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GPS-Enabled Real-Time Donation and Welfare Coordination Platform: Bridging Donors, NGOs, and Beneficiaries in India

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Abstract: *Every day, there is a lot of food, clothes, and medicines going to waste in India. There are millions of people living in poverty, on the side of the road, and in underprivileged areas who are unable to obtain these necessities. This is a lack of coordination and not a lack of giving. Most donation platforms are currently internet based, manual, and donor-centric. These platforms use non-formal communication methods and static location fields. This results in delayed distribution, significant resources wasted, and a lack of accountability. Welfare organizations are separate entities within the government, and NGOs face challenges in finding accessible funds quickly and efficiently. The poorest of the poor, those living on the street and without a registered address, are completely unknown to these systems. In order to bridge these critical gaps in the Indian social welfare system, this paper proposes the use of a GPS-based mobile donation coordination system named 'Welfare Connect.' This system enables the coordination of donations across the four categories of food and daily essentials, clothing and household items, money, and medical supplies via a single interface. The system facilitates the real-time integration of individual donors, NGOs, and government welfare agencies. The use of the 'Street Level Need Reporting' feature enables the reporting of the need for resources on behalf of roadside individuals who cannot register their need. The system helps in reducing the wastage of perishable resources via expiry date notifications. Additionally, the system facilitates evidence-based planning and pre-positioning via the government welfare dashboard. When these capabilities are used together, the shift in the donor technology is from donor convenience to the beneficiary outcome, thus making the delivery of social welfare responsive to human need in real time*

Keywords: GPS-based donation system, real-time coordination, social welfare platform, resource optimization, food waste

I. INTRODUCTION

Over 228 million people in India are living below the poverty line in their country, and there are still millions living in slums, on the sides of roads in cities, and in areas affected by natural disasters who do not have constant access to clothing, food, or medical attention. At the same time, there are enormous amounts of unused resources such as food from restaurants, clothing from homes, and medications from pharmacies that are being wasted on a daily basis simply because there is no efficient way for these resources to be distributed.

The coordination mechanism between potential contributors and actual beneficiaries is still disjointed, despite the fact that charity is an integral part of Indian culture and NGOs are the sole source of providing welfare to the people. The donors do not know where their money is required the most. NGOs face problems while trying to find local donations

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that are easily accessible. Static databases, which are not updated regularly to show the current requirements, are used by government welfare organizations. This system is failing the people it is trying to serve.

Even though the solutions are mostly inadequate at present, digital technology has the potential to bridge this gap. Most donation platforms are online portals geared towards monetary donations as opposed to physical items. Location intelligence is either non-existent or limited to inputting pin codes or cities manually. There is no prominent platform in India that brings together all welfare organizations run by the government, NGOs, and donors into a single ecosystem with GPS technology and real- time capabilities.

In order to develop a mobile application for facilitating real- time donation coordination via GPS technology for four types of resources: food/daily necessities, clothing/household items, financial resources, and medical supplies, this paper proposes and critically discusses the design for a Welfare Connect mobile application. In addition to criticism of existing systems, objectives for a system are determined, a framework is proposed, and implications for social welfare services in India are discussed.

II. LITERATURE SURVEY

The problem of unorganized donation management and its consequences for resource wastage has been documented in several studies. Shelar et al. identified nine specific drawbacks of existing manual donation systems in India, including bureaucratic complexity, the absence of a common platform, poor fraud detection mechanisms, and the inability of needy individuals to communicate their requirements to potential donors [1]. Although their work paved the way for a centralized digital system, it only provided a basic web-based system that doesn't have real-time matching or location-based functionality.

De Silva et al. developed a centralized donation management system at SLIIT, Sri Lanka, designed to connect donors and recipient organizations through a digital platform, improving accessibility and basic tracking of contributions [2]. Their study acknowledged that the system faced challenges in scalability and real-time coordination, particularly when location-based matching was absent. This confirms that centralization of data alone is insufficient without geospatial intelligence, NGOs still cannot efficiently identify nearby donations.

Pazhanivel and NanthaKumar directly addressed the food waste dimension of this problem by developing a mobile application 'FoodShare' that uses geolocation services to connect surplus food providers such as restaurants and hotels with nearby trusts and recipients [3]. Their approach has proved that it is possible to significantly reduce food wastage and improve efficiency in the distribution of food items through proximity-based matching and real-time communication. Although their work is limited to only food donation and does not extend to other categories of donation, as well as welfare bodies, it is the most relevant work currently available for reference to implement the GPS-based approach proposed in this study.

Jade and Babar emphasized the importance of administrative oversight and real-time tracking in building donor trust and ensuring accountability in donation platforms [4]. The approach proposed by them proved that it is possible to significantly reduce wastage of food items and improve efficiency in the distribution of such items through proximity-based matching and real-time communication. Although their work is limited to only food donation and does not extend to other categories of donation, as well as welfare bodies, it is the most relevant work currently available for reference to implement the GPS-based approach proposed in this study.

Donation platforms have developed gradually from manual- based systems to web-based systems and then to mobile and location-based system applications, based on the cumulative body of literature examined. All four categories of donations, including GPS-based real-time proximity matching, street-level need reporting to serve unregistered recipients, and access to government welfare bodies, are not currently integrated into a cohesive system. This is the gap to be filled by the proposed Welfare Connect system.

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III. OBJECTIVES

The main aim of the planned Welfare Connect platform is to develop a GPS-enabled mobile application to connect welfare agencies, non-governmental agencies, and individual donors for the effective distribution of donated resources to needy individuals. The specific goals are as follows:

- To make it possible for donors to sign up, see the list of donations that are available in four categories (clothes and household items, food and daily necessities, money, and medical supplies), and monitor the status of their contributions in real time.
- To make it possible for NGOs and recognised welfare organisations to effectively coordinate pickup and distribution activities and find donations in the area using GPS-based proximity filtering. Why To promote evidence-based welfare planning by giving government welfare agencies a real-time dashboard of resource requirements and donation availability within their domains.
- To reveal location-tagged, real-time need signals from underprivileged communities and roadside people, allowing donors and NGOs to recognise and respond to urgent need.
- To prevent wastage of resources, particularly perishable food and urgent medical supplies, through proximity-based matching algorithms and expiry date reminders.
- To maintain the accountability and transparency through the welfare effect reports, tracking of transactions, and also verify the users through an administrative oversight module.

IV. PROPOSED SYSTEM AND METHODOLOGY

System Architecture

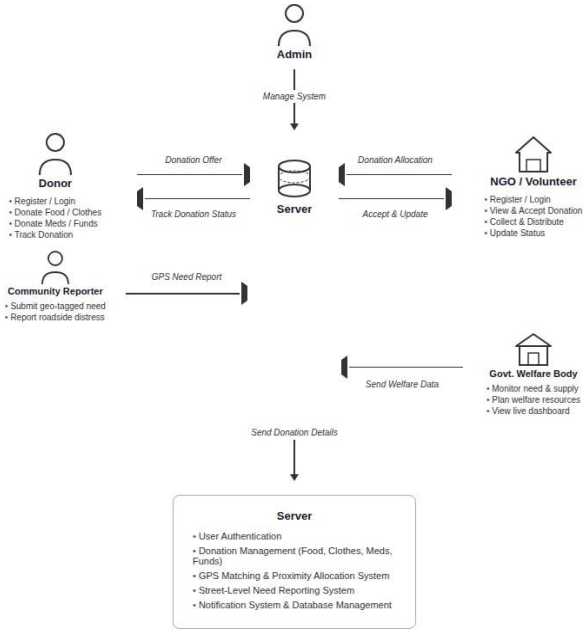

Fig. 1. Architecture diagram

A. System Overview

The Welfare Connect platform is conceived as a mobile-first application developed for Android and iOS, with a responsive web interface for government welfare body access. The system is organized around four primary user roles: Donor, NGO/Volunteer, Government Welfare Body, and Administrator. Each role is assigned a distinct module with clearly defined permissions and functionalities.

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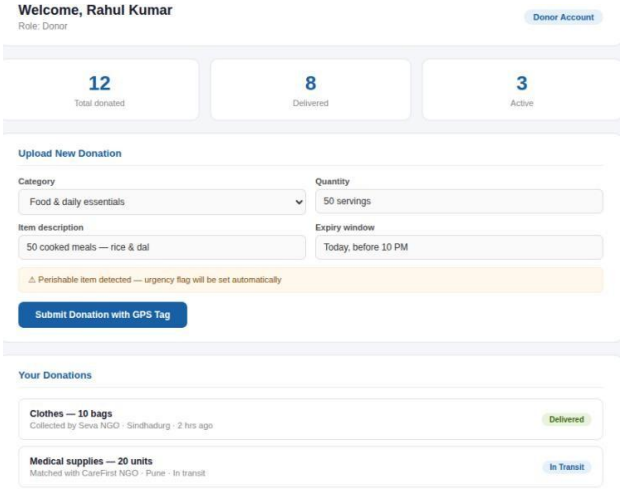
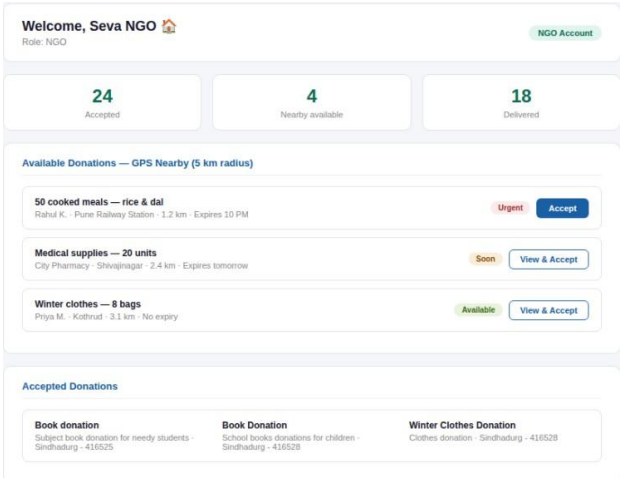
With a responsive online interface for government welfare body access, Welfare Connect is developed as a mobile-first application for both iOS and Android. There are four main user roles for Donor, NGO/Volunteer, Government Welfare Body, and Administrator. Each role has a unique module with precisely defined permissions and functionalities.



The main innovation in Welfare Connect is the integration of real-time GPS position data into all aspects of the donation life cycle, including impact verification, pick-up, delivery, and listing and discovery. Welfare Connect continually changes the geospatial context of donations, NGO capacity, and beneficiary need, as compared to static location variables in current systems. With a responsive online interface for government welfare body access, Welfare Connect is developed as a mobile-first application for both iOS and Android. There are four main user roles for Donor, NGO/Volunteer, Government Welfare Body, and Administrator. Each role has a unique module with precisely defined permissions and functionalities.

B. Donor Module

The individual user has the facility to register using a mobile number or social media account in the Donor section and can donate or list the donations in one of the four categories. These categories are food and daily essentials, clothing and household items, cash, and medical supplies. While making the physical donation, the donor has to fill in the details, amount, and time when the donation will be available. The technology will then tag the donation with the donor's GPS location.



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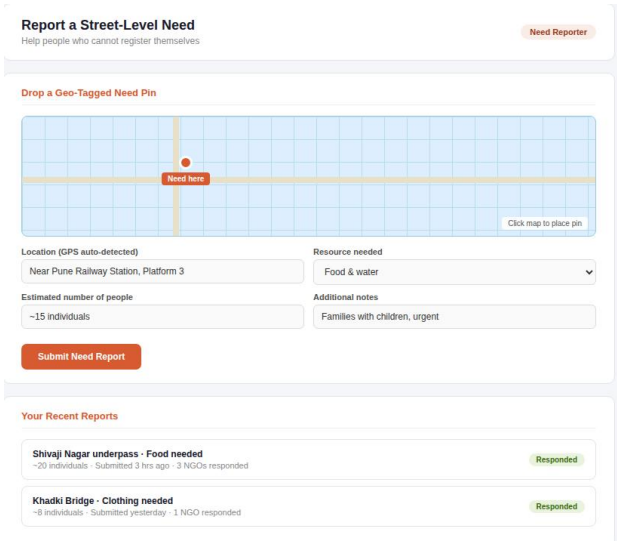
The method will also provide the facility to automatically generate urgency indicators, thus creating a high priority in the NGO feed for the donation, such as cooked food or medicine to be used within a certain time. Through a live dashboard facility in the app, the donor will be able to view the status of the donations in real time.

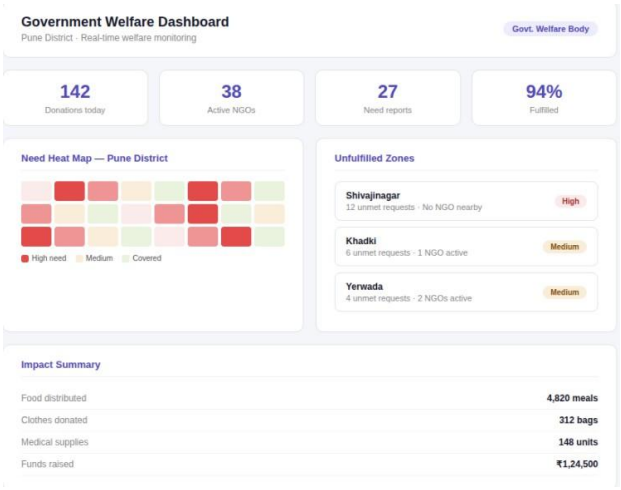
C. NGO and Volunteer Module

A live map feed is provided that shows the available donations in the customizable GPS radius. The NGOs or volunteer organizations can view the distance, time taken, and item description of the donations. The system will prioritize urgent donations such as perishables or high-quantity items. NGOs can accept the donation with one tap, which will send a notification to the donor.

In the NGO module, the volunteer coordinators can assign the pick-up task to the volunteers who are available. They can track the volunteers in real time. They can mark the task as done when the delivery is over. After the delivery of the item, the NGOs can log the transaction in the system's welfare impact record. They can send a notification to the donor.



D. Government Welfare Body Module



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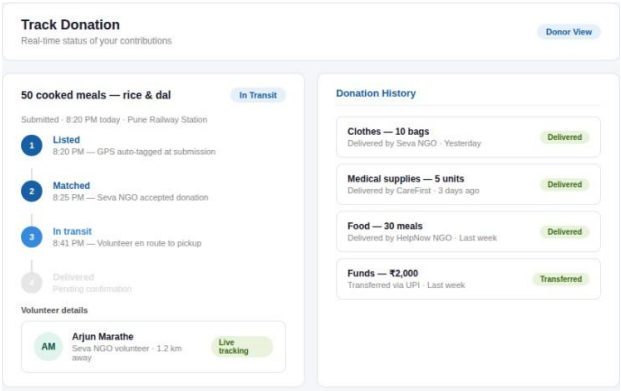
A special dashboard providing aggregate, real-time visibility of availability of donations, NGO activities, and unmet needs requests within their jurisdiction is made available to welfare bodies of the government, such as district social welfare offices, municipal corporations, and state welfare departments. This module does not need to be installed on a mobile device and can be accessed through any web browser. The dashboard helps the welfare body track the coverage of active NGOs, areas of high need using the heat map visualization tool, and areas where demand is consistently higher than supply. Evidence-based welfare planning and resource pre- positioning over time can be done using the data provided in the dashboard, especially during periods of high demand such as the monsoon season or winter, or during periods of large gatherings such as festivals or celebrations.

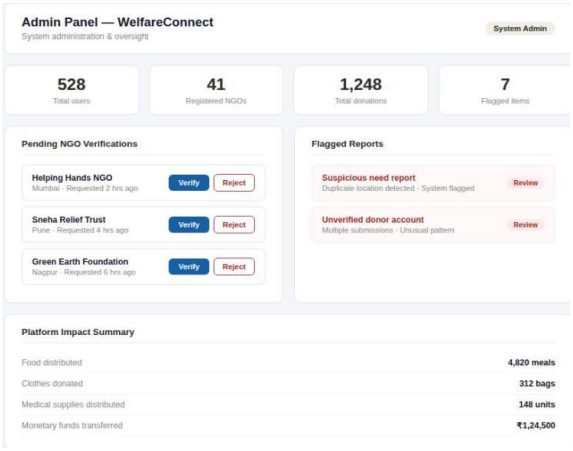
E. Street-Level Need Reporting

Street Level Need Reporting is one of the special features provided by the Welfare Connect Platform. This allows users to report a geotagged need report containing information on the location, approximate population size, and type of resources required (food, clothing, medical attention, or shelter). This can be reported by any registered user, including government field staff, NGO volunteers, or simply concerned members of society. This information will be visible to donors and NGOs in the region as need flags on the live map.

The information gap for those living in informal settlements or on the side of the road and not having access to formal assistance systems is filled by this feature. This creates a community-driven early warning system, providing ground-level intelligence to formal welfare systems through third-party need reporting.



F. Technology Architecture



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The proposed solution will be based on mobile-first development, Node.js/Express.js as the backend technology stack, and React Native for developing hybrid applications for both Android and iOS platforms. MongoDB will be used as the primary data store for user profiles, donation information, need reports, and transaction history. Google Maps Platform API will be used for providing real-time location services. Proximity query performance will be achieved through geospatial indexing.

Firebase Cloud Messaging will be used for sending push notifications to donors for updates on donations and for sending updates to NGOs for new donations received nearby. The 'Monetary Donation' category will be supported through integration with a payment gateway (UPI/Razor Pay). The administrative oversight module will be provided as a React.js panel accessible via a web browser.

V. DISCUSSION AND RESULT

Feature	Existing systems	Welfare Connect (proposed)
Platform type	Web-based only	Mobile-first (Android + iOS) + Web
Location matching	Manual city / pin code entry	Real-time GPS proximity matching
Donation categories	Single category (food or clothes)	4 categories: food, clothes, meds, funds
Beneficiary visibility	Registered NGO members only	Street-level geo- tagged need reporting
Govt. integration	None	Dedicated welfare body dashboard
Expiry / waste alerts	Not available	Automated expiry urgency flags
Real-time tracking	Limited or absent	Live status: listed to transit to delivered
Payment support	Cash / bank transfer only	UPI / Razor pay integrated

Table II. Comparison of existing donation platforms vs. Welfare Connect

The proposed solution will be based on a mobile-first approach with a Node.js and Express.js backend and React Native for developing a cross-platform mobile application for both iOS and Android. MongoDB will be used as a primary database for storing user profiles, donation data, need reports, and transaction history. Google Maps Platform API will be used for providing real-time location services. Proximity query performance will be provided by geospatial indexing.

Firebase Cloud Messaging will be used for sending push notifications to donors for updates on donations and for sending notifications to NGOs for new donations nearby. The monetary donation type will be supported through integration with a payment gateway for UPI and Razor Pay. The administrative oversight module will be provided as a React.js panel for a web browser.

There are also implications for the street-level need reporting feature itself. The feature generates a real-time community- maintained map of urgent social needs. This has never existed in such an accessible and user-friendly form. Ultimately, government agencies can use this data in an aggregated and anonymized form as a powerful tool in the pre-positioning of resources, advocacy, and welfare services. Another design decision was the recognition of the institutional reality of Indian welfare services. The design decision was to include government welfare agencies as a user role. NGOs work best in tandem with the system of welfare services in India. They work best in collaboration with the system, not in opposition to it. The technology facilitates the alignment of incentives between the formal and informal welfare systems by giving government officials real-time visibility into community-driven donation activities.

One such key factor would be the digital divide. The adoption of smartphones in the rural and semi-rural areas of India may not be uniform despite the rapid growth. Therefore, the proposed platform has to be developed in such a manner that it can operate in low-bandwidth conditions and can perform basic operations such as listing donations and reporting needs in offline mode.

VI. FUTURE SCOPE

The proposed Welfare Connect platform is an initial architecture that has the potential for expansion as more data becomes available and its usage increases. This architecture has the potential for expansion in various ways:

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• speech-Based Interface: This will help illiterate and semi-literate people list their donations and express their needs without the need for text input by integrating ASR and NLP technology for regional language speech commands.
• Aadhaar-Based Verification: Verified impact records, authentic welfare targeting, and eliminating duplication by integrating the registration of welfare beneficiaries with the digital identification provided by Aadhaar.
• Offline Mode: In the absence of internet connectivity, features like donation listing, delivery status, and need reporting will still be active, and the server will automatically synchronize once the internet connection is restored.
• AI-Based Need Prediction: This module will help welfare organizations prepare in advance by utilizing machine learning algorithms based on past trends and seasonal changes to identify high-demand areas.
• Volunteer Reward System: To ensure high volunteer participation and minimize the dropout rate in NGO operations, the reward system will include features like badges, leaderboards, and certificates.
• QR Code Donation Tracking: Each donation will have a unique QR code for tracking the donation from listing, pickup, and finally delivery.

VII. LIMITATIONS

Despite filling up critical gaps in existing systems, there are various disadvantages to the proposed Welfare Connect system, which need to be understood.
• Dependency on Smartphones and Internet Access: The most disadvantaged section of the Indian population might not have access to smartphones and/or internet access. Although this problem is partially addressed through SMS, it is not completely solved.
• GPS Accuracy Restrictions: The quality of hardware installed in devices can affect the accuracy of GPS. Interference from building locations can affect the accuracy of GPS, which is critical for proximity calculations.
• NGO & Volunteer Availability: The ability to utilize available donations might be affected if there is a lack of NGOs in such locations, especially rural areas.
• Misuse of Need Reporting: The street-level need reporting feature may be subject to false or fraudulent reports. Therefore, moderation and verification mechanisms from the community are necessary to ensure the integrity of the data.
• Barriers in Government Integration: There may be barriers in the integration process due to government agencies. Organisational acceptance cannot be guaranteed by technical capabilities.

VII. CONCLUSION

However, lack of generosity is not the key factor for the social welfare problem in India. It is simply a matter of poor coordination. Starvation is just two kilometers away, while excess food is being wasted. While patients cannot receive therapy, medicines are expiring unused. While communities cannot face winter with adequate cover, clothing is stored unused. Until today, no infrastructure has been developed to address these problems.
To address these problems, Welfare Connect proposes the GPS-enabled, mobile-first, real-time contribution coordination system. Welfare Connect is a new approach to social welfare technology by integrating individual donors, non-governmental organizations, and government welfare organizations into a location-based ecosystem, as well as the street-level need reporting tool to bring to light the invisible social welfare needs of India's marginalized populations.
Platforms currently in use have been optimized for the convenience of the donor. Beneficiary outcomes are optimized by Welfare Connect. The contribution of this paper has been the transformation in the design philosophy from transactional to relational, from static to real-time, and from donor-centric to need- centric. Platforms like this have the potential to create a new level of social infrastructure in India as the digital revolution continues to sweep the nation, making welfare distribution sensitive to the rhythms of actual human need and compassion efficient.

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