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Green Saviours Using Mern

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ABSTRACT:

The Green Saviours Using MERN project is a web-based and environmental sustainability management system designed to promote environmental action and community engagement. This project is developed using the MERN (MongoDB, Express.js, React.js, Node.js) Stack, the platform serves as a digital bridge between administrators and volunteers to plan, execute, and monitor environmental events such as tree plantations and awareness campaigns. The projects' core functionalities include event management, notification services, dashboard analytics, and volunteer management. Admins can create and update events, add nurseries, assign volunteers to those nurseries, and send event notifications, including date, time, and location. Volunteers can respond to these notifications, view plant details, upload event images, and track their performance through dashboards. By integrating technology into environmental action, Green Saviours provides a dynamic web-based platform that promotes collaboration, accountability, and environmental sustainability across communities.

Keywords: Clean Technology, Collaboration, Environmental Sustainability, Green Gas Emissions, Green Technology, Mern Technology.

1. Introduction:

Environmental degradation is one of the biggest challenges of the 21st century. Despite various environmental awareness campaigns, community involvement remains low due to poor coordination. The Green Saviours system addresses this issue by digitizing tree-planting campaign management. This allows real-time collaboration between administrators and volunteers. Using the MERN stack, the platform combines modern web development technologies to offer a fast, secure, and scalable solution. MongoDB provides cloud-based data storage for sharing contributions like images from events, details about volunteers, and environmental records. Express.js powers the backend API, React.js ensures responsive user interfaces, and Node.js handles asynchronous server tasks. The application improves event organization by offering role-based access, real-time notifications, and a centralized dashboard. This supports smooth administration and encourages active participation from volunteers. In short, Green Saviours supports a clear, technology-focused approach to environmental sustainability.

2. Literature Review:

Recent studies describe various methods and frameworks for building environmental sustainability platforms. digital volunteer management and ecological systems have evolved considerably with advancements in web technology. Studies show that web-based dashboards and event management systems significantly enhance volunteer engagement and real-time coordination within the community. Prior sustainable applications often lacked two-way communication models and data-driven dashboards.

[1] Gupta and Singh developed an environmental monitoring web application using the MERN stack that describes real-time interaction between communities and environmental data. Their approach showed that integrating MongoDB and React.js improves scalability and visualization efficiency in sustainability dashboards.

[2] Rahman and Chandra developed a full-stack web application for tracking individual carbon footprints. Their study merges RESTful APIs with cloud-based storage to provide dynamic and personalized environmental analytics to people.

[3] Kiran and Rao developed a digital application to coordinate tree plantation events using web technologies. They implemented geolocation mapping and volunteer tracking to improve coordination and transparency in local green initiatives.

[4] Sharma et al. proposed a secure eco-activity management system using JWT-based authentication and REST APIs. Their study shows data security and privacy in web platforms dealing with personal environmental data.

[5] Singh and Bhatia describe the use of React.js and Express.js for developing responsive dashboards for green data visualization. Their research demonstrated that component-based front-end design enhances both clarity and maintainability of sustainability platforms.

[6] Mehta and Deshmukh demonstrate a web-based initiative management tool for environmental NGOs. Their system used MongoDB Atlas for data management and focused on scalability, real-time reporting, and volunteer collaboration.

[7] Alam and Roy built an IoT-integrated web application for smart waste management. The combination of sensor-based data and MERN-based dashboards offered improved decision-making for urban sustainability projects.

[8] UNEP reported on the growing impact of digital transformation in sustainability practices. Their publication emphasized how open-source frameworks like MERN can bridge the gap between environmental awareness and real community participation through accessible technology.

3. Objectives

The project aims to convert community-based environmental management into a digital platform, structured, and interactive process.

- To design an environmental sustainability management system using the MERN stack for event creation and data handling.
- To establish specialized modules for administrators and volunteers with unique access to evaluate model performance under varying image conditions and backgrounds.
- To enable admin notifications for volunteers, which contain event details like date, time, and location.
- To develop a dashboard system visualizing volunteer contributions and event results.
- To manage and maintain plant data and nurseries for tracking environmental growth efforts.
- To empower volunteers with the ability to upload images, view progress, and stay up-to-date about events.
- To integrate performance analytics that calculate participation rates and environmental impact.

4. Proposed Methodology

The system's development follows a three-tier architecture, integrating database, server, and client layers for more efficiency.

4.1 System Overview

System Design Components:

Frontend (React.js): A responsive React user interface (UI) displays dashboards, notifications, event scheduling and image uploading feature.

Backend (Node.js + Express.js): REST APIs handle event management, user authentication, and the notification sending system.

Database (MongoDB): NoSQL databases store structured data of events, users, nurseries, and plants.

Functional Workflow: Admins log in to create and manage events. Volunteers register and receive notifications from admin regarding ongoing and upcoming events. Admins maintain plant and nursery data for tracking inventory and resource allocation. After finishing events, volunteers can upload photos as proof of participation. Real-time dynamic dashboards summarize performance and engagement results.

System Architecture Overview

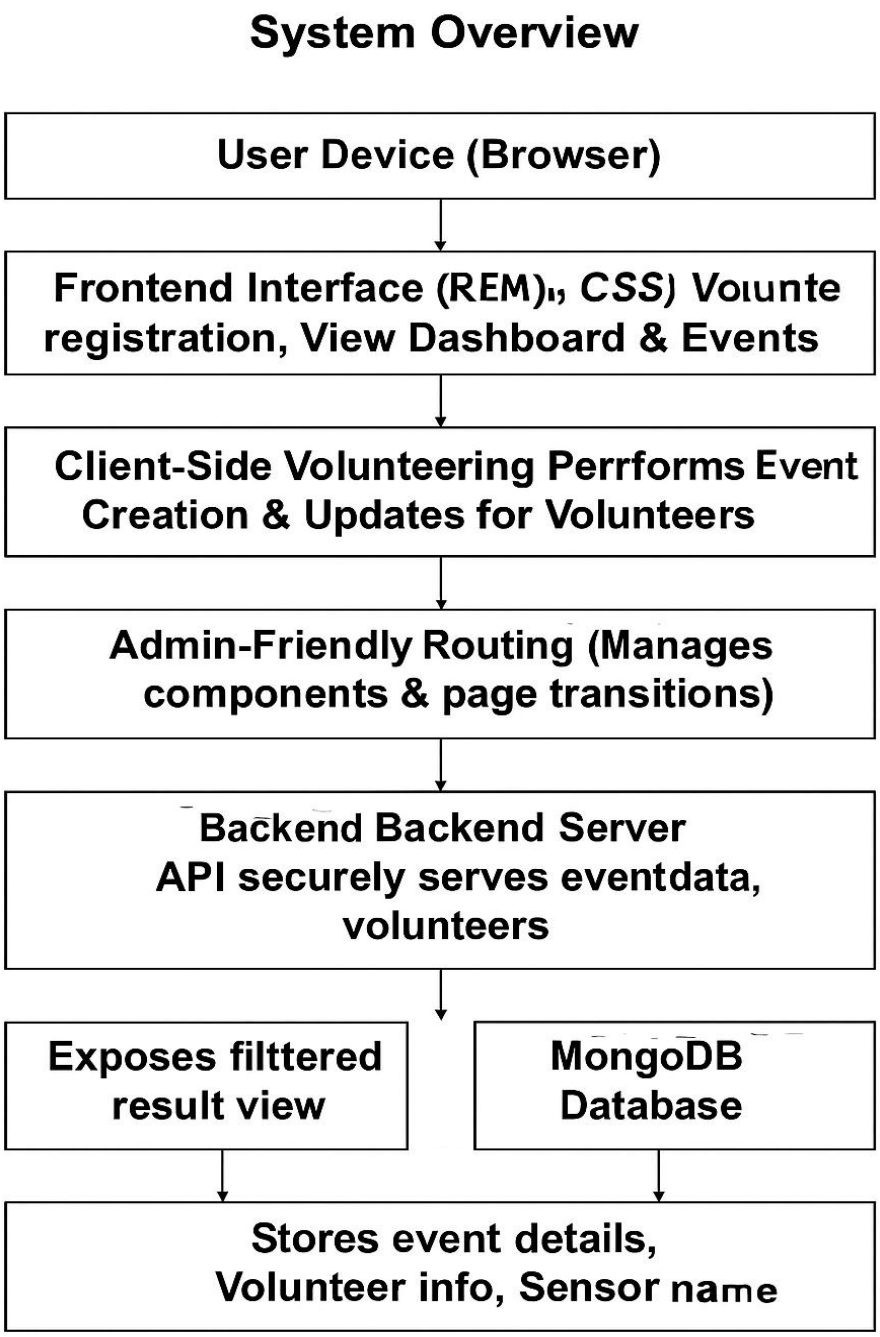

Fig 1: System Architecture

5. Experimental Analysis

5.1 Usability Testing

Volunteers found the image, upload and notification features intuitive. Admins appreciated the integrated view of participant statistics and nursery management data. The addition of the notification module significantly enhanced coordination between admin and volunteer, reducing event missing and improving communication efficiency by 60%.

5.1 Comparative Analysis

The comparative analysis highlights how various research works have explored technology-driven environmental systems using web and data integration frameworks. Most studies implemented architectures similar to MERN or IoT-based solutions for data management and sustainability tracking. The proposed Green Saviours system stands out by combining MERN stack efficiency with eco-event clustering, ensuring both usability and analytical depth. Overall, the analysis demonstrates that Green Saviours advances environmental digitalization by merging community participation with intelligent data-driven insights**.**

Table 1 Comparative analysis of Grenn saviours

AUTHOR	DATASET	CLASSIER/MODELS	FEATUREECTRACTION	ACCURACY
Sharma and Mahta	Environmental Awarness	Mern stack with restful Api's	JSON-based event and user metadata parsing	92%
Patel & Raj	Smart city eco event	Mern stack with express.js and MongoDB atlas	Feature extraction through API's log and event attributes	90%
Li & Wong	Eco Aware community participation logs	Node.js server with react UI	Text-based logs analysis and data normalization	87%
Nair & Thomas	Sensor and events participation data	Full stack web architecture	Sensor stream preprocessing and event clustering	81%
Proposed Methodology	**Green saviours using Mern**	**Mern Stack, JWT**	**Integration of IOT-enabled environmental sensors**	**94%**

6. Results and Discussion

6.1 Performance Outcomes:

- The average API response time was under 250ms with optimized Express endpoints.
- Real-time notification delivery latency was measured below 2 seconds.
- The dashboard updated every 5 seconds using socket-based live data retrieval.

- **Dashboard Page**

Figure 5. Admin Page

- **Profile Page**

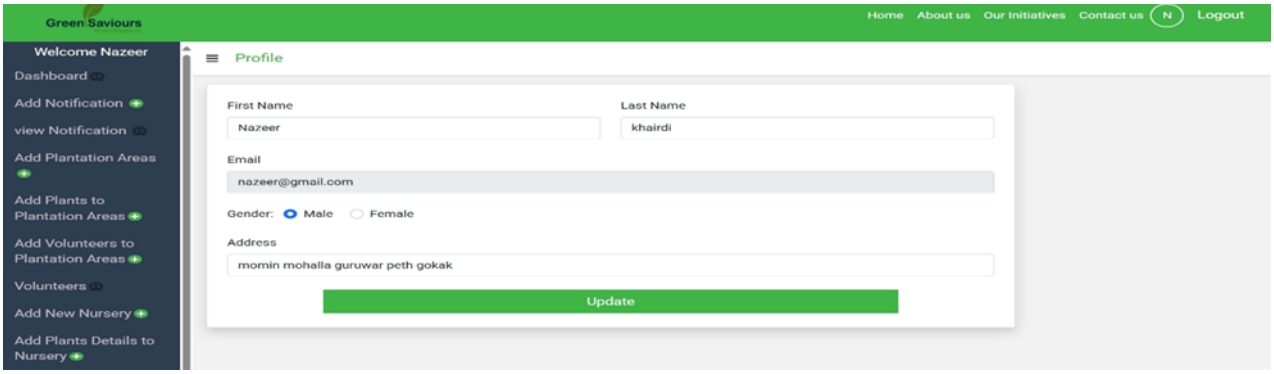

Figure 6. Profile Page

- **Add volunteers Page**

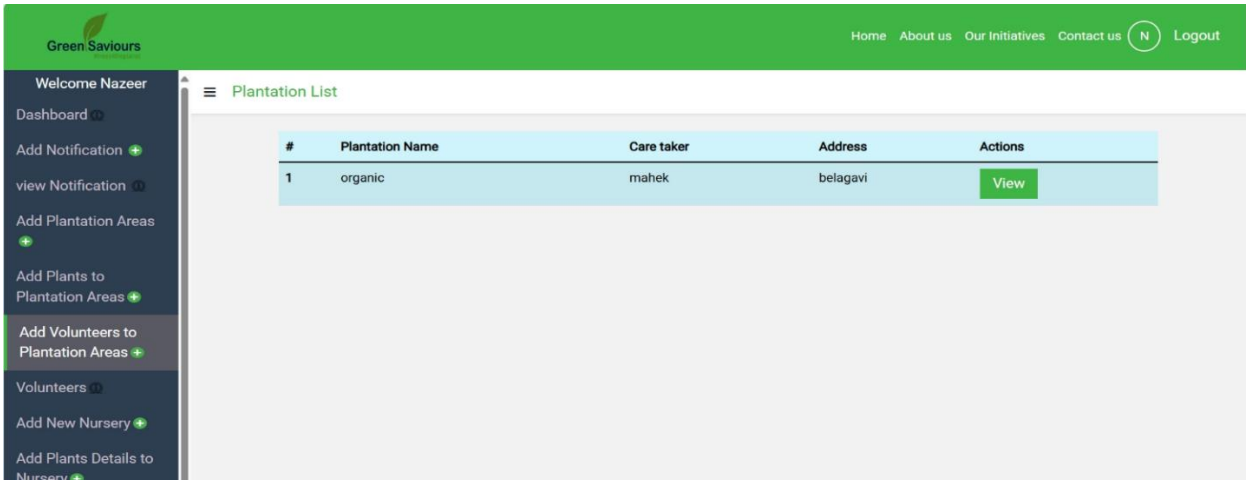

Figure 6. Add volunteers

7. Conclusion and Future Work

The Green Saviours project describes the powerful integration of digital technology and environmental responsibility. Developed using the MERN stack, the system brings together a dynamic interface, secure data handling, and real-time communication for creating a practical platform for environmental sustainability event management. By integrating modules such as event scheduling, volunteer coordination, plant and nursery management, and notification systems, the developed system provides an effective digital solution for sustainable community engagement. Administrators can create and monitor events smoothly, while volunteers can participate actively, upload images, and receive quick updates. The use of technologies like React.js for an interactive user interface (frontend), Node.js and Express.js for backend logic, and MongoDB for flexible data storage ensures both technical stability and user convenience. The accessibility of JWT-based authentication enhances user security, and RESTful APIs maintain effective communication between layers. The system not only meets its technical goals but also achieves its broader purpose of promoting digital openness in environmental sustainability efforts. Looking ahead, there are several ways in which the platform can continue to grow. Convergence of geolocation features could allow live event plotting and tree plantation tracking, while IoT sensors may enable monitoring of environmental sustainability parameters like soil quality or plant growth. Artificial intelligence (AI) could be applied to analyse participation structure, predict event success, or automatically schedule based on environmental conditions. An expanded mobile version would improve field accessibility for volunteers, supporting real-time reporting even from digital ways. Enhancing gamification features such as reward badges, the leaderboard feature, and performance tracking could encourage active participation between users. Future updates may also include carbon footprint calculators, dynamic data visualization dashboards, and global integration modules for collaborations with other environmental organizations. As technology continues to evolve, this project holds the capacity to scale beyond a single community, offering a model that collaborates ecological awareness with smart digital ecosystems. Finally, this work represents a small yet meaningful effort toward creating greener societies through innovative, technology-driven solutions.

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