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Agrowsmart: A Farming Web Site

Prathmesh B. Desai, Yashraj S. Bhosale, Sanchit P. Mane, Pranali S. Kadam, Ravina C. Jadhav
Under the Guidance of Mrs.**M.M.Kamble**
Nanasaheb Mahadik Polytechnic Institue,peth

Abstract

Agriculture remains the backbone of many developing economies, yet farmers often face challenges such as lack of timely market information, limited awareness of government schemes, high equipment costs, and insufficient expert guidance. With the increasing availability of internet services and digital technologies, web-based agricultural platforms can play a vital role in bridging this information gap. This project presents Agrow Smart, a smart agriculture web application developed using the Next.js framework, designed to provide farmers with a centralized digital platform for accessing essential agricultural services.

The system integrates features such as real-time market rates, AI-based assistance for crop- related guidance, a farmer community forum for knowledge sharing, information on government schemes, machine rental services, and personalized user profiles. By leveraging the performance and scalability advantages of Next.js, including server-side rendering and efficient data handling, the platform ensures fast and reliable access even in low-bandwidth conditions.

Overall, Agrow Smart aims to improve agricultural productivity, reduce operational costs, and support informed decision-making by empowering farmers through modern, accessible, and intelligent digital solutions.

Introduction

Agriculture is essential for food security and economic stability, but farmers often struggle with scattered information, lack of market price awareness, limited knowledge of government schemes, and restricted access to expert advice. Traditional methods are slow, unreliable, and costly. To overcome these challenges.

Agrow Smart is developed as a web-based smart agriculture platform using Next.js. It provides a secure, single dashboard that offers real-time information, intelligent assistance, and agriculture-related services. The main goal of Agrow Smart is to help farmers make informed decisions, improve productivity, reduce costs, and enhance overall accessibility through modern web technology.

Literature review

Earlier agricultural information systems were mostly static websites or government portals that provided limited and outdated information. These systems often lacked personalization, interactive features, and real-time updates. Farmers had to rely on physical markets, agents, or local offices to obtain price details and scheme information.

Later developments introduced mobile applications and web portals offering market prices and weather updates. While these systems improved accessibility, many of them were limited to a single service and did not provide an integrated solution. Additionally, several platforms depended on proprietary systems or complex interfaces, making them difficult for rural users to adopt. Recent advancements in web development, especially frameworks like React and Next.js, have enabled the creation of fast, responsive, and scalable applications.

AI-based assistance and community-driven platforms have also shown promise in delivering personalized agricultural guidance and peer learning. Agrow Smart builds upon these advancements by combining multiple agriculture-related services into a single web platform, ensuring simplicity, performance, and usability for farmers.

Proposed System/Methodology

The proposed Agrow Smart system is a web-based application designed using a modular and component-based architecture. The system workflow begins with user authentication and proceeds through a centralized dashboard that provides access to multiple agricultural services. The system is divided into the following major modules:

1. User Authentication Module
2. Dashboard Module
3. Market Rate Module
4. AI Assistance Module
5. Community Module
6. Government Scheme Module
7. Machine Rent Module
8. User Profile Module

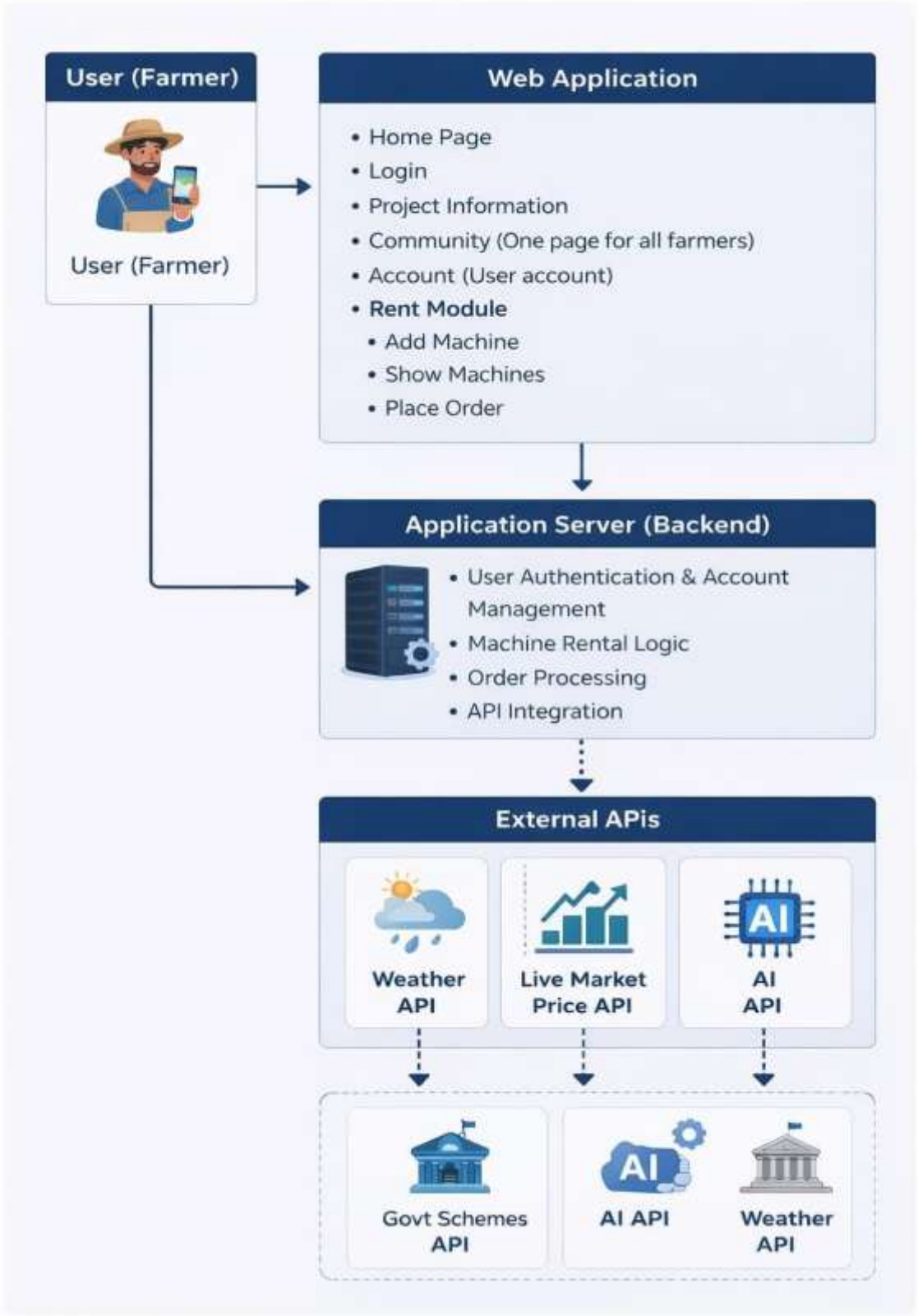
Once a user signs up or logs in, the system validates credentials and redirects the user to the dashboard. Each service is accessible through dashboard shortcuts, allowing quick navigation and efficient usage. The application uses Next.js features such as server-side rendering and optimized routing to ensure fast load times and smooth user experience.

System architecture

Agrow Smart follows a client–server architecture, where:

- The client side is built using Next.js and React components.
- The server side handles authentication, data fetching, and API integration.
- The database stores user details, preferences, and service-related data.

The modular design ensures scalability, maintainability, and easy future enhancements.



Implementation

The Agrow Smart website is implemented using Next.js, which provides built-in routing, optimized rendering, and improved performance. The user interface is designed with reusable components such as navigation bars, cards, forms, and dashboards to maintain consistency across the platform.

Home Page

Agrow Smart Home Page serves as the landing page to attract farmers and showcase the platform's value instantly. It uses a modern, responsive design with Next.js and Tailwind CSS.

Authentication

Secure authentication mechanisms ensure that only authorized users can access the dashboard and services. Dashboard After login, users are redirected to the dashboard, which displays shortcuts to all major features of the system.

Working

The Agrow Smart system operates in a step-by-step workflow:

1. The user opens the website and accesses the home page.
2. The user registers or logs in using valid credentials.
3. Upon successful authentication, the user is redirected to the dashboard.
4. From the dashboard, the user can navigate to:

o Market Rate: View current crop prices.

o AI Assistance: Receive intelligent farming suggestions.

o Community: Interact with other farmers.

o Government Scheme: Access scheme details and benefits.

o Machine Rent: Find and rent agricultural machinery.

o Profile: View and update personal information.

5. The system continuously provides updated information and services through a responsive and interactive interface.

Result

Agrow Smart is a complete full-stack Next.js 16 web application designed for smart agriculture management, featuring a farmer dashboard with real-time crop monitoring, soil analysis, weather forecasts, and market price insights. The project includes six main pages—landing page with hero section and features, authentication pages with email/password and Google OAuth, comprehensive dashboard displaying weather cards and Recharts analytics, farm management for adding GPS-mapped fields with crop/soil data, and analytics/reports section with PDF/CSV export capabilities—all built responsively using Tailwind CSS with a modern green/orange agriculture theme and Lucide React icons. Development uses the standard Next.js app router structure with API routes for weather (Open WeatherMap), market data, and recommendation logic, plus components like Navbar, CropCard, and Weather Widget, supported by dependencies including React 19, TypeScript, Recharts, React Hook Form, Zod validation, and NextAuth.js authentication.

Future Scope

- **Weather Forecast Integration:**

Real-time weather updates and alerts for crop planning.

- **Multilingual Support:**

Support for regional languages to improve usability for rural users.

- **Mobile Application Integration:**

Development of a mobile app version for wider reach.

- **Advanced AI Features:**

Crop disease detection and yield prediction using AI and ML.

- **E-commerce Integration:**

Direct buying and selling of agricultural products through the platform.

Conclusion

Agrow Smart is a comprehensive and user-friendly smart agriculture web platform developed using Next.js. The system addresses key challenges faced by farmers by providing centralized access to market rates, intelligent assistance, community interaction, government schemes, and machinery rental services.

The project demonstrates how modern web technologies can be effectively used to support agriculture, promote digital inclusion, and improve the overall efficiency of farming practices. Agrow Smart serves as a scalable and practical solution for smart farming and has strong potential for future enhancements.

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