

SMART BUS TICKET USING QR CODE

For the Degree of
**Bachelor of Technology in
Computer Science and
Engineering**

By

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Under the Guidance of
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(2020-2021)

A
Project Report
On

SMART BUS TICKET USING QR CODE

Submitted by

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CERTIFICATE

This is to certify that, the project entitled “**SMART BUS TICKET USING QR CODE**”, which has been submitted herewith in the partial fulfillment for the award of the ‘**Bachelor of Technology**’ in ‘**Computer Science and Engineering**’ of Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad (M.S.). This is the result of the original work and contribution by **Tanya Dixit, Manthan Gadekar and Rutuja Ganakwar** under my supervision and guidance.

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Abstract

Public transport is the cheapest and has therefore, always been popular with the masses. The advancement in transport system has been increasing in day-to-day life. The transport plays a vital role in individuals' life, in making it efficient we are introducing an android application. The android application has the bus ticket system using QR reader. The android mobile has a great part in human life, it helps the people to be stay connected with web.

In this project, we are proposing QR reader for bus ticketing system. The QR code (Quick Response code) becomes popular outside the automotive industry due to its fast readability and greater storage capacity compared to standard UPC barcodes. The proposed system provides web application as well as android application for the passengers to buy their tickets online. During the travel time, we can get the ticket by entering their location details and make payment. Message alert will be notified to the passenger. By this application, we can minimize the usage of paper (Tickets) and there will not be any problem in getting change.

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CHAPTER 1

INTRODUCTION

1.1 Project Background

High demand of the usage of public transportations leads to many establishments of transportation companies to satisfy the demands. One of the famous and demanding public transportation is the express buses. This public transportation commonly is a big help when someone is travelling far away. Some passengers find it more convenient travelling with the express buses rather than driving that leads to so many possibilities of incidents such as dozing off while driving and involving car crashes.

Smart Bus Ticket Using QR Code is a mobile application where customers can buy tickets via mobile. Every ticket purchased will be given QR code for verification process. The QR code is essential during the boarding process where customer need to show their QR code before on board to the bus. Bus driver will then scan customer QR code to update the availability of the passenger. This will ease the management to check the overall passenger for every trip who already on board and who is not. The current Implementation needs staff to print the ticket during purchasing process at counter. Perhaps, customer needs to line up in order to purchase ticket.

This new system will support the eco green campaign that urged by the government with using less paper. It will improve the current system by using QR code whereby it is more efficient for the customer to keep the ticket. It also improves the management process in generating reports easily and systematically.

1.2 PROBLEM STATEMENT

Passengers might lose the printed tickets purchased from the counter, so they have to go to the ticket counter as it is not convenient as it takes too much effort and time. In manual system, staff need to print the ticket during purchasing process at counter.

This will require relatively high cost to buy paper to print the tickets. Even in these pandemic situations this no touch services will be beneficial for the senior citizens as well as the people travelling in these buses.

The problem statement is the description of problems that arise currently and needed to be solved by the end of the project testing and evaluation. The problems arise that resulted in this project are:

- a) Passengers might lose the printed tickets purchased from the counter.
- b) Passengers have to go to the ticket counter to purchase tickets and it is not very convenient as it takes much time and effort.
- c) In manual System, staff need to print the ticket during purchasing process at counter. This will require a relatively high cost to buy paper to print the tickets.

1.3 OBJECTIVES

The main purpose of this project is to produce an application that can help ease to solve all the problems of purchasing bus tickets for any journey. Therefore, the objectives to reach the goal are as follows:

- a) To analyze and design e-ticketing application based on QR Code technology.
- b) To develop an application that utilizes QR-Code that supports express bus. Integrated e-ticket and to improve the management process in generating reports easily and systematically.
- c) To test the functionality of e-ticketing system based on QR code technology.

1.4 Project Scopes

Project scopes often help in determining the focus of a project and making the development more organized and systematic. For this project, the scopes are divided into two parts that are category of users and system functionality.

Scope of User

- 1. Conductor:
 - a) Scan passengers QR code
- 2. Passengers:
 - a) User Registration
 - b) Buying e-tickets with QR code

1.5 Limitation

- a) Passenger who does not sign up in this app cannot buy a bus ticket.
- b) Passenger cannot change their seat after complete their payment.
- c) Conductor cannot update their information.

1.6 Expected Result

The expected result for the Smart Bus Ticket Using QR Code app is the passengers are able to make their booking through passenger's mobile phone. Conductor able to scan the passenger's ticket using QR Code. To achieved the objective for this system which is to implement the application for the users and improves the management process in generating reports easily and systematically.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Literature Review discuss the researchers and analysis of already existing systems and implementation of possible technique and method to use in this project. This is done to help determine the best possible technique and methods so that the feasibility of the project can be determined. In this project, the topics related are the attendance system, QR-code implementation in academic problems. As these topics related closely in this project, the researchers are made as to make it references to develop the Smart Bus Ticket App.

2.2 Project and Research

2.2.1 Researches on QR-Code

QR-Code has been used widely nowadays since it improves the need of mobility of other materials such as business card, flyers and pamphlets. As the usage is spreading fast, the essentials of scanning QR-Code has been so much widely implemented in most of the devices used today especially mobile phones. Therefore, I choose to implement and use this technology in my project to increase the values and to keep up with latest techs used.

2.2.1.1 QR-Code Information contain

By their very nature, QR codes (and other data matrix codes) are meant to be read by machines, not humans, so there's only a certain amount we can tell just by looking at them. Although each code is different, they contain a few interesting, common features.



- 1. Quiet zone:** An empty white border that makes it possible to isolate the code from among other printed information (for example, on a dirty envelope, among the black and white print of a newspaper, or on smudged product packaging).
- 2. Finder patterns:** Large black and white squares in three of the corners make it easy to confirm that this is a QR code. Since there are only three of them, it's immediately obvious which way up the code is and which angle it's pointing at (unless the code is partly obscured or damaged in some way).
- 3. Alignment pattern:** This ensures the code can be deciphered even if it's distorted. (Viewed at an angle, printed on a curved surface, and so on).
- 4. Timing pattern:** This runs horizontally and vertically between the three finder patterns and consists of alternate black and white squares. The timing pattern makes it easy to identify the individual data cells within a QR code and is especially useful when the code is damaged or distorted.
- 5. Version information:** There are various different versions of the QR code standard the version information (positioned near two of the finder patterns) simply identifies which one is being used in a particular code.
- 6. Data cells:** Each individual black or white square that's not part of one of the standard features (the timing, alignment, and other patterns) contains some of the actual data in the code.

2.2.1.2 Applications for QR-Codes

While QR codes gained recognition due to their increasingly widespread use in marketing and consumer-facing applications, they can also be useful in industrial applications, such as:

- 1. Operational Instructions** - QR codes can be used to convey operating instructions, procedures, and other information necessary for operating heavy equipment.

2. Facilities management - They can be used to document schematics and other instructions for plumbing, wiring systems, and alarm systems, providing an easy way to communicate these details to contractors or maintenance workers.

3. Maintenance and repairs - QR codes may be used to submit requests for maintenance service or as a way to easily document that routine maintenance has been performed, creating a complete audit trail of service and repair records.

4. Regulatory compliance - In industrial applications, equipment and machinery often requires periodic inspection, regular maintenance, and permits or licenses to comply with regulatory requirements. QR codes can be utilized to store this information and make it readily accessible.

2.2.1.3 Advantages of QR-Code

The QR code has many advantages over a conventional barcode, however. The main advantage is that you can store up to a hundred times more information on a QR code than on a conventional horizontal barcode. In addition, QR codes can be scanned from any direction for 360 degrees. This makes them easier for your device to read and lessens the possibility of background interference.

The third main advantage is that from a marketing point of view, the code's appearance is unique and interesting, increasing the likelihood of engaging the customer in any campaign where it might be deployed.

A QR code reader can be downloaded onto a smartphone by anyone, and they are mostly free of charge. This means that any customer can walk into your business with his or her smartphone, and scan a QR code which you have generated. An Android user can use something like QR Code Reader, and an iPhone user can download the Quick Scan app. Both are free of charge.

2.3 Summary

This study is made to act as guide for successful mobile application development as it will provide a better understanding both on the problem and solution faced.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter discusses the methodology of this system which includes the model used for developing the system, and system requirement. The development model and Gantt chart are known as the basic step to plan and execute the project systematically and makes sure the progress is on track. To help understanding the system better, this chapter also explains the system designs which are Context Diagram and Data Flow Diagram and database design which are Entity Relationship Diagram and database scheme.

3.2 Prototyping Methodology Model

The prototyping model is applied in this development of the system because when detailed information related to input and output requirements of the system is not available. In this model, it is assumed that all the requirements may not be known at the start of the development of the system. It is usually used when a system does not exist or in case of a large and complex system where there is no manual process to determine the requirements. This model allows the users to interact and experiment with a working model of the system known as prototype. The prototype gives the user an actual feel of the system. At any stage, if the user is not satisfied with the prototype, it can be discarded and an entirely new system can be developed.

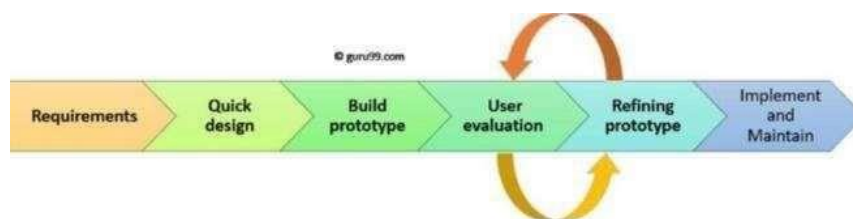


Figure 3.1: Prototyping Model

3.2.1 Requirement Gathering and Analysis

All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification document. In this project, requirements are captured by doing researchers on previous works and existing systems. Literature review is done to get more information and requirements to be fulfilled.

It is also done by comparing techniques, algorithms and methods to implement in this project. As I mentioned above, I would like to propose a Mobile Application therefore some research on existing Mobile apps is also being done to get requirements needed in this system. At the end of this phase, objectives, scope and limitation of work are determined.

3.2.2 Quick Design

In this phase, context diagram (CD) data flow diagram (DFD), entity-relationship diagram (ERD) and framework are designed. These help to understand the process flow of the system. Any changes might occur during development according to system requirements. It is not a detailed design and includes only the important aspects of the system, which gives an idea of the system to the user. A quick design helps in developing the prototype.

3.3 Requirement Analysis

Requirement analysis results in the specification of software operational characteristics includes software interface with other system elements and establishes constraints must meet requirement analysis allows the software engineer sometimes called an analysis or model. In this role to elaborate on basic requirement established during earlier requirement engineering task and builds needs that depict user serious functional activities, problem classes and their relationships, system & close behavior, and the flow of data as it is transferred.



Figure 3.2: Flow of data

Requirements Analysis is the process of defining the expectations of the users for an application that is to be built or modified. It involves all the tasks that are conducted to identify the needs of different stakeholders. Therefore, requirements analysis means to analyses, document, validate and manage software or system requirements.

High-quality requirements are documented, actionable, measurable, testable, traceable, helps to identify business opportunities, and are defined to a facilitate system design.

3.3.1 Software Requirement Specification [SRS]

- Operating system
 - Windows 10 and others.
- Front End
 - Java, Android Studio
- Backend Database
 - Google Firebase
- Browser
 - Chrome, Internet Explore and any other

3.3.2 System Requirement

3.3.2.1 Hardware

- Laptop
- Printer
- Android Phone
- USB Cable

3.3.2.2 Software

- Android Studio
- WPS Office Word 2019
- Fire store

3.4 Android Studio Overview

Basically, Android Studio is a platform that most Android apps developer used today to develop Android apps as it is designed specifically for Android development. Based on IntelliJ IDEA, it is the official Integrated Development Environment (IDE) for Android app development and it is available for download on Windows, Mac OS and Linux.

Android Studio requires the understanding of two basic programming languages which are Java Object-Oriented Programming for controlling all the processes that you desire the apps to do and XML mark-up language for controlling the design of apps layout.

One of the advantages of using Android Studio when developing an app is that it provides the Android Virtual Device which eases the process of developing where you can check from time to time the appearance and functionality of your app. But need to run the emulator smoothly on your laptop is that Android Studio requires the minimum of 8GB RAM from your laptop. Another alternative for running the emulator while developing the apps is to run it on your own device. But you need to activate the Developer Options by clicking on the Build number of your device form the About phone section in Setting 7 times and turn on the USB Debugging for the emulator to find and run on your own device.

3.5 Functionality

1. Scan passengers QR code

The conductor will scan the passenger's QR code whether the ticket is valid or not

2. User Registration.

Passenger needs to register first before using this app by submitting their details such as user name, password, phone number, age, etc.

3. Buying e-Tickets with QR code.

Passenger will be given QR code that will be generated directly from the details of the ticket that they wish to purchase.

3.6 Functional Requirement

Requirement 1- ADMIN:

3.6.1 ADMIN Login-

In this login screen the admin had to login using his/her user credentials and passwords. New Admin personal can create a new admin login also.

3.6.2 ADMIN Menu Screen-

In this screen all the operators or functions will be present as:

3.6.2.1 Account Verification

3.6.2.2 E-Pass Applications

3.6.2.3 Log Out

3.6.3 USER's Information for ADMIN-

Admin can view the passenger's details and applications given for the passes. Admin can approve and reject if the applications are not completely filled or the information are not complete by the user/passenger. These figures also show the pending and approved passenger list. It also shows the list of users that has registered on the mobile application. If the user forgot their password, they can contact the admin and the management, after that the admin will recover the data and ask the user to sign up again.

Requirement 2- USER:

3.6.2.1 USER Login –

In this login screen the user had to login using his/her user credentials and passwords. New user personal can create a new user login account by giving the information also.

3.6.2.2 USER Homepage and Personal Details Page –

After signing up the user had to give his/her correct personal details by filling the details and giving the traveling details as well, the user had to provide the College or Office details with the identity card or office ID for the verification process. The user had to submit the details and submit it for the verifications and validation process for approximately 24 Hours.

3.6.2.3 Verification Page for the USER –

After the detailing and filling the required information the user details are now verified by the admin. The users' card and every information are verified by the admin in every sense and approved and rejected on the information given base. The verification process takes up to 24 hours.

3.6.2.4 Verified Account USER Page with the QR Code –

After successful verification user will get QR code. User can easily travel with the help of QR code only. Unique Id is generated for each and every user using the application.

Requirement 3- CONDUCTOR:

3.6.3.1 CONDUCTOR's QR Code Scanner-

The conductor will have to give the permission for using the phone's camera for scanning the QR-Code provided by the user for the verification process is she/he is a valid user or not, or are they even allowed to travel within the bus.

3.6.3.2 Verified Passenger Notification-

The conductor will scan the QR-Code which are given to the verified user and approve the user to travel in the bus. After the scanning of the QR-Code the conductor will be notified if the user/passenger is valid user or not.

- > QR code contains:
 - > User Details
 - > Source & Destination
 - > Date and Time of booking
 - > Total Fare

3.7 Non – Functional Requirement

Performance defines how fast a Software system or its particular piece responds to certain users' actions under certain workload.

Availability describes how likely the system is accessible for a user at a given point in time

3.8 System Designs

Systems design is the process of defining elements of a system like modules, architecture, components and their interfaces and data for a system based on the specified requirements. It is the process of defining, developing and designing systems which satisfies the specific needs and requirements of a business or organization.

This is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering.

3.8.1 Architectural Diagram

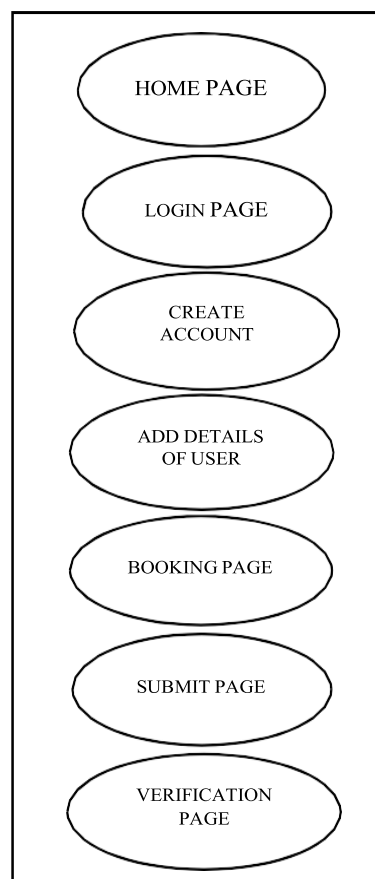


Figure 3.3 Architectural diagram of Smart bus app.

3.8.2 Framework Design

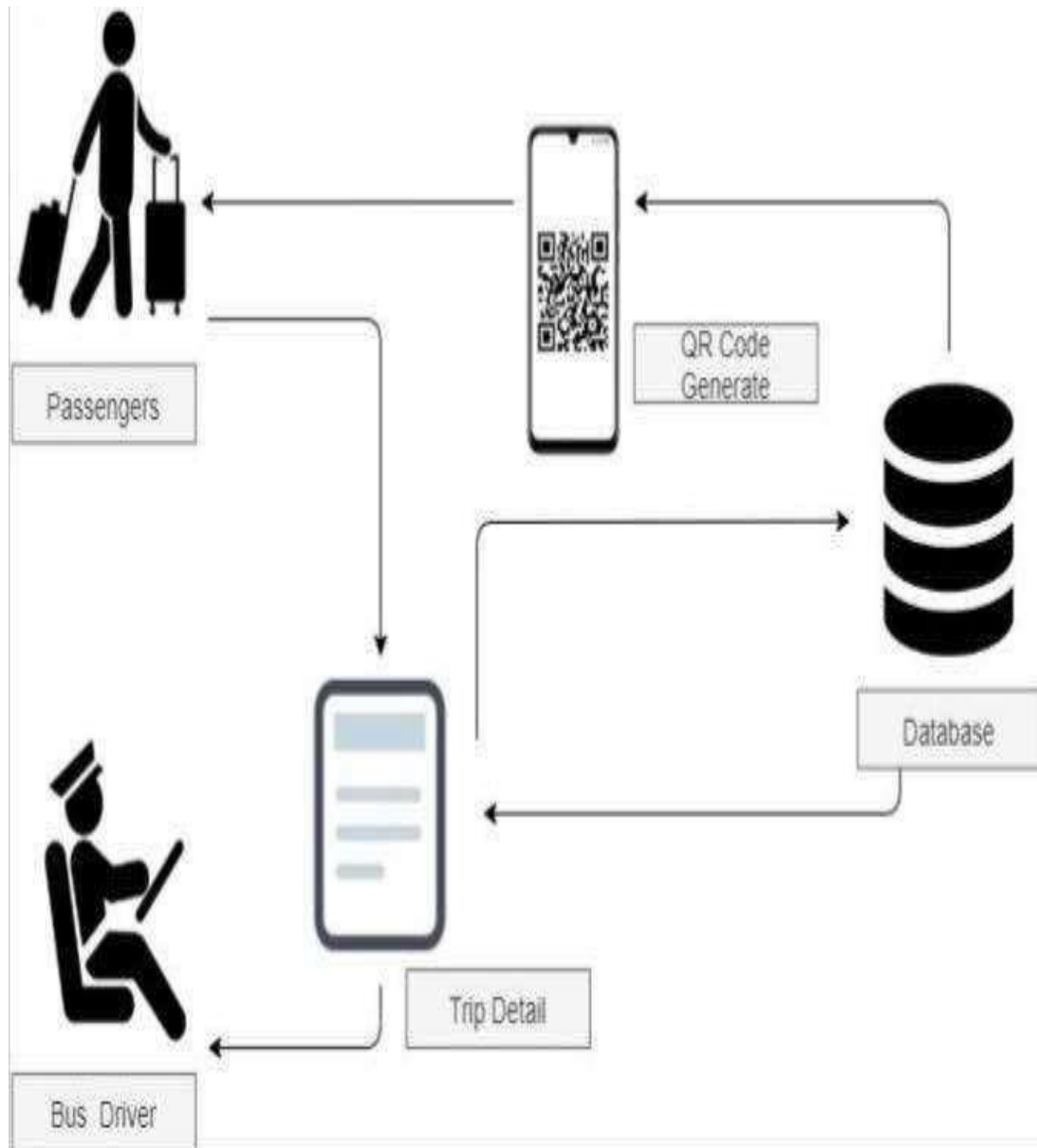


Figure 3.4: System Framework for Smart Ticket Bus Using QR Code

3.9 Process Model

3.9.1 Context Diagram

CONTEXT DIAGRAM

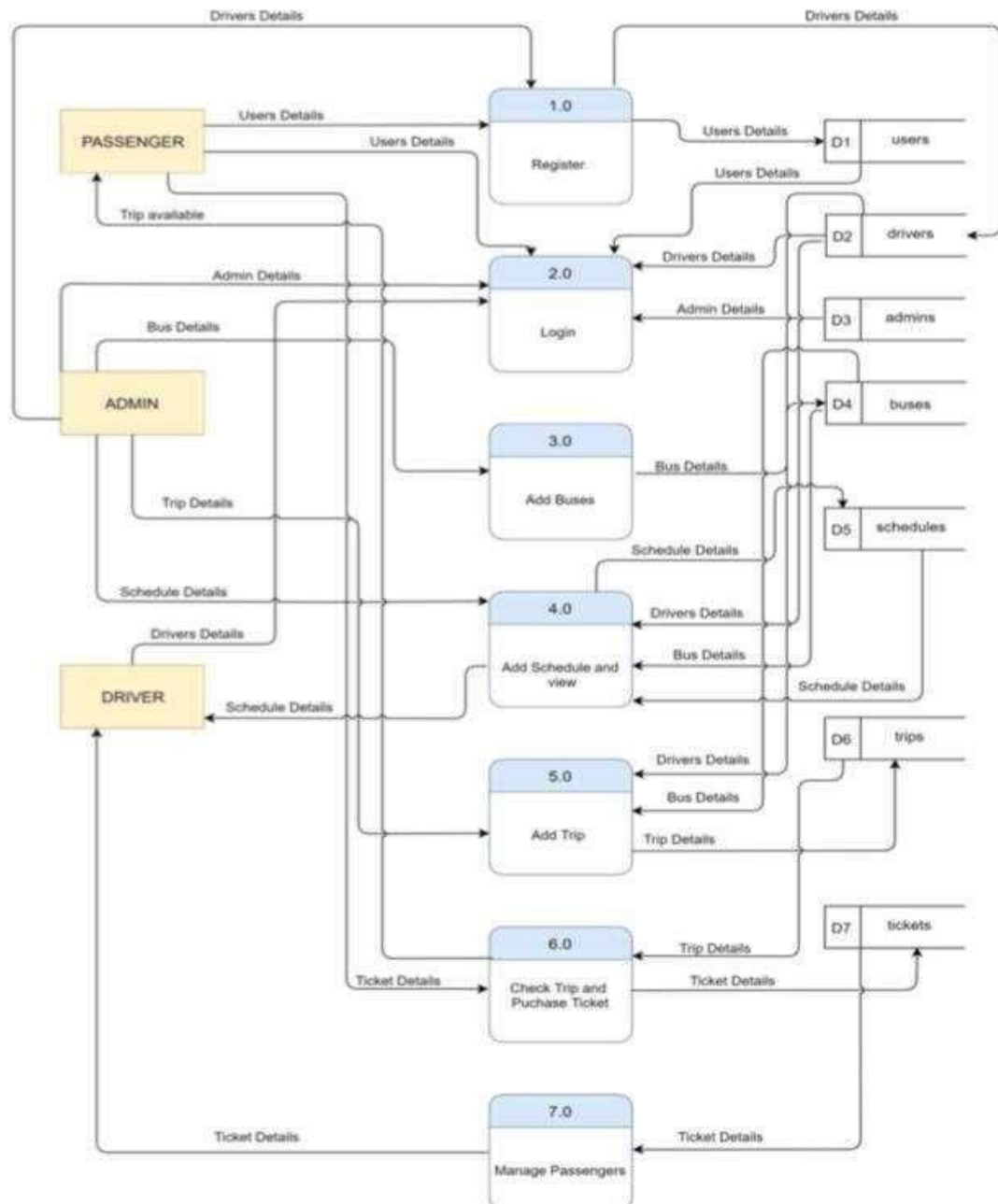
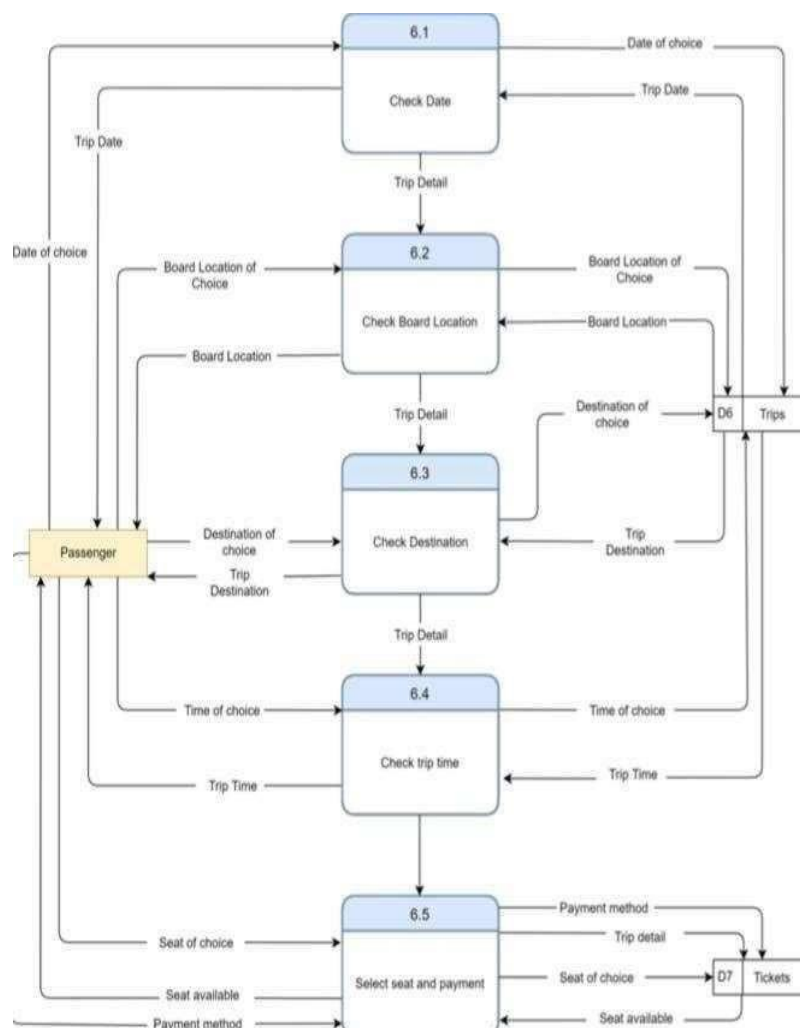


Figure 3.5 (a): Data Flow Diagram

The above diagram shows the data flow diagram with seven processes and seven data stores. The three entities which are passenger, admin and driver.

All entities will be involved. As for individual entity, passenger involves in the process register, login and check trip and purchase ticket. For admin, processes involved is registration for bus driver, add trip or destination. Each data store saves details based on the processes involved. For data store D1 Users, the processes the involve are register and login from the entity Passenger. For data store D2 Drivers and D3 Admins save the details from login processes for each entity. For data store D4 Buses. The bus over 12 years used need to be removed also admin can add new buses and update bus information. Data store D6 Trips, save the details from add new trip or destination processes and the process that involves are check trip and purchase ticket from the passenger. The driver can also view the trip details and driver schedule from data store D5 and D6. On the other hand, for data store D7 Tickets, is the data store that involved in the process check trip and purchase ticket from entity passenger and manage passenger from Entity driver

Figure 3.5 (b): Data Flow Diagram (Level 1)



The above data flow diagram shows the processes and data stores involve under the process purchase ticket in data flow diagram level 0.

There are five processes and two data stores involved. The processes are check date, check board location check destination, check trip time, Select seat and payment.

On the other hand, the data stores are D6 Trips and D7 Tickets

3.9.2 User-Admin Diagram

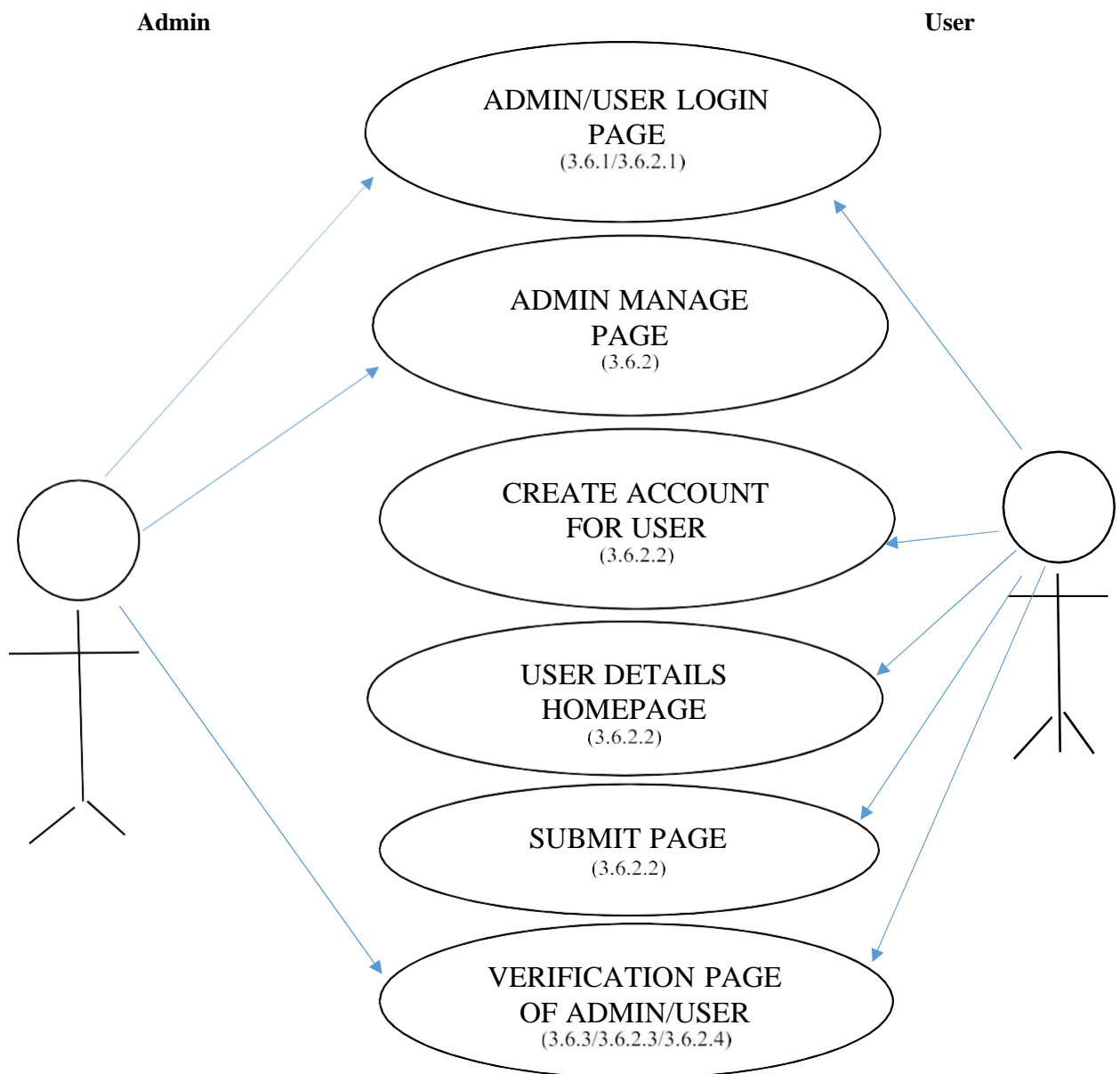


Figure 3.6: User- Admin Diagram

3.9.3 Working Procedure Diagram

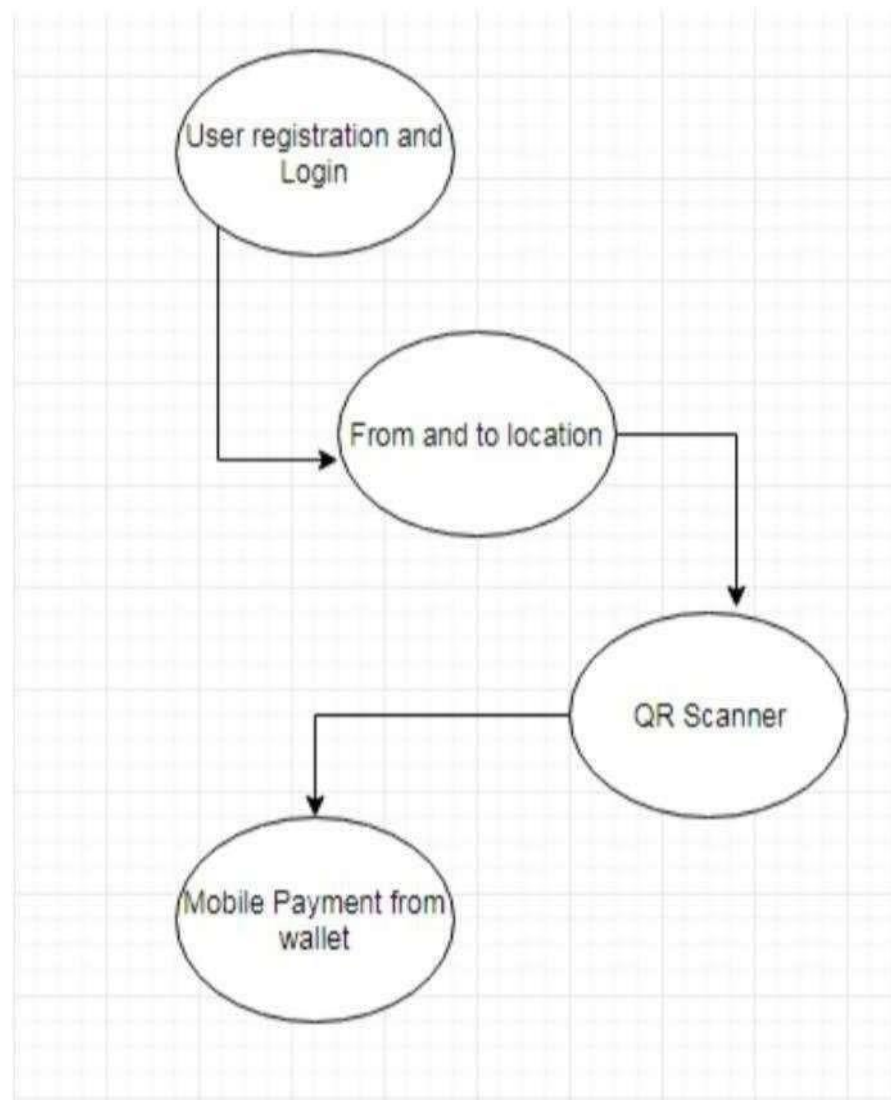


Figure 3.7: Procedural work flow of the application

3.9.4 Sequence Diagram

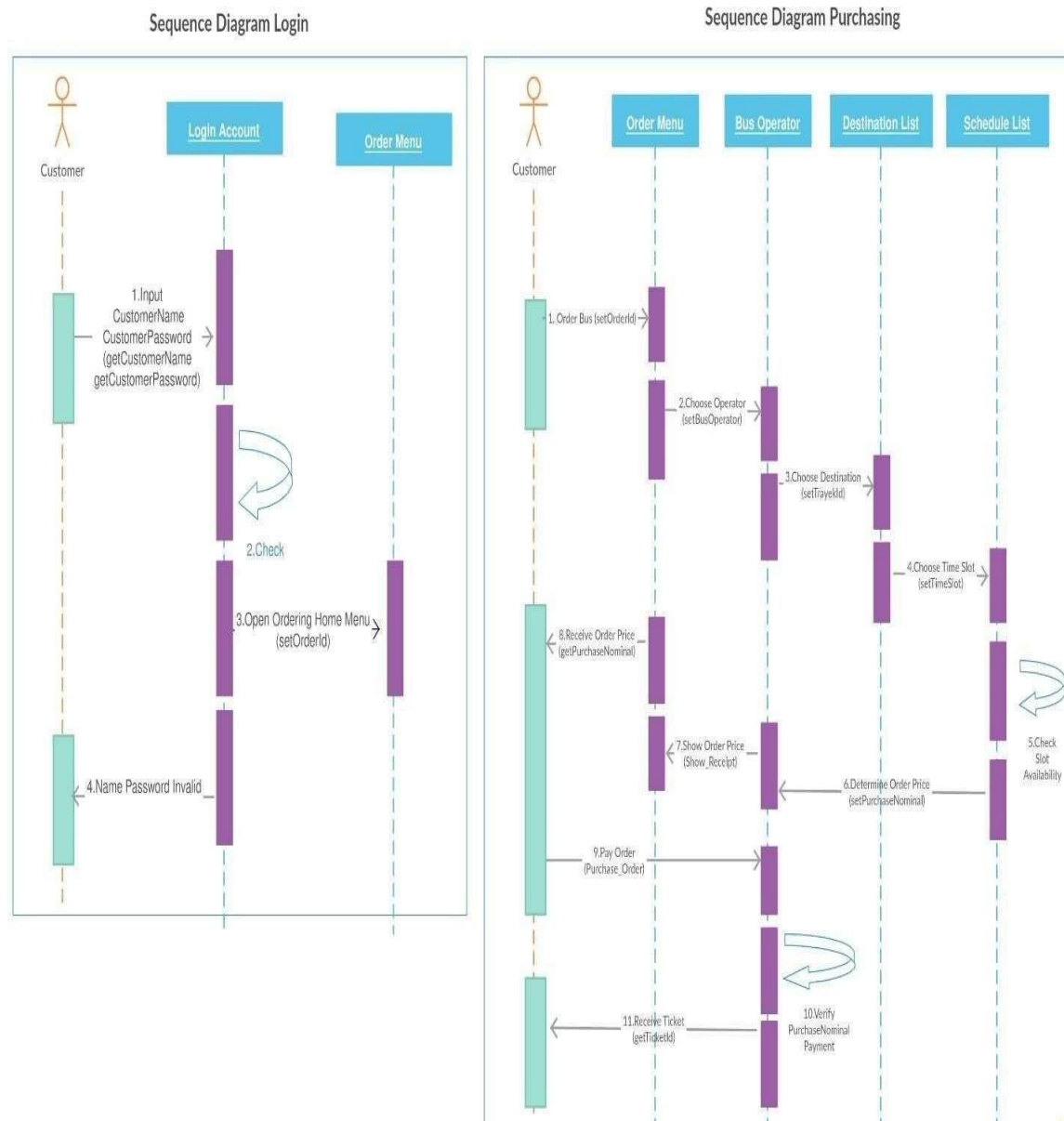


Figure 3.8: Sequential Diagram

3.10 Data Model

3.10.1 Entity Relationship Diagram

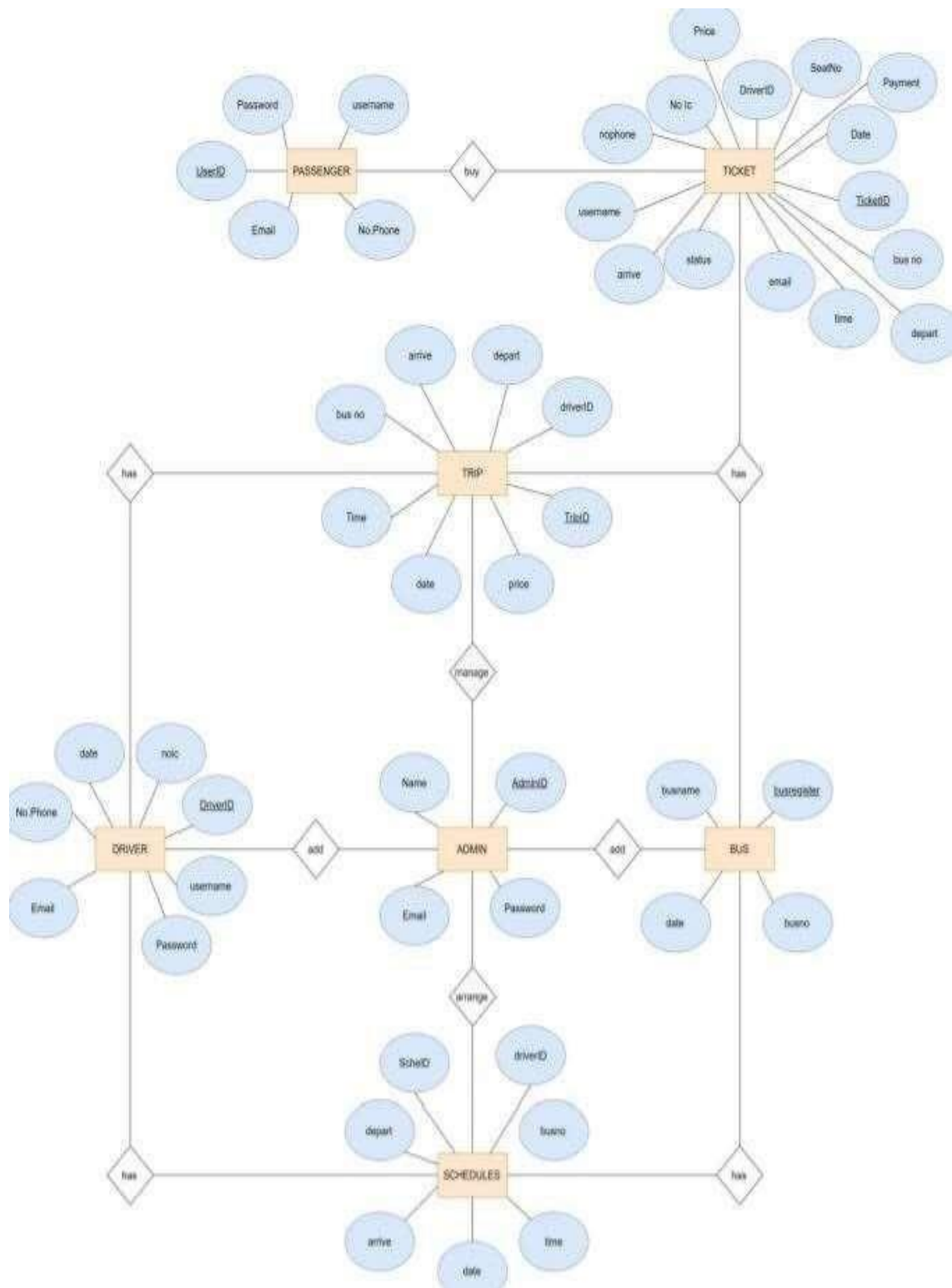


Figure 3.9 Entity Relationship Diagram for the Smart Bus ticket using QR Code

3.11 Summary

In this chapter, it talks about the methodology that is used for Smart Bus Ticket Using QR Code and explains the Project Life Cycle Phase. It also explains the hardware and software requirement that are used in this project. All of this information can facilitate the application development process.

Besides, this chapter also discuss on the User admin Diagram, Data Flow Diagram and Entity Relationship Diagram of the mobile application which are essential asa guideline for the application development.

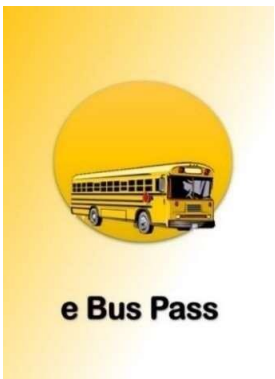
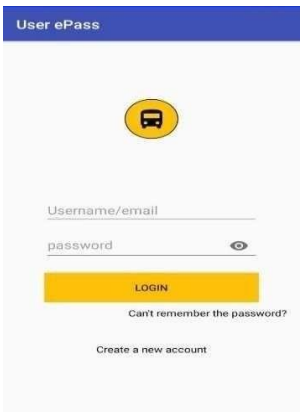
CHAPTER 4

IMPLEMENTATION AND RESULTS

4.1 Introduction

This chapter discusses the implementation phase and the results from the developed project. The subtopics that will be included in this chapter are the interfaces of the project with further explanation about each of them. This chapter also discusses the results of the developed project and what has been achieved.

4.2 USER

<p>1)</p>  <p>Figure 4.1: START AND LOGIN FOR USER</p> <p>2)</p>  <p>Figure 4.2: HOME PAGE AND REGISTRATION FOR USER</p>	<p>1. Start screen will remain 2 to 3seconds after the application is started.</p> <p>2. In this login screen the user had to login using his/her user credentials and passwords. New user personal can create a new user login account by giving the information also.</p>
---	---

3)

User ePass

Personal Details

First Name:
First Name

Middle Name:
Middle Name

Last Name:
Last Name

Gender: ☒ Male ☐ Female

Travelling Details

From:
Starting Location

To:
Destination location

College Details

College:

SUBMIT DETAILS

Figure 4.3: MENU FOR BOOKING OF USER

4)

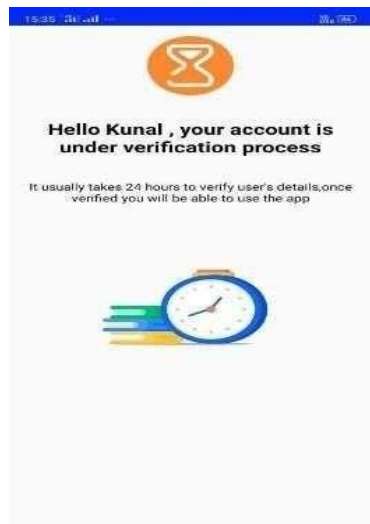


Figure 4.4: VERIFICATION PAGE FOR USER

1. After signing up the user had to give his/her correct personal details by filling the details and giving the traveling details as well.

2. The user had to provide the College or Office details with the identity card or office ID for the verification process.

1. The users' card and every information are verified by the admin in every sense and approved and rejected on the information given base.

2. The user had to submit the details and submit it for the verifications and validation process for approximately 24 Hours.

5)



Figure 4.5: VERIFIED ACCOUNT USER PAGE WITH QR CODE

After successful verification user will get QR code. User can easily travel with the help of QR code only. Unique Id is generated for each and every user using the application.

4.3 ADMIN

1)

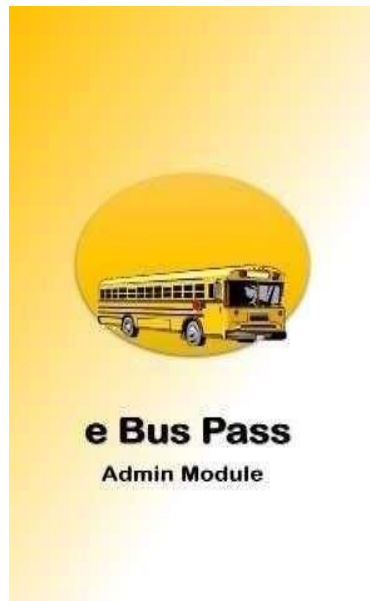


Figure 4.6: START SCREEN FOR ADMIN

This is start screen of admin module. It starts with the logo of application and will stay for about 2 to 3 second on screen when the screen will start.

2)

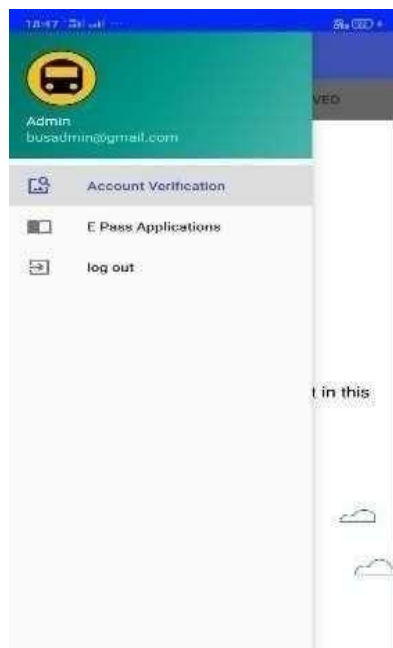


Figure 4.7: ADMIN MENU SCREEN

This Figure shows menu for admin. Here, are 2 functions which are account verification and E-pass applications.

3)

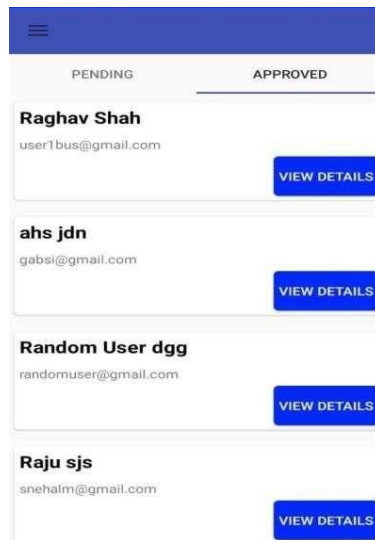


Figure 4.8: USERS' INFORMATION FOR ADMIN

4)

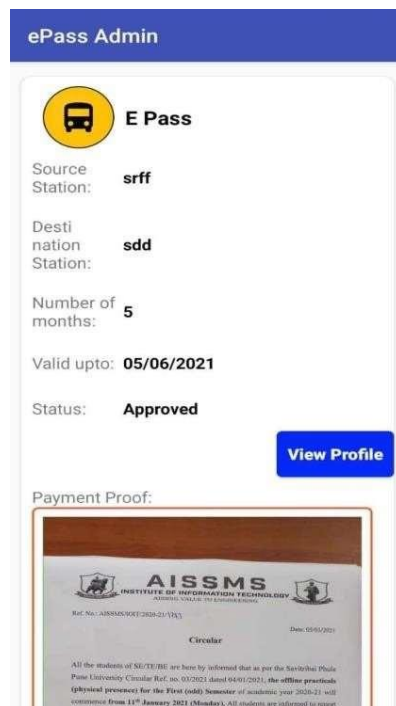


Figure 4.9: E-PASS VERIFIED PAGE FOR ADMIN

These figures also show the pending and approved passenger list. It also shows the list of users that has registered on the mobile application. If the user forgot their password, they can contact the admin and the management, after that the admin will recover the data and ask the user to sign up again.

Admin can view the passenger's details and applications given for the passes. Admin can approve and reject if the applications are not completely filled or the information are not complete by the user/passenger.

4.4 CONDUCTOR

1)

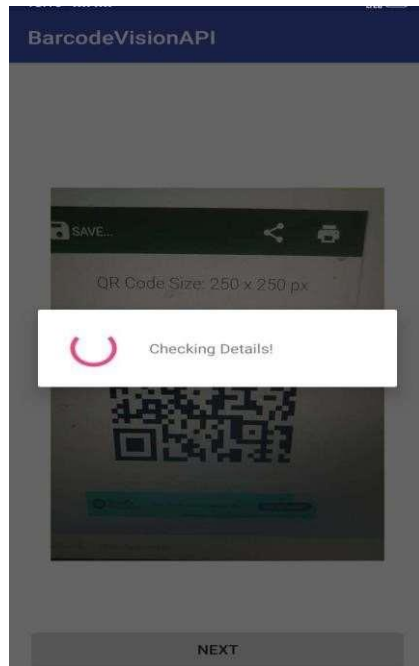


Figure 4.10: QR CODE SCANNER FOR CONDUCTOR

2)

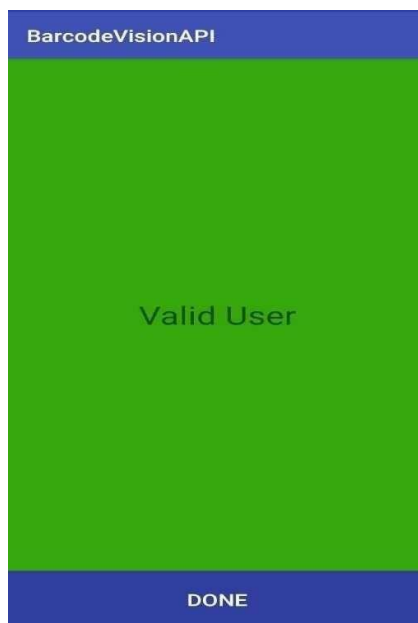


Figure 4.11: NOTIFICATION FOR VERIFIED PASSENGER/USER

In these figures, the conductor will scan the QR-Code which are given to the verified user and approve the user to travel in the bus.

QR code contains:

- > User Details
- > Source & Destination
- > Date and Time of booking
- > Total Fare.

After the scanning of the QR-Code the conductor will be notified if the user/passenger is valid user or not.

4.5 Summary

In this chapter, the interfaces of the system that help the user to interact with the system. Besides that, the testing approach is the methods that are used for test the functional and nonfunctional of the system for each main module on the system by using the test case.

CHAPTER 5

CONCLUSION

5.1 Introduction

This chapter will discuss a conclusion of this project and the content on this chapter are summary for the whole of this project, project contribution, and some suggestion for the future.

5.2 Project Contribution

Smart Bus Ticket Using QR Code have been developed for user to solve the issue of users might lose the printed tickets purchased and helping the staff management to reduce the cost to buy paper to print the tickets. This project has been proven to help passengers in saving them from spending more time and effort just to go to the ticket counter to purchase tickets. It has achieved the objectives and scope that were stated in this project.

5.3 Conclusion

The paper summarizes the current issues in bus ticketing system. To overcome from this, we are working towards android platform. We have identified the current gaps and open research areas. Our research will focus on these open problems and propose effective solutions for the same.

This paper introduces on how to secure passenger information. To overcome the drawbacks of manual ticketing system we are using QR-Code for security purpose of passengers' information in the propose system.

QR-Code provides all the features which make it a valid technology for mass public transport ticketing: contactless transactions at high speed, stability and simplicity.

The proposed solutions based on combinations of standards and technologies using current contactless infrastructures. Our proposed application will be feasible for novice users as well as professional users. The proposed application will be used for the bookinga ticket without standing in queues for travelling through bus.

This android application reduces the manual work of both ticket bookers and ticketcheckers. It is basically the transition from a manual to digital system for ticket booking of as well as ticket checking of bus.

Thus, the problem associated with bus ticket booking as almost solved. If aforementioned project is incorporated with present ITS system, then it will be manifest to figure out the passenger movement at each stop.

Depending on passenger density at a circumstantial time the authority can assign ample number of buses for that route and when passenger count is less the unnecessary stops can be cancelled.

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