

IOT Based Traffic Payment System

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

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We hereby notify that, this project has been done by us under the supervision of **Prof. Dr. Syed Akhter Hossain, Head, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

Every day in modern society vehicle is needed to transport a lot of people and goods. Especially in city area roads are crowded with buses, cars, bikes etc. Sometimes they break different types of traffic rules and traffic police file them with amercement. Then they have to pay the fine immediately or received letter for paying the fees by going to a bank. This proposed project “IOT Based Automated Traffic Payment System” a system developed for making this payment system online using android smartphone. Police can post charge online and general users can view if they have any charges against them. The system stores user’s image, information, vehicle license and registration. Police can file charge by matching license plate. The proposed system is implemented using Java programming language with Firebase database.

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CHAPTER 1

INTRODUCTION

1.1 Introduction:

Bangladesh is a densely populated country. So basically, roads are also crowded with public transports, cars, bikes etc. Among this crowd some drivers tend to violate traffic laws thinking that traffic police will not notice them, some do not have licenses and some causes serious accidents on the road.

According to Bangladesh Road Transport Authority (BRTA) statistics as of February 2017, Bangladesh had over 2.9 million registered vehicles, but only 1.9 million of them had driver's licenses. These one million "ghost" drivers, lacking any knowledge about traffic rules or safe driving, have taken a bloody toll on the roads. According to Bangladesh Jatri Kalyan Samity—a passenger welfare forum— at least 224 people have been killed and 866 injured in 203 road accidents on the first 12 days of August 2019 alone.

<https://www.thedailystar.net/shift/news/road-transport-act-2018-details-repercussions-reactions-1823818>

So, everyday many drivers get fines with or without their knowing. We wanted to make the payment system online so that those who didn't know about their fines can easily pay without going to a bank.

1.2 Motivation:

Our main focus is to solve people's problem to make their life easier. When we thought about problems then we found traffic system is one of the major problems for the people. We found that there are lots of problem we can solve in traffic sector. But it's not so easy to make revolution in a public sector. So, we started to find out way to reduce people harassment. Eventually we found a way that if we would make traffic case and fine payment system digital then traffic system will be more comfortable for all. Traffic policing will be simpler and faster.

1.3 Objectives:

- Traffic payment will be automated
- Traffic data management will be digitalized
- Make traffic policing comfortable to people
- People will get online payment
- Make traffic system fast and easy

1.4 Expected Outcomes:

We previously said that our main goal is to make traffic system fast and easy. This project will help both traffic police and general public to achieve a safe and hassle-free payment system. Some expected outcomes of our project are below-

- Save people time and money
- People will less likely to break laws
- Reduce people's harassment
- Hassle free traffic policing
- Traffic policing will be comfortable

CHAPTER 2

Background Study

2.1 Introduction:

In this chapter, we are going to discuss the technologies we used in this project. This chapter will thoroughly describe the works related to this project and comparative studies including database, programming language, management, and platform. We are using android development platform because in Bangladesh most of the people use android phone. So, it will be easier to provide them with a better application. We have used our previous courses knowledge to develop this project.

2.2 Comparative Studies

During the development of this project we learned different kind of technology and applied it.

Some of this includes –

Project Management: Efficient project management is very important to develop a project because it ensures that the project development process maintain an overflow and complete within a projected time frame.so from the beginning we tried hard to maintain a efficient management plan.

Database: It is a key part of a mobile application development. We have used real-time Firebase database in this project.

System Analysis: As we have previous software engineering experience that's why we used different software engineering methodology to develop this project.

Development Platform: As we developed an android based mobile application that's why we use official Android Studio 4.0 which is the latest version of this development kit.

Programming Language: We all know android studio support java and kotlin programming language. We have used java as we are experienced in java.

2.3 Related Works

We have found some literature regarding this project but we don't think anyone in Bangladesh or internationally has done this project. This is one of the pioneer innovations on traffic payment service.

2.4 Challenges

1. **Data entry:** Data entry is quite difficult because we have to go to traffic police office to collect data and it was huge data to put. We also need BRTC database support for data verification purpose.
2. **Bug:** At first stage the application had lots of bug and could not work very responsibly.
3. **Co-operating with police:** Working with police was a huge hassle, at first, they weren't helping us that much but with the help of our supervisor we were able to work with them.
4. **Resources:** We had a very few resources to do this project.
5. **Implementation:** Our biggest challenge is implementing this project in real life and make it user friendly.
6. **Security:** Last but not the least security would be a threat in future.

CHAPTER 3

SOFTWARE REQUIREMENTS SPECIFICATION

3.1 Introduction

This chapter will describe how the application is represented, how it will work, who can access it, who can use it. It will show us what type of information is needed to build this application and the way it works; it will also give us a basic knowledge of admin panel and what type of information a user will provide to create account and how they can access it. It will also show us how secure the system is.

3.2 Overall Description

This application will give access to user, admin and police.

- User: They are the main target audience for this project. We build this project to make their traffic payment system easy. Through this application they can create an account using their phone number. User can add their car with registration number and others valid document of the vehicles.
- Admin: They are the back-end user of this application. They have the absolute authority to change anything.
- Police: They are one of the main characters of this project. They can create their account using their employee ID and other required information. They identify the traffic rules beakers and file the case under the state traffic law.

3.3 Use Case Diagram

The simplest way of represent the relation between user and system is use case diagram. It shows the interaction between different user and various use case to which user are connected. In this use case diagram, it represents three users of our application. Here, admin has the supreme authority to approve and verify user means car owner and police account. Admin can solve customer report issues and update the latest news/announcement. Now comes to the police activity, here police have watchdog rules. They find out the law breakers and file the case under traffic rules. User is the main service receiver of our application. They can create account to join in our application and add their vehicles to get our automated traffic payment service. That's all about user and system interaction of our application.

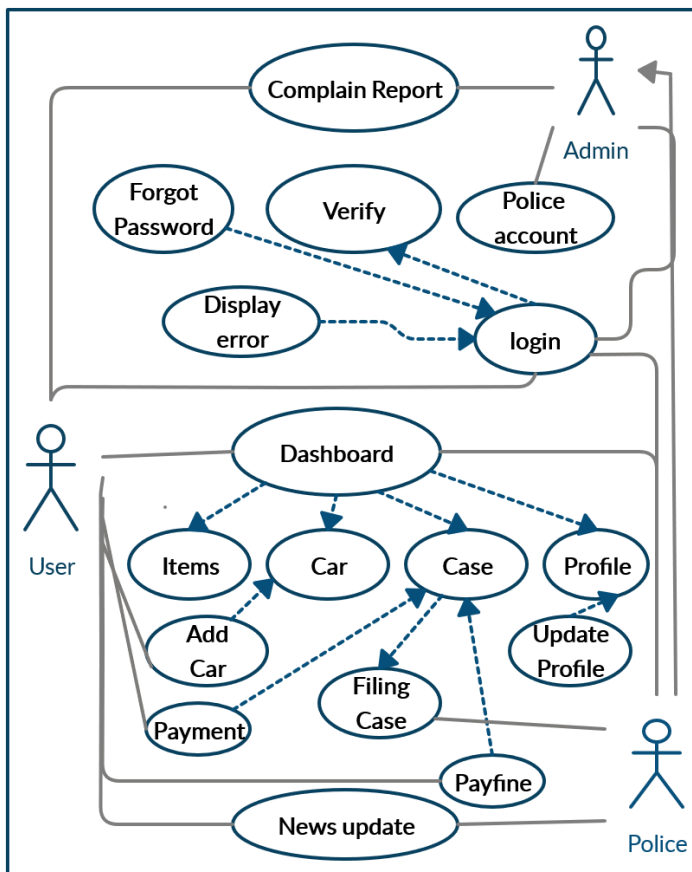


Figure-3.1: Use Case Diagram

3.4 ER Diagram

Entity Relationship Diagram is an abstract data model that visualize the database connection. It is mainly representing how different entities connected in database and show the more generalization and specialization connection of entities. ER diagram have no work in business process but involved in the connection of entities in database domain. It gives the overview of the entities connection in the database column.

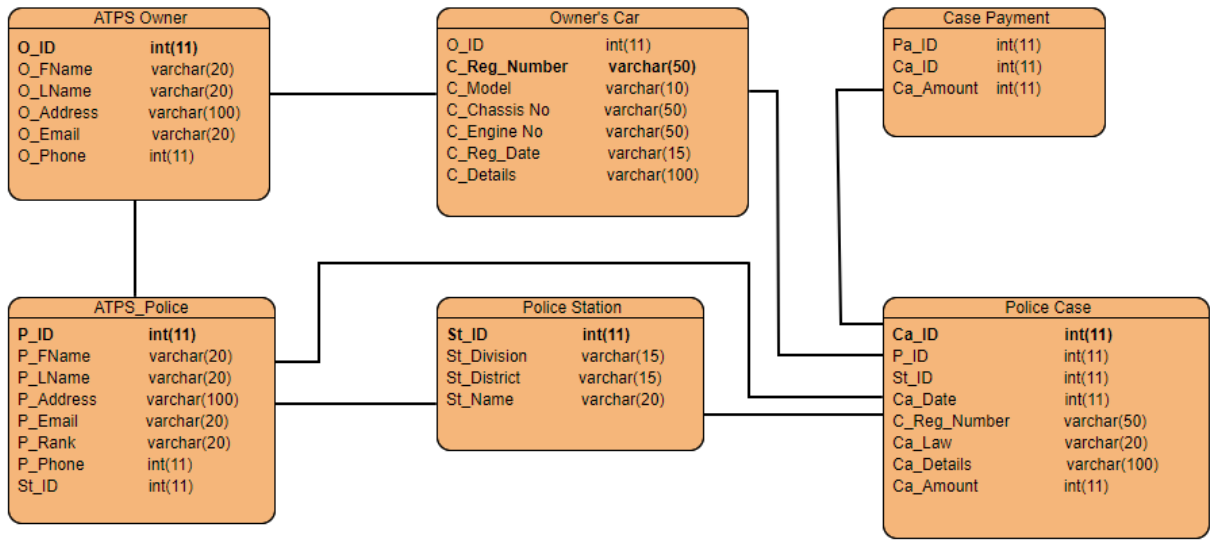


Figure-3.2: ER Diagram

CHAPTER 4

DESIGN SPECIFICATION

4.1 Introduction

This chapter will explain User Interface (UI) of this project. User Interface is a gateway for the user and a computer system to interact, in particular the use of input devices and software. User Interface is the most crucial design to do because without a good and user-friendly UI the general user will not be interested to use the application. This chapter will describe both front end design and back end design. We took extra time to build a smooth, bug free User Interface. So that front-end user as well as back end user will get an easy, hassle free, smooth UI experience.

4.2 Front-end Design

Front-end is the mirror of a mobile application. It's called User Interface (UI) in mobile application term. UI is the medium of interaction between user and system. So, from the beginning we were concern to design a user-friendly UI. So that people can operate easily and feel comfort to use our system. As Android Studio is an integrated tool so it has built-in function to design UI which is developed using Extensible Markup Language (XML). As it is a lightweight language so it doesn't make our layout heavy.

Figure-4.1 is the Home page which is appear when user login to our application.

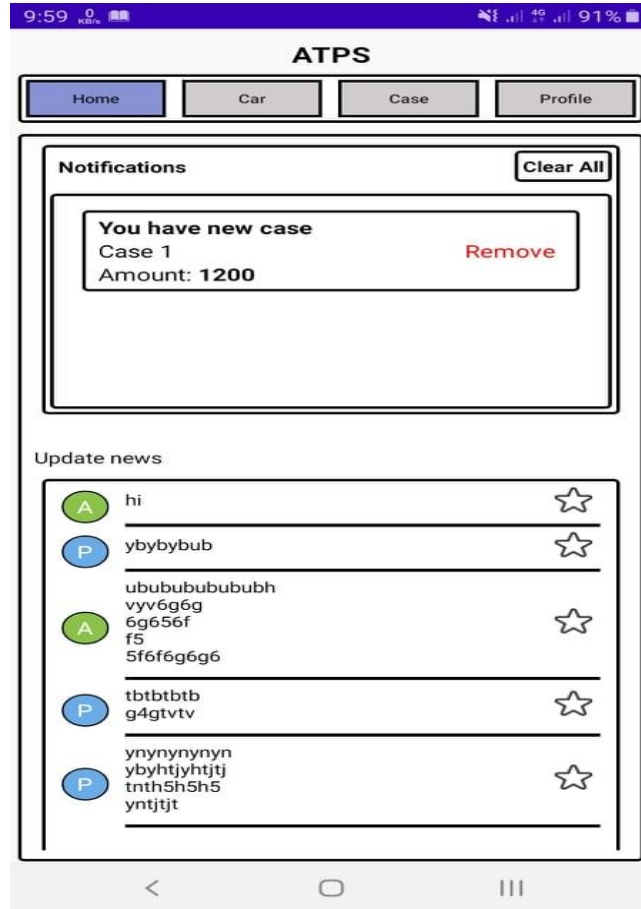


Figure-4.1: User Home Page

Figure-4.2 is the login page which appear when user open our application. User can Login using their email and password by this page.

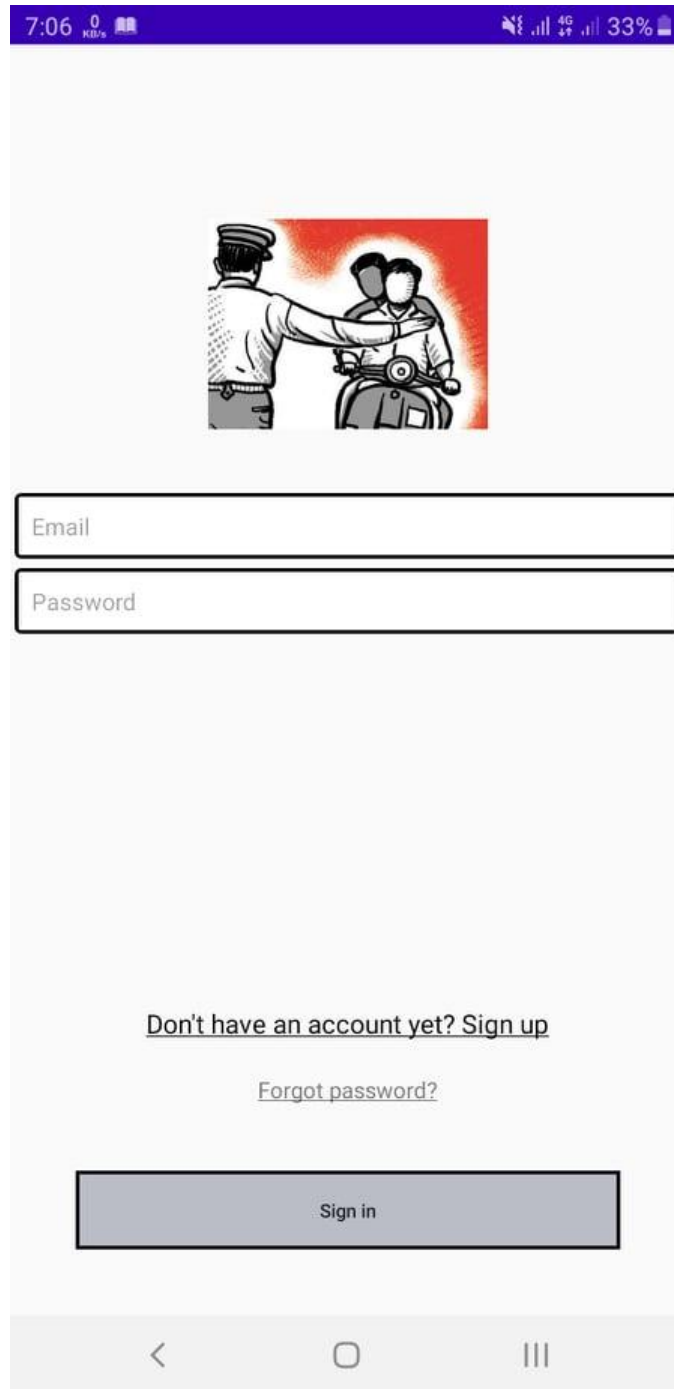


Figure-4.2: User Login Interface

Figure-4.3 is signup page for car owner who doesn't have account can create their account using this window by providing valid document. As we have three type of user, this page is for car owner account.

The screenshot shows a mobile application interface for signing up as a car owner. At the top, there is a status bar with the time 7:06, 0 KB/s, and 33% battery. Below the status bar is a header area with a landscape image icon. The main form consists of the following fields:

- User type: Owner or Driver (dropdown menu)
- First name
- Last name
- NID/Passport
- Address
- House No
- Road No
- Postal Code
- Police station
- District
- Division
- Email
- Mobile No
- Tel No
- Password
- Retype Password

At the bottom of the form is a 'Sign up' button. Below the button is a standard Android navigation bar with back, home, and recent apps icons.

Figure-4.3: Signup page for Car Owner

Figure-4.4 is a signup page for police using this page they can create their account by providing valid information.

4:41 0 KB/s 4G 63%

User type Police

First name Last name

NID/Passport

Employee ID

Rank Select

Branch Postal Code

Police station ID

Police station

District Division

Email

Work Mobile No Home Mobile No

Password

Retype Password

Sign up

Figure-4.4: Signup page for Police

Figure-4.5 is forgot password page to retrieve password.

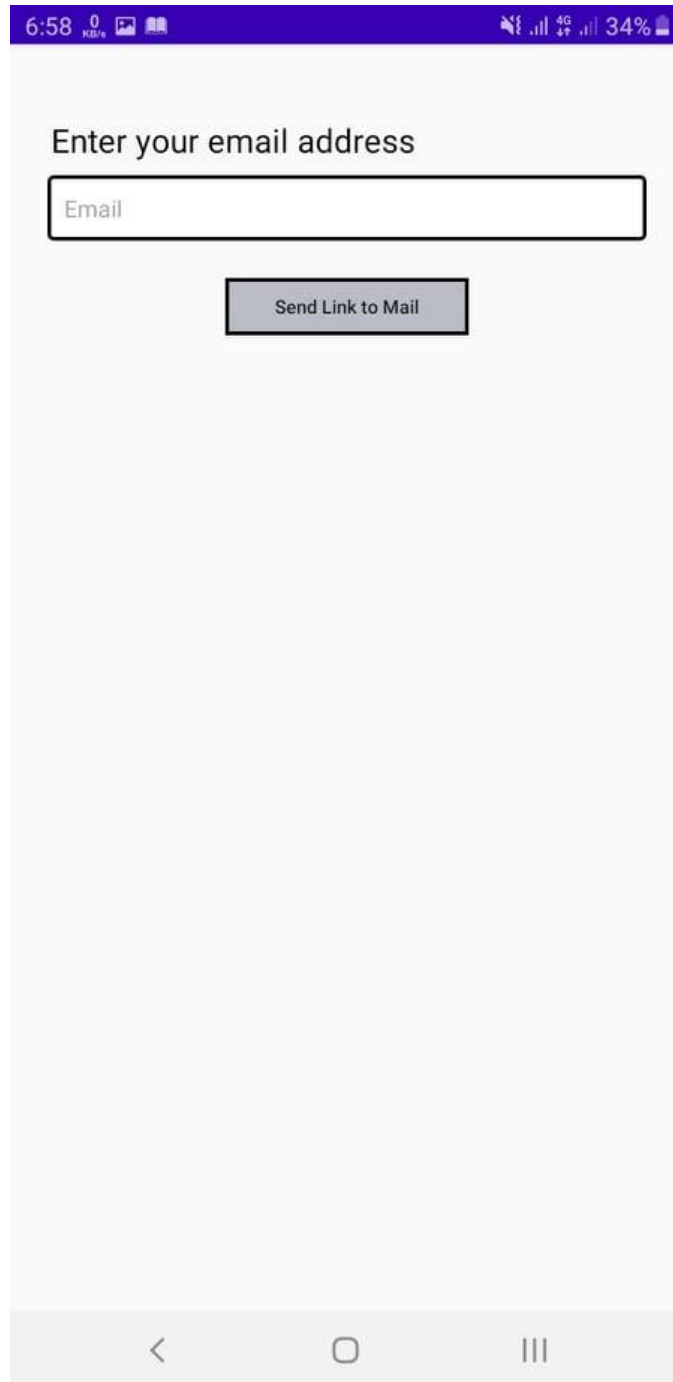


Figure-4.5: Forgot Password

Figure-4.6 is user profile page where they can check and update their profile information.

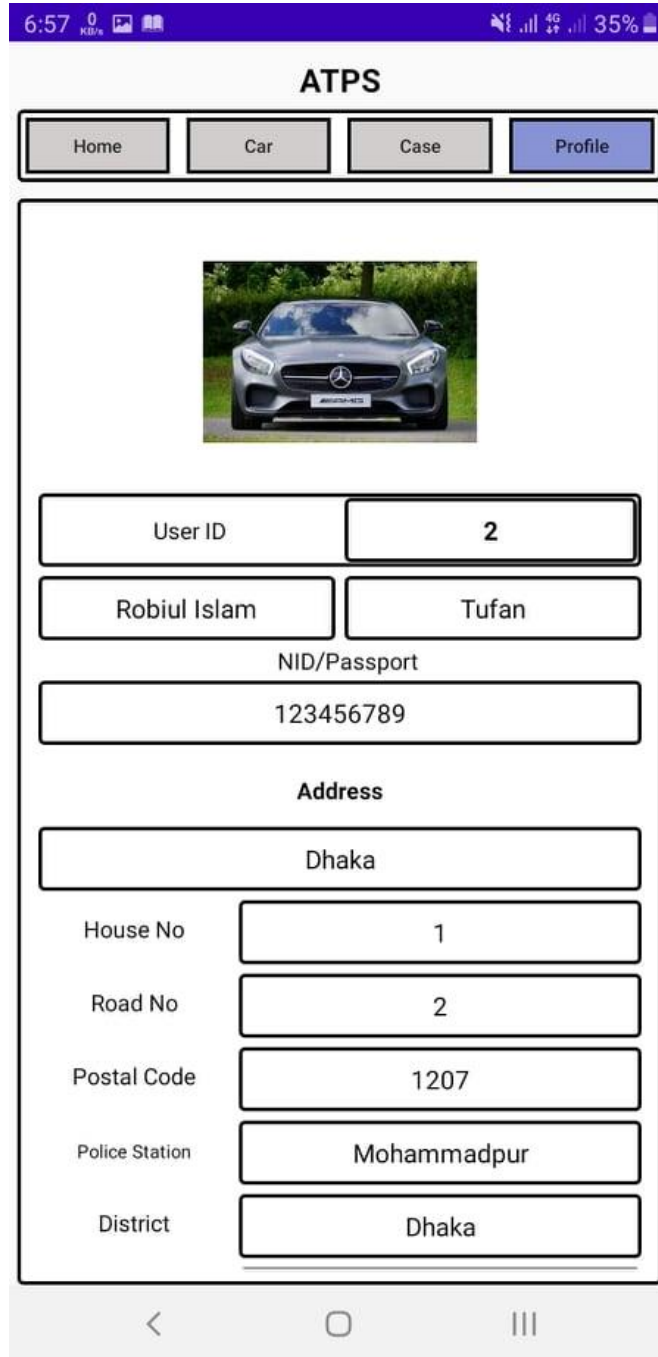


Figure-4.6: User Profile

Figure-4.7 is user case page in this page user can see all the cases against him. From this page user can go to case details page.

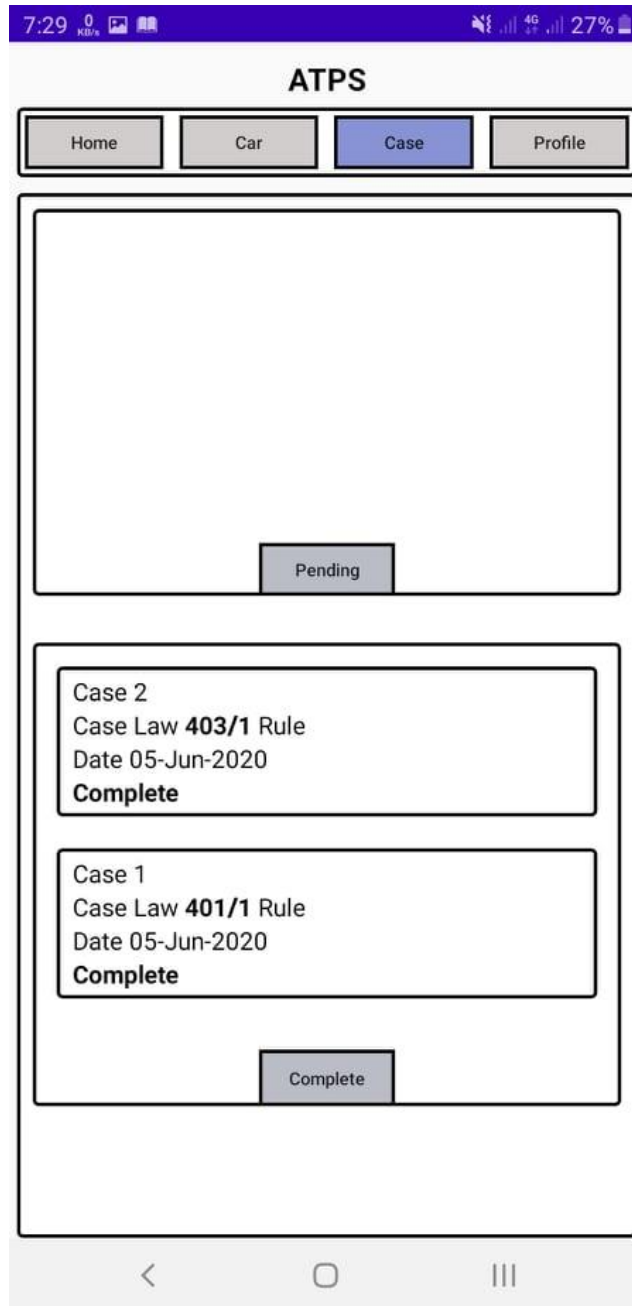


Figure-4.7- Case Home Page

Figure-4.8 is case details page where user can check the case details like amount of fine, case reason and law details. User can report using report button if they have any obligation or query. Otherwise forward to payment page to pay the fine using payment button.

The screenshot shows a mobile application interface for 'Case Details'. At the top, there is a status bar with the time 7:29, 0 KB/s, and 27% battery. Below the status bar, the title 'Case Details' is centered. The main content area contains six rows of information, each with a label on the left and a text input field on the right. The labels are 'Case Number:', 'Car Number:', 'Case Date', 'Amount', 'Case Details', and 'Case Law'. The corresponding values in the input fields are '2', '123456789', '05-Jun-2020', '1400', 'Wrong road', and '403/1'. Below the input fields, there are three buttons: 'Report', 'Payment', and 'Back'. At the bottom of the screen, there is a navigation bar with a back arrow, a home circle, and a menu icon.

Case Number:	2
Car Number:	123456789
Case Date	05-Jun-2020
Amount	1400
Case Details	Wrong road
Case Law	403/1

Report Payment Back

Figure-4.8: Case Details

Figure-4.9 is payment page to pay the fine using case number and amount.

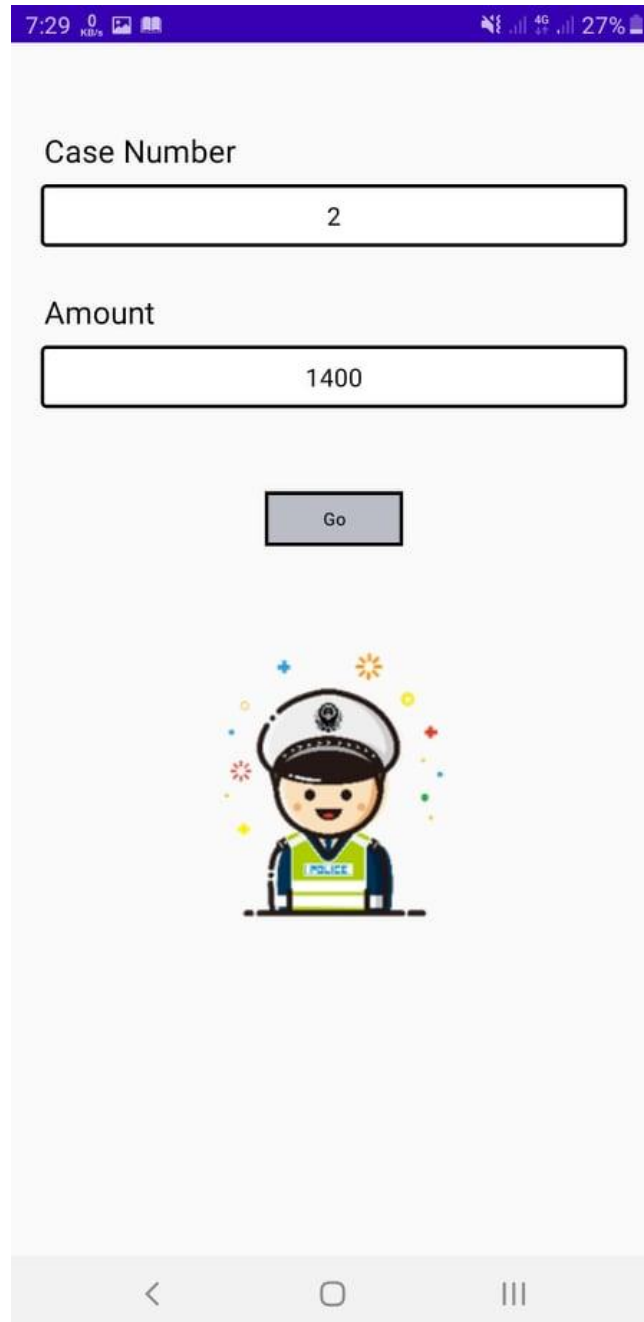


Figure-4.9: Payment Interface

Figure-4.10 is payment check account page where user can pay the fine using various payment gateway.

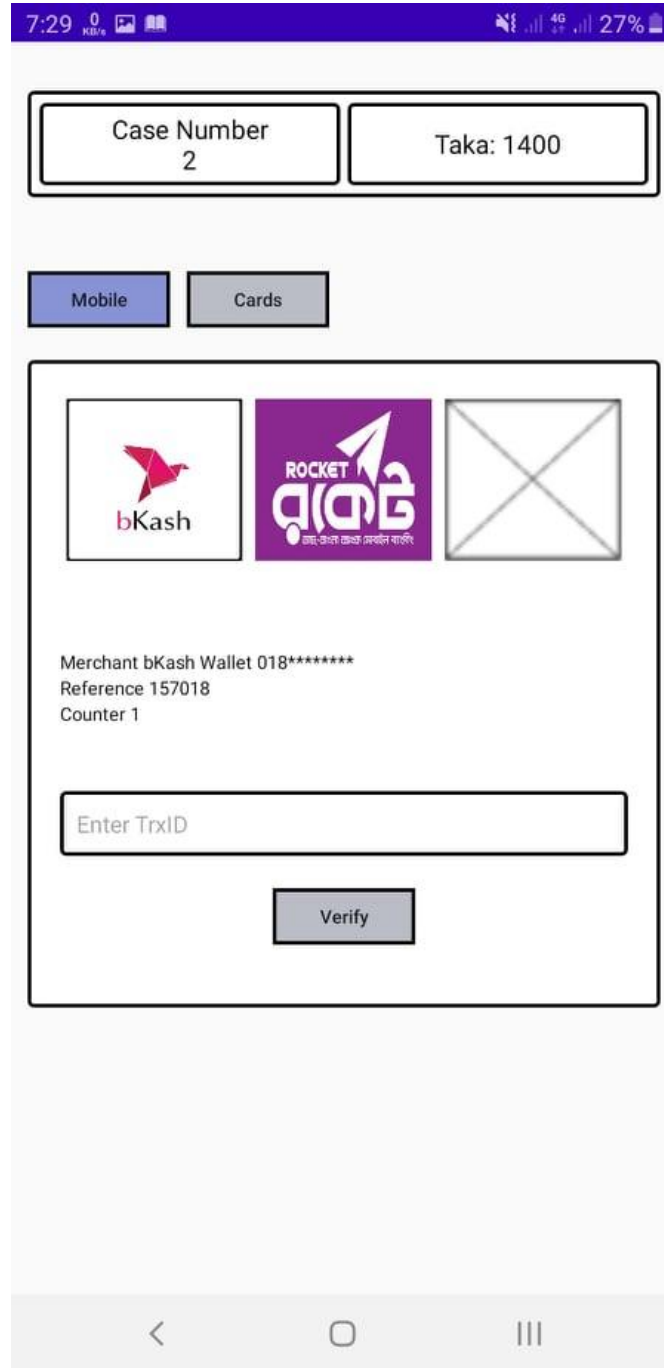


Figure-4.10: Payment Checkout

Figure-4.11 is vehicles details page where user can check vehicles all information and case against that particular vehicle.

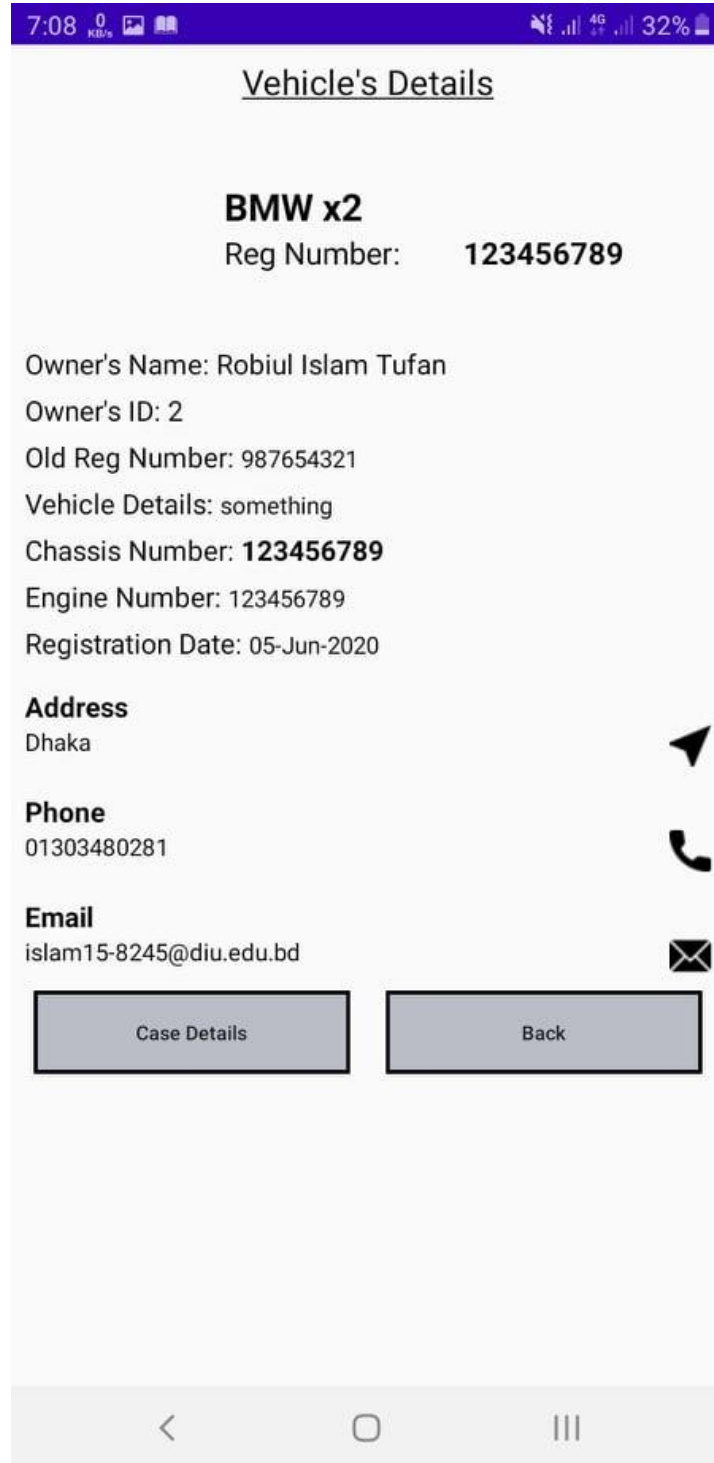


Figure-4.11: Vehicle Details

Figure-4.12 is police profile page that contains police account information where they can check and update information.

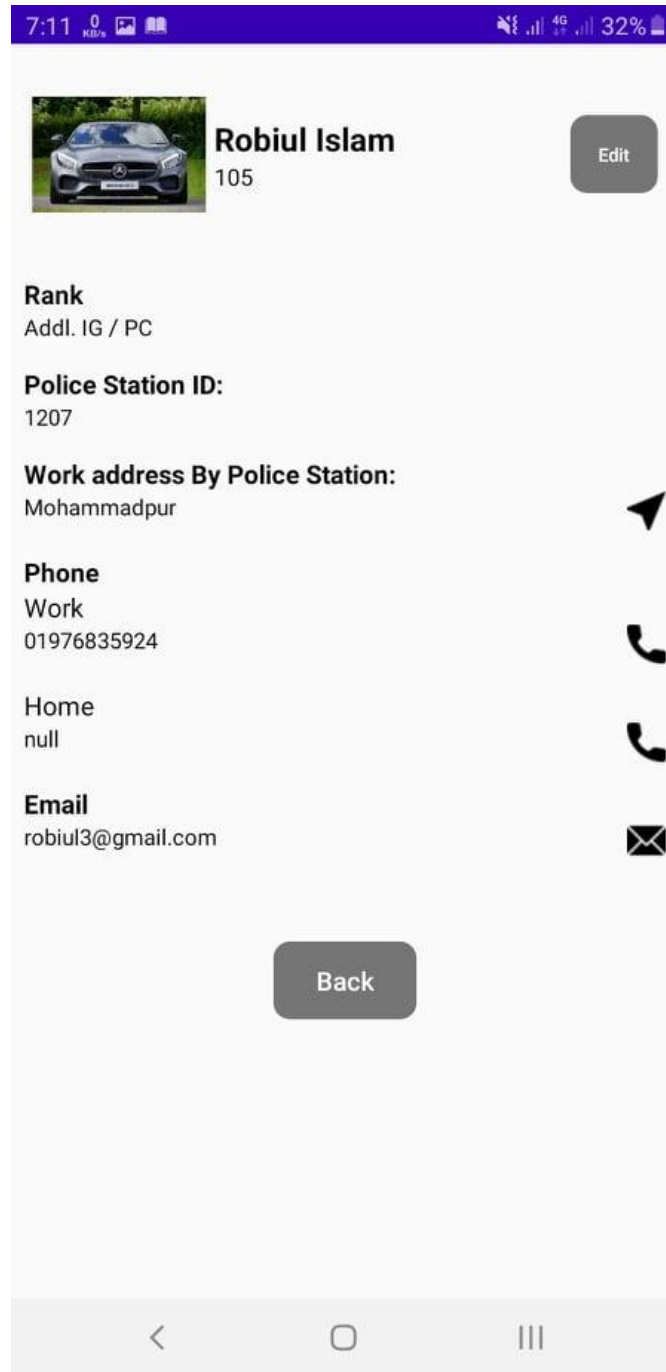


Figure-4.12: Police Profile

Figure-4.13 is Police Dashboard which has vehicle search interface for vehicle so that they can find required vehicle records and file case easily. They also create news/announcement using this window.

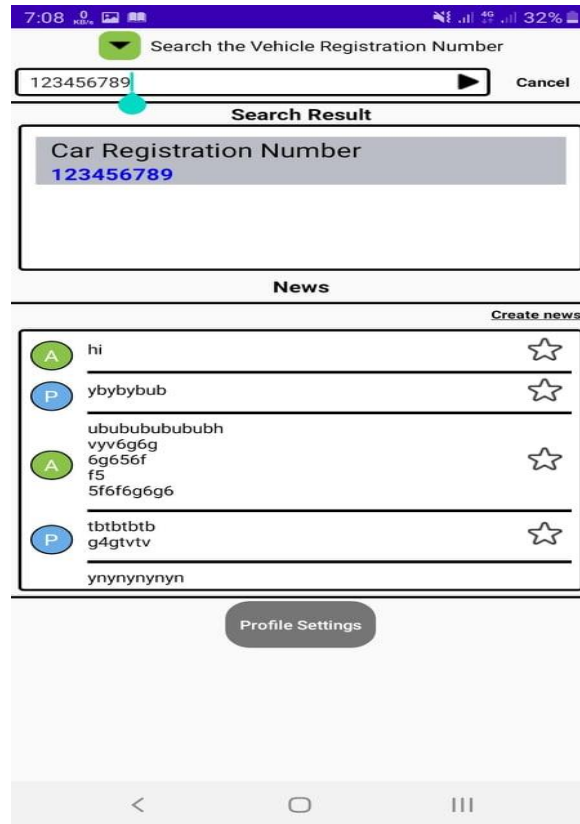


Figure-4.13- Police Dashboard

4.3 Back-end Design

Back-end is the most critical part of android development project. The function which appear in front-end and people operate these functionality design in back-end. In the back-end data can insert, delete, manipulate into database. Back-end is the operational part of front-end function. Front-end can't perform without back-end support.

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Introduction

This chapter shows how our mobile application response in production. How well it's interacted with user and give smooth experience with the help of front-end and back-end. It's also shows how this android application store user's data in database. This visualize how front-end take data and how back-end store it in database. By giving demo or real-world data we tested our mobile application and all the test case with its result shown with picture. We also tested either our mobile application is being able to take those demos or real-world data and handled it properly or not.

5.2 Unit Test

It's a testing method where each component of mobile application tested separately. It's a process to verify each component works individually. The goal of unit testing is to isolate each part of the program and show that the individual parts are correct. By applying unit test bug can be fixed early phase in development.

5.3 Integration Test

It's an opposite process of unit testing. Rather than testing individual component in integration test all the things are combined. Here, all the developed modules are coupled together to test. In integration testing developed materials are tested together. Testing performed to expose defects in the interfaces and in the interactions between integrated components or systems.

5.4 System Test

It is a level of software testing where a complete and integrated software is tested. The purpose of this test is to evaluate the system's compliance with the specified requirements. System test is performed on a complete integrated system to evaluate the system completely. It's a testing where whole system is evaluated fully.

5.5 Acceptance Test

It's a testing where system is tested for acceptability. Acceptance testing is a test conducted to determine if the requirements of a specification or contract are met. The anticipated result of a successful test execution:

- test cases are executed, using predetermined data
- actual results are recorded
- actual and expected results are compared, and
- test results are determined.

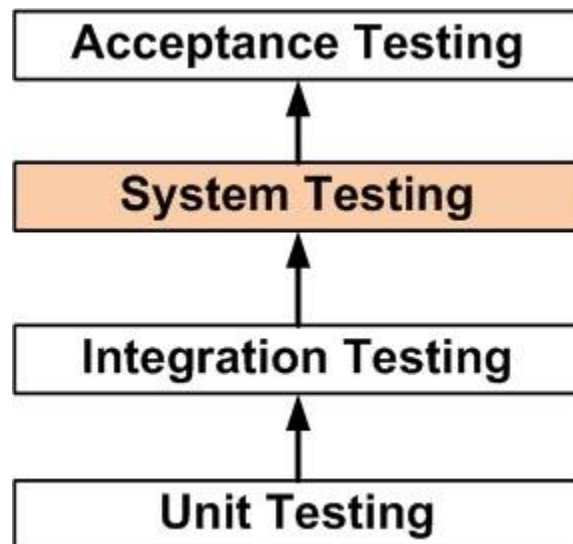


Figure 5.1: Step by step testing process

CHAPTER 6

FUTURE SCOPE AND CONCLUSION

6.1 Introduction

Every innovation and development have future scope and plan. This chapter discuss about the future aspects and plan regarding this project.

6.2 Future Development Scope

Nothing remains unchanged in this globe. Necessity change with time so we have to come up with the time. We have so many future plans regarding this project. We will work with some new and interesting feature to add in our system. We want to make traffic policing service easier for people. If we get enough support from authority then we will make it real in near future.

6.3 Conclusion

The reason behind this project is to solve people problem. We tried to do something special to reduce people harassment. Now we are focusing how we can integrate others policing service in our system. So that people can easily get policing service without any kind of harassment.

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