

## Saubhagya: An Online Food Donation Platform For Ending Hunger and Malnutrition in Sri Lanka

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### Abstract

Hunger and malnutrition continue to be significant challenges in developing nations, including Sri Lanka. To address this issue, the research paper presents "Saubhagya," an online web application that provides a platform for social assistance. The platform allows individuals to donate food and groceries to needy organizations such as blind, deaf, orphanages, making it a user-friendly and effective solution. Users are required to register as food donators, needy people(organizations), partners and food collection agents. The system connects these user groups when necessary, ensuring a smooth and efficient process. One unique feature of "Saubhagya" is its live capability of tracking food collection and delivery using GPS and Google Maps. This feature ensures that food donations are delivered to the right organizations promptly, promoting transparency, accountability, and communication among users. The research paper aims to evaluate the effectiveness of "Saubhagya" in reducing hunger and malnutrition in Sri Lanka through user feedback and system performance metrics. If successful, the platform can be scaled to other developing nations facing similar challenges. This research demonstrates the potential of digital platforms in addressing social and environmental challenges. By leveraging technology, collective action can be harnessed to create positive social impact. "Saubhagya" represents a significant step forward in the fight against hunger and malnutrition, and it is hoped that it can inspire others to use technology to address pressing global issues.

Keywords : Food Donation Management, Hunger and malnutrition, Food Insecurity, Donator, Food Donation Web Application

### Abstrak

Kelaparan dan kekurangan gizi terus menjadi tantangan yang signifikan di negara-negara berkembang, termasuk Sri Lanka. Untuk mengatasi masalah ini, makalah penelitian menghadirkan "Saubhagya", sebuah aplikasi web online yang menyediakan platform untuk bantuan sosial. Platform ini memungkinkan individu untuk menyumbangkan makanan dan belanjaan ke organisasi yang membutuhkan seperti tunanetra, tuli, panti asuhan, menjadikannya solusi yang ramah pengguna dan efektif. Pengguna diharuskan mendaftarkan sebagai donatur pangan, orang (organisasi) yang membutuhkan, mitra dan agen pengumpul pangan. Sistem menghubungkan kelompok pengguna ini bila diperlukan, memastikan proses yang lancar dan efisien. Salah satu fitur unik "Saubhagya" adalah kemampuannya melacak pengumpulan dan pengiriman makanan secara langsung menggunakan GPS dan Google Maps. Fitur ini memastikan bahwa donasi makanan dikirimkan ke organisasi yang tepat dengan segera, mempromosikan transparansi, akuntabilitas, dan komunikasi antar pengguna. Makalah penelitian bertujuan untuk mengevaluasi keefektifan "Saubhagya" dalam mengurangi kelaparan dan kekurangan gizi di Sri Lanka melalui umpan balik pengguna dan metrik kinerja sistem. Jika berhasil, platform tersebut dapat ditingkatkan ke negara berkembang lainnya yang menghadapi tantangan serupa. Penelitian ini menunjukkan potensi platform digital dalam mengatasi tantangan sosial dan lingkungan. Dengan memanfaatkan teknologi, tindakan kolektif dapat dimanfaatkan untuk menciptakan dampak sosial yang positif. "Saubhagya"

*merupakan langkah maju yang signifikan dalam memerangi kelaparan dan kekurangan gizi, dan diharapkan dapat menginspirasi orang lain untuk menggunakan teknologi guna mengatasi masalah global yang mendesak.*

*Kata Kunci : Pengelolaan Donasi Pangan, Kelaparan dan Gizi Buruk, Kerawanan Pangan, Donor, Aplikasi Web Donasi Pangan*

## **I. Introduction**

Hunger and malnutrition are critical challenges faced by developing nations worldwide. Despite significant economic development and increased agricultural output, starvation and malnutrition continue to be major obstacles in many countries, often due to environmental degradation, drought, and loss of biodiversity. Sri Lanka is one such country facing these issues.

To address the problem of hunger and malnutrition in Sri Lanka, this research paper presents "Saubhagya," an online web application that provides a platform for social assistance. The platform allows individuals to donate food and groceries to needy organizations such as blind, deaf, orphanages, and more. The goal of this platform is to address the issue of hunger and malnutrition in Sri Lanka by providing an efficient and user-friendly solution.

The problem statement of this research is to address the issue of hunger and malnutrition in Sri Lanka. The significance of this research lies in the potential of digital platforms to address social and environmental challenges, particularly in developing nations. The research questions for this study are: How effective is "Saubhagya" in reducing hunger and malnutrition in Sri Lanka?, What are the user feedback and system performance metrics of the "Saubhagya" platform?, How can "Saubhagya" be scaled to other developing nations facing similar challenges?, The remaining sections of this paper will discuss the design and implementation of "Saubhagya," the evaluation of its effectiveness, and its potential impact on addressing hunger and malnutrition in Sri Lanka and other developing nations. The paper concludes by highlighting the significance of digital platforms in addressing global issues and the potential for future research in this area.

## **II. Literature Review**

Hunger and malnutrition are persistent problems in many developing nations, including Sri Lanka. A growing body of research indicates that digital platforms can play a crucial role in addressing these challenges by facilitating efficient food donation systems. One study [1] found that digital platforms can help bridge the gap between food waste and food insecurity by providing a direct link between food donors and needy organizations. The study highlighted the importance of technology in reducing food waste and alleviating hunger.

Similarly, a study [2] suggested that digital platforms can be effective in addressing malnutrition by enabling real-time tracking and monitoring of food distribution. The study found that digital platforms increased the efficiency and transparency of food distribution, leading to improved nutritional outcomes. Other studies have highlighted the role of digital platforms in promoting social and environmental sustainability. For instance, a study [3] emphasized the importance of digital platforms in reducing food waste and promoting sustainable consumption practices.

Overall, the literature suggests that digital platforms have great potential in addressing social and environmental challenges, including hunger and malnutrition. "Saubhagya" represents an innovative application of digital technology in addressing the problem of hunger in Sri Lanka, and it is hoped that this research will contribute to the growing body of knowledge on the effectiveness of digital platforms in social and environmental problem-solving.

## **III. Related Work**

### **1. Share the Meal' Donation and Fundraising Application**

'Share the meal' is a contribution and fundraising online application [4] that allows users to give money to purchase a meal for someone in need. There are also fundraisers set up to assist people and to promote sustainable agriculture. Users can give money for a single meal, with a minimum donation of \$0.80 USD. The problem with this service is that users may only contribute money to others in order to buy a meal; they cannot personally contact the individual and assist them.

### **2. Food Donation Connection' Food Wastage Management Application**

'Food donation connection' is a website [5] that handles extra food and distributes it to those in need. 'Food Donation Connection' organizes food donation programs for restaurants interested in donating food. Donors

receive financial rewards through tax savings, as well as engagement in community and business reputation, as part of the charity process. The issue with this application is that only restaurants may be donors, and they must also collaborate with a charitable organization.

### 3. Application for Reducing Food Waste in India (No Food Waste)

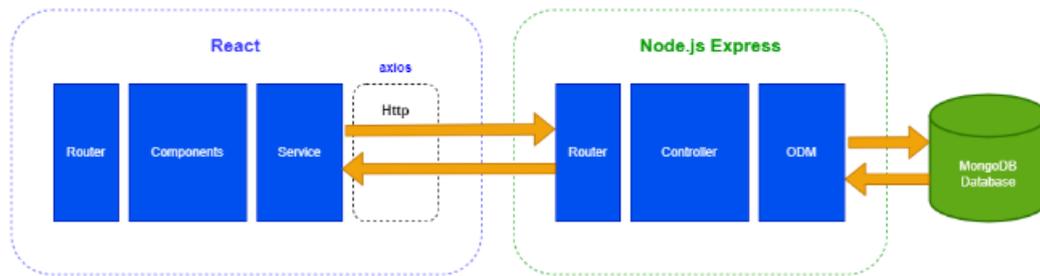
It is a food collection and waste management network [6] that gathers excess food from individuals and companies and distributes it to those in need. They even gather food from celebrations such as weddings, parties, and other special occasions. The group only needs a phone call with the location, and they will come and pick up the food. They also have a transport vehicle called 'Foodiva,' which was designed just for collecting leftovers.

### 4. Application for Reducing Food Waste in India (No Food Waste)

Food insecurity affects around 34 million individuals in the United States [7]. 'Feeding America' is an organization that connects people with food banks, food pantries, and local food programs. It is beneficial to link with local food banks so that people may find their location and pick up some food. Donors can also find out where food banks are located and give food to them. The application is only accessible in the United States.

## IV. Methodology

"Saubhagya: Food Donation Web Application" is made up of the following components: React, a frontend JavaScript toolkit for developing web apps; MongoDB, a document-based open-source database; and NodeJS is a JavaScript runtime environment, and Express is a NodeJS web application framework.



**Figure 1: MERN Stack Development Architecture**

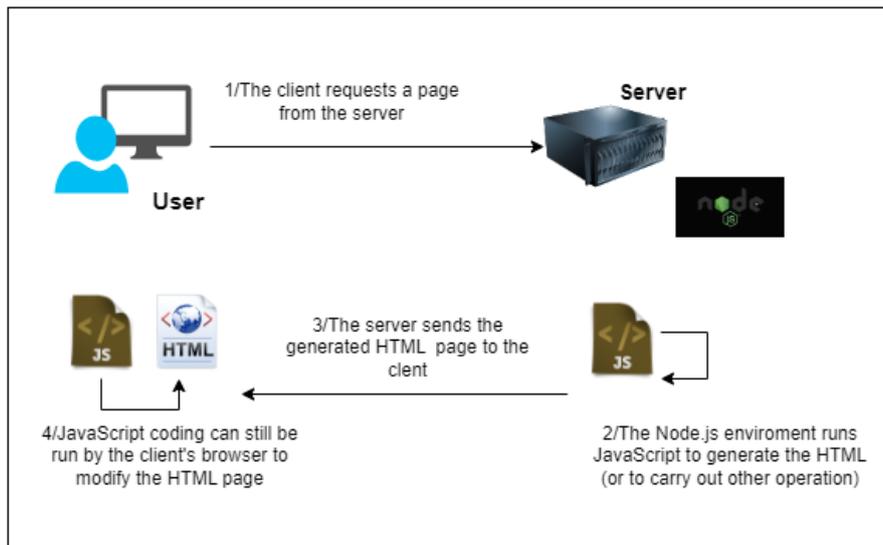
Figure 1 depicts the essential components of a full stack application. A full stack application is made up of two major components: the frontend and the backend. The code that shows the application in the user's browser is typically referred to as the frontend. The backend is made up of all the logic that represents the program executing on servers and connecting to the database. The frontend is often built with ReactJS. Everything related to showing data to the user, re-rendering objects in the browser using DOM elements, and furthermore is written by the developer.

All HTTP requests from the frontend are handled by the backend server, which also loads data from the database. The database is a location where all of the data from the application is saved in schemas. The frontend of the Saubhagya web application is ReactJS [8]. React is a popular JavaScript library for creating user interfaces. It is one of the quickest and most versatile JavaScript libraries for developing apps, and it has a large community to assist fellow developers if they run into any issues. ReactJS allows developers to design applications based on components. Developers split the whole user interface into reusable components since programmers break down difficult code into smaller bits. The various components are subsequently merged into parent components, which are then displayed.

To study ReactJS, programmers must have a fundamental understanding of HTML [9], CSS [10], and JavaScript [11]. HTML is utilized in the creation of web applications. It is equivalent to the human body's skeleton. CSS is an abbreviation for Cascading Style Sheet. It is used to create and style websites, and it allows developers to employ colors, fonts, and a variety of other aesthetic options. JavaScript, a text-based computer language that can be used on both the client and server sides, may be used to create interactive web pages.

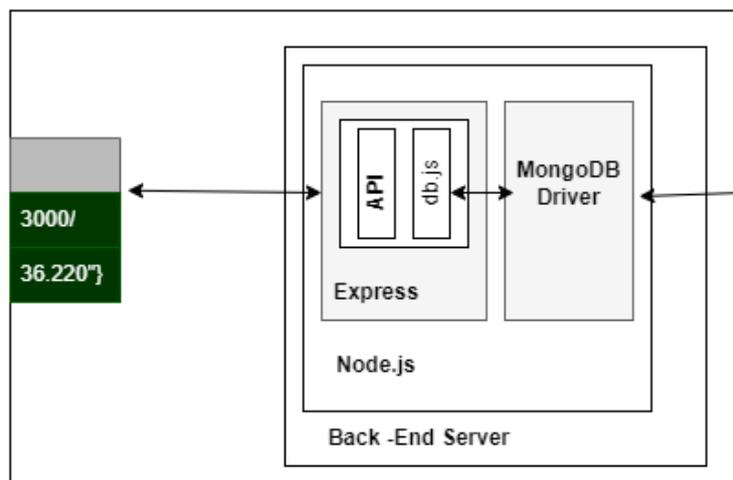
After being acquainted with these web development languages, programmers must understand npm. Npm is a package manager for Node.js. It is used to add node modules and packages to the project. Fundamental ReactJS concepts such as component architecture, state, props functional component, class, and how to integrate API with React app, among others, are required when creating a ReactJS-based web application. React router will assist

developers in loading specified interface material and redirecting to certain sites. Server Render and webpack assist developers in keeping dependencies in a project's static file. Loaders in Webpack assist to conduct certain tasks in the project.



**Figure 2:** NodeJS: what is NodeJS for

Figure 2 shows that NodeJS [12] is neither a language nor a framework. It is a JavaScript runtime that is free and open source. The JavaScript engine, like NodeJS, executes code in the runtime environment, although it contains certain extra server-side modules. Because NodeJS is developed in C, C++, and JavaScript, it is highly quick and has excellent performance. NodeJS has a lot of functionality, which is why it can run JavaScript code on the server.



**Figure 3:** RESTful API using node.js and express.js

ExpressJS [13] is a NodeJS framework built for fast and simply creating APIs, online applications, and cross-platform mobile apps. It has excellent performance; it is quick, light, and unopinionated. Express does not compel programmers to create code in a specific way. ExpressJS is a scripting language for the server. If programmers must develop a rest API, ExpressJS will shorten the time required to code. That is why the ExpressJS framework for NodeJS was created. This is seen in figure 3.

MongoDB [14] is a document-oriented, no-sequence database (NoSQL). It was originally made accessible in August 2009. When it comes to relational data structures, MongoDB substitutes documents for the rows that are common in such models. Because of its adaptability, developers can deal with evolving data models. MongoDB supports embedded documents, arrays, and other document-based capabilities and may define complex hierarchical connections with a single record. The document is schema-free since the defined keys are not fixed.

Large-scale data transfers are thus out of the question. Before beginning with backend implementation, programmers must install the necessary applications.

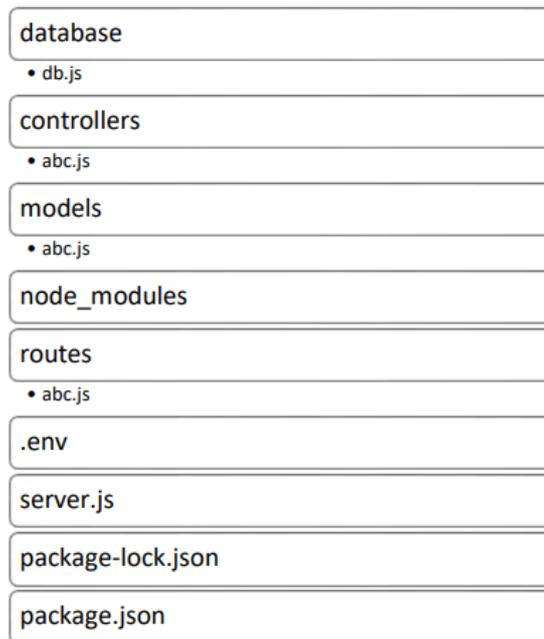
1. VS Code or a similar editor
2. The most recent Node.js version
3. API Postman

### Creating Frontend

Install Node and npm first to rapidly set up a development environment for the application. Visit the NodeJS website and download version 18.15.0 LTS. The frontend of the project may now be created by developers. The command run "create-react-app Saubhagya-web-application" may be used for this. This will create a folder and install the packages required to run React in that folder. Within that folder, type npm start, and a local server will be launched.

### Creating Backend

1. Make a new folder and name it, then open it in VS code and run the command "npm init -y" to start the project.
2. In the terminal, type "npm i cors dotenv express mongoose" to install the dependencies.
3. Modify the server.js file's main entry point.
4. Make the folders database, controllers, models, and routers. Figure 4 depicts the previously described folder arrangement.



**Figure 4:** Folder structure of the backend

5. Replace the scripts with the ones displayed in Figure 5.

```
"scripts": {  
  "start": "nodemon server.js",  
  "dev": "nodemon server.js"  
},
```

**Figure 5:** Backend package.json file

6. To begin the server, programmers must import express, then configure the app with express(), create a get function for the endpoint "http://localhost:3000" with app.get(), and set the PORT to 3001.

7. Run the nodemon server with the command "npm run dev." If the server starts properly, the terminal should display "server is running on port 3000."
8. Copy the MongoDB URL from the database and put it into the .env file. Replace and with the database's login and password.
9. Open the database folder's index.js file and import mongoose, the database URL from the .env file, construct the database connection function for connecting to the database, export the method, and call it in the server.js file.
10. In the models folder, create different files that specify the database schemas for the services we provide in this application, such as boarding Schema, product Schema, and etc.
11. Define the end point methods, such as create, update, delete, and retrieve methods, and etc.
12. Include the route end points in the server.js file.
13. Use the Postman API to test the newly generated end points [15].

### **Tools used for the Implementation**

Azure board [16] is one of the key Azure DevOps services that is used in a project to track work with Kanban boards, making it simpler to finish tasks as a team. When programmers utilize Azure DevOps, they will have an Azure board on which they may construct and configure a Kanban board. A Kanban board contains information on all of the work items that developers will deliver or work on in a certain project.

It is simple to manage and work on items in the project backlog using the Azure board. The backlog will contain all of the tasks that must be completed in the current or forthcoming sprint. Azure boards will also give a variety of reports. As the project progresses, developers must update their tasks and features on the Kanban board. Azure boards are great for task management and tracking because they give a clear image of work completed/being completed by team members.

GitHub [17] is a web-based graphical user interface hosting service. GitHub enables team members to communicate, track, and update their work while working on the project from any place. As a result, projects remain open and on schedule. The team can stay organized and on the same page by using GitHub. Pull requests on GitHub help teams evaluate, improve, and suggest new code. Implementations and recommendations can be addressed before making modifications to the source code.

SonarQube [18] simply scans through a developer's code and discovers errors early on. It is an open-source static testing analysis application. It is used by developers to maintain the uniformity and quality of their source code.

Code quality checks look for potential defects, design inefficiencies caused by code errors, duplication of code, insufficient test coverage, and other concerns.

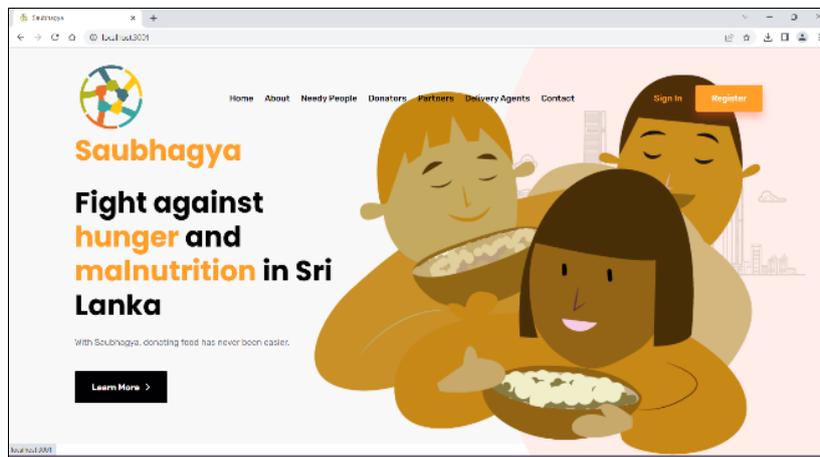
Selenium [19] is a free (Open Source) automated testing framework for web applications that runs across several browsers and platforms. Selenium's major focus is on web-based application automation. Selenium is a collection of tools that each target a different aspect of an enterprise's testing needs.

### **V. Proposed System**

The proposed system "Saubhagya" is an online web-based system that serves as a platform for people who want to donate food to those in-need with the goal of zero hunger in Sri Lanka. This proposed system will eliminate all disadvantages of the current food donation systems and benefit all users. The basic prerequisite to use this web application is a smartphone. The system has four types of users and this system has a unique software engineering feature. The users are,

1. Needy People
2. Donators
3. Partners
4. Delivery Agents

The unique feature of this system is that, the live capability of tracking food collection and delivery using GPS and Google Maps.

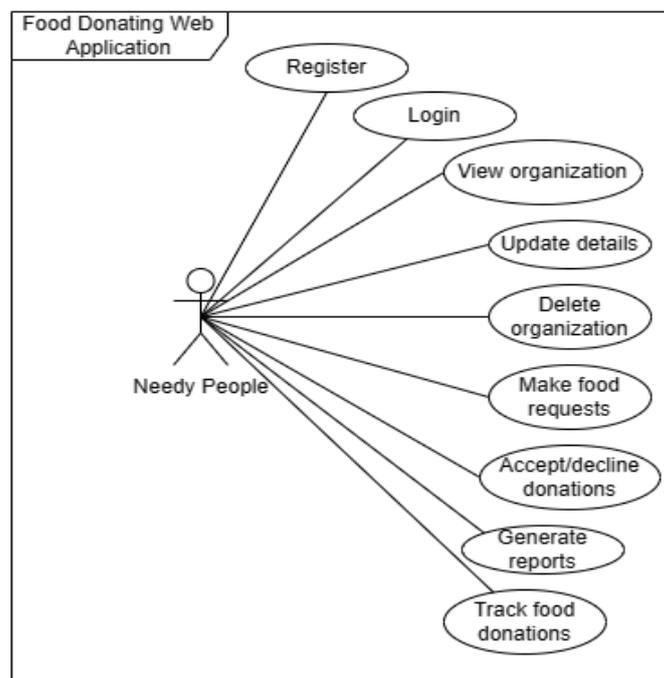


**Figure 6:** Home page-Saubhagya

All the four types of users should login or register with the system to utilize Saubhagya.

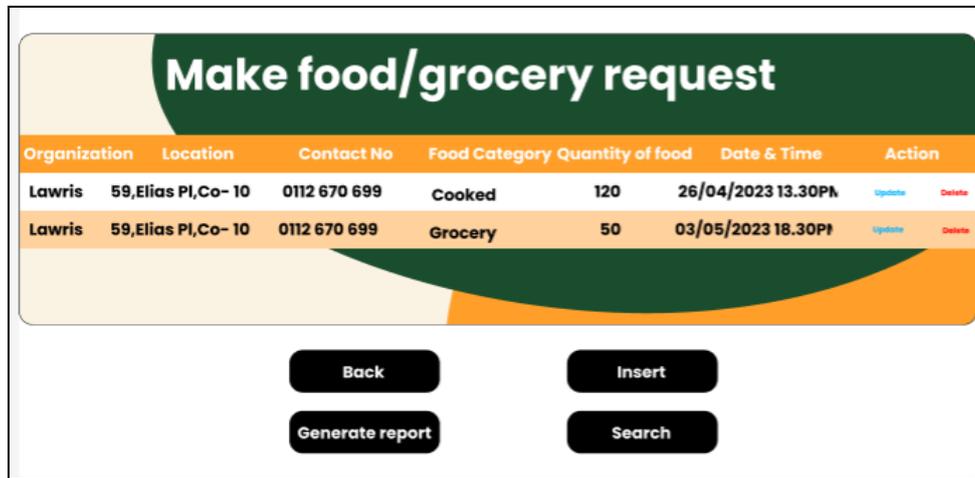
### Needy people

Needy People is a key user of the system. They can present their organization in the system to obtain food donation via the system. Needy People organizations are viewed many donators who visit the web application. Initially, Needy People must register their organization in the system. They should provide details such as organization name, address, contact number, email, number of children, number of adults, meals, food preferences, other required necessities and organizational logo.



**Figure 7:** Use case diagram of needy people

The above use case [Figure 7] shows the needy people functional activities. These are the basic functionalities that needy people can operate in the web-based system. Needy people can post requests of food to obtain it from the donators. Also, the donators can send food donation requests to the Needy People. There Needy People can accept or decline the food donate requests through the system.



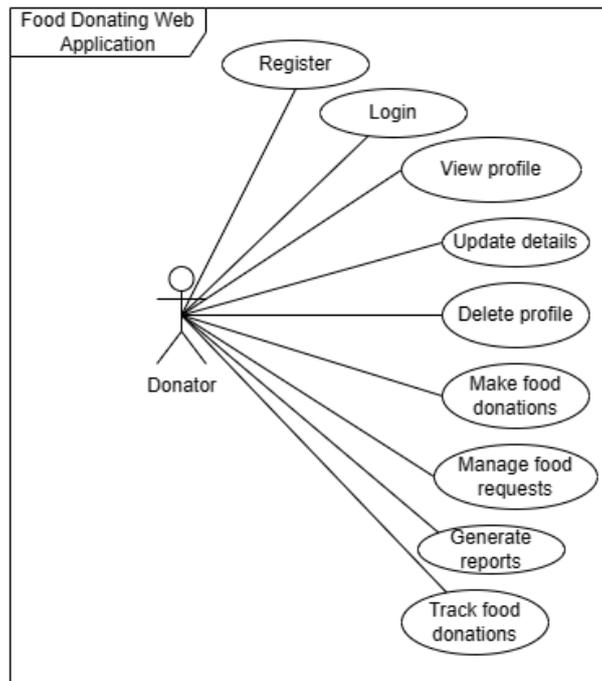
**Figure 8:** Needy people make food request

Needy People can do all the curd operations through the system [Figure 8]. Such as insert the organization to the system. Update the organization details, view or delete organization from the system. Search other needy people organizations. generate reports on food requests.

When considering the advantages of the system for needy people, Saubhagya is a life savior for the needy people because physical food donation programs are not happening as expected. To get rid of that problem, this online food donation platform for the needy people is the ideal option to eliminate hunger in Sri Lanka. Because, multiple food donators can connect with this platform.

**Donators**

The key resource of this system is the donors. They give food and other necessities to those in need. Donators might donate for the food requests raised by the needy people. Additionally, they can use the system to contribute food to their preferred organization for those in need. The main benefit of this process is that it enables donors to connect with partners to post about their spare food and then donate it to those in need who cannot afford to buy food for themselves. Unlike other platforms for food donations, Saubhagya gives donors the opportunity to make donations and manage food requests.



**Figure 9:** Use case diagram of Donator

The functional actions of the Donor are shown in the above-mentioned use case [Figure 9]. These are some of the fundamental features of the web application that donors can use. In addition to the benefits of the system for

donations, it also saves donors time because physical donation programs can occasionally be a little time-consuming. The ideal approach to manage donations is through the web platform, which will eliminate that issue. The user satisfaction is yet another benefit in addition to those mentioned before.

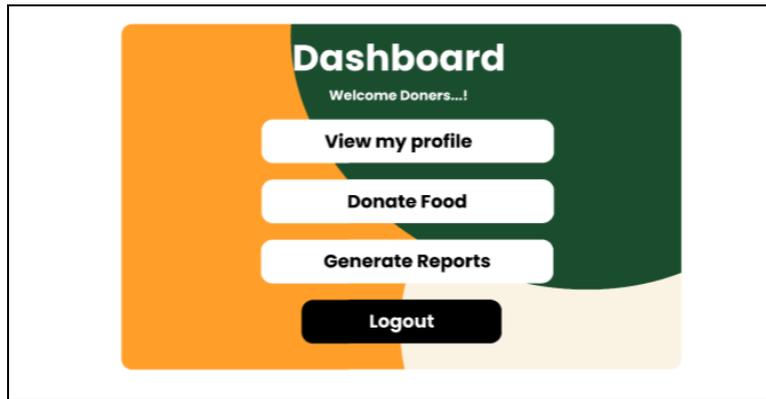


Figure 10: Donator dashboard

This interface [Figure 10] displays the donors' dashboard. The user can view the active donations, pending donations, and reject donations. Users can also view the latest requests received for his/her donations. Donators can do all the curd operations through the system. Such as insert the donations to the system. Update the donation details, view or delete donations from the system. Generate reports on food donations.

**Partners (Food Donor Partner)**

A Food Donor Partner is a person who voluntarily supports donations. They can support a donation in a variety of ways. Those are:

- By donating goods etc.
- Donation of processed food.
- By donating money.
- By offering discounts on the purchase of goods or food (only for business locations).

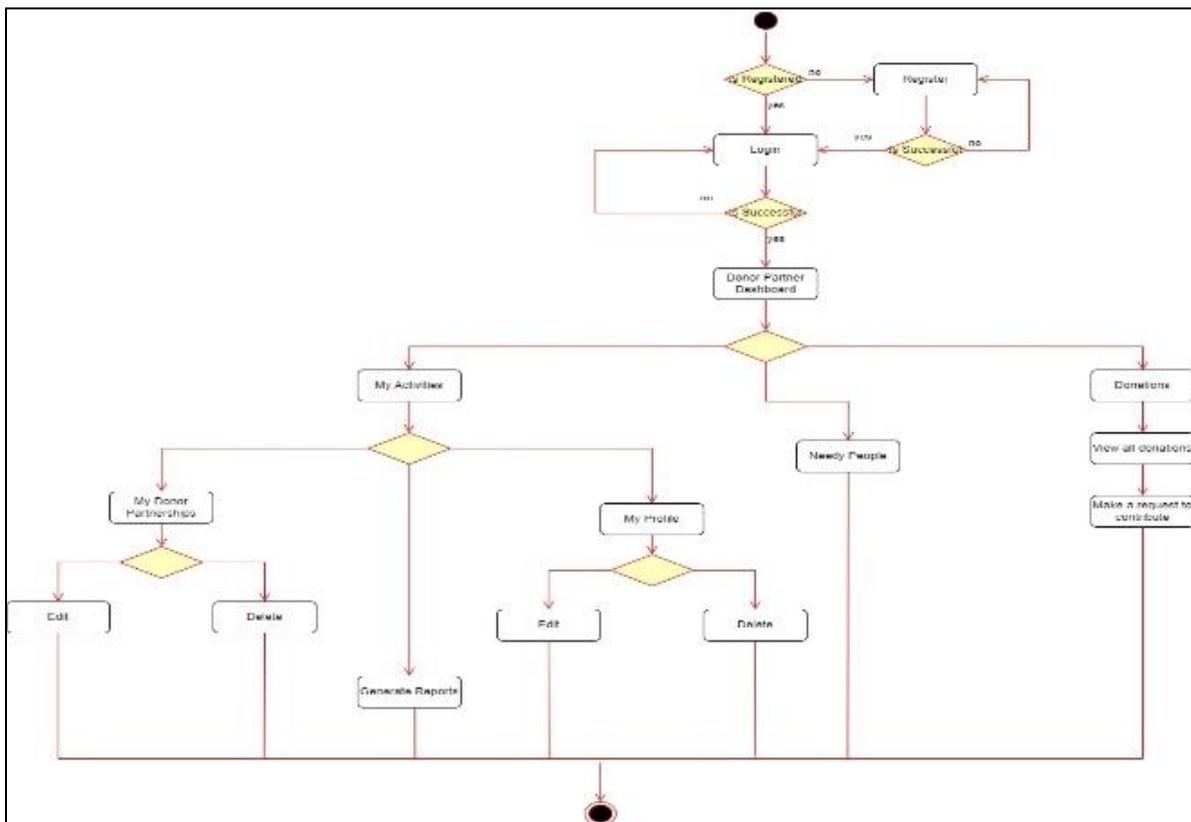
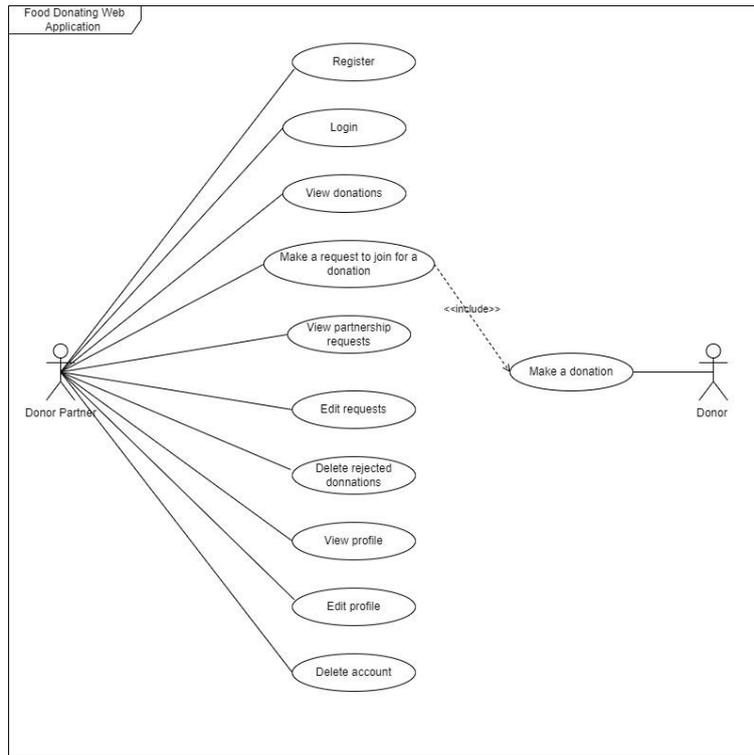


Figure 11: Key user flow of donor partner

Before using the web application, the user must register and log in (if a new user). After login, the user will be redirected to a separate dashboard [Figure 11]. There the Donor Partner can see "Needy People" as well as "Donations". Under donations, partner can request to contribute to a donation of their choice.



**Figure 12:** Use case diagram of donor partner

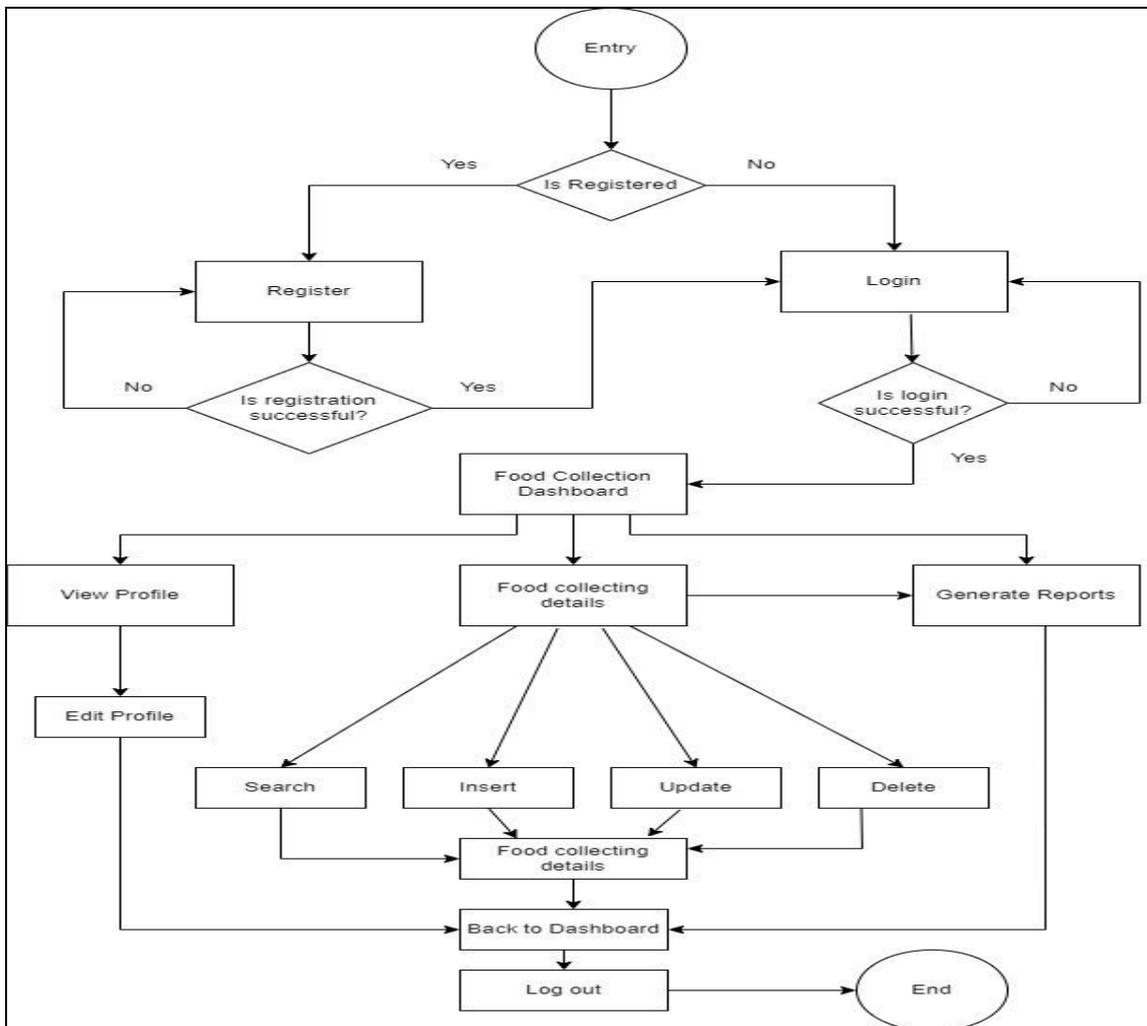
Above diagram [Figure 12] demonstrate the basic functionalities that a partner can do. Partners can view donation partnership requests, generate reports, and view the user profile. Under “My Partnerships”, all data about solicitations and donation partnerships made so far is displayed. He or she can edit a request that has not been approved by the donor. The ability to delete is also present but only requests rejected by the donor can be deleted. And like other features, the donor partner can view the profile, edit the profile, generate reports and delete his or her account.

**Delivery agents**

**Figure 13:** Add food collection details

The proposed system for food collection agents consists of several key features, starting with registration where users can sign up to become food collection agents by providing their name, contact details, and other necessary information. After registration, users can log in to their personalized dashboard, which includes the view my account page and food collecting details. The view my account page allows users to view and update their profile information, while the add new food collecting details page enables users to add new food collection activities to the system [Figure 13].

The view food collecting details page displays existing food collection activities, and users can edit or delete them on the update & delete food collecting details page. Additionally, the system provides a search function that enables users to search for specific food collection activities based on different parameters, and users can generate reports based on the collected food data. Overall, this key user flow diagram outlines how users can navigate through the system to manage their food collection activities efficiently.



**Figure 14:** Key user flow of delivery agent

The above diagram [Figure 14] highlights the functionality offered to food collecting agents in order to efficiently handle the food collection process. Agents can create new food collecting activities, view current ones, update or delete them, and search for specific activities based on certain criteria. In addition, the system allows the user to generate reports based on the food data you collect.

**Unique feature of Saubhagya Web application**

The real-time tracking feature in Saubhagya uses GPS and Google Maps to track the food collection and delivery process. When a Donator or Partner posts a donation or support request on the platform, the system automatically assigns a Delivery Agent to collect and deliver the donation to the Needy People organization. The Delivery Agent then uses the Saubhagya app on their smartphone to navigate to the collection and delivery locations.

As the Delivery Agent moves from the collection location to the delivery location, the system tracks their location using GPS and displays it on a map in real-time. This allows all the four types of users to track the progress of the delivery process. The Needy People organization can see the status of the delivery in real-time and estimate the arrival time. The Donator or Partner can also see the status of their donation or support and track its progress. Additionally, the Delivery Agent can use the real-time tracking feature to navigate to the delivery location more efficiently and update the status of the delivery in the system.

The real-time tracking feature is a significant advantage of Saubhagya, as it provides transparency and accountability to the food donation process. It allows all the four types of users to track the delivery process in real-time and ensures that the donations reach the Needy People organization on time. It also helps to build trust between the users of the platform and encourages more people to donate food and support.

Overall, the combination of GPS and Google Maps in Saubhagya provides an accurate, efficient, and user-friendly way to track the location of Delivery Agents in real-time. This benefits all the four types of users by providing transparency, accountability, and trust in the food donation process.

## **VI. Discussion**

The Saubhagya web application is a cutting-edge solution to the ongoing challenges of hunger and malnutrition in Sri Lanka. By leveraging the latest technology and utilizing the MERN stack, the application provides a user-friendly and effective platform for individuals to donate food and groceries to those in need.

The front end of the application is built using ReactJS, which is a popular JavaScript library that allows for efficient rendering of web pages. The back end of the application is built using ExpressJS and Node.js, which are two powerful and widely-used web development frameworks. These technologies enable the application to handle large amounts of data and perform complex calculations in real-time.

To store and manage the data, the application uses a MongoDB database. This database is highly scalable and can handle large amounts of data, making it an ideal choice for a platform like Saubhagya. The application also uses various libraries such as Axios, Mongoose, and Express, which help to streamline the development process and improve the performance of the application.

In terms of design, the Saubhagya web application has been developed with the user in mind. The interfaces are simple and intuitive, featuring side navigations, menus, icons, and buttons that make it easy for users to navigate and understand the application. Additionally, the application utilizes external CSS libraries such as Bootstrap and material icons to make it more visually appealing and engaging for users.

Overall, the Saubhagya web application is a powerful and innovative solution to the challenges of hunger and malnutrition in Sri Lanka. By utilizing the latest technology and developing a user-friendly platform, the application has the potential to make a significant impact in reducing hunger and improving the lives of those in need.

## **VII. Conclusion**

In conclusion, the issue of hunger and malnutrition remains a significant challenge in developing nations such as Sri Lanka. The research paper proposes "Saubhagya," an online web application that provides a platform for social assistance to address this issue. This system allows individuals to donate food and groceries to needy organizations such as blind, deaf, orphanages, and more, making it a user-friendly and effective solution.

The unique feature of "Saubhagya" is its live capability of tracking food collection and delivery using GPS and Google Maps, ensuring transparency, accountability, and communication among users. The paper aims to evaluate the effectiveness of "Saubhagya" in reducing hunger and malnutrition in Sri Lanka through user feedback and system performance metrics.

The significance of this research lies in the potential of digital platforms to address social and environmental challenges, particularly in developing nations. By leveraging technology, collective action can be harnessed to create positive social impact. The findings of this research will contribute to the development of digital platforms that can address pressing global issues.

The proposed system "Saubhagya" has the potential to make a significant impact on reducing hunger and malnutrition in Sri Lanka and other developing nations. The system's scalability makes it a promising solution that can be adapted to other countries facing similar challenges. This research demonstrates the potential of technology to address social and environmental challenges and inspire further research in this area.

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