

FOODFLOW-SHARE TO SPARE

A PROJECT REPORT
BY

TEAM NO. 1

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DECLARATION

We hereby declare that the work which is being presented in the report entitled “FoodFlow-Share To Spare”, is an authentic record of our own work carried out during the period from JAN, 2023 to April, 2023 at School of Computer Science and Engineering and Technology, Bennett University Greater Noida.

The matters and the results presented in this report has not been submitted by me/us for the award of any other degree elsewhere.

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ABSTRACT

"Every time we waste food, we waste a part of the earth's resources. Let's savor every bite and cherish every ingredient, for in reducing food waste, we nurture both our planet and US."

Scarcity of food is an endemic problem in our country. Despite having a culture that demands celebration with food for every occasion, hunger and malnutrition have become a never-ending situation amongst the homeless and poor. "FoodFlow: Share to Spare" is a step towards making our country a better place for all. It aims to minimize hunger and maximize happiness. FoodFlow is an app that aims to connect those who have in excess with those who are in need. Using the latest high end technologies this venture is focused on creating a mobile application that easily facilitates sharing of surplus food available at restaurants , food messes , events etc. to food shelters , NGO's and other places that need food. Through our app, the donors can easily register themselves, on the spot, and provide the needed details about the surplus food like - quantity, allergens, type-vegetarian/non-vegetarian - which can then be claimed by nearby shelters before it goes to waste. This helps in reducing food waste and addressing food insecurity in the community. Our goal is to move one step ahead in this race of making our survival sustainable and sufficient.

1. INTRODUCTION

Food shortage and wastage is not a problem that has recently come up. It is an endemic in most countries that has been affecting millions for decades. According to eatrightindia.gov.in, “82% of hungry people live in countries with food surpluses, not food shortages”. The Food and Agriculture Organization (FAO) of the United Nation claims that approximately one-third of all food produced for human consumption is lost or wasted globally each year. From events and occasions to food messes and restaurants, wastage of food happens in all areas of life. At every step in the supply chain, from manufacturing to sourcing out, food squandering is persistent and unavoidable. Inefficiencies in the food delivery system are one of the primary causes of food waste. Surplus food is frequently wasted or abandoned due to logistical obstacles, a lack of cooperation, and inadequate infrastructure for food recovery and redistribution. Furthermore, consumer behaviour and preferences contribute to food waste, with factors such as overbuying, expiration dates, and food handling methods all playing a part. To address these difficulties, there has been a shift towards using technology to optimise food supply chains, decrease waste, and promote food sustainability. In response to these challenges, there is a growing urgency to adopt sustainable practices and innovative solutions to reduce food wastage and promote food security. This project report focuses on one such solution: the development and implementation of the FoodFlow app. Built on cutting-edge technologies like FlutterFlow and Firebase, FoodFlow is a mobile application designed to connect surplus food providers with organizations and communities in need. It provides a platform for both the donors and receivers to connect with each other in real time and facilitate the sharing of food. Its user-friendly UI allows easy access to all the resources that the application aims to provide. Without the involvement of a middleman, NGO's or food shelters can connect with the event organisers or restaurants to ensure smooth and seamless delivery of food. This project report delves deeply into FoodFlow's development process, features, and impact. It investigates the technical advances that are driving food waste reduction, the problems encountered during implementation, and the lessons learnt for future sustainability programmes. This report's goal is to inspire and inform stakeholders in the food industry, government agencies, NGOs, and the broader community to take meaningful action towards a more sustainable and equitable food system by demonstrating the potential of technology-driven solutions to complex global challenges.

2. PROBLEM STATEMENT

This project is concerned about the pressing issue of food wastage that has been prevalent in many countries for over a decade. Despite of food being produced in excess; the problem of hunger and food unavailability still prevails in many places. There have been many initiatives in this field that aim to reduce this problem , however the solutions have not been scaled to reach the maximum population.

From events and gatherings to hostel messes and small occasions , wastage of food is prominent. Despite all this there are villages and hunger spots where people don't have surety of getting even one meal for the day. The potential of country is being wasted as the children and working youth is not getting the proper nutrition and nourishment to grow and develop.

The schemes of one day meals must certain extend been able to solve this issue however there is more left to be done.

FoodFlow is a step in this direction. It is based on the issue mentioned above and tries to put forward a solution that benefits society. This application allows the parties with excess food to connect with the people who need it in real time. This platform is available free of cost to the donors and receivers so that they don't think twice before investing their time and efforts to work for this noble cause!

Our project demotes the idea of homelessness by not delivering food to "hunger-spots" but rather donating it to well established and government recognized locations such as food banks and shelters.

In addition to the quantity of the surplus food being distributed, our project also allows the donors to provide additional information about the food being donated such as their allergens, time passed since it has been cooked, type of food (Vegetarian/Non-vegetarian) etc. so that the food can be donated to a food bank/shelter according to the needs of the recipients. Our project demotes the idea of homelessness by not delivering food to "hunger-spots" but rather donating it to well established and government recognized locations such as food banks and shelters.

Another benefit of donating it to well-established locations is to ensure proper statistics and information regarding the amount of food being re-distributed and the number of people benefiting from it. This information also helps our app implement the feature of dynamic graphs

and charts to show the number of contributions made by different organizations and the number of recipients regularly receiving food, a feature that also helps our solution differ from pre-existing ones.

3. BACKGROUND RESEARCH

Food wastage is dominant at all levels of the supply chain i.e. from growing the produce to delivery and consumption. Our research was based on these grounds itself. We have emphasized more on knowing the wastage of food at all the levels and getting an in depth analysis of how our application will serve to reduce this problem significantly.

A contract farming agreement is a legal agreement between an agricultural producer and a contracting party, such as a food processor, retailer, or distributor. This agreement is critical in reducing food waste at the manufacturing level of the supply chain.

The agreement works by providing agricultural producers with a guaranteed market for their products, ensuring that produce is harvested and used efficiently rather than going to waste owing to a lack of buyers or market fluctuations. This predictability in sales encourages producers to organise their production more properly, lowering the risk of overproduction or resource underutilization. Furthermore, contract farming agreements sometimes include terms for modernising the production process, giving technical help, and delivering economic incentives to the producer. These strategies help to reduce food waste by enhancing efficiency, increasing yield quality, and promoting sustainable agriculture practices.

Value-Added Surplus Products (VASP) are food products manufactured from surplus ingredients, which are food waste mostly and in the Upcycling case food loss can be included (Bhatt et al., 2018). The UF is the first consumer product-based solution to prevent food waste and encourage the production of high-quality end products (Rodríguez, Alvarez-Sabatel, Ríos, Rioja, & Talens, 2022; Upcycled Food Association (UFA), 2023). Upcycling food waste to animal feed not only reduces environmental impact by diverting waste from landfills but also contributes to sustainable productivity by optimizing resource utilization.

A framework called the extended value-attitude-behavior (VAB) hierarchy is a framework that is commonly used in consumer behavior research to understand how values (what is important to consumers), attitudes (how consumers feel about certain issues), and behaviors (actions taken by consumers) are interlinked. By extending this hierarchy, the study aims to explore the factors influencing Chinese consumers' behavior regarding food waste in restaurants.

The research focuses on consumers dining in groups, which is a common practice in Chinese culture. Understanding how group dynamics shape food waste behaviors is crucial for developing effective strategies to reduce waste.

Automated tools for quantifying food waste are an emerging technology with some promise. Studies demonstrate the effectiveness of one such tool, the plate waste tracker, in accurately detecting plate waste with a high level of precision (within $\pm 10\%$ of values manually recorded by staff). By detecting waste directly from plates, this tool also provided insights into the number of guests discarding food, which was approximately 40 % lower on average than the number obtained when staff manually counted plates and entered the information. Consequently, the automatically collected data indicated a 35 % higher waste-per guest ratio than that derived from manual information.

The tool provided guests with the opportunity to provide feedback on the reasons behind their food waste. As automated tools for quantifying food waste become more prevalent, it is crucial to understand the results produced by these methods in comparison with manual approaches. The automated tools have an advantage over manual recordings in that they can track food waste with greater granularity. Because the waste was not measured as an aggregate value in the present study, the automated approach was able to reveal that a minority of students (20 %) were responsible for a significant proportion (60 %) of all plate waste. If this waste alone could be halved, this would reduce overall food waste by 31 %. Therefore, identifying measures that target high-profile wasters would have a substantial impact in reducing plate waste overall. To date, policy makers and practitioners in the public catering sector seeking to achieve food waste reduction have targeted all pupils with the same information, campaigns, and nudges. The results in the present study suggest that this is a waste of effort, as most of the pupils do not have any practical possibility to reduce their food waste. Greater potential lies in targeting a much smaller group of high food wasters that have real potential to reduce their waste. Efforts should therefore be made to devise interventions that reach this minority of pupils and change their behaviours in a desired direction. This, together with other actions, is necessary to achieve a more sustainable food system.

There are many more research based on reducing food wastage that have a common issue of reaching to the maximum audience. Our venture tries to eliminate this issue by digitalising the

solution . FoodFlow is a mobile application that uses the latest technology to reduce the waste at almost all levels of the supply chain and make the world a better place to live.

3.1. Proposed System

Our initiative, "FoodFlow: Share To Spare," seeks to solve the pressing issue of food waste by developing a network that connects leftover food from a variety of sources, including restaurants, university mess halls, food courts, and festivals, to local shelters or food banks. This effort is motivated by the desire to reduce food waste while also addressing food insecurity within the community.

Donors can quickly register themselves on the spot using our app and provide important information about the leftover food, such as quantity, allergens, and type (vegetarian/non-vegetarian). This information is critical for surrounding shelters and food banks to collect leftover food before it goes to waste. By facilitating this direct connection, we streamline the process of food donation and ensure that excess food is utilized to benefit those in need.

Our target audience consists of restaurants, food enterprises, event organisers, food banks, shelters, and individuals who want to help reduce food waste and help vulnerable communities. FoodFlow aspires to establish a more efficient and transparent food-sharing economy by offering a user-friendly platform that emphasises social responsibility and sustainability.

One of our most notable innovations is the use of real-time graphs and charts to provide insights into donation trends, distribution patterns, and effect measurements. These visualisations enable users to track their contributions, discover areas for development, and make informed decisions to maximise their effect. In addition, our software has a K-Nearest Neighbours (KNN) module that identifies nearby recipients for leftover food, increasing food distribution efficiency and lowering transportation costs.

Furthermore, our concept emphasises the need of giving leftover food to well-established and government-recognized organisations like food banks and shelters. This approach ensures accurate statistics and information about food redistribution and beneficiary numbers. It also aids in the implementation of dynamic graphs and charts that highlight contributions made by various organisations as well as regular recipients of donated food, distinguishing our solution from other platforms.

To summarise, FoodFlow seeks to transform food donation and distribution by leveraging technology, promoting social responsibility, and cultivating sustainable practices. By connecting

surplus food sources with people in need, we hope to build a more equitable and efficient food system that benefits both persons and the environment.

3.2. Goals and Objectives

The below table highlights the goals and objectives of the team while working for the project.

Table 1: Goal and Objectives

#	Goal or Objective
1	Make the system ui easier to operate so that maximum population can work with it.
2	Make the system administration automated so that backend work is reduced
3	Provide services to the users at little to no cost so that the application reaches out to many.
4	Build a prototype that demonstrates the flow of the project at early stages of project development so that changes can be made in time.
5	Include opinions from the stakeholders involved in this project to get an efficient output.
6	Complete deadlines and work on time to ensure fast and efficient delivery of our app.
7	Sportsmanship while working with the team keeping in mind each other's viewpoints.
8	Creating databases to store the data in an organized manner using reliable tools.
9	Using platforms that provide app development tools and assistance.
10	Use charts and mind maps to have better understanding of the product and the services it aims to provide.

4. PROJECT PLANNING

This section covers the details of the project planning. Selecting the lifecycle of the development, project stakeholders, resources required, assumptions made (if any) are detailed in the sections below.

4.1. Project Lifecycle

The "FoodFlow" project will use an iterative and agile approach. Our team will begin by gathering requirements and developing a high-level development plan with FlutterFlow and Firebase technologies. We will then proceed with implementation in numerous iterations, emphasising teamwork, frequent meetings, and ongoing feedback to ensure the application's success.

4.2. Project Setup

Table 2: Project Setup

#	Decision Description
1	FlutterFlow, Firebase, VS Code, Git for version control
2	Adhere to Flutter coding standards and Firebase database rules
3	Regular backups and version control using Git
4	Test environments set up for Android and iOS platforms

4.3. Stakeholders

Table 3: Stakeholders

Stakeholder	Role
Donors	Providers of surplus food(includes event organizers, restaurants, hostel mess etc.)
Receivers	Organizations receiving food(NGO's , food shelters etc.)
Developers	Developing the project and handling the administartion

Testers	Business managers , friends and family who helped in the testing of this application.
Mentor	Guided us through the whole journey of app development

4.4. Project Resources

Table 4: Project Resources

Resource	Resource Description	Quantity
FlutterFlow	Visual app development platform	1
Firebase Database	Backend database for storing donor and receiver data	1
Development Team	Team responsible for the development of the project.	2
Test Devices	Android and iOS devices for app testing	4
Internet Access	Stable internet connection for development and testing	1

4.5. Assumptions

Table 5: Assumptions

#	Assumption
A1	The FlutterFlow and Firebase platforms will remain stable throughout the development.
A2	Donors and receivers will actively participate and register on the FoodFlow platform.
A3	The team will have access to necessary development tools and resources throughout.
A4	Team will have sufficient time to complete a working model to present by end-semester
A5	The development schedule will allow for iterative improvements and feature enhancements.
A6	The development test data provided will be sufficient to create an accurate prediction of user actions
A7	The models developed will be easily extended to other forms within the time frame
A8	The app will be compatible with a range of devices and operating systems.

5. PROJECT TRACKING

5.1. Tracking

Project tracking refers to the process of monitoring and managing the progress of a project throughout its lifecycle. It involves keeping track of tasks, milestones, resources, timelines, and budgets to ensure that the project stays on schedule and within budget.

Table 6: Tracking

Information	Description	Link
Code Storage	Project code will be stored in Git repository.	https://github.com/kareenatuli/Food-Flow
Bug Tracking	Bug tracking will be done in Firebase Crashlytics.	https://firebase.google.com/docs/crashlytics
Project Documents and Assignments	Weekly reports, specification, and design documents, etc. will be stored in our previously created GitHub repository.	https://github.com/kareenatuli/Food-Flow
Continuous Integration	Continuous integration will be done with GitHub actions.	https://github.com/kareenatuli/Food-Flow
Regression Testing	Regression testing will use FlutterFlow testing suite.	https://docs.flutterflow.io/deploying-your-app/testing-your-app

5.2. Communication Plan

Table 7: Regularly Scheduled Meetings

Meeting Type	Frequency/Schedule	Who Attends
Conference Call	Weekly	Project team and mentor
Team Meeting	Weekly	Project team
Sprint Planning Meeting	Start of each sprint	Project team and mentor
Sprint Retrospective Meeting	End of each sprint	Project team
Sprint Review Meeting	End of each sprint	Project team, and mentor

Table 8: Information To Be Shared Within Our Group

Who?	What Information?	When?	How?
Project team	Task assignments & General scrum information	Weekly	Team meetings, listing in Project Specification.

Table 9: Information To Be Provided To Other Groups

Who?	What Information?	When?	How?
Mentor	Final deliverables	At completion of project	Project specification doc., code, Power Point presentation
Mentor	Weekly report	Weekly	Email and Trac site access
Mentor	Project baselines	At the end of each sprint	Onsite customer demo, access to repository

Table 10: Information Needed From Other Groups

Who?	What Information?	When?	How?
Mentor	Requirement changes	Start of each sprint	Class meetings
Friends and Family	Feedbacks regarding the project	Start of second sprint	Email/phone call

5.3. Deliverables

Table 11: Deliverables

#	Deliverable
1	Study results
2	Code repository
3	Test and test results
4	Survey results
5	Process documentations
6	Flow charts and use case documents
7	Postmortem document
8	Final report (final PowerPoint presentation, 3 minute video, and final sprint)

6. SYSTEM ANALYSIS AND DESIGN

This section describes in detail about the design part of the system.

6.1. Overall Description

The Food Flow app illustrates the principles of User-Centered Design by prioritizing user needs and preferences throughout the design process. The app begins with a login page that simplifies the authentication process by allowing login through email ID and password. An option to create a new user account has also been added that helps the user to get connected with the app. Along with it the users identify themselves as donors or receivers at the time of account creation to ensure smooth management of databases. The donors can easily upload information about donated food through intuitive input fields. Visual cues and prompts guide users through the process, reducing the chances of errors. Frequent checks have been created to keep the user updated. Food banks are provided with a clear and organized view of available donations, from which they can choose depending upon the requirement. The interface displays relevant information about each donation, such as food description and donor details, enabling food banks to make informed decisions.. These features help implement the concepts of easy navigation and make the app intuitive to use.

6.2. Users and Roles

Table 12: Users And Roles

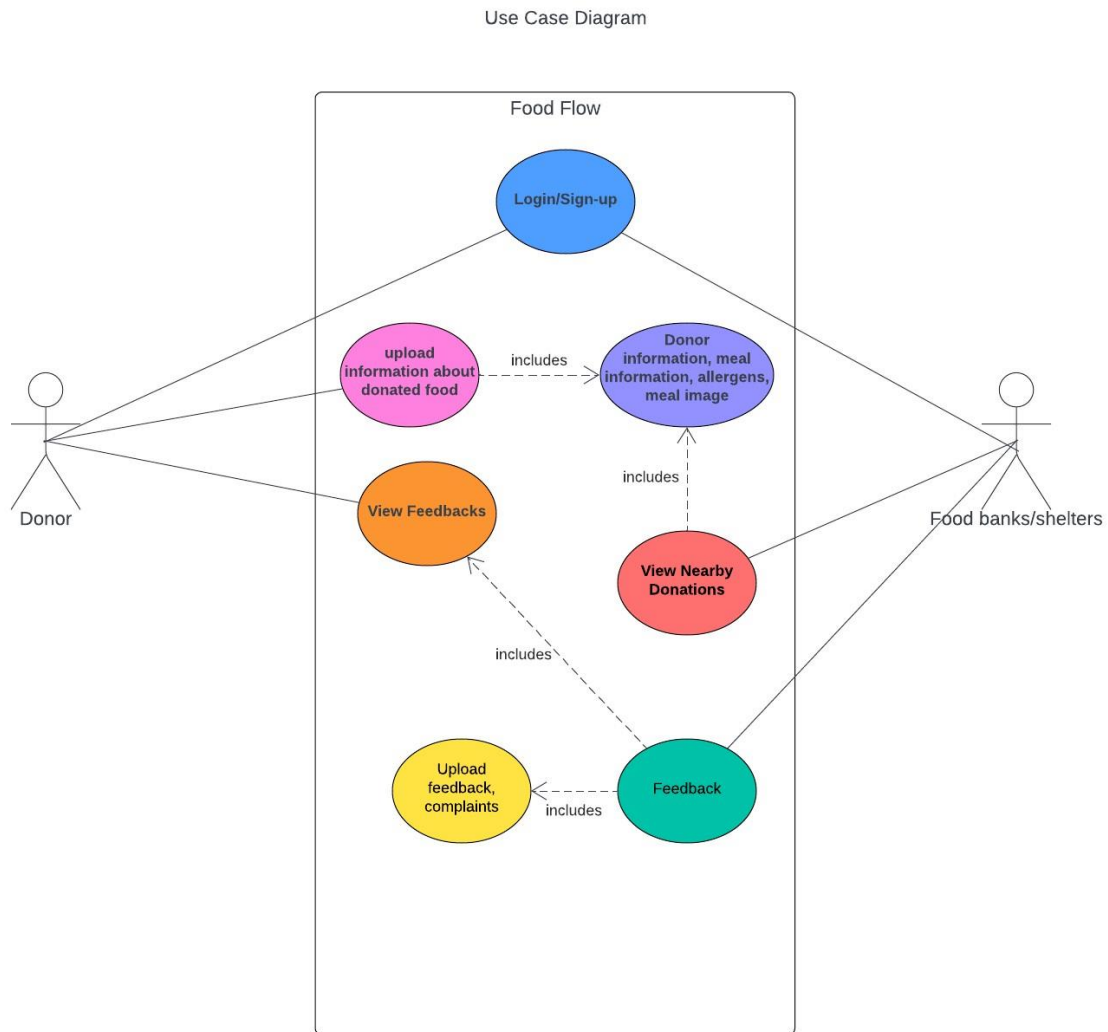
User	Description
Developers	A team of 2 , responsible for the development of the application . Managing database and UI using Flutter Flow and Firebase respectively.
Donors	The event managers and other concerned groups of people that will provide with surplus food to deliver via the app.
Receivers	The people who would be at the receiving end of the application responsible for food collection from the donors.

6.3. Design diagrams/Use – Case Diagrams/Activity Diagrams

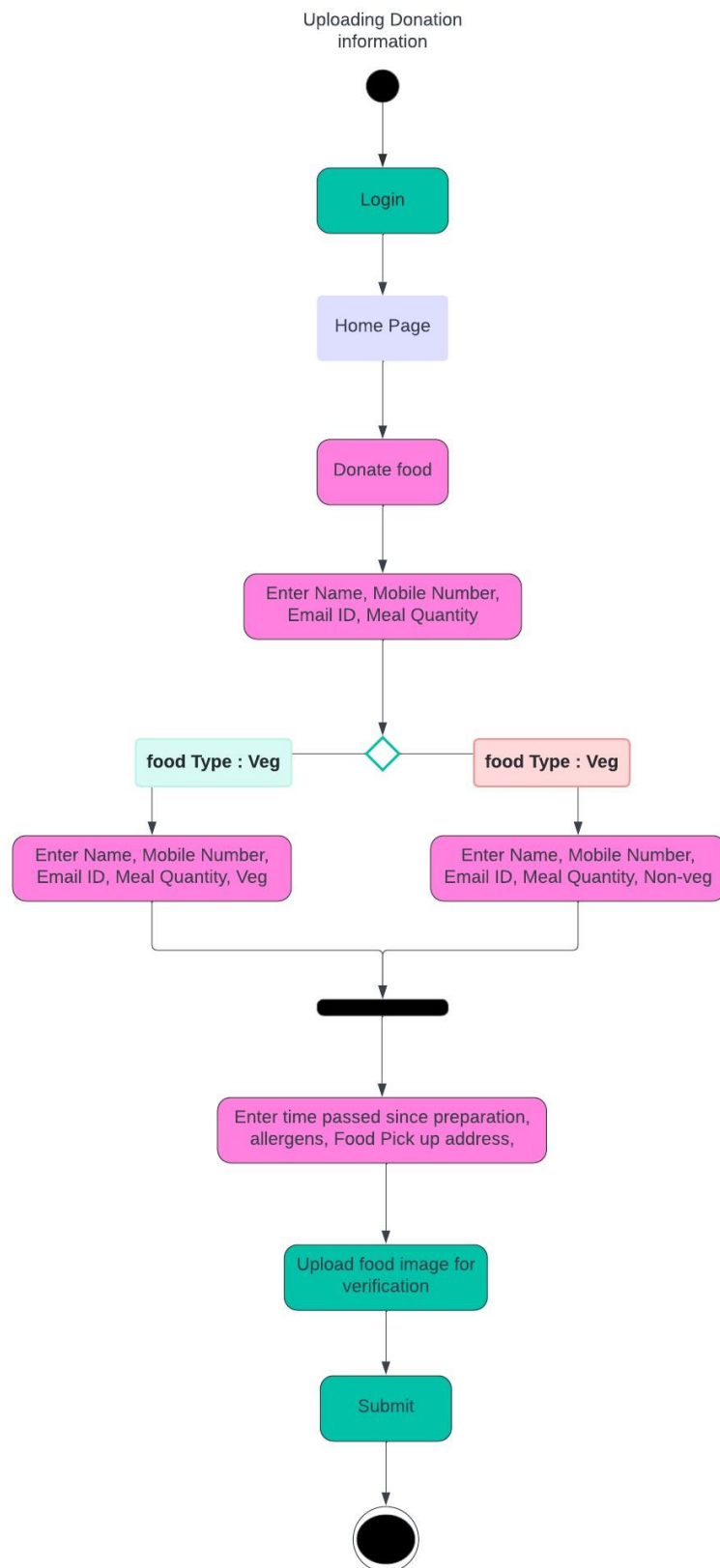
6.3.1. Product Backlog Items

1. As a restaurant manager, I want to register my restaurant on FoodFlow so that I can donate surplus food easily.
2. As a shelter representative, I want to view available surplus food listings on FoodFlow so that I can claim food donations for my shelter.
3. As a donor, I want to provide details about surplus food such as quantity, allergens, and type (vegetarian/non-vegetarian) on FoodFlow so that recipients can make informed decisions.
4. As a recipient, I want to receive notifications/alerts when new surplus food listings are available on FoodFlow so that I can claim donations promptly.
5. As a user, I want to view a map showing the locations of nearby restaurants and shelters on FoodFlow so that I can easily find and interact with them.
6. As a donor, I want to track the status of my donated food on FoodFlow to ensure it reaches the intended recipients.
7. As a recipient, I want to provide feedback or reviews on received food donations through FoodFlow to help improve the donation process.
8. As a system administrator, I want to manage user accounts and permissions on FoodFlow to ensure secure access and data privacy.
9. As a user, I want to access FoodFlow from both web and mobile platforms for convenience and accessibility.
10. As a donor, I want to receive acknowledgments or thank-you messages from recipients on FoodFlow to encourage continued participation in food donation efforts.

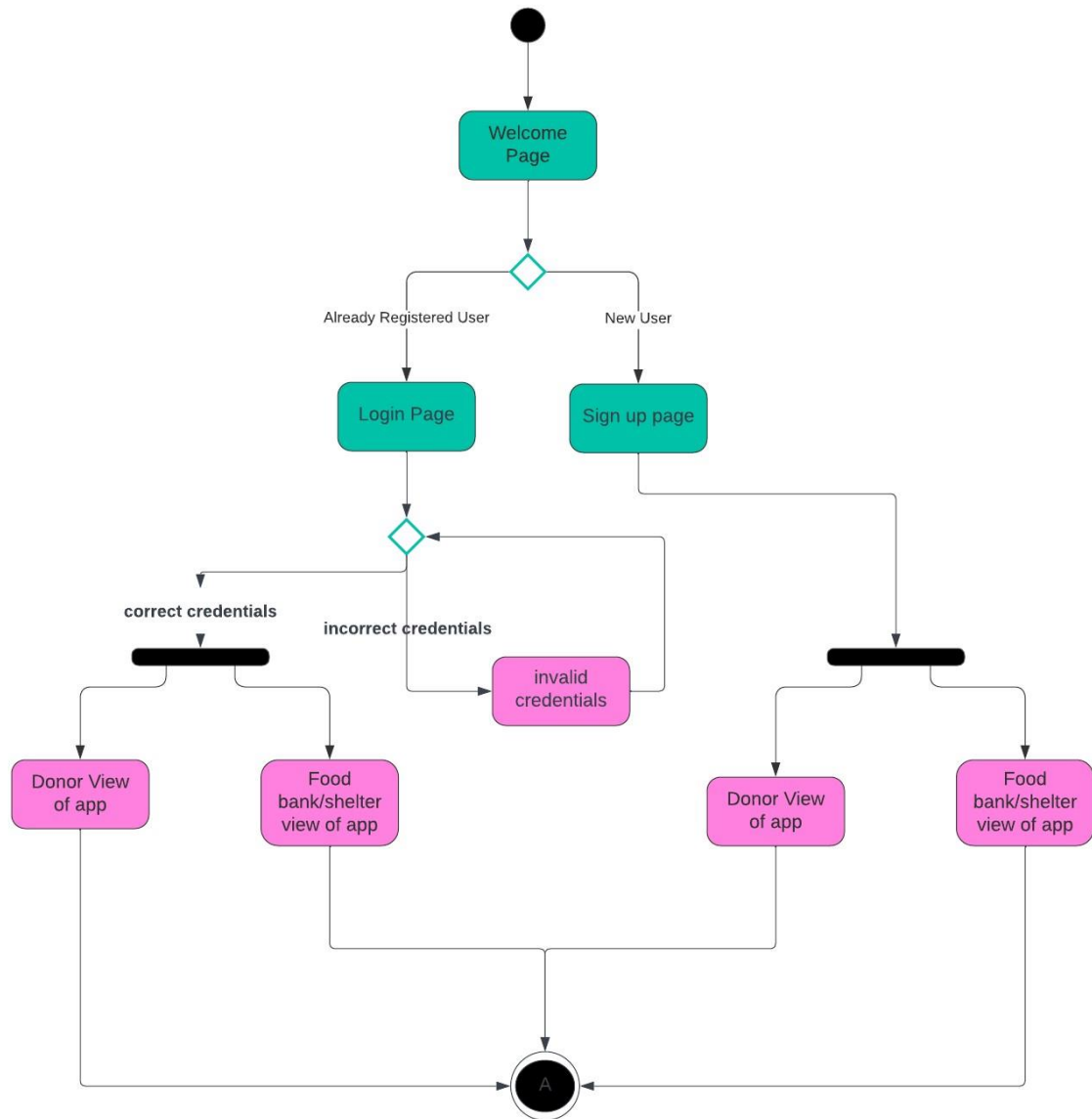
6.3.2. Use Case Diagram



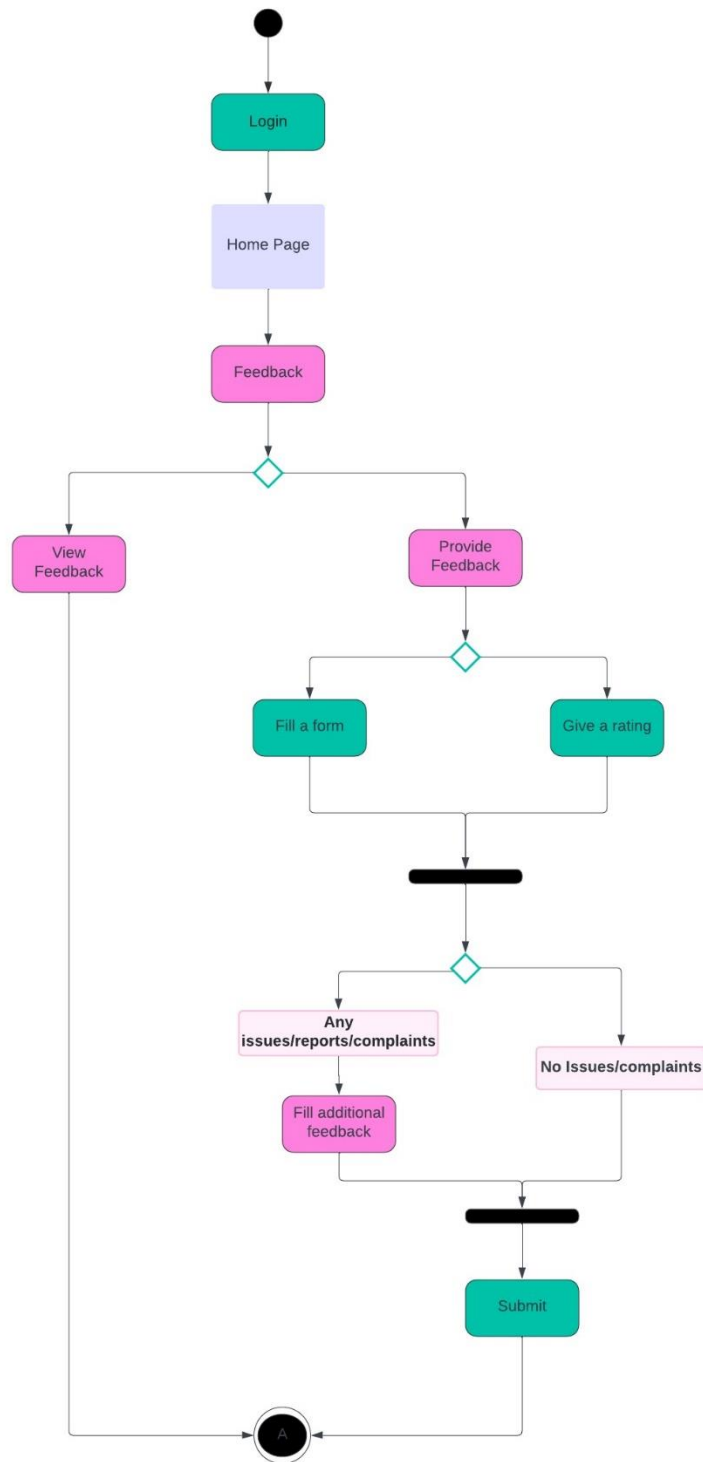
6.3.3. Activity Diagrams



Login/Sign up Activity diagram



Feedback Activity diagram



7. USER INTERFACE

7.1. UI Description

Without requiring a lot of coding knowledge, FlutterFlow is a potent visual app development platform that simplifies the process of developing Flutter applications. With its simple drag-and-drop interface, users can create UI elements with ease by dragging widgets such as photos, text fields, buttons, and containers onto a canvas and organizing them anyway they want. The platform offers a large collection of pre-built UI elements that can be easily customized to meet the branding and design specifications of the application. FlutterFlow creates effective Flutter code in the background, adhering to Flutter rules and best practices, depending on the visual design. It easily connects to databases, APIs, and authentication systems with its smooth integration with backend services. The ability to preview an app in real time facilitates rapid feedback and iterative design improvement.

Google offers a complete platform called Firebase that includes several services and tools for creating and managing online and mobile applications. It provides services like hosting, cloud functions, real-time database, authentication, analytics, and more, all rolled into one platform. Applications requiring real-time updates and collaboration are best suited for Firebase's real-time database, which enables developers to store and sync data across clients in real-time. Secure user authentication via social media logins, email and password, or unique authentication techniques is offered by the authentication service. With capabilities like CDN integration and automated SSL certificates, Firebase hosting provides quick and safe web app hosting. Developers can use server-side code through cloud functions to react to events that are produced by custom events or Firebase services. Furthermore, Firebase offers strong analytics tools to monitor user behavior, app performance, and engagement, assisting developers in making data-driven decisions to enhance their apps. All things considered, Firebase streamlines backend development, quickens app development cycles, and offers dependable infrastructure for scalable applications.

7.2. UI Mockup

8. PROJECT CLOSURE

This section elucidates the overall lookup at the project and some of the future works that may enhance our current solution.

8.1. Goals / Vision

Our vision for the Food Flow app is to create a sustainable solution that efficiently connects surplus food providers with local shelters and food banks. Our main goal is to decrease food waste, alleviate hunger, and foster community collaboration through the utilization of technology. Our goal is to reduce food waste, alleviate hunger, and establish cooperation among communities. In the future, we aim to enhance our solution by implementing features such as real-time tracking, Feedback portal, In-app chatting, and expanding our network to reach more communities in need.

8.2. Delivered Solution

Our planned solution aimed to deliver a comprehensive mobile application that connects surplus food providers, such as restaurants and events, with local shelters and food banks. The app was intended to facilitate the donation process, allowing surplus food to be claimed and distributed efficiently to those in need. Key features included user authentication, donation listings, feedback mechanisms to ensure transparency and accountability, and real-time statistics.

The delivered solution primarily consists of a fully functional Android application developed using Flutter Flow. The app allows surplus food providers to create listings for available donations by providing details such as food quantity, Allergens etc. which are then accessible to registered shelters and food banks through the “available donations” tab. Users can navigate through the app, claim donations, and even view the real-time statistics of how much our application has helped in donating food to those in need. The solution also includes backend integration using Firebase to manage user authentication, data storage, and real-time updates.

Overall, the delivered solution aligns closely with the planned objectives, offering a user-friendly interface, efficient data management, and real-time demographics regarding our app usage and contribution.

8.3. Remaining Work

Moving forward, we aim to enhance the user experience by implementing an in-app chatting feature to facilitate communication between surplus food providers and recipients. This will ensure security and limit the donation process to the app, rather than causing the need for users to connect through external chatting applications.

Additionally, we plan to integrate KNN (K-Nearest Neighbors) algorithm and Google Maps functionality to enable easy and automatic location detection. However, due to budget constraints, these features were not implemented in the current version of the app. Implementing these features will improve the efficiency of donation matching and enhance the overall user experience.

Furthermore, we intend to incorporate a feedback mechanism within the app to promote transparency and continual improvement. Users will be able to provide feedback on their donation experiences, allowing us to address any issues and optimize the donation process.

Overall, these enhancements will contribute to the ongoing improvement of the Food Flow app, making it more user-friendly, efficient, and transparent in its mission to reduce food waste and alleviate hunger in our communities.

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