

**JONOPOD: A SMART GOVERNANCE SYSTEM**

**BY**

**Mahdi Saifullah Srizan**

**ID: 181-15-1869**

**AND**

**Rashaduzzaman Ananda**

**ID: 181-15-1870**

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

Supervised By

**Ohidujjaman**

Senior Lecturer

Department of CSE

Daffodil International University

Co-Supervised By

**Mohammad Jahangir Alam**

Lecturer

Department of CSE

Daffodil International University



**DAFFODIL INTERNATIONAL UNIVERSITY**

**DHAKA, BANGLADESH**

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## **APPROVAL**

This Project titled “**Jonopod: A Smart Governance System**”, submitted by Mahdi Saifullah Srizan and Rashaduzzaman Ananda to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 18.01.2022.

## **BOARD OF EXAMINERS**

---

**Dr. Touhid Bhuiyan**  
**Professor**

Department of CSE  
Faculty of Science & Information Technology  
Daffodil International University

**Chairman**

---

**Md. Mahfujur Rahman**  
**Senior Lecturer**

Department of CSE  
Faculty of Science & Information Technology  
Daffodil International University

**Internal Examiner**

---

**Dr. Mohammad Shorif Uddin**  
**Professor**

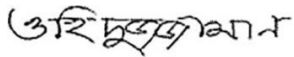
Department of CSE  
Jahangirnagar University

**External Examiner**

## DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Ohidujjaman, Senior Lecturer, Department of Computer Science & Engineering** 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.

**Supervised by:**



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**Ohidujjaman**  
Senior Lecturer  
Department of CSE  
Daffodil International University

**Co-Supervised by:**



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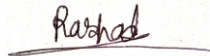
**Mohammad Jahangir Alam**  
Lecturer  
Department of CSE  
Daffodil International University

**Submitted by:**



---

**Mahdi Saifullah Srizan**  
ID: 181-15-1869  
Department of CSE  
Daffodil International University



---

**Rashaduzzaman Ananda**  
ID: 181-15-1870  
Department of CSE  
Daffodil International University

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## ABSTRACT

We want to build a smart governance system that can improve our social life. Our main goal is to create a bonding between citizens, public representatives and other service holders. So, our project is kind of a social networking application for our government employees who are working in different public service institutions. Using this app users can express their social needs and objection to the authority. We all notices great amount of dissatisfaction towards our political leaders, police department etc. Often our public representatives do not care about public opinions and they do whatever they want. It is a common scenario for Bangladesh. But if there is a platform where public representatives work history will be recorded, it may create liability sense among them because their history will reflect their character in future. Citizens will be able to distinguish a good public representative from corrupted ones. We can build a competitive environment for them where they will stay connected with each other and can resolve social problems effectively. User can find their local government profiles and approach them whenever needed. Partially our project will work on some emergency situations like if a fire hazard occurs, any user can quickly contact with local fire service. Or, if user finds them in health emergency situation, they can immediately contact ambulance, doctors even if the user is not from that particular area. Our project will work to implement an effective governance system for our country. It can digitalize our rural areas also by allowing everyone to be more concern about the society. We hope our project can help our society to be more effective and beautiful.

**Keywords:** smart governance, public service, public opinion, competitive environment, emergency situations, effective governance.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

“Jonopod” is a mobile application that we can use to bring our social problems to the authority easily. It can act as a bridge between citizens and different government departments like local government, police, fire service and health experts. A general user can create one public service profile which will be available to another user. For example, a user might be police. So, the user will create a police service profile with the information about his/her job location, designation and phone number. This information will remain available for anyone need to contact with police. Same process is applicable for fire service, health service and for public representatives.

### 1.2 Motivation

It is not any secret that we have many complains towards our government. Most of our political leaders are corrupted and our whole country is one of the most corrupt country in the world. We cannot stop this by a day but we believe if we can build a digital platform where every leader works will be recorded and reviewed by general peoples, it may increase liability scenes among ourself. Initially we will only collect reports about problems from our surroundings and later will show a comparative analysis of their work.

### 1.3 Objectives

Our primary target is to collect problem reports from our citizens easily so that authority can take necessary steps to resolve the problem. Another objective it to build a digital database and a large community of our political leaders starting from local government to parliament members and their works will be there to be reviewed by general peoples. We will allow general users to make constructive comments about work of the leaders. Additionally, the app will provide geological condition, potentially hazardous points of the area will be marked by victims.

## **1.4 Expected Outcomes**

- Fast solutions to social problems.
- Make it easy to report problems to the local government.
- Keep record of all events to analyze in future to create insights.
- Maintain a clean environment for the user
- Easy police service
- Easy fire service
- Improve emergency health service
- Provide emergency contacts when needed
- An effective society

## **1.5 Project Management and Finance**

It is a crucial task for a software team to manage a project effectively. We tried to develop the app for our country and society but it does not have any financial aspects. We can launch this app in play store and earn money from advertisements. But it is not a sustainable method for our project. It would be best if our government wants to use our platform and implement it in our targeted departments. It can provide useful information about our whole country for the government. To reduce social problems and maintain social stability is one of the important tasks of governments. But they cannot solve problems if they do not know about the problem. So, we created an app that can be used to collect different kinds of social problems so that our government can acknowledge them properly. Also, we will be able to add more government departments if our government supports us.

## **CHAPTER 2**

### **BACKGROUND**

#### **2.1 Preliminaries/Terminologies**

Activity of maintaining communications with a view to achieving collective goals through cooperation is called governance [1]. A single person does not need governance but when many people stay together as a family, or as a village, or as a country the need for governance arises. This system organizes all the required task for everyone. In this modern world we need to utilize modern technology to build a smart governance system. If we want to increase the efficiency of public service of a country, we must ensure smart communication between citizens and the government [2].

#### **2.2 Related Works**

There are some projects that serves related purpose as “Jonopod”. Dhaka North City Corporation [3] launched an app to digitalize their service named “Shobar Dhaka”. But they applied their app only to Dhaka North City Corporation. As our government is working hard to build a digital Bangladesh, they have launched various web sites to make information accessible for the people. But still these web sites are not so well organized [4]. We want to make most important public services like police, fire service, health and local government easily accessible for mass people. We have attached some screenshots of related apps below. First app is “Shobar Dhaka” and second app is “Fire service”.

Figure 2.2.1 is the Shobar Dhaka App which also collects reports about social issues and resolves them in future. It has options for road, mosquitos, garbage, street light, public toilet, drainage, illegal structure and water log.

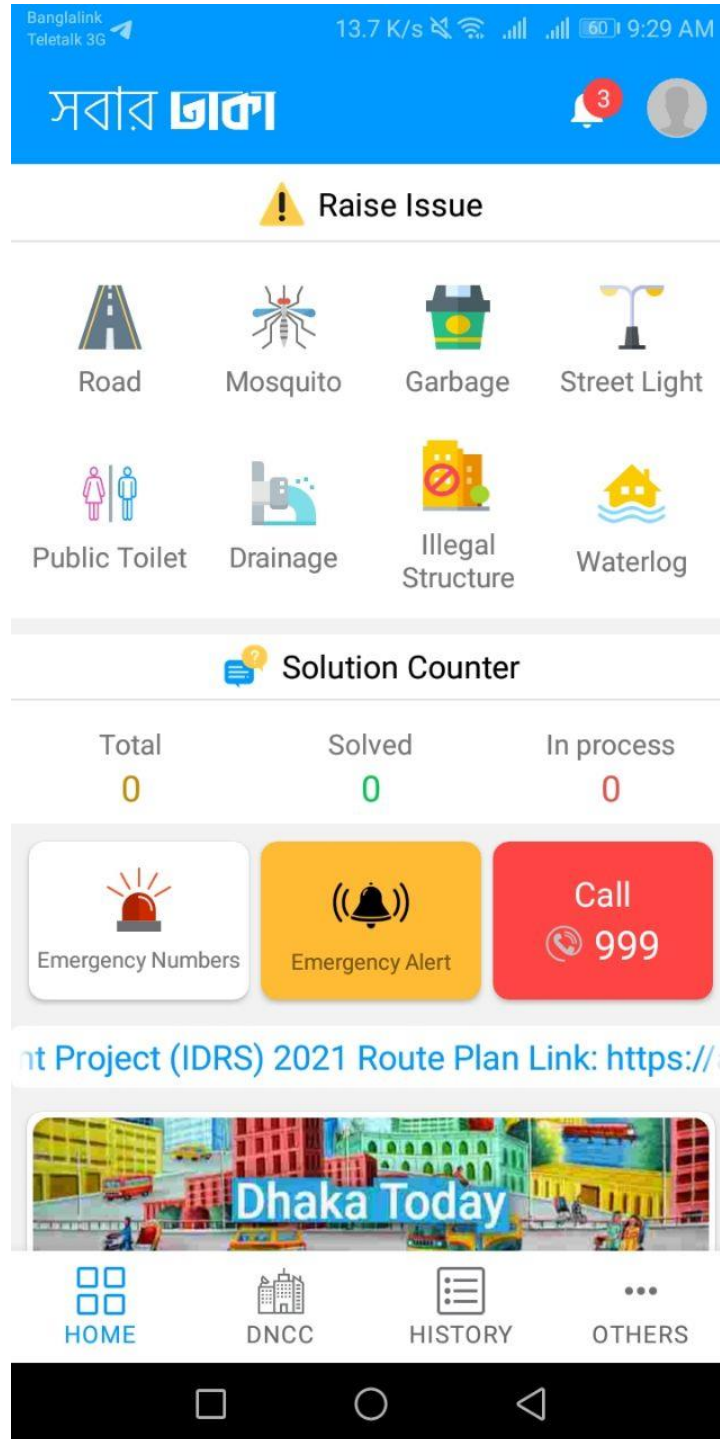


Figure 2.2.1: Shobar Dhaka App

Figure 2.2.2 is the about page of Shobar Dhaka Application. Here they have added Mayor, CEO, Department Heads, Councillors. They also provides some forms and their website address along with facebook page.

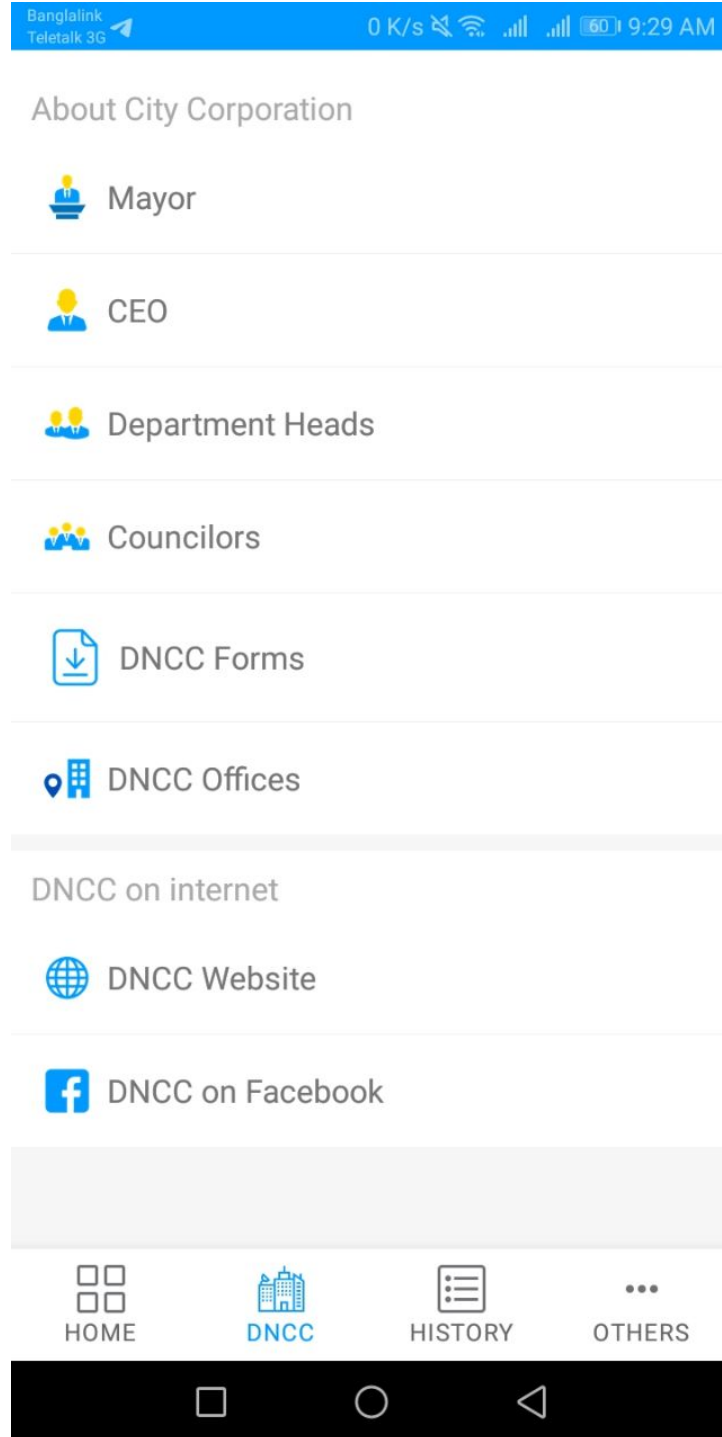


Figure 2.2.2: Shobar Dhaka About Page

Figure 2.2.3 is another app launched by our government that gives us only fire service contacts. It is not convenient for a user to use an app for only one service, so we wanted to build a versatile app for multiple public services.



Figure 2.2.3: Fire Service App

## 2.3 Comparative Analysis

“Shobar Dhaka” only works for Dhaka North city corporation but “Jonopod” will work for our whole country. We also noticed that there are some problems <sup>[5]</sup> in the app they built. On the other hand, “Fire Service” app which is developed by our government, only provides fire related solutions. Also, the user interface of “Fire Service” is backdated <sup>[6]</sup> as well. We have added fire service contacts along with police and local governments. Also, we tried to make our app more informative, user friendly and simple than these apps. Table 2.3 presents a comparative analysis of “Shobar Dhaka”, “Fire service” and “Jonopod”.

TABLE 2.3 COMPARATIVE ANALYSIS

	Shobar Dhaka	Fire service	Jonopod
Covered Area	Dhaka North City Corporation	Whole Country	Whole Country
Report Feature	Yes	No	Yes
Public Representatives	Dhaka North City Corporation	No	Yes
Police	No	No	Yes
Fire service	No	Yes	Yes
Health Service	No	No	Yes



## **2.4 Scope of the Problem**

“Jonopod” will work on collecting reports about various problems of our whole country. After collecting reports, we shall categorize the problems and store them in location hierarchy so that a user from particular place can track their surrounding problems easily. We believe that the first step of solving a problem is acknowledging the problem. So, we want to record our problems and let our user and authority know about their surroundings. This also can help a new settler to decide if a place is good for them or not.

## **2.5 Challenges**

Our biggest challenge is to gather data of the local government, police department, fire service. It is a huge task. We thought about keeping an option to add local information for our general but reliable citizen. We cannot do this alone. To make our project successful we need help from our government and citizens. Government can help us providing their database access <sup>[7]</sup> and if the government gives instruction to our service holders <sup>[8]</sup> to create a profile in our app, it will be very easy for us to make this project successful.

# CHAPTER 3

## REQUIREMENT SPECIFICATION

### 3.1 Business Process Modeling

User can view local information without logging into the system and they can write reports. But if they want add a service profile for them, they have to register and after that they can create a service profile which will be available to all other users.

Figure 3.1 Shows when a user enters the system, they can get local info about service profiles, register account and report problems. If they register in the system, they can create a service profile of their own.

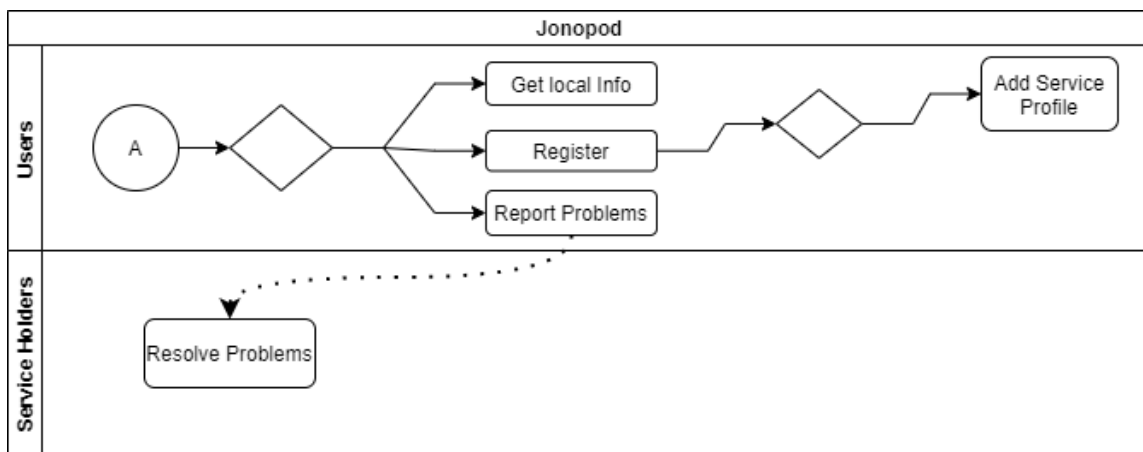


Figure 3.1 Business Process Modelling

## 3.2 Requirement Collection and Analysis

Hardware requirements:

- Android Smartphone
- GPS Sensor
- Camera
- Network Connectivity

Software requirements:

- OS: Android
- Minimum Android SDK 26
- Camera Permission
- GPS Sensor Permission
- Google map
- Camera app

### 3.3 Use Case Modeling and Description

From the figure 3.3.0 we can see that a user contacting with police, local leader, fire service. Also, the user can add a service profile so that citizens can get his public profile. It is showing an interactive and simple model of our project.

Actors: Public Representatives, Police, Fire service, Doctor, User

Use cases for user: Contact for public service, submit reports.

Use case for service holders: Add service profile.

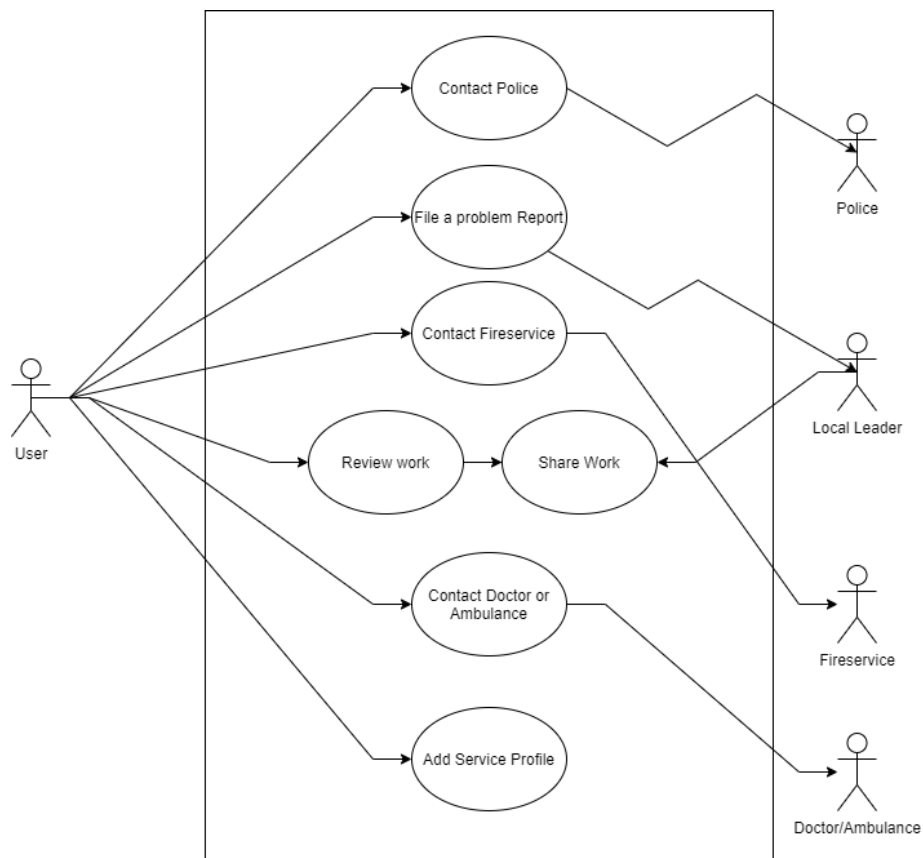


Figure 3.3.0 Use Case Modeling Description

Here are our use case descriptions of the model.

TABLE 3.3.1 USE CASE DESCRIPTION OF REPORT FEATURE

Use Case	Submit Report
Primary Actor	Citizen/User
Secondary Actor	Null
Description	This use case allows users to submit a report about social issues from their surroundings to the local authority.
Pre-condition	Citizen has to be registered
Scenario	Select issue type, enter Statement, add picture, select location, select authority, submit report
Post-condition	Report submitted successfully

TABLE 3.3.2 USE CASE DESCRIPTION OF CONTACT FOR SERVICE

Use Case	Contact for Service
Primary Actor	Citizen/User
Secondary Actor	Police, Fire service, Health service, Public representatives
Description	This use case allows user to contact directly for public services
Pre-condition	Null
Scenario	Call for service, Send a Direct message
Post-condition	Established contact successfully

TABLE 3.3.3 USE CASE DESCRIPTION OF ADD SERVICE PROFILE

Use Case	Add Service Profile
Primary Actor	Police, fire service, health service, public representatives.
Secondary Actor	Null
Description	This use case allows service holders to create their service profiles
Pre-condition	User has to be registered
Scenario	Enter name, enter sector, enter designation, enter phone number, select location
Post-condition	Successfully added a service profile

### 3.4 Logical Data Model

Data model from figure 3.4.0 shows relationships between entities. A citizen can create one or more service profile. Each service profile and reports have a location entity which denotes their location from division to union level. As we are categorizing reports using location hierarchy, we needed location entity for that. So, all reports have a Location. Also, every service holder works on a specific location. So, there is “Has-A” relationship between location and service profiles too, because a service holders have a specific work place location. We have provided the data model to represent our entity relations of our project below.

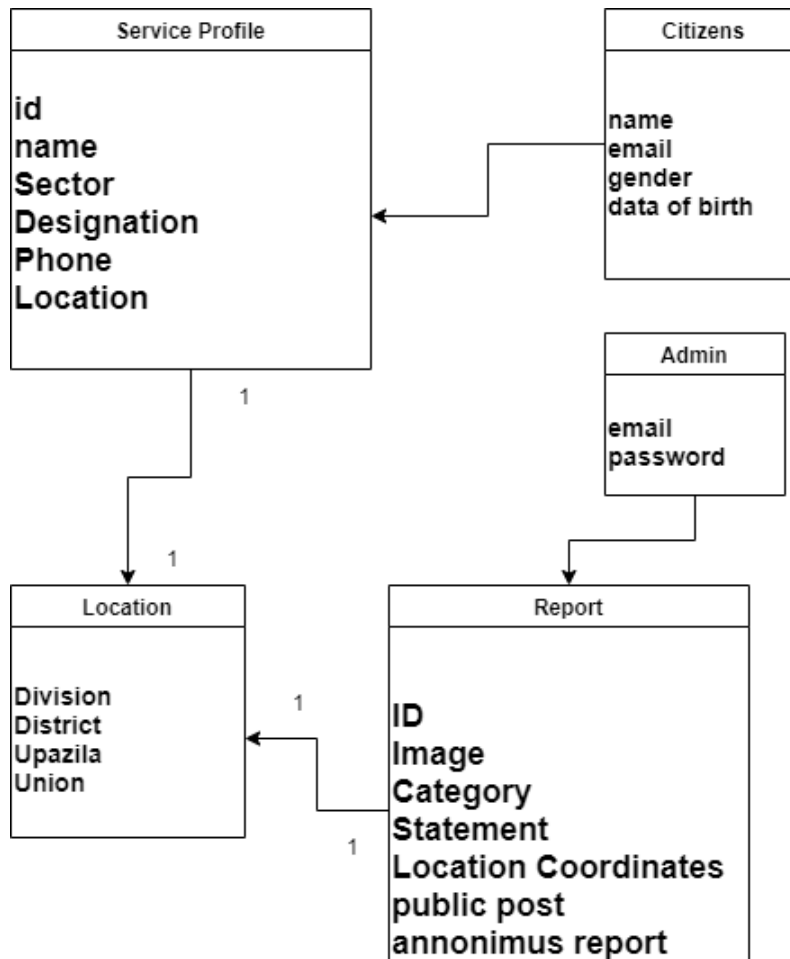


Figure 3.4.0 Logical Data Model

### **3.5 Design Requirement**

- User friendly user interface
- Get Local governments Data from governments database.
- Location permission from user
- Camera permission from user
- Internet connectivity

## CHAPTER 4

### DESIGN SPECIFICATION

#### 4.1 Front-end Design

User will see a home page like the figure 4.1.1 from below when “Jonopod” is started. Here they can fix their location by clicking the edit button from top right corner of the screen. After that user can access local governments profiles, police profiles, fires stations information and profiles that are related to our health system. They also can navigate to feeds page, report page and profile page from this screen using the bottom navigation bar.

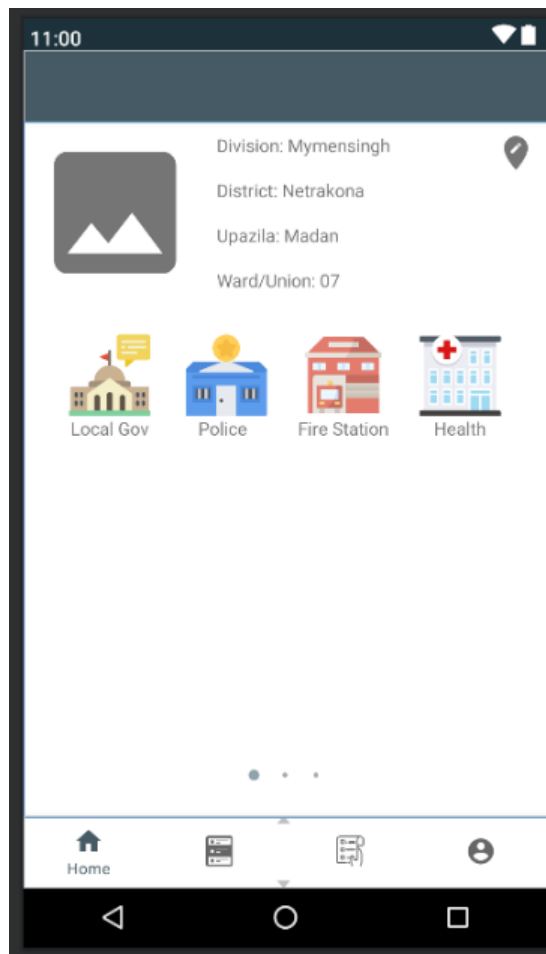


Figure 4.1.1: Home Fragment



Public Posts will be shown in feeds page of figure 4.1.2. If someone report a problem enabling the “Public Post” check box in report page, it will be shown here. After that other user also can share their reactions to the report if they think they will appreciate it or not.



Figure 4.1.2: Feeds Fragment

Users Profile Page: User's name, email and gender will be shown in figure 4.1.3 and if the user adds any service profile, it will be shown under the "Service Profiles" segment. Using the edit button, user can edit their profile and using the delete button, they can delete their service profile from the list.

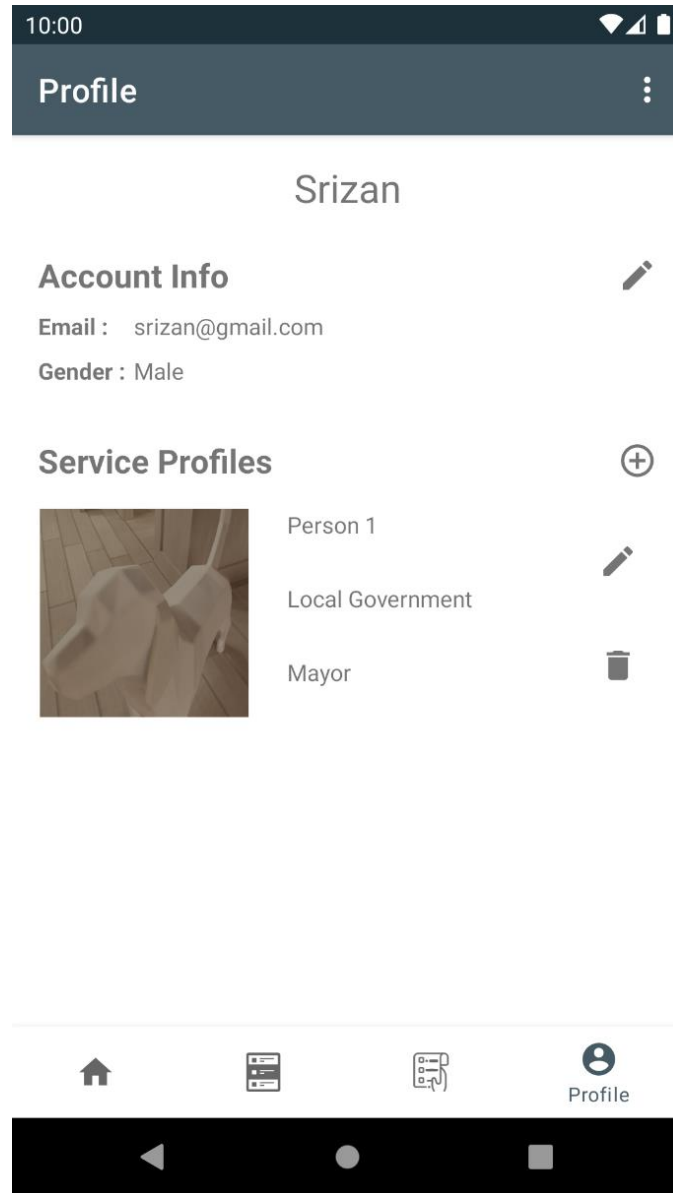


Figure 4.1.3: Profile Fragment

Report Page: When user want to write a report about something, user will post the report using this page of figure 4.1.4. User can make this report anonymous and public post. If user enable public post option, the report will be shown in “Feeds” page.

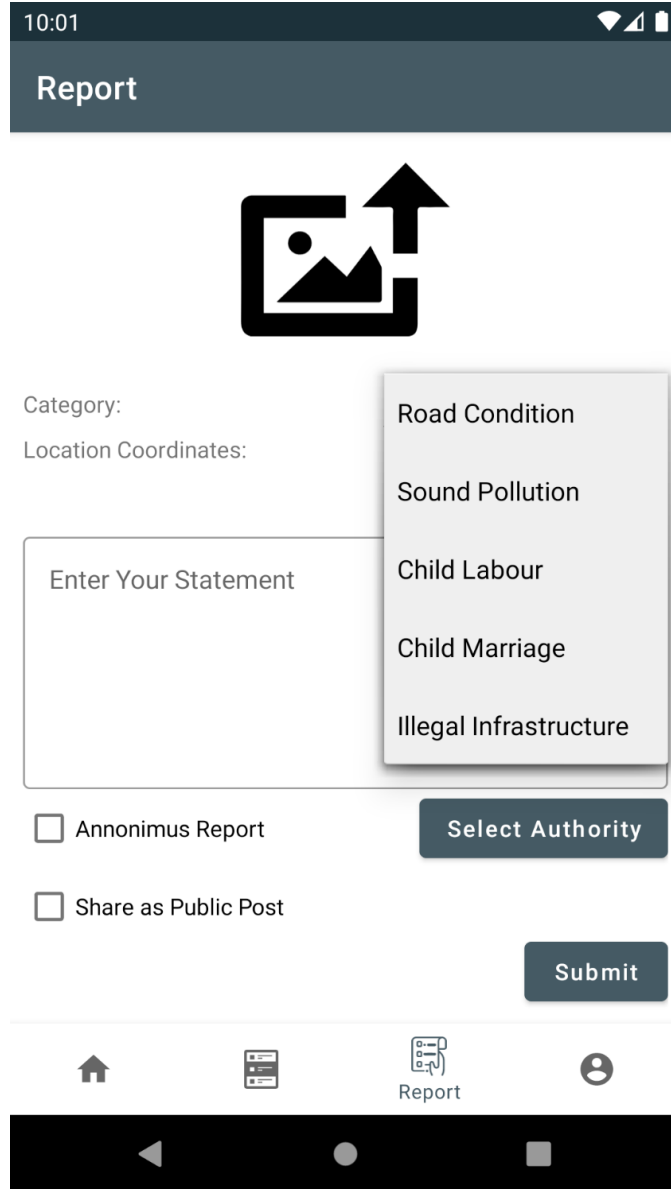


Figure 4.1.4: Report Fragment

Service Profile Insertion: User Can add their service profile using the page of figure 4.1.5 and this profile will be available for citizens of that particular location. They will need to provide their name, job sector, designation, phone number, location and a profile picture. Select Location button opens the bottom sheet fragment which is used to select the exact location.

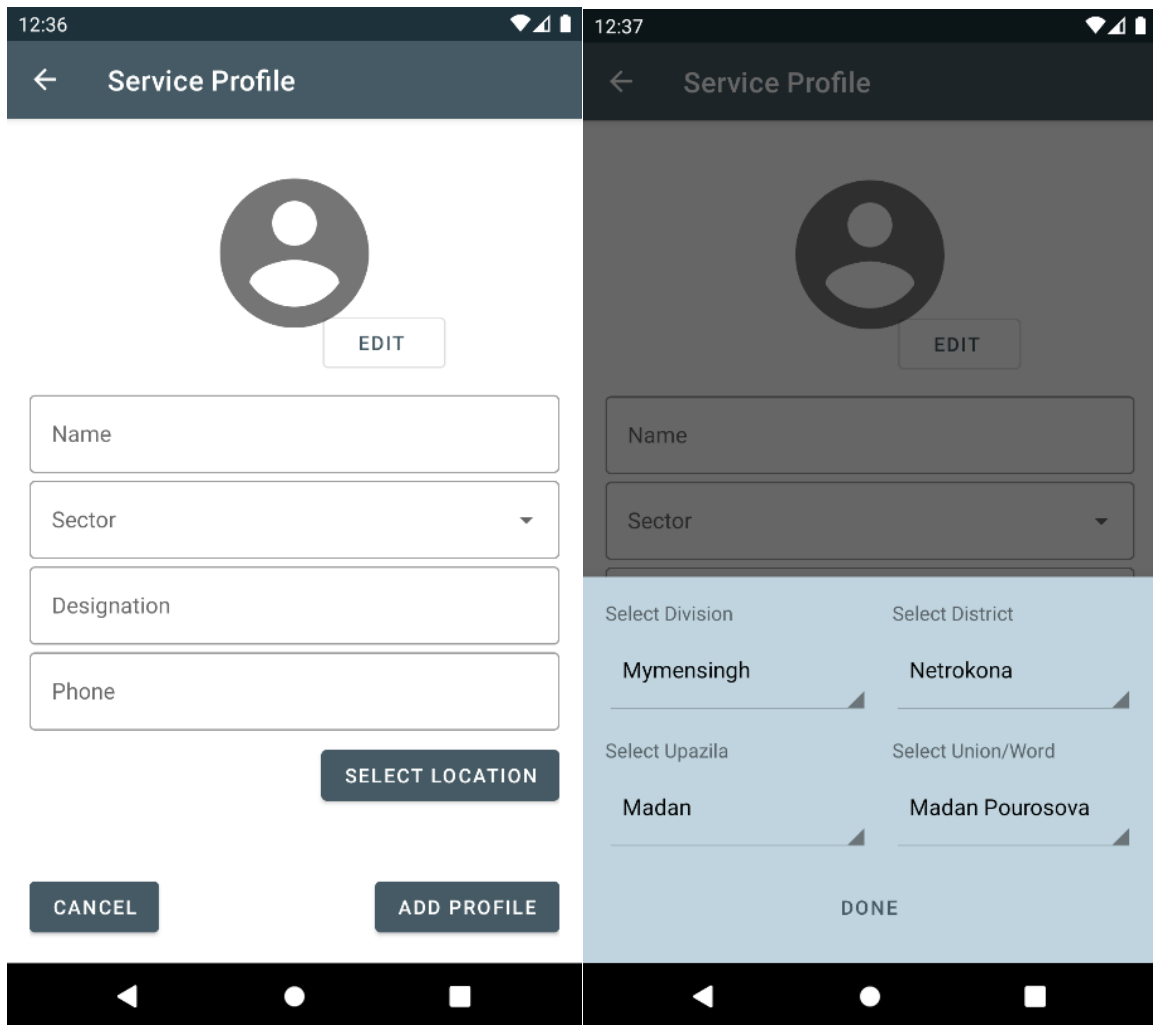


Figure 4.1.5: Add Service Profile Fragment with specific location selection option

Figure 4.1.6 is the Login and Register Page for authentication. User can swipe to navigate from Login fragment to Register fragment and vice versa. User cannot insert any email here if the email is not in valid format. The eye button of the password field shows the password or hide the password if needed. The register tab from the top will open the register page and user can register there.

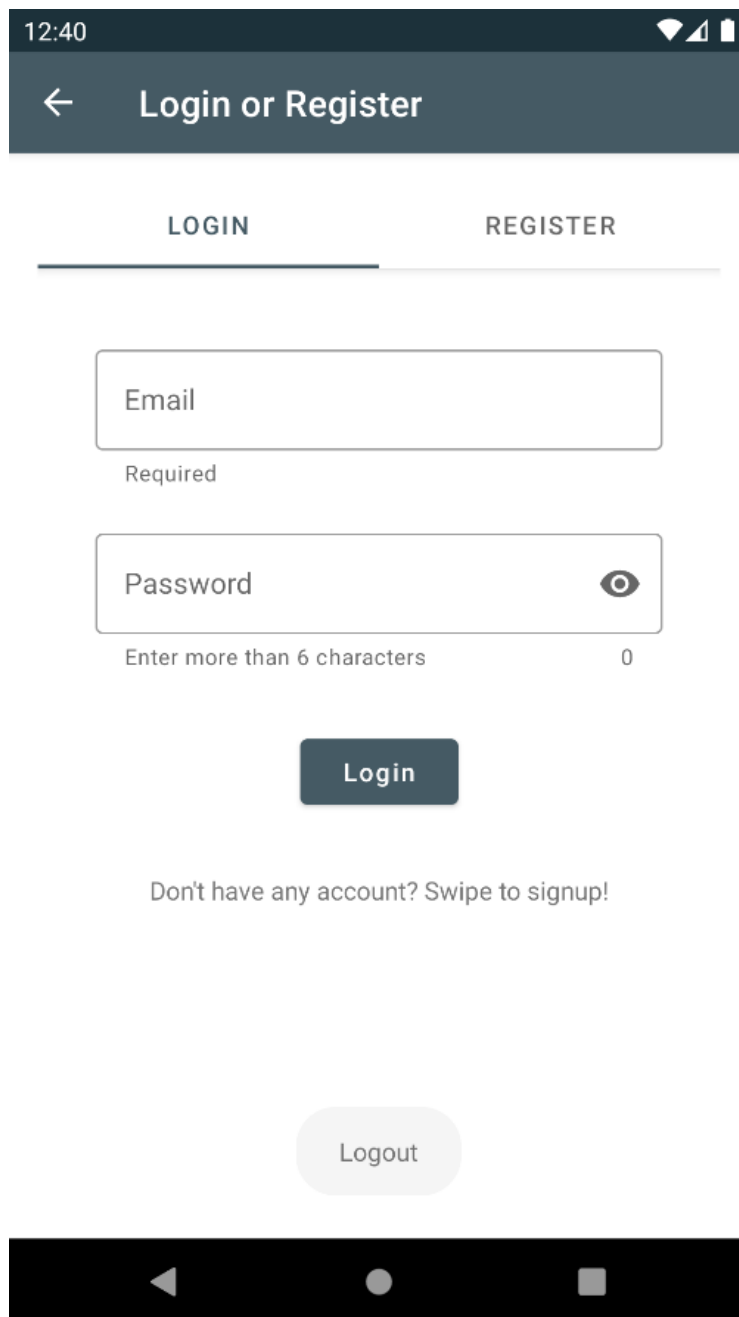


Figure 4.1.6: Authentication Fragment

We have simplified our registration page of figure 4.1.7 to make our app user friendly. User can register only using their name, email and gender. After registration, user will be logged in automatically and can use features that are not available for non-registered user.

The screenshot shows a mobile application interface for registration. At the top, there is a dark header bar with a back arrow on the left and the text "Login or Register" in the center. Below the header, there are two tabs: "LOGIN" and "REGISTER". The "REGISTER" tab is selected, indicated by a blue underline. The registration form consists of four text input fields stacked vertically: "Name", "Email", "Password", and "Confirm Password". Below these fields is a "Gender" label followed by a dropdown menu currently showing "Male". At the bottom right of the form is a dark blue button labeled "Register". The bottom of the screen shows the standard Android navigation bar with back, home, and recent apps icons.

Figure 4.1.7: Register Form

## 4.2 Back-end Design

We used “Firebase Firestore” as back-end server. It is a NOSQL database system which works using collection and document. A document is similar to a row of SQL database but here it is schema less. One or multiple documents can be grouped together and it will create a collection.

Figure 4.2.1 shows the cloud fire store database where we have created collections of users, feeds, service profiles and locations.

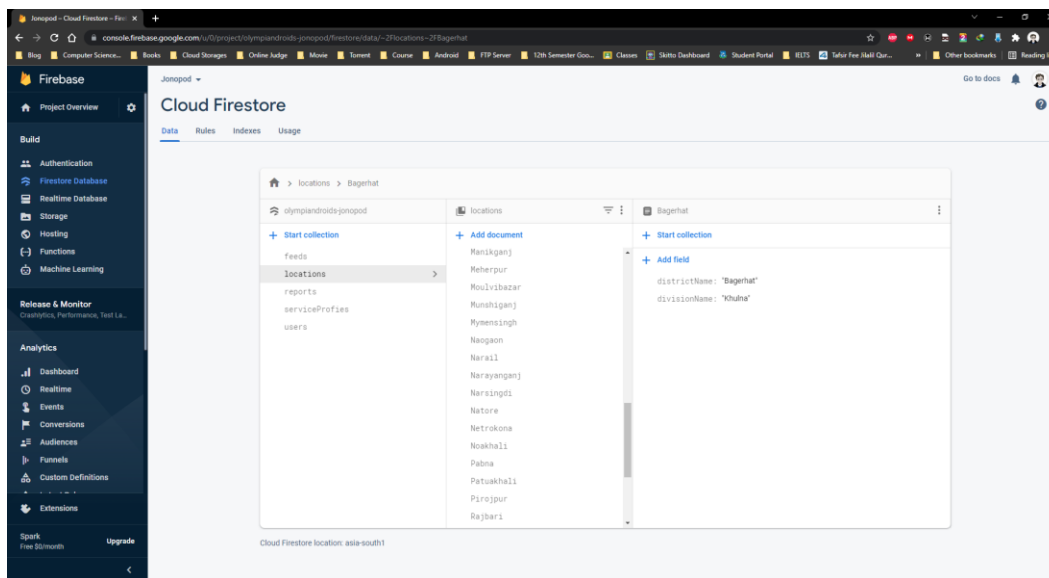


Figure 4.2.1: Cloud Firestore Database

Data Model of Service Profile: Service profile documents have seven string fields.

```
serviceProfile{  
    uuid: "Unique user id from firebase authentication"  
    name: "Name of the service holder"  
    phone: "Phone number"  
    sector: "Sector of the service profile"  
    designation: "Designation of the service profile"  
    location: "Location of the posting"  
    imageLink: "Profile picture of the service holder"  
}
```

Data Model of Service Profile: A location document is consisted of four string fields. We have used this entity in service profile, report location and authority location.

```
location: {  
    division: "Division name"  
    district: "District name"  
    upazila: "Upazila name"  
    union: "Union name"  
}
```



Data Model of Reports: A report contains four fields of string type, a location field and a type of timestamp.

```
Report {  
    category: "category of the report"  
    date: "date of the submission"  
    user: "Report owner"  
    statement: "Report text"  
    imageUrls: "URLs from cloud storage after upload"  
    location: "location of the authority who will check the report"  
}
```

Data Model of Feeds:

```
Feeds {  
    date: "date of the submission"  
    user: "feeds owner"  
    statement: "feeds text"  
    imageUrls: "URLs from cloud storage after upload"  
}
```

Figure 4.2.2 shows all the registered users' credentials. We cannot see user's password here but we can remove any user if they do anything illegal.

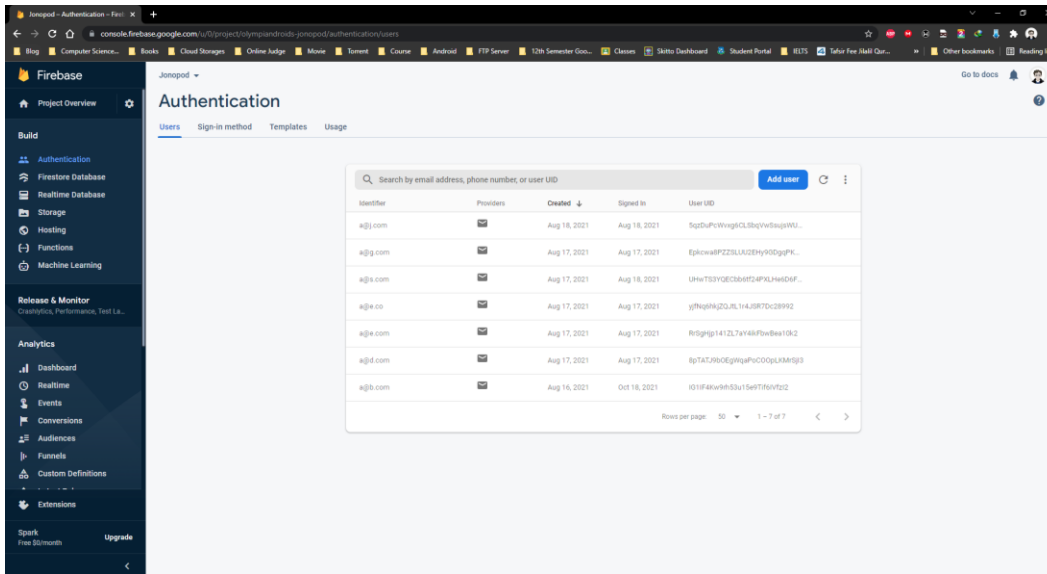


Figure 4.2.2: Authentication

Figure 4.2.3 show the image storage of our app. Here we are storing all the images from reports and citizens service profiles. We generate a download link for each image and associate the link with respective documents.

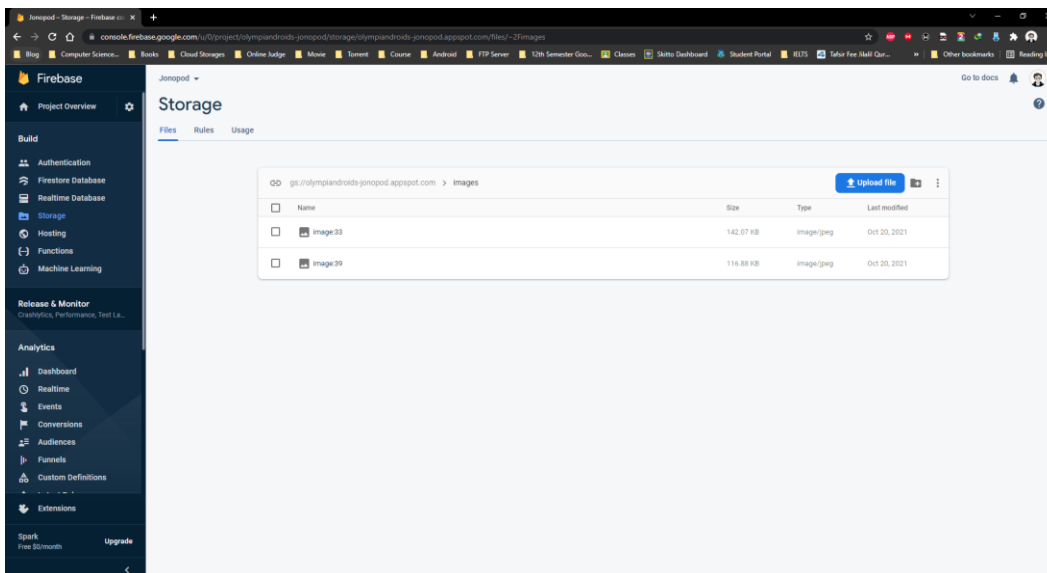


Figure 4.2.3: Storage for Images

### **4.3 Interaction Design and User Experience (UX)**

We tried to build an easy-to-use graphical user interface because the app will be used by mass people. User can access service holders' information straight from the home page. They can go to local governments profile, police profile, fire service profile and doctors' profile straight from the home page. We implemented a location selection feature that can take input as drop-down menu where no typing is necessary. We have structured the database in way that user select their location from division to union. In input form we used a simple get location button that can get the last location using just one click and also user can get location point using a google map fragment.

### **4.4 Implementation Requirements**

Xml: Front-end language.

Java: Language for business logic of the app

Firebase Authentication: It is a service to login and resister users. We used only email authentication.

Firebase Firestore: Online NOSQL database for our app. It helps us to create a horizontally scalable database.

Firebase Storage: Online storage for images and other files.

Android Studio: The IDE for android development recommended by Google. It is an intelligent ide developed by JetBrains.

We need cloud functions and notification server to complete our project but it is paid service by google so we could not implement some features yet. In future when we will get funding for our project, we will be able to integrate these features.

## **CHAPTER 5**

### **IMPLEMENTATION AND TESTING**

#### **5.1 Implementation of Database**

Authentication: Any user can use our app to get information about local governments, police, fire service and doctors without authentication. But if a user wants to submit a report about specific problem, he/she have to register an account. After registration users can create their own service profile exposing their name, sector, designation, phone and their exact location where they provide service.

Firestore: We have used firestore NOSQL database system to store our information on the cloud. It is horizontally scalable and easy to use. We could use real-time database but firestore is more convenient for our project.

Storage: Firebase storage feature was needed to save user profile images and images of reports that user submits. It works just like a storage structure of a computer where we can store our binary files.

#### **5.2 Implementation of Front-end Design**

Xml was used to implement our ui section. It is markup language which is used in various sectors of computer science. We followed one activity for entry point of the app method and further we used fragments for different views. We used android's latest jetpack navigation component library for ui navigation. As for design pattern we used MVVM architecture pattern. It means Model, View, and View Model. There are other architecture patterns out there but google prefers using MVVM pattern so we used it in our app.

### 5.3 Testing Implementation

We tested our app using different inputs. We restricted user inputs from key board where we could use dropdown menu which is called spinner in android development. When user wants to register, the app will check validity of email. We also have restricted the password length to at least 6 characters. After passing all the validation, user can login or register and use the app with full functionality.

### 5.4 Test Results and Reports

Here we recorded some test results for login function. We implemented a validation method which checks if the entered email is valid or not. If the email is valid and the password is at least 6 characters long, user will be successfully logged in.

Table 5.4.1 shows the test result of login process. Our test result provided us our desired outcome.

TABLE 5.4.1: USER LOGIN TEST

Conditions	Email	Invalid	Valid	Invalid	Valid
	Password	Invalid	Invalid	Valid	Valid
Actions	Expected result	Enter valid email and valid password	Enter valid password	Enter valid email	Successful
	Result	Enter valid email and valid password	Enter valid password	Enter valid email	Successful

Test result of registration process is shown in table 5.4.2. It is similar to the login process.

TABLE 5.4.2: USER REGISTRATION TEST

Conditions	Email	Invalid	Valid	Invalid	Valid
	Password	Invalid	Invalid	Valid	Valid
Actions	Expected result	Enter valid email and password more than 6 character	Enter password more than 6 character	Enter valid email of standard email format	Successful
	Result	Enter valid email and password more than 6 character	Enter password more than 6 character	Enter valid email of standard email format	Successful

## **CHAPTER 6**

### **IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY**

#### **6.1 Impact on Society**

“Jonopod” can develop smart and effective social model in Bangladesh. It will work on public rights, public safety and public health to improve our lifestyle. A digital database can help us to reach police, doctors, fire service, public leaders whenever needed. For example, during a fire emergency someone might not know how to contact with local fire service or if we need medical help, it will be best to have local ambulances contact number. “Jonopod” can solve these problems by providing all the information about police, fire service etc. We just have to store professional profiles in our database. Regarding this purpose we created options for everyone to create their service profile in our app. After that anyone can get their information from anywhere.

#### **6.2 Impact on Environment**

If our user uses the “Report” feature to submit reports about their environmental problems, authority can easily response to those problems and thus we can improve our social environment. For example, if someone reports about a garbage dump on wrong place, broken drain system, sound pollution or similar types of problem, local authority can take necessary steps to those problems which will eventually build a cleaner environment. Also, as user can file a report without using paper, so it can save a lot of trees which is used to make paper. So, we can say that our project can also contribute to create a greener environment.

### **6.3 Ethical Aspects**

Our app will keep track of our leaders works and different kinds of crime reports. Unethical works report can be collected from user if they report honestly. Then if there is someone in the local area working for the police department and also have a service profile in our app, can act on the issue immediately. This system can increase transparency in our social structure and build ethically right society. We hope everyone will use our app and utilize it properly.

### **6.4 Sustainability Plan**

To achieve long term goals, we need appropriate sustainability plan. If there is no proper planning in running a project, it will stop its journey without getting any success. Initially we will only collect data from user reports and help authority to resolve them. But in order to create different insights, like which area is more safe than other or which area in our country is more vulnerable to crimes, we need huge amount of data and knowledge to process that data. We need knowledge of data science and machine learning to make the system intelligent. We may use it to predict crimes in our country as well. Nowadays, most of the business are using data driven methodology to gain success in predicting human behavior. We want to use such algorithms of data science to create information from raw data. As we developed this app for government purpose, our sustainability plan depends on governments decision. Our government can use our app to provide public services more effectively. We will submit our project to different kinds of innovation competition in order get attention from our government.



## **CHAPTER 7**

### **CONCLUSION AND FUTURE SCOPE**

#### **7.1 Discussion and Conclusion**

“Jonopod” is not developed on a business purpose. If our government want to use this app to build a collaborative relation between citizens and local government along with police and fire service, it can change our political and social condition. Those who cannot reach authority because of complications or because of fear, they can express their opinions comfortably. For example, if a citizen suffers from sound pollution from the neighborhood, usually no one complains about this kind of situation but gets annoyed. We have created a way to raise voice about this kind of social issues along with broken road, broken drain, garbage dump, can express their words when they facing a sound pollution etc. It can help our government to be more successful in building a digital Bangladesh.

#### **7.2 Scope for Further Developments**

When a software project stop updating, it starts to lose appeals from its user. We have to continue its development process and add more feature. If we get support, we can continue to develop this project and add new features. Initially we thought about adding some options for local land marks but we could add the feature. We could store different government projects and make them available to be reviewed by citizens. It can create a competitive environment for our leaders who are in charge of local government. We will study and research more to gain more insight about our society, learn new ways to make our life easy. We can use data science in our project to analyze our social needs and condition which can help us to predict different kinds of events that impacts on our society.

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