

# **AgriConnect**

## **Feasibility Analysis: AgriConnect**

### **1. Technical Feasibility**

- **Required Technologies:** The platform is built with Spring Boot for backend services, React + Redux for the frontend, and Neon PostgreSQL (cloud-based) for database management. Authentication is secured with Spring Security & JWT, while the entire application is containerized using Docker and deployed on Render Cloud.
- **System Compatibility:** As a web-based SaaS solution, AgriConnect is fully compatible with modern browsers (Chrome, Firefox, Edge, Safari) across both desktop and mobile devices, ensuring easy access for farmers and vendors.
- **Scalability & Maintenance:** The architecture follows a modular, microservice-oriented design, separating backend, frontend, and database layers. This ensures smooth maintenance and supports future expansion, such as AI-based crop predictors and chatbot integration.
- **Data Security & Authentication:** Implements robust authentication (JWT, role-based access control) and secure cloud-hosted PostgreSQL. Deployed over HTTPS with containerized isolation for reliable and encrypted transactions between farmers, vendors, and the system.

- **Software Requirements Specification (SRS) for AgriConnect**

- **1. Introduction**

- **1.1 Purpose**

- This document specifies the requirements for AgriConnect, a SaaS-based platform designed to connect small and marginal farmers with larger farmers and service providers for access to tractors, harvesters, land, and labor. The platform also provides AI-driven crop prediction, yield estimation, and a chatbot assistant to support farmers in decision-making.

- **1.2 Scope**

- AgriConnect will allow farmers to book farming equipment and labor from other farmers, receive crop recommendations, and interact with a chatbot assistant for weather, soil, and market queries. Vendors and big farmers can list equipment, track bookings, and manage their services. The system will include predictive analytics for agricultural insights.

- **1.3 Overview**

- The platform is focused on improving farming efficiency, reducing costs, and promoting resource sharing among farmers. By offering equipment booking, AI predictions, and smart assistance, AgriConnect aims to create a collaborative digital ecosystem for agriculture.

- **1.4 Need and Problem Addressed**

- Small farmers often struggle with limited access to machinery and lack timely crop decision support. Meanwhile, big farmers often have idle machinery capacity. AgriConnect solves this by providing a shared marketplace for equipment and AI-driven advisory services, reducing costs, increasing productivity, and improving decision-making for all farmers.

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- **2. General Description**

- 2.1 Features**

user registration and login (Farmer, Vendor/Equipment Owner).

- Equipment booking system for tractors, harvesters, and labour.
- Crop prediction & yield estimation powered by ML.
- Chatbot/voice assistant for real-time farmer support (crop, weather, soil, pricing).
- Dashboards for farmers (bookings, recommendations) and vendors (equipment usage).
- Secure booking management for transparency.
- 2.2 Users
- Small/Marginal Farmers: Access equipment, book services, and receive AI based recommendations.
- Big Farmers/Equipment Owners: List and rent out equipment/labour and manage bookings.
- Vendors/Service Providers: Provide specialized farming services (plowing, harvesting).

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- **3. Functional Requirements**

- **3.1 Key Features**

- Farmers can book machinery/labour and view booking history.
- Vendors can list equipment/services with availability, pricing, and location.
- AI module provides crop recommendation, yield forecast, and market insights.
- Chatbot answers farmer queries on weather, soil, and pricing.
- Dashboards provide real-time booking stats, earnings, and insights.

- **3.2 Prioritized Features**

- User registration and login (Farmer, Vendor).
- Equipment listing and booking functionality.
- Farmer and Vendor dashboards.
- AI-powered crop prediction & chatbot assistant.

### 3.3 Input and Output

- Input: User registration details, login credentials, booking requests, equipment listings, queries to chatbot.
- Output: Booking confirmations, dashboard statistics, crop predictions, chatbot responses.

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## 4. User Interface Requirements

### 4.1 Software Integration

- Backend: Spring Boot + Spring Security (JWT Authentication).
- Frontend: React + Redux for state management.
- Database: Neon PostgreSQL (cloud-based).
- Deployment: Dockerized and hosted on Render Cloud.
- Future Integration: APIs for weather forecasts, soil data, and market prices.

### 4.2 User Interface Design

- Homepage: Highlights platform features (equipment access, AI predictions, chatbot).
- Farmer Dashboard: Displays bookings, AI crop recommendations, and chatbot access.
- Vendor Dashboard: Shows listed equipment, bookings, and earnings reports.
- **Chatbot Interface: Simple, conversational UI for queries and answers.**

### 4.3 Example

- An equipment booking card in the Farmer's dashboard might show:
- Equipment: Tractor – John Deere 5310
- Owner: Ramesh Singh
- Location: Kanpur, IN
- Rate: ₹400/hour

-Booking actions and chatbot responses should complete in under 3 seconds.

- Dashboard data loads instantly on login.
- **5. User Capacity**
- Initially supports up to 1,000 concurrent users, scalable via Render Cloud.
- **Scalability**
- Architecture supports future microservice expansion for AI modules, voice assistance, and marketplace features.

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- **6. Non-Functional Attributes**

- **6.1 Usability**

- Designed with a farmer-friendly interface, simple workflows, and multilingual support.
- Fully responsive for mobile devices, ensuring accessibility in rural areas.

- **6.2 Reliability**

- Targets 99.5% uptime with Docker container orchestration and Render's scaling features.

- **6.3 Security**

- Implements JWT authentication and role-based access via Spring Security.
- Data stored in Neon PostgreSQL with encryption.
- All communications secured with HTTPS.

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- **7. Appendices**

- **7.1 Glossary**

- Farmer (Small/Marginal): A user booking equipment, labour, or using AI advisory tools.
- Vendor/Big Farmer: A user who lists tractors, harvesters, or labour for rent.
- Equipment Booking: Renting farm machinery or services for specific time slots.

AI Crop Predictor: ML-based service suggesting crops and estimating yields.

- Chatbot Assistant: AI-powered tool answering farming-related queries

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