Product Requirements & Specification Document

Project Name

AgroVision - Smart Agriculture Dashboard

Description

AgroVision is a futuristic, research-driven smart agriculture dashboard built with React, TypeScript, Tailwind CSS, and Redux Toolkit. It provides real-time sensor data visualization, advanced crop management forms, and role-based access, optimized for responsive use across devices.

1. Goals & Objectives

Goal	Description
Real-time Data Visualization	Display live sensor data (e.g., soil moisture, temperature)
Advanced Crop Management	Enable detailed crop management via dynamic forms
Role-Based Access	Secure, differentiated access for Admin, Agronomist, and Viewer
Responsive & Futuristic UI	Ensure seamless experience on all devices with a modern theme

2. Core Features

Feature	Description
Dashboard Overview	Real-time summary of key sensor metrics and alerts
Sensor Data Visualization	Interactive charts/graphs for environmental and crop data
Crop Management Forms	Advanced, dynamic forms for adding/editing crop data
User Authentication & Roles	Login/logout, role-based access (Admin, Agronomist, Viewer)
Notifications & Alerts	Real-time notifications for critical sensor thresholds
Settings & Profile	User profile management and basic settings
Responsive Design	Optimized for desktop, tablet, and mobile

3. User Roles & Permissions

Role	Permissions
Admin	Full access: manage users, sensors, crops, settings
Agronomist	View/add/edit crop data, view sensor data
Viewer	View dashboard and sensor data only

4. Technical Specifications

4.1 Technology Stack

Layer	Technology
Frontend	React, TypeScript
State Mgmt	Redux Toolkit
Styling	Tailwind CSS
Markup	HTML, CSS
Charts	(e.g.) Recharts/Chart.js
Auth	JWT or OAuth2 (to be defined)

4.2 Architecture Overview

```
[Client: React/TS/Tailwind]
    |
    |-- Redux Toolkit (State Management)
    |-- Auth Layer (Role-based)
    |-- API Layer (REST/GraphQL, to be defined)
    |
[Backend: Sensor Data API, Auth API (external)]
```

5. UI/UX Requirements

Requirement	Specification
Theme	Futuristic, research-oriented, clean, high-contrast
Responsiveness	Mobile-first, adapts to all screen sizes
Accessibility	WCAG 2.1 AA compliance
Navigation	Sidebar (desktop), bottom nav (mobile), clear sectioning
Data Visualization	Real-time, interactive, color-coded charts
Forms	Dynamic, validated, user-friendly

6. Functional Requirements

ID	Requirement
FR1	Display real-time sensor data on dashboard
FR2	Render interactive charts for historical and live data
FR3	Provide advanced forms for crop management (add/edit/delete)

FR4	Implement user authentication and role-based access control
FR5	Show notifications for critical sensor events
FR6	Allow user profile and settings management
FR7	Ensure full responsiveness and accessibility

7. Non-Functional Requirements

ID	Requirement
NFR1	High performance and low latency UI
NFR2	Secure authentication and data handling
NFR3	Scalable and maintainable codebase
NFR4	Consistent, modern, and accessible design

8. Key Screens & Components

Screen/Component	Description
Login/Register	Auth screens with role selection
Dashboard	Overview, key metrics, alerts
Sensor Data Charts	Real-time and historical data visualization
Crop Management	Advanced forms for crop data
User Management	(Admin only) Manage users and roles
Notifications	Real-time alerts and messages
Settings/Profile	User preferences and profile

9. Acceptance Criteria

- All core features implemented and tested
- Role-based access enforced throughout
- Real-time data updates without page reloads
- Fully responsive and accessible UI
- All forms validated and error-handled
- Codebase follows best practices and is documented

10. Milestones & Timeline

Milestone	Target Date
UI/UX Design Complete	Week 2

Core Dashboard & Auth	Week 4
Data Visualization	Week 6
Crop Management Forms	Week 7
Role-Based Access	Week 8
Testing & QA	Week 9
Release	Week 10

11. Risks & Mitigations

Risk	Mitigation
Real-time data integration	Use mock APIs for development/testing
Role-based security gaps	Thorough testing and code reviews
UI complexity	Modular, reusable component design

12. Out of Scope

- Backend sensor data ingestion (assumed external)
- Advanced AI/ML analytics (future phase)
- Multi-language/localization

End of Document