

**FEEDIE FOOD- RESCUE  
(WASTE FOOD MANAGEMENT SYSTEM & DONATION APP)**

**Project Progress Report**

**Submitted in Partial Fulfillment of the Requirements for the Degree of**

**BACHELOR OF TECHNOLOGY**

**in**

**COMPUTER SCIENCE & ENGINEERING**

**BY**

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## **DECLARATION**

I hereby declare that this submission is our own work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

Signature

Name: Rishabh Maindola

Roll No.: 1900950100066

Date:

## **CERTIFICATE**

This is to certify that Project Report entitled "**FEEDIE FOOD – RESCUE (WASTE FOOD MANAGEMENT SYSTEM & DONATION APP)**" which is submitted by Rishabh Maindola in partial fulfilment of the requirement for the award of degree B. Tech. in Department of Computer Science and Engineering of MGM's College of Engineering and Technology which is affiliated by AKTU Lucknow, is a record of the candidates own work carried out by them under my supervision. The matter embodied in this report is original and has not been submitted for the award of any other degree.

**Date:**

**Supervisor Signature:**

**Name of Supervisor: Mr. Mohammad Asim**

**Designation: Assistant Professor**

## **ACKNOWLEDGEMENT**

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## **ABSTRACT**

Many people face starvation because of food shortages. Food shortages in developing countries are common. Smallholders and laborers are the most affected. In addition, in the current pandemic, laborers' employment has been taken away, leaving them unable to feed themselves and their families. There are several ways and means to help the needy, but nothing works better than making a contribution to an organization dedicated to helping poor communities battle against food scarcity. People living in NGOs also face food shortage issues. This excess waste food usually ends up in landfills, creating potent greenhouse gases which have dire environmental implications. Which has a great impact on our economy and GDP.

Our “(Feedie Food- Rescue waste food management system and donation app)” is an innovative solution designed to tackle the issue of food waste by efficiently managing surplus food and connecting it with those in need. This system utilizes a user-friendly app interface that allows food businesses and individuals to easily donate excess food, which is then collected and distributed to charitable organizations or those in need. With the help of this application, donors can add donations, receivers with the help of delivery riders can serve food to many people.

By knowing the reality, we are building this project with the help of Android, Java and firebase using an App development technology to provide a best portal to contact with different organisations into a single organized place.

So, our aim is to change our “food abundance” mindset to a “food scarcity” one, working our way towards a zero-waste end goal. To feed someone else or, at the very least, compost it so it doesn't end up in landfills and doesn't get waste it will also help economically and socially to strive for the best results.

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# **CHAPTER – 1**

## **INTRODUCTION AND BACKGROUND OF PROJECT**

### **1.1 LITERATURE REVIEW**

Food waste is one of the major challenges of our society. According to the Food and Agriculture Organization (FAO), around 1.3 billion tonnes of food are wasted globally every year. In recent years, waste food management systems and donation apps have emerged as promising solutions to tackle this issue. In this literature review, we will examine the existing literature on waste food management systems and donation apps.

- 1) Waste food management systems involve the proper collection, segregation, and disposal of food waste. A study by Akbari et al. (2019) examined the effectiveness of various waste management systems, including composting, recycling, and landfill, in reducing food waste. The study found that composting was the most effective way of managing waste food [8].
- 2) Another study by Kumar et al. (2021) examined the effectiveness of an integrated waste management system that included source segregation, composting, and biogas generation. The study found that this system significantly reduced food waste and greenhouse gas emissions [9].
- 3) Donation apps are mobile applications that allow individuals and businesses to donate excess food to those in need. A study by Prado et al. (2020) examined the impact of donation apps on reducing food waste. The study found that donation apps were effective in reducing food waste and providing food to those in need [10].

- 4) A study by Mittal et al. (2021) investigated the effectiveness of donation apps in reducing food waste and addressing food insecurity in India. The study found that donation apps are a promising solution for addressing food waste and hunger, as they can provide a platform for connecting surplus food with those in need [12].
- 5) Similarly, a study by Olabarrieta-Landa et al. (2021) examined the role of donation apps in reducing food waste and addressing food insecurity in Spain. The study found that donation apps have the potential to facilitate food recovery and reduce waste, but their success depends on various factors such as user engagement, trust, and infrastructure [13].
- 6) A study by Seo et al. (2020) investigated the factors that influence the intention to use donation apps for food waste reduction in South Korea. The study found that perceived usefulness, perceived ease of use, and perceived enjoyment significantly influence the intention to use donation apps for food waste reduction [14].

In conclusion, waste food management systems and donation apps have emerged as effective solutions to tackle the issue of food waste. Composting has been found to be the most effective way of managing waste food, while donation apps have been effective in reducing food waste and providing food to those in need. Factors such as perceived usefulness, ease of use, and social influence significantly influence the adoption of donation apps. Further research is needed to develop and implement more effective waste food management systems and donation apps.

## **1.2 PROBLEM DEFINITION**

The wastage of food is a major problem in many urban areas, resulting in financial losses for businesses and having negative environmental impacts. Additionally, food wastage exacerbates the issue of hunger and malnutrition, particularly in developing countries. A waste food management system and donation app can help address this problem by connecting food providers with organizations that distribute food to those in need. The app would allow food providers to easily list their excess food, while organizations can easily request and collect the food. Overall, such a system could help reduce food waste, increase access to food for vulnerable populations, and promote social responsibility.

Poor management of food waste causes the loss of natural resources, human health issues, pollution in rivers and other water bodies, the generation of methane emissions from dumps and landfills, and a missed opportunity to recover valuable energy, organic matter, nutrients and water contained in food waste. While it is difficult to estimate impacts on biodiversity at a global level, food wastage unduly compounds the negative externalities that monocropping and agriculture expansion into wild areas create on biodiversity loss, including mammals, birds, fish and amphibians.

Food waste is one of the largest waste streams in India, with a high generation rate and a low recycling rate. In 2019, food waste made up one-fifth of the total amount of waste generated in India, but only 18% of it was recycled. Making it easier to segregate food waste for treatment and tracking the amount of segregated food waste are key steps to reducing the amount of food waste generated and promoting its treatment.

This waste has a significant impact on the economic, environmental, and social consequences as it contributes to greenhouse gas emissions and uses valuable resources. So, it's relevant to today's market, society, and industry needs as it promotes sustainable food practices, contributes to reducing waste, alleviates hunger and complex issues of food insecurity, and also provides a sustainable solution for addressing the social, environmental challenges and promotes the efficient use of resources and food management.

## **1.3 BRIEF INTRODUCTION OF THE PROJECT**

Our main aim is to have embarked on an ambitious journey to create a local circular food economy through our project "FEEDIE FOOD- RESCUE (WASTE FOOD MANAGEMENT SYSTEM & DONATION APP)". The problem of food waste is a relatively modern one. The average person in India wastes 137 grams of food every single day. That's 0.96 kg per week or 50 kg per year. In India, 40% of the food is wasted which is equivalent to Rs 92,000 crores a year and according to the Environmental Protection Agency, food waste is now the primary kind of waste going into landfills, and 15% of the food waste in landfills comes from restaurants. This costs the food industry \$8 billion to \$20 billion.

Food waste is a significant issue worldwide, and it has become a major problem in many urban areas. The causes of food waste occur at different stages of producing, processing, retailing and even consumption. Food Waste management is one of the core concerns of the modern age. Many people waste a lot of food as they don't value food since they get it so easily. On the other hand, there are even people who don't get any food to eat for days. There is also a significant amount of food waste generated in our homes and also in many restaurants/cafes that have a policy to not serve food from the previous day, despite being perfectly edible. This is all thrown away as "waste", at the end of day. This excess food waste usually ends up in landfills, creating potent greenhouse gases which have dire environmental implications. Waste is carried and thrown improperly leading to an unhealthy and inhabitable environment that costs the government an insane amount of money with not at all positive impact, it not only has financial implications for businesses, but it also has adverse effects on the environment, exacerbating the issue of hunger and malnutrition.

However, there is hope in the form of our "Feedie Food- Rescue", which have been developed to reduce food waste and donate excess food to those in need. It is designed to connect food providers, such as restaurants, hotels, and grocery stores, with organizations that distribute food to those in need. These systems provide an easy-to-use interface for food providers to list their excess food, while organizations can easily request and collect the food.

So, by seeing this we have planned to develop a software where everyone will get food without any hunger pangs. As nations around the world are developing, their concerns and accountability for a healthier and sustainable environment is also increasing. In this research, we proposed to design and implement an effective waste food management system and donation application with android application, in this system the donor can provide food to the receiver by requesting them. Receiver can also request a delivery rider for the pickup and completion of donation. No food waste is the mission of this system. In this system there are 4 major entities namely, Admin, Donor, Receiver and Rider. Admin can login and manage Donor, Receiver and Rider by approving, declining, adding them and updating the list. Donor, Receiver and Rider can login and update their profiles. Donors can also view the accepted food list which is yet to pick up and can add access to food details. They can also accept requests from the receiver and can also view the accepted, pending and previous today's Access Food list which are accepted by riders. They will be getting notifications. Receivers can login and update their profile by providing details. They can view and accept the donor request and also food details. They can accept and assign a rider for food pick up. In the time of food shortage the receiver can also raise requests to the donors and will get notifications.

So, this system offers a convenient and efficient way to donate excess food and connect donors with delivery riders and with the volunteers like NGO's, charities and other organizations that can distribute the surplus food to those in need both humans and animals, and promotes sustainable practices. The goal is to reduce food waste and increase access to food for vulnerable populations. By doing so, these systems can help promote social responsibility, reduce costs for food distribution organizations, and minimize the environmental impact of food waste.

## **1.4 PROPOSED MODULE**

In this proposed system, we have developed a system for donating excessive food to the needy or NGO's. FEEDIE FOOD- RESCUE has been designed in such a way that it can fulfil the needs to help reduce the wastage of the food. Overall, these proposed modules would provide a comprehensive and efficient waste food management system and donation app that streamlines the donation process, promotes food waste reduction, and ensures the safe and efficient distribution of donated food to those in need.

**The system comprises of 4 major modules with their sub-modules as follows:**

### **Admin:**

1. **Login:** Admin can login using credentials.
2. **Manage Donor:** Admin can manage donors by approving or declining users.
3. **Manage Receiver:** Admin can manage receivers by approving or declining users.
4. **Manage Rider:** Admin can manage riders by approving or declining users.
5. **Logout**

### **Donator:**

1. **Register:** Users can register using credentials.
2. **Login:** User can login in his personal account using email and password.
3. **Profile:**
  - Change Profile
  - Update details
  - Reset Password
4. **Home:**
  - Add Donation
  - Check Status : will show Pending/Accepted/Decline status of donation.
  - Donation History
  - Email Verification
  - Notification
  - Logout

## **Receiver:**

1. **Register:** Users can register using credentials.
2. **Login:** User can login in his personal account using email and password.
3. **Profile:**
  - Change Profile
  - Update details
  - Reset Password
4. **Request Food:**
  - A popup type notification appears
  - Request food from donor
  - Assign employee for delivery of the food
5. **Location**
6. **History**
7. **Notifications:** NGO will get notified on new restaurant order, or request accepted for food.
8. **Logout**

## **Rider:**

1. **Register:** Users can register using credentials.
2. **Login:** User can login in his personal account using email and password.
3. **Profile:**
  - Change Profile
  - Update details
  - Reset Password
4. **Accept Donation:**
  - Pick up
  - Can view more info of donor donation details
  - Can view GPS Location of donor
5. **Complete Donation**
  - Can upload images after delivery to needy ones
6. **History**
7. **Notifications**
8. **Logout**

## **1.5 HARDWARE & SOFTWARE REQUIREMENTS**

### **Hardware requirements:**

**Computer:** A computer with a minimum of 4GB RAM, a quad-core processor, and a dedicated graphics card is recommended for a smooth development experience.

**Monitor:** A high-resolution monitor or display for comfortable coding and testing.

**Storage:** Sufficient storage space is required to store the application files, project files, and other development-related files.

**USB Cable:** A USB cable is required to connect the Android device to the computer for testing and debugging purposes.

**Physical Device:** A physical device is required to test the document scanning application.

**Internet Connection:** An internet connection is required to download the necessary software tools, libraries, and dependencies.

### **Software requirements:**

**Android Studio:** Android Studio is the official Integrated Development Environment (IDE) for Android app development. It provides a rich set of features, including code editing, debugging, testing, and deployment.

**Java Development Kit (JDK):** The Java Development Kit is required to develop Android applications with Java programming language. It includes the Java Runtime Environment (JRE), the Java compiler, and other development tools.

**Android SDK:** The Android Software Development Kit (SDK) is a collection of tools and resources that developers use to create Android applications. The SDK includes libraries, development tools, and platform tools that are required to develop the document scanning application.

**Android Emulator:** Android Studio provides an emulator that simulates an Android device and allows testing the application on different Android versions and screen sizes.

**Git:** A version control system such as Git for managing code changes

**Database:** A database system such as firebase.

**Debugging Tool:** A debugging tool to help you identify and fix bugs in your code

# **CHAPTER-2**

## **SYSTEMS ANALYSIS AND SPECIFICATION**

### **2.1 FUNCTIONAL MODEL**

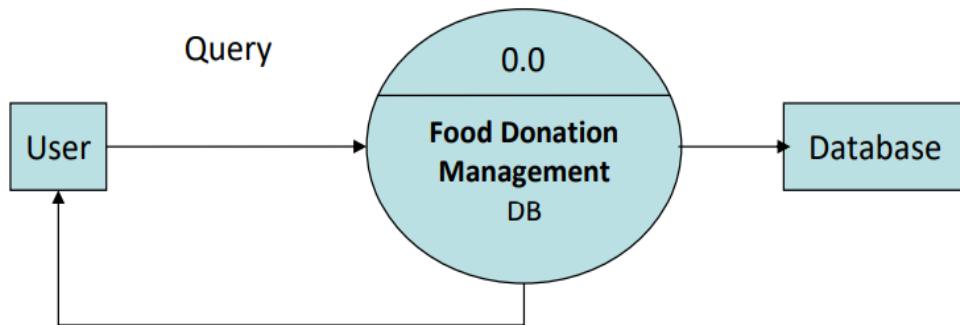
A function model is a graphical representation of a system's function within a defined scope. The purposes of the function model are to describe the functions and processes, assist with discovery of information needs, help identify opportunities, and establish a basis for determining product and service costs. Representing in a structural way our food wastage management project clearly going to show the neat and clean concept behind our idea. (To save food and provide for the poor as well as improving health).

#### **2.1.1 Data Flow diagram (DFD)**

A data flow diagram (DFD) is a graphical or visual representation using a standardized set of symbols and notations to describe a business's operations through data movement.

##### **Zero Level Data Flow Diagram (0 Level DFD)**

This is the Zero Level DFD of FEEDIE FOOD- RESCUE, where we have elaborated the high-level process of food waste. It's a basic overview of the whole waste food management system and donation app or process being modelled. It's designed to glance at Donors, Receivers and Riders showing the system as a single high-level process, with its relationship to external entities. It should be easily understood by a wide audience, including Acceptor, Donor and Rider.



### DATABASE DETAIL

Fig 2.1.1 Zero Level Data Flow Diagram (0 Level DFD)

#### First Level Data Flow Diagram (1<sup>st</sup> Level DFD)

First Level DFD (1st Level) of Food Waste Management System shows how the system is divided into subsystems (processes), each of which deals with one or more of the data flows to or from an external agent, and which together provide all of the functionality of the waste food management system and donation app as a whole. Level 1 DFDs are still a general overview, but they go into more detail than a context diagram. In level 1 DFD, the single process node from the context diagram is broken down into sub-processes. As these processes are added, the diagram will need additional data flows and data stores to link them together. In level 1 DFD processes are further split into contacting donors (NGOs, houses people), different restaurants as receiver and delivery riders. Inside the food donation database we are having items from different NGOs and restaurants information according to the geolocation of restaurants. If we talk about process requests where a request is pop up from needy restaurants and then considered by admin to contact and provide assurance regarding food. After distribution of food if still remained in NGOs and different so we can use that wastage for further compost decomposition.

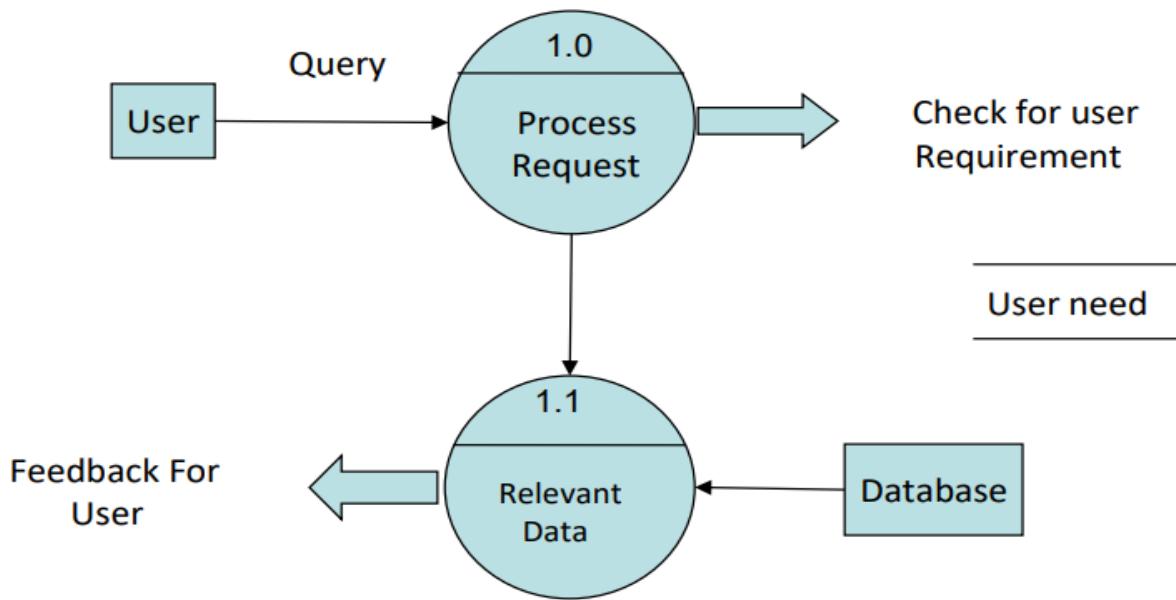


Fig 2.1.2 First Level Data Flow Diagram (1<sup>st</sup> Level DFD)

#### Second Level Data Flow Diagram (2<sup>nd</sup> Level DFD)

Second level DFD provides a more in-depth and detailed view of the processes, data flows, data stores, and entities involved in a particular subsystem or process. It typically expands on the processes and data flows of the first level DFD, breaking them down into smaller, more manageable components.

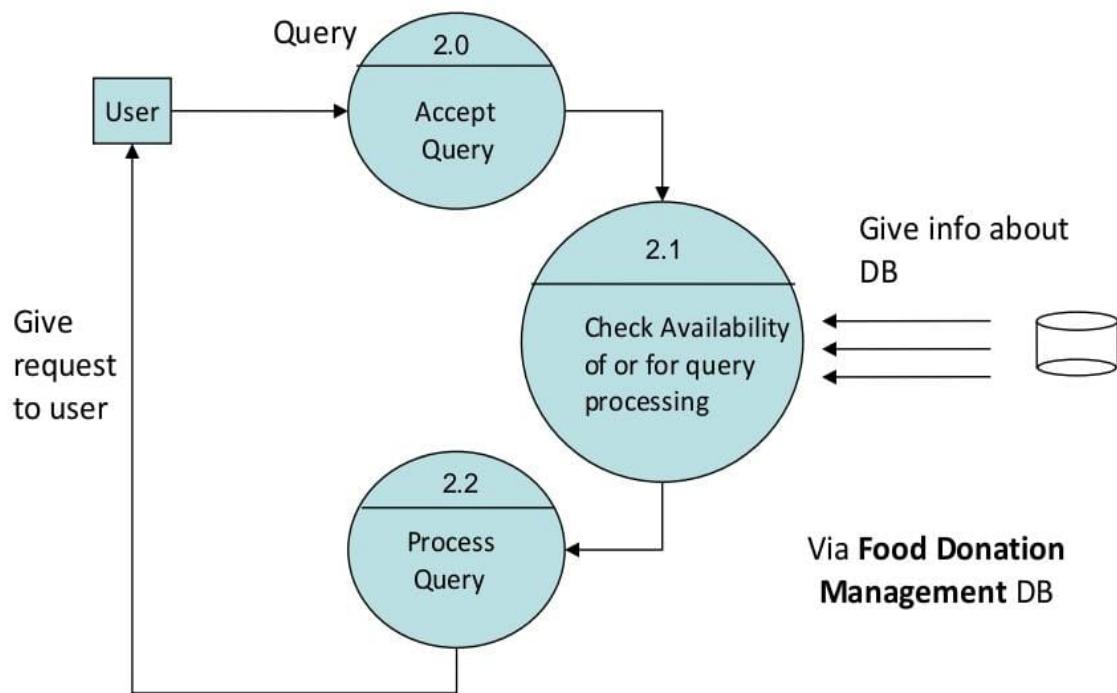


Fig 2.1.3 Second Level Data Flow Diagram (2<sup>nd</sup> Level DFD)

## 2.2 Data Model

A data model is a conceptual representation of data objects, their attributes, relationships, and the rules that govern the interaction between them. It provides a framework for organizing and structuring data in a way that makes sense for a particular application or domain. A data model can be represented in different forms, such as an Entity-Relationship (ER) diagram or a UML class diagram.

A data model serves as a blueprint for designing a database or information system. It helps to identify the entities that need to be represented, the attributes that describe those entities, and the relationships between them. It also helps to ensure data consistency and integrity by defining rules for data validation and business logic.

Overall, a data model provides a way to describe the structure of data in a way that is easy to understand and implement, and is essential for effective data management and application development.

## 2.2.1 ER Diagram

This ER (Entity Relationship) Diagram represents the model of Food Waste Management System Entity. The entity-relationship diagram of the Food Waste Management System illustrates the relationships between the different entities in the app's database like between Agent/Donor, NGO's, Food, Order, Delivery etc. It used structure data and to define the relationships between structured data groups of Waste Food Management System functionalities. Each entity contains primary keys and unique keys. There are one-to-one and one-to-many relationships available.

### **Food Wastage Management System entities and their attributes:**

- Registration Entity (of Donor, Receiver, Rider): UserName, UserEmail, MobileNo., UserId, Password, VechileType, VehicleNo.
- User Login Entity (of Donor, Receiver, Rider): UserEmail, Password.
- Admin Entity: Admin\_Email, Password.
- Waste Food Donation Management: Manage\_Donor, Manage\_Receiver, Manage\_Rider, Add\_Donation, Status, Accept\_Donation, Complete\_Donation, Request\_Food, History, Location, Notify\_user, Email\_Verification, Profile.

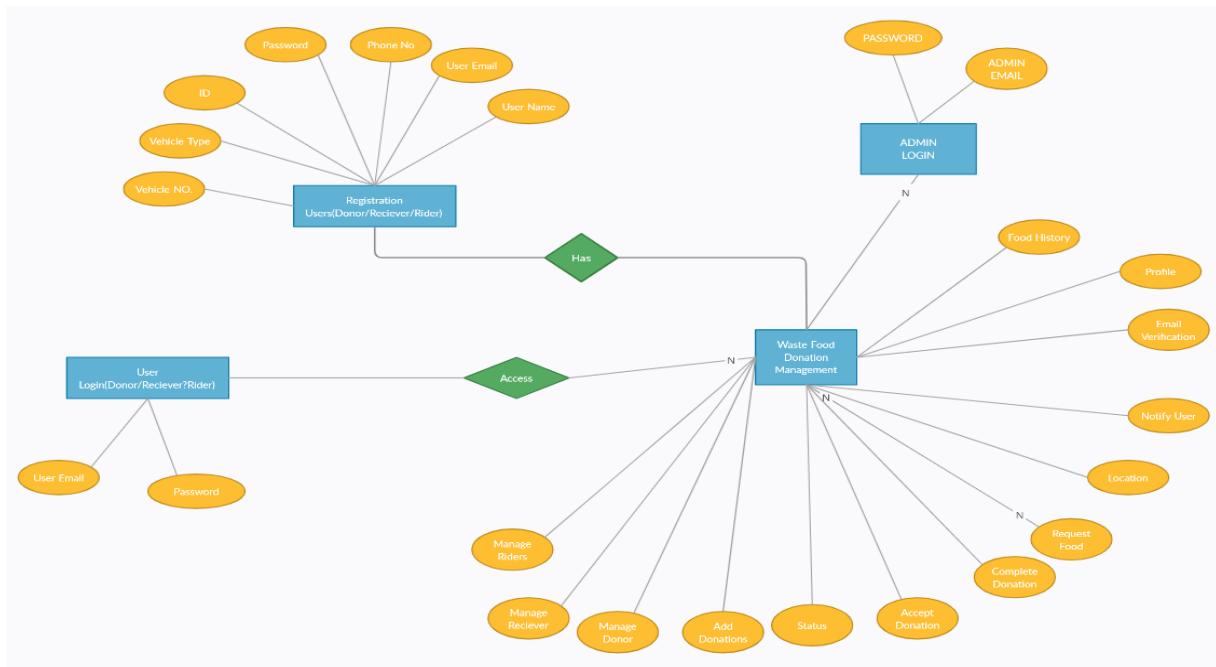


Fig 2.2.1 Entity Relationship Diagram(E-R)

## **2.3 Process Flow Model**

A process model is a formal way of representing how a business operates. It is one method of representing a process model and it is a graphical representation of the sequence of steps or activities involved in a process or system. It illustrates how inputs are transformed into outputs through a series of stages, and the flow of data and information between these stages. The model consists of four main processes: donation, request, delivery, and management. It typically consists of a series of interconnected boxes or shapes, each representing a specific task or activity, with arrows indicating the flow of materials, information, or other resources between them. It can be used to analyse and optimize a process, identify bottlenecks or inefficiencies, and design or modify a system. The process flow model also includes decision points where the app's algorithms and administrators make decisions based on the information available in the app's database. Overall, the process flow model provides a clear and structured overview of the app's sequence of actions, which helps to ensure that the app operates smoothly and efficiently.

### **2.3.1 Activity Diagram**

These are the Activity UML diagram of “FEEDIE FOOD- RESCUE” which shows the flows between the activity of Admin, Donor, Receiver, Rider. Nodes and edges represent the various activities and decisions in the app. Different activities like user logs in, enters the dashboard page, and selects options like Donate Food, Request Food, Manage Account, Log Out and updating the system with the help of database. Basically, a process flows from initial to final execution. Decision points in the activity diagram model show where the app's algorithms and administrators make decisions based on the information in the database. The activity diagram model helps the app to operate smoothly and efficiently.

Throw preprocessing and data of users Diagram of Waste Food Management System and Donation App are as follows:

- Admin Activity
- Donor Activity
- Receiver Activity
- Rider Activity

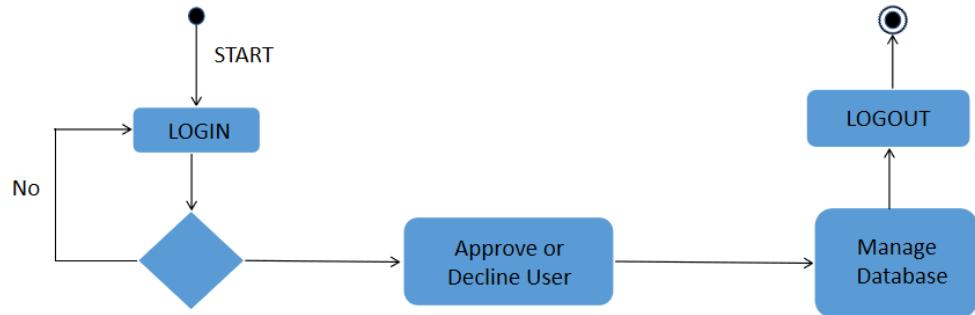


Fig 2.3.1 Activity Diagram of Admin

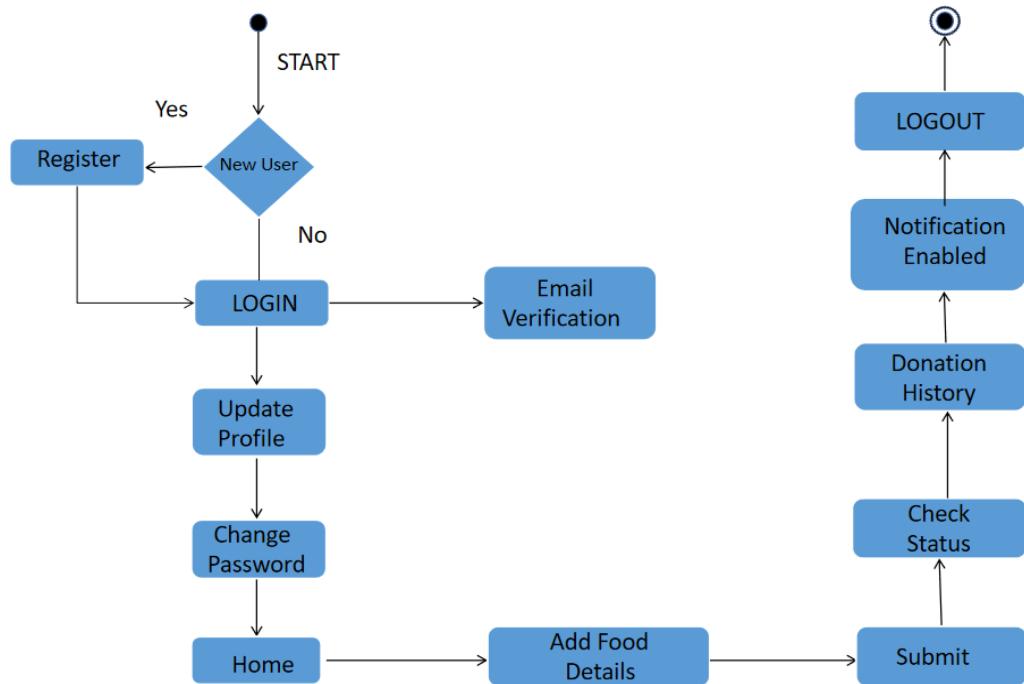


Fig 2.3.2 Activity Diagram of Donor

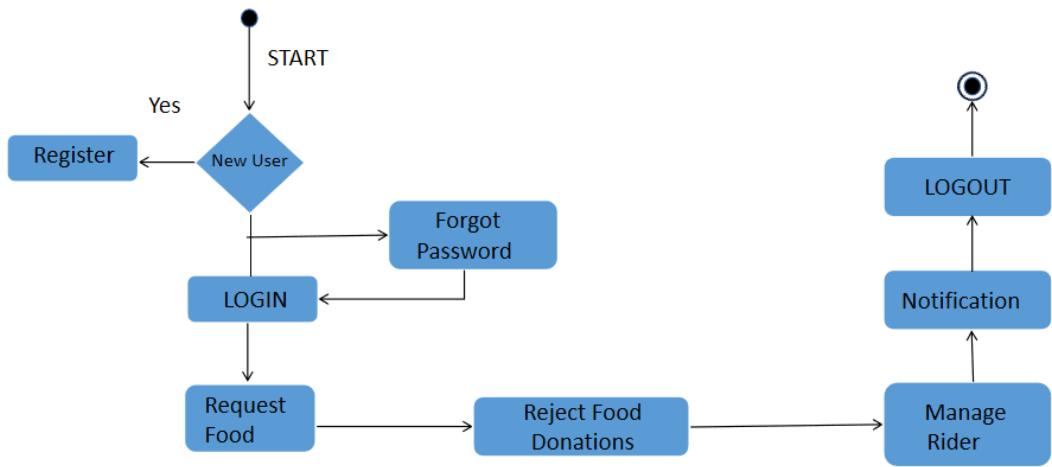


Fig 2.3.3 Activity Diagram of Receiver

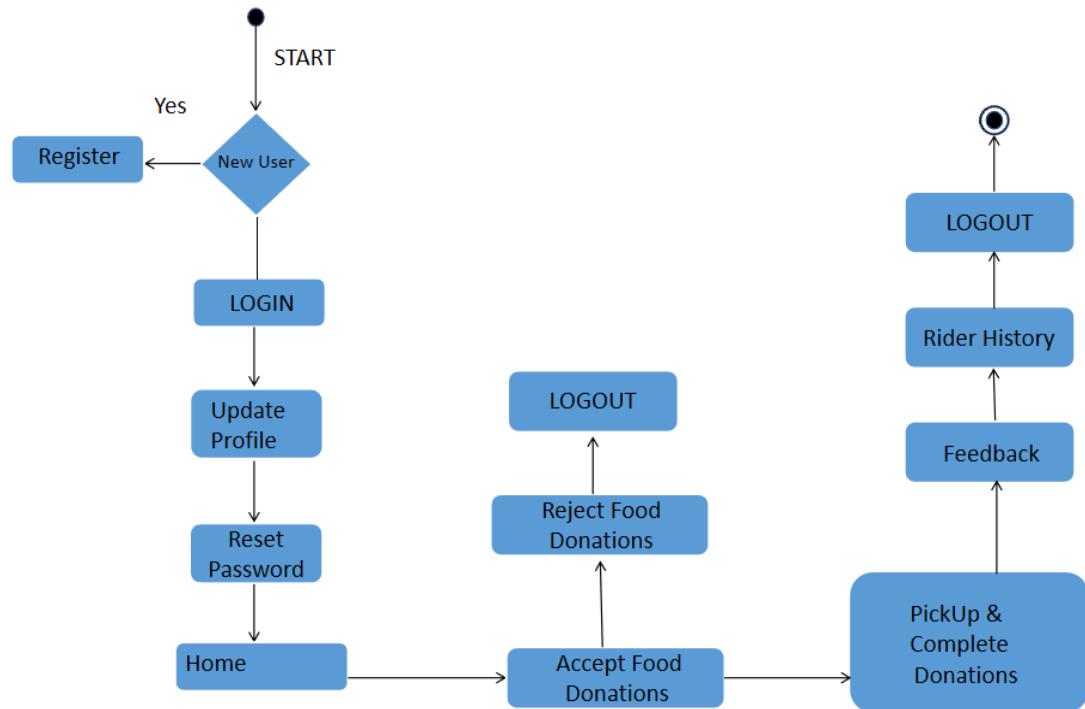


Fig 2.3.4 Activity Diagram of Rider

## **2.4 Behavioral Model**

The behavioural model of the Waste Food Management System and Donation App is centred on the actions and behaviours of the users who interact with the app. The primary goal of the app is to encourage and facilitate the donation of excess food by individuals and organizations. It is a type of software engineering model that describes the behavior of a system or a software application. It focuses on the interactions between different components of the system and how they respond to input stimuli. It shows how the system behaves over time, and can be used to validate and verify the functional requirements of the system. It can also be used to identify potential performance bottlenecks and to optimize the system for better performance.

### **2.4.1 Sequence Diagram**

The sequence diagram of the food wastage management app illustrates the interactions between the different components of the app. The sequence diagram shows the flow of messages between these components during key processes such as donation, request, and delivery. For example, when a donor submits a donation request, the app server sends a message to the receiver component to review and accept the donation. Similarly, when a rider is assigned to a delivery request, the app server sends a message to the rider component with details about the delivery.

The main components include:

- Admin Management
- Donor Management
- Receiver Management
- Rider Management
- Database Management

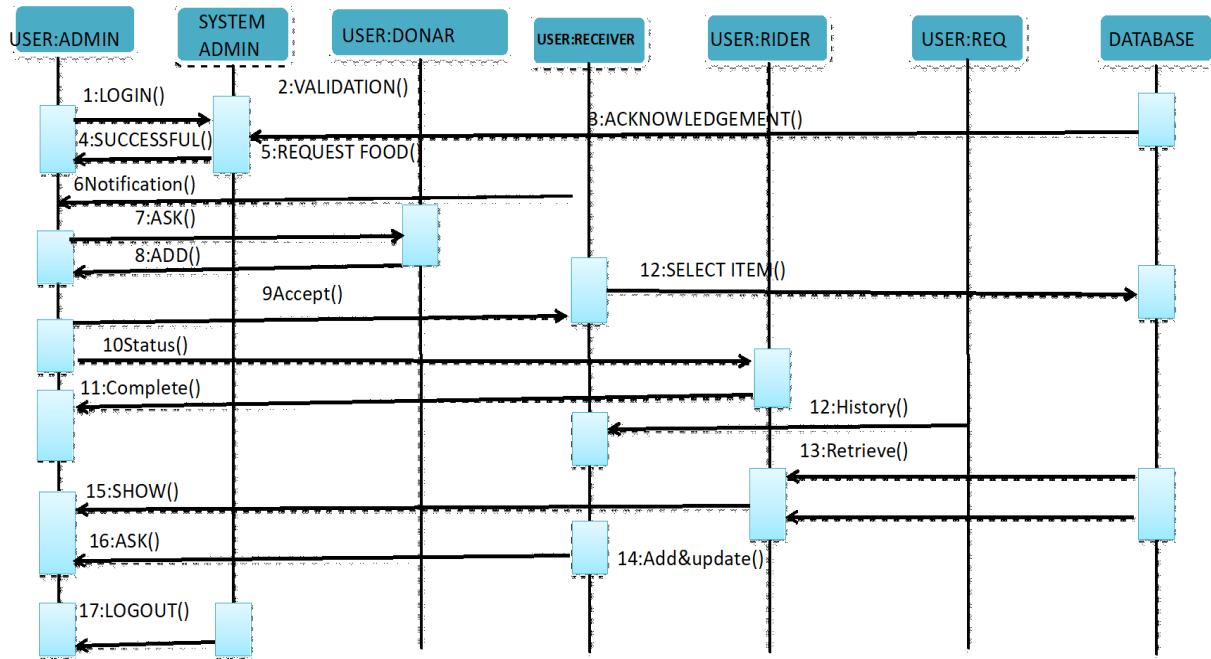


Fig 2.4.1 Sequence Diagram

## 2.4.2 Class Diagram

Class Diagram describes the structure of Waste Food Management System and Donation App classes, their attributes, operations (or methods), and the relationships among objects. The main classes of the Food Waste Management System are Database Management System, Admin, Forget Password, New Registration, User, Donor, NGO, Account, APP Database.

- The class diagram depicts the main classes and their relationships in the app.
- The main classes include Donor, Receiver, Rider, Donation, Request, Delivery, and User.
- The User class is the parent class for Donor, Receiver, and Rider, and contains shared attributes such as name, email, and password.
- The Donation class contains attributes such as food type, quantity, and expiry date.
- The Request class contains attributes such as food type, quantity, and delivery location.
- The Delivery class contains attributes such as delivery date, delivery status, and delivery location.

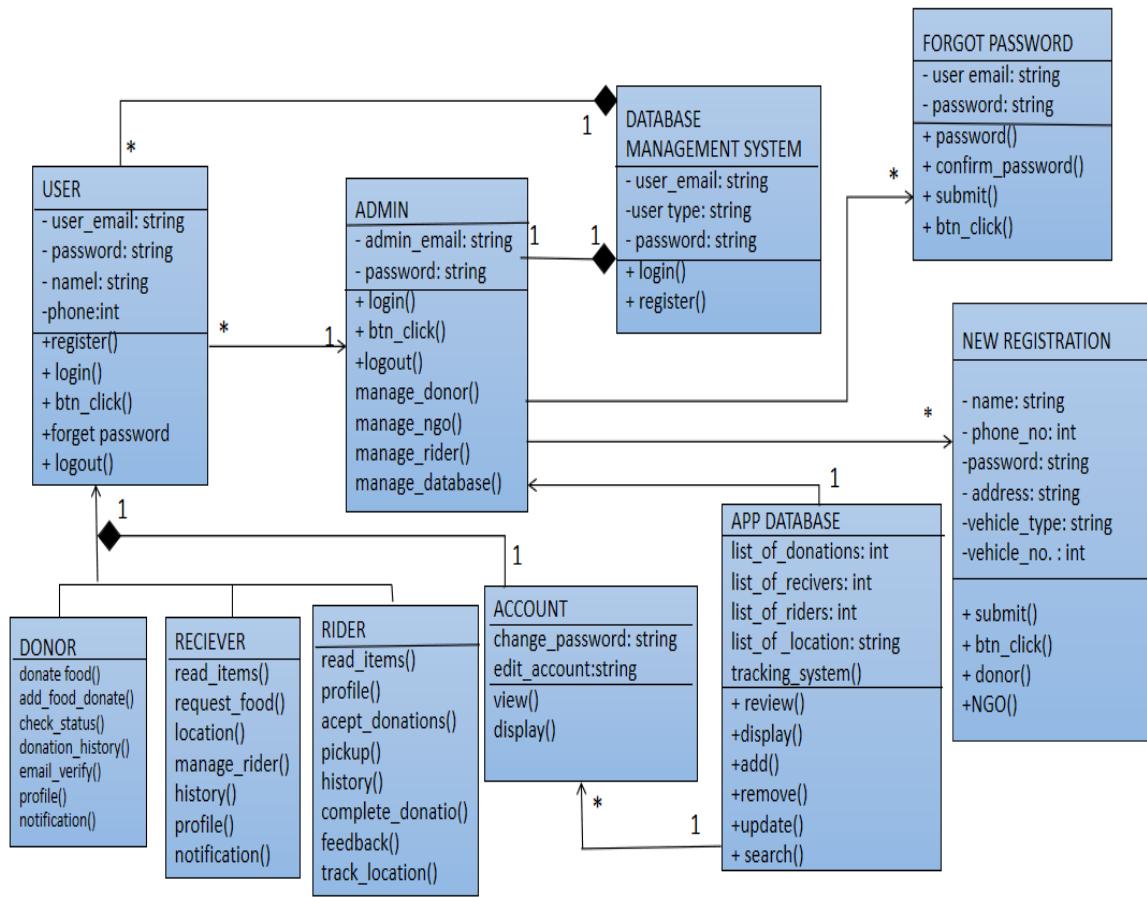


Fig 2.4.2 Class Diagram

## 2.5 System Design

The system will be developed using 3-tier architecture:

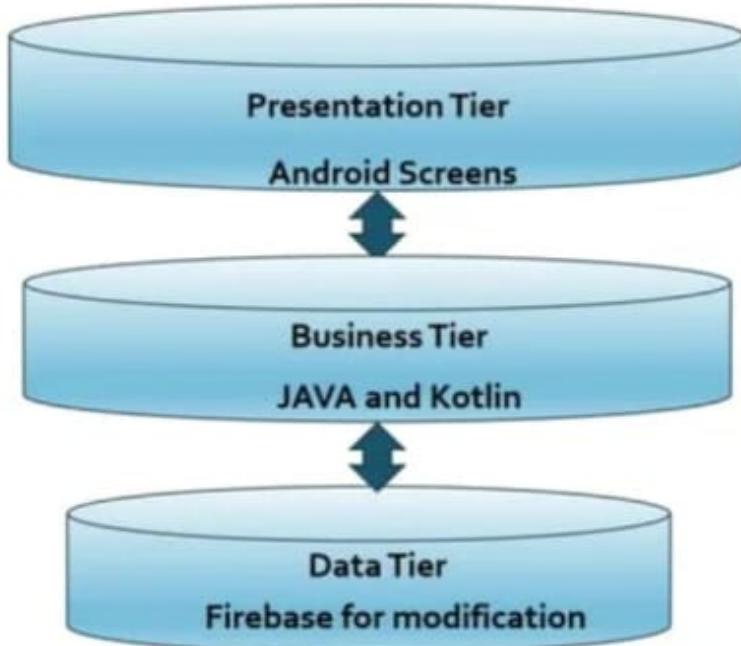


Fig 2.5 Three Tier Architecture

- **Presentation Layer (UD):** Presentation layer contains pages like .aspx or windows form where data is presented to the user or input is taken from the user.
- **Business Access Layer (BAL) or Business Logic Layer:** BAL contains business logic, validations or calculations related with the data, if needed.
- **Data Access Layer (DAL):** DAL contains methods that helps business layer to connect the data and perform required action, might be returning data or manipulating data (insert, update, delete etc).

## **Feasibility Study**

The feasibility study is performed to determine whether the proposed system is viable considering the Technical, Operational and Economical factors. After going through a feasibility study, we can have a clear-cut view of the system's benefits and drawbacks. The purpose of this feasibility study is to determine the viability and potential success of a waste food management system and donation app. The system would aim to reduce food waste by enabling food businesses and individuals to donate excess food to those in need. The donation app would allow users to easily connect with organizations that accept and distribute donated food.

### **2.5.1 Technical Feasibility**

The proposed system is developed using Android Studio, Python, Machine Learning, MySQL and JAVA as the back end. The proposed system needs an Android Device (Min Version 5.0) to serve the requests submitted by the users. All the required hardware and software are readily available in the market. Hence the system is technically feasible. Developing a waste food management system and donation app would require expertise in software development, user experience design, and database management. The app would need to be compatible with a range of devices and operating systems to maximize its accessibility and reach. There would also need to be an efficient system for tracking donations, managing inventory, and coordinating pick-ups and deliveries.

### **2.5.2 Operational Feasibility**

Operational feasibility is crucial for the success of the waste food management system and donation app. The app must be user-friendly and intuitive, with clear instructions and easy-to-use features that meet the needs of all stakeholders involved in the donation process. Scalability is also important to accommodate an increasing number of donations and users, which requires a robust server infrastructure and database management system. The app must have the necessary resources and infrastructure to manage the donation process effectively, such as staff, transportation, and storage facilities. Overall, the waste food management system and donation app must be well-designed, scalable, and have the necessary infrastructure and resources to be operationally feasible.

### **2.5.3 Economical Feasibility**

The economic feasibility of a waste food management system and donation app would depend on its ability to generate sufficient revenue to cover its development and operational costs, while providing a return on investment. Potential revenue streams could come from partnerships with food businesses, premium features or advertising opportunities. Costs would include expenses related to app development, server hosting, database management, marketing and operational costs. A detailed financial analysis would need to be conducted to determine the viability and profitability of the app. The potential social and environmental benefits could create a positive impact on the overall economy through reduced food waste disposal costs and improved public health.

# CHAPTER-3

## MODULE IMPLEMENTATION & SYSTEM INTEGRATION

### SPLASH SCREEN

- The splash screen of the Food Wastage Management app features the app's logo and a loading animation.
- The loading animation is designed to be visually appealing and to reinforce the app's mission of reducing food wastage.
- The duration of the splash screen is carefully timed to provide enough time for the app to load without causing the user to lose interest or become frustrated.

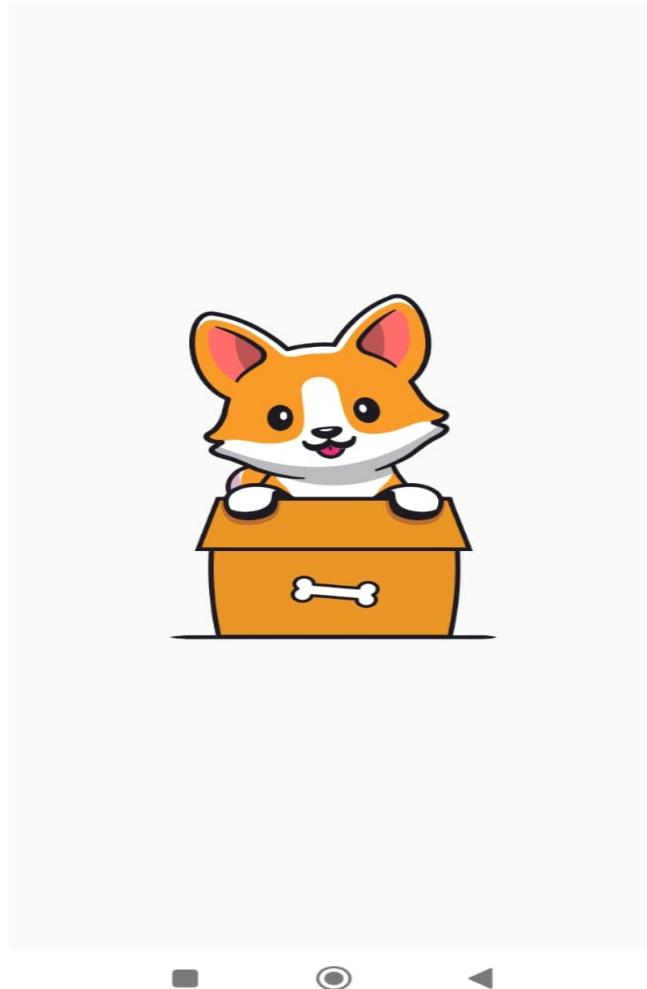


Fig 3.1 Splash Screen

## LOGIN PAGE

- The login page is the first point of entry for users to access the app.
- Users can log in using their registered email and password or through social media authentication.
- In case the user has forgotten their password, a 'Forgot Password' option is provided, which directs them to a password reset page. For security purposes, the app uses encryption techniques to protect user credentials and prevent unauthorized access.

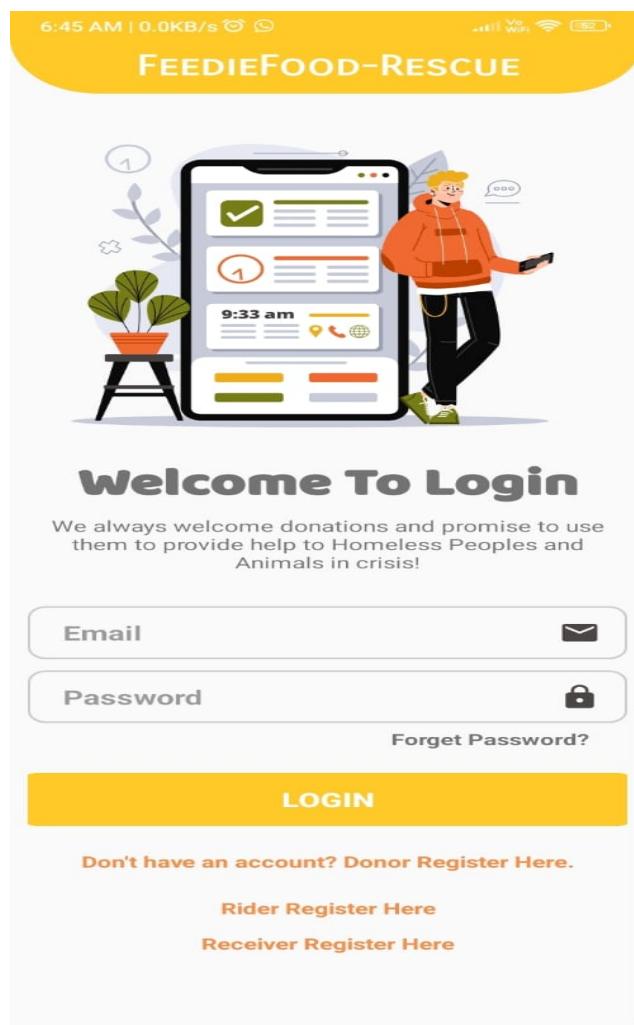


Fig 3.2 Login Page

## ADMIN PANEL

The admin panel page of the waste food management and donation app provides a comprehensive interface for administrators to manage and control various aspects of the application. With features such as user management, food donations management, analytics and reporting, rider management, and settings management, the admin panel empowers admins to effectively manage the app and ensure that it operates smoothly.

- **User management:** Admins can manage user accounts by approving and declining their account, including creating new accounts, resetting passwords, and updating user profiles.
- **Food donations management:** Admins can manage food donations, including accepting or rejecting donations, tracking food inventory, and coordinating donations to various recipient organizations.
- **Logout button:** It is located in the top right corner of the admin panel interface. When the admin clicks on the logout button, a confirmation dialog box appears to confirm their action. Once the admin confirms the logout action, their session is properly ended, and their access token or session cookie is invalidated to ensure the security of their account. Finally, the admin is redirected to the login page to enable them to log back in if necessary.

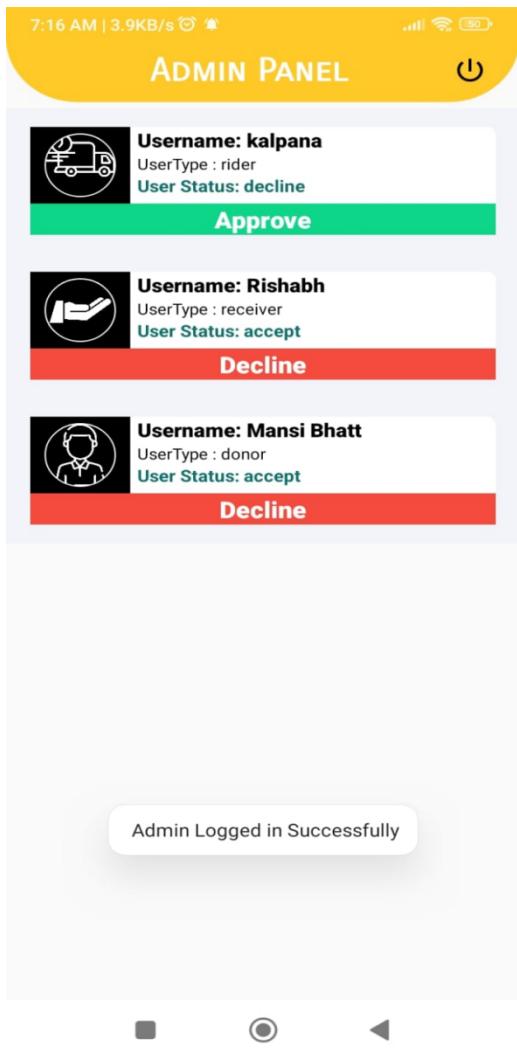


Fig 3.3 Admin Panel

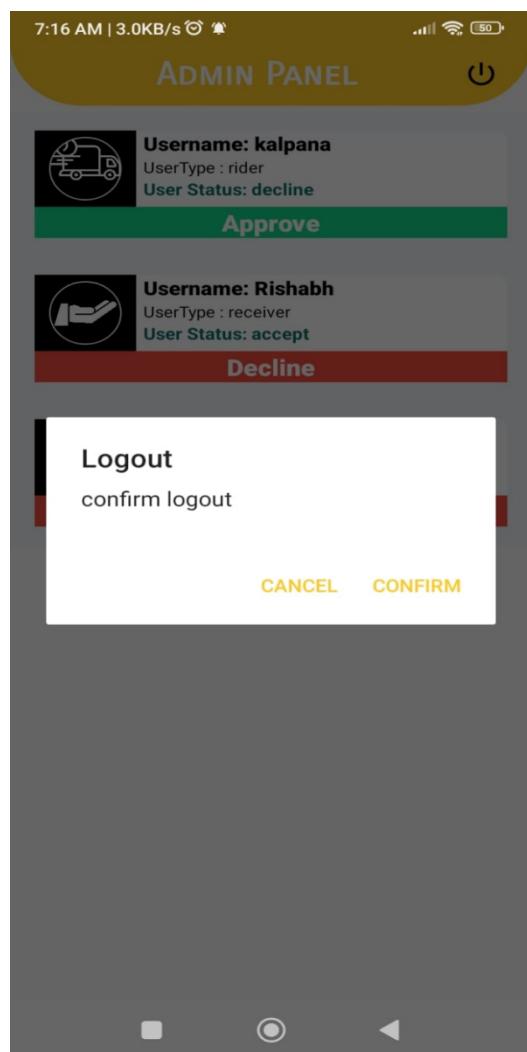


Fig 3.4 Logout of Admin Panel

## DONOR PANEL

- **Donor Registration Page:** of the Feedie Food- Rescue waste food management and donation app enables individuals or organizations to create new donor accounts and start donating food to the app. To create a new account, donors are required to fill in their personal information, including their name, email address, and phone number. Donors are also prompted to choose a unique username and password that will be used to access their account in the future by login.
- **Dashboard:** once the donor successfully registers, they are redirected to their account dashboard, where the logo and app name are visible with the email of the user. There are three main modules such as home, profile and logout.
- **Home page:** there are other modules such as add donation, status, history, notification, email verification and logout.
- **Add Donation:** this feature allows users to donate surplus food to those in need. The donation process is simple and intuitive, with users selecting the 'Donation' option from the home page and filling out a donation form
- with details about the food, they wish to donate. The form includes fields for donation type, weight type, vehicle type, address, district, mobile no., location.
- **Status:** once the donation form is submitted, the donation is added to the app's database and marked as 'Pending' until it is reviewed, 'Approve' when accepted by a receiver and 'Delivery' when delivered by the rider.
- **Donation History:** allows users to view a list of all the donations they have made in the past. This feature helps users to keep track of their donation activities and ensure that they are contributing to the cause effectively.
- **Donation Capture:** in donation history when clicking on see more user can view the pictures of delivered food by the rider.
- **Update profile:** users can view and manage their profiles, including change profile, update profile and reset password.

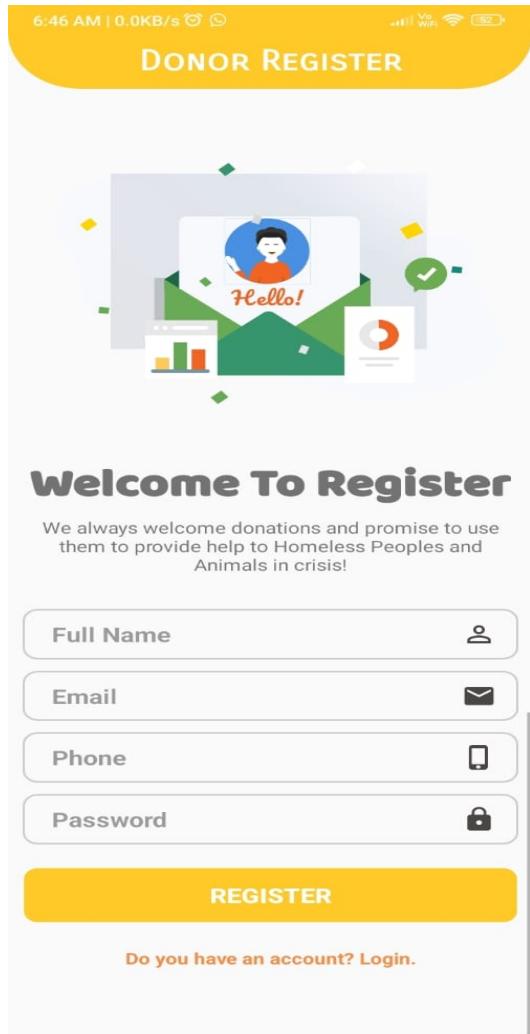


Fig 3.5 Registration Page of Donor

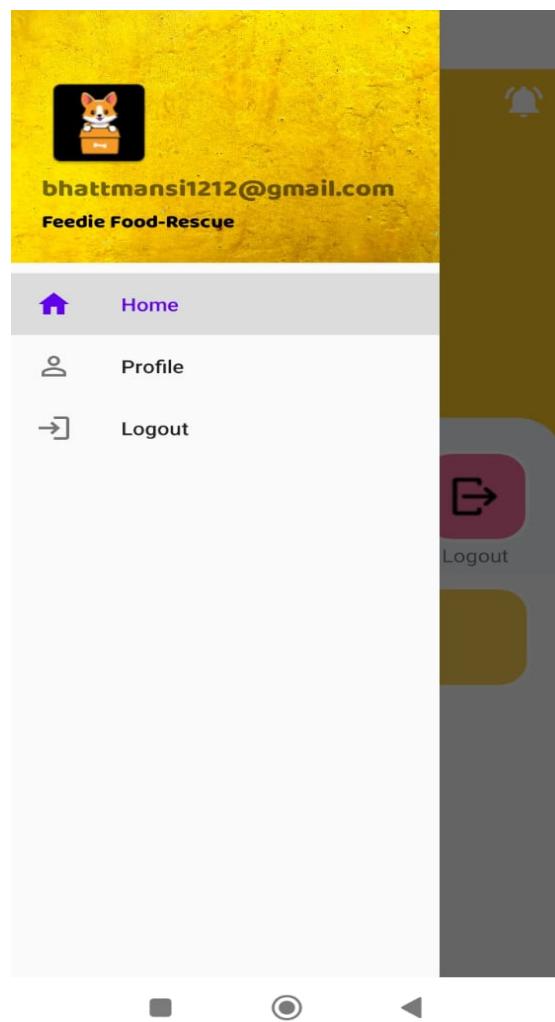
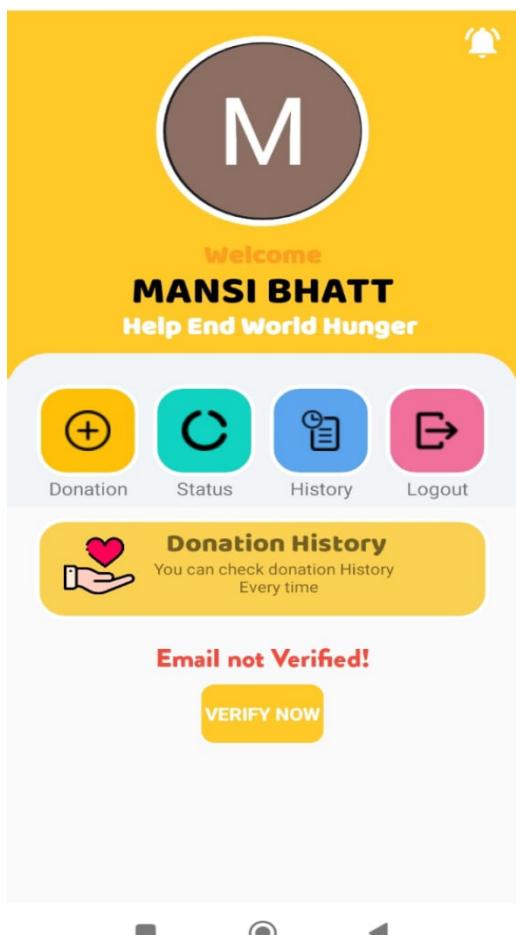


Fig 3.6 Dashboard of Donor

Fig 3.7 Home Page of Donor



6:48 AM | 2.7KB/s ADD DONATION

**Donation Type**

<input type="radio"/> Only People	<input type="radio"/> Both
<input type="radio"/> Only Animals	

**Donation Weight Type**

<input type="radio"/> 1-10Kg	<input type="radio"/> 10-30Kg
<input type="radio"/> 30-50Kg	<input type="radio"/> 50-100Kg

**Suggest Vehicle Type**

<input type="radio"/> Bike	<input type="radio"/> Car
<input type="radio"/> Van	<input type="radio"/> Truck

**Address**

Address:

**District**

Street:

**Mobile No**

9811889670

**Location**

28.5826485 | 77.3583911

Fig 3.7 Home Page of Donor

Fig 3.8 Add Donation

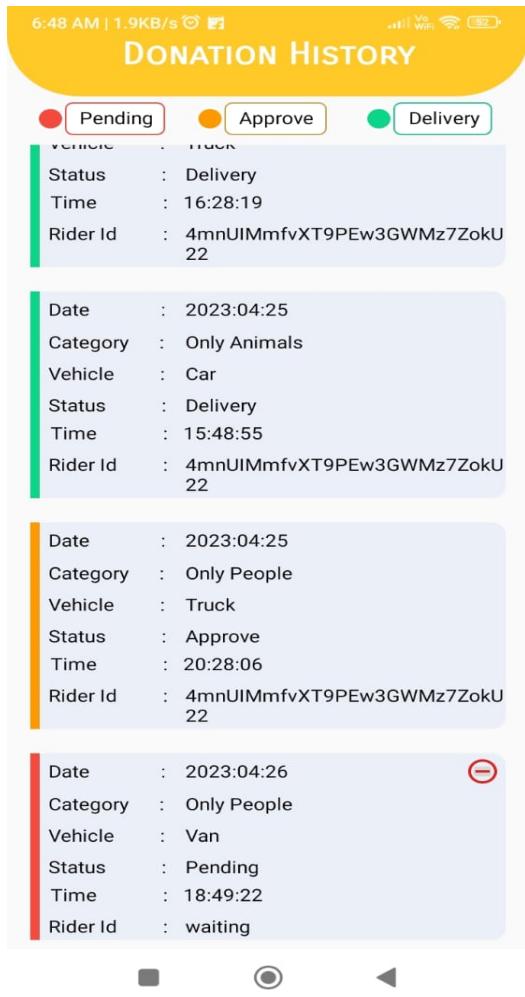


Fig 3.9 Check Status

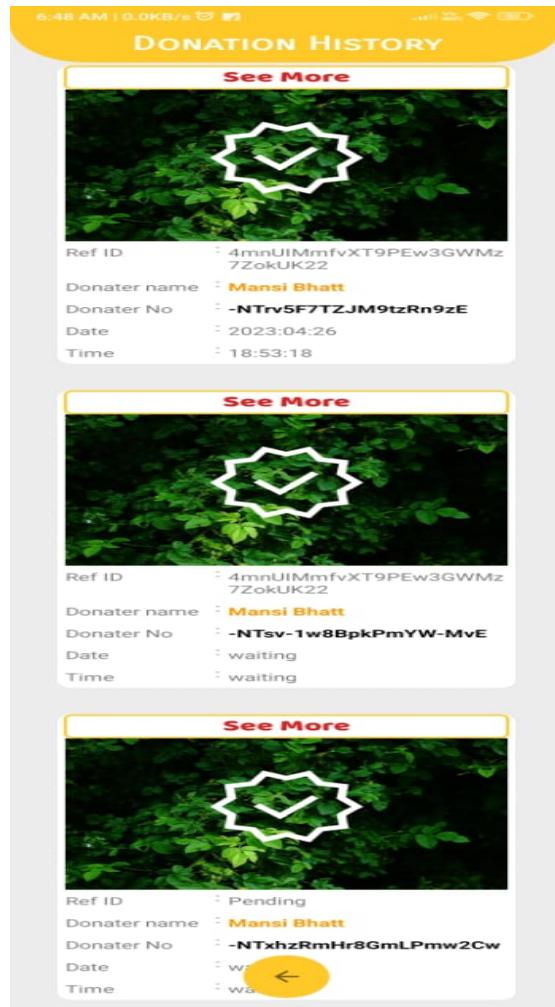


Fig 3.10 Donation History of Donor

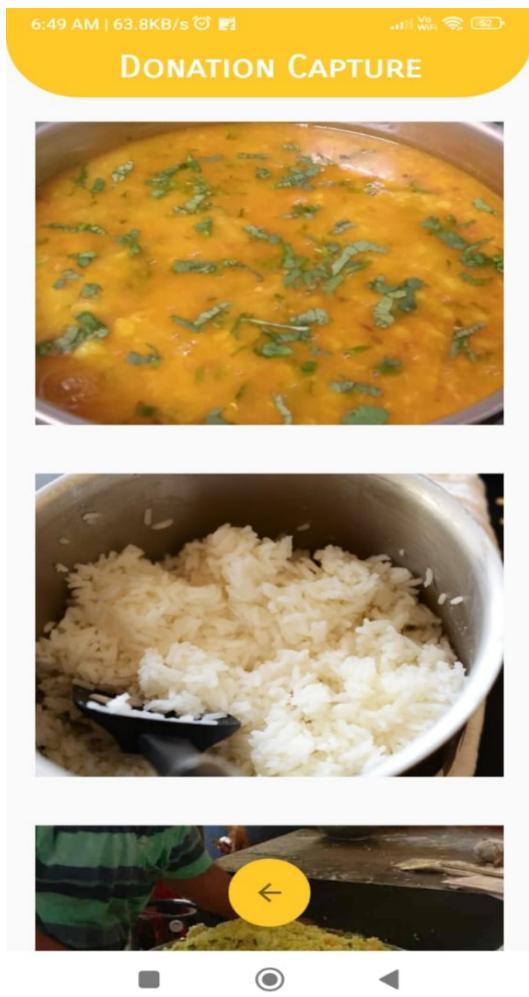


Fig 3.11 Donation Capture

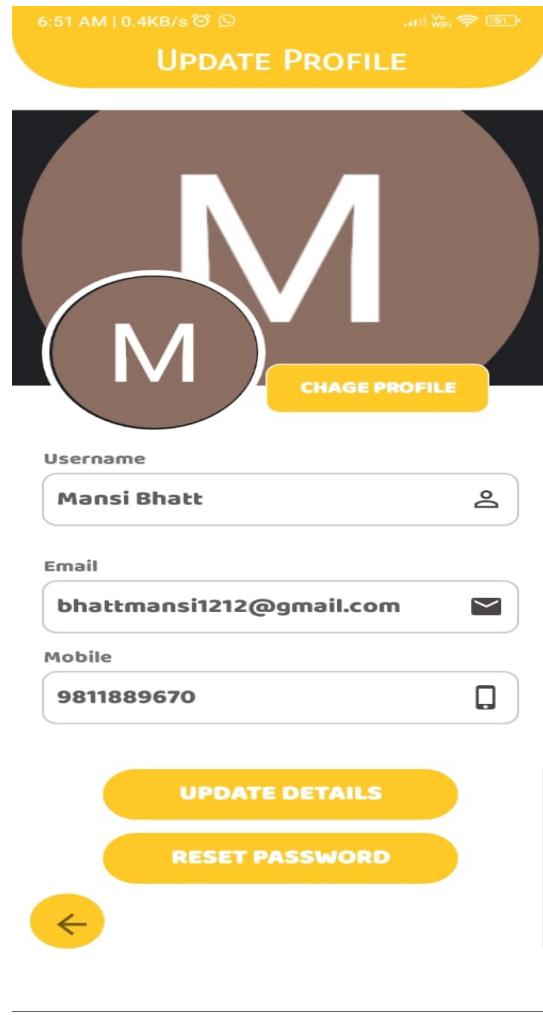


Fig 3.12 Update Profile of Donor

## RECEIVER PANEL

- **Receiver Registration Page:** of the Feedie Food- Rescue enables individuals or organizations to create new receiver accounts and start requesting food. To create a new account, receivers are required to fill in their personal information, including their name, email address, and phone no., Receiver are also prompted to choose a unique username and password that will be used to access their account in the future by login.
- **Request food:** this feature allows users to make a request for food donations. Users can specify their location, the number of people they need food for, and any specific dietary requirements. Once a user submits a request, it is added to the database and can be viewed by food donors and administrators. This feature helps to streamline the process of requesting and receiving food donations, making it easier for users to get the help they need.

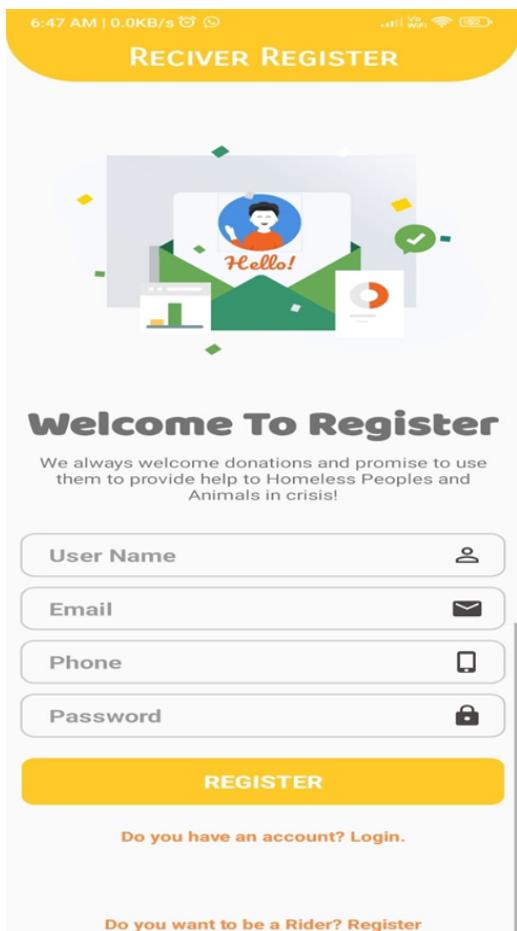


Fig 3.13 Receiver Register

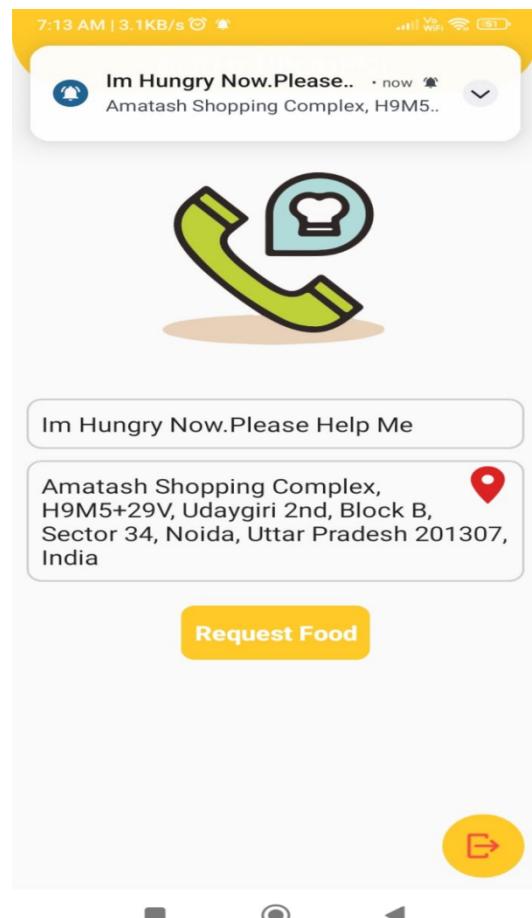


Fig 3.14 Request Food of Receiver

## RIDER PANEL

- **Rider Registration Page:** of the Feedie Food- Rescue enables individuals or organizations to create new rider accounts and deliver food to the needy. To create a new account, riders are required to fill in their personal information, including their name, email, mobile no., vehicle type, vehicle no., id. Riders are also prompted to choose a password that will be used to access their account in the future by login.
- **Home page:** the profile, name and email of the user visible at top, there are other modules such as donations, completed, history and logout.
- **Accept Donations:** allows riders to view their delivery requests, this feature is designed to help riders to view more information and location of donors to keep track of their delivery activity, as well as to provide them with an overview of their performance.
- **Complete Donation:** allows riders to upload a photo of the delivered food, the uploaded photo will also visible on donor's donation history activity. This will also help in building trust between donors and recipients, creating a more transparent and reliable donation process.
- **Donation History:** allows riders to view a list of all the deliveries they have made in the past. This feature helps users to keep track of their delivery activities and ensure that they are contributing to the cause effectively.
- **Update profile:** users can view and manage their profiles, including change profile, update profile and reset password.



Fig 3.15 Rider Register

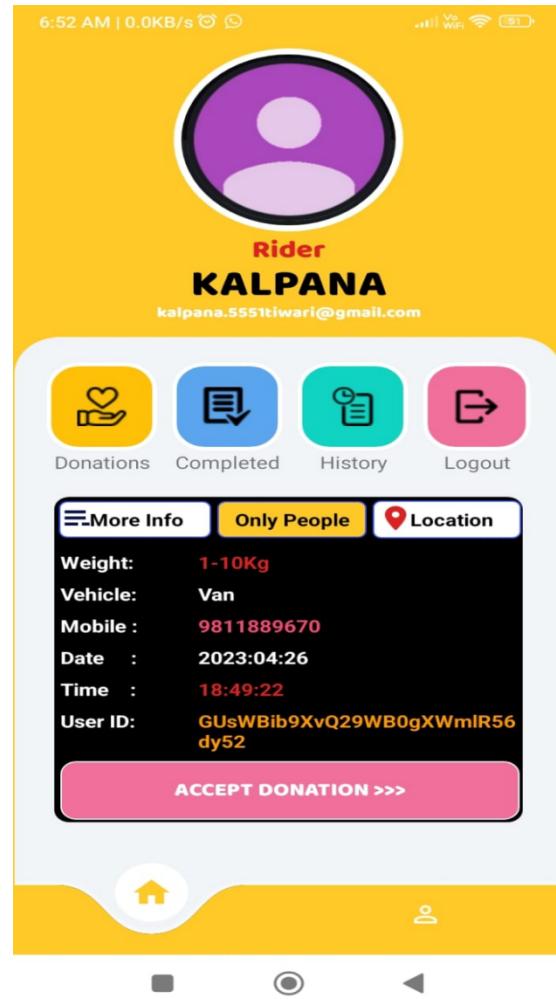


Fig 3.16 Home Page of Rider

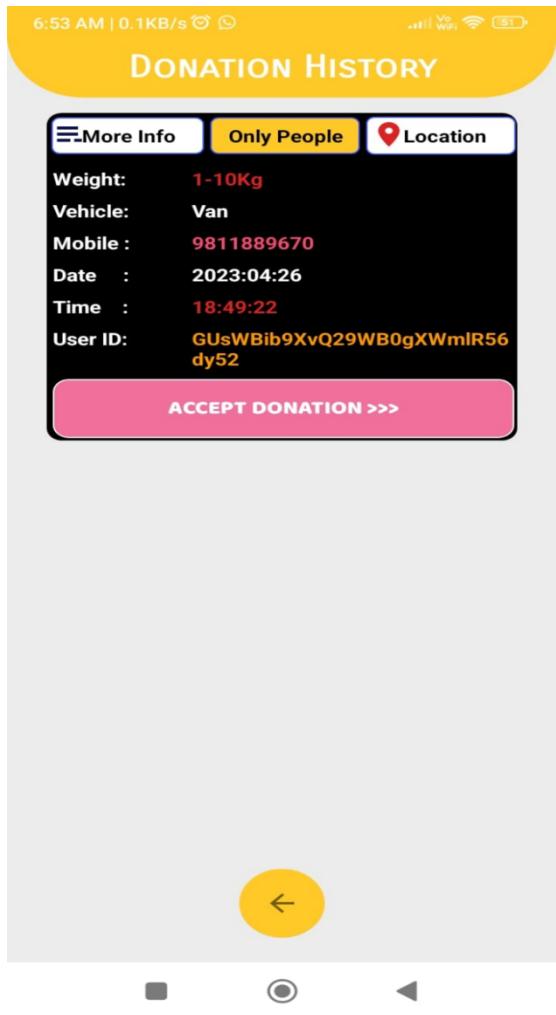


Fig 3.17 Accept Donation

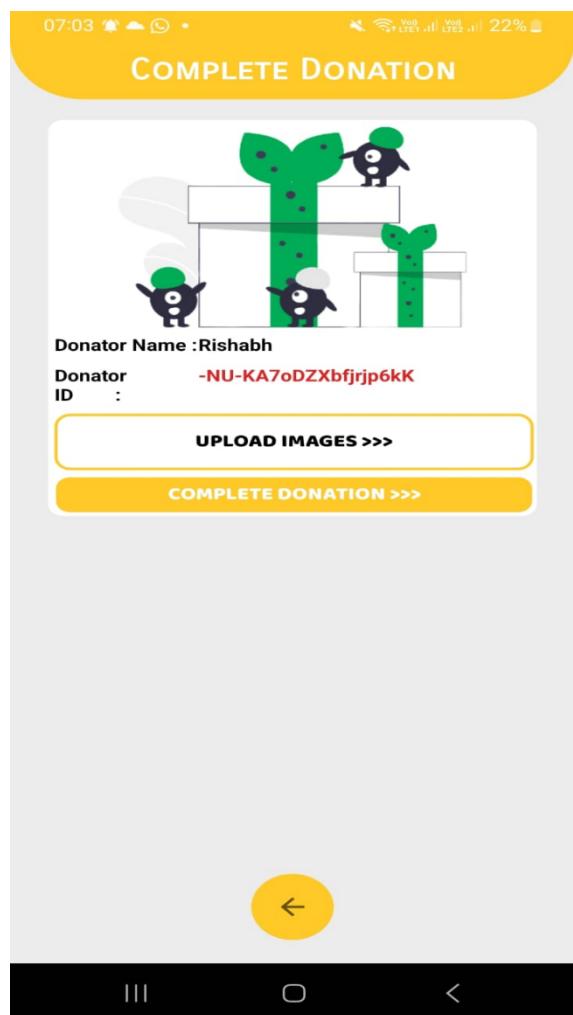


Fig 3.18 Complete Donation

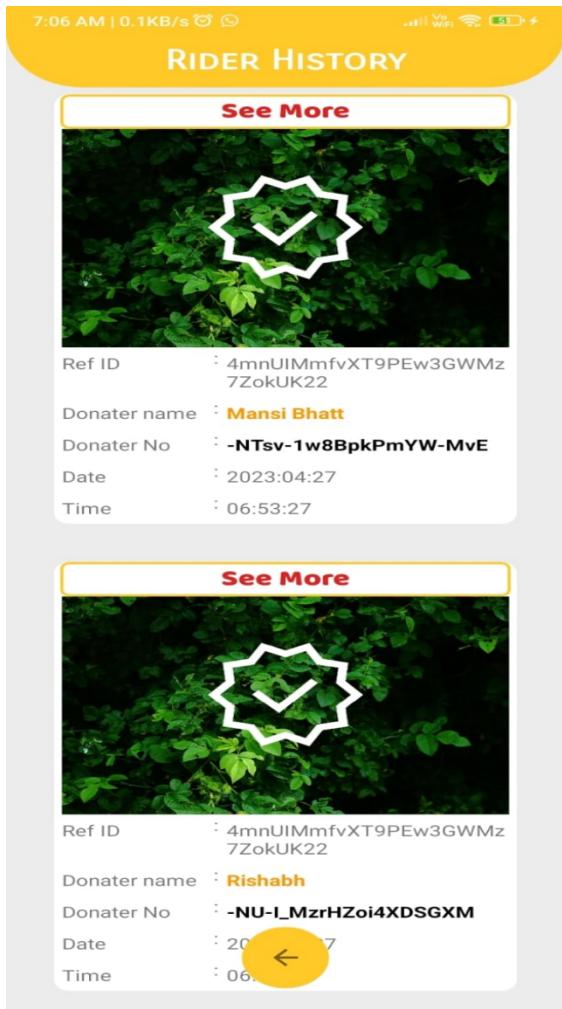


Fig 3.19 Rider History

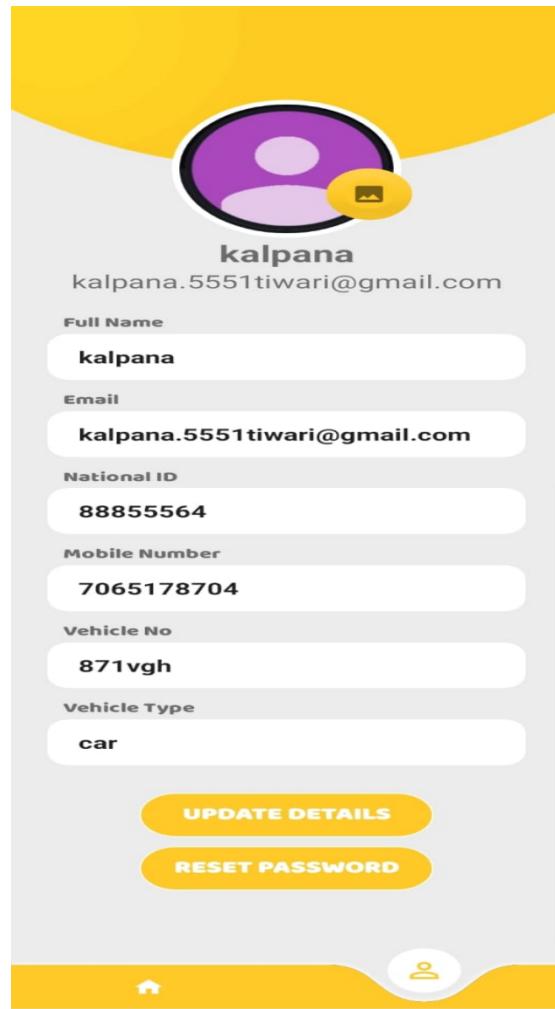


Fig 3.20 Profile of Rider

## **CHAPTER – 4**

### **TESTING & EVALUATION**

#### **4.1 VERIFICATION**

We check if the project we are building meets all the required specifications or not. For passing this phase proper walkthrough of required components for the development took place. Code inspection took place and was checked many times not only by us but also by our guide and other staff members. It doesn't include execution of code Hence; we cannot find bugs in the verification process but the code has been checked for any non-terminating loop and ambiguity.

#### **4.2 TESTING**

As the project is on a big scale, we always need testing to make it successful. If each component works properly in all respects and gives desired output for all kinds of inputs then the project is said to be successful. So the conclusion is-to make the project successful, it needs to be tested. The testing done here was System Testing checking whether the user requirements were satisfied. The code for the new system has been written completely using JAVA as the coding language and Android Studio as the interface for front-end designing. The new system has been tested well with the help of the users and all the applications have been verified from every nook and corner of the user. Although some applications were found to be erroneous these applications have been corrected before being implemented. The flow of the forms has been found to be very much in accordance with the actual flow of data.

## Levels of Testing

In order to uncover the errors present in different phases we have the concept of levels of testing. The basic levels of testing are:

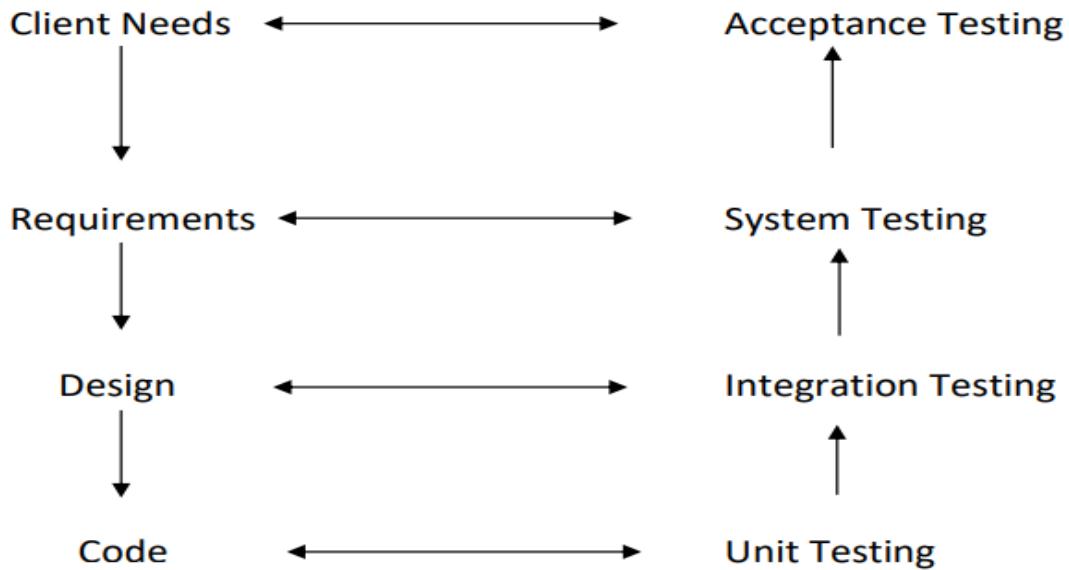


Fig 4.2 Steps involved in testing

A series of testing is done for the proposed system before the system is ready for the user acceptance testing.

The steps involved in Testing are:

### 4.2.1 Unit Testing

Unit testing focuses verification efforts on the smallest unit of the software design, the module. This is also known as “Module Testing”. The modules are tested separately. This testing was carried out during the programming stage itself. In this testing each module is found to be working satisfactorily as regards to the expected output from the module.

#### **4.2.2 Integration Testing**

Data can be passed across an interface; one module can have adverse effects on another. Integration testing is systematic testing for construction of the program structure while at the same time conducting tests to uncover errors associated with the interface. The objective is to take unit tested modules and build a program structure. All the modules are combined and tested as a whole. Here correction is difficult because the isolation of cause is complicated by the vast expense of the entire program. Thus, in the integration testing step, all the errors uncovered are corrected for the next testing steps.

#### **4.2.3 System testing**

System testing is the stage of implementation that is aimed at ensuring that the system works accurately and efficiently for live operation commences. Testing is vital to the success of the system. System testing makes a logical assumption that if all the parts of the system are correct, then the goal will be successfully achieved.

#### **4.2.4 Validation Testing**

At the conclusion of integration testing software is completely assembled as a package, interfacing errors have been uncovered and corrected and a final series of software tests begins, validation test begins. Validation tests can be defined in many ways. But the simple definition is that validation succeeds when the software functions in a manner that can be reasonably expected by the customer. After the validation test has been conducted one of two possible conditions exists. 70 One is the function or performance characteristics that conform to specifications and are accepted and the other is deviation from specification is uncovered and a deficiency list is created. Proposed system under consideration has been tested by using validation testing and found to be working satisfactorily.

#### **4.2.4 Output Testing**

After performing validation testing, the next step is output testing of the proposed system since no system could be useful if it does not produce the required output in the specified format. Asking the users about the format required by them tests the outputs generated by the system under consideration. Here the output format is considered in two ways, one is on the screen and other is the printed format. The output format on the screen is found to be correct as the format was designed in the system designed phase according to the user needs. For the hard copy also, the output comes as the specified requirements by the users. Hence output testing does not result in any corrections in the system.

#### **4.2.5 User Acceptance Testing**

User acceptance of a system is the key factor of the success of any system. The system under study is tested for user acceptance by constantly keeping in touch with the prospective system users at the time of developing and making changes wherever required.

### **4.3 TEST CASES**

**User registration:** Test the registration process, including the creation of an account, password, and email verification. To begin with login, users need to register by filling up basic registration details. There are multiple fields in the registration page and every field has to be filled by the user.

**User Login:** Login id and password are kept compulsory fields, and if the id or password doesn't match then it will show an error message.

**User profile:** Test the user profile creation, update profile and reset password functionalities. Verify that user information is accurately displayed.

**Food donation:** Test the process of donating food. Verify that users can create a donation, including selecting the type of food, specifying the quantity, and choosing a donation centre.

**Food pickup:** Test the process of scheduling a pickup for donated food. Verify that the rider can pick up the food after requesting done by the receiver that any charity users can schedule, and that the pickup location is accurately displayed.

**Donation centre:** Test the process of creating and managing donation centres. Verify that admins can update user information, can approve and decline user accounts as needed.

**Notifications:** Test the notification system for users and admins. Verify that users receive notifications for successful food requests, email verification and reset password mail.

**Reporting:** Test the reporting system for users and admins. Verify that users can view their donation history, and that admins can view donation centre metrics, such as the number of donations and pickups.

**User feedback:** Test the feedback system for users. Verify that users can provide feedback on the donation process, including uploading the picture captured of delivered food donation to needy.

**Security:** Test the security features of the app, including authentication, authorization, and data encryption. Verify that user data is protected and that only authorized users can access sensitive information.

**Compatibility:** Test the app on devices like mobile. Verify that the app is compatible with different screen sizes and that all features are functional on different devices.

## 4.4 SETTING UP ENVIRONMENT

Upon launching the application, the user is presented with the app's basic interface, which includes pre-existing scans for testing purposes. Each scan encompasses the characters that would typically be present in an actual document.

The screenshot shows the Android Studio interface. The top navigation bar includes File, Edit, View, Navigate, Code, Befactor, Build, Run, Tools, Git, Window, Help, and MyFirstApp - DonationActivity.java [MyFirstApp.app.main]. Below the toolbar are tabs for activity\_home.xml, DonationActivity.java (selected), SplashActivity.java, strings.xml, and styles.xml. The left sidebar shows the Project structure with packages like com.mansibhatt.myfirstapp and sub-directories like main/java and main/res. The main code editor displays Java code for DonationActivity.java, which interacts with Firebase services such as FirebaseAuth, FirebaseFirestore, FirebaseDatabase, and FirebaseStorage. The bottom terminal window shows the build process: 13% EXECUTING, 41% EXECUTING, and BUILD SUCCESSFUL in 1m 53s. The status bar at the bottom right indicates 51:1 LF, UTF-8, 4 spaces.

```
@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_donation);

    fAuth = FirebaseAuth.getInstance();
    fStore = FirebaseFirestore.getInstance();
    currentUserID = FirebaseAuth.getInstance().getCurrentUser().getUid();
    donations = new Donations();
    databaseReference = FirebaseDatabase.getInstance().getReference().child("Donations");
    key = databaseReference.push().getKey();
    storageReference = FirebaseStorage.getInstance().getReference();

    documentReference = fStore.collection("users").document(fAuth.getUid());
}

checkStatus();
```

```
<-----> 13% EXECUTING [1m 6s]g > Resolve files of :app:debugCompileClasspath > Transform firebase-encoders-json-18.0.0.aar (com.google.firebaseio:firebase-encoders-json:18.0.0)
<-----> 13% EXECUTING [1m 6s]g > Resolve files of :app:debugCompileClasspath > Transform firebase-encoders-json-18.0.0.aar (com.google.firebaseio:firebase-encoders-json:18.0.0)
<-----> 41% EXECUTING [1m 14s] > Resolve files of :app:debugCompileClasspath > Transform firebase-encoders-json-18.0.0.aar (com.google.firebaseio:firebase-encoders-json:18.0.0)
<-----> 41% EXECUTING [1m 14s] > Resolve files of :app:debugCompileClasspath > Transform firebase-encoders-json-18.0.0.aar (com.google.firebaseio:firebase-encoders-json:18.0.0)

BUILD SUCCESSFUL in 1m 53s
44 actionable tasks: 1 executed, 43 up-to-date
PS C:\Users\Rishabh\Desktop\Waste food project with admin panel\Waste food project with admin panel\Waste food project with admin panel\Food-Donation-App_ReCustomize-main>
```

Fig 4.4 Setting up the local environment

## 4.5 DEPLOYING PRODUCTION BUILD

We will deploy our build using the 'Gradle Build' command on the command prompt. After which, our app will get deployed on the Gradle local environment.

The screenshot shows a terminal window with the title 'Terminal: Local'. The command 'gradle build' is being run, and the output shows the task ':app:compileDebugJavaWithJavaC' with notes about deprecated APIs and a successful build. The terminal also shows the path PS C:\Users\Rishabh\Desktop\Waste food project with admin panel\Waste food project with admin panel\Waste food project with admin panel\Food-Donation-App\_ReCustomize-main>.

```
> Task :app:compileDebugJavaWithJavaC
Note: Some input files use or override a deprecated API.
Note: Recompile with -Xlint:deprecation for details.

BUILD SUCCESSFUL in 3m 55s
44 actionable tasks: 44 executed
PS C:\Users\Rishabh\Desktop\Waste food project with admin panel\Waste food project with admin panel\Waste food project with admin panel\Food-Donation-App_ReCustomize-main>
```

Figure 4.5 Deploying production build

## CHAPTER 5

### TASK TIMELINE & SCHEDULE OF ACTIVITIES

#### 5.1 TASK DECOMPOSITION

- i. **Market research and analysis:** Identify current waste food management practices, Identify existing donation apps and their features, Conduct market research and identify target users, Analyse potential challenges and risks.
- ii. **Design and development of the app:** Develop user personas and use cases, Develop app architecture and wireframes, Define feature requirements and prioritization, Develop project plan and timeline.
- iii. **Testing and debugging:** Develop frontend and backend of the app, Implement database and server-side logic, Integrate app with third-party APIs for location, payment, and messaging, Develop and implement user authentication and authorization, Conduct unit, integration, and acceptance testing, Identify and resolve bugs and issues, Prepare app for deployment to app stores, Deploy app and monitor usage and performance.
- iv. **Continuous improvement and maintenance:** Provide ongoing maintenance and support for the app, Monitor user feedback and make improvements, Address any technical issues that arise, Provide customer support to users.

## 5.2 PROJECT SCHEDULE

- i. **Study of research papers** - (31<sup>st</sup> August, 2022 - 20<sup>th</sup> September, 2022) – In this stage, we researched different research papers that were available related to the Topic of our project, an android waste food donation application. We got an idea of what all work has already been done on the selected topic and what we need to do further to make it useful.
- ii. **Perform System Analysis** - (21<sup>st</sup> September, 2022 – 1<sup>st</sup> October, 2022) – In this step problems, opportunities and we analysed the system and got to know about the directives.
- iii. **Identity Requirements** – (2<sup>nd</sup> October, 2022 – 15<sup>th</sup> October, 2022) – In this step, we made a proper list of what all are the requirements of our project. We identified the requirements so that we could work accordingly and can fulfil all the requirements.
- iv. **Study of Technologies to be used** - (16<sup>th</sup> October, 2022 – 26<sup>th</sup> November, 2022) – At this stage we were ready to begin with the actual study of the technologies that were to be used in our project.
- v. **Assign Task** - (27<sup>th</sup> December, 2022 – 31<sup>st</sup> December, 2022) – After learning the technologies and understanding which member will be able to do which type of work, we assigned different parts of the project to all the team members. All the members worked on their part and would also help the other team members if needed.
- vi. **Perform System Design** – (1<sup>st</sup> January, 2023 – 20<sup>th</sup> January, 2023) – At this stage, we defined the architecture, product design, modules, interfaces, and data for our project to satisfy the specified requirements.
- vii. **Develop System** – (21<sup>st</sup> January, 2023 – 29<sup>th</sup> March, 2023) – This was one of the most crucial parts of our project where we built out the project and actually started combining the different pieces of the project together to make a final product. During the development phase of the FEEDIE FOOD- RESCUE application, we utilized various technologies to create the final product. We used Java as the primary programming language for developing the Android application, Firebase as our backend service, and Android Studio as our IDE. By utilizing a combination of advanced technologies and tools, we were able to build a robust application that provided our users a friendly interface so that they can easily donate excess food to the needy ones.

- viii. **Perform Unit Testing** – (30<sup>th</sup> March, 2023 – 3<sup>rd</sup> April, 2023) – In unit testing, the individual units of source code were tested to determine whether they fit to use or not.
- ix. **Perform Integration Testing** – (4<sup>th</sup> April, 2023 – 13<sup>th</sup> April, 2023) – At this stage, individual modules were combined and tested as a group. It is conducted to evaluate the compliance of a system or component with specific functional requirements.
- x. **Deploy System** – (14<sup>th</sup> April, 2023 – 24<sup>th</sup> April, 2023) – After all the above steps, finally the product was moved from a temporary or development state to a permanent or desired state.
- xi. **Perform Bug Fixes and Maintenance** – (25<sup>th</sup> April, 2023 – 15<sup>th</sup> May, 2023) – In this state we used different methods to perform bug fixes and maintenance to make sure that our application is running smoothly and any issues are fixed on time.

<b>Task</b>	<b>StartDate</b>	<b>End Date</b>	<b>Duration (Days)</b>
Study of research papers	31 <sup>st</sup> August, 2022	20 <sup>th</sup> September, 2022	20
Perform System Analysis	21 <sup>st</sup> September, 2022	1 <sup>st</sup> October 2022	10
Identify Requirements	2 <sup>nd</sup> October, 2022	15 <sup>th</sup> October, 2022	13
Study of Technologies to be used	16 <sup>th</sup> October, 2022	26 <sup>th</sup> November, 2022	41
Assign Task	27 <sup>th</sup> December, 2022	31 <sup>st</sup> December, 2022	4
Perform System Design	1 <sup>st</sup> January, 2023	20 <sup>th</sup> January, 2023	19
Develop System	21 <sup>th</sup> January, 2023	29 <sup>th</sup> March, 2023	67
Perform Unit Testing	30 <sup>th</sup> March, 2023	3 <sup>rd</sup> April, 2023	4
Perform Integration Testing	4 <sup>th</sup> April, 2023	13 <sup>th</sup> April, 2023	9
Deploy System	14 <sup>th</sup> April, 2023	24 <sup>th</sup> April, 2023	10
Perform Bug Fixes and Maintenance	25 <sup>th</sup> April, 2023	15 <sup>th</sup> May, 2023	20

Table 5.2 Project Schedule

## **5.3 TASK SPECIFICATION**

**Research and Analysis:** Identify current waste food management practices

Goal: To understand the current waste food management practices in the market.

Inputs: Online research, interviews with food waste management experts, and NGOs.

Outputs: Detailed report outlining the current waste food management practices and the problems they face.

Estimated effort and duration: 33 hours over 2 weeks.

**Identify existing donation apps and their features**

Goal: To analyse existing donation apps and identify their features.

Inputs: Online research, analysis of competitor apps.

Outputs: Detailed report outlining the features of existing donation apps.

Estimated effort and duration: 41 hours over 2 weeks.

**Conduct market research and identify target users**

Goal: To understand the market needs and identify potential users for the app.

Inputs: Online research, interviews with target users and stakeholders, and competitor analysis.

Outputs: Detailed report outlining the market research findings and target user personas.

Estimated effort and duration: 15 hours over 4 weeks.

**Analyse potential challenges and risks**

Goal: To identify potential challenges and risks that could affect the development and deployment of the app.

Inputs: Research, analysis of market trends, and expert opinions.

Outputs: Detailed report outlining the potential challenges and risks and mitigation strategies.

Estimated effort and duration: 23 hours over 2 weeks.

**Design and Planning**

Develop user personas and use cases

Goal: To create user personas and use cases for the app

# **CHAPTER – 6**

## **PROJECT MANAGEMENT**

### **6.1 MAJOR RISKS AND CONTINGENCY PLANS**

There are several major risks that should be implemented while building Feedie Food-Rescue, these risks can lead to significant issues such as food safety concerns, reputation damage, legal liabilities, and financial losses. To mitigate these risks, it's important to develop a contingency plan that outlines the steps to be taken in the event of an issue or crisis..

#### **Food Safety Risks**

One of the major risks is the potential for food safety issues.

The contingency plan are to quickly remove the affected food from circulation, notify donors and recipients, and conduct an investigation to identify the cause of the issue.

#### **Donor & Recipient Risk**

Another risk is the potential for fraud, such as donors or recipients misrepresenting themselves or their organizations.

The contingency plan should include steps to suspend the fraudulent donor or recipient account, notify other users, and take appropriate legal action if necessary.

#### **Technical Issue**

Technical issues, such as system crashes or data breaches.

The contingency plan should include steps to quickly identify and isolate the issue, notify users of any potential data breaches, and work to restore system functionality as quickly as possible.

## **Lack of Donor & Recipient Participation**

Lack of participation from donors and recipients, which can lead to low donation levels and limited impact.

The contingency plan should include steps to identify the root cause and develop targeted marketing and outreach efforts to address the issue.

## **Legal & Regulatory Compliance**

The system may face risks related to non-compliance with applicable laws and regulations. This could include food safety regulations, data protection laws, and charity laws.

The contingency plan should include steps to mitigate this risk, address the issue, take corrective action, and report any violations to the relevant authorities as necessary.

## **Reputation Damage**

The system may face risks related to reputation damage, such as negative publicity or loss of trust from donors and recipients.

The contingency plan should include steps to overcome from this, assess the extent of the damage, communicate with stakeholders, and take steps to rebuild trust.

## **Financial Risks**

The system may face financial risks, such as a lack of funding or unexpected expenses.

The contingency plan should include steps to mitigate this risk, identify the root cause, develop a plan to address the issue, and seek additional funding or support as necessary.

By proactively identifying and addressing these risks, and developing a comprehensive contingency plan, a waste food management system and donation app can operate effectively and minimize the potential for negative consequences.

By identifying these risks, and developing a comprehensive contingency plan, Feedie Food-Rescue can operate effectively and minimize the potential for negative consequences.

## **6.2 PRINCIPAL AND GENERAL OUTCOMES**

Feedie Food-Rescue app aims to create a sustainable and efficient platform that connects food donors with food recipients to minimize food waste, alleviate hunger, and improve food safety.

### **Understanding Database Management**

Through developing this app, we gain knowledge of database management techniques to design, develop and maintain a database system that can efficiently store and manage large volumes of data, such as donor and recipient information, food donations, and logistics data.

### **User interface design**

Designing an intuitive and user-friendly interface for a food donation app can be challenging. By building your own app, you likely gained experience in designing user interfaces and learned what works and what doesn't.

### **Security**

When it comes to management & donation app, security is always a concern. You likely learned about security measures you can implement, such as encryption and authentication, to help protect users' privacy and data.

### **Debugging**

Building any software application involves debugging, and this likely held true for your food donation app as well. Through debugging your app, you likely gained experience in identifying and fixing bugs, which is an essential skill for any software developer.

### **Testing**

Testing is a critical component of software development while building project, it likely involved extensive testing to ensure that the app functions correctly under various conditions. Through this process, you likely learned about different testing methodologies and gained experience in testing.

# **CHAPTER – 7**

## **CONCLUSION AND FUTURE SCOPE**

### **7.1 CONCLUSION**

In conclusion, our project “Feedie Food- Rescue” have the potential to play a significant role, proposed application would make majority of the people to get involved in donations and would eliminate the wastage of food and alleviate food insecurity by connecting food donors with organizations that can distribute the food to those in need, our project can help to reduce the amount of edible food that ends up in landfills and ensure that it is used to feed people instead. This app also has the potential to streamline the food donation process, making it easier for businesses and individuals to donate excess food.

However, there are still challenges to be addressed in the development and implementation of the app, such as ensuring food safety and hygiene, building trust between donors and recipients, and addressing logistical challenges such as transportation and storage. The success of the app relies on the collective efforts of individuals, organizations, depends on a number of factors, including the availability of volunteers to transport and distribute the food, the willingness of donors to use the app and donate food, and the reliability of the organizations that receive the food and, on the governments to promote awareness, incentivize participation, and build strong partnerships.

To overcome these challenges, it is important for waste food management and donation app to build strong partnerships with local organizations, promote awareness about the issue of food waste and the benefits of donating food, and offer incentives to encourage more people to use the app.

Overall, waste food management and donation apps have the potential to make a real difference in reducing food waste and addressing food insecurity. Ultimately, it offers a valuable opportunity to make a positive impact on both the environment and society.

System Design developed in Android based on Java language, Firebase as our backend service, and Android Studio as our IDE. The Development of this system takes a lot of effort from us. We think this system gave a lot of satisfaction to all of us. Though every task is never said to be perfect in this development field even more improvement may be possible in this application. We learned so many things and gained a lot of knowledge about the development field. We hope this will prove fruitful to us.

## **7.2 FUTURE SCOPE**

There are several areas of development that could further enhance the impact of these apps, including: -

**Artificial Intelligence:** With advances in artificial intelligence (AI), waste food management and donation apps can use algorithms to predict when and where food donations will be available, and match them with organizations in need of food. AI can also help optimize the distribution of food donations to reduce transportation costs and minimize food waste.

**Blockchain:** By incorporating blockchain technology into waste food management and donation apps, donors and recipients can track the movement of food donations and ensure that they reach their intended destinations. This can help improve transparency and accountability in the food donation process.

**Gamification:** Waste food management and donation apps can incorporate gamification elements, such as points and rewards, to incentivize people to donate food and participate in the food donation process. This can help increase engagement and encourage more people to get involved.

**Scaling up:** Waste food management and donation apps can expand their operations to reach more donors and recipients across different geographies. This can help reduce food waste and address food insecurity in more communities around the world.

**Expansion to new markets:** The global reach of waste food management and donation apps can be expanded to reach new markets, especially in developing countries where food waste and food insecurity are prevalent. This could involve partnerships with local organizations and government agencies to build strong networks of donors and recipients.

**Adoption by businesses:** Waste food management and donation apps could be adopted by businesses such as restaurants, supermarkets, and caterers to reduce their food waste and donate surplus food. This could lead to a significant reduction in food waste and the promotion of responsible business practices.

**Increased public awareness:** Waste food management and donation apps can be used to raise public awareness about the impact of food waste on the environment and society, and the benefits of donating surplus food to those in need. This can encourage more people to participate in the food donation process and contribute to a more sustainable and equitable food system.

Overall, waste food management and donation apps have a lot of potential for future growth and development, as they can leverage emerging technologies and innovative strategies to address the challenges of food waste and food insecurity.

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