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COMMUNITY REUSE AND EXCHANGE HUB FOR NEIGHBOURHOOD ITEM SHARING

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ABSTRACT

The System is a web-based application designed to promote sustainable living and strengthen community collaboration by enabling local residents to share, exchange, and reuse unused household items. In today's consumer-driven society, many usable items are discarded prematurely, leading to increased waste and environmental impact. This system addresses the problem by providing a digital platform where individuals can connect within their neighborhood to efficiently redistribute resources. The application is developed using React.js for the frontend to deliver a responsive, user-friendly interface and Django Representational State Transfer (REST) Framework for the backend to handle business logic, authentication, and secure data processing. A My Structured Query Language (MySQL) database is used for reliable storage and management of user information, items, and request records. The system follows a role-based access model consisting of Admin and User roles. New users must register and wait for admin approval to ensure platform authenticity and safety. Once approved, users can add items they wish to share, browse items posted by others, and send item requests. Item owners have full control to approve or reject incoming requests. Upon approval, the requester is granted access to the owner's contact details, ensuring privacy and controlled communication. Administrators are responsible for approving users, monitoring listed items, and removing inappropriate or inactive entries. The platform emphasizes transparency, data integrity, and ease of use while preventing duplicate requests and unauthorized access. By encouraging reuse over disposal, the System contribute to waste reduction, resource optimization, and stronger neighborhood engagement. The system demonstrates a practical implementation of full-stack web development principles while addressing real-world environmental and social challenges.

Keywords: Community Resource Sharing, Sustainable Living, Role-Based Access Control (RBAC), Django REST Framework, React.js, Waste Reduction

1. INTRODUCTION

Urban environments consist of multiple neighborhoods that differ significantly in their socioeconomic, demographic, and environmental characteristics, resulting in diverse community needs and priorities. Variations in factors such as income, education, employment, healthcare access, public infrastructure, and population distribution influence the quality of life and the expectations of residents within each locality [1]. Communities become stronger when individuals identify common concerns and shared objectives, fostering a greater sense of belonging, trust, and social cohesion. These shared needs enable residents to recognize themselves as part of the same community and strengthen relationships that extend beyond simple geographical proximity [2]. Consequently, understanding the unique characteristics of individual neighborhoods is essential for developing policies and services that effectively address local requirements.

A neighborhood represents more than a physical location where people reside. It includes residents, business owners, employees, service providers, and other individuals who regularly

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interact within the same geographical area, contributing to the neighborhood's social and economic activities [3]. Frequent interactions through work, education, shopping, recreation, and daily commuting create strong connections not only within a neighborhood but also between different neighborhoods across a city. Therefore, neighborhoods that are geographically distant may still maintain close social and functional relationships due to continuous human movement and shared activities. Furthermore, residents' emotional attachment to their neighborhood is influenced by factors such as the amount of time spent in the area, utilization of local facilities, and demographic composition, including the presence of children, elderly individuals, and non-working adults.

Community behavior is shaped by a combination of socioeconomic status, education, social networks, ethnicity, working conditions, healthcare accessibility, and the surrounding physical environment, all of which influence the needs and priorities of local populations [4]. Considering these diverse characteristics allows policymakers to design targeted interventions rather than applying uniform solutions across all neighborhoods. Encouraging citizens to actively communicate their concerns and participate in planning processes enables governments to better understand community requirements while promoting transparency, trust, and collaborative decision-making. In recent years, increasing emphasis has been placed on involving citizens in the co-production, planning, and implementation of government development initiatives, recognizing public participation as a key factor in achieving sustainable urban development and more effective governance [5].

1.1 Problem Definition

Urban communities often discard usable household items due to the absence of a structured and trusted medium for local sharing and reuse. Existing platforms lack neighborhood-level focus, leading to inefficiencies, safety concerns, and limited user engagement. There is no centralized system to verify users and regulate item exchanges within a community. As a result, resources are wasted and environmental impact increases. The proposed system aims to address these challenges by providing a secure, admin-controlled neighborhood item sharing platform.

2. LITERATURE SURVEY

Neha Singh, et al. [5] presented a web-based platform for managing the listing, sharing, and tracking of reusable household items to address the growing issue of waste generation caused by improper disposal practices. The study emphasized that traditional methods of donating or redistributing reusable products were often unorganized, time-consuming, and limited in reach, resulting in valuable resources being discarded. The proposed platform provided a structured digital environment where users could upload item details, monitor availability, and coordinate exchanges efficiently. By simplifying the reuse process and improving accessibility to reusable goods, the system encouraged responsible consumption, minimized unnecessary waste, and promoted sustainable resource management within local communities.

Karan Malhotra, et al. [6] developed a community collaboration platform that encouraged residents to participate in repeated exchanges of reusable household items. The study highlighted that active community involvement is essential for building sustainable neighborhoods and reducing excessive consumption. The proposed platform improved communication among users through organized item listings, request management, and exchange coordination, enabling smooth interactions between community members. The implementation strengthened neighborhood relationships, increased long-term user

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participation, and promoted environmentally responsible practices through continuous resource sharing. Pooja Nair, et al. [7] proposed a digital application that implemented RBAC along with simplified item exchange workflows to improve residential resource-sharing activities. The study identified several challenges in existing sharing systems, including inefficient user management and complicated exchange procedures. To overcome these limitations, the application assigned permissions based on user roles while simplifying the processes of listing, requesting, approving, and exchanging items. This approach enhanced platform usability, reduced unnecessary purchases, and encouraged residents to maximize the utilization of available household resources.

Rohit Sharma, et al. [8] implemented a localized sharing economy platform designed to facilitate neighborhood-level exchange of reusable products through a web-based system. The study emphasized that restricting exchanges to nearby communities could reduce transportation costs, minimize delivery time, and improve accessibility to shared resources. The proposed platform enabled residents to connect with nearby users, allowing faster and more convenient exchanges while strengthening trust and cooperation among community members. The implementation demonstrated that localized sharing models not only improved resource utilization but also promoted stronger social connections and sustainable community development. Ananya Rao, et al. [9] focused on enhancing the security and reliability of community resource-sharing platforms by implementing secure authentication mechanisms and controlled user access. The study recognized that user trust is essential for the successful adoption of digital sharing systems. The proposed platform incorporated authentication procedures and access control policies to ensure that only verified users could access system resources and participate in exchanges. These security mechanisms protected user information, prevented unauthorized activities, and created a safer environment for community participation. Vikram Iyer, et al. [10] proposed a peer-to-peer digital platform that supported circular economy principles by enabling users to exchange reusable household products directly with one another. The study emphasized that extending the lifecycle of products through reuse can significantly reduce waste generation and resource consumption. The proposed implementation encouraged sustainable consumption practices by facilitating organized item exchanges, reducing dependence on purchasing new products, and improving overall resource efficiency.

Priya Deshmukh, et al. [11] implemented a web-based community sharing platform that enabled residents to donate, request, and reuse household items through an organized digital environment. The study highlighted that technology-driven sharing platforms could significantly improve accessibility to reusable products while reducing resource wastage and promoting sustainable community development. The implementation simplified the sharing process by providing structured item management and easy access to available resources. Aman Gupta, et al. [12] developed a digital solution for optimizing neighborhood resource utilization through structured sharing mechanisms that reduced unnecessary purchases and improved the efficient use of available household items. The proposed platform enabled residents to share underutilized resources conveniently, thereby lowering consumption costs and encouraging responsible resource management. Shreya Joshi, et al. [13] proposed an online community sharing platform that enhanced resident engagement while promoting sustainable reuse practices. The study

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emphasized that accessible digital platforms could strengthen community participation by simplifying communication and exchange activities. The proposed implementation introduced user-friendly features for listing, searching, requesting, and managing reusable items, making the sharing process more efficient and encouraging continuous collaboration among community members. Through improved accessibility and interaction, the platform supported long-term neighborhood cooperation and sustainable resource utilization.

4. PROPOSED METHODOLOGY

The research is a centralized web-based system designed to enable secure and organized sharing of reusable household items within local communities. As shown as Fig. 1. The system replaces informal and unstructured sharing methods with a verified, role-based digital platform. It allows users to register, obtain admin approval, list items, browse available resources, and request items efficiently. The admin module ensures authenticity by approving users and monitoring shared items. Item owners retain full control over approving or rejecting requests, ensuring safe exchanges. By integrating React.js, Django REST Framework, and MySQL, the system provides a scalable, reliable, and user-friendly solution that promotes sustainability and community collaboration.

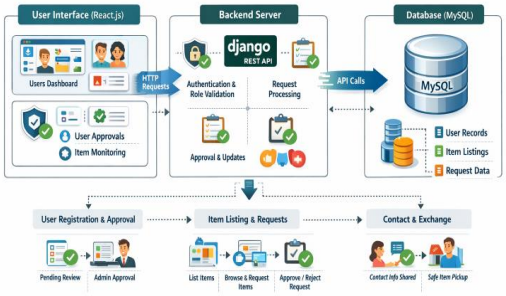


Fig. 1: Proposed System Architecture of CREH.

User Interface (Web Browser – React): The user interacts with the system through a browser-based graphical interface developed using React.js, which provides simple and intuitive navigation. Features such as user registration, login, profile viewing, item listing, item browsing, and request management are designed for ease of use. Separate dashboards are provided for users and administrators, allowing role-specific access to system functionalities. Users can add items, request items, and track request status, while administrators access approval and management controls. All user interactions are converted into secure Hyper Text Transfer Protocol (HTTP) requests and sent to the backend for processing.

Backend Server (Django REST Framework): The backend server functions as the central control unit that processes all incoming requests from the React frontend. It handles user authentication, role validation, admin approval checks, item management, and request handling operations. Core application logic such as preventing duplicate requests, enforcing permissions, approving or rejecting item requests, and status updates is implemented at this layer. The Django REST Framework ensures secure Application Programming Interface (API) communication and smooth coordination between frontend and database layers.

Database Layer (MySQL): The MySQL database is responsible for storing and managing all persistent information used by the system. It maintains structured records of users, roles, approval status, shared items, item requests, and request statuses. Relational queries ensure efficient retrieval and updating of data while maintaining consistency and integrity. Conditional data access, such as revealing contact details only after approval, is enforced through controlled queries.

User Registration and Approval Flow: When a user submits registration details, the information is validated and stored securely with a pending approval status. This mechanism prevents

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unauthorized access and ensures platform safety. The administrator reviews and approves legitimate users before granting access. Once approved, users can log in and access their respective dashboards.

Admin Management Module: The administrator acts as a system supervisor responsible for approving users, viewing platform activity, and managing shared items. Admins can monitor all listed items, remove inappropriate or inactive entries, and ensure proper system usage. This module maintains trust, security, and smooth platform operations.

User Item Sharing and Request Module: Approved users can list items they wish to share, browse items posted by other users, and send item requests. Item owners receive and manage requests by approving or rejecting them. Upon approval, requesters are granted access to the owner's contact and address information, enabling safe and controlled exchanges.

End-to-End Operational Flow: All system activities follow a structured flow from the React interface to the Django backend and MySQL database. Requests are validated, processed, and stored using secure API mechanisms. Role-based access control ensures users interact only with permitted features. The integrated workflow supports transparency, efficient resource reuse, and community-driven sustainability.

3.1 Django Framework

The Django Framework, implemented using Django REST Framework, acts as the core backend engine of the System. It receives and processes all HTTP requests sent from the React frontend, manages authentication, enforces role-based access control, and coordinates data flow between the application logic and the MySQL database. Django ensures secure request handling, validation of inputs, and consistent business logic execution. By exposing RESTful APIs, the framework enables smooth communication, scalability, and reliable system performance.

Request Reception from Frontend: The Django server receives HTTP requests from the React application through predefined REST API endpoints. Each request contains data related to user actions such as registration, login, item addition, or item request handling. Django routes these requests internally for further processing.

URL Routing and API Mapping: Django's Uniform Resource Locator (URL) dispatcher matches incoming requests to the appropriate API view based on the URL pattern. This ensures that each request is directed to the correct function handling that specific operation. Proper routing enables organized and modular backend structure.

Request Validation and Parsing: The Django REST Framework validates incoming request data for completeness and correctness. Invalid or missing data is rejected with appropriate error responses. This step ensures that only valid and safe data enters the system.

Authentication and Role Verification: Django verifies user credentials and checks user roles such as admin or user. Approval status is also validated before granting access to protected resources. This step enforces security and prevents unauthorized system usage.

Business Logic Execution: Core application logic is executed in this stage, including user approval handling, item creation, request management, duplicate request prevention, and status updates. Django ensures that rules and conditions are consistently applied across the system.

Database Interaction: Django communicates with the MySQL database to store, retrieve, or update records. Operations include inserting new users, fetching item lists, updating approval status, and storing request decisions. Transaction handling ensures data integrity.

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Response Formation and Transmission: After processing, Django constructs structured JSON responses and sends them back to the React frontend. These responses include success messages, error notifications, or requested data. This allows the frontend to update the user interface dynamically.

Continuous Feedback and Reprocessing: Based on frontend feedback or repeated user actions, new requests are generated and sent to the backend. Django continuously processes these requests, maintaining synchronization between the application layers. This feedback loop supports real-time operation.

4. RESULTS AND DISCUSSION

Fig. 2 allows the administrator to review and control access to the System. This page displays a list of registered users along with their details such as username, email address, mobile number, and current approval status. The administrator can approve pending user accounts through this interface, ensuring that only verified and authorized users are allowed to access the platform features. By providing a clear approval mechanism, this page strengthens security, prevents unauthorized participation, and maintains trust within the community. The results shown on this page demonstrate effective administrative control over user onboarding and system access.

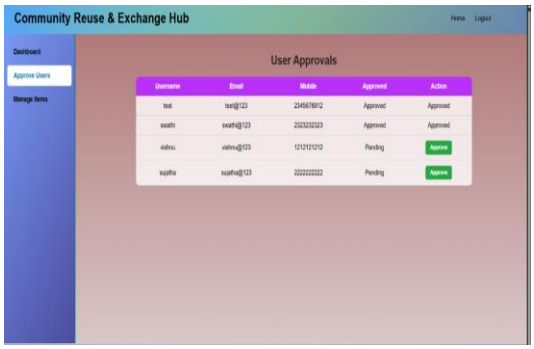


Fig. 2: User approval management page.

Fig. 3 provides a centralized view of all items shared by users in the community. It displays key details such as item name, description, owner, and current status to support effective monitoring. Administrators can take immediate action by removing inappropriate or inactive items to maintain platform quality. This interface ensures controlled item management and helps uphold trust and compliance within the system.

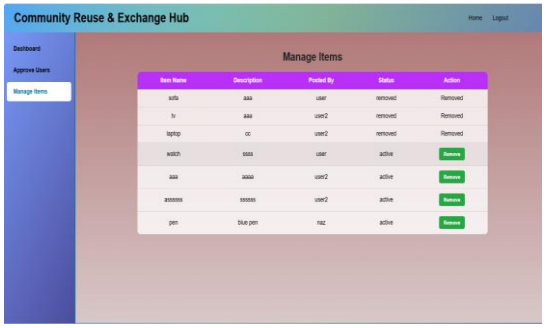


Fig. 3: Admin – manage item page.

Fig. 4 displays the list of items that a user has requested from other community members through the System. This page shows essential details such as the item name, item owner, request status, and contact information. Once a request is approved by the item owner, the user is able to view the owner's contact number and location, enabling direct coordination for item collection. This controlled visibility ensures privacy while supporting effective communication after approval. The page demonstrates successful completion of the item request workflow and reflects transparent and secure exchange between users within the community.

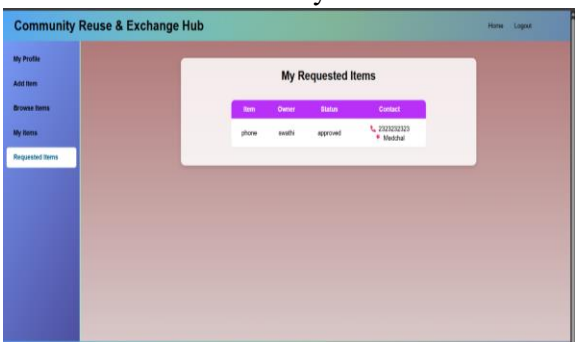


Fig. 4: My requested items page.

5. CONCLUSION

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The System successfully demonstrates an effective and secure approach to promoting sustainability and community collaboration through a web-based platform. The system replaces informal item-sharing methods with a structured, role-based solution that ensures trust, transparency, and controlled access. By integrating React.js for a responsive frontend, Django REST Framework for robust backend processing, and MySQL for reliable data storage, the platform delivers smooth performance and efficient data handling. Admin approval workflows enhance security by verifying users before granting access. Performance improvements are achieved through optimized API communication, reduced page reloads, and efficient database queries. Real-time updates ensure faster item request handling and status synchronization. Modular architecture improves maintainability and scalability while minimizing system latency. Automated request validation prevents duplicate entries and unnecessary processing overhead. Efficient state management in the frontend enhances user experience. The system reduces administrative effort, improves response times, and encourages responsible reuse of household items, contributing positively to environmental sustainability and neighborhood engagement.

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