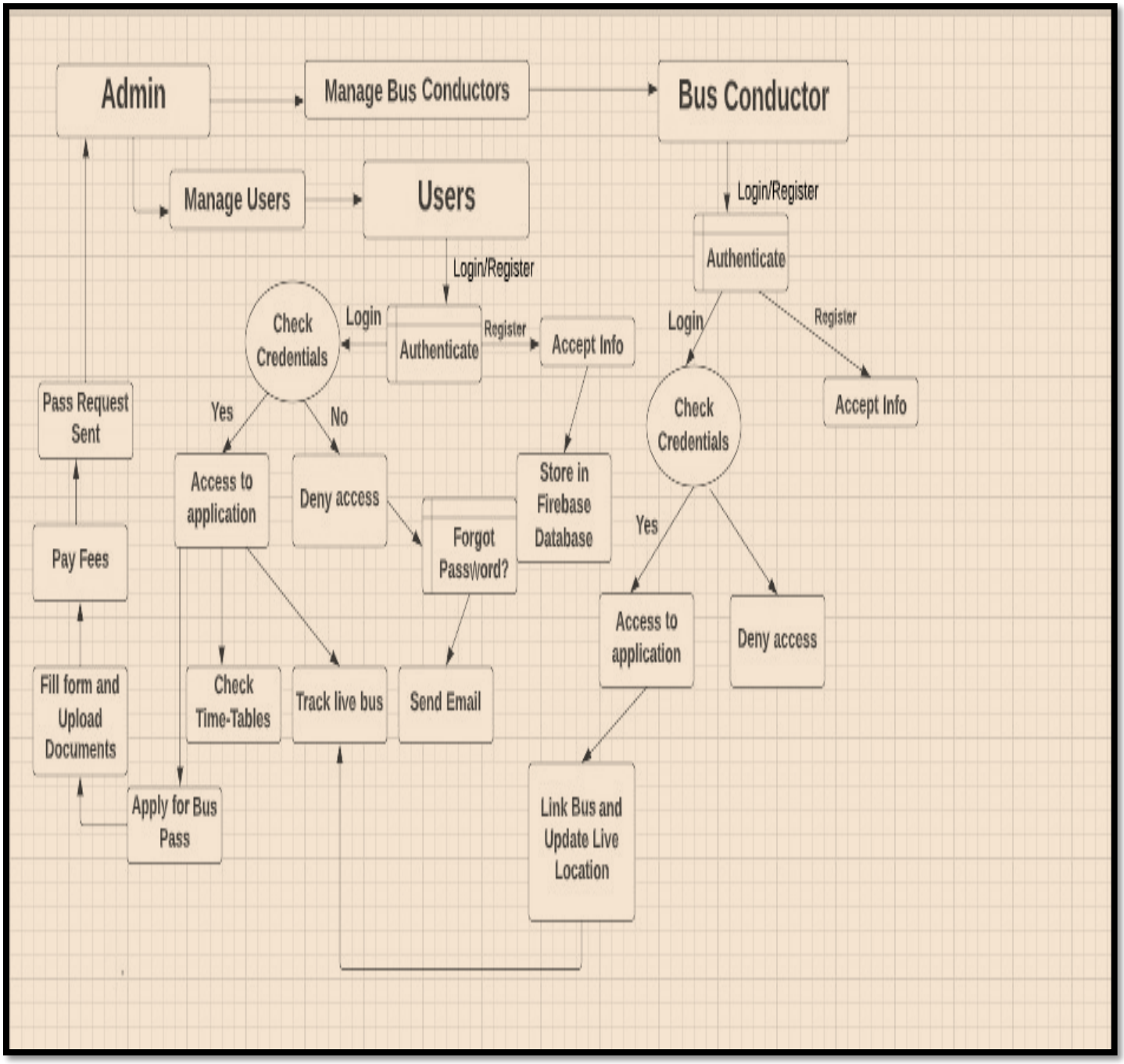
A) DFD Level 0:

DFD Level 0 is also called a Context Diagram. It’s a basic overview of the whole system or process being analyzed or modeled. It’s designed to be an at-a-glance view, showing the system as a single high-level process, with its relationship to external entities.



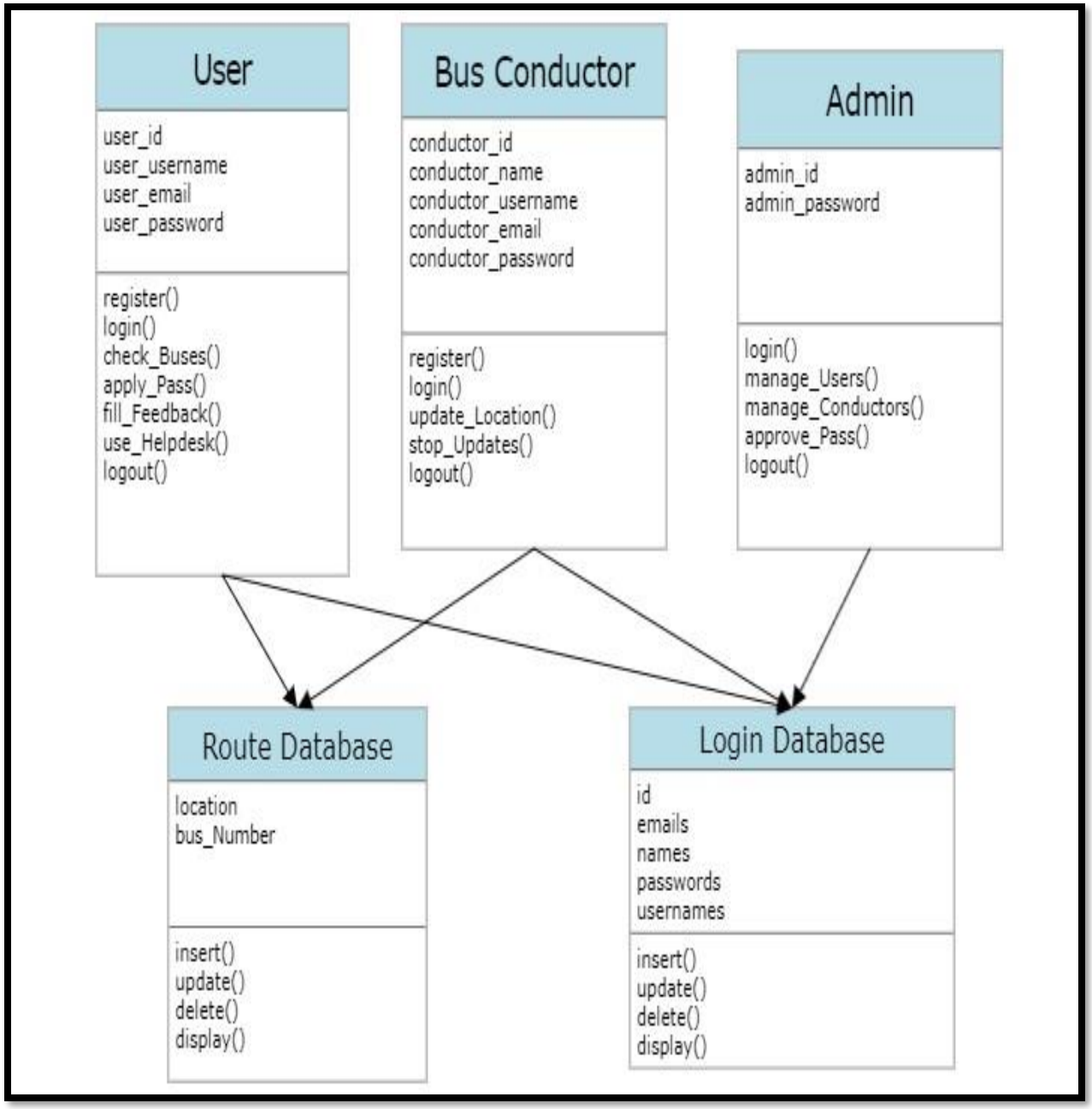
B) DFD Level 1:

The top level, is referred to Level 0 or the Context Diagram, it represents the system as one process box. Level 1 data flow diagrams show incoming data flow, processes and output data flows. Level 1 DFDs should show a process to handle each incoming data flow and a process to generate each output data flow.



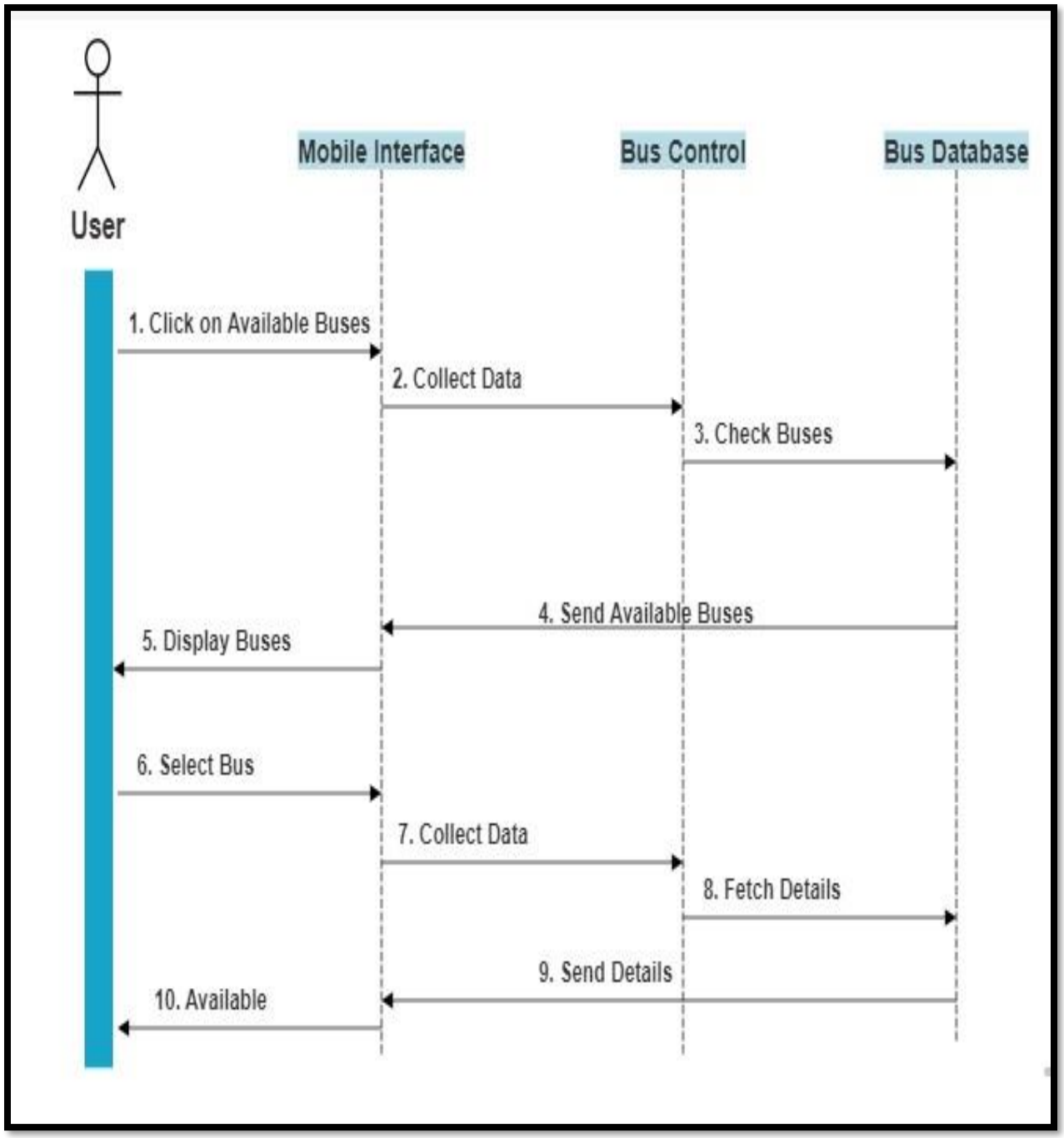
5.3 Class Diagram:

Class diagrams are the main building block of any object-oriented solution. It shows the classes in a system, attributes, and operations of each class and the relationship between each class. In most modeling tools, a class has three parts. Name at the top, attributes in the middle and operations or methods at the bottom. In a large system with many related classes, classes are grouped together to create class diagrams. Different relationships between classes are shown by different types of arrows.



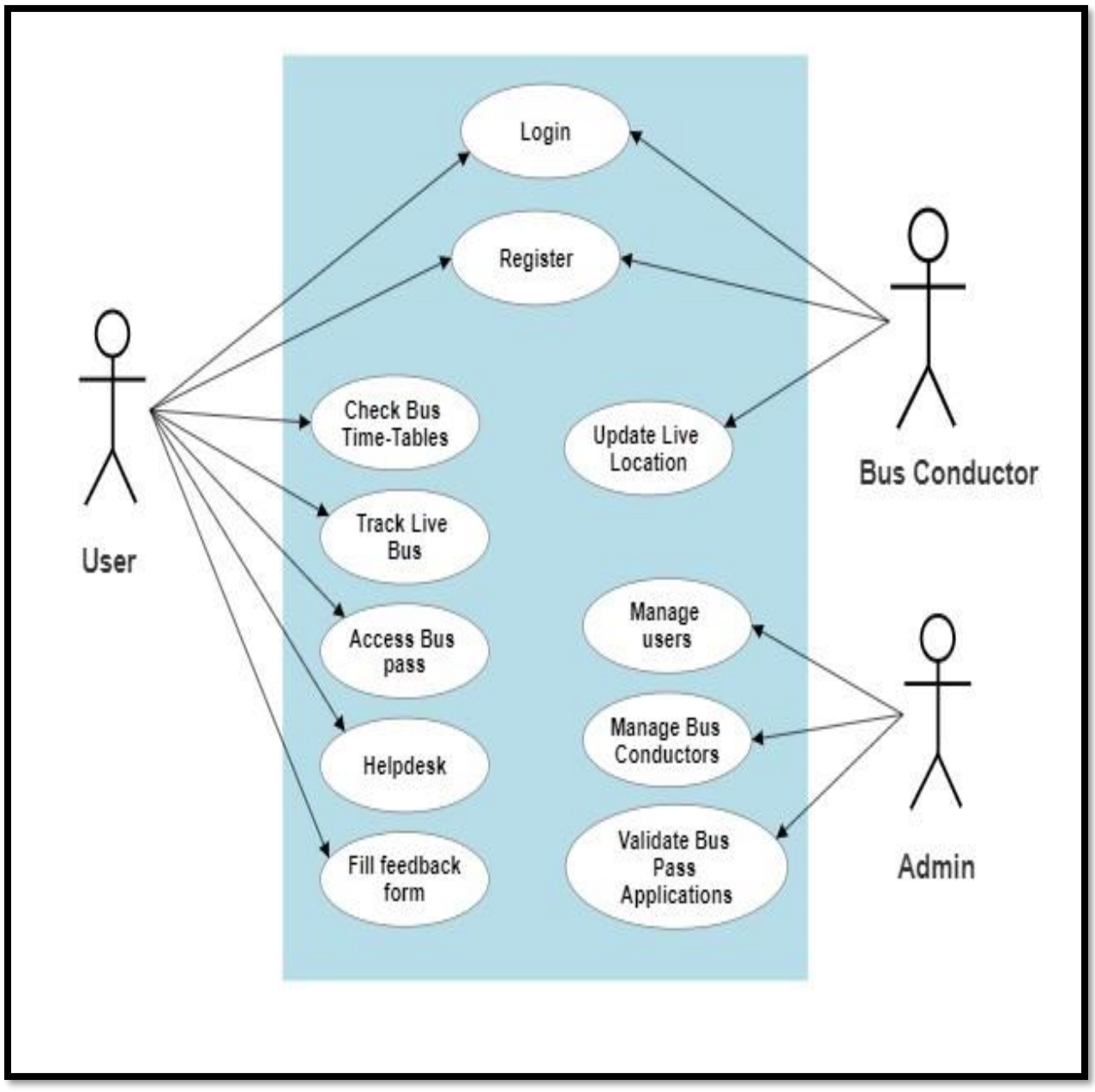
5.4 Sequence Diagram:

A sequence diagram is an interaction diagram. From the name, it is clear that the diagram deals with some sequences, which are the sequence of messages flowing from one object to another. Interaction among the components of a system is very important from implementation and execution perspective. Sequence diagram is used to visualize the sequence of calls in a system to perform a specific functionality.



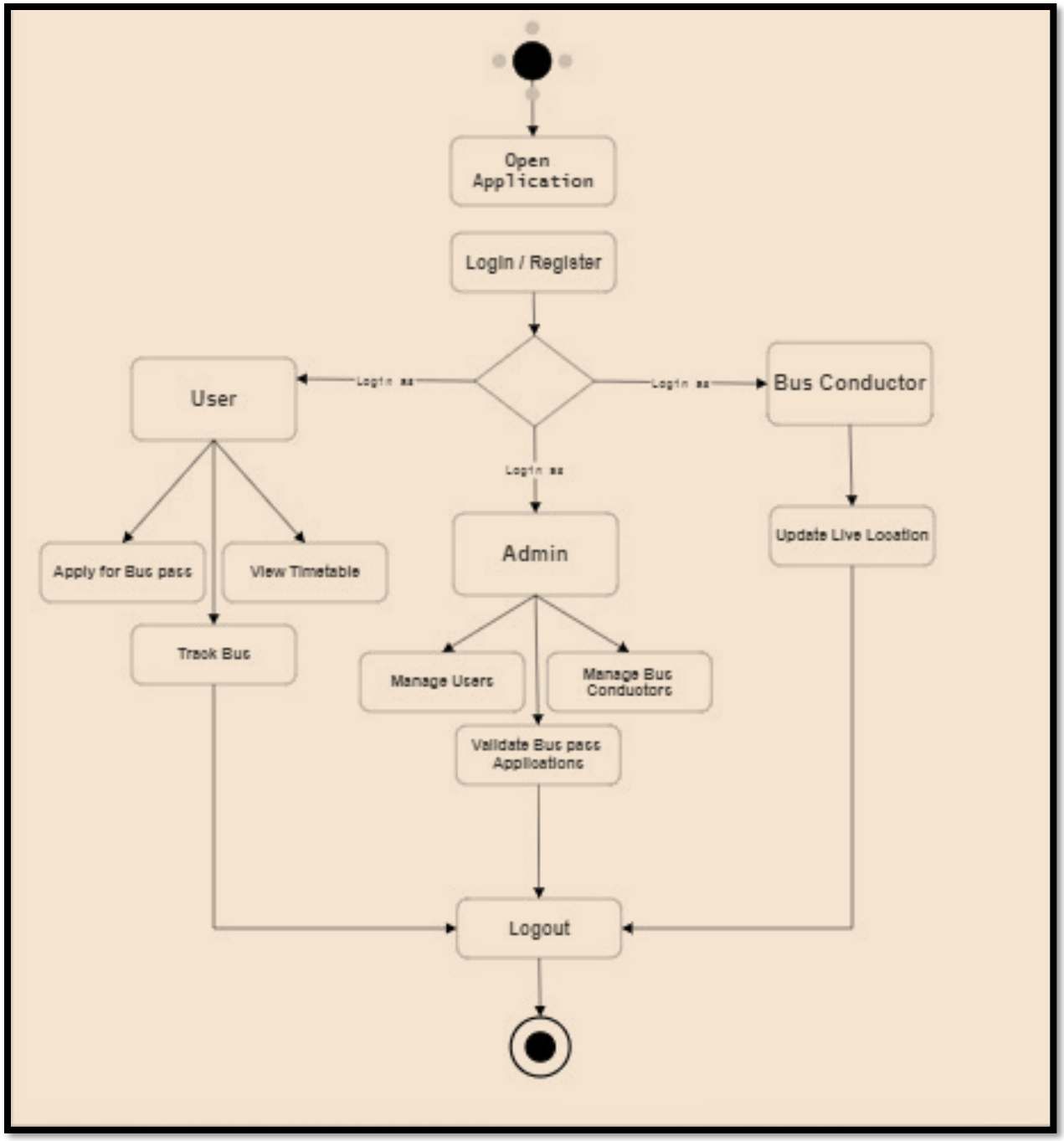
5.5 Use Case Diagram:

Use case diagrams are a set of use cases, actors, and their relationships. They represent the use case view of a system. A use case represents a particular functionality of a system. Hence, use case diagram is used to describe the relationships among the functionalities and their internal/external controllers. Use case diagrams give a graphic overview of the actors involved in a system, different functions needed by those actors and how these different functions interact.



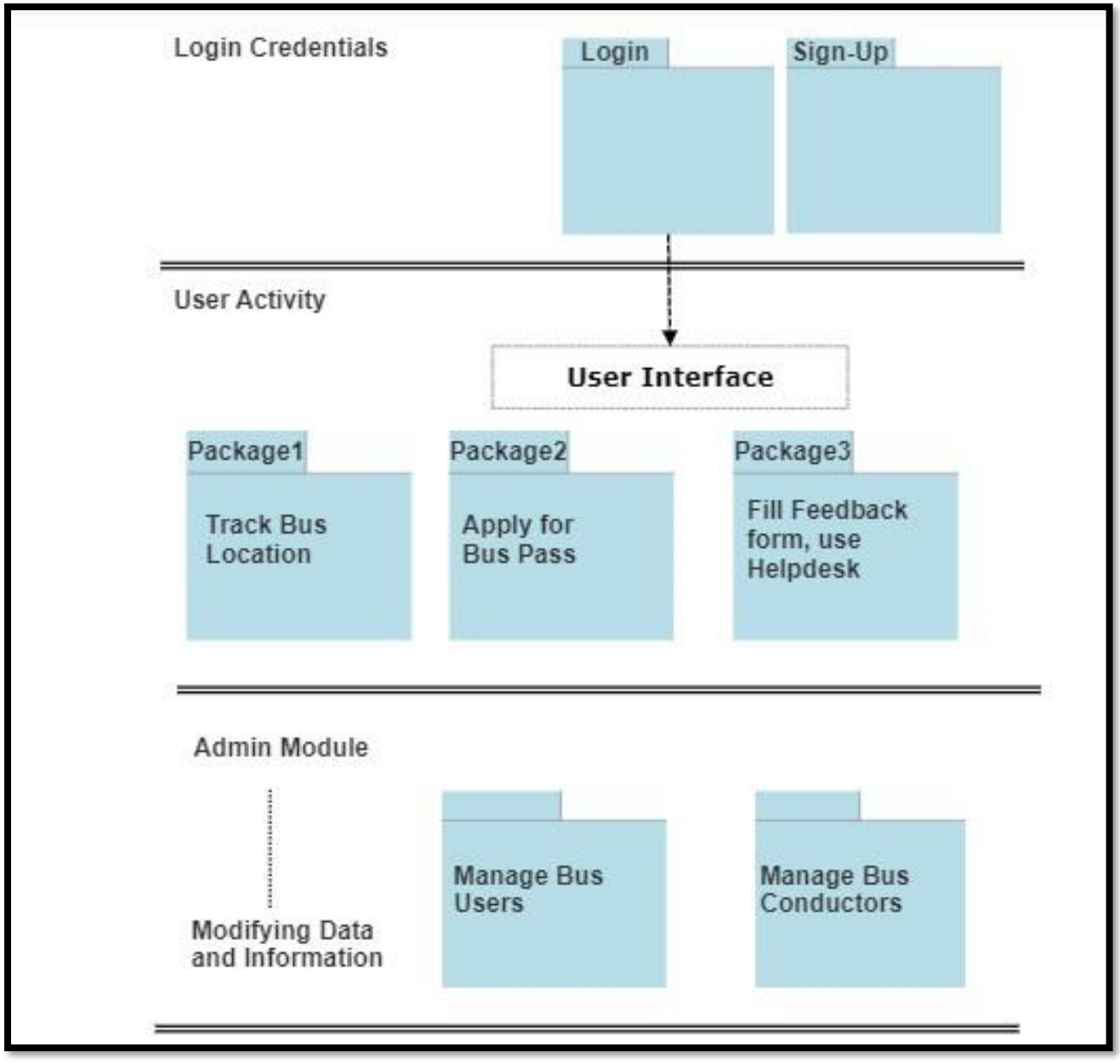
5.6 Activity Diagram:

Activity diagram describes the flow of control in a system. It consists of activities and links. The flow can be sequential, concurrent, or branched. Activities are nothing but the functions of a system. Activity diagrams are used to visualize the flow of controls in a system.



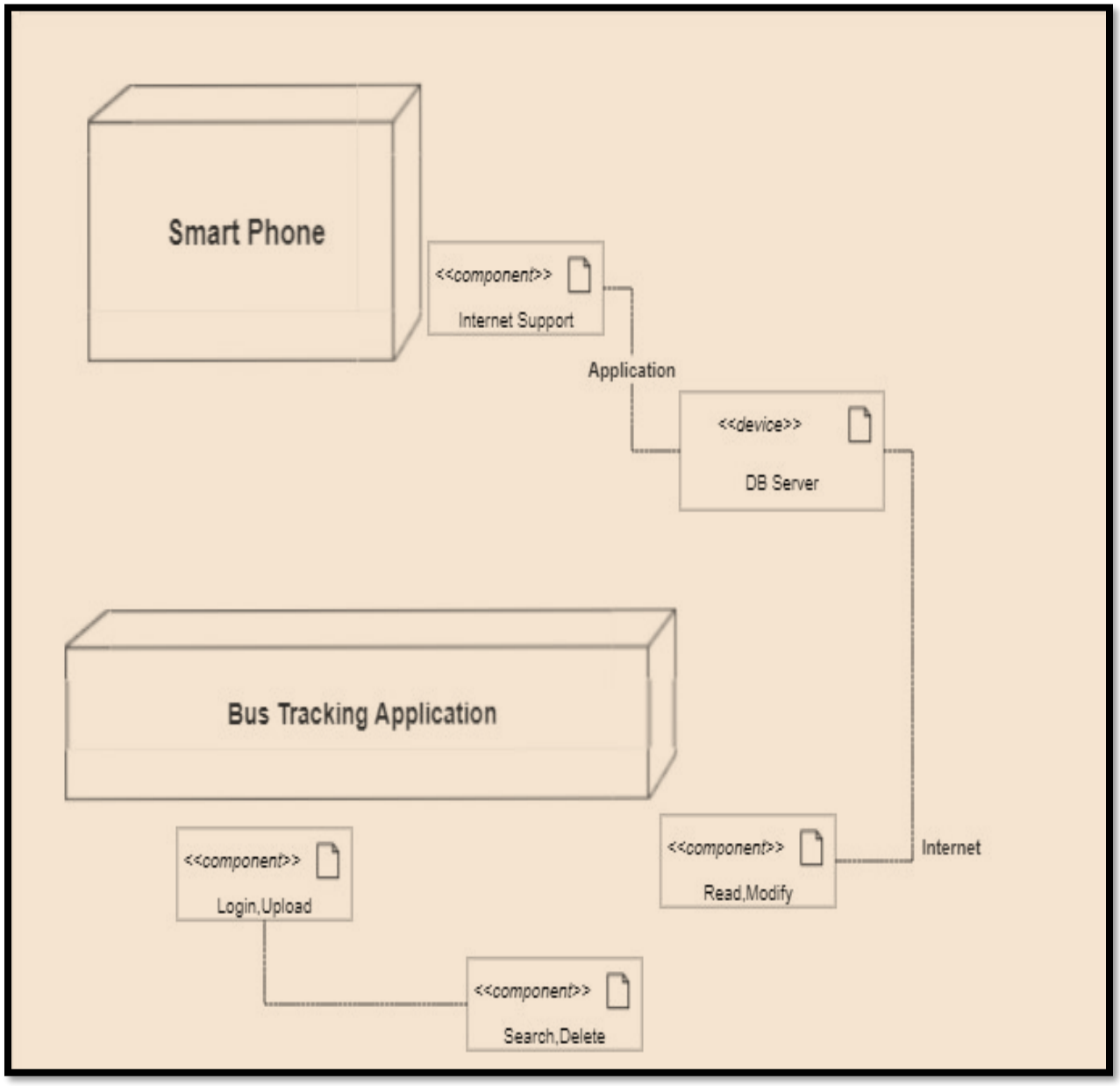
5.7 Package Diagram:

Package diagram, a kind of structural diagram, shows the arrangement and organization of model elements in middle to large scale project. Package diagram can show both structure and dependencies between sub-systems or modules, showing different views of a system, for example, as multi-layered (aka multi-tiered) application - multi-layered application model.



5.8 Deployment Diagram:

Deployment diagrams are a set of nodes and their relationships. These nodes are physical entities where the components are deployed. Deployment diagrams are used for visualizing the deployment view of a system. This is generally used by the deployment team. A deployment diagram shows the hardware of your system and the software in that hardware. Deployment diagrams are useful when your software solution is deployed across multiple machines with each having a unique configuration.



06. PROJECT TESTING

Fig 8: System Testing

6.1 Test Plan

The Test Strategy presents the recommended approach to the testing of the software applications. This part describes how they will be performed. The main considerations for the test strategy are the techniques to be used and the criterion for testing to be completed. However, before starting the system test (both functional and non-functional requirements testing), we must perform unit test for each unit of the system (fields, methods, classes, and components) and make sure that all unit must pass the check list of unit test.

6.1.1 Unit testing:

Definition:

UNIT TESTING is a type of software testing where individual units or components of a software are tested. The purpose is to validate that each unit of the software code performs as expected. Unit Testing is done during the development (coding phase) of an application by the developers. Unit Tests isolate a section of code and verify its correctness. A unit may be an individual function, method, procedure, module, or object.

In SDLC, STLC, V Model, Unit testing is first level of testing done before integration testing. Unit testing is a White-Box testing technique that is usually performed by the developer. Though, in a practical world due to time crunch or reluctance of developers to tests, QA engineers also do unit testing.

Methodology:

White Box Testing - It's referred to as a glass box testing/transparent testing. In this type of testing, the tester is aware of internal functionality. The internal structure of an item or function to be tested is unknown.

Black Box Testing - It is a type of testing, tester not aware of the internal functionality of a system. The internal structure of the function to be tested is unknown.

Gray Box Testing – It's referred to as semi-transparent testing. It is a combination of a Black Box and White Box testing. It is the type of testing in which tester aware with internal functionality of a method or unit but not in a deeper level like white box testing. In this, the user partially aware of the internal functionality of a system.

6.2 Positive and Negative Testing:

The following table shows the test cases performed using the positive and negative testing technique for the TapNGo application Login Page:

Sr. No.	Test Case	Result
01	Verify if a user will be able to login with a valid username and valid password.	POSITIVE
02	Verify if a user cannot login with a valid username and an invalid password.	NEGATIVE
03	Verify the login page for both, when both the field is blank and the Submit button is clicked.	NEGATIVE
04	Verify the messages for invalid login	POSITIVE
05	Verify if the characters entered in the password field is visible as asterisk or bullet signs.	POSITIVE
06	Verify if a user is able to login with a new password only after he/she has changed the password.	POSITIVE

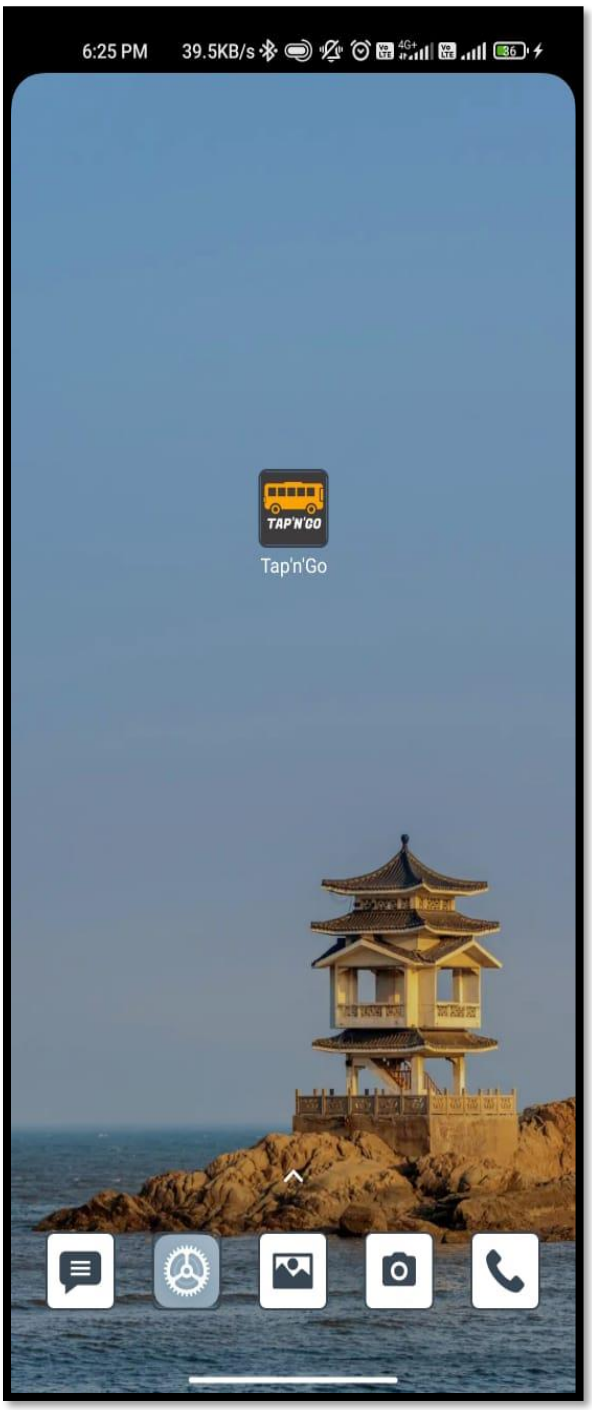
6.3 Following are some of the test cases performed on the TapNGo application:

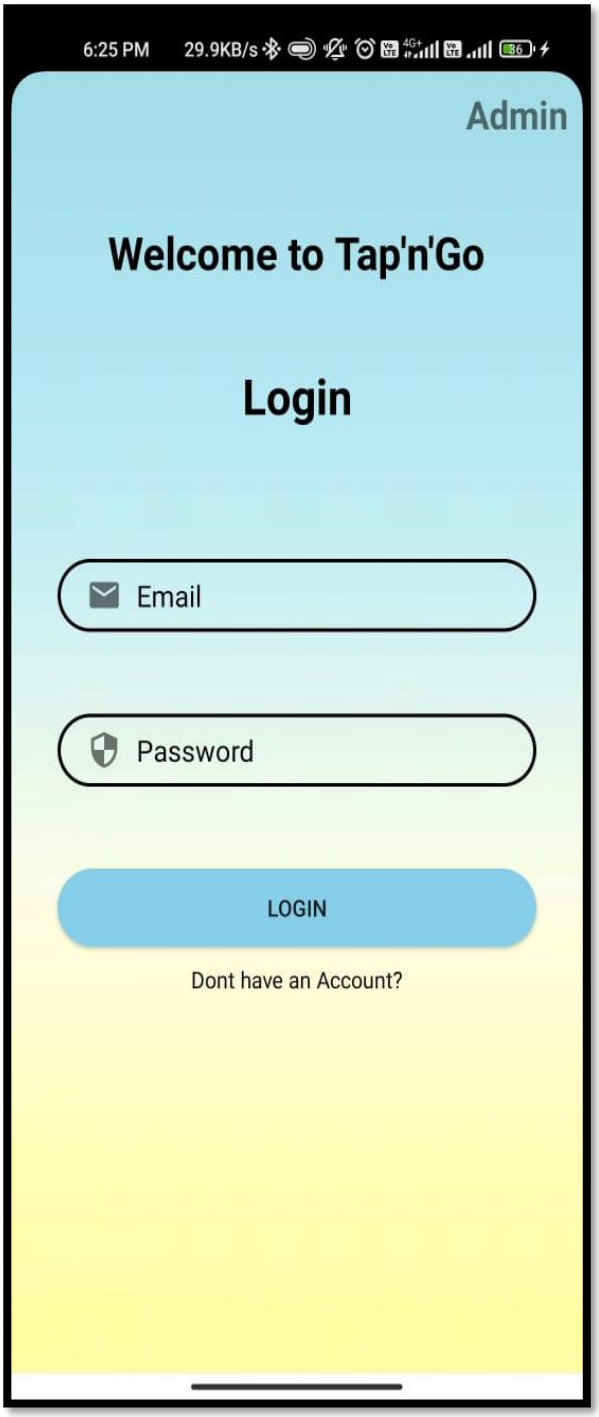
Test Case (s)	Steps	Expected Results	Status
Test Case	**01**		
	The user Clicks the app icon on the mobile phone.	The application will be opened and the first screen will be displayed.	**PASS**
Test Case	**02**		
1)	Enter a valid username and valid password. Click Login button	User should be directed to the homepage of an application.	**PASS**
2)	Enter an invalid username and valid password. Click Login button	Error message saying that invalid username should be displayed and cannot be directed to the homepage of an application.	**PASS**
3)	Enter a valid username and invalid password. Click Login button.	Error message saying that invalid password should be displayed and cannot be directed to the homepage of an application.	**PASS**

Test Case	**03**		
	Verify the following username and password cobinations. Note V means valis and I means invalid.	Note E means error messgae and stays on the same screen and H means it is redirected to the dashboard.	
1)	Blank,Blank	E(Please fill out the fields)	**PASS**
2)	Blank,I	E(Please fill out this field for username)	**PASS**
3)	Blank,V	E(Please fill out this field for username)	**PASS**
4)	I,Blank	E(Please fill out this field for password)	**PASS**
5)	I,I	E(Invalid credentials)	**PASS**
6)	I,V	E(Invalid username)	**PASS**
7)	V,Blank	E(Please fill out this field for password)	**PASS**
8)	V,I	E (Invalid password)	**PASS**
9)	V,V	H	**PASS**

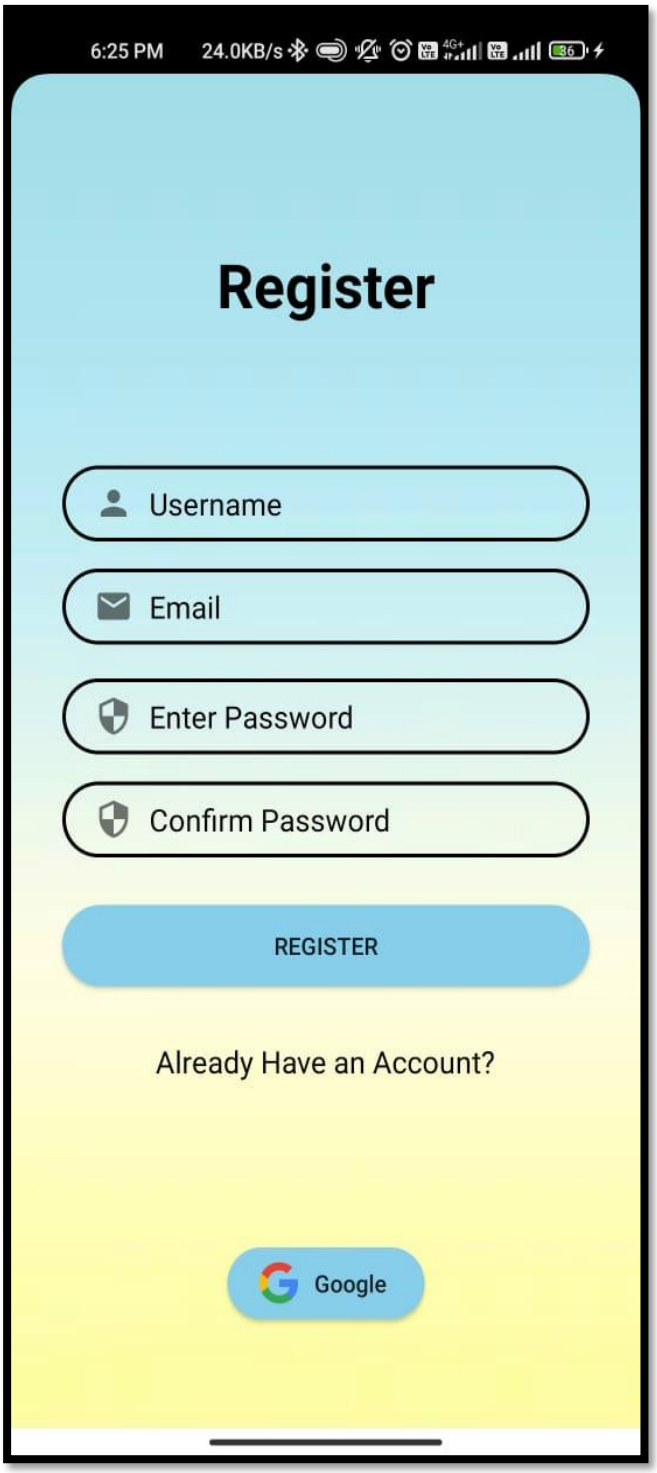
Test Case	**04**		
	An application will be allowing the user and the bus conducto to login at the same time from the two different devices.		
1)	The user send the request ETA for the bus from his/her login.	The request available messgae should be displayed on the conductor application screen	**PASS**
2)	The conductor is not online.	If the user tries to locate bus in this case he/she should be displayed with the message: you bus conductor is offline.	**PASS**
3)	The Bus conductor links the bus with the specific bus number.	The users requesting for the same bus bumber should only updated with the conductor's live location.	**PASS**
4)	The driver's location is updating as the bus moves.	It should be stored in firebase database and should be sldo updated on the user's screen.	**PASS**
5)	The bus conductor logouts from the system as the bus reaches the destination.	The user shoul be stopped displaying the bus location.	**PASS**
6)	The user clicks the Logout button in the left drawer fragment.	The user should be successfully logged out from the system and the application will be closed.	**PASS**

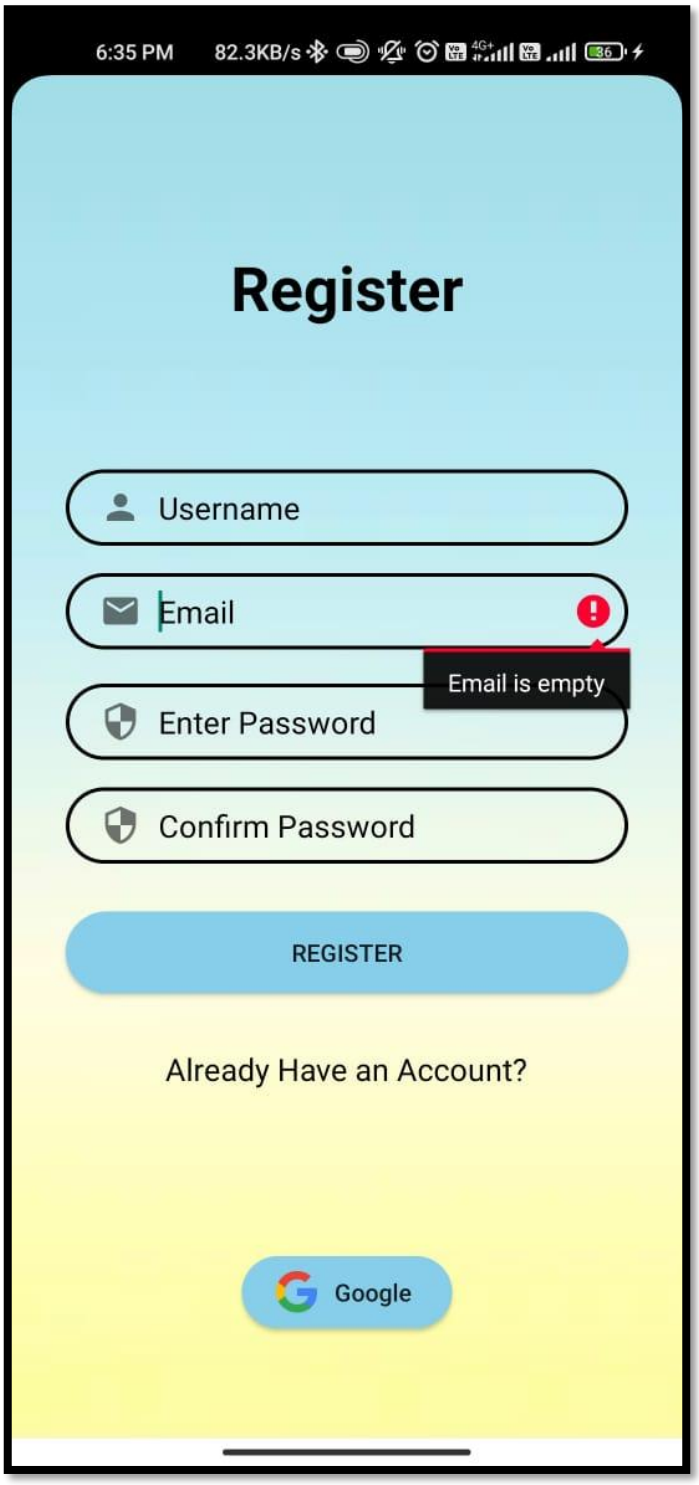
07. PROJECT OUTPUT

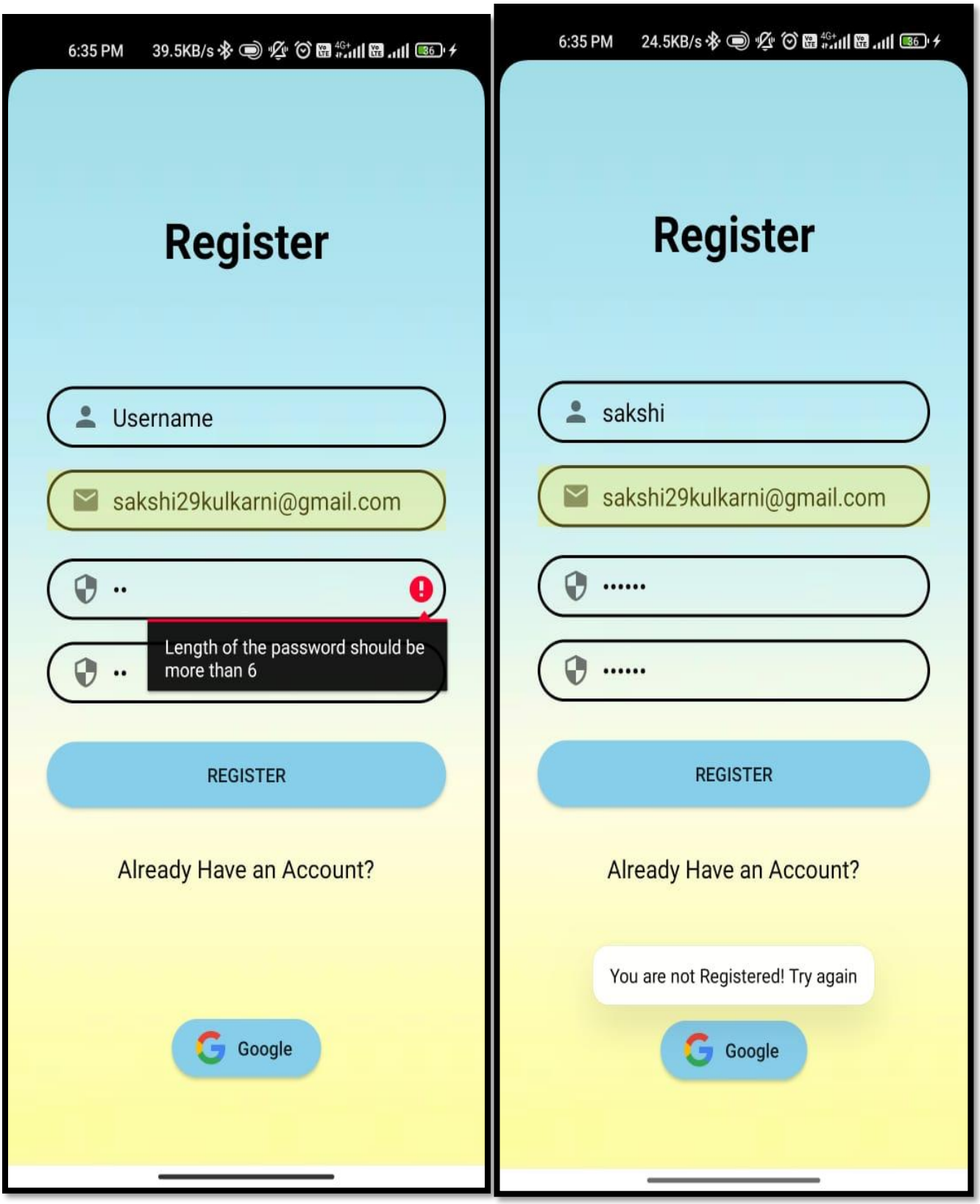


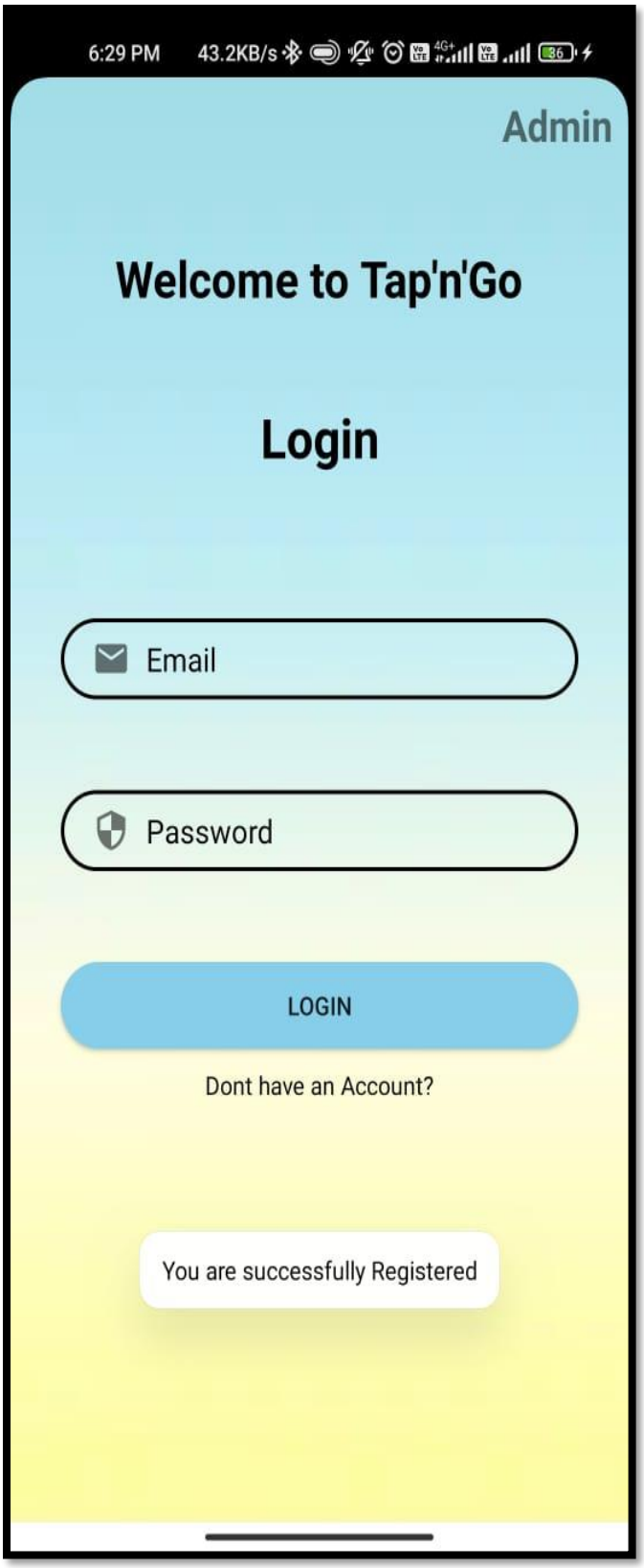


User Register:






6:35 PM 39.5KB/s
Register
Username
sakshi29kulkarni@gmail.com
Length of the password should be more than 6
REGISTER
Already Have an Account?
Google
6:35 PM 24.5KB/s
Register
sakshi
sakshi29kulkarni@gmail.com
REGISTER
Already Have an Account?
You are not Registered! Try again
Google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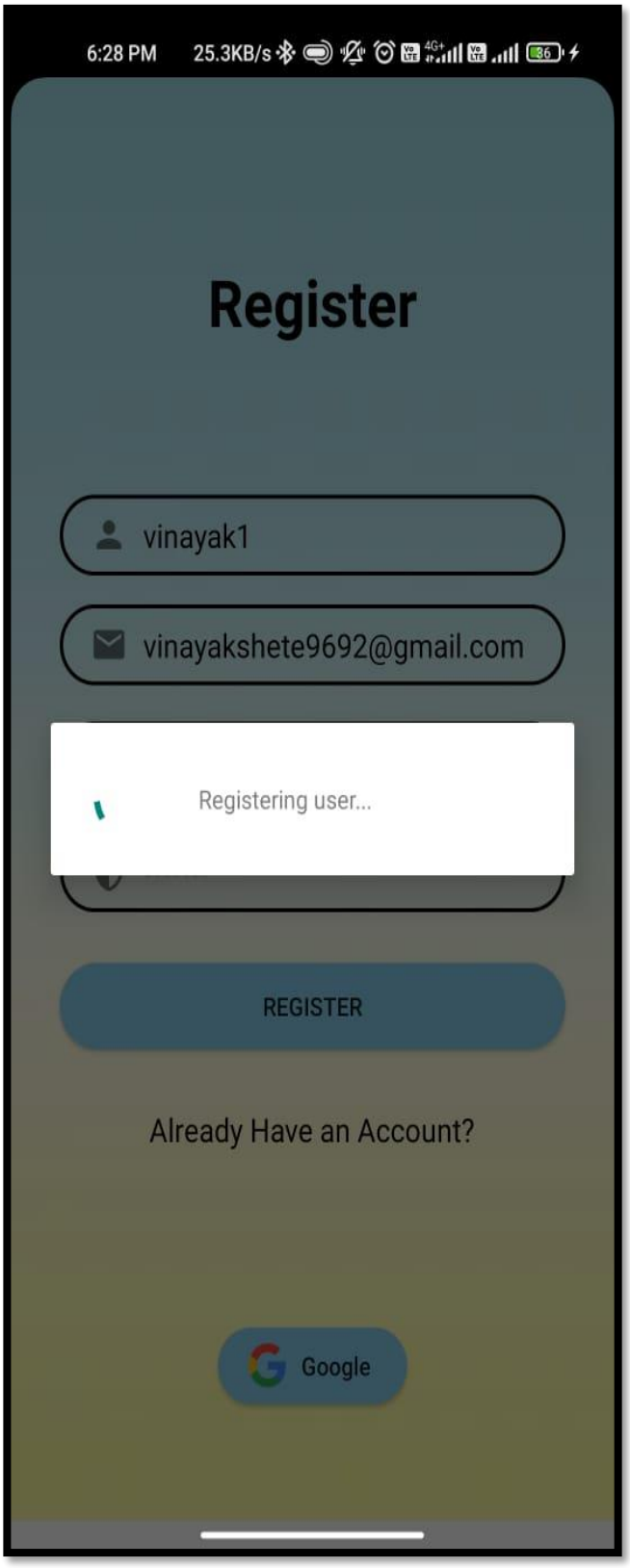
43.2KB/s
Admin
Welcome to Tap'n'Go
Login
Email
Password
LOGIN
Dont have an Account?
You are successfully Registered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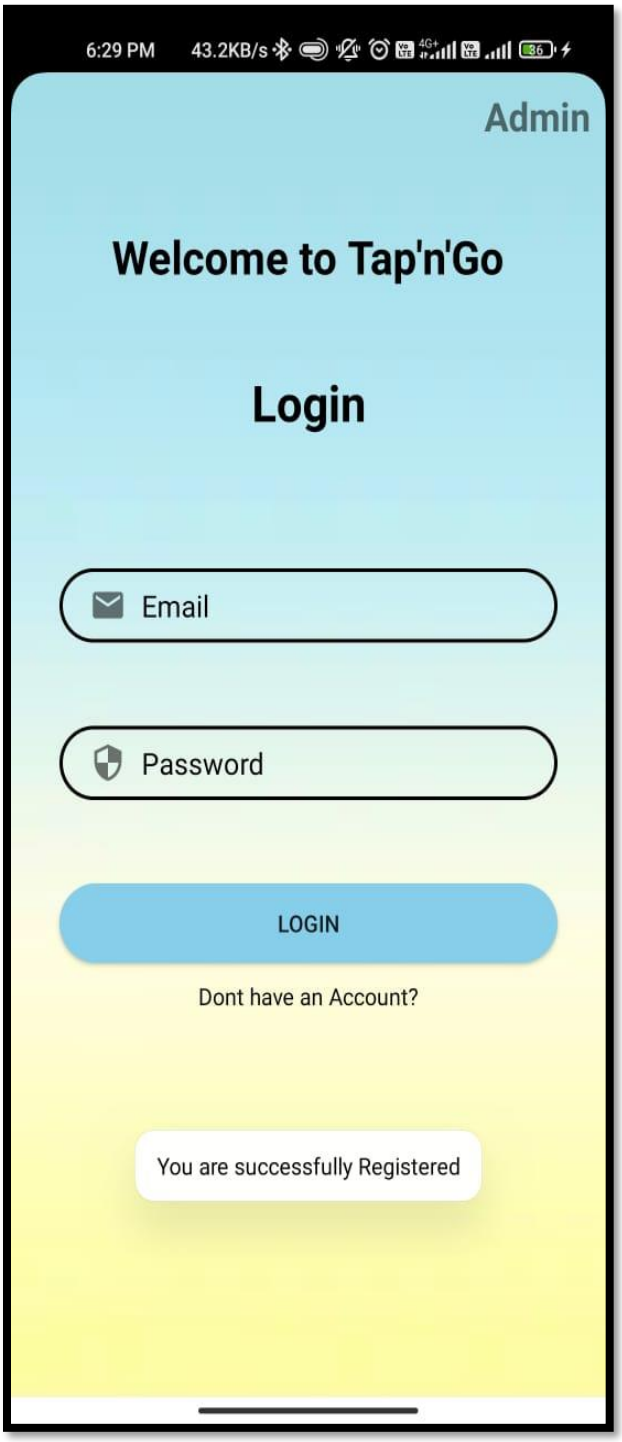
25.3KB/s
Register
vinayak1
vinayakshete9692@gmail.com
Registering user...
REGISTER
Already Have an Account?
Google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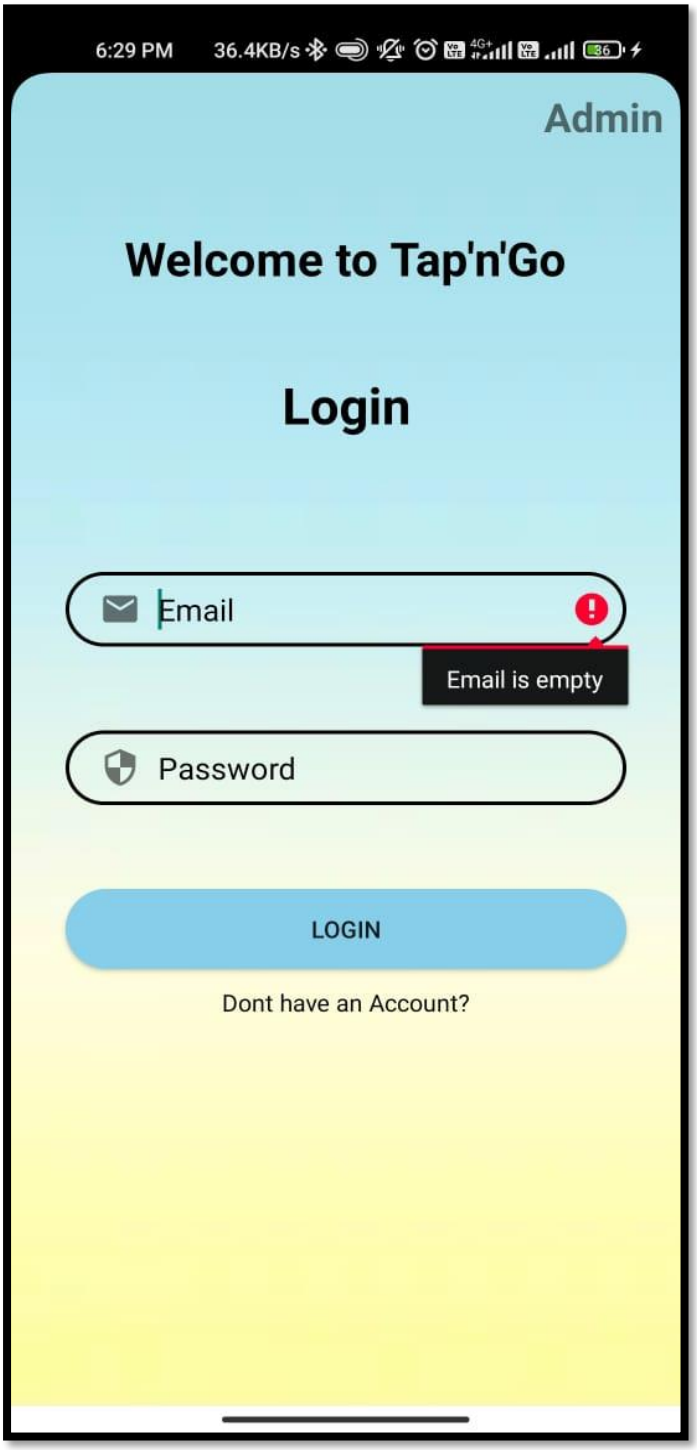
Admin
Welcome to Tap'n'Go
Login
Email
Password
LOGIN
Dont have an Account?
You are successfully Registered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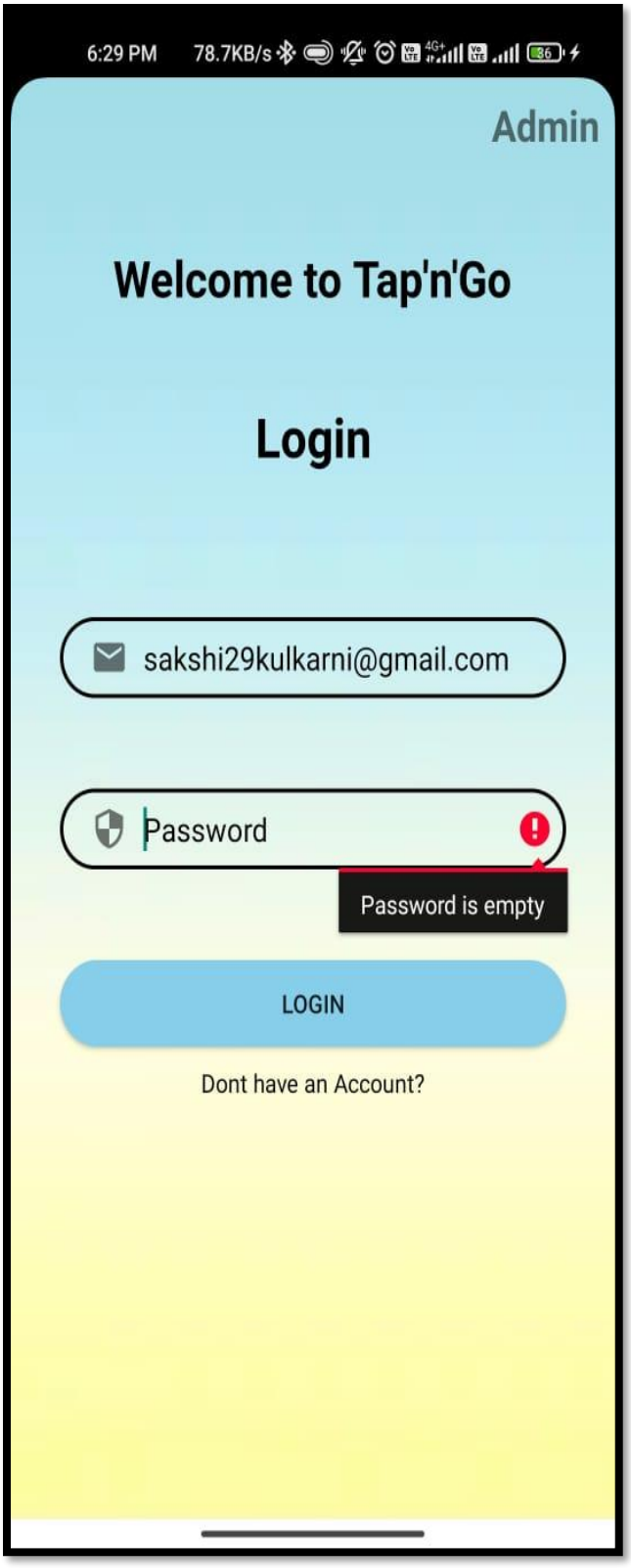
Admin
Welcome to Tap'n'Go
Login
Email
Email is empty
Password
LOGIN
Dont have an Account?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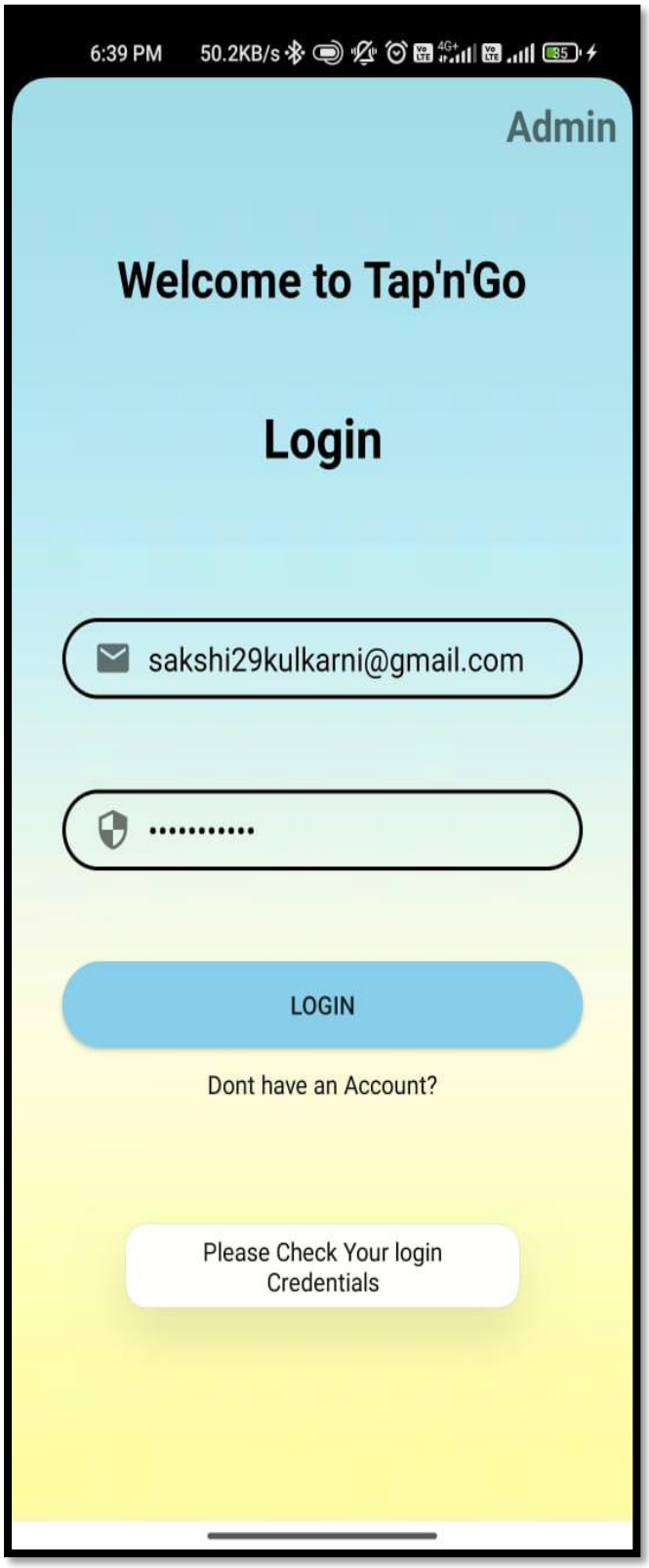
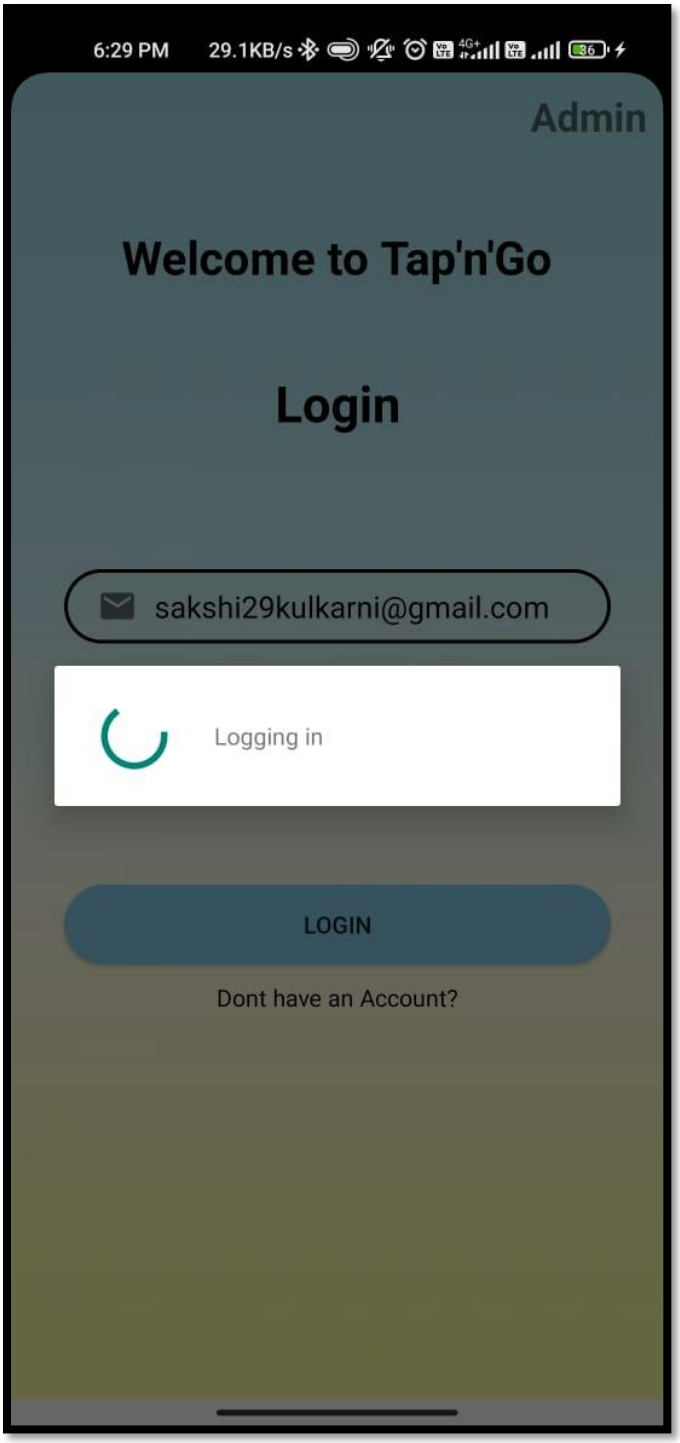
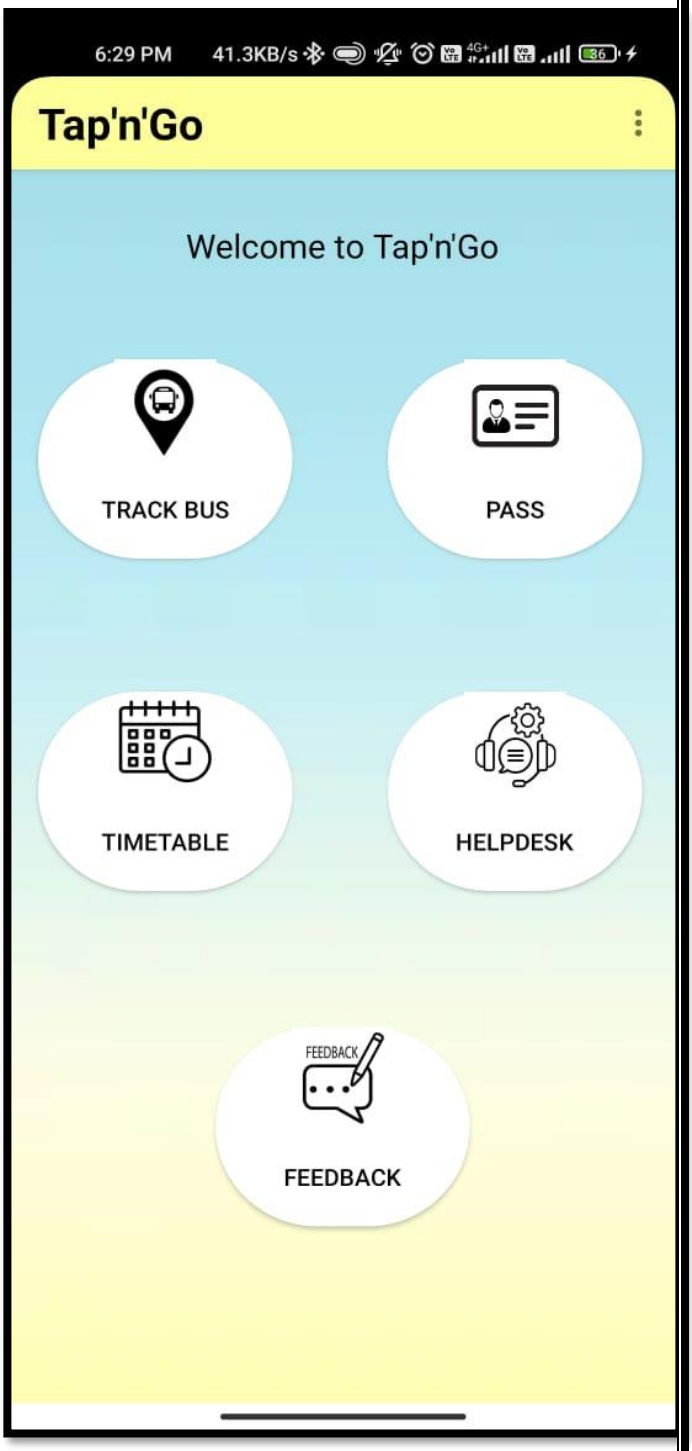
Admin
Welcome to Tap'n'Go
Login
sakshi29kulkarni@gmail.com
Password
Password is empty
LOGIN
Dont have an Account?


6:39 PM 50.2KB/s
Admin
Welcome to Tap'n'Go
Login
sakshi29kulkarni@gmail.com
LOGIN
Dont have an Account?
Please Check Your login Credentials

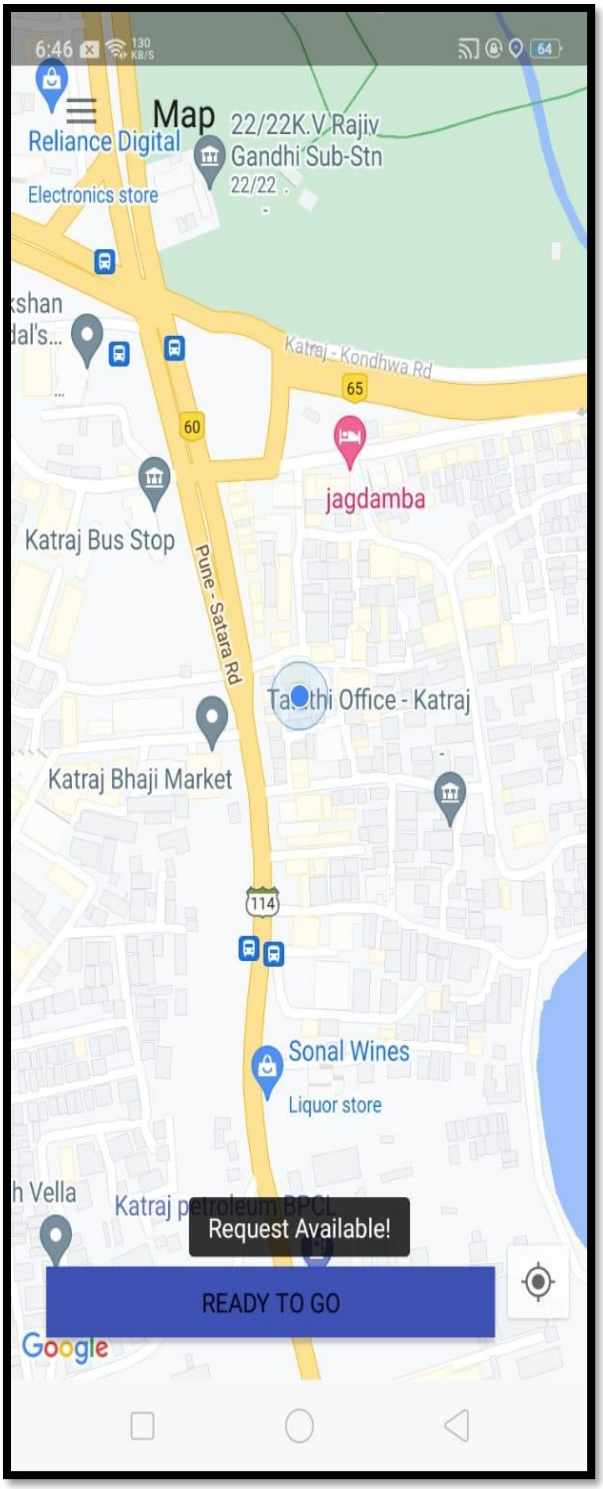


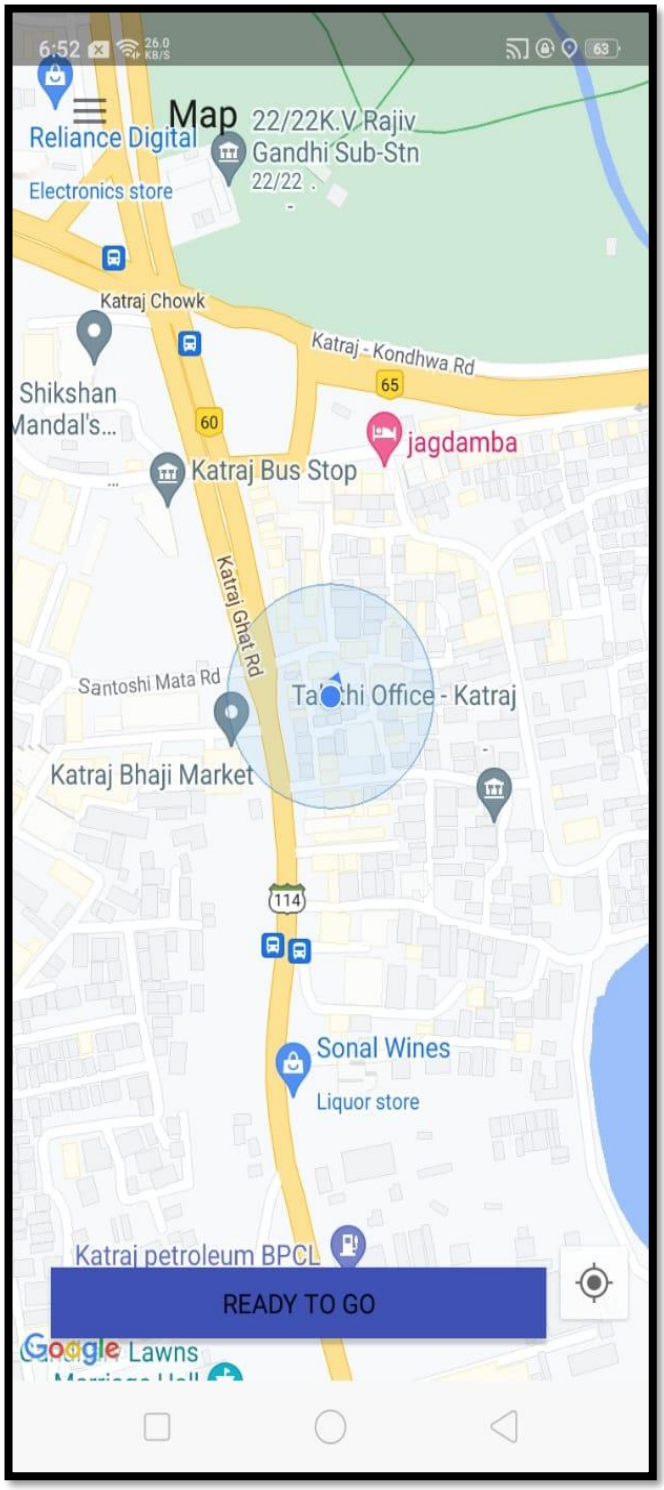


User Login Successful!

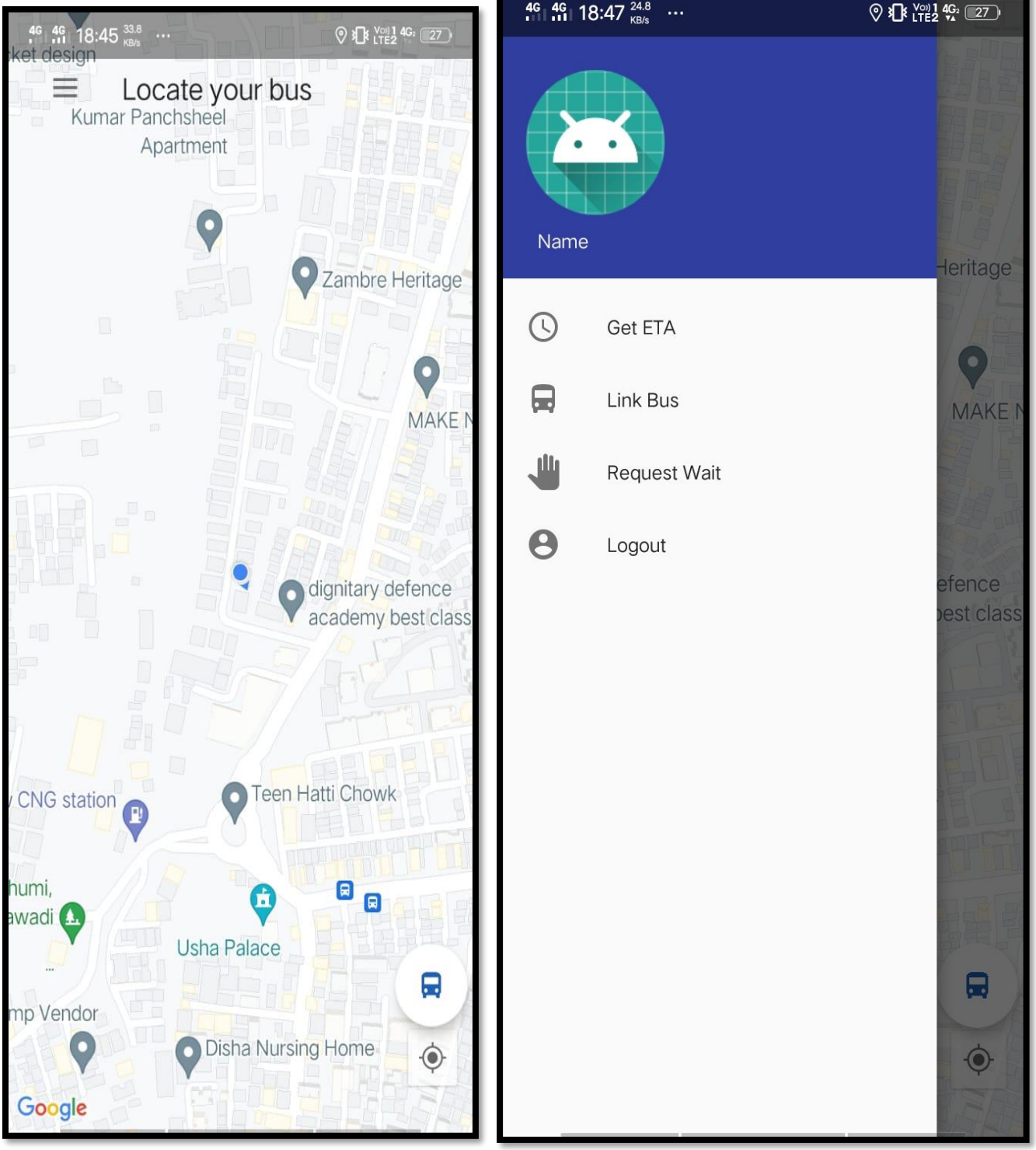

6:29 PM 41.3KB/s
Tap'n'Go
Welcome to Tap'n'Go
TRACK BUS
PASS
TIMETABLE
HELPDESK
FEEDBACK
FEEDBACK


6:47
Map
Reliance Digital
Electronics store
22/22K.V Rajiv Gandhi Sub-Stn
22/22
Katraj - Kondhwa Rd
65
60
Whats your bus no?
2
8
11
23
Sonal Wines
Liquor store
Katraj petroleum BPCL
READY TO GO
Google

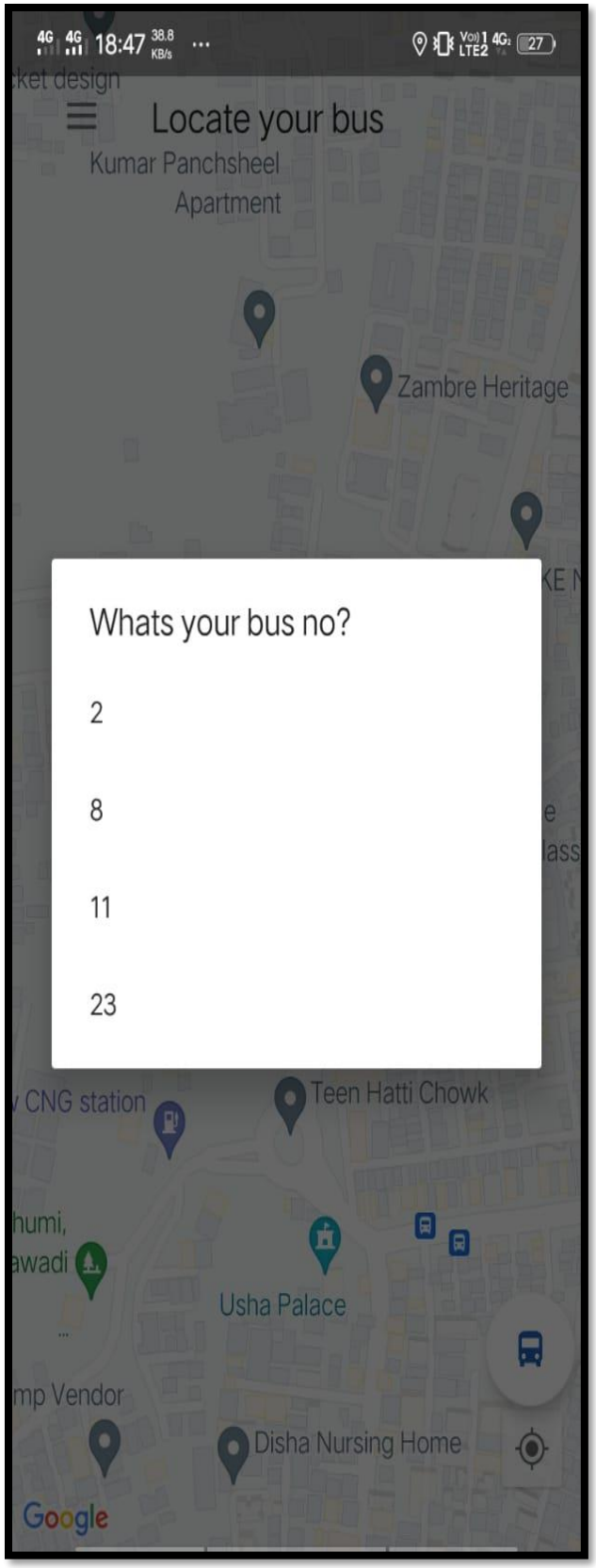


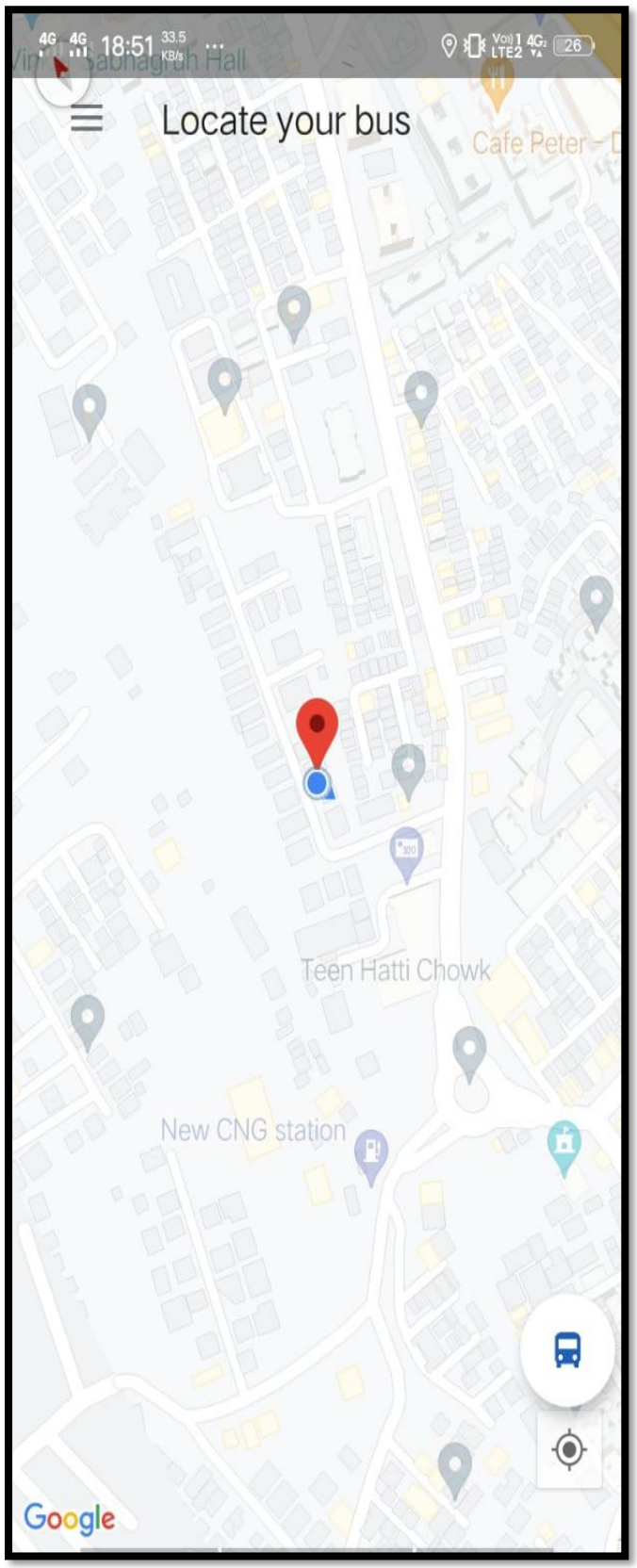


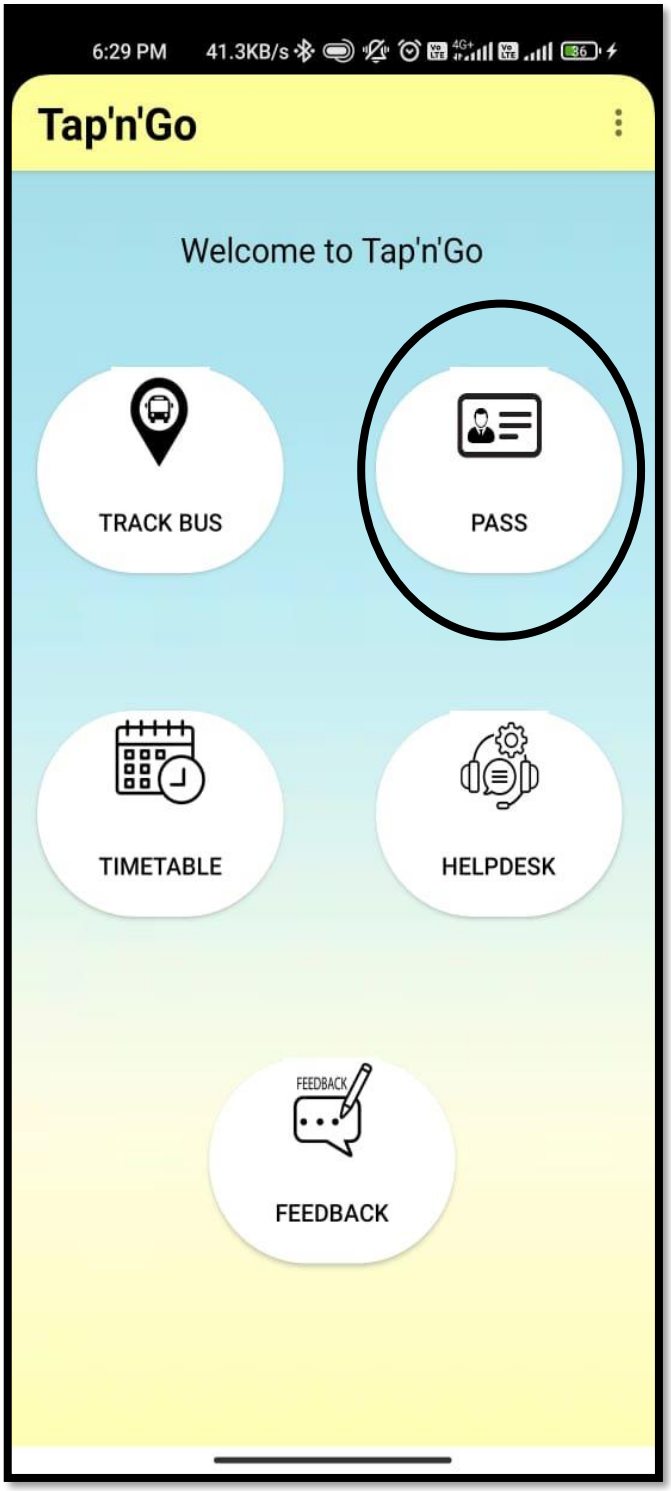
Bus Conductor Login

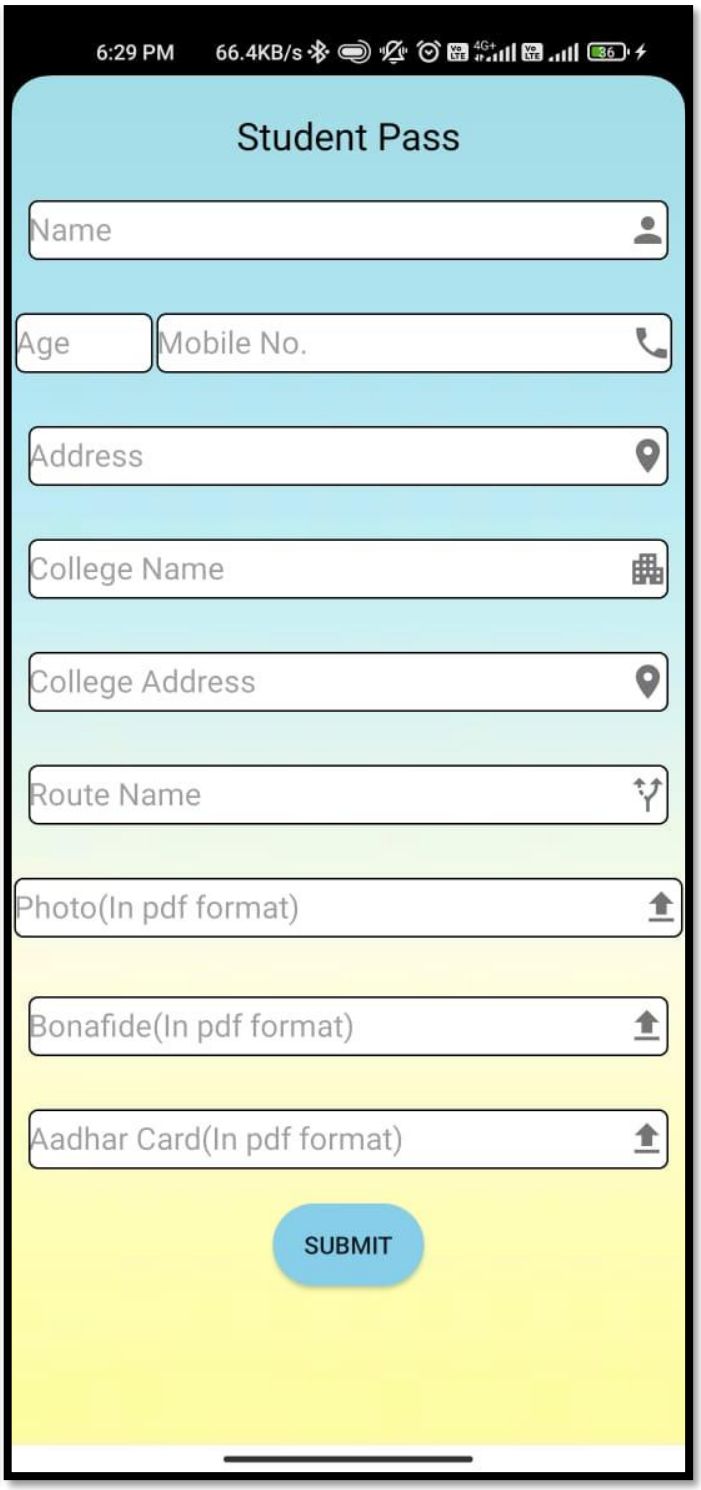


Bus User Login


Locate your bus
Kumar Panchsheel Apartment
Zambre Heritage
Whats your bus no?
2
8
11
23
Teen Hatti Chowk
Usha Palace
Disha Nursing Home
Google


Locate your bus
Cafe Peter
Teen Hatti Chowk
New CNG station
Google


6:29 PM 41.3KB/s
Tap'n'Go
Welcome to Tap'n'Go
TRACK BUS
PASS
TIMETABLE
HELPDESK
FEEDBACK
FEEDBACK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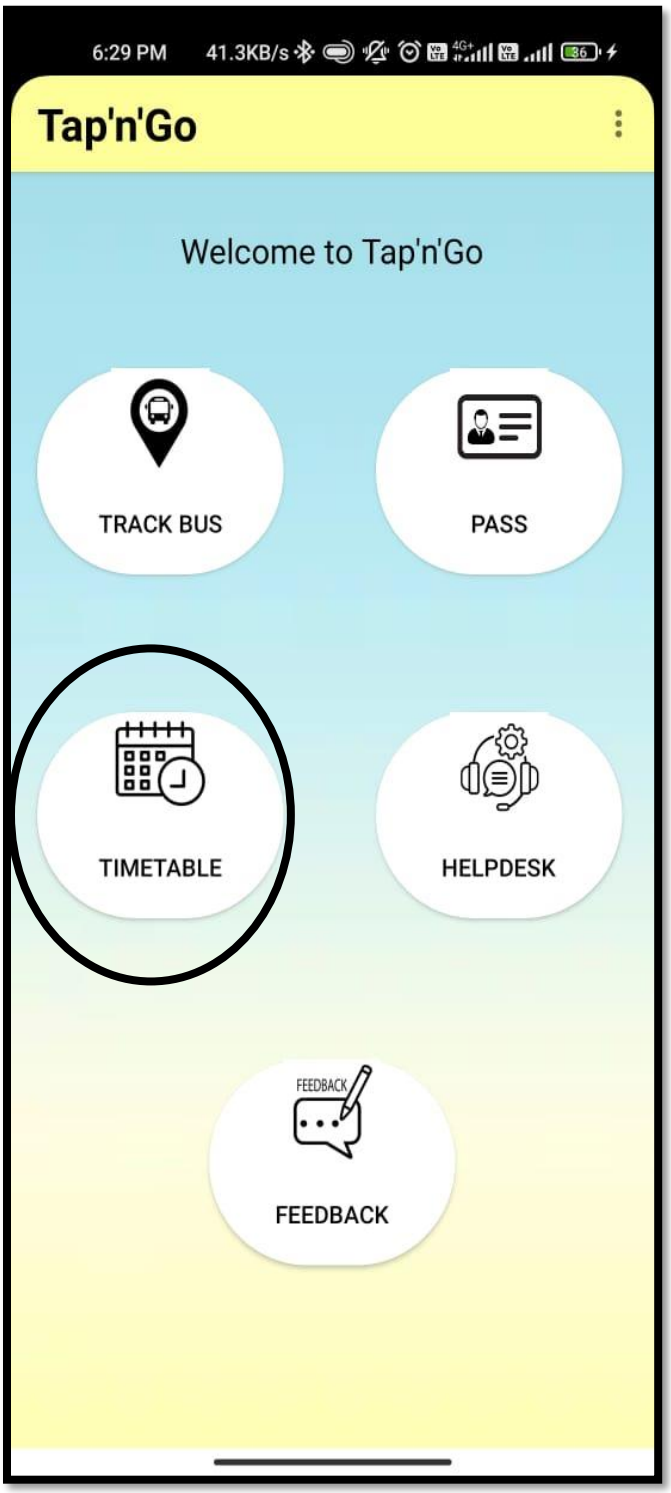
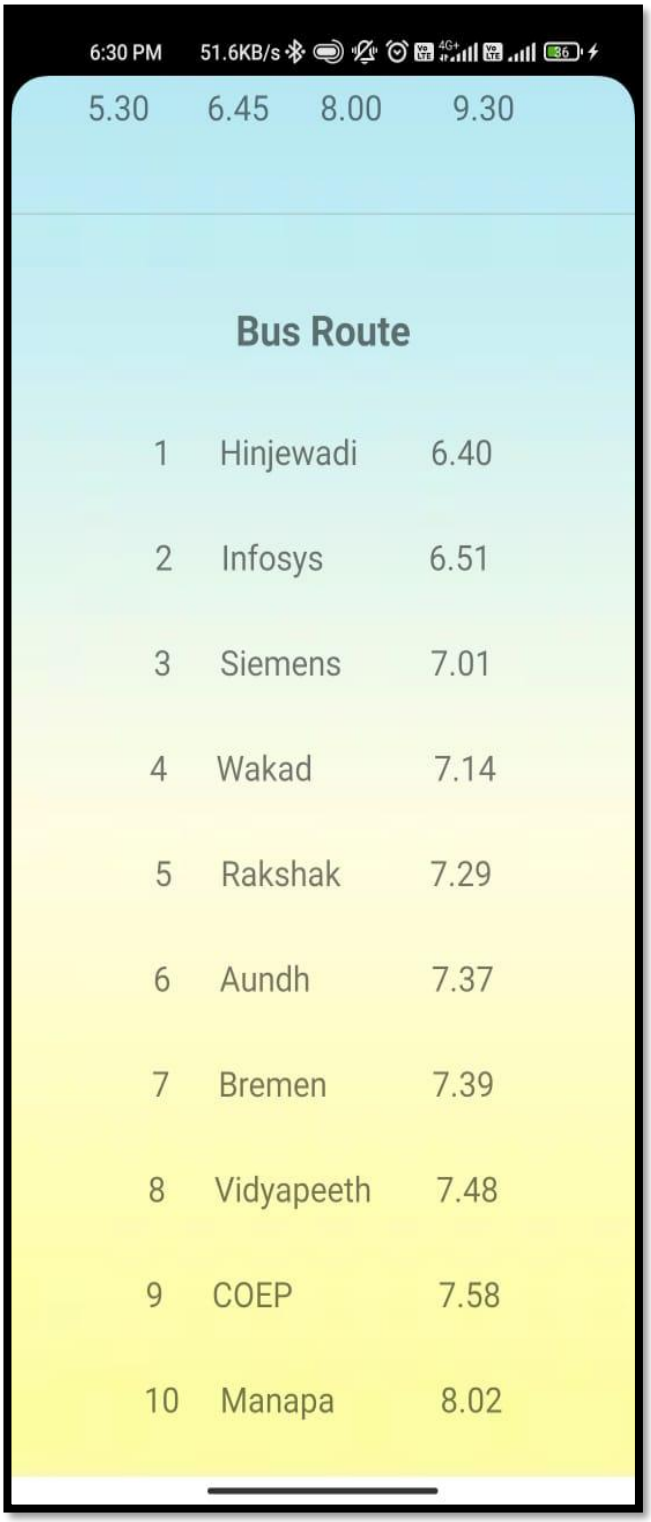
Student Pass
Name
Age
Mobile No.
Address
College Name
College Address
Route Name
Photo(In pdf format)
Bonafide(In pdf format)
Aadhar Card(In pdf format)
SUBMIT

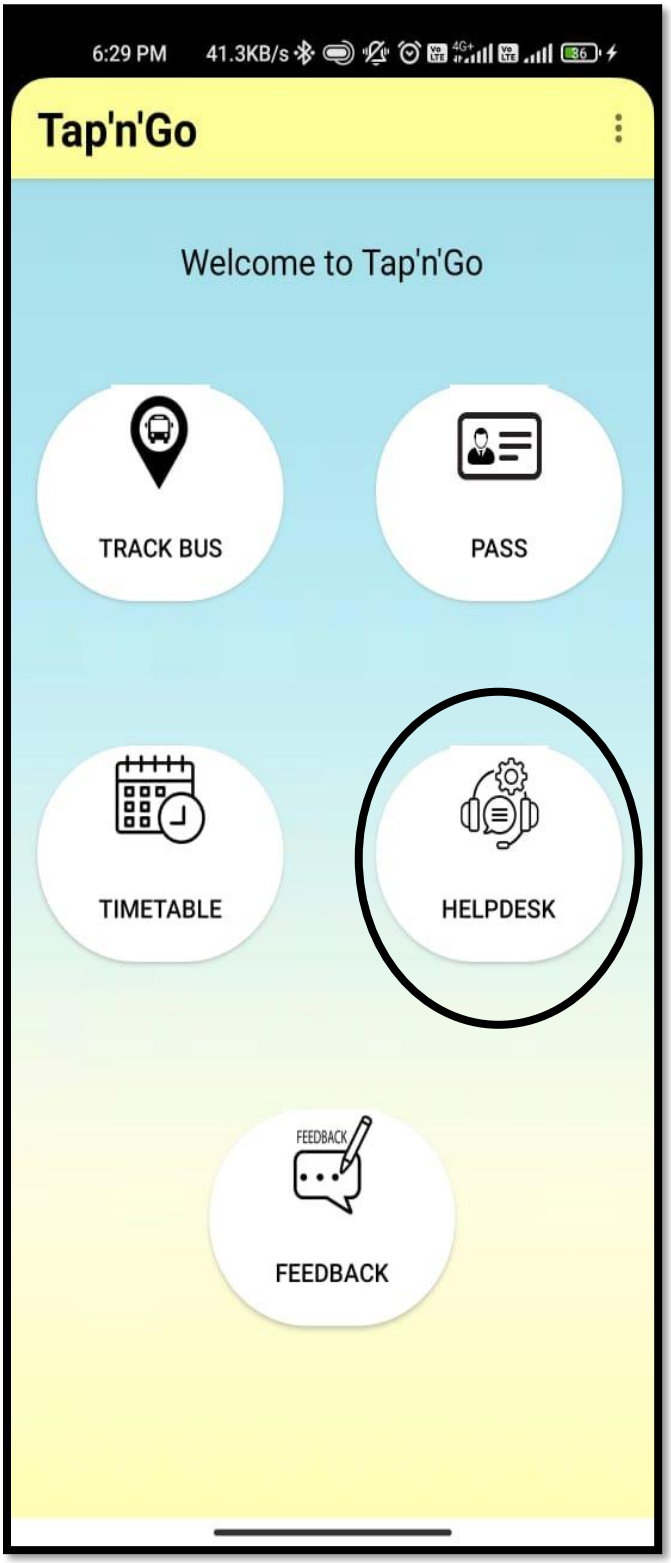

6:30 PM
66.4KB/s
Senior Citizen Pass
Name
Age
Mobile No.
Address
Route Name
Photo(In pdf format)
Adhar Card(In pdf format)
SUBMIT

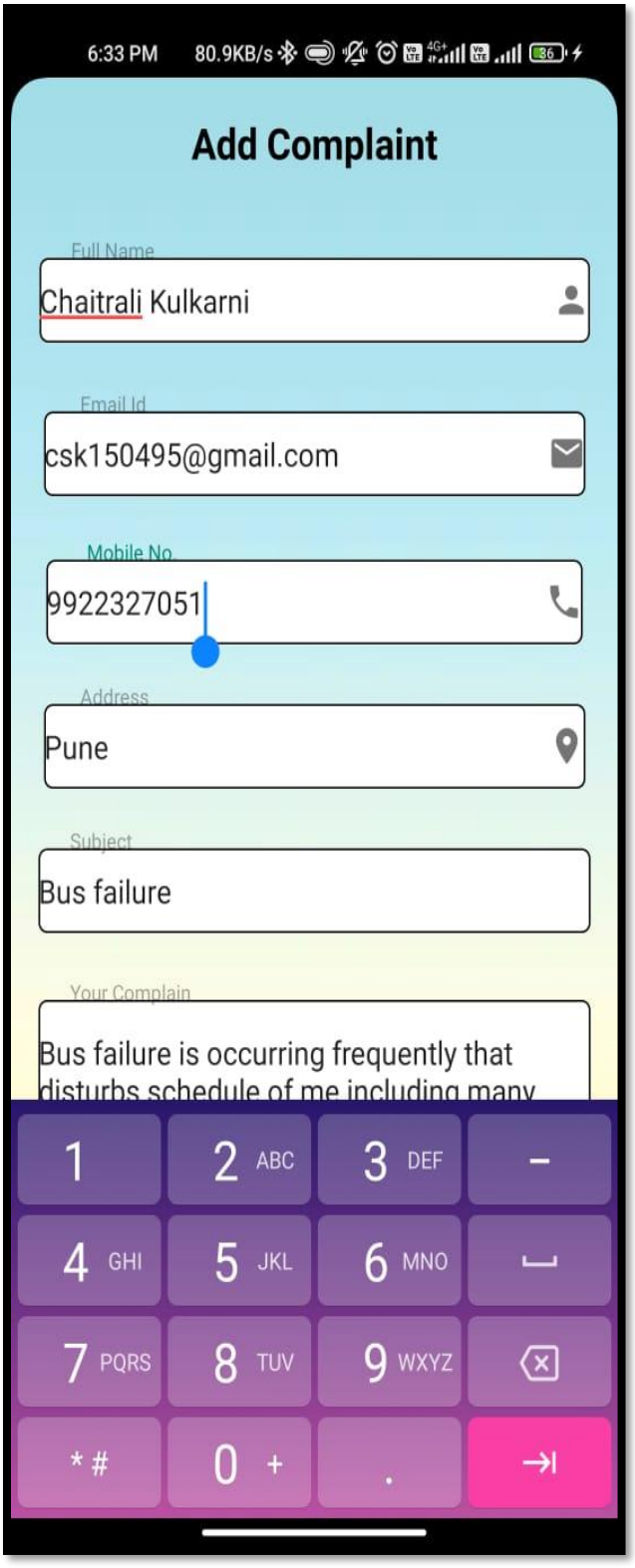

6:29 PM 41.3KB/s
Tap'n'Go
Welcome to Tap'n'Go
TRACK BUS
PASS
TIMETABLE
HELPDESK
FEEDBACK
FEEDBACK


6:30 PM 26.3KB/s
Select Route to show Timetable
100 - Hinjewadi to Manapa
353 - Bhosari to Shikrapur phata
298 - Chinchwadgaon to katraj
348 - Nigdi to Pune station
322 - Manapa to Akurdi Railway Station
35 - Manapa to Mukai chowk
36 - Chinchwadgaon to Manapa
42 - Nigdi to Katraj
43 - Nigdi to Katraj Bypass

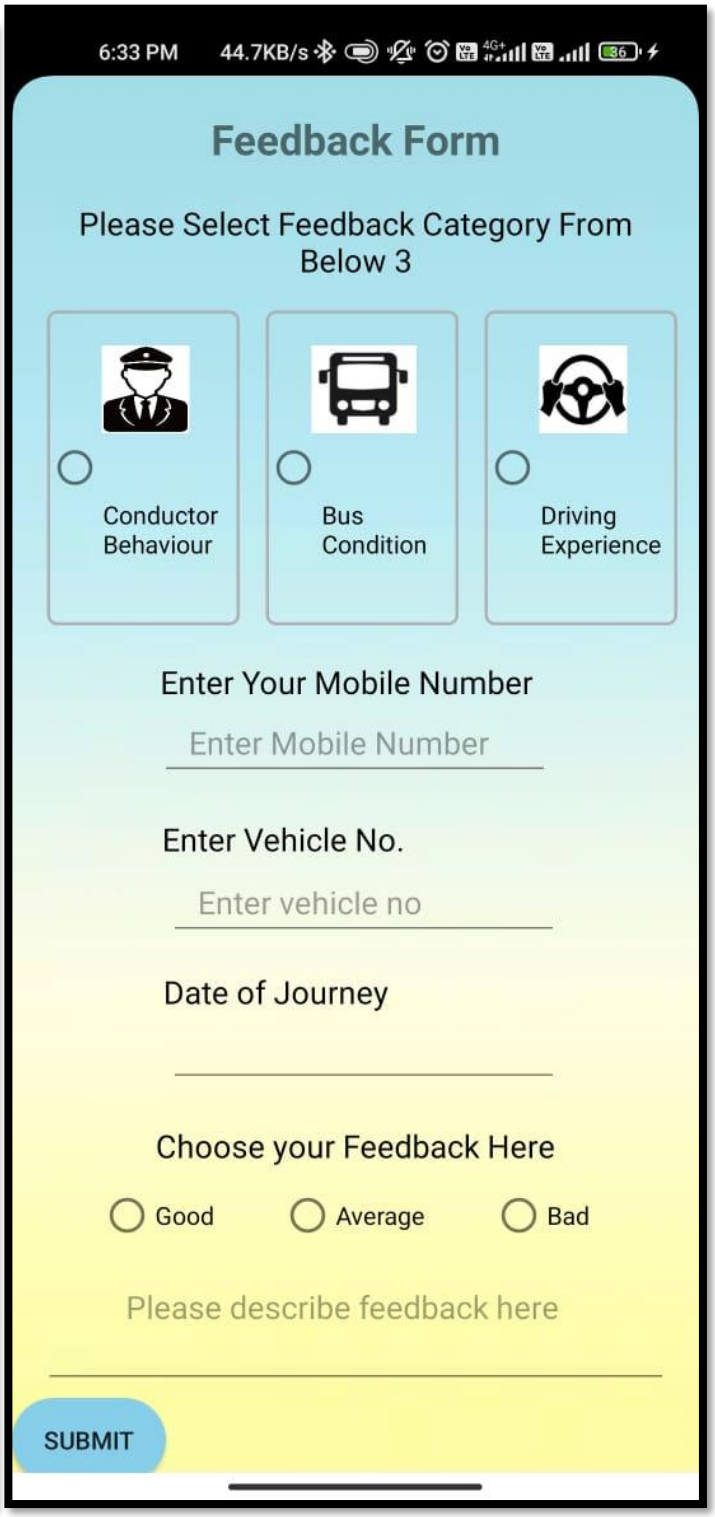

6:30 PM 48.5KB/s
Timings
6.40 8.15 9.45 11.00
12.30 1.45 3.00 4.50
5.30 6.45 8.00 9.30
Bus Route
1 Hinjewadi 6.40
2 Infosys 6.51
3 Siemens 7.01
4 Wakad 7.14
5 Rakshak 7.29
6 Aundh 7.37

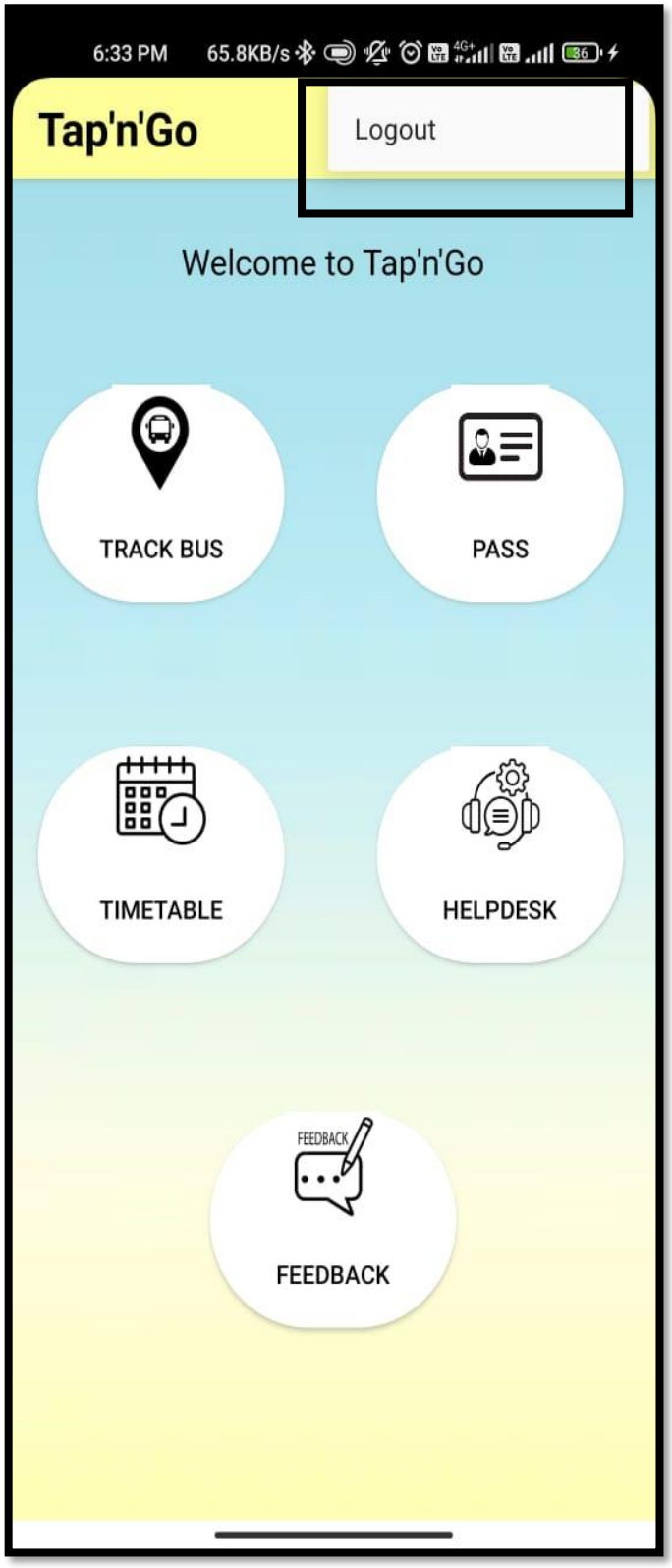

6:30 PM 51.6KB/s
5.30 6.45 8.00 9.30
Bus Route
1 Hinjewadi 6.40
2 Infosys 6.51
3 Siemens 7.01
4 Wakad 7.14
5 Rakshak 7.29
6 Aundh 7.37
7 Bremen 7.39
8 Vidyapeeth 7.48
9 COEP 7.58
10 Manapa 8.02

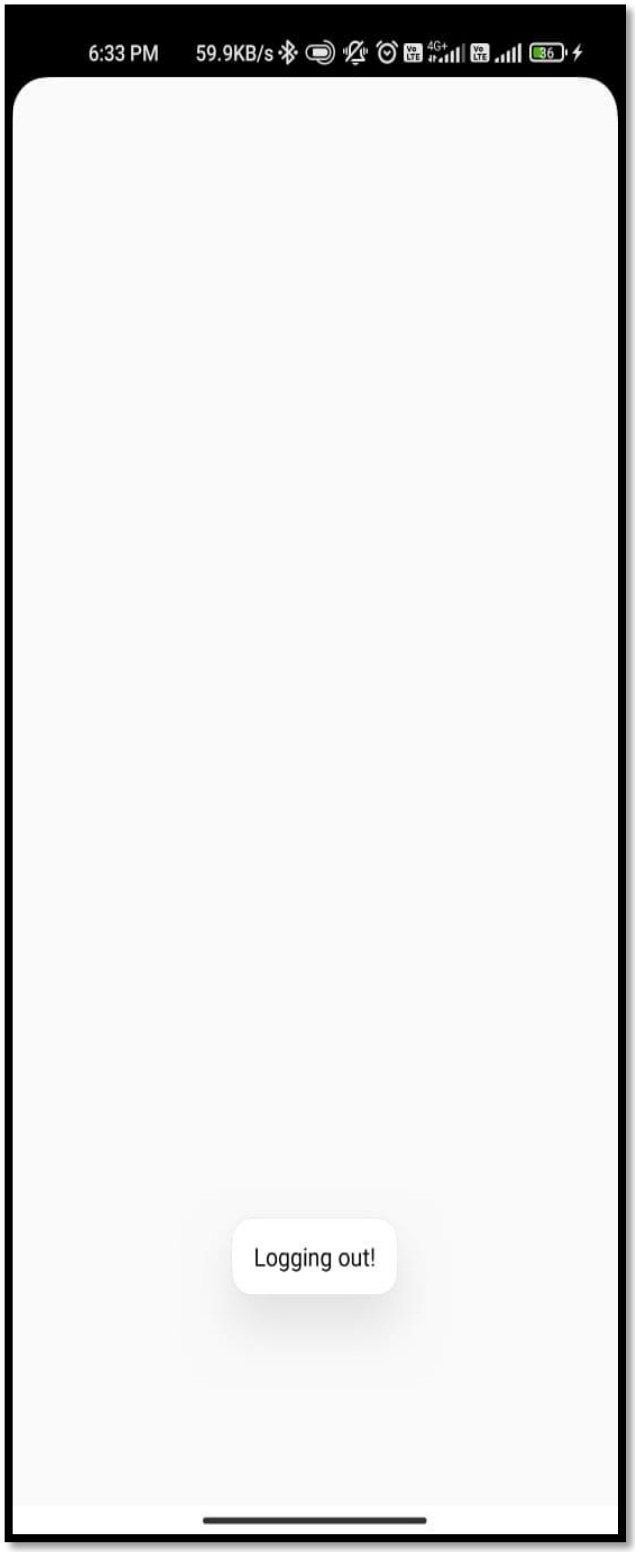

6:29 PM 41.3KB/s
Tap'n'Go
Welcome to Tap'n'Go
TRACK BUS
PASS
TIMETABLE
HELPDESK
FEEDBACK
FEEDBACK


6:33 PM 80.9KB/s
Add Complaint
Full Name
Chaitrali Kulkarni
Email Id
csk150495@gmail.com
Mobile No
9922327051
Address
Pune
Subject
Bus failure
Your Complain
Bus failure is occurring frequently that
disturbs schedule of me including many


6:33 PM 68.4KB/s
Add Complaint
Full Name
Chaitrali Kulkarni
Email Id
csk150495@gmail.com
Mobile No.
9922327051
Address
Pune
Subject
Bus failure
Your Complain
Bus failure is occurring frequently that disturbs schedule of me including many other people.
SUBMIT


6:33 PM 44.7KB/s
Feedback Form
Please Select Feedback Category From Below 3
Conductor Behaviour
Bus Condition
Driving Experience
Enter Your Mobile Number
Enter Mobile Number
Enter Vehicle No.
Enter vehicle no
Date of Journey
Choose your Feedback Here
Good
Average
Bad
Please describe feedback here
SUBMIT


6:33 PM 65.8KB/s
Tap'n'Go
Logout
Welcome to Tap'n'Go
TRACK BUS
PASS
TIMETABLE
HELPDESK
FEEDBACK
FEEDBACK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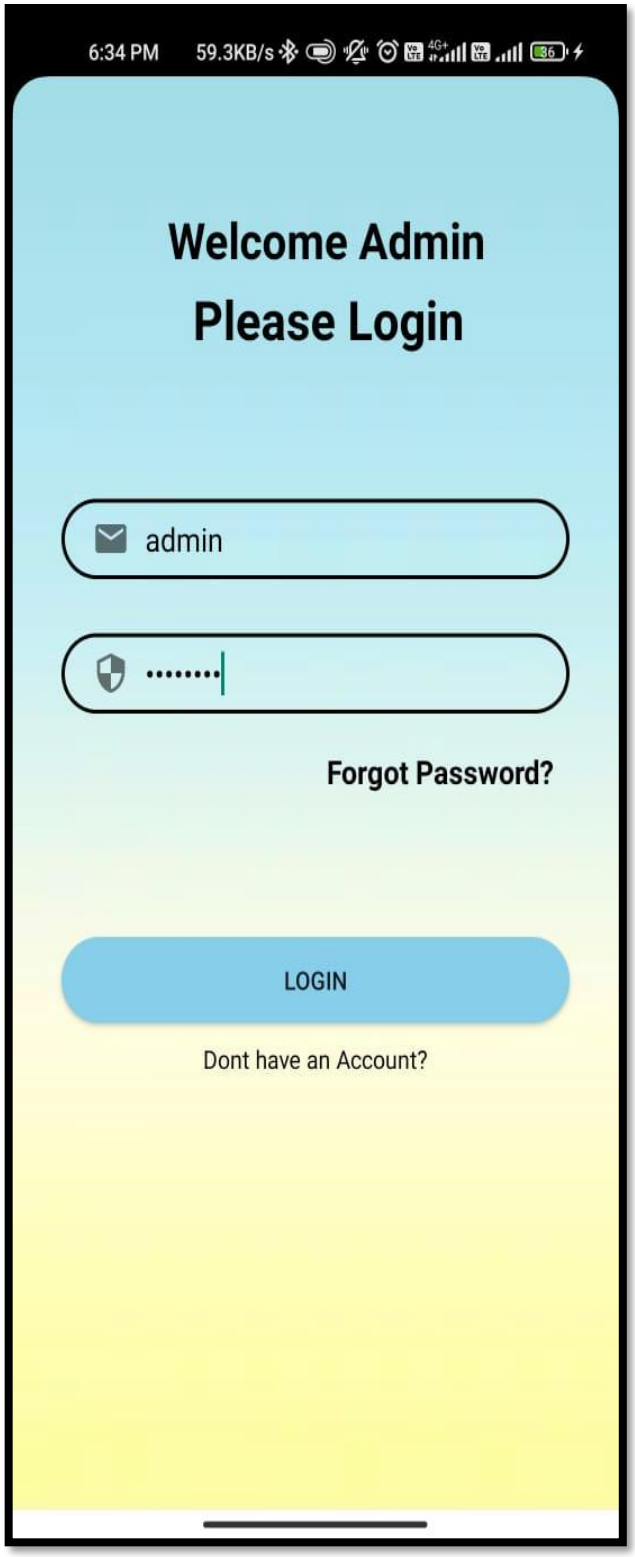
Logging out!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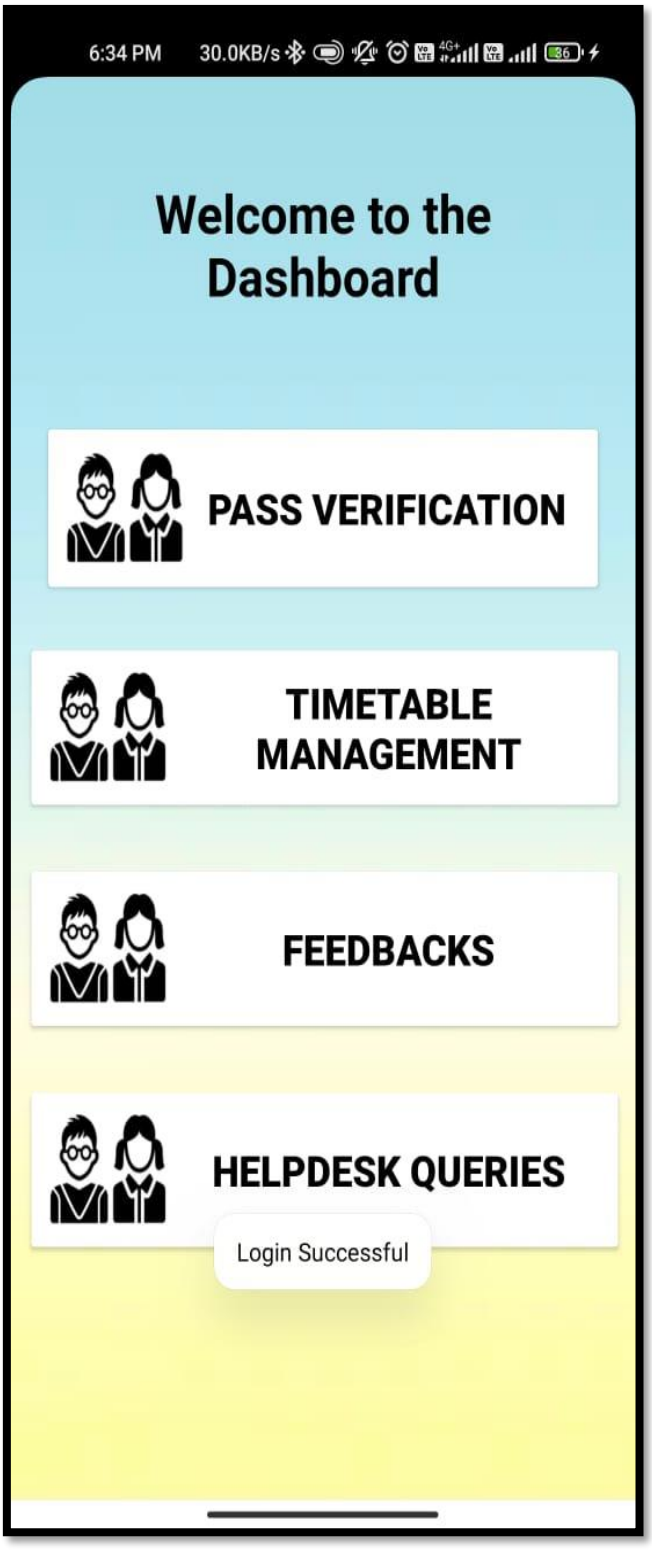
Welcome Admin
Please Login
admin
Forgot Password?
LOGIN
Dont have an Account?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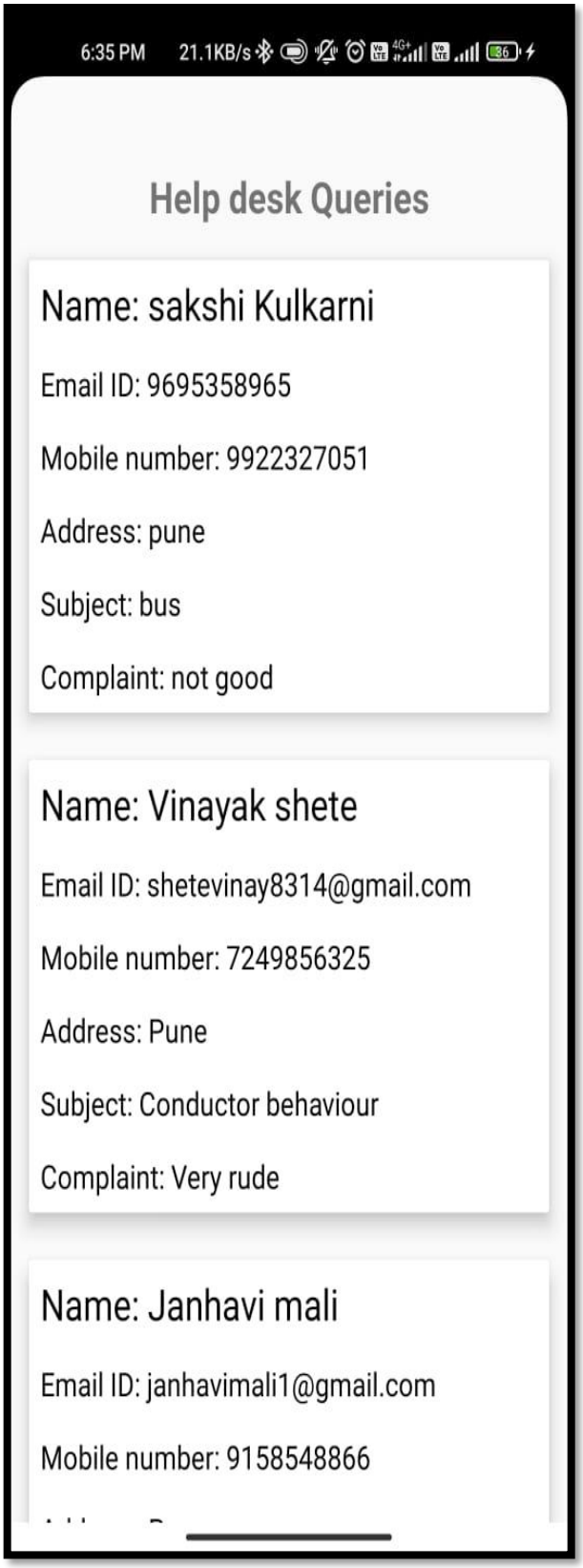
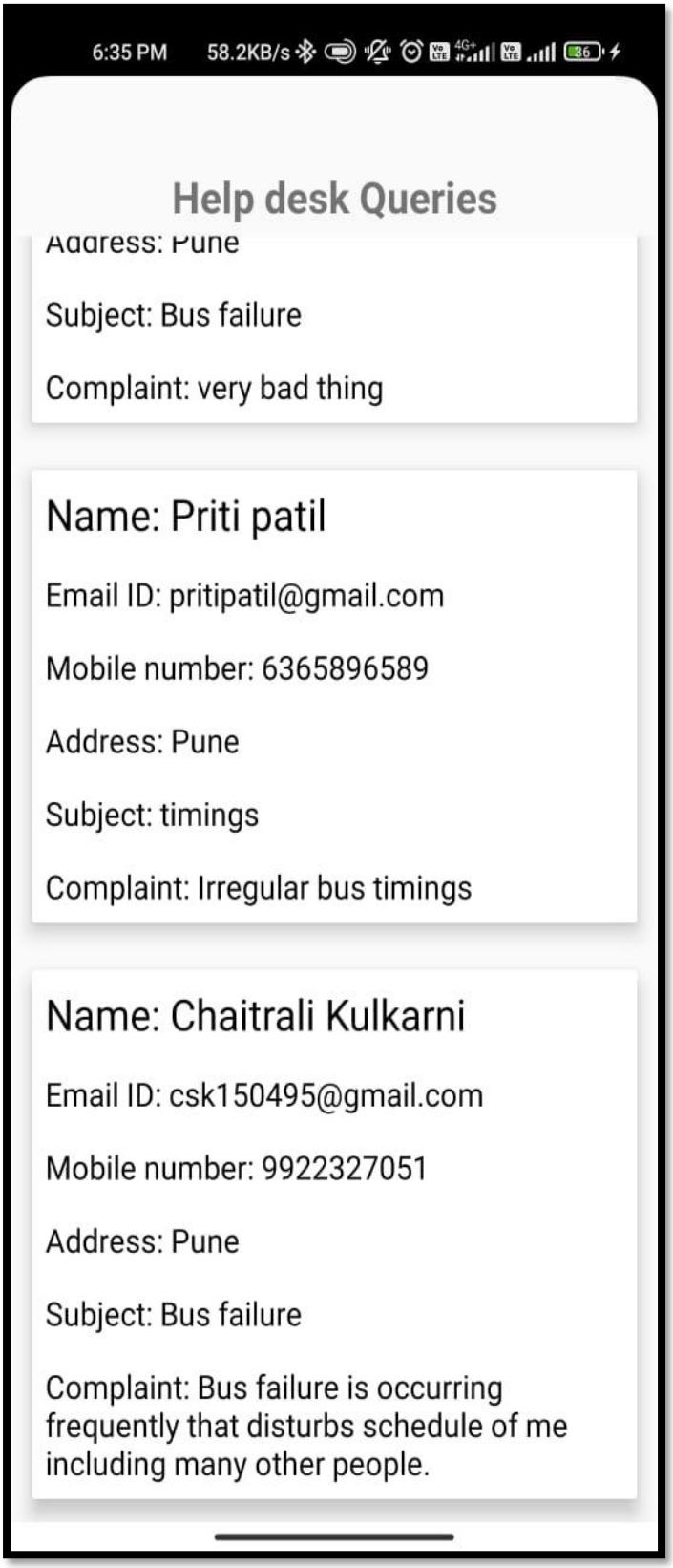
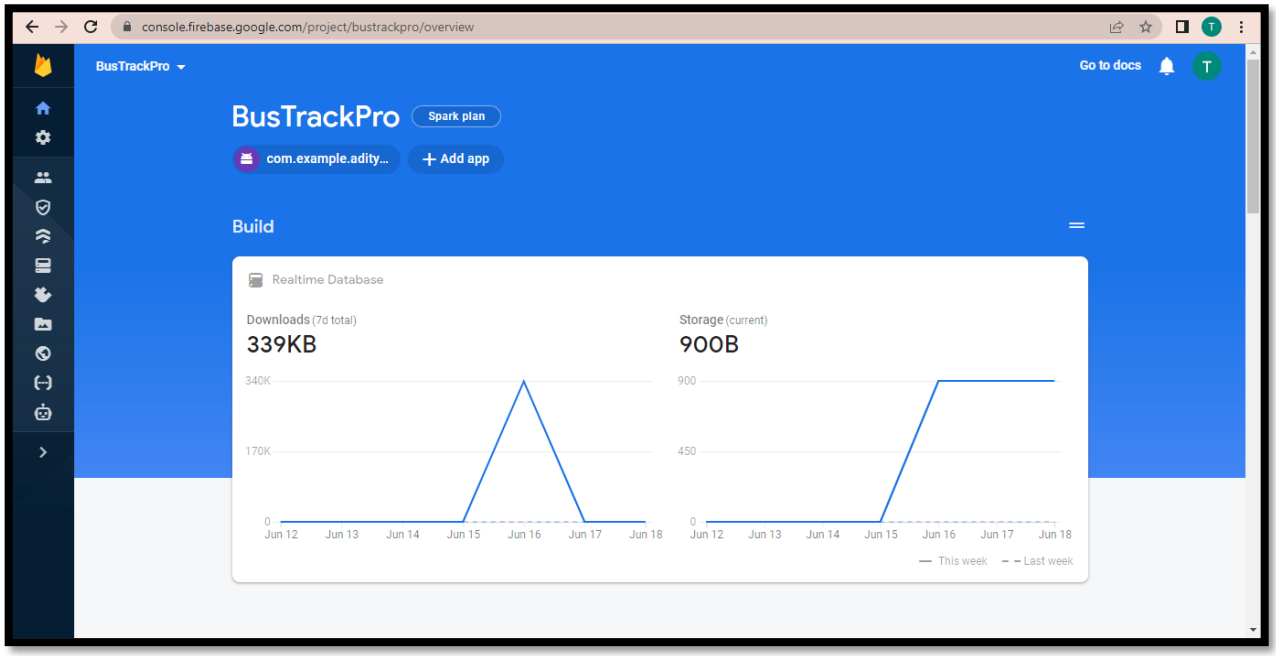
Welcome to the Dashboard
PASS VERIFICATION
TIMETABLE MANAGEMENT
FEEDBACKS
HELPDESK QUERIES
Login Successful

Admin Login


6:35 PM 21.1KB/s
Help desk Queries
Name: sakshi Kulkarni
Email ID: 9695358965
Mobile number: 9922327051
Address: pune
Subject: bus
Complaint: not good
Name: Vinayak shete
Email ID: shetevinay8314@gmail.com
Mobile number: 7249856325
Address: Pune
Subject: Conductor behaviour
Complaint: Very rude
Name: Janhavi mali
Email ID: janhavimali1@gmail.com
Mobile number: 9158548866


6:35 PM 58.2KB/s
Help desk Queries
Address: Pune
Subject: Bus failure
Complaint: very bad thing
Name: Priti patil
Email ID: pritipatil@gmail.com
Mobile number: 6365896589
Address: Pune
Subject: timings
Complaint: Irregular bus timings
Name: Chaitrali Kulkarni
Email ID: csk150495@gmail.com
Mobile number: 9922327051
Address: Pune
Subject: Bus failure
Complaint: Bus failure is occurring frequently that disturbs schedule of me including many other people.

Firebase: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BusTrackPro
Go to docs
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Spark plan
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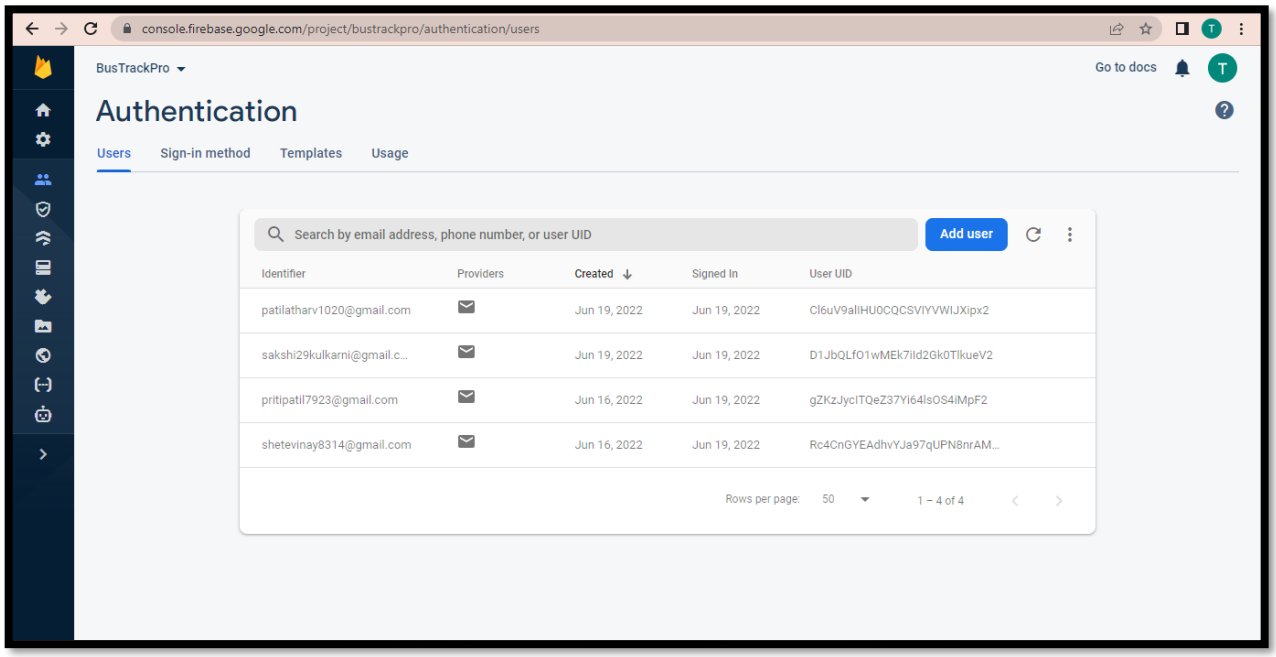
Add app
Build
Realtime Database
Downloads (7d total)
339KB
Storage (current)
900B
340K
170K
0
900
450
0
Jun 12
Jun 13
Jun 14
Jun 15
Jun 16
Jun 17
Jun 18
This week
Last week


console.firebase.google.com/project/bustrackpro/authentication/users
BusTrackPro
Go to docs
Authentication
Users
Sign-in method
Templates
Usage
Search by email address, phone number, or user UID
Add user
Identifier
Providers
Created
Signed In
User UID
patilatharv1020@gmail.com
Jun 19, 2022
Jun 19, 2022
Cl6uV9allHU0CQCSVlYVWIJXipx2
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Jun 19, 2022
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pritipatil7923@gmail.com
Jun 16, 2022
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shetevinay8314@gmail.com
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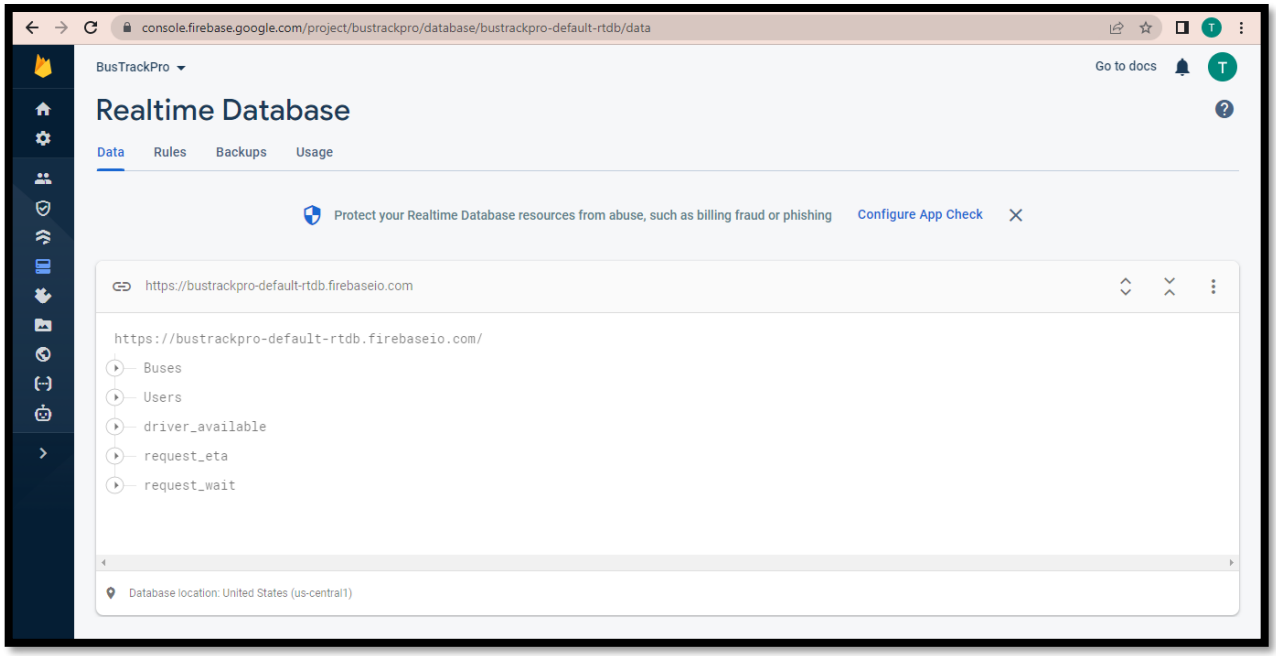
console.firebase.google.com/project/bustrackpro/database/bustrackpro-default-rtdb/data
BusTrackPro
Go to docs
Realtime Database
Data
Rules
Backups
Usage
Protect your Realtime Database resources from abuse, such as billing fraud or phishing
Configure App Check
https://bustrackpro-default-rtdb.firebaseio.com
https://bustrackpro-default-rtdb.firebaseio.com/
Buses
Users
driver_available
request_eta
request_wait
Database location: United States (us-central1)


Realtime Database
https://bustrackpro-default-rtdb.firebaseio.com
https://bustrackpro-default-rtdb.firebaseio.com/
Buses
2
11
Users
Driver
Students
driver_available
Database location: United States (us-central1)


https://bustrackpro-default-rtdb.firebaseio.com
11
Users
Driver
Students
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request_eta
Database location: United States (us-central1)

08. ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

- The project will be helping in the live tracking of the bus.
- The user will be able to know all the details of the bus.
- This application improves transportation efficiency and productivity.
- Route optimisation becomes easy.
- The bus pass process is made online which will save a lot of time.
- The route deviations can be immediately identified and addressed.
- The user can complaint the authority if the conductor or driver misbhaves with the passengers.
- This application will help many users who travels using public vehicles like Buses.

DISADVANTAGES:

- Work rensentment
- Rare inaccuuracy of GPS
- Loss of Network
- Battey Drainage

09. FUTURE SCOPE

This app is mainly developed for PMPML. As PMPML is a public transport service therefore it helps the environment by saving the fuel. Lot of people travel by bus that avoid the traffic by each ones vehicle. PMPML user may face some inconvenience travelling now, so providing those rich facilities and ease of use will attract more people hence help increase the users of PMPML. There are people who prefer public transport at many conditions such as late night travel. BRT routes help to reach earlier so everyone may prefer to take bus when they have to reach on time. Our application is currently bound to limited features but in nearby days we are aiming to add more functionality such as: We are going to add the actual payment API for the bus pass generation. That will fulfill the requirements to generate a bus pass and admin can then accept or deny the users request. Next thing is to add a portal to manage the advertisements that are displayed on TVs in PMPML. Also we are going to work for updating the UI that will give smooth experience.

Our application can track the live bus, which is going to provide ease to every person travelling in bus. This facility is mainly important in rural areas where the numbers of buses are less and the timings are also not fixed. Also a user will come to know to know whether the bus is departure yet or not, or if the bus is failed in between. Bus tracking is also going to help the user save his time by keeping an eye on the bus by sitting at home.

These all points give us the confidence that our application has a bright future, and the requirements are always increasing in this field so consistent development is all what is needed.

10. CONCLUSION

The project titled "TapNGo- Bus Tracking Application" using Google Maps API developed in Android is a model for bus tracking unit with the help of GPS receivers. The project is successfully implemented with all the features mentioned in system requirement specification.. The key role of this system is to reduce unnecessary and repetitive tasks and manage more documentation and paper-based workload.So in the coming year, it is going to play a major role in our day-to-day living. We have completed the project as per the requirements of our project. Finally the aim of the project i.e. to trace the vehicle is successfully achieved.

11. REFERENCE LINKS

1) https://www.tutorialspoint.com/android/index.htm

2) https://developer.android.com/codelabs/build-your-first-android-app

3) https://developer.android.com/studio/write/firebase

4) https://firebase.google.com/docs/android/setup

5)https://support.google.com/maps/answer/3273406?hl=en&co=GENIE.Platform%3DAndroid

6) https://developers.google.com/maps/documentation/android-sdk/start

7) https://developers.google.com/maps/documentation/android-sdk/get-api-key

8) https://www.youtube.com/watch?v=urLA8z6-l3k

9) https://alphatech.technology/Howto-Entry-srk/How-to-Google-Maps-API-Key-bek/

10) https://www.javatpoint.com/android-sqlite-tutorial

THANK YOU!