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Enhancing Web Development for Volunteer and Donation Coordination Platforms *Learning: A Predictive Policing Approach*

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Abstract

Volunteerism is vital in addressing societal challenges. However, the coordination of volunteers and management of donations are usually challenging for non-profit organizations. This project deals with developing a web-based platform to ease these processes and further improve efficiency and engagement for both volunteers and donors. This study explores innovative web development strategies tailored to enhance these platforms' performance. By integrating responsive design, robust backend support, and user-friendly interfaces, the project ensures seamless interaction for donors, volunteers, and administrators. Advanced features like automated matching algorithms, real-time notifications, and secure payment gateways are incorporated to streamline operations and build user trust. The platform utilizes HTML, CSS, and JavaScript for a dynamic and responsive frontend, supported by PHP and MySQL for backend operations. A focus on accessibility ensures compliance with Web Content Accessibility Guidelines (WCAG), enabling inclusivity for users with diverse needs. To enhance user engagement, the system employs gamification

techniques, such as progress tracking and badges for donors and volunteers.

This project underscores the transformative potential of web development in fostering collaboration and amplifying social impact. The proposed solution addresses existing challenges, ensuring a reliable, efficient, and user-centric platform that empowers communities and maximizes outreach.

Keywords: *Volunteer Coordination, Donation Platforms, Web Development, Responsive Design, Gamification.*

I. INTRODUCTION

Volunteer and donation coordination platforms have emerged as essential tools in addressing societal challenges by bridging the gap between resources and needs. These platforms enable individuals, non-profits, and community organizations to collaborate effectively, fostering collective action toward meaningful causes. However, despite their growing importance, many existing platforms face limitations that hinder their

effectiveness. Issues such as poor user experience, lack of accessibility, inefficiencies in matching volunteers and donors to opportunities, and concerns about data security often reduce their potential impact.

In an era of rapid technological advancements, there is a pressing need to enhance these platforms to meet the dynamic demands of users. Modern web development practices offer a pathway to create systems that are not only functional but also intuitive, secure, and inclusive. By leveraging technologies such as responsive design, advanced algorithms, and scalable cloud infrastructures, it is possible to create platforms that deliver seamless and impactful user experiences.

This paper proposes a comprehensive framework for improving volunteer and donation coordination platforms. Central to this approach is the integration of features that address existing challenges while introducing innovations to enhance engagement and trust. Key elements include automated matching algorithms to connect users with suitable opportunities, real-time notifications for timely communication, and secure payment gateways to facilitate hassle-free donations. Additionally, incorporating gamification elements such as badges and progress tracking can foster sustained user participation, while an analytics dashboard provides valuable insights for administrators to optimize operations.

The proposed system also emphasizes accessibility and inclusivity, ensuring compliance with Web Content Accessibility Guidelines (WCAG) to cater to users with diverse needs. Furthermore, robust security measures, including SSL encryption and multi-factor authentication, are prioritized to protect sensitive user data. Cloud-based solutions ensure scalability and reliability, allowing the platform to handle increased traffic during high-demand periods such as disaster relief efforts.

By addressing these aspects, the platform aims to empower communities and organizations, enabling them to maximize their outreach and impact. This paper delves into the development process, system architecture, and key features of the proposed platform. It also evaluates the system's effectiveness through user feedback and performance metrics, offering a roadmap for future enhancements. Ultimately, this work underscores the transformative potential of web development in creating digital solutions that drive social change and foster community engagement.

II Addressing the Shortcomings of Current Volunteer and Donation Systems

The increasing reliance on technology in the nonprofit sector has highlighted significant shortcomings in existing volunteer and donation systems. These platforms, while essential for facilitating charitable activities, often suffer from inefficiencies that hinder their effectiveness. This paper aims to identify and address these shortcomings, ultimately proposing a more robust framework for volunteer and donation coordination.

One of the primary issues with current systems is the lack of user-friendly interfaces. Many platforms are designed without considering the diverse backgrounds of their users, leading to confusion and frustration. Volunteers, who may not be tech-savvy, often struggle to navigate these systems, resulting in decreased engagement. A user-centered design approach is essential to create intuitive interfaces that cater to all users, regardless of their technical expertise. [1].

Another significant shortcoming is the fragmentation of information across multiple platforms. Many organizations utilize separate systems for volunteer management, donation processing, and event coordination. This

fragmentation complicates the user experience and makes it challenging for organizations to maintain a cohesive strategy. A unified platform that integrates these functionalities can streamline operations and enhance user engagement.

Moreover, current systems often lack effective communication tools. Volunteers and donors need timely updates and clear channels for interaction with organizations. Many existing platforms do not provide adequate notification systems, leading to missed opportunities for engagement. Implementing real-time communication features, such as chat functions and push notifications, can significantly improve user interaction and satisfaction. [2].

Data security and privacy are also critical concerns in volunteer and donation systems. With increasing incidents of data breaches, users are becoming more cautious about sharing personal information. Current platforms often do not implement robust security measures, which can deter potential volunteers and donors. It is imperative to adopt industry-standard security protocols to protect user data and build trust within the community.

Furthermore, the lack of analytics and reporting tools in many systems limits organizations' ability to assess their performance [3] [4] [5]. Visualization techniques [1] [2] [3] play a crucial role in interpreting complex data sets, particularly in the domains of volunteer and donation coordination. These techniques facilitate the understanding of relationships between various data points, such as volunteer demographics, donation patterns, and engagement metrics. Effective visualization methods include interactive dashboards, heat maps, and network graphs, which can reveal insights into volunteer distribution, donor behavior, and the impact of campaigns [4] [5].

In addition to visualization, machine learning approaches, including unsupervised learning and supervised learning methods [6] [7] [8], are increasingly utilized to analyze volunteer and

donation data. Unsupervised learning techniques, such as clustering and dimensionality reduction, help identify hidden patterns and groupings within the data, enabling organizations to segment their volunteers and donors more effectively [9] [10]. Conversely, supervised learning methods can be employed to predict future donation behaviors and volunteer engagement based on historical data, allowing organizations to tailor their outreach strategies [11] [12].

Furthermore, the integration of geographic information systems (GIS) with visualization techniques enhances the analysis of spatial relationships in volunteer and donation activities. GIS-based mapping can illustrate the geographic distribution of volunteers and donations, providing insights into regional engagement and identifying areas that may require additional support [13] [14]. This spatial analysis can be complemented by predictive modeling techniques, which forecast future trends in volunteerism and philanthropy based on historical patterns [15] [16].

Clustering methods, which have gained traction in data analysis, are particularly valuable for uncovering patterns within volunteer and donation data. These methods contribute to understanding volunteer behavior, donor motivations, and the effectiveness of various campaigns [17] [18]. By applying clustering algorithms, organizations can identify distinct groups of volunteers and donors, facilitating targeted communication and engagement strategies [19] [20].

While machine learning algorithms have gained significant traction in the field of volunteer and donation prediction, they are not without limitations and do not necessarily outperform traditional data mining techniques. Each approach offers distinct performance characteristics and outcomes, which can vary based on the specific context and data utilized [1] [2]. This study's primary objective is to familiarize readers with previous research in this domain and the

corresponding levels of accuracy achieved, presented in a tabular format for clarity [3] [4].

format, making it difficult for organizations to derive actionable insights [1].

The main contribution of this study lies in its comprehensive overview of the applications of machine learning and data mining in volunteer and donation prediction. By categorizing studies based on different techniques, this research provides concise summaries of each methodology employed for analyzing volunteer engagement and donation behaviors [5] [6]. Furthermore, the study highlights the challenges faced by

developers of such predictive systems, emphasizing the need for a nuanced understanding of the strengths and weaknesses of each approach.

2.1 Challenges in Volunteer and Donation Coordination Platforms

Researchers and nonprofit organizations encounter several challenges when attempting to effectively coordinate volunteer efforts and manage donation activities. These challenges can hinder the ability to predict volunteer engagement and donation patterns, as well as to select the most effective strategies for outreach and support. Additionally, computer science researchers employing machine learning, data mining, and spatial-temporal data analysis face their own set of obstacles in this domain.

One significant challenge is the substantial volume of data generated by volunteer and donation activities, which necessitates extensive storage capacity and efficient data management solutions. Organizations often struggle to handle large datasets that include volunteer demographics, donation histories, and engagement metrics.

Moreover, volunteer and donation-related data often exist in diverse formats, such as text, images, spreadsheets, and unstructured data. This diversity complicates the process of converting these data into a comprehensible and analyzable

In the realm of machine learning, accurately labeling data instances (e.g., categorizing volunteers or donations) poses a significant challenge. Mislabeled data can lead to inaccurate predictions and ineffective strategies, ultimately impacting volunteer engagement and donor retention.

Selecting the most suitable data mining algorithms that can yield superior results compared to currently utilized methods is another challenge faced by organizations. The effectiveness of these algorithms can vary significantly based on the specific characteristics of the data, requiring organizations to invest time and resources in experimentation and validation.

Additionally, environmental and contextual factors, such as community engagement levels, economic conditions, and seasonal trends, exert an influence on volunteer participation and donation behaviors. These factors can lead to substantial errors in prediction models if not adequately accounted for. To achieve high prediction accuracy, any volunteer and donation coordination system must consider these environmental and contextual variations.

In summary, addressing these challenges is crucial for enhancing the effectiveness of volunteer and donation coordination platforms. By recognizing and mitigating these obstacles, organizations can improve their strategies for engaging volunteers and maximizing donations, ultimately leading to more successful outcomes in their missions.

3. MATERIALS AND METHODS

3.1. Literature Survey

Here are some research papers and articles related to such kind of applications:

"Blood donation and Life saver-blood donation app" by Hamlin and Mayan [1] discusses the development of a mobile application called Life Saver, which aims to encourage blood donation by making the process more accessible and convenient. The app allows users to register as blood donors, find nearby blood donation centers, and receive notifications when their blood type is in high demand.

"BDonor: A Geo-localized Blood Donor Management System Using Mobile Crowdsourcing" by Das *et al.* [2] presents BDonor, a geo-localized blood donor management system that uses mobile crowd-sourcing to connect blood donors with patients in need of blood. The authors highlight the importance of blood donation and the challenges associated with traditional methods of blood donor management, such as low blood stock, limited accessibility, and lack of awareness. BDonor addresses these issues by using mobile crowdsourcing to identify potential blood donors and connect them with patients in need of blood in their geographic vicinity.

"Foodernity: A Mobile and Web Application for Food Sharing" by Morilla *et al.* [3] presents "Foodernity", a mobile and web application designed to promote food sharing among individuals and organizations. The app aims to reduce food waste and hunger by connecting food donors with beneficiaries. The authors provide a comprehensive overview of the app's features, including user registration, donation posting, donation claiming, and user feedback.

The paper "Aahar-Food Donation App" by Mathur *et al.* [4] describes the development of a mobile application that enables users to donate excess food to NGOs and charitable organizations. The authors highlight the issue of food wastage and the need to reduce it by making use of technology to connect donors and recipients.

The research work "SeVa: A Food Donation App for Smart Living" by Varghese *et al.* [6] presents a mobile application called SeVa (Serve and Value) that aims to reduce food waste and promote food donation. The app is designed to connect individuals or organizations that have surplus food with those in need.

The paper "Blood Donation and Life Saver-Blood Donation App" by M R Anish Hamlin and Albert Mayan J [1]. discusses the development of a mobile application called "Life Saver" that is designed to help increase blood donations in India. The authors note that there is a shortage of blood in India and that many people are unaware of the importance of donating blood. The app is intended to raise awareness of the need for blood donations and to make it easier for people to donate.

The paper by Ali *et al.* [7] introduces a Blood Donation Management System aimed at enhancing the efficiency and effectiveness of blood donation processes. The system

encompasses various features including donor registration, blood type tracking, inventory management, and appointment scheduling, all designed to streamline blood donation activities. By providing a centralized platform for donors, recipients, and healthcare professionals to interact and coordinate, the system aims to improve the overall management of blood donation activities, ensuring timely access to safe and compatible blood units while minimizing wastage.

The paper by Almeida and Cunha [8] presents a digital donation platform designed for nonprofit and charity organizations, aiming to enhance their outreach and fundraising efforts. The platform leverages information communication technologies to facilitate seamless and secure online donations, fostering engagement and support from a wider audience.

The paper by Singh and Sharma [9] presents the development of an Android application aimed at facilitating book donation. The paper outlines the implementation of the application, which likely involves features for users to easily donate books and connect with potential recipients. The technology's potential benefits for promoting book sharing and improving access to educational resources are discussed.

The paper "G-GET: All in One Donation App" by Ranjani *et al.* [10] presents G-GET, a comprehensive donation application to streamline the donation process by providing a centralized platform for users to contribute to various charitable causes. Through an intuitive interface, G-GET facilitates convenient donations to multiple organizations, enhancing user engagement and promoting social impact. The app's potential implications for increasing charitable giving and its role in leveraging computational science and technology are explored.

The paper "Order n Eat" [11] by Sivakumar *et al.* presents an Android app developed during the COVID-19 pandemic, utilizing Firebase as its backend. The app aims to facilitate food ordering and delivery services, catering to the increased demand for contactless transactions during the pandemic.

In addition to the above academic articles, the following is an elaboration on several of the existing donation platforms that we surveyed before proposing our new platform, the summary of the existing donation applications is provided in Table 1.

4. PROPOSED MODEL

Here's a basic flow diagram (Fig. 1) for a donation application:

4.1. Sign Up

Users will create an account with their details, such as name, email, and phone number.

4.2. Choose Donation Category

Users will select the category of donation they wish to make, such as food, clothes, blood, or other items.

4.3. Create a Donation Request

Users will create a donation request, providing details about the items they wish to donate, such as quantity, type, and condition.

4.4. Search for Beneficiaries

The app will suggest nearby organizations or individuals who require the specific items being donated.

Table 1. Existing donation platforms.

Donation App	Category	Foundation Year	Features	Limitations
GiveIndia	Fund Donation	1999	They accept clothes and other donations for various causes and distribute them to the underprivileged.	These organizations do not have dedicated apps for clothes donation, and the donation process may vary depending on the trust or NGO.
Akshaya Patra	Clothes and other donations	2000	They accept clothes and other donations for various causes and distribute them to the underprivileged.	Not have dedicated apps
Blood Donor	Blood	2013	Simple and easy-to-use interface, allows users to find donors and request blood donations.	Limited user base in some regions, may not have the latest features compared to newer apps.
Oye Happy	Clothes	2014	A gifting platform that allows users to donate clothes as part of its "Give for a Cause" initiative. They work with NGOs to distribute clothes to the needy.	Clothes donation may be limited to certain occasions or campaigns.
Feeding India	Food	2014	Feeding India has a wide network of volunteers and partners across India, making it easier to reach out to beneficiaries in various locations. They focus on food recovery and redistribution from weddings, events, and restaurants, reducing food waste significantly.	The app's availability and outreach might vary in some remote areas of India, limiting its impact in certain regions.
Robin Hood Army	Food	2014	Operates on a volunteer-driven model and has a strong social media presence, allowing it to gather more support and engagement from the community.	Its operations may not be as consistent or scalable in all regions. Coordination and logistics may pose challenges during large-scale food distribution efforts.
No Food Waste	Food	2014	user-friendly interface, enabling easy donation of excess food by individuals and businesses. It focuses on reducing food wastage at the source by connecting donors and beneficiaries directly.	The app's presence and coverage might be concentrated in specific urban areas, potentially limiting its reach to rural regions.
BloodConnect	Blood	2015	Wide network of registered donors, easy search and request feature, user-friendly interface	Some regions may have limited coverage, but regular updates are essential to ensure the best user experience
India Food Banking Network	Food	2016	IFBN is a collaborative effort that works with various food businesses, charities, and NGOs to ensure efficient food collection and distribution. It has a more structured approach to food donation and food banking.	The app's user base and operations might not be as widespread as some other more well-known platforms, leading to potential gaps in coverage.
Jeevandayini	Blood	2016	Connects donors and recipients effectively, allows emergency blood requests, provides contact details of donors	May require frequent updates for better functionality and user engagement
Klotho	Clothes	2017	Klotho is a social enterprise app that connects donors with NGOs and underprivileged communities. They focus on recycling and upcycling clothes, promoting sustainability.	The availability and reach of Klotho's services may be limited to specific cities or regions.
Sewa	Blood	2017	Extensive database of donors, quick access to blood donors, works in various cities across India	User feedback suggests occasional technical issues and may require regular maintenance
Blood-4-Life	Blood	2018	Provides a platform for voluntary donors, an easy registration process for donors, and recipients.	Smaller user base compared to some other popular apps, limited coverage in certain regions
Friends2Support	Blood	2019	Large donor database, real-time notifications for blood requests, user-friendly design	Some users have reported occasional delays in response times
Eco-Trunk	Clothes	2019	An app that facilitates the donation and exchange of second-hand clothes. They aim to promote sustainable fashion and reduce textile waste.	May not be as extensive as larger platforms, so finding recipients for your donations could depend on local demand.

(Table 1) contd.....

Donation App	Category	Foundation Year	Features	Limitations
Donatekart	Donate Supplies	2020	They collaborate with NGOs and allow users to donate clothes as part of their charitable campaigns.	The availability of clothes donation campaigns may vary, and it may not be a dedicated platform for clothes donation.

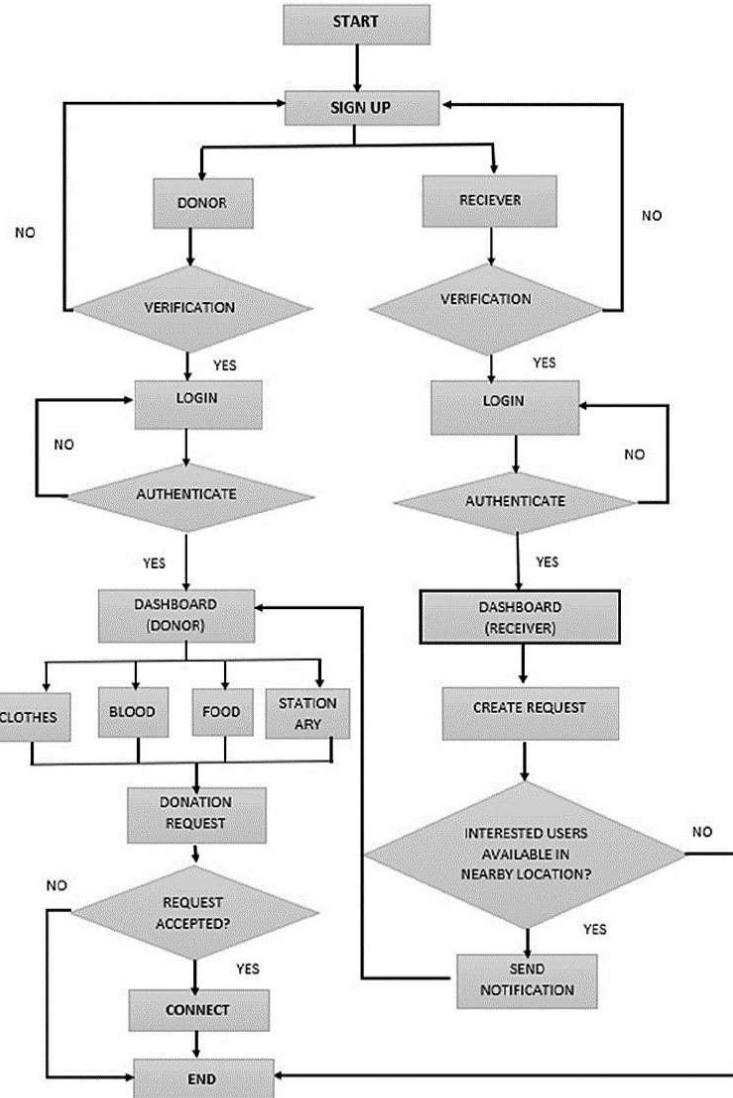


Fig. (1). Workflow diagram.

4.7. Rate and Review

After the donation is made, users and beneficiaries will be able to rate and review each other based on their experience, to help build trust and accountability within the system.

4.8. Donation History

Users will have access to their donation history, including details of all donations made through the app.

5. APP DEVELOPMENT: DESIGN AND IMPLEMENTATION

5.1. Design of the DONAPP

We elucidate the framework of our DONAPP, which integrates various HCI principles [12]. Effective interaction design necessitates addressing the specific needs and considerations of the targeted users [13]. Consequently, our app design encompasses the following stages:

5.1.1. Stakeholder Identification

Within the realm of HCI, stakeholders are defined as “individuals or entities impacted by the system and possessing a direct or indirect sway over its requirements” [12]. In the context of our DONAPP, we classify stakeholders into four donation categories: food, blood, clothing, and stationery. Certainly, there are several differences between these categories, both in terms of the nature of the donations themselves and the processes involved in donating and receiving them. Here are some key distinctions:

5.1.1.1. Nature of Donations

5.1.1.1.1. Food

Food donations typically consist of perishable or non-perishable items intended for consumption. These can include canned goods, fresh produce, packaged foods, etc.

5.1.1.1.2. Blood

Blood donations involve giving a portion of one's blood for medical purposes, such as transfusions for patients undergoing surgery, suffering from medical conditions, or in emergencies.

5.1.1.1.3. Cloth

Cloth donations encompass clothing items such as clothing, blankets, shoes, and other textiles. These items are often used to provide warmth, protection, and comfort to those in need.

5.1.1.1.4. Stationery

Stationery donations include items like pens, pencils, notebooks, textbooks, and other educational materials. These donations are typically used for educational purposes and to support learning activities.

5.1.1.2. Donation Processes

5.1.1.2.1. Food

Food donations may require adherence to certain health and safety regulations, especially for perishable items. Donors may need to coordinate with food banks, shelters, or organizations equipped to handle food storage and distribution.

5.1.1.2.2. Blood

Blood donations involve a more structured process, often requiring donors to visit blood donation centers or mobile blood drives. Donors undergo health screenings and must meet specific eligibility criteria before donating blood.

5.1.1.2.3. Cloth

Cloth donations may involve sorting and organizing clothing items before donating them to shelters, thrift stores, or other organizations. Some charities may have specific guidelines for the types and conditions of clothing they accept.

5.1.1.2.4. Stationary

Stationary donations are often collected and distributed through educational institutions, community centers, or charitable organizations. Donors may need to coordinate with these entities to ensure that donated stationary items reach those in need, such as students or educators.

5.1.1.3. Recipients

5.1.1.3.1. Food

Food donations are typically directed towards individuals or families facing food insecurity, homeless shelters, soup kitchens, or food banks.

5.1.1.3.2. Blood

Blood donations are primarily used in medical settings, including hospitals, clinics, and emergency response situations, to treat patients with various medical conditions or injuries.

5.1.1.3.3. Cloth

Cloth donations are often provided to individuals experiencing homelessness, refugees, disaster victims, or those in need of clothing assistance due to financial hardship.

5.1.1.3.4. Stationary

Stationery donations are usually targeted towards students, schools, educational programs, or community initiatives aimed at supporting learning and academic development.

Overall, while all types of donations serve important humanitarian purposes, the specific nature of the donations and the processes involved in donating and receiving them can vary significantly based on factors such as health and safety considerations, logistical requirements, and the needs of the recipients.

By taking these distinctions into account, we've pinpointed stakeholders who encompass a diverse range of ages and ethnicities. Most of them reside in the nearby vicinity, making it convenient for us to engage with them in person.

5.1.2. Facilitating Social Interaction in Interface Design

Throughout the interface design phase, we engage stakeholders in interviews to gather their insights, suggestions, and preferences regarding the app's usability. For instance, we explore entry fields from both donor and recipient perspectives. These insights inform the layout of the app. During on-site visits to stakeholders, we gather ethnographic data to ensure their perspectives are incorporated into our app designs.

5.1.3. Crafting Conceptual Designs

This stage involves creating wireframes and initial mockup designs that serve as foundational blueprints [13]. Our approach to designing the DONAPP involves blending

our creative concepts with stakeholder suggestions and insights gleaned from ethnographic studies. These wireframes offer a simple framework including entry fields.

5.1.4. Engaging Stakeholders in Design Evaluation

In this Human-Computer Interaction (HCI) process, we seek feedback from stakeholders on the wireframes developed during the conceptual design phase. Typically, app designs undergo refinement based on stakeholder assessments [13]. For the DONAPP, we utilize straightforward questionnaires and direct discussions to gather stakeholder feedback. The final app design evolves based on this feedback loop, refining the mockup designs accordingly.

5.1.5. Iterative Development of Final App Design

HCI principles often advocate for iterative design processes [12]. While larger systems may necessitate multiple iterations, our DONAPP, currently in its prototype phase and targeting a specific region, undergoes one iteration. This streamlined process is facilitated by the

cooperative nature of our stakeholders, who provide satisfactory evaluations early on. The resulting final design serves as the blueprint for implementing DONAPP.

5.2. App Implementation on the Android Platform

The implementation of the DONAPP utilizes the Android Platform [14] for several reasons: Firstly, Android Studio offers a range of innovative and user-friendly features that facilitate development. Secondly, we intend to distribute the app via the Android marketplace through Google, which offers a straightforward process for individual developers. The front-end design and functionalities of the app are coded using Android, while the backend is developed using Java. Data entered by users and the insights derived from it are stored in Firebase, serving as the app's knowledge base (KB).

The app is divided into two modules: Donor and Receiver. Both the donor and receivers' registers on the application provide the necessary information (Fig. 2). The donor section is again divided into four sections based on the item to donate *i.e.*, food, clothes, stationery and blood.



Fig. (2). Signup.



Fig. (3). Donor signup.

After signup there is a form for proper data to be recorded from the donor/receiver to match the requirements (Fig. 3). The navbar of dashboards of the donor and receiver contains features of chat, notification, history, and profile of the user.

The donor's side: The donor is provided with 4 categories to choose from namely food, clothes, blood and stationery (Fig. 4). When the option of food is chosen, the user is again given two options to choose from. One is for human edibles and the other one is for animal/pet edibles. Depending on the option chosen by the user some questions regarding the type of food, its expiration date, quantity, pictures, etc. are being asked to get relevant information about the food to be donated. The user is asked to choose the type of organization to which he wants to donate i.e., NGO, Orphanage, shelter home, or old age home (Fig. 5).

After selection, the list of organizations based on factors such as distance, availability, past donation acceptance record, and the quality needed are suggested to the user, the user chooses one of the organizations to donate to and makes a donation request by clicking on the donate button. If there is no organization of the selected category in his locality then a 'not available' message is displayed, the user then can select a different category to donate. Once the request has been created the nearby organizations present in the list are also made aware of the request apart from the organization selected by the user. Once the donation request is accepted by the organization, the donation request gets closed for other organizations. If the organization selected by the user refuses to accept the donation, then other organizations present in the list get an option to accept or reject the donation the preference is given based on the distance and quantity required by the organization taking the past

donation history as a constraint. Once the donation request is approved, there is a chat feature in the donor section, where the Ngo's contact (who accepted the donation) gets added to the contact list for communication.

Once the donation has been received by the organization and the organization confirms the transaction, in the donor dashboard the name and date of donation are added in the donation history section (Fig. 6). The donor cannot donate to the same organization more than two times in 15 days. This constraint is added so that the same organization does not receive donations all the time, leading other organizations to starvation. If the user selects the clothes option, then the user is asked to select the type of clothing he is willing to donate, *i.e.* summer clothing or winter clothing. Based on the option chosen the user is asked to give further details of clothing such as the age group of clothes, pictures of clothes, and quantity to donate (Fig. 5).

The organization-choosing process is the same as that in the food section with the difference that if there is no organization in the selected category then the organization within 18 km of the range is displayed to the user in the list. If still in 18 km there is no organization of selected category, then the message not available is displayed, the rest all the process is the same as that in

food donation.

Likewise, the stationery option works in the same fashion as that of clothes. If the user wants to donate blood, then the user's scanned medical records are to be submitted in the application along with some contact details, age, blood group, and residential details. The data and medical records submitted by users are displayed to the hospitals in urgent need of blood. Apart from the urgent requirement by hospitals in case of emergency, users can donate blood to nearby blood banks suggested to them in the app. Whenever an emergency is created by nearby hospitals, the notification of the required blood type and hospital name is displayed to all nearby users. Once a user confirms to donate blood and donates it, the request is closed on both sides and the record is maintained in the user account as well as in the hospital or blood bank dashboard.

The receiver side: Let us see the app from the organization's view. While signup organization details like its location, type, and type of acceptable donation, its contact information is taken (Fig. 7). When any organization says NGO signs up with an app, there will be two courses of action, one will be where he can see the donor's request for a donation and the other will be where he can create a request for the need of donation by providing its requirement and time limit.



Fig. (4). Donor homepage.



TIME TO DONATE



FILL THE INFORMATION

PICK UP ADDRESS

CONTACT NUMBER

SUMMER CLOTHES

WINTER CLOTHES

DONATE

Fig. (5). Donate clothes.

YOUR DONATIONS

Organization name: Happy hope
Organization Type: Orphanage
Donation Date: 19/09/2022
Donation Type: cloth

Organization name: Rainbow homes
Organization Type: Shelter home
Donation Date: 30/07/2022
Donation Type: Stationery

Organization name: Bhumi
Organization Type: Ngo
Donation Date: 11/01/2022
Donation Type: Food

Fig. (6). Donar history.

All the data provided is stored in the database to do the filtering and match the needs generated by an organization with that of users. If the organization receives the notification that a user wants to donate then he has the option to reject or accept it, else if the organization name was displayed in the list to the user while creating a donation request the organization will receive the donation request but will be in waiting where the accepted donation button will be disabled (Fig. 8). If the organization selected by the user denies the request, then the accepted donation button will be enabled according to the preference.

The organization can also create a request for need. For doing so he will be given the same options of categories as donors *i.e.*, blood, food, clothes, and stationery. While creating the food acceptance request the organization is bound to provide the details like food required is for pets or humans, that it will have to give

details like at maximum for how many days he can accept the food, and what type of food is required or is willing to accept.

The request generated will be put to be displayed to all the donors who are near the NGO as well as the name will be suggested in the list where the donors choose the organization for donation if the criteria of the donor and organization match. The Ngo dashboard has a section where the list of all the donors who want to donate with the specification of items is displayed. The NGO can accept donations according to their need. The donor whose donation is accepted receives a message of "donation accepted" from the organization and the rest all the donors get the notification of "not accepted" for the same category (Fig. 9). The receiver/organization cannot accept more than two donations in 15 days. There is a chat feature available for organizations to chat with their respective donors.

Get Started!!
Build Your Organization Profile...

Organisation Name

E-Mail

Phone Number

Acceptable Donations

Organisation Category

Address

City

Street Address

Pin Code

State

Country

SUBMIT

Already have an account? [Login](#)

Fig. (7). Receiver signup.



Fig. (8). Recipient/receiver page.



Fig. (9). Receiver history.

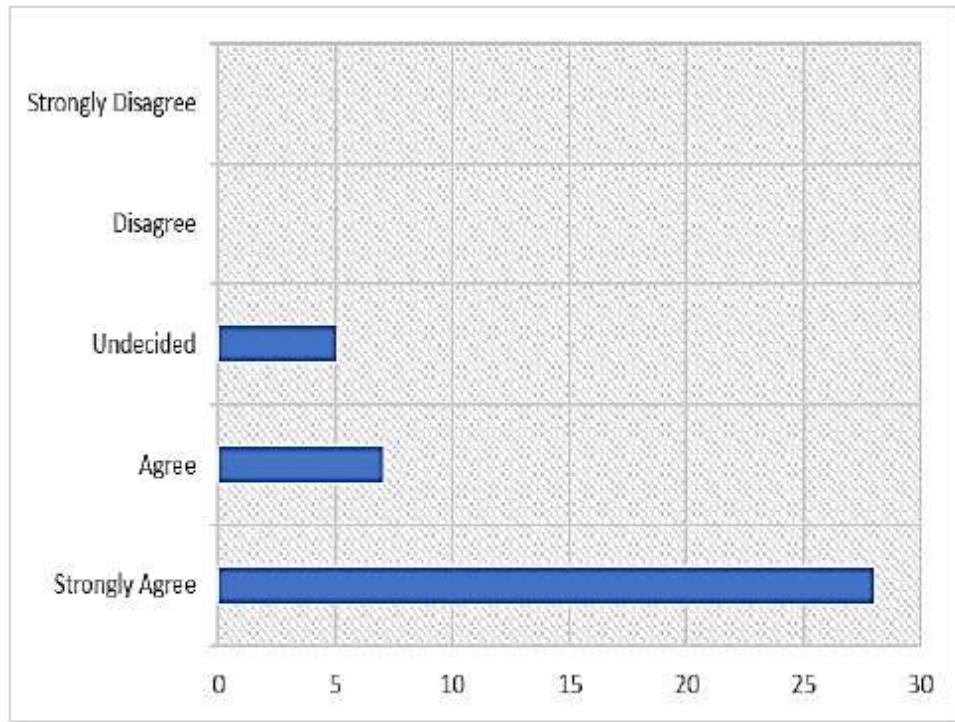
6. RESULTS AND DISCUSSION

To test the effectiveness of DONAPP, we conduct simple, informal user surveys that are provided to various stakeholders. These surveys are designed to assess the app in both an objective and subjective manner. The objective survey questions used in the survey are as follows:

We surveyed to evaluate the DONAPP, with Q3-Q8 utilizing a Likert scale commonly used in HCI. Our survey was distributed to over 50 participants, and we received responses from 40 individuals. The results of the survey

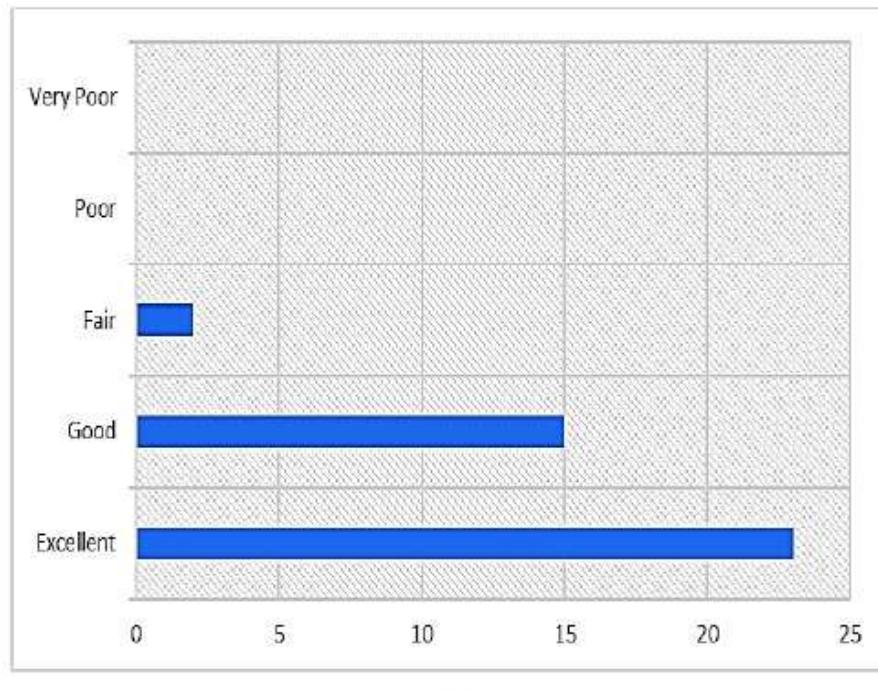
show that people from 5 different states in India have taken the survey, indicating a broad residential interest in the app. Additionally, we found that the app is popular across a range of occupational demographics, as responses included over 10 different occupations. We have summarized the results of Q3-Q8 and Q11-Q12 in Figs. (10-13). Whereas the answers to Q9 and Q10 show that our app is up to the mark. It is noteworthy that respondents were highly motivated to fill out the survey, and all questions received positive responses, indicating satisfaction with DONAPP.

- Q1. Which state do you reside in?
- Q2. What is your profession?
- Q3. How user-friendly is the app?
- Q4. How easy is it to navigate the app?
- Q5. How well do you find the overall layout of the app?
- Q6. How quickly does the app respond to user commands?
- Q7. How stable is the app? Does it crash or freeze often?
- Q8. How helpful are the app's documentation, tutorials, and support resources?
- Q9. I will recommend to others to subscribe to DONAPP for donations.
- Q10. Does the app have all the necessary features? (Yes/No)
- Q11. Does the app save your work automatically? (Yes/No)
- Q12. I intend to donate something to the NGO's/ Needy via DONAPP.



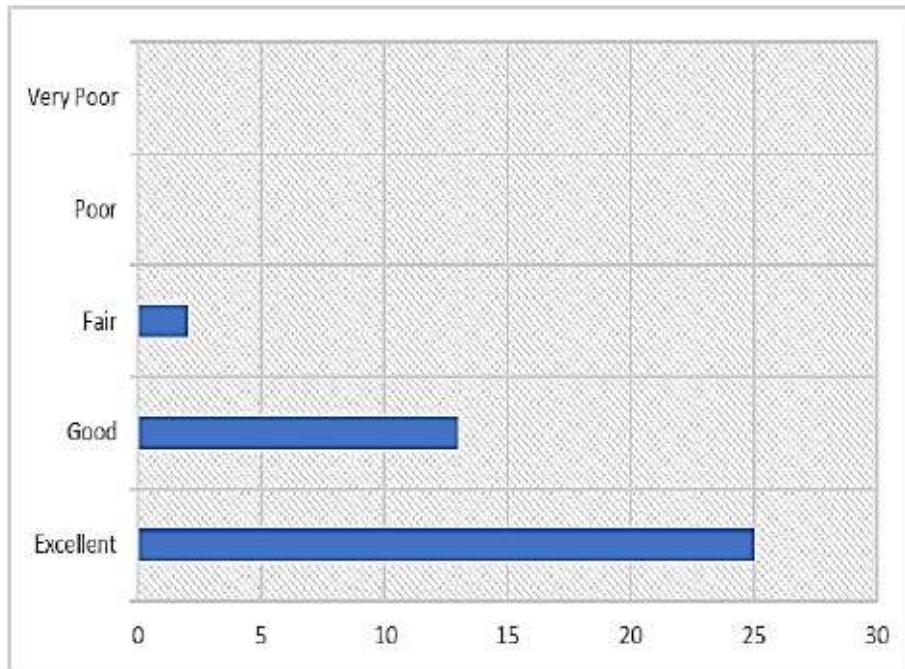
(a)

Fig. 10 contd.....



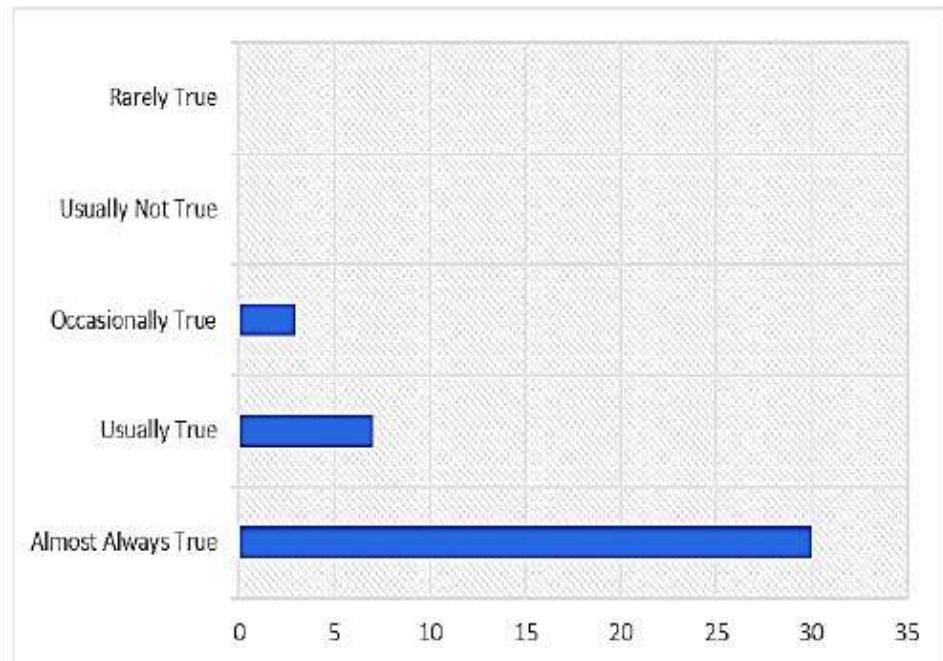
(b)

Fig. (10). (a) Responses to Q3 based on the user friendliness of the DONAPP (b) Responses to Q4 based on the navigation of the DONAPP.



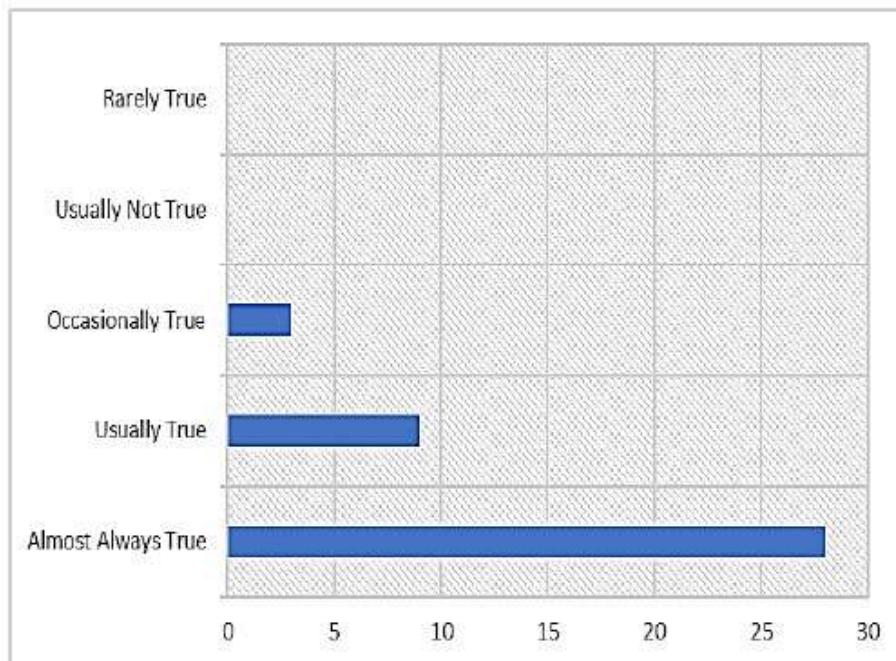
(a)

Fig. II contd.....



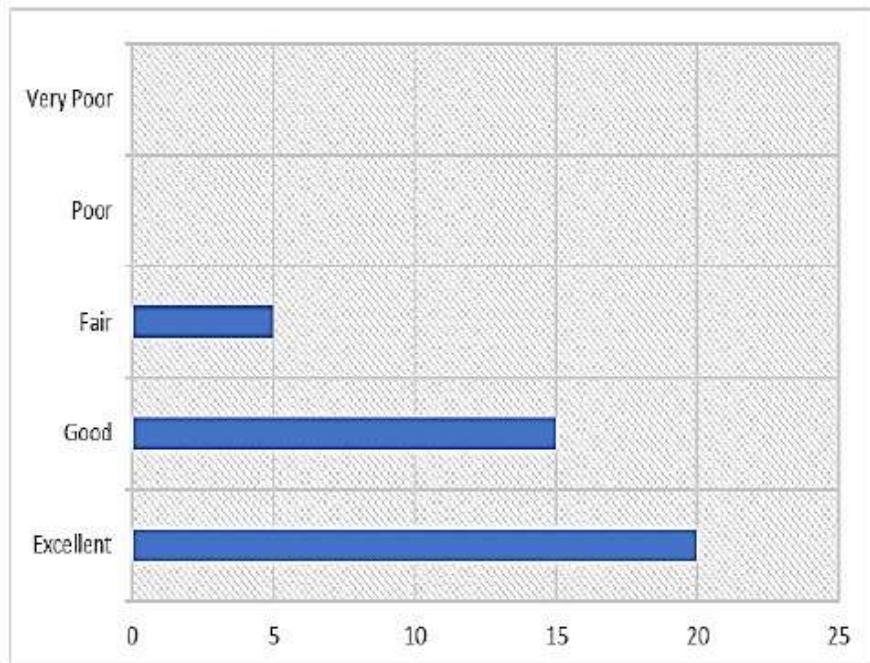
(b)

Fig. (11). (a) Responses to Q5 based on the overall layout of the DONAPP (b) Responses to Q6 based on the responsiveness of the DONAPP.



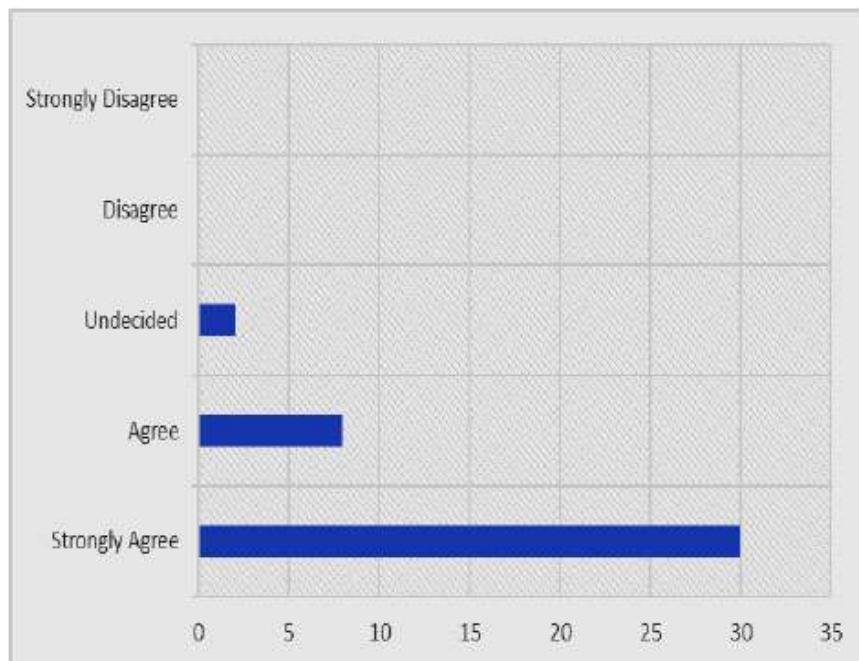
(a)

Fig. I2 contd.....



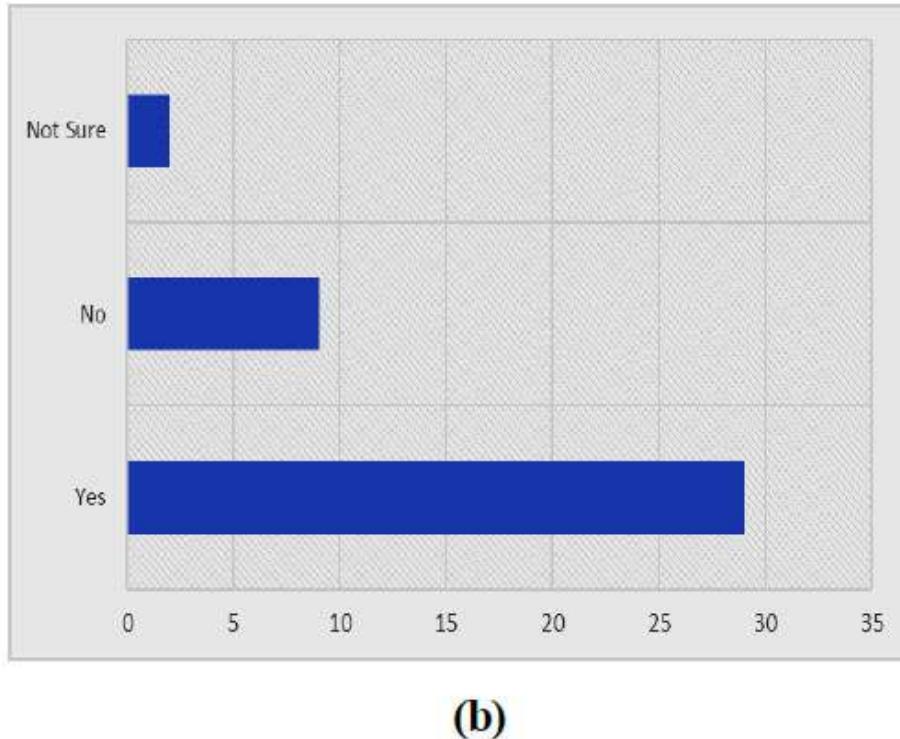
(b)

Fig. (12). (a) Responses to Q7 based on the stability of the DONAPP (b) Responses to Q8 based on the utility of the DONAPP.



(a)

Fig. 13 contd.....



(b)

Fig. (13). (a) Responses to Q11 based on user intention to use the DONAPP (b) Responses to Q12 based on user willingness to recommend DONAPP to others.

We also ask users to give verbal comments in the surveys to enable a subjective evaluation of the DONAPP. However, it is common to receive a range of feedback/comments after conducting a survey. This feedback includes positive comments about the application's features and usability, as well as negative feedback about areas that need improvement. Some comments are neutral or offer suggestions for future development. It is important to analyze and address all feedback received to improve the proposed application and ensure user satisfaction. These comments are summarized herewith.

The evaluation of the prototype DONAPP, both objectively and subjectively, has been very positive overall. The survey results clearly indicate that participants find the app useful, and the verbal comments are encouraging, reflecting a positive initial response and an eagerness for the eventual release of the app. It is also great that some participants have offered ideas for improvement. Based on these suggestions and our research, we have identified several areas where the app could be improved, including transparency, personalization, accessibility, security, and social sharing. These improvements will increase the app's appeal and will be implemented in an updated version of the DONAPP, which we plan to release on the Android marketplace via Google. We will also work on enhancing the app's publicity to reach a wider audience.

CONCLUSION

The proposed idea of creating a centralized platform in the form of an app to connect donors and receivers can be a very effective way to bridge the gap between them. With the increasing use of smartphones and the internet, such an app can provide an easy and convenient way for people to find NGOs, orphanages, and shelter homes around their locality that require donations. Similarly, the app can also help people find nearby blood donation centers and donors in case of urgent blood needs. The app is designed with features such as a searchable directory of NGOs, orphanages, and shelter homes, a map-based interface to locate nearby blood donation centers, and a messaging system to send notifications to potential blood donors in case of an emergency. The app also provides information about the specific donation needs of each organization or hospital, making it easier for donors to identify the most urgent needs and make targeted donations. This study centers on the development, execution, and assessment of an initial prototype application named DONAPP, aimed at facilitating various forms of donations. The key aspects of our investigation are as follows:

- Introducing DONAPP, which aligns with existing donation applications while incorporating additional functionalities.
- Addressing donation-related challenges from the perspectives of both donors and recipients.

- Integrating human-computer interaction (HCI) concepts into the application's design, subsequently implementing it on the Android platform, and conducting 40 user surveys with diverse demographics, yielding highly favorable responses.

Future endeavors involve potential enhancements to DONAPP based on prototype feedback, with the prospect of releasing it on the Android marketplace. We anticipate that our findings will prove valuable to app developers, NGO personnel, HCI and IoT researchers, as well as professionals in related fields. Overall, the proposed centralized platform in the form of an app will be an effective solution to connect donors and receivers and ensure that resources such as food, clothing, and blood are not wasted but reach those who need them the most.

LIST OF ABBREVIATIONS

- UNEP = United Nations Environment Program
 HCI = Human-Computer Interaction
 KB = Knowledge Base

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

HUMAN AND ANIMAL RIGHTS

No animals/humans were used in this research.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

The data and supportive information are available within the article.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest financial or otherwise.

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Declared none.

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