

# Integrated Care :Veterinary First Aid and Plant Disease Management for Healthier Animals and Crops

\*B Mahesh Reddy<sup>1</sup>, Shaik Muhammad Faizan<sup>2</sup>, Pinjari Abdul Rahiman<sup>3</sup>, Syamanaboyina Hari Prasad<sup>4</sup>, Uppara Kartheek<sup>5</sup>

<sup>1</sup>Assisstant Professor, Department of CSE, KSRM College of Engineering, Kadapa, India <sup>2,3,4,5</sup>Student, Department of CSE, KSRM College of Engineering, Kadapa, India

### Abstract:

Farmers and villagers often face challenges in managing plant diseases and providing adequate first aid to animals due to a lack of immediate access to expert advice. The inability to quickly identify and treat plant diseases leads to crop loss, while delayed veterinary assistance can worsen the health of livestock. Traditional methods of communication with agronomists and veterinarians are slow and inefficient, especially in remote areas where access to professional care is limited. The "Integrated Care: Veterinary First Aid and Plant Disease Management" system addresses these issues by enabling farmers and villagers to capture images or videos of plant diseases or injured animals and send them to nearby experts. Agronomists can provide timely recommendations on disease management and fertilizers, while veterinarians can advise on first aid for animals. Built on the MERN stack, the platform ensures real-time communication, empowering rural communities with quick access to professional advice and improving both crop health and animal welfare.

**Keywords:** MERN, Authentication, Authorization, Hashing, Security, Plant Disease Management, Veterinary First Aid, Change Password, Cloudinary, Image Sharing, Video Sharing.

### **1** Introduction

Agriculture and livestock management are essential components of rural livelihoods, yet farmers and villagers often face challenges in identifying plant diseases and providing first aid to animals due to limited access to expert advice. The inability to diagnose and treat plant diseases in a timely manner results in significant crop losses, while delays in veterinary care can deteriorate the health of livestock. Traditional methods of consultation diseases, but expert recommendations remain crucial for accurate diagnosis and treatment.

This research introduces an innovative system, "Integrated Care: Veterinary First Aid and Plant Disease Management," designed to bridge the gap between farmers and experts using modern technology. Built on the MongoDB, Express.js, Node.js, HTML5, CSS and BootStrap. This system enables users to capture and upload images or videos of diseased plants or injured animals, facilitating real-time diagnosis and expert recommendations. By leveraging digital communication, this platform empowers rural communities with quick, reliable, and professional agricultural and veterinary support.

The proposed solution emphasizes accessibility, ease of use, and real-time expert consultation, ensuring that farmers receive timely interventions to improve crop health and animal welfare. Through this approach, the system not only enhances agricultural productivity but also contributes to sustainable farming practices and economic stability in rural areas. This paper explores the development, functionality, and impact of the proposed platform, highlighting its potential to revolutionize rural healthcare for plants and animals.



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# **2**. LITERATURE SURVEY

[1] Digital Agriculture and Remote Consultation Platforms.

The Food and Agriculture Organization (FAO) (2021) highlights how digital agriculture plays a crucial role in improving farming efficiency and reducing the dependency on physical consultations. Studies show that mobile-based advisory services and AI-powered diagnostic tools can provide timely recommendations, thereby improving crop yields and animal health outcomes.

Similarly, Sharma & Gupta (2021) discuss machine learning applications in agriculture, emphasizing how image-based disease detection can assist farmers in remote areas. The research underscores that image recognition models can help in the identification of plant with agronomists and veterinarians are slow and inefficient, particularly in remote areas where professional assistance is scarce.





## [2] Existing Systems for Plant Disease Diagnosis:

Several mobile and web-based platforms have been developed to support farmers in identifying plant diseases. Patel & Desai (2022) review various agricultural mobile applications, focusing on their ability to diagnose plant diseases. However, most existing systems lack personalized recommendations from agronomists, making them less effective for farmers who require specific advice based on soil conditions, weather patterns, and local farming practices.

Moreover, AI-driven solutions such as Plantix and AgroAI provide disease identification through image processing but do not integrate real-time expert feedback, making them incomplete solutions for farmers who require customized treatment plans and immediate consultations.

## [3] Veterinary Support and Telemedicine for Animal Health

Veterinary services in rural areas are often limited due to geographical constraints and a shortage of professionals. Larson & McMillan (2017) highlight how telemedicine has revolutionized healthcare in rural communities, allowing farmers to remotely consult veterinarians for first-aid advice.

The American Veterinary Medical Association (AVMA) also recognizes the importance of virtual veterinary care, particularly for livestock management. However, many existing platforms do not integrate both veterinary and agricultural disease management, leading to fragmented solutions.

## [4] MERN Stack for Scalable and Real-Time Applications

The proposed system utilizes the MongoDB, Express.js, HTML, CSS, JS, Node.js, which provides a scalable and real-time communication platform. World Bank (2020) discusses the impact of cloud-based solutions in agriculture, emphasizing how web applications can connect farmers to experts with minimal infrastructure requirements.

Furthermore, research on real-time notification systems (Kaur & Singh, 2018) suggests that instant alerts and messaging systems significantly improve user engagement and response time in advisory



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platforms. The use of React.js for front-end development ensures a user-friendly experience, while Node.js and MongoDB facilitate efficient data management and retrieval.

Ensuring a user-friendly interface accessible to low-tech users, Implementing security features [5] Limitations of Existing Systems:

• Delayed Response Times: Many platforms lack real-time expert intervention, causing delays in disease treatment.

• Limited Accessibility: Several solutions require high-end smartphones and continuous internet C. Testing & Performance Optimization

• Lack of Veterinary Integration: Most existing systems focus only on plant diseases and do not address animal health management.

• Absence of Localized Recommendations: Current digital solutions provide generalized advice but fail to consider regional factors like soil conditions, climate, and local pests





[6] Proposed System as a Solution:

The Integrated Care platform overcomes these limitations by:

- Providing real-time expert feedback from both agronomists and veterinarians.
- Middleware to handle user permissions, security, and validation.
- o Integration with Mapbox API for location-based expert recommendations.
- Database Management (MongoDB):
- Stores user profiles, disease queries, expert responses, and feedback data.
- Optimized for fast retrieval and query processing.
- Security & Privacy Measures:
- Session-based authentication using Passport.js.
- Data encryption for secure storage of sensitive information.
- o Role-based access control to prevent unauthorized actions.

• Allowing farmers to upload images/videos for accurate diagnosis.

### **3. METHODOLOGY**

A. System Architecture and Workflow

The system is built using the MERN stack MongoDB, Express.js, HTML, CSS, JS, BootStrap, Node.js to ensure scalability, performance, and real-time interactivity. The workflow consists of the following:

To ensure reliability and scalability, rigorous testing methodologies are applied:

1. Functional Testing:

- o Verify image upload, expert responses, and authentication workflows.
- 2. Usability Testing:
- Ensure an intuitive user experience, especially for low-tech farmers.

- 3. Performance Testing:
- Evaluate server response time and database query efficiency.

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B. Web-Based Platform Development

The platform is designed to be responsive, lightweight, and accessible, even in low-connectivity environments. Key components:

- 1. Front-End Development (React.js):
- $_{\odot}\,$  A user-friendly dashboard for farmers and experts.
- o Image/video upload feature with drag-and-drop functionality.
- o Real-time notifications for expert responses.
- 2. Back-End Development (Node.js & Express.js):
- API endpoints for user authentication, file uploads, and expert responses.
- $_{\odot}\,$  Middleware to handle user permissions, security, and validation.
- Integration with Mapbox API for location-based expert recommendations.
- 3. Database Management (MongoDB):
- Stores user profiles, disease queries, expert responses, and feedback data.
- o Optimized for fast retrieval and query processing.
- 4. Security & Privacy Measures:
- o Session-based authentication using Passport.js.
- Data encryption for secure storage of sensitive information.
- o Role-based access control to prevent unauthorized actions.
- C. Testing & Performance Optimization

Testing and performance optimization are critical for ensuring that a software application is reliable, secure, and efficient. In the context of Integrated Care: Veterinary First Aid and Plant Disease Management, rigorous testing and optimization ensure that the platform provides accurate, real-time, and seamless services to farmers and experts



Fig: Flow Architecture

D. Deployment & Future Enhancements

The final version of the platform will be deployed on cloud servers (AWS, Firebase, or Heroku) for high availability and scalability.

- 1. Deployment Strategy:
- Continuous Integration/Continuous Deployment (CI/CD) using GitHub Actions.
- Cloud storage for handling large media uploads.
- 2. Future Enhancements:
- AI-based disease prediction using machine learning models.
- Offline functionality for farmers with limited internet access.
- Multilingual support for accessibility in diverse rural communities.

## **4. CONCLUSION**

The Integrated Care: Veterinary First Aid and Plant Disease Management system addresses the critical challenges faced by farmers due to limited access to expert guidance, delayed disease diagnosis, and inadequate veterinary care. By leveraging modern web technologies, the system enables farmers to upload images or videos of plant diseases or animal health issues and receive real-time expert recommendations. Security and privacy are prioritized through data encryption and



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role-based authentication, ensuring safe interactions between users and experts. The system can be further enhanced by integrating AI-based disease detection, offline access, and multilingual support, making it globally adaptable and highly effective. This research demonstrates the transformative potential of digital agricultural solutions in enhancing crop productivity and animal health. By combining expert knowledge with technology, the system offers a sustainable, scalable, and practical solution for rural communities. Future advancements in AI, smart farming, and veterinary telemedicine will further improve agricultural support systems, paving the way for efficient and technology-driven farming practices.

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