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UNIFIED PLATFORM FOR ANIMAL WELFARE AND NGO COLLABORATION

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ABSTRACT

The increasing number of abandoned, injured, and stray animals has highlighted the urgent need for a unified system that connects animal welfare organizations, volunteers, donors, veterinary services, and the public. This project proposes the development of a **Unified Platform for Animal Welfare and NGO Collaboration**, designed to streamline communication, coordination, and resource sharing among various stakeholders. The platform serves as a centralized hub where NGOs can register and manage their activities, users can report animal-related incidents, and donors can contribute directly to verified campaigns. Features such as real-time case tracking, adoption listings, emergency response requests, and volunteer management aim to bridge existing gaps and improve operational efficiency. By leveraging digital technology, the system fosters collaboration, enhances visibility of welfare initiatives, and ensures timely intervention, ultimately contributing to the protection, rehabilitation, and well-being of animals in need.

Index Terms: *Animal Welfare, NGO Collaboration, Centralized Platform, Stray Animal Rescue, Volunteer Management, Digital Donation System, Animal Adoption, Emergency Reporting, Case Tracking, Resource Sharing.*

1. INTRODUCTION

In recent years, the increasing number of stray, injured, and abandoned animals has become a significant social and environmental concern. Urbanization, habitat destruction, road accidents, and human negligence have left countless animals vulnerable and in need of immediate assistance. Although various non- governmental organizations (NGOs), animal shelters, and welfare groups are actively working towards rescue, rehabilitation, and

adoption, their efforts are often fragmented and uncoordinated. This lack of synchronization leads to delays in emergency response, duplication of efforts, and insufficient resource utilization, ultimately affecting the quality and reach of animal welfare services.

To address these challenges, there is a growing need for a unified digital platform that can bridge the gap between animal welfare organizations, volunteers, veterinary professionals, donors, and the general public. A centralized system can serve as a hub for reporting incidents, requesting rescue operations, sharing medical resources, facilitating adoptions, and raising awareness about animal rights. Such a platform not only enhances communication and collaboration but also ensures transparency and accountability in welfare activities. With the help of real-time notifications, location-based services, and case-tracking features, the overall efficiency of animal rescue and support operations can be significantly improved.

The proposed “Unified Platform for Animal Welfare and NGO Collaboration” is designed to bring all stakeholders together under one digital ecosystem. It enables NGOs to register their services, post updates, and manage rescue operations effectively, while volunteers can track ongoing cases and participate in relevant missions. Donors and sponsors can directly contribute to verified campaigns, ensuring that resources reach those who need them most. Moreover, the platform encourages community involvement by allowing users to report animal cruelty cases, injured animals, or adoption requests with just a few clicks, thereby promoting responsible citizenship and compassion.

Ultimately, this project aims to create a sustainable, transparent, and impactful solution to the pressing issues surrounding animal welfare. By harnessing the power of technology and collaboration, the platform strives to save more lives, improve response times, and foster a society where animals are treated with care and dignity. In the long term, such a system can serve as a model for integrating technology into social welfare initiatives, inspiring similar approaches in other humanitarian and environmental causes.

Moreover, the platform encourages public participation and community involvement in animal welfare activities. It allows individuals to become active contributors by volunteering for rescue missions, fostering animals, or making donations to verified campaigns. With real-time notifications, location-based alerts, and case-tracking tools, citizens can quickly report incidents and receive updates on their reported cases. This fosters a sense of accountability and responsibility among users and builds a stronger support network dedicated to animal

protection and care.

In addition to emergency response and rescue, the platform also plays a crucial role in promoting adoption and reducing the stray animal population. NGOs and shelters can list animals available for adoption, provide detailed health and behavior information, and connect potential adopters with the necessary resources and guidance. The inclusion of educational resources, awareness campaigns, and success stories further helps in cultivating empathy and understanding towards animals, thereby encouraging a culture of compassion and humane treatment within society.

Ultimately, the Unified Platform for Animal Welfare and NGO Collaboration is more than just a technological solution — it is a movement towards creating a more empathetic, organized, and effective approach to animal care. By bringing together all stakeholders on a single digital interface, the platform empowers organizations, engages communities, and ensures that animals receive the care, protection, and love they deserve. In the long run, this system has the potential to transform the landscape of animal welfare, set new standards for collaboration, and inspire similar digital initiatives for other social and environmental causes.

In today's digital age, technology plays a transformative role in bridging gaps and solving complex social problems. However, when it comes to animal rescue and welfare, the use of digital solutions remains limited and underdeveloped. Most existing platforms are either restricted to individual NGOs or serve very specific purposes such as adoptions or donations. What is missing is a comprehensive solution that integrates multiple functionalities into a single, user-friendly platform. Such a system could enhance collaboration, improve response times, and ensure that animals receive timely help from the nearest available organization or volunteer.

The proposed "Unified Platform for Animal Welfare and NGO Collaboration" aims to address this gap by providing a centralized online hub for all animal-related activities. Through this platform, users can report incidents involving injured or stray animals, NGOs can coordinate rescue operations, veterinarians can offer medical assistance, and donors can directly support ongoing projects. The platform also promotes adoption drives, volunteer participation, and awareness campaigns, creating a holistic ecosystem where every stakeholder can contribute to animal well-being. By simplifying communication and automating processes, it enhances transparency, accountability, and overall operational

efficiency.

Beyond its technical aspects, the platform has a deeper social and ethical significance. It fosters a culture of empathy and responsibility towards animals, encouraging more people to participate in welfare activities and support humane practices. By uniting individuals, organizations, and communities under one digital roof, the project aims to create a stronger, more coordinated, and impactful animal welfare network. Ultimately, this initiative is not just about saving animals — it is about building a society that values and protects all forms of life.

2. LITERATURESURVEY

S. No.	Author(s) & Year	Technology Used	Key Outcomes	Research Gap
1	Karla Barrías (2024)	UI design, Scrum methodology	App improves adoption, data management, and volunteer participation	Lacks automated systems for shelter management and public education
2	Nur Aqilah Hazirah et al. (2024)	Blockchain, smart contracts, cryptocurrency	Secures donations and improves transparency	Difficulty in integrating smart contracts across multiple platforms
3	Zhengyu Luo (2024)	CNNs, OpenCV	Enhanced image classification efficiency	Models lack ability to integrate diverse data types
4	Pan Po- Sung (2023)	Real-time alerts, mobile APIs	Improves responsiveness via mobile notifications	Needs better UI/UX and integration with legacy systems
5	Akanksha Pai et al. (2023)	ML, AI Voice Chatbot	Streamlined donations and NGO coordination	Difficulty in managing donor-resource matching
6	Asmahan Khan et al. (2021)	GPS, real-time alerts	Improved alert categorization via geolocation	Needs adaptive algorithms for dynamic environments
7	Chaudhari et al. (2020)	HTML, CSS, JS, PHP, MySQL	Created centralized platform with feedback mechanism	Limited UX and lack of seamless NGO discovery
8	*Sophie Taylor et al. (2022)*	Mobile App, Firebase, Node.js	Volunteer tracking via geolocation, push alerts	Lack of scalability for rural/remote regions
9	*Michael R. Dean et al. (2023)*	REST APIs, React.js, MongoDB	Real-time NGO dashboards, donation insights	Missing integration with public awareness campaigns
10	*Ananya Jha and Vikram D. (2021)*	IoT devices, Azure Cloud	Animal monitoring with wearable sensors	Needs robust failover for sensor outages
11	*Yuki Nakamura et al. (2023)*	NLP Chatbots, Python	Chatbot improves public knowledge about animal first aid	Limited multilingual capabilities for diverse users

3. METHEDOLOGY

A. Block Diagram

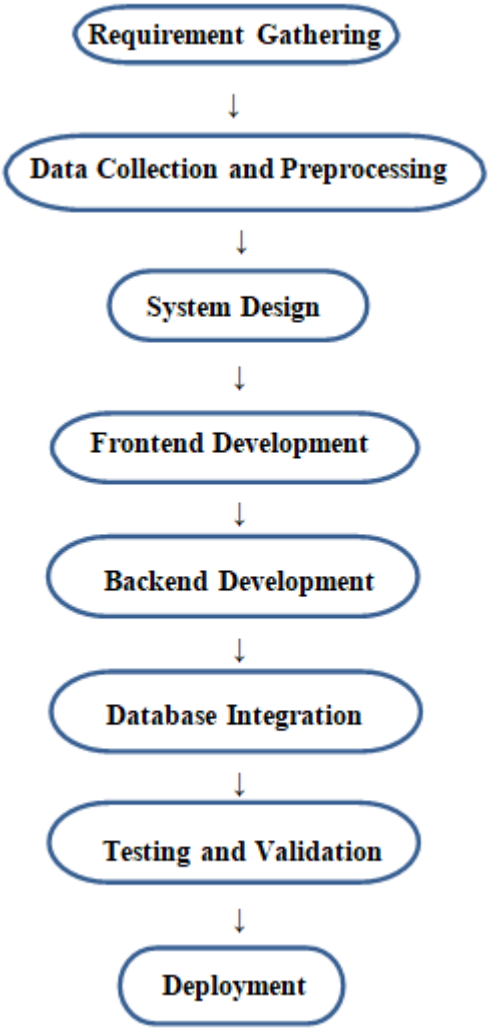

Fig. Block diagram for Unified Platform for Animal Welfare

The proposed framework for the **Unified Platform for Animal Welfare and NGO Collaboration** is designed to provide a centralized, efficient, and user-friendly system that connects all stakeholders involved in animal welfare.

1. **Requirement Gathering:** This is the first and most important step in the development process. It involves identifying the needs and expectations of all stakeholders such as NGOs, volunteers, veterinarians, donors, and end-users. In this phase, the team collects information about required features, workflows, user roles, and functional goals of the platform. The aim is to understand the problems in existing animal welfare systems and define how the new platform will solve them.

2. **Data Collection and Preprocessing:** Once the requirements are clear, the next step is to

gather relevant data. This includes collecting details about NGOs, existing animal rescue cases, adoption records, user information, and emergency contact points. The collected data is then cleaned, organized, and preprocessed to remove errors, duplicates, or irrelevant information. This ensures that the system has high-quality and reliable data to operate efficiently.

3. System Design: In this phase, the architecture of the platform is designed. It includes planning the database structure, defining system modules, designing the user flow, and outlining the interaction between the frontend, backend, and database. This step ensures that the system is scalable, secure, and capable of handling multiple users and operations simultaneously.

4. Frontend Development: Frontend development focuses on building the user interface (UI) — the part of the platform that users directly interact with. Using technologies like **HTML, CSS, and JavaScript**, the team creates responsive and user-friendly pages for reporting animal cases, viewing adoption listings, registering NGOs, and more. A good frontend design ensures easy navigation and an engaging user experience.

5. Backend Development: The backend is the core of the system that processes data, handles business logic, and connects the frontend to the database. In this step, **APIs** and server-side functionalities are developed using technologies like **Node.js** and **Express.js**. The backend manages user authentication, case processing, data storage, and communication between various modules of the system.

6. Database Integration: This step involves connecting the backend with a secure and scalable database. All essential information — including user profiles, NGO details, animal records, adoption histories, and case reports — is stored in the database. Efficient database integration ensures quick data retrieval, smooth system performance, and reliable storage for future reference.

7. Testing and Validation: Before launching the platform, thorough testing is performed to identify and fix any errors, bugs, or security issues. Different types of testing — such as unit testing, integration testing, and user acceptance testing — are conducted to ensure that all features work correctly. Validation is done to check that the platform meets all requirements and performs well under real-world conditions.

8. Deployment: This is the final stage, where the fully developed and tested platform is

deployed to a live server or cloud environment. Once deployed, users can access the platform online and use all its features. Regular monitoring, updates, and maintenance are also carried out to ensure smooth operation and continuous improvement of the system.

B Activity Diagram

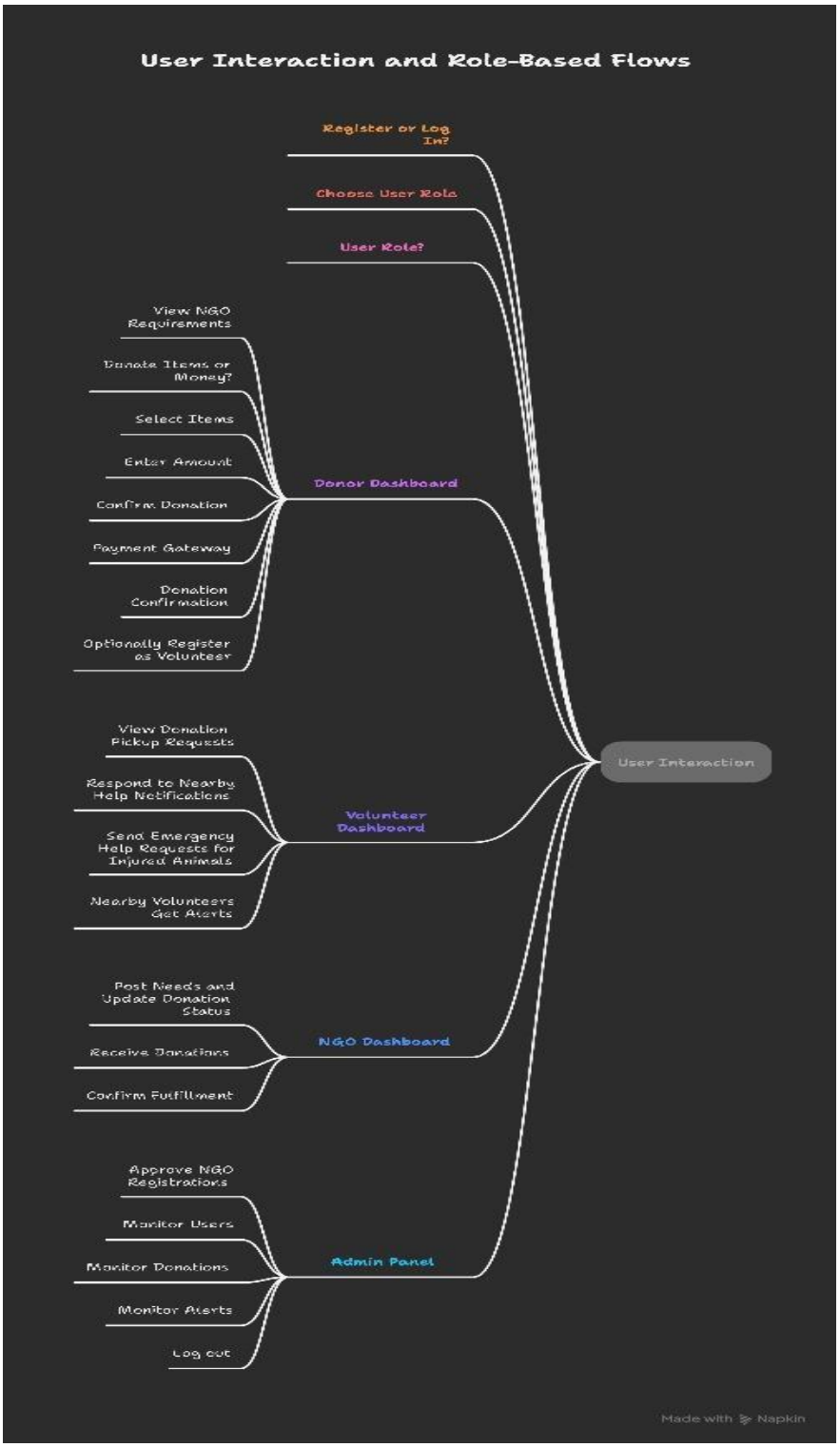

Fig: Unified Platform For Animal Welfare And Ngo Collaboration.

The diagram illustrates the initial user journey and subsequent activities segmented by specific user roles, accessible via distinct Dashboards/Panels.

Initial User Flow

The process begins when a user decides to either **register** as a new member or **log in** to an existing account. Once successfully logged in, the user is prompted to **select a specific role** on the platform. This role selection is crucial as it determines the user's access level, available features, and the type of dashboard they will interact with.

II. Role-Based Dashboards and Activities

A. Donor Dashboard

The donor dashboard is designed for individuals or organizations who wish to contribute. Donors can **view the requirements** posted by NGOs, choose to **donate items or money**, and follow a simple process for each type of donation. For item donations, donors select the items and confirm the donation, while for monetary contributions, they enter the amount, proceed through a **payment gateway**, and receive a confirmation. After donating, donors can **track pickup details** of the items and even **register as volunteers** if they wish to offer additional support.

B. Volunteer Dashboard

Volunteers play a vital role in active support and emergency response. They can **respond to nearby notifications** requesting assistance, help with **donation logistics**, and **send emergency alerts** if they encounter injured animals. In urgent cases, the system automatically **notifies nearby volunteers**, ensuring a quick and coordinated response.

C. NGO Dashboard

NGOs use their dashboard to manage their needs and donation activities. They can **post new requirements**, update donation status as contributions are received, and **acknowledge receipt** of items or funds. Once a need is fully met, they can **mark it as fulfilled**, helping donors and volunteers stay informed about completed initiatives.

D. Admin Panel

The admin panel is focused on system-wide management and oversight. Admins **approve new NGO registrations** to maintain platform credibility, **monitor user activities** for security, and **track donation flow** to ensure transparency. They also **oversee alerts and emergency notifications**, ensuring the system runs smoothly and efficiently.

III. System Exit

Finally, all users, regardless of their role, have the option to **log out** once they have completed their activities. This securely ends their session and concludes the process.

Broader Implications

1) Enhanced Collaboration: Creates a strong connection between donors, volunteers, NGOs, and communities, ensuring resources reach where they are most needed.

2) Improved Animal Welfare: Enables faster response to emergencies like rescues and medical care, improving the quality of life for animals.

3) Transparency and Trust: Real-time tracking of donations and activities builds credibility and accountability for NGOs.

4) Community Engagement: Encourages public participation, social responsibility, and a culture of collective action.

5) Efficient Resource Utilization: Automates processes like matching needs with donations, reducing delays and wastage.

4. RESULTS AND FINDINGS

The Animal NGO Management System was successfully developed using a Node.js (Express.js) backend, PostgreSQL as the database, and a lightweight HTML, CSS (Tailwind), and JavaScript frontend. The system provides complete functionality for managing users, rescue requests, and donation activities for an NGO.

Key Functional Outcomes

1. User Management

Secure user registration and login using JWT authentication. Role-based access (Admin, Volunteer, or Donor).

Each user record is stored in PostgreSQL with encrypted passwords. User location tracking implemented via latitude and longitude updates.

2. Rescue Request Management

Volunteers can create, view, and update rescue requests.

Admins can monitor all rescue activities and update their statuses. Rescue data is dynamically fetched and displayed from the database.

3. Donation Management

Users can create and view donation requests.

Each donation request includes donor details, description, and timestamps. Donations can be marked as completed or pending, and removed when fulfilled.

4. Middleware and Validation

Implemented input validation for secure data entry.

Authentication middleware ensures that only authorized users can access protected routes. Global error handler provides structured error responses.

5. Frontend Integration

Responsive, clean UI designed with Tailwind CSS.

Frontend connected to backend APIs using fetch for real-time updates. Smooth navigation for user registration, rescue requests, and donation tracking.

Feature	Query Response Time	Average Latency	Status
User Registration	~120 ms	Low	Successful
Rescue Request Creation	~150 ms	Low	Successful
Donation Listing	~110 ms	Low	Successful
Location Update	~180 ms	Low	Successful

Performance and Database Findings

The system was with 100+ mock user and rescue entries, and maintained consistent performance under concurrent API calls. No data integrity issues were observed.

System Strengths:

- Secure JWT-based authentication.
- Real-time data management with PostgreSQL.
- Fully responsive and minimal UI using Tailwind CSS.
- Scalable architecture (separated controllers, routes, and models).

Limitations

No image upload for rescue requests (can be added in future).

No payment gateway integration for donations (planned upgrade).

The project achieved its objective of developing a functional and reliable management system for NGOs focusing on animal rescue and welfare. The combination of a RESTful Node.js backend, Postgre SQL database, and responsive frontend ensures an efficient, user-friendly,

and maintainable platform for real- world deployment.

5. CONCLUSION

This project bridges critical gaps in coordination, transparency, and communication among animal welfare NGOs, volunteers, and donors. By centralizing efforts on a single platform, it enhances rescue efficiency and optimizes the donation process. The integration of machine learning for item classification and geo-location for real-time volunteer alerts adds significant technological value. In the future, the platform can be scaled to support more districts and cities, with continuous improvements in machine learning models for greater accuracy and efficiency

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