



Daffodil
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Project/Thesis/Intern Title

Digital Tolling

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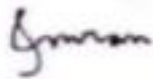
This Project report has been submitted in fulfillment of the requirements for the
Degree of

Bachelor of Science in Software Engineering.

APPROVAL

This thesis/project/internship titled on “Title”, submitted by Student_Name, ID: 172-35-abc to the Department of Software Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Software Engineering and approval as to its style and contents.

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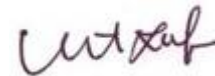
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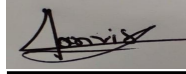
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DECLARATION

I am hereby declare that I have taken this project under the supervision of **Farhan Anan Himu, Department of software Engineering**, Daffodil International University. I am also declare that neither this project nor any part of this has been submitted elsewhere for award of any degree.

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ABSTRACT

This project name is Digital tolling- an android based mobile application for toll billing system. Mainly, Drivers of many type of vehicle like bus, mini bus, taxi, truck, lorry truck, bikes etc. can create an account and easily can pay the toll bill in different flyovers and bridges. There are many bridges and flyovers in different cities and highways. Most busy flyovers and bridges are Mayor-Hanif flyovers, Japan Bangladesh bridges, Bangabandhu Bridge etc. In these flyovers and bridges take toll bill manually. But it is not digitally. We can see, others developed country don't use hand cash in toll bill. They used different type of payment gateway. So this project is digitally and drivers can pay toll bill by scanning a QR code. Mainly, this project has two parts. One part is for user application And Second part is for admin panel can

control the transactions. This project will be very useful because it will reduce hand-cash billing system in flyovers and bridge.

TABLE OF CONTENTS

CONTENTS	PAGE
Board of examiners	i
Declaration	ii
Acknowledgement	iii
Abstract	iv
CHAPTER	
CHAPTER 1: INTRODUCTION	1-2
1.1 Introduction	1

1.2 Motivation	1
1.3 Objective	1-2
1.4 Expected Outcome	2
1.5 Report Layout	2
CHAPTER 2: BACKGROUND	3-5
2.1 Introduction	3
2.2 Related Work	3-4
2.3 Comparative Studies	4
2.4 Scope of the Problem	4
2.5 Challenges	5
CHAPTER 3: SOFTWARE REQUIREMENT SPECIFICATION	6-10
3.1 Business Process Modeling	6
3.2 Use case Modeling and Description	7
3.3 UML Diagram	8
3.4 ER Diagram	9
3.4 Logical Data Model	10
3.5 Design Requirements	10
CHAPTER 4: SDESIGN SPECIFICATION	11-34
4.1 Front End Design	11-33
4.2 Back End Design	34
4.3 Interaction Design and UX	34
4.4 Implementation Requirement	34
CHAPTER 5: IMPLEMENTATION AND TESTING	35-36
5.1 Implementation of Database	35
5.2 Implementation of Front-end Design	35
5.3 Implementation of Interaction	35
5.4 Testing Implementation	35

5.5 Test Results and Reports	36
CHAPTER 6: CONCLUSION AND FUTURE SCOPE	37-39
6.1 Discussion and Conclusion	37-38
6.2 Scope for Further Developments	38-39
APPENDIX	40-41
REFERENCE	42

LIST OF FIGURES

FIGURES	PAGE NO
Figure 3.1: Business process modeling of digital tolling system.	6
Figure 3.2: Use case modeling of digital tolling system.	7
Figure 3.3: UML diagram of digital tolling system.	8
Figure 3.4: ER diagram of digital tolling system.	9
Figure 4.1: Screenshot of our application icon.	11
Figure 4.2: Screenshot of user Sign in option	12
Figure 4.3: Screenshot of Sign In with E-mail	13
Figure 4.4: Screenshot of Sign In with Phone Number	14
Figure 4.5: Screenshot of Phone number with country codes	15
Figure 4.6: Screenshot of Phone number verification by OTP code	16
Figure 4.7: Screenshot of user sign up option	17
Figure 4.8: Screenshot of Create a New Account Via E-mail	18
Figure 4.9: Screenshot of vehicle registration	19
Figure 4.10: Screenshot of Vehicle Category Selection	20
Figure 4.11: Screenshot of home page	21
Figure 4.12: Screenshot of side bar navigation	22
Figure 4.13: Screenshot of Scan QR code	23
Figure 4.14: Screenshot of Getting Bill of Registered Vehicle QR Code	24
Figure4.15: Screenshot of payment method	25
Figure 4.16: Screenshot of Payment pending for admin confirmation	26
Figure 4.17: Screenshot of Payment Confirm Notification	27
Figure 4.18: Screenshot of Payment Rejected Notification	28
Figure 4.19: Screenshot of toll bill list of bridges	29
Figure 4.20: Screenshot of history of toll bill transaction	30
Figure 4.21: Screenshot of user profile	31
Figure 4.22: Login Page on Admin panel in web application	32
Figure 4.23: Transaction List on Admin panel in web application	33

Chapter: 01

Introduction

1.1 Introduction

The Project is an android based project. Digital tolling system application is a mobile application that is used to pay money using online payment method. First of all, when we design our project xml file, we have made some plan. Because, this application will use drivers of different vehicles. So, the UI design must be user friendly and the activity have to easily understandable. Basically this project is divided into two part. One part is user part that will be used by driver or user. And other part is for transaction control will be used by admin officers. User can login, registrations, scan and pay money by this application. Admin officer can control the transaction. If all is ok with payment he will give the permission for passing tollbar. It will be very useful to reduce hand-cash and retail money.

1.2 Motivation

Actually, when I am journey by bike in a highway, that time I were facing some financial problem. Those time the toll man need to get money but have not any retail money to pay the bill. One day when we were in a journey by bus in Bangabandhu bridges then I also faced same problem. That's why I an more stressed with this question. Since I noticed this issue, we tried to solve it at first level for me. The fundamental problem helped me ready for this application. At such a period, I found opportunities to help them by developing a mobile app where user can pay the bill online and easily without any sufferings.

1.3 Objective

The main goals under the android applications are:

- i. I want to reduce the suffering of hand-cash transactions.
- ii. I want to reduce the suffering of retail cash about toll bill.
- iii. A user-friendly interface where the drivers can easily login and registration for paying money for selected bridges and vehicles.
- iv. It is fully digital platform for paying money in online payment gateway.
- v. This helps precludes to waste time on retail cash misery.

- vi. Drivers can add their vehicle type, vehicle color, plate no in their profile.
- vii. To promote, polite and very well organized bridge and flyover toll billing system.
- viii. It will make safe and comfortable our road journey.
- ix. User can see the transaction history.

1.4 Expected Outcome

I want to run this project from help in ICT division. I expect the result of my project to be completely correct and precise. The major infrastructure accessible for the toll charts in each bridge and flyover in this project. User should feel more comfortable paying toll bill by applying this application. In this time I want to work with government level of all bridge and flyover in full Bangladesh. I want produce at least 10,000 clients in one year.

1.5 Report Layout

A complete description of My process and related activities and terminology will be slowly provided in this mobile application. In chapter 1, I discuss about introduction, motivation, objectives, expect outcome of my project. In chapter 2, I discuss introduction, related work, comparative studies, scope of the problem and challenges. This chapter I am talking about main focus and backdrop of the project. In chapter 3, I design and poised business process modeling, Use case modeling and description, UML diagram, ERD diagram, Logical data model, design requirement in my project. In chapter 4, I am gives front end design, back end design and implementation requirement in our project. In chapter 5, I described implementation of firebase database, interaction, testing result and report of my project. In chapter 6, I am described discussion and conclusion and limitation of this application. This chapter I am talking about conclusion, future work and limitation of my project.

Chapter: 02

Background

2.1 Introduction

This is an android application which is online toll billing app people by android mobile scanning QR code and that's reduce hand cash problem. In this project I am worked some month or days in field level. I am talking about my project with bus drivers, truck drivers, CNG drivers. They were very much interested to using this method or application. I'm described my project with some general people also. They were appreciated in this project. I am stated to collect some information and toll bill list of each bridge. After completing my work in field level then I am started my main flow of work. First of all I design front end and then started working in back end. Then started admin panel work in web-based platform using firebase database [5]. I am so much excited for this project because I am facing this problem in bridges and flyovers.

2.2 Related Work

When I want to do that since one year ago this was very unique idea in Bangladesh scenarios. But few months ago, I noticed that nexus-pay dutch bangla bank have already generated a method for toll bill. When the vehicle passed away the toll plaza the system will take a photo and scan. The toll bill automatically paid. But this venture is not operates so popularly. Because of every driver have created a bank account and use his license and plate no data. This is not so easy method for drivers or users. But in my application user can create an account and can complete vehicle registration at a very short time. They will scan QR code by scanner in toll plaza then complete their payment easily. Have many type of payment gateway application in our country like b-Kash, nexus-pay. Dutch Bangla bank make a system on nexus pay application [1]. Drivers or users make an account in their bank then he pay bill of bridges. It is so much difficult. When we worked in field level and talk about many different drivers like CNG, minibus, bus, car, truck drivers they were not interested on dutch bangla systems. Because, they have to open a bank account. But in my application they can easily pay toll bill. So it is very easy for user or drivers. [1]

In other hand we see an application Info Talk toll calculator. The methodology of this app is select start and end location. Then show bridge and calculate money of this bridge. In this application used a Google map. Here, user can select start location and end location by Google map. When users selected start and end location then, the app algorithms create a route and show next bridges or flyovers. [2]

2.3 Comparative Studies

I have developed my project to use it as a fully android based application benefits to satisfy the fantastic aspect of the problem. Nexus-pay for toll billing application is very simple that is used same feature. And it is not suitable and user friendly for user. So it is not used properly. The user level is very low. Many people or user could not use this application for her creating bank account. In the toll plaza user can scan by QR code. Split Data form QR Code using scanner [8]. Then a list of vehicle categories and toll bill will display in android mobile. It is very simple and user friendly. Comparison between such features is well established. Also I can see that some application also provide bad user functionality and terrible user interface design. But my application offer user friendly user interface design. I have unique properties that are not obtainable in any other application such as identification of phone numbers graphical views in my application.

2.4 Scope of the Problem

Student need to check for a lot of stuff, so they need to check other page or Google search. Yet accessing all the relevant document at a period is a very hard and its resource- consuming to do all those issue as well. So form this perspective, I want to build up a mobile application is very helpful that is payment gateway for user or drivers in bridges on her mobile in a single platform. Important and tough work is field work. Users were interesting about my project. But, some of user or drivers are not use smart phone. Then I described manual option will be ok. When I build my venture I need to so many field works. Simultaneously I need to spend in the toll place. I took about the toll list like bike 40 taka, small vehicle 120 taka and talk about the toll plaza man about our digital system.

2.5 Challenges

When I have to do some task, certain difficulties must be faced. If I choose to build up my project, I take my option into consideration. Neither task can be smooth at all. Likewise, I will face certain obstacle in order develop of my project. Expenditure in the first phase is a big problem for me. Another problem I face in the suitable compilation of information. In this venture, when I am working on admin panel, I faced some problem. The problem is user part android base and I am connected firebase database. But My admin part is web based admin panel. I could connect MySQL database easily. But my user part was connected firebase database so I wanted to connected firebase database with admin panel. This was very tough for me. Quality and portrayal application depend on user interface design and payment method. Payment is tough for me. I do based on user friendly service development with payment method in my project.

Chapter: 03

Software Requirement Specification

The specific need state what a framework must be completed. The specific requirement state what should be done together to overcomes the association incentive. Specific requirement are specific many type of model like business process modeling, Use case diagram, UML diagram, ERD diagram etc.

3.0 Functional Requirements

3.1 Business Process Modeling

The following figure 3.1, the activity begins by logging in. If the user already login then go home activity. When the user will complete login then he will go Menu activity. If user never login then he must be registration and login.

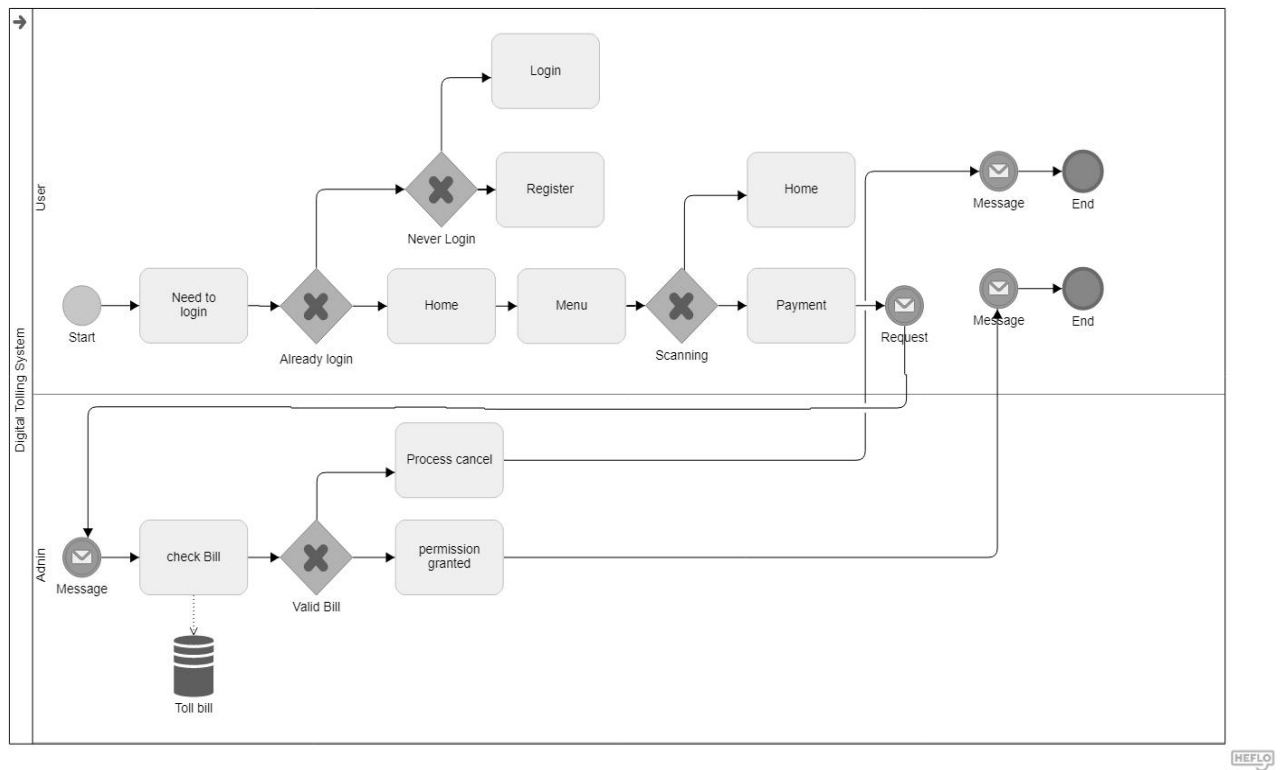


Figure 3.1 – The Business Process Model of digital tolling system

Notification will be passed to admin panel. Admin can check bill. If the bill is valid then he will assign permission granted otherwise the process is a cancel.

3.2 Use Case Modeling and Description

The use case proofing is a useful tool for securing preconditions. This provides visual overviews of the brand system. Use case model is very useful for our digital tolling bill android base mobile application. The following figure 3.2, this has two actors one is User and others is Admin and nine use case.

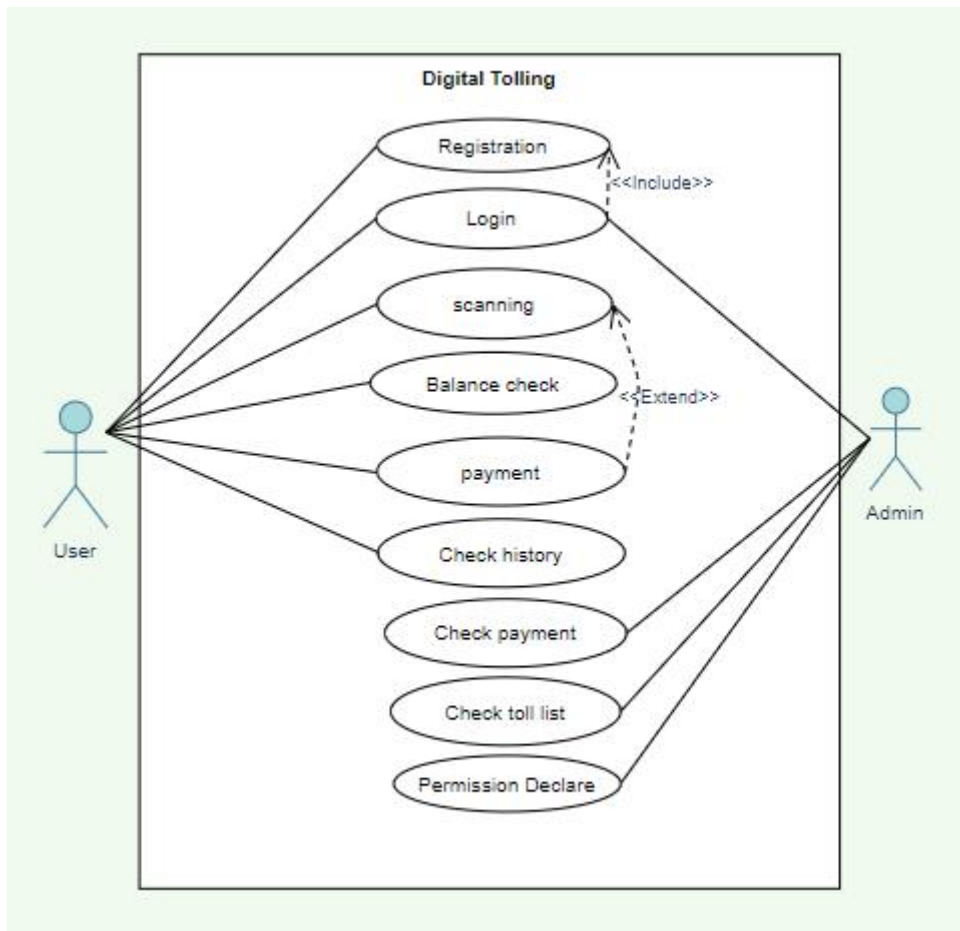


Figure 3.2 - Use Case Modeling of digital tolling system

In figure 3.2 architecture framework, user can login. If he can login then must be register in this system. So this relationship is a include relationship.

3.2.1 Identifying Use cases

UC-1: Registration

•UC-2: Login

•UC-3: Scanning

•UC-4: Balance check

•UC-5: Payment(user, Admin for check)

•UC-6: History

•UC-7: Toll list(User)

•UC-8: permission(Admin)

3.2.2

Use Case Id	UC-1
Use Case name	Registration
Scenario	User can registered to the system
Triggering event	If any user want to use clicked Sing Up button
Brief description	User can sign up where it should provide some basic information about user like First Name, Last Name, Email, Password and NID number .
Actors	User, Admin
Extending use case	None
Including use case	Registration
Stakeholders	Drivers, toll man
Pre-Condition	None
Basic path	1.Click on “Sign Up” on Home Page 2.Get Registration Page 3.Enter First Name 4.Enter Last Name 5.Enter Email Address 6.Enter NID number 7.Enter the Password 8. Re-Enter the Password 9. Select user type (which vehicle driver)
Alternative Path	None
Exceptional Path	None
Post-Condition	All the input values must be validate.

3.2.3

Use Case Id	UC-2
Use Case name	Login
Scenario	User can registered to the system
Triggering event	If any user want to login clicked Sing Up button
Brief description	User can sign up where it should provide some basic information about user like First Name, Last Name, Email, Password and NID number .
Actors	User, Admin
Extending use case	None
Including use case	Registration
Stakeholders	Drivers, toll man
Pre-Condition	Registration first
Basic path	1.Click on “login” on Home Page 2.Enter Email Address 3.Enter the Password
Alternative Path	None
Exceptional Path	None
Post-Condition	None

3.2.4

Use Case Id	UC-3
Use Case name	Scanning
Scenario	User can scan for pay to the system
Triggering event	When anybody want to pay.
Brief description	When anybody want to pay he need to scan first.
Actors	User
Extending use case	None
Including use case	payment
Stakeholders	Drivers,
Pre-Condition	Login first
Basic path	none
Alternative Path	None
Exceptional Path	None
Post-Condition	None

3.2.5

Use Case Id	UC-4
Use Case name	Balance check
Scenario	User can pay to the system and checking balance
Triggering event	After pay they can check balance.
Brief description	None
Actors	User, Admin
Extending use case	Payment
Including use case	Scanning
Stakeholders	Drivers, toll man
Pre-Condition	None
Basic path	None
Alternative Path	None
Exceptional Path	None
Post-Condition	All the input values must be validate.

3.2.6

Use Case Id	UC-5
Use Case name	Payment
Scenario	User can registered to the system
Triggering event	If any user want to use clicked scanning button .
Brief description	User can scan and pay.
Actors	User
Extending use case	None
Including use case	Scanning
Stakeholders	Drivers
Pre-Condition	None

Basic path	None
Alternative Path	None
Exceptional Path	None
Post-Condition	None

3.2.7

Use Case Id	UC-6
Use Case name	Check history
Scenario	User can registered to the system
Triggering event	If any user want to use clicked history button
Brief description	User & Admin Both can check history.
Actors	User, Admin
Extending use case	None
Including use case	Registration
Stakeholders	Drivers, toll man
Pre-Condition	None
Basic path	None
Alternative Path	None
Exceptional Path	None
Post-Condition	All the input values must be validate.

3.2.8

Use Case Id	UC-7
Use Case name	Check payment
Scenario	Admin need to login to the system
Triggering event	If any user want to use clicked Sing Up button
Brief description	Only admin can access that.
Actors	Admin
Extending use case	None
Including use case	Registration
Stakeholders	Drivers, toll man, admin
Pre-Condition	None
Basic path	None
Alternative Path	None
Exceptional Path	None
Post-Condition	All the input values must be validate.

3.2.9

Use Case Id	UC-8
Use Case name	Check toll list
Scenario	User can check toll list to the system
Triggering event	If any user want to use clicked Up to list button

Brief description	When user cross the road before pay they can check toll list.
Actors	User
Extending use case	None
Including use case	None
Stakeholders	Drivers
Pre-Condition	None
Basic path	None
Alternative Path	None
Exceptional Path	None
Post-Condition	All the input values must be validate.

3.2.10

Use Case Id	UC-9
Use Case name	Permission declare
Scenario	Only for admin
Triggering event	None
Brief description	Only admin have that access to declare.
Actors	Admin
Extending use case	None
Including use case	None
Stakeholders	Admin
Pre-Condition	None
Basic path	When user paying bill then admin declare to go.
Alternative Path	None
Exceptional Path	None
Post-Condition	Pay first then go by getting clearence.

3.3 UML Diagram

The following figure 3.3, uml diagram of digital tolling system in framework, main classes are User and Admin. Others classes are login, registration, vehicle registration, scan, balance, payment, logout. User and admin can login and logout so that has a relation with user and admin.

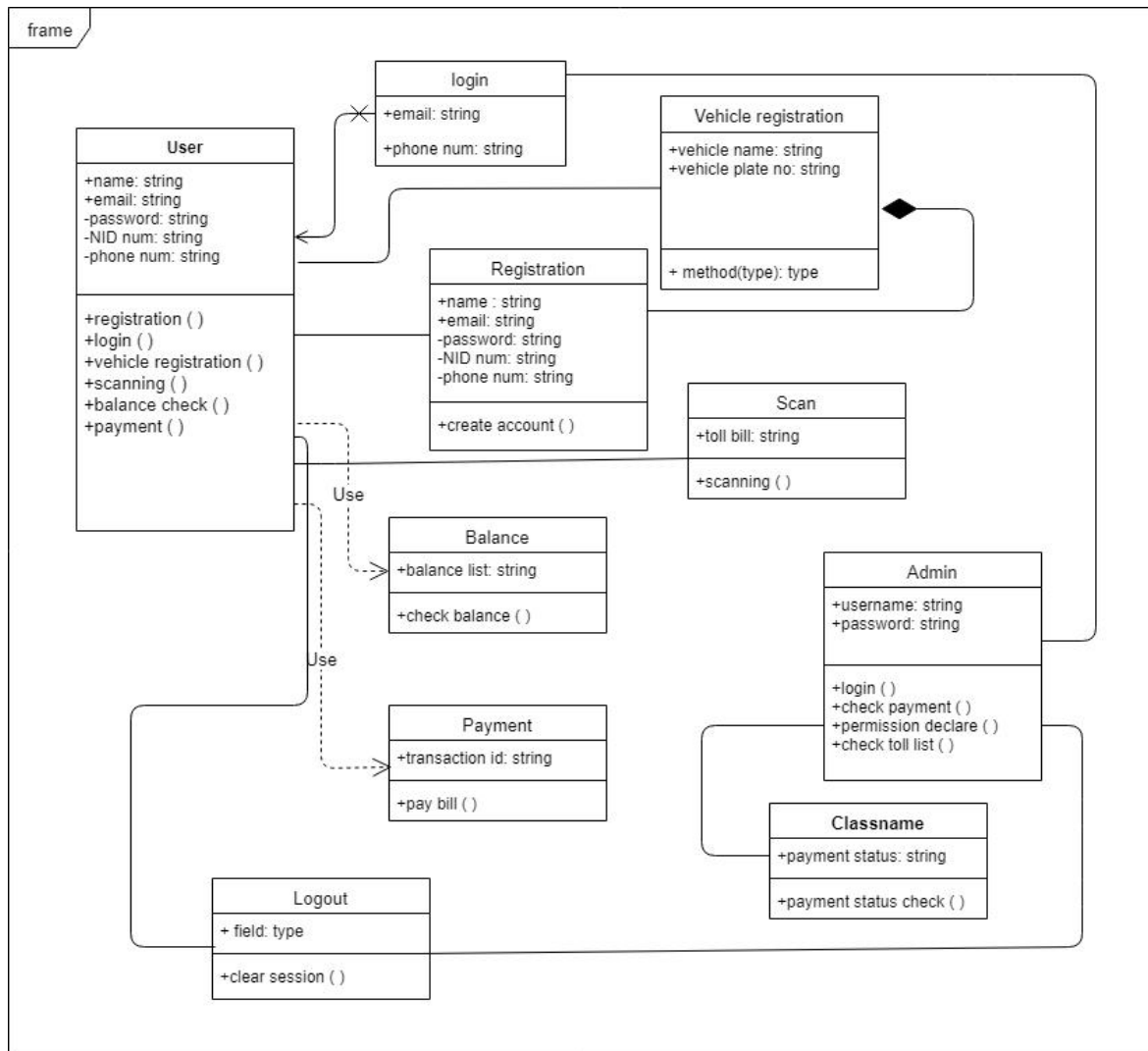


Figure 3.3 – UML Diagram of digital tolling system

User has some of field that name, e-mail, password, NID number, Phone number. Here we use + sign that means it is public and we use – sign that means it is private. Methods are registration, login, vehicle registration, scan, check balance and payment in our project.

3.4 ER Diagram

The system database exertion has relation many users. The following figure 3.4, entities are user registration, admin, scan, vehicle registrations, balances, payment, toll bills, permission declare. Users have many attributes name, email, password, and NID number, phone no.

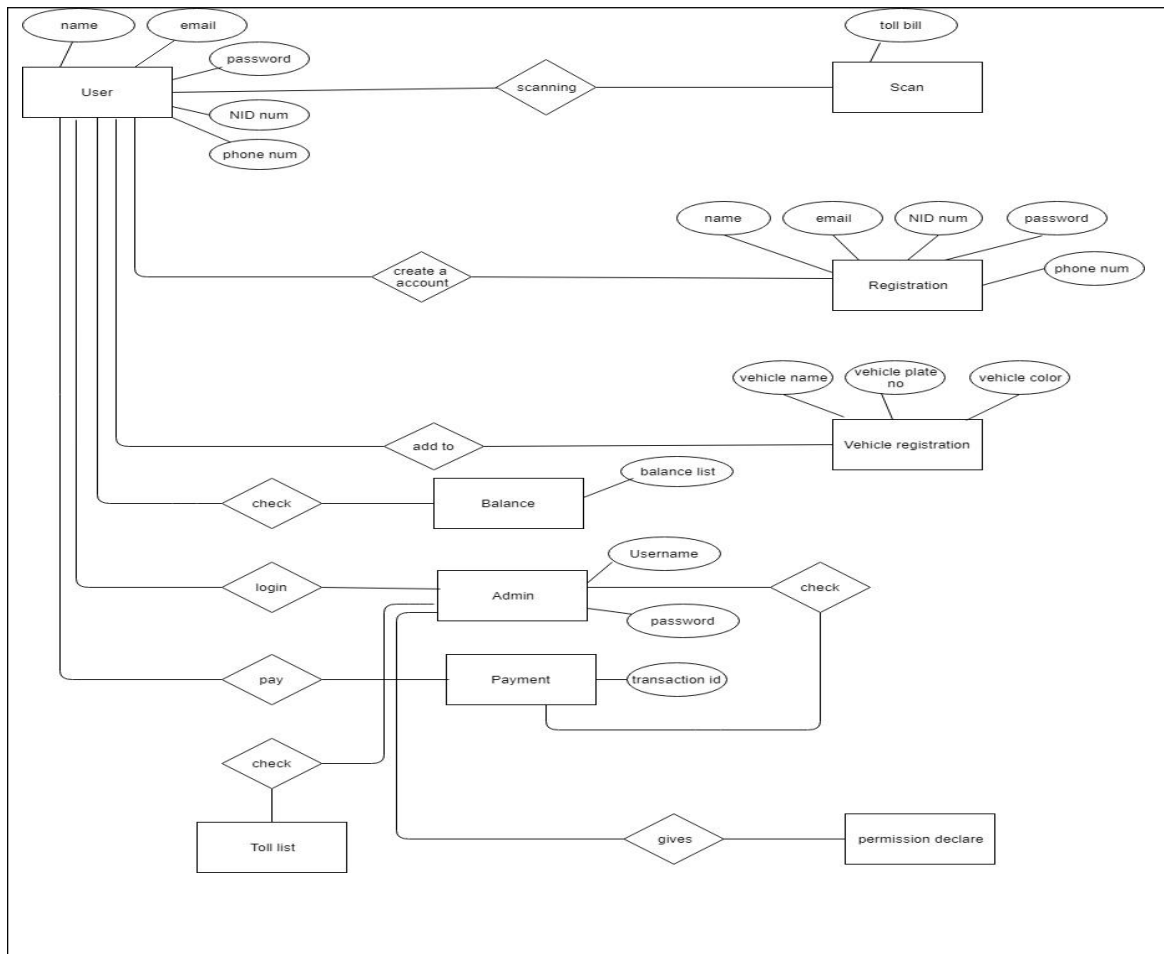


Figure 3.4 - ER Diagram of digital tolling system

In figure 3.4, admin have two attributes username, password. User and admin can login in this diagram with a logging in relationship. Vehicle registration have many attributes vehicle name, vehicle plate no, vehicle color, vehicle type. Payment has a single attribute which is transaction id.

3.5 Logical Data Model

All data will be linked to the database in the conceptual data model section. The data will be moved to the mobile from the server. Application will take all of data in firebase database. The logical database schema consisted primarily of a few

components such as data object, identities key and the entity relationship. The security system of the application is good enough for the user.

3.6 Design Requirements

- We have an encryption in our process for our user. We have design and model user login, registration and vehicle registration.
- We have design a model the user create an account by registration. We have a model the user register her g-mail or phone number authentication.
- We design a model admin panel. He can login with username and password.
- We make a pattern for user scanner by QR code scanner.
- We make architecture for check balance for user in our project.
- We have a layout for payment method by payment gateway.
- We add to design permission declare by admin.
- We also design a toll list chart and show data using firebase database.

The user interface is designed using XML. Adobe PS used to design logo and icon photo design. We used draw.io online drawing tool for drawing business process modeling, Use case diagram, UML diagram, Flowchart, ERD diagram that are very helpful for our venture. [9]

Chapter: 04

Design Specification

4.1 Front End Design

User interface development is the process of creating interfaces in software and electronic product with an emphasis on aesthetics and fashion. We are building a front end design that is easier for user to manage. We designed the front end architecture for all type of user who will able to controlling this application easily. We used XML front end architecture.

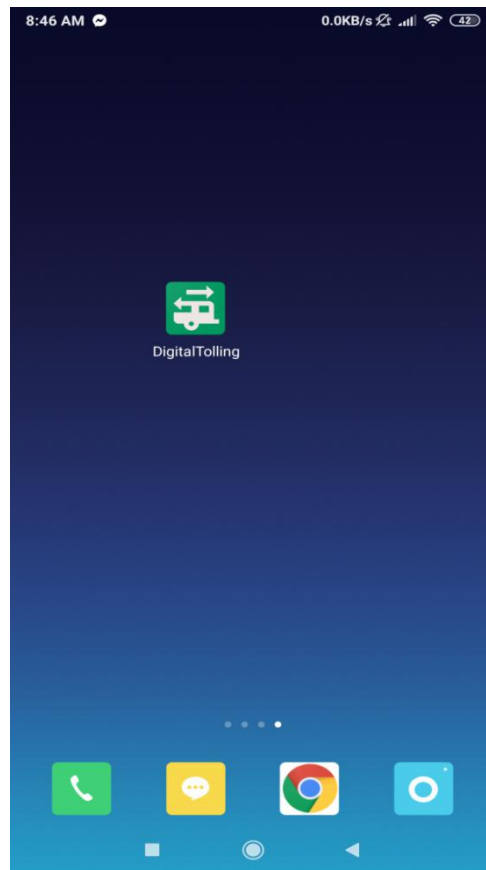


Figure 4.1: Screenshot of Our Application icon.

Step1: User Sign in Option

The following figure 4.2, sign in layout, user can easily login via e-mail or mobile number to the digital tolling system application. We give here two types of sign in schemes, if any user does not have an e-mail address then he can sign in via mobile or

he then register via e-mail address. If user doesn't have any account of digital tolling, then he has to choose 'not a user? Register' option. Then he will get the register page.

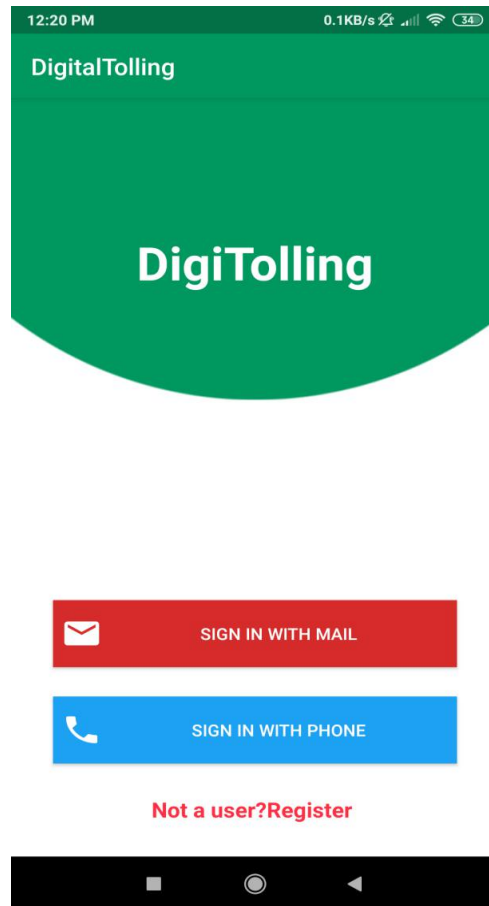


Figure 4.2: Screenshot of user Sign in option

Step 2: Sign In with E-mail

The following figure 4.3, user can sign in via email address. User must fill up to email address and password correctly. By entering the correct e-mail address and password section, the user can login if a user already has an account in digital tolling system.

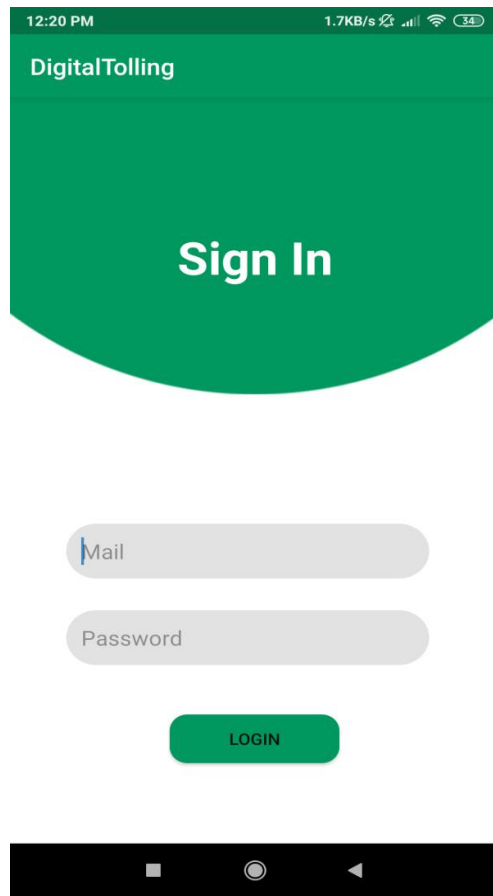


Figure 4.3: Sign In with E-mail

Step 3: Sign In with Phone Number

The following figure 4.4, the phone number verification, first user have to his/her active mobile number and then an authentication code will be supplied by the system after check. This preserves and protects the security of the user.

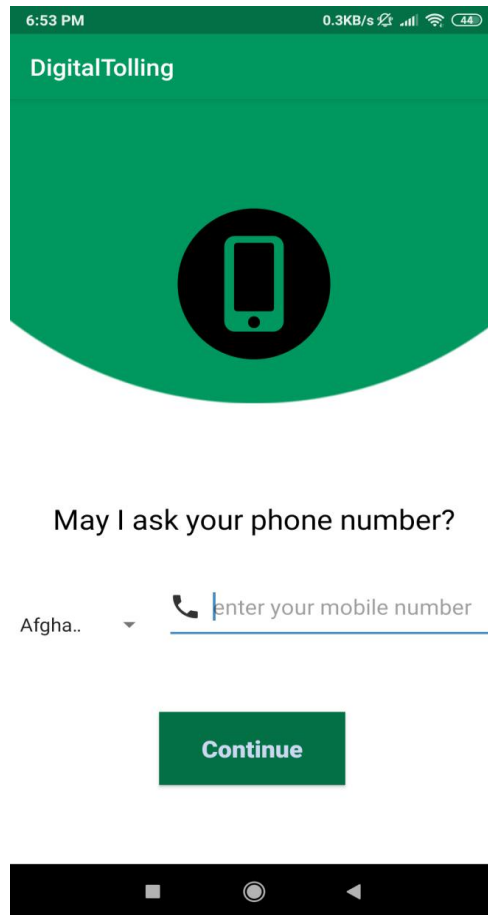


Figure 4.4: Screenshot of Sign In With Phone number

Step 4: Insert Phone Number with Country Codes

In Step 4, the phone number authentication with various country codes, User must have to select his country code. If he lives in Bangladesh but he select India country code then he could not sign in by mobile number.

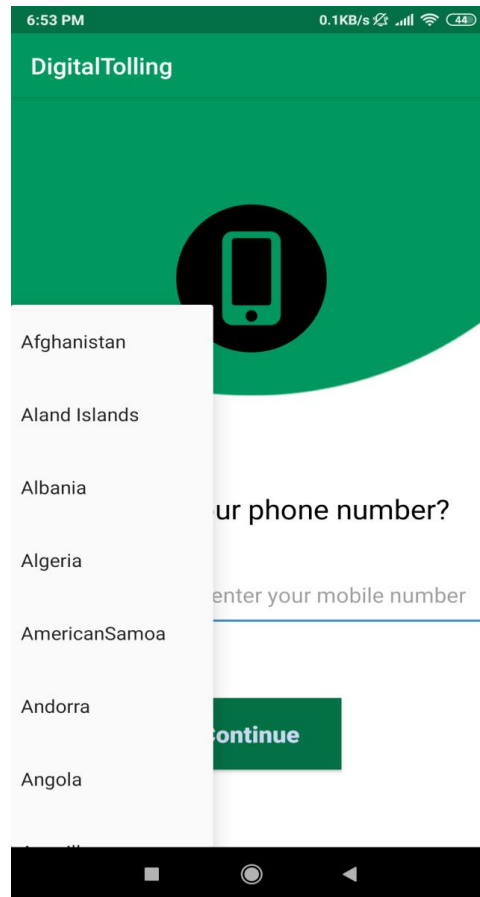


Figure 4.5: Screenshot of Phone number with country codes

Step 5: Phone Number Verification by OTP Code

The following figure 4.6, If the user gives an active and open mobile number and click the continue button the application will send an OTP code from firebase store via his mobile number that is very secret. [3]. After set an OTP code then user must click sign in button.

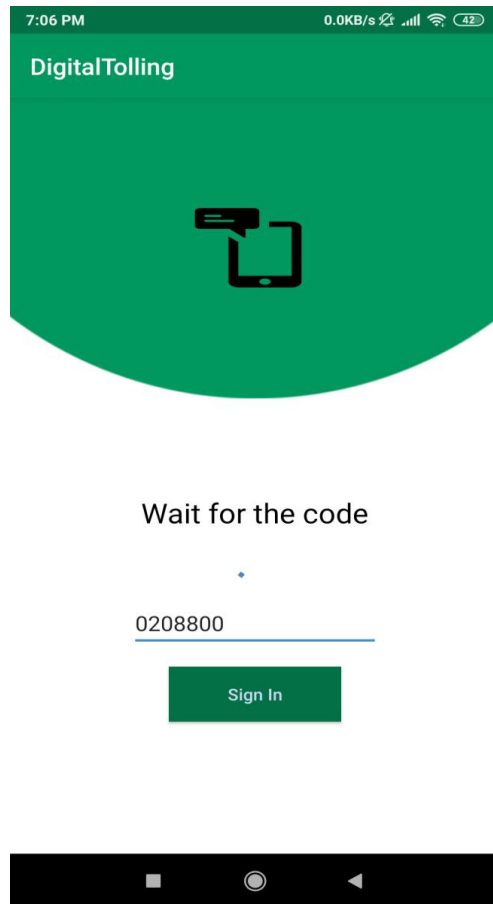


Figure 4.6: Screenshot of Phone number verification by OTP code

Step 6: User Sign up Option

The following figure 4.7, there is two options for creating a new account. User can create a new account by his email or phone number.

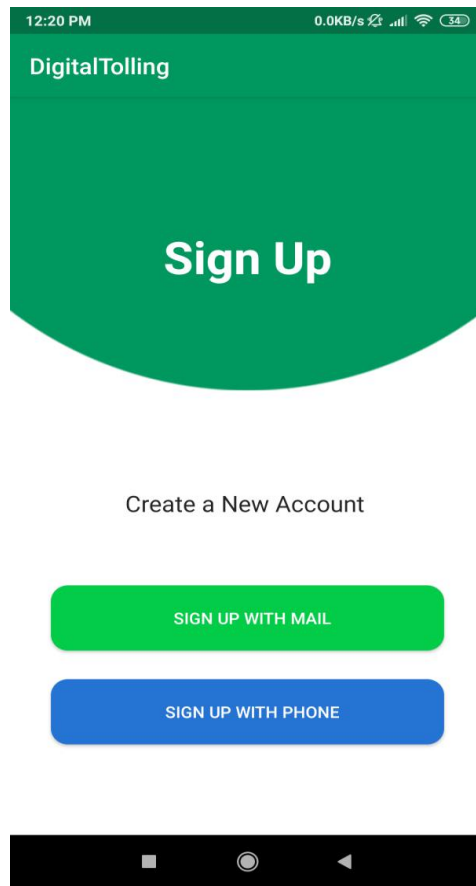


Figure 4.7: Screenshot of user sign up option

Step 7: Create a New Account via E-mail

The following figure 4.8, if you are not a user, you must register a new account in the digital tolling system application. User must be put her name, e-mail address, NID

number, password and confirm password correctly. Then an account will create in his name. If user can register successfully then he will go to vehicle registration activity.

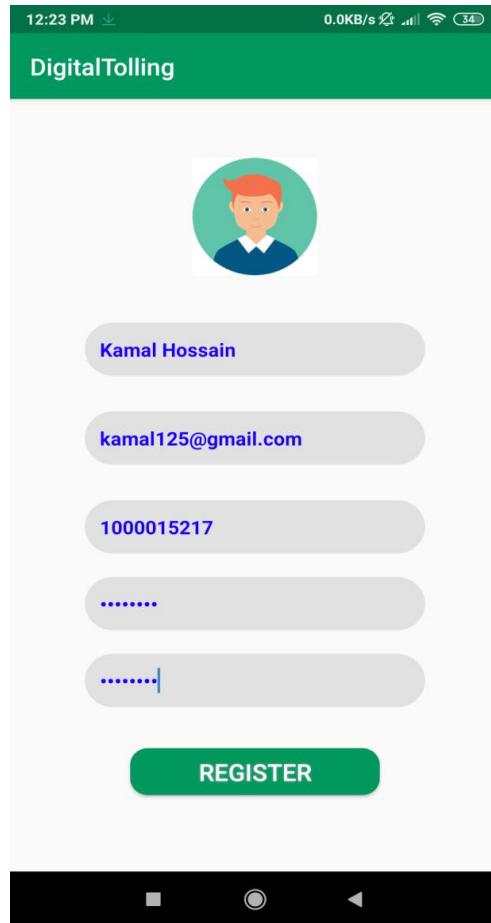


Figure 4.8: Screenshot of Create a New Account via E-mail

Step 8: Vehicle Registration

The following figure 4.9, when the user created an account by registration. Then he must have to fill up vehicle information. Have to put vehicle name, vehicle plate no, vehicle color. User must be selected vehicle type.

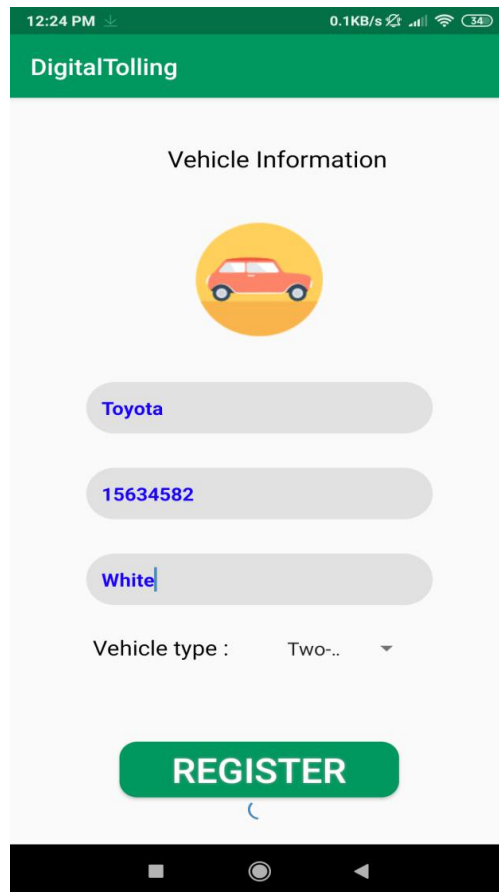


Figure 4.9: Screenshot of Vehicle Registration.

Step 9: Vehicle Category Selection

The following figure 4.10, if the user put his vehicle information then he must have to select vehicle type. There are eleven type of vehicles. They are two- wheelers, auto rickshaw, car, SUV, microbus, pick-up vans, minibus, bus, truck, Lorrie truck, Lorries.

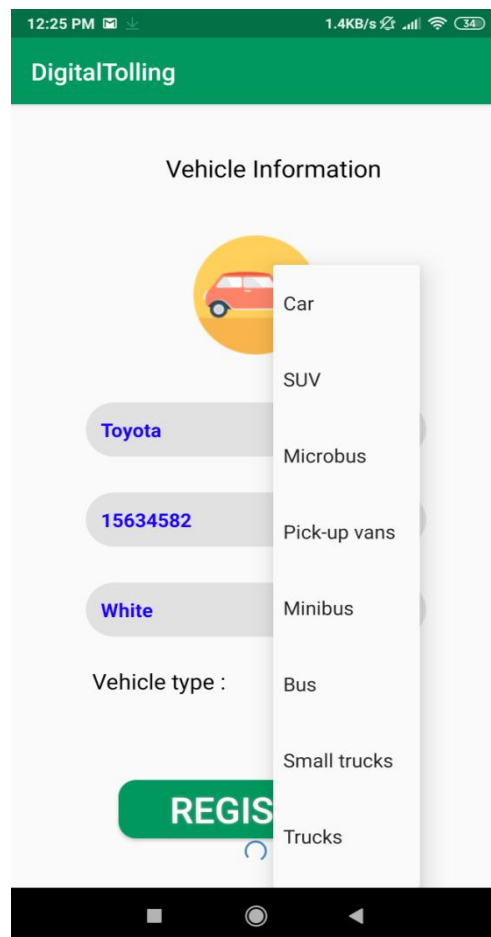


Figure 4.10: Screenshot of Vehicle Category Selection

Step 10: Home Page

The following figure 4.11, in home page we designed card view in XML front end design. There are four part Scan, Toll list, and history and User profile. In toll list, user can see toll bill list. In scan method, user can easily scan and then go to next activity. In history, all the transactions of users will appear. In profile, user information can be shown.

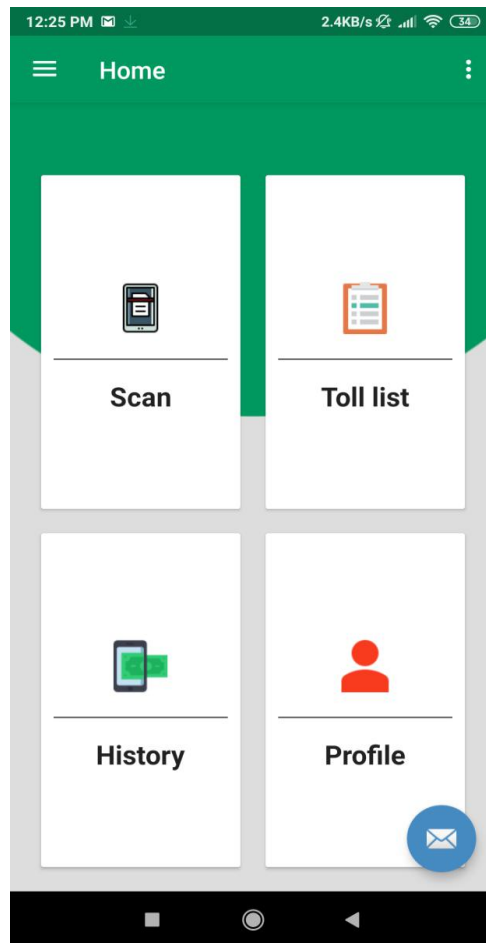


Figure 4.11: Screenshot of Home page

Step 11: Sidebar Navigation

The following figure 4.12, in sidebar navigation, we make a design for four options. They are home, profile, setting and sign out. When user wanted to go home and profile he must to be click home and profile bar. When user can sign out by the sidebar navigation then he goes to log in activity.

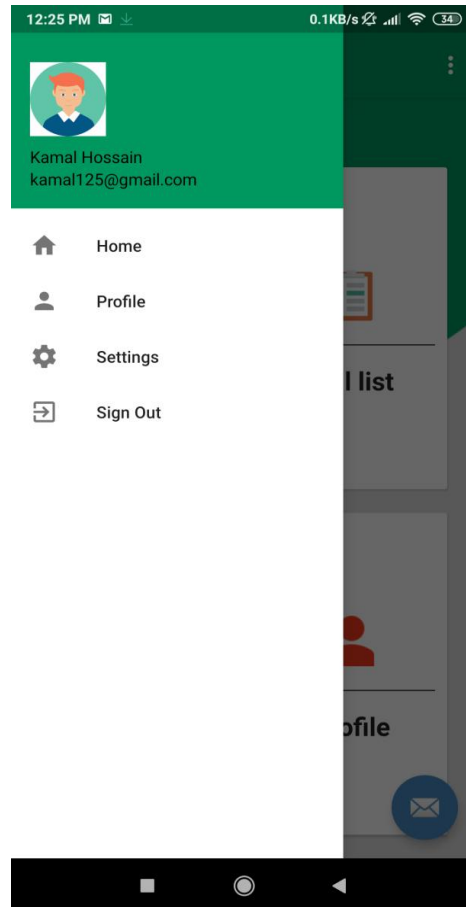


Figure 4.12: Screenshot of Sidebar Navigation

Step 12: Scan QR Code

The following figure 4.13, when the user clicked scan method then open her mobile camera. In scan method user can scan by QR code. [4]. It is very simple and scanning time is very short less than one second. All the toll categories will include in the QR code and the scanner will just match the registered vehicle type.

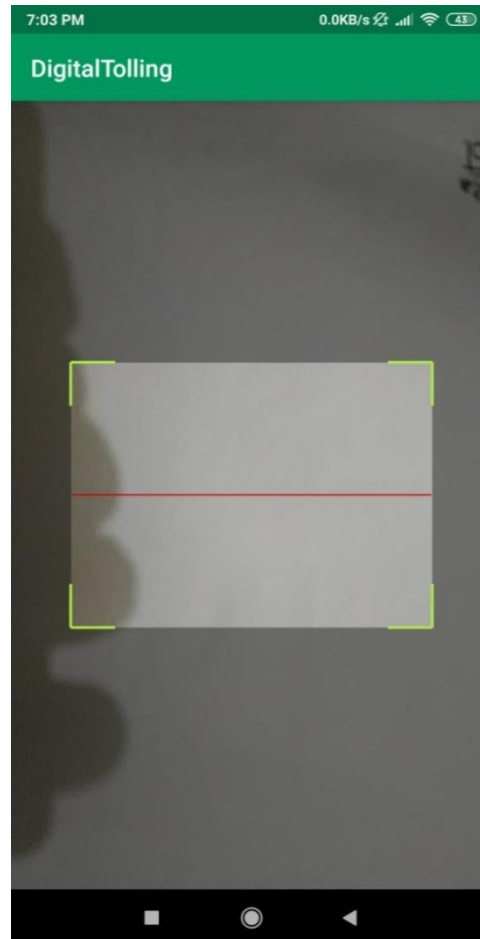


Figure 4.13: Screenshot of Scan QR code

Step 13: Getting the Bill of Registered Vehicle Form QR Code

The following figure 4.14, when the user will click on scan button then the mobile camera will open automatically. After completing QR code scan in toll plaza then he will get a bill for his vehicle type. Example in this screenshot we can see the toll bill is 15 taka.

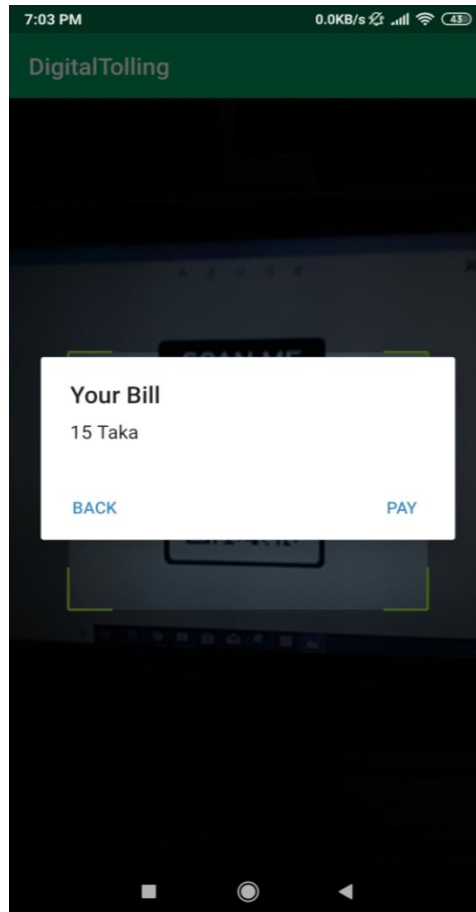


Figure 4.14: Screenshot of Getting the Bill of Registered Vehicle Form QR Code

Step 14: Payment Method

The following figure 4.15, this is payment method activity in digital tolling system application. When user already completed QR code scanning section and click pay option then he will come to this payment method. Here, we keep three options which are popular payment gateway like B-kash, Rocket, Nogod.

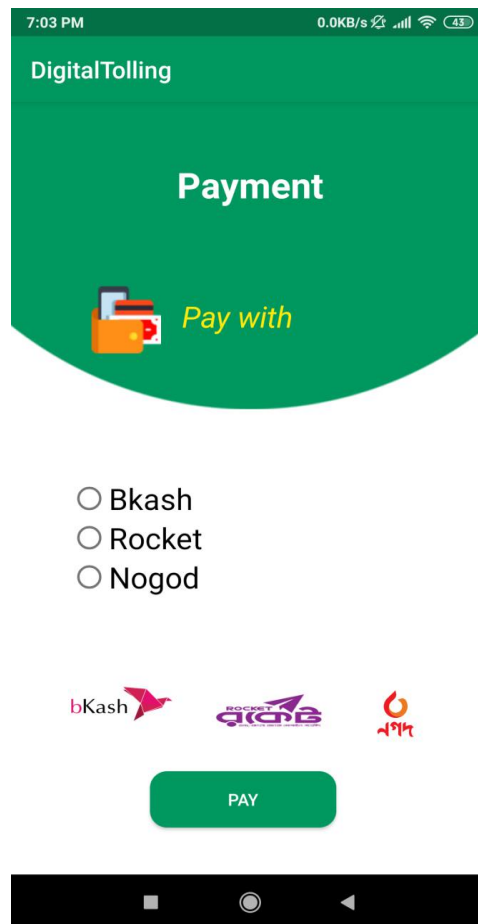


Figure 4.15: Screenshot of Payment Method

Step 15: Payment Pending For Admin Confirmation

The following figure 4.16, after selecting the payment option and clicking the pay button then user payment will go to admin panel for confirmation. Before that user payment will be in pending. User have to wait for the notification from admin.

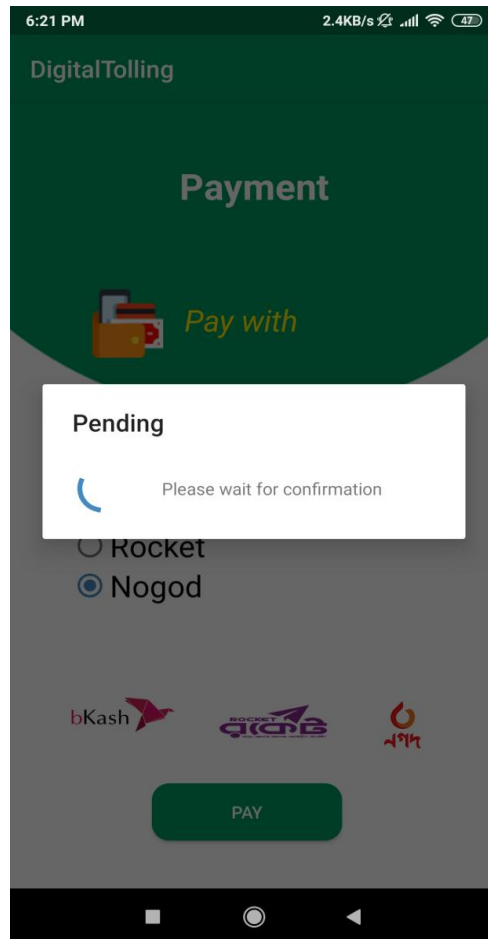


Figure 4.16: Screenshot of Payment pending for admin confirmation

Step 16: Payment Confirm Notification

The following figure 4.17 if everything is ok with the payment method, admin will give him confirmation. Then user will receive a popup confirmation notification and get the permission to cross the toll bar.

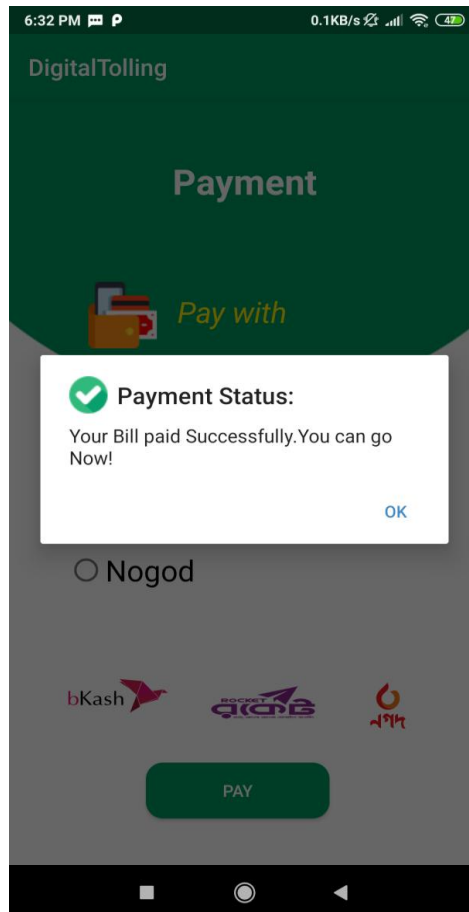


Figure 4.17: Screenshot of Payment Confirm Notification

Step 17: Payment Rejected Notification

The following figure 4.18, if there is any problem with the payment method ex-user account have not the exact money to pay the toll bill then admin will reject his transaction. Then user will receive a notification that his payment is rejected.

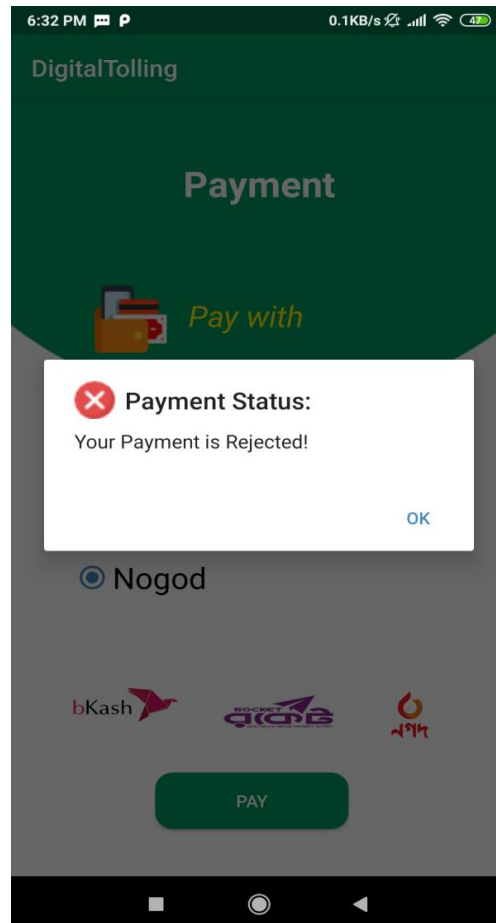


Figure 4.18: Screenshot of Payment Rejected Notification

Step 18: Toll Bill List of Bridges

The following figure 4.19, user can see the toll list of the vehicles for his known. He will also get update if there will any change in any toll bill. We collect this toll bill list from Bangladesh Bridge Authority website. [7]



The screenshot shows a mobile application interface with a green header bar containing the text 'DigitalTolling'. Below the header, the title 'Toll List' is centered. A table lists various vehicle types and their associated toll amounts in Taka (tk). The table has two columns: the vehicle type and the toll amount.

Vehicle Type	Toll Amount (tk)
Honda	10tk
Auto-rickshaw	18tk
Car	60tk
SUV	70tk
MicroBus	85tk
PickupVan	130tk
MiniBus	173tk
Bus	260tk
Small truck	173tk
Truck	260tk

Figure 4.19: Screenshot of toll bill list of bridges

Step 19: History of Toll Bill Transaction

The following figure 4.20, in history option, user can see all the transaction he has done before with that time and Date. In history list user can see transaction Id, type, Plate No., and the bill her paid.

Figure 4.20: Screenshot of history of toll bill transaction

Step 20: User Profile

The following figure 4.21, in profile option, user can see his profile details. In future we will give an update. In this update user can edit his profile information.

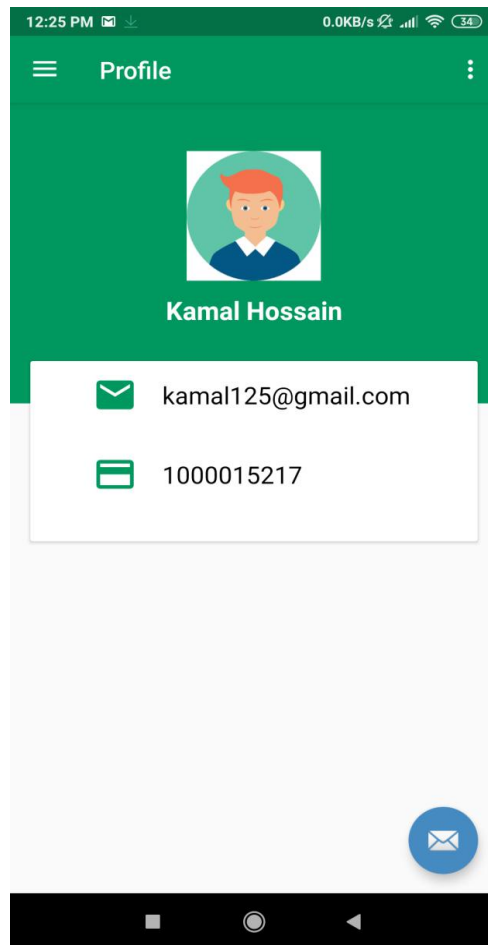


Figure 4.21: Screenshot of user profile

Step 1: Login Page of Admin Panel in Web Application

The following figure 4.22, this is Login page of admin panel and that is our second part in our digital tolling system application. This page is designed by html, CSS for frontend design. And in backend developed by raw PHP. Admin can easily login by his username and password.

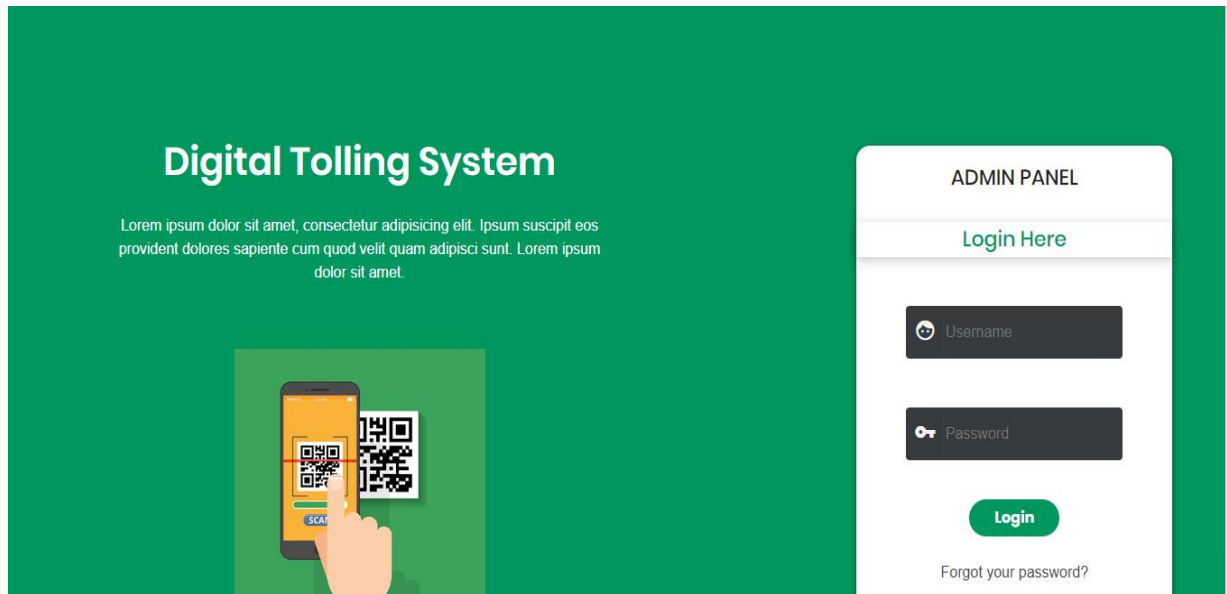


Figure 4.22: Screenshot of Login Page on Admin panel in web application

Step 2: Transaction List of Admin Panel

The following figure 4.23, this is transaction list of admin panel that was design by html, CSS in web application. Here, a table and field are vehicles name, transaction id, plate no, type, paid bill, action. When user already clicked pay option then vehicle name, transaction id, plate no, type, paid bill will appear in this list. If user paid bill

correctly then admin will confirm button, user get a notification 'payment successfully, can go now'. Here we show data form firebase database in web panel. [6]

Vehicle Name	Transaction Id	Plate No	Type	Paid Bill	Action
	-Mat-tBehVaXeYun5ePR		Lorries	345 TK	<button>Confirm</button> <button>Reject</button>
Toyota Corolla	-Mhhldd0jnHq4gOFVmnE	1566184664	Car	60 TK	<button>Confirm</button> <button>Reject</button>

Figure 4.23: Screenshot of Transaction List on Admin panel in web application

4.2 Back- End Design

Back end is a segment that function under the programs but only the developer can see it, the user don't have understand and will not able see this. In reality front end design just a way to connect with the user but the user could not see and never see how the systems work. It's a harder to back end portion of an android application. For back end development, we use java. And the admin panel, we used PHP in our system. I must make sure that my back end development its good enough to protest customer

information. The real-time firebase is used for the storage of the cloud hosted data to the storage of data. We are use Firebase database [5] in our application.

4.3 Interaction Design and UX

Interaction modeling is a topic that controls the communication of a device and the user. The mechanism that identify the user problem, that discover the outcomes are actually interaction design. I designed my UX architecture is very simple. I could discover the greater commitment depends on the simple design of UX at different site. So I made it very simple and user friendly for the user. The satisfaction of user is important to me.

4.4 Implementation Requirements

I used various type types of tools attributes, components to build my digital tolling system application. The use of this tool has made this device easily accessible and valuable to people. I had to work a lot for correct implementation. I had to explore different kind of java programming. It was UX model that I had to think. I have taken a long time to model appropriately and clearly. JDK, android studio, real-time firebase and the firebase database are used.

Chapter: 05

Implementation and Testing

5.1 Implementation of Database

I have made every effort to ensure the security and management of application in the database. I create my database with the quick response to Google firebase. Hopefully

we will create a secured and stable database. Include all type of data that are register in our context process. We will progressively make the database safer. We were implemented real time database with very fast response. [5]

5.2 Implementation of Front-end Design

The forehead start was created with XML design. I was focus mainly UI architecture in the front-end. SDK for computer character control are used. We still strive to be straightforward in UI development for interactive application and seek other component design to make the request beautiful. I am implement a very simple design for user interaction and user friendly. In this, I am using tool for UI design.

5.3 Implementation of Interactions

An element and communication between those components is defined by a computer system design. All data from the database is named in My plan and transferred to application. That's why my mobile application is lighter. Interaction can be found nearly everywhere. User can get service from app on the digital tolling system with the admin panel is mainly regulated. I am successfully execute my application and the communication between our applications and user is very remarkable.

5.4 Testing Implementation

After the task, I have tested and successfully completed my project. Transfer data adequately. When I acted a user and put a data in our application then the data is transfer to database properly. My test results are appropriate but I am working hard to make them more precise.

5.5 Test Results and Reports

The reports are necessary to formally represents test results and to quickly calculate the results. I am presenting the test case, test data, predicted outcomes, current output, and eventually find out what our application is looking for. The test result 96 percent that I am pleased with. Hope, I am going to be more successful. Main testing results

are simple to use application, improve contact user interaction, reduces hand cash and retail money, save times.

Chapter: 06

Conclusion and Future Scope

6.1 Discussion and Conclusion

This project would make our life comfortable and easier on the road. We have to face a lot of problems. Most of the drivers like bus, minibus, truck, CNG are illiterate. But interesting part is most of driver are using smart phone and control many type of application. However the UI design of this app is very simple and user friendly so, there was no problem running this application. We can see most of time driver pay cash on hand and toll man collect this cash then he input it on his computer. My applications solve the hand to hand cash problem. Users pay money by online payment gateway. It reduces hand-cash problem and retail money. Toll man or admin will not have to input data. Because the user fill up vehicle registration and click payment button then the projected payment show on admin panel. I have few tagging policies that can disperse my venture so rapidly. I would like to progressively spread all bridges and flyover in Bangladesh, at 1st stage in particularly in Dhaka city. This project was designed to explain all the following elements and activities during the application development. There are many bridge and flyovers in different city and highway. Most busy flyovers and bridges are Mayor- Hanif flyovers, Japan Bangladesh bridges, Bangabandhu Bridge etc. In these flyovers and bridge take toll bill has been manually. But it is not digitally. So this project is digitally and drivers can pay toll bill in our digital tolling- an android based mobile application. We talk about our project with bus driver, truck driver, CNG driver, lorry truck driver. They were very much interested to using this method or application. I described My project with some general people. They were appreciated in this project. I stood to collect some information and toll bill list of each bridge. After completing my work in field level then I started my main flow of work. First of all I'm design front end and then started design in back end. Then I am started admin panel work in web-based platform using firebase database. I am so much excited for this project because I was facing this problem in bridge and flyovers. There are some extra facilities for the users that they will be able where he or she drove by vehicle. The application will improve and give better performance by more users or drivers. . More use and more feedback allow to gives more accurate information. It will help to reach to user effortlessly and effectively. Many challenges have to be confronted when we do many functions. I consider my choice into account when I am choose to construct my design. Any task can at all be seamless. In addition, to build our endeavor I must face other obstacles. My project is based on user-friendly design of products with payment methods.

Limitations of Our application

As with all applications, My application also have some limitation. Those obstacles will be solved in the future. Some of the most significant drawbacks are:

- The application must be connected to the internet. So without a strong internet connection, the user could not coordinate my proposal.
- Developed by two platform mobile application and web application.
- Some data are very sensitive one of them is NID number. So I have an extra security for my application.
- Several function or characteristic must be updated.
- We only dropped English in our application and should keep a Bangla version.
- All of users are drivers. Most of drivers are illiterate.



6.3 Scope for Future Developments

My plan can be built in the future in many ways. Scopes for future development write bellow:

1. I will going to work on all bridges and flyovers in Bangladesh.
2. I am going to offer our own program of protections.
3. In future I will be doing my project on IOS.
4. In future I will connect with Arduino in my venture.
5. When admin will click confirm button then call Arduino by http call. Lastly, the toll plaza will open by Arduino.
6. I want to work with government level.
7. I am going to build my own user database system.
8. In future I will find our application is English language as well as Bengali language.
9. I will try my best for how to be more users friendly in future.
10. For addition my application requires more capacity that I attach this to my larger database system.
11. I want to work with ICT division by this venture.

Appendices

Appendix A: Project Reflection

DigitalTolling Database Go to docs  

- Comm
- Reject
- Users
- payment + X
 - fpqQRcu3P9bVcM4kS0jcC9TR80A2
 - LsRShHB8PGMRWIm4byj
 - date: "Wed, 30 Oct '19"
 - key: "-LsRShHB8PGMRWIm4by"
 - nID: "4661656595"
 - plateNo: "64667676"
 - time: "5:39 PM"
 - vehicleColor: "Red"
 - vehicleID: "7"
 - vehicleName: "Safety Bus"
 - + -LsTCBHfkyK04jP20bt0
 - gLFC0w7beiek8Ye3jzG6KrpepMF3
 - LsVx7J5mVx4R90-VQXt
 - date: "Thu, 31 Oct '19"

[5]

```

app x
Configure project in Project Structure dialog. Open Project Structure Hide notification
1  apply plugin: 'com.android.application'
2
3  android {
4      compileSdkVersion 27
5      defaultConfig {
6          applicationId "com.example.digitaltolling"
7          minSdkVersion 19
8          targetSdkVersion 27
9          versionCode 1
10         versionName "1.0"
11         testInstrumentationRunner "android.support.test.runner.AndroidJUnitRunner"
12     }
13     buildTypes {
14         release {
15             minifyEnabled false
16             proguardFiles getDefaultProguardFile('proguard-android-optimize.txt'), 'proguard-rules.pro'
17         }
18     }
19 }
20
21 dependencies {
22     implementation fileTree(dir: 'libs', include: ['*.jar'])
23     implementation 'com.android.support:appcompat-v7:27.1.1'
24     implementation 'com.android.support:cardview-v7:27.1.1'

```

```

app x
Configure project in Project Structure dialog. Open Project Structure Hide notification
27 //firebase core
28 implementation 'com.google.firebase:firebase-core:16.0.1'
29 //firebase auth
30 implementation 'com.google.firebase:firebase-auth:16.0.1'
31 //firebase Storage
32 implementation 'com.google.firebase:firebase-storage:16.0.1'
33 implementation 'com.google.firebase:firebase-database:16.0.1'
34
35 //glide library
36 implementation 'com.github.bumptech.glide:glide:4.9.0'
37 implementation 'com.android.support:support-v4:27.1.1'
38 implementation 'com.github.bumptech.glide:compiler:4.9.0'
39 annotationProcessor 'com.github.bumptech.glide:compiler:4.9.0'
40
41
42 implementation 'com.android.support:design:27.1.1'
43 testImplementation 'junit:junit:4.12'
44 androidTestImplementation 'com.android.support.test:runner:1.0.2'
45 androidTestImplementation 'com.android.support.test.espresso:espresso-core:3.0.2'
46
47 implementation 'me.dm7.barcodescanner:zxing:1.9'
48 }
49
50 apply plugin: 'com.google.gms.google-services'
dependencies{

```

References

- [1] Nexus pay toll bill, available at <https://play.google.com/store/apps/details?id=com.dbbl.nexus.pay&hl=en>
- [2] Info Talk toll calculator, available at <https://play.google.com/store/apps/details?id=com.infotalk.android.tollcalc&hl=en>.
- [3] Authenticate with Firebase on Android using a Phone Number, available at <https://firebase.google.com/docs/auth/android/phone-auth>,
- [4] Android QR Code scanner, available at <https://demonuts.com/scan-barcode-qrcode/>,
- [5] Android Firebase Real-time Database Read and Write, available at <https://firebase.google.com/docs/database/android/read-and-write>,
- [6] Web set-up with firebase database, available at <https://firebase.google.com/docs/web/setup>
- [7] Toll bill rate of Vehicles Data collection, available at <http://www.bba.gov.bd/site/page/4093c137-8d48-46db-a1cb-54aaf5924a5c/-> ,
- [8] Split Data form QR Code, available at <https://www.geeksforgeeks.org/split-string-java-examples/>,
- [9] Diagram Drawing tool, available at <https://www.draw.io> ,

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< 1% match (Internet from 02-Apr-2021) http://dspace.daffodilvarsity.edu.bd:8080/bitstream/handle/123456789/5352/162-15-8107%20%2028%20%2029.pdf?isAllowed=vs&sequence=1
< 1% match (Internet from 01-Oct-2021) http://dspace.daffodilvarsity.edu.bd:8080/bitstream/handle/123456789/5271/172-15-9784%20%2025%20%2029.pdf?isAllowed=vs&sequence=1
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http://dspace.daffodilvarsity.edu.bd:8080/bitstream/handle/123456789/5458/163-15-7795%20%20-%20.pdf?file=1&isopen=1
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<p>< 1% match (student papers from 30-Oct-2019)</p> <p>Submitted to Daffodil International University on 2019-10-30</p>
<p>< 1% match (student papers from 04-Apr-2018)</p> <p>Class: Article 2018</p> <p>Assignment: Journal Article</p> <p>Paper ID: 340931790</p>
<p>< 1% match (student papers from 28-Jul-2015)</p> <p>Submitted to Sri Lanka Institute of Information Technology on 2015-07-28</p>
<p>< 1% match (student papers from 15-May-2020)</p> <p>Submitted to Aston University on 2020-05-15</p>
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<p>Daffodil International University Department of software Engineering Project : Digital Tolling Supervised by: Farhan Anan Himsu Lecturer Department of Software Engineering Daffodil International University Submitted by: Md: Tanvir Alam 173-35-2224 Department of Software Engineering Daffodil International University ABSTRACT This project name is Digital tolling- an android based mobile application for tol billing system. Mainly Drivers of many type of vehicle like bus, mini bus, taxi, truck, Jerry truck, bikes etc. can create an account and easily can pay the toll bill in different highways and bridges. There are many bridges and highways in different cities and highways. Most busy highways and bridges are Thapar, Harid, Dhawra, Jagan, Bar, Jalesar, Indore, Navabandhu, Indore etc. In these highways and bridges take toll bill manually. But it is not digitally. We can see others developed country don't use hand cash as toll bill. They used different type of payment systems. So this system is digitally and drivers can pay toll bill by scanning a QR code. Mainly, this project has two parts. One part is for user application and second part is for admin panel can control the transactions. This project will be very useful because it will reduce hand-cash billing system in highways and bridges. # TABLE OF CONTENTS CONTENTS PAGE Board of examiners Declaration Acknowledgement Abstract CHAPTER CHAPTER 1- INTRODUCTION 1-2 1-1 Introduction 1 1-2 Motivation 1 1-3 Objective 1-2 1-4 Expected Outcome 1-5 Report Layout 2 2 © Daffodil International University CHAPTER 2- BACKGROUND 3-5 2-1 Introduction 3 2-2 Related Work 3-4 2-3 Comparative Studies 4 2-4 Scope of the Problem 4 2-5 Challenges 5 CHAPTER 3 : SOFTWARE REQUIREMENT SPECIFICATION 6-10 3-1 Business Process Modeling 6 3-2 Use case Modeling and Description 7 3-3 UML Diagram 8 3-4 ER Diagram 9</p>