

Food Share Tech: A Smart Platform for Food Donation and Redistribution

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Abstract

In fashionable days people ought to create use of trendy technologies to seek out the growth sector altogether. Waste worldwide is increasing day by day. The survey says there was a 5% increase in wastage every year till 2020. It has now increased to 7%. It includes food wastage, clothes, and other goods wastage. This project helps us to decrease wastage and even monitor the wastage in area-wise divisions. It tells all the users to donate food or any other goods like clothes, toys, and books by using the app. The FreeMorsel team handles the complete donation process. After logging in to the app the user can start donating with a single click and then the donation will be picked by the FreeMorsel rider and will be donated to the people in need. The information about the donation campaigns was made available to the user so that they can register themselves to volunteer in any campaigns if they wish to. The core plan of the application is to link the licensed Ngos with people through this application to avoid misuse of donations. The application was developed through the Flutter framework with the backend of Firebase to provide results on a real-time basis.

Keywords

Firebase, Flutter, Mobile application, API, Geolocation, Android Application Development, NodeJS, Gcloud, cloud functions, Python Flask.

Introduction

Living standards are constantly improving, advanced technology provides convenience to people, and media information can immediately propagate worldwide. Wasting things (food, goods, etc) is a common problem in our society. Management of those extra things is crucial since it can improve our environmental and economic sustainability. Numerous issues in society, such as wars, genocide, scrambling resources, and more, however, accompany these factors. These problems lead to an increase in the number of people who don't get proper resources every day. An important goal in our world today is to eliminate wastage by reutilizing available sources within local communities: leftover food items in restaurants, extra goods that may be approaching expiration; and any perishable items not used in entirety within their desired period [1]. People have met many individuals or charities seeking donations in their daily lives. Indeed, governments and celebrities encourage the community to contribute and help those in need. The development of the application or software product is considered an activity based on human behavior. According to research, in order to create a fully functional mobile app, attention must be given to the benefits of high website quality, easy transaction processes, and high-quality project content for perceived trustworthiness and empathy. This concept can eliminate hesitation among people and increase the willingness to help people who

need help. Pollution is an upsetting outbreak in deeply populated nations like India. There is ample evidence from the highways, garbage bins, and landfills to prove that. Bins, restaurants, social and family events, and services waste too much food and goods. Wastage is not only a symptom of craving or pollution but also of various financial problems.

We have chosen a path to implement our innovative ideas in the form of this project named “FreeMorsel”. The basic concept which emerged from our project is to provide necessary items to the ones in need. ‘FreeMorsel’ is a cross-platform application that provides a platform for the donation of useful items (food, clothes, etc.) to the nearest NGO. Many people and institutes wish to donate things to needy organizations. Also, many organizations wish to ask for various things required of them. Nevertheless, there is no source accessible via which they can meet their needs. Therefore, a web-based application through which people can donate items as per their capacity will be useful in creating a bridge between Donors and those who need it.

There is a points and reward system for each donation from the user. So, it will keep them motivated to reduce the wastage of goods and foods. The person who is in need will be able to receive it. The number of donations will help the user to increase their level and rank in the application. The rank and level will help to analyze the data from which area the donation is coming more or wastage are more. As the rank and level increase, the rewards and points will be given to that particular user. The user has to login into the app using their phone number. At the time of the first login, the user will be given a page where they can enter their details. After login, the first page shows the nearby donations made in an area of a radius of 5 km. It has a tutorial on how to make a donation using the app. It has all the tutorials and descriptions to explain how to donate. The user has to tap on the add icon in the bottom center of the app where they will be redirected to the page where they need to add the information about their donation and click pictures of it. After the post of the donation, the FreeMorsel rider will be notified by the post and they will go to collect the donation from the user. The rider is sent to analyze the donation and check what things are being donated by the user. The donated things will be collected at one place in the FreeMorsel shop. At the time of donation, it will be given to the poor people/ people who are in need.

Literature Survey

C. Varghese et al., 2021 [1] It is somewhat novel in the sense of providing quite a different functionality to assist food donation through the ubiquitous interactive display of relevant knowledge on food for suppliers and consumers. It keeps track of waste food for restaurants. H. Hajj Diab et al., 2018 [2] The Donor can also put up items for donation and view all donation requests. The Admin and Donor both can view the Receiver’s and Donor’s location. The database may also be updated and monitored by the Admin. The Receiver can also perform operations like requesting items, viewing requested items, and claiming donations. Mrigank Mathur et al., 2021 [3] Android program that provides donors and seekers with a forum to donate and collect food once they have successfully logged into the system. The machine will still be live, providing a 24/7 service. At a relatively low cost, the machine can make food available. S. Radhika et al., 2022 [4] The proposed system is an android application, developed on Android studio 4.1 using react-native and NodeJs, and MongoDB for data storage and requires an internet connection. Fulfills the NGO’s motto, Creates a positive vibe for donors

by donating food so they feel happy. R. Adline Freeda et al., 2018 [5] All the processes are sorted according to the time. The waiting time, the availability time everything is calculated so that the food quality is not compromised. The donated food reaches the needful. Also, quality is checked and on time. Vidhi Panchal et al., 2020 [6] Here the donor and the people in need both get connected through the application. The leftover food from parties, hotels, and households is collected which ensures no wastage. Pritom Kumer Rajvor et al., 2021 [7] There are three roles that help to interact with each other and get the donation drive completed. It helps to manage the donated food. Check whether the food is spoiled or not before getting donated. Mafishan Ali et al., 2019 [8] Application was to reduce food wastage as much as we can and to feed those people who do not have enough food for one time to feed themselves. It's a big hassle for them to search for food every day to feed themselves as well as their families, and also for donors to reach out to them.

Hitesh V. Raut et al., [9] The development part is divided into different sub-modules depending on the client-server system. Those interdisciplinary sub-modules include the development of steps like client application development, server application development and the environment used, technologies used, and database server with a platform to be used in all mobile operating systems ranging from android, blackberry, IOS, etc. S Periyanyagi et al., [10] The B-Door app was created to protect the donor's privacy and donor identity, as well as the recipient's safety, using the J48 decision tree algorithm. The proposed solution attempts to provide support for both emergencies and reserved time things. This Application was developed through Android Studio and Flutter UI Framework together with the base at the backside and provides our results on a Real-time basis. Shinta Oktaviana R et al., 2020 [11] This research aims to create a system to connect the community with individuals or organizations that want to donate excess food. The prototype process was used to create this system so that consumers could provide input more quickly. This research aims to create an application model that can connect food donors, humanitarian communities, and people who are starving in Jakarta. Suraya Masrom et al., [12] This paper provides a features comparison study among several charity mobile applications, defining the limits of the application and introducing the F4U mobile charity application. The ideas presented in this paper related to the system design, architecture, and testing are beneficial for researchers who intend to develop another kind of mobile application. R. Gokul et al., 2022 [13] This Application is pointed toward fostering a Blood giver application. use. The application deals with various modules and their related reports, which are created according to the appropriate techniques and guidelines that the administrator advances. Ms. Pradnya Jagtap et al., 2018 [14] This project aims at maintaining all the information pertaining to blood donors, and different blood groups available in each blood bank and helps them to manage in a better way. The aim is to provide transparency in this field, make the process of obtaining blood from a blood bank hassle-free and corruption free and make the system of blood bank management effective document is a template

Proposed System

The Food Donation Portal Proposed System is an internet-based application that allows all people to donate leftover food. The product has been seen to be a powerful way of donating items over the internet. etc. Food waste has dramatically increased. According to information

provided by the Food and Agricultural Organization, around 1.3 billion tonnes of food are wasted annually, or one-third of all food produced for human use. On the other hand, as per WHO, 20% of the population faces extreme food shortages. Hence there is a need to come up with a solution that can avoid food wastage and help the people in need. In India, nearly 40% of the food gets wasted which is approximately to Rs 92,000 crores annually.

Food pollution is a troubling situation in densely developed nations like India. Too much food gets wasted from weddings, canteens, pubs, social and family get-togethers, and events. The scheme will bring them into practice instead of losing these items by donating them to different people, and organizations such as orphanages, old age homes, etc. Some individuals and institutions want to contribute items to organizations in need. A cross-platform-based application has therefore been created in which individuals can donate food products according to their capacity. The food donation application serves as an interface between consumers searching for a channel to donate without wasting surplus food.

Scope

This application has a wide scope in the future in developing countries that consists of rich as well as poor people. Some people have the privilege of a lot of things whereas there are people who don't have access even to afford a basic lifestyle. If this donation business will be put online then people can donate their extra stuff without any discomfort and those who need this stuff can have these items. Moreover, this application will be of great use in case of natural calamity like an epidemic break where people would be able to donate food and clothes in time of need to people. Hundreds of thousands of food are wasted in celebrations like weddings or parties just because nobody wants to spend their time finding people for donating their food so our application will ease their work as they don't have to take do anything but just register for this application and someone will pick up the items they want to donate from their doorstep. This application can be a great help in solving food as well as good crisis problems.

Methodology

In this project, the first thing was analyzing the requirements, mapping the flow, and jotting down the various other requirements of the targeted audience. Later, to understand the project better, we made various design flows, DFD diagrams, and ER diagrams. The whole UI/UX of the application is drawn over Figma software, which is used to make GUI designs, wireframes, and even prototypes of the application. The application is developed on the Flutter framework. This framework is a cross-platform framework that is used to develop applications for iOS, Android, and the Web with a single source code.

Also on the server side, Firebase is used. It is a one-stop solution for all the backend work. The cloud function will also be deployed over Firebase or Heroku, depending on the function's workload and return values. The application will be deployed on the Google Play Services server and will be available to download from the Play Store and App Store as well.

The data store in the database is more simplified and it takes low bandwidth and processing power to fetch data from the database. The user information is also stored in the local storage hence no repetitive fetching is required. This feature is made keeping Green IT in mind.

Functional Requirements:

1. Hardware Requirements-

- **Development**

- RAM: Minimum 8GB
- Processor: i3-6 Gen
- Memory: 200GB storage

- **Testing:**

- OS: Android 5+, IOS 10+

- **User: Mobile Device**

2. Software Requirements-

- **Vscode:** It is a source-code editor made by Microsoft with the Electron Framework, for Windows, Linux, and macOS.
- **Flutter:** Flutter is an open-source UI software development kit created by Google. It is used to develop cross-platform applications for Android, iOS, Linux, macOS, Windows, Google Fuchsia, and the web from a single codebase.
- **Firebase:** Firebase is a set of hosting services for any type of application. It offers NoSQL(Cloud Firestore) and real-time hosting of databases, content, social authentication, notifications, or services, such as a real-time communication server.

Product Designs:

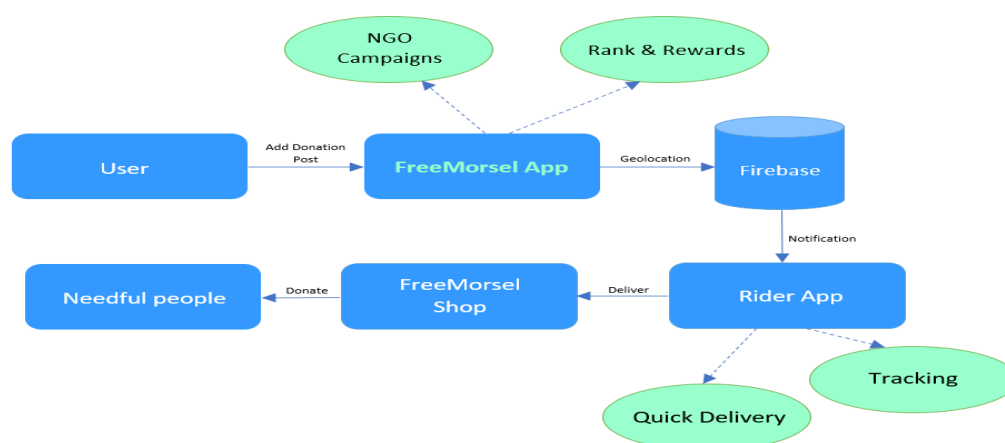


Fig 1.1 Basic flow of the application

The above fig 1.1 shows the basic flow of the application which is shown as a single module. Right from the User side where they donate through the app, then proceeding towards the rider side where he comes to collect the order and hands it over to the nearest NGO/Shop, which is then distributed to the needy.

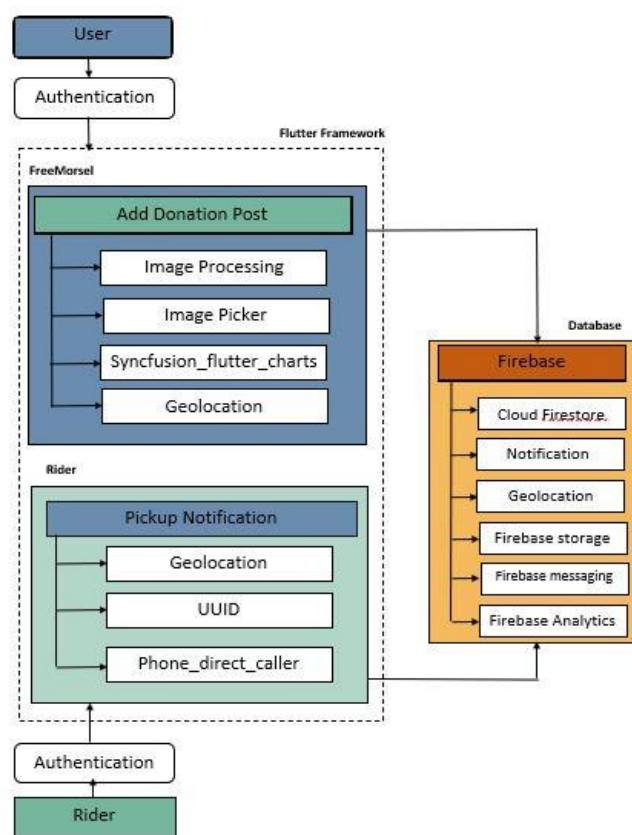


Fig 1.2 System Architecture of FreeMorsel

The above fig 1.2 shows the system architecture where the flow is divided into sub modules to understand them better. It shows the detailed features that the app provides like geolocation, unique Id generation(UUID), image processing, etc.

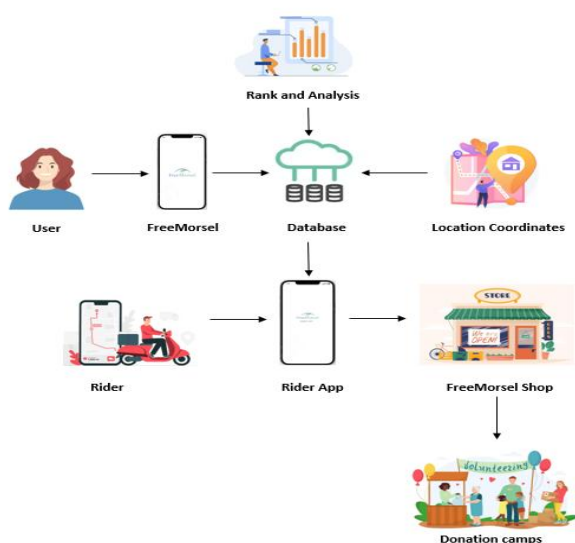


Fig 1.3 Graphical representation of the app

The above fig 1.3 shows a graphical representation of the flow of the application. It shows the user side application, the rider side application that has been developed and also the FreeMorsel stores.

Implementation

This Software application consists of maintaining user information, maintaining receiver end details, retaining donation details, request for a donation, and delivery updates. It can be accessed from anywhere and anytime which makes the donation process less challenging. This is a mobile application developed with the use of flutter and firebase using dart language. At the time of the first login, the user will be given a page where they can enter their basic details like name, email-id, etc.

Frontend

The User interface of the app should be user-friendly and easy to use so they may need a compatible device where they can take full advantage of the app. The user interface was developed using the Flutter framework which uses Dart language. It helps to build a cross-platform application using a single codebase. The user can use the app on ios as well as on android phones. There is also an authentication feature where the user needs to verify themselves by entering the phone number with a One-Time Password.

```
import 'package:cloud_firestore/cloud_firestore.dart';
import 'package:firebase_auth/firebase_auth.dart';
import 'package:firebase_messaging/firebase_messaging.dart';
import 'package:freemorsel/data/userdata.dart';
import 'package:freemorsel/provider/notificationprovider.dart';

Future<bool> checkLogin() async {
  try {
    bool newUser = true;
    String uid = FirebaseAuth.instance.currentUser!.uid;
    await FirebaseFirestore.instance
      .collection("Users")
      .doc(uid)
      .get()
      .then((docSnapshot) async {
        if (docSnapshot.exists) {
          getFCM(uid: uid);
          newUser = true;
        } else {
          newUser = false;
        }
      });
    return newUser;
  } catch (e) {
    return false;
  }
}

Future newUserLogin() async {
  String uid = FirebaseAuth.instance.currentUser!.uid;
  fcmToken = (await FirebaseMessaging.instance.getToken());
  FirebaseFirestore.instance.collection("Users").doc(uid).set({
    "userId": uid,
    "username": username,
    "phoneNo": phoneNum,
    "email": email,
    "noOfDonation": 0,
    "profilePic": profilePicSelector,
    "points": 0,
    "level": 0,
    "token": fcmToken,
    "notification": false,
    "offerNotification": false,
    "driveCampNotification": false
  });
}
```

Fig 2.1 Model code that checks whether the user is new or not

The above fig 2.1 shows how to use code to identify whether a user is a new user or an existing user when they sign in.

Fig 2.2 Model code for OTP verification

Backend

For storing the data that is collected from the application by the user Firebase is used. It offers a NoSQL database, storage, authentication, notifications, etc. The data is stored in collections and documents in NoSQL format. NOSQL is the best and fastest way to retrieve data from the database.

Users > CEKFalbt0mVow.	Users	CEKFalbt0mVowxK8V6F88sq0xJm2
Start collection Donations PendingDonation Rider TrendingCampaigns UpComing Users testing	Add document 05yna382IabhxPjOSRWFwF0G0eQ2 3Bu23xFrFIw1Nr2znab51zA3NgI3 7YbTnkSbitbdQEgLIomZ8GQ2nPB2 CEKFalbt0mVowxK8V6F88sq0xJm2 NWtkSAvuBEMydADE0DDzbM7142h1 Ra8hPfDzNZM5cSb42jkhVk7AsHd2 uVyEpHCrcegVY0nCBt20TWxLgv1 wQgNAzC50Wb6Fhwyga5AdU56Epc2	Start collection Add field PhoneNo: "9819535276" Points: 0 email: "tejas.tamkar@gmail.com" level: 0 noOfDonation: 0 profilePic: 3 token: "eSPxCpy_SweFkyKriuM3_N:APA91bFXpXKHpbHbq90iaCEXcF-TIUv9TbaXIYRLbluxpwq70khhPhXbuVlsJGmFdppYohjfwyHFvDfA0qeMIQ" userId: "CEKFalbt0mVowxK8V6F88sq0xJm2" username: "Tejas Tamkar"

Fig 2.3.1 Users Collection in Firebase

The above Fig 2.3.1 shows the Users collection of firebase where the user data and other details are stored.

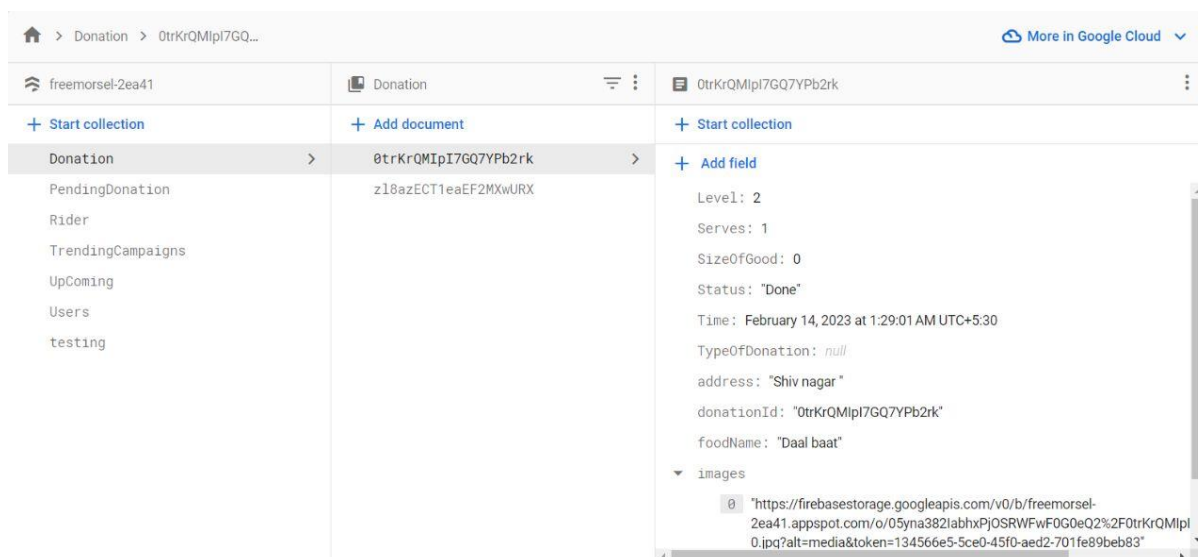


Fig 2.3.2 Donation Collection in Firebase

The above Fig 2.3.2 shows the Donation collection of firebase where the details of the donation posted by users gets stored.

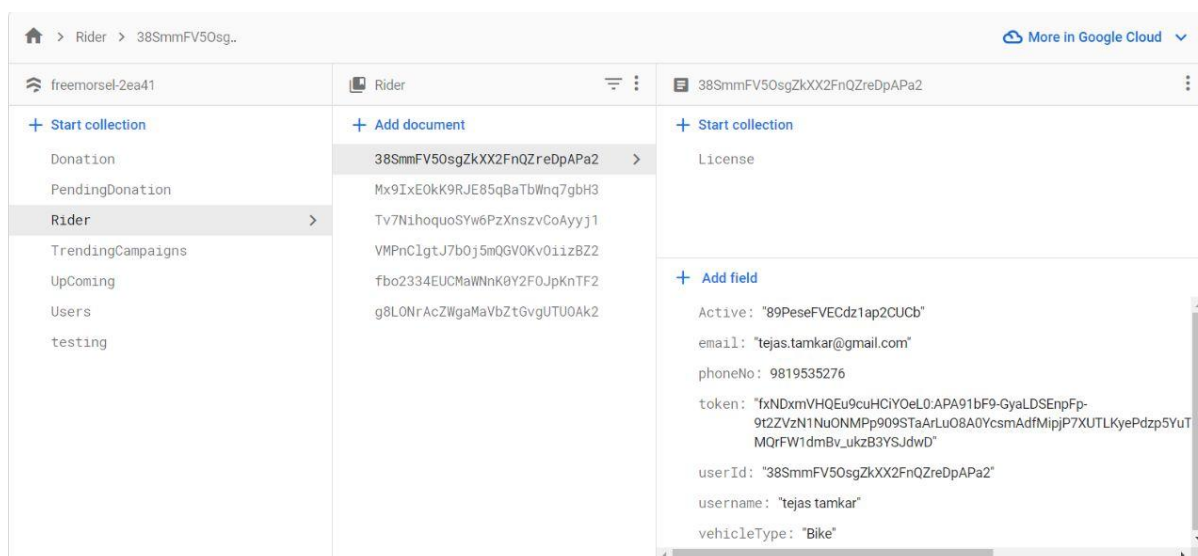


Fig 2.3.3 Rider Collection in Firebase

The above Fig 2.3.3 shows the Rider collection of firebase where the details of the rider is stored.

Result and Discussion

FreeMorsel

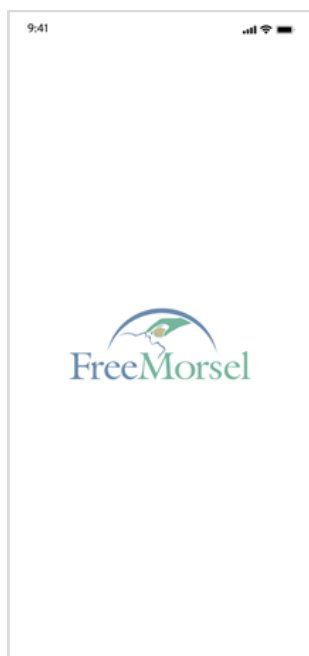


Fig 1: Splash Screen

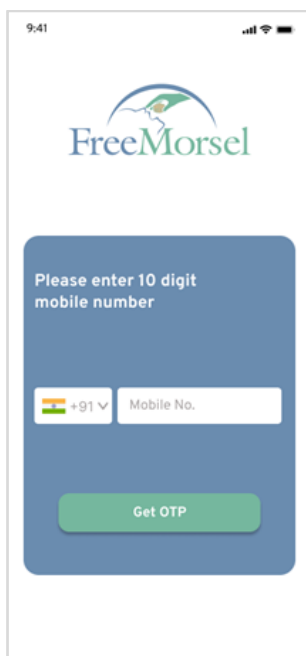


Fig 2: Login Screen

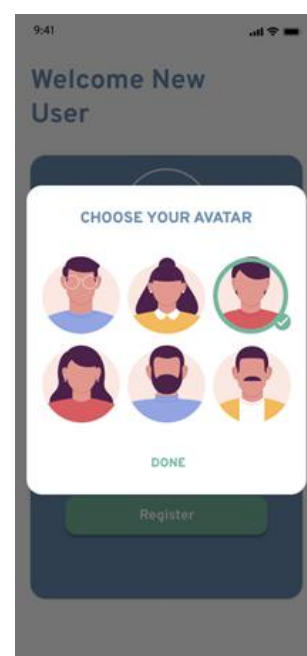


Fig 3: Avatar Selection

The Splash Screen [fig 1] is the first page of the app which the user will see after opening the app and will be redirected to the Login page [fig 2] where the user has to enter their phone number and verify the OTP sent on the phone number provided by the user using the backend functions. If the user is new to the app then they will be redirected to the registration form where the user have to enter their basic details (name, phone number, etc) and can also select their avatar [fig 3] for their profile.

FreeMorsel Rider app is where the rider will get the notifications regarding the donations posted by the donors in the FreeMorsel app. Once the Rider log in in the rider app they will be redirected to the Home Page[fig 10]where they can get the information about the number of pickups they had completed and they can also view the active and the upcoming pickup based on the location of the rider at that time. The Rider has to confirm the pickup by clicking on the “Accept Pickup “ button and then collect the donation from the user from the address mentioned in the Order Details[fig 11]. Every Donation will have unique pickup id which can be verified by the donor when the rider collects the food from them. The user can also track the rider through Geolocation[fig 12] so that the user is kept updated regarding the status of the rider.

The FreeMorsel app permits the user with a simple one click-one tap Donation feature anytime and anywhere. In order to check the responses from the users with regards of functionality of FreeMorsel system, 30 volunteers were asked to test the features of the system and were asked to give the feedback about the app. The feedbacks were taken into consideration and new updates were made in the app and many volunteers registered for the upcoming donation campaigns organized by NGOs through FreeMorsel.

Conclusion

The proposed application eliminates food waste and thus satisfies other criteria, such as food goods from vulnerable organizations. The proposed scheme is currently aimed at eliminating the significant waste that normally exists in India, which can include any items. The framework is required to upgrade and optimize the same system, which will further add to the application's reliability and usefulness. Thus, it will further help the development of NGOs with the use of useful items through donations.

Future Scope

In future, our application can be made more congenial with features such as

- The analysis of Areas where donations were frequently made, Chat feature, Ratings, etc can be added as extra features.
- The FreeMorsel can organize campaigns of their own
- Information of NGOs connected with FreeMorsel can be made available to the user.
- This app can be grown on a large scale and spread across other states in future.

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