Statement of Work PhytoPi

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SWE-310

Sofware Engineering I

PhytoPi Chamber I

1.**Project Objectives.**

The goal of this project is to design and implement an IoT-based controlled environment system that enables plants to grow through their entire life cycle with minimal human intervention. The system will:

- Monitor environmental variables (temperature, humidity, soil moisture, light).
- Use a Raspberry Pi 5 as the control hub to collect and process data.
- Provide real-time monitoring and notifications via mobile app/cloud dashboard.
- Automate alerts and support long-term unattended plant growth.

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<tr><td>Generated image of model in mind</td><td>Example of mobile app connected to Pi</td></tr>
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<tr><td>Compact set up example</td><td>Professional growth chamber</td></tr>
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2. Scope
In Scope

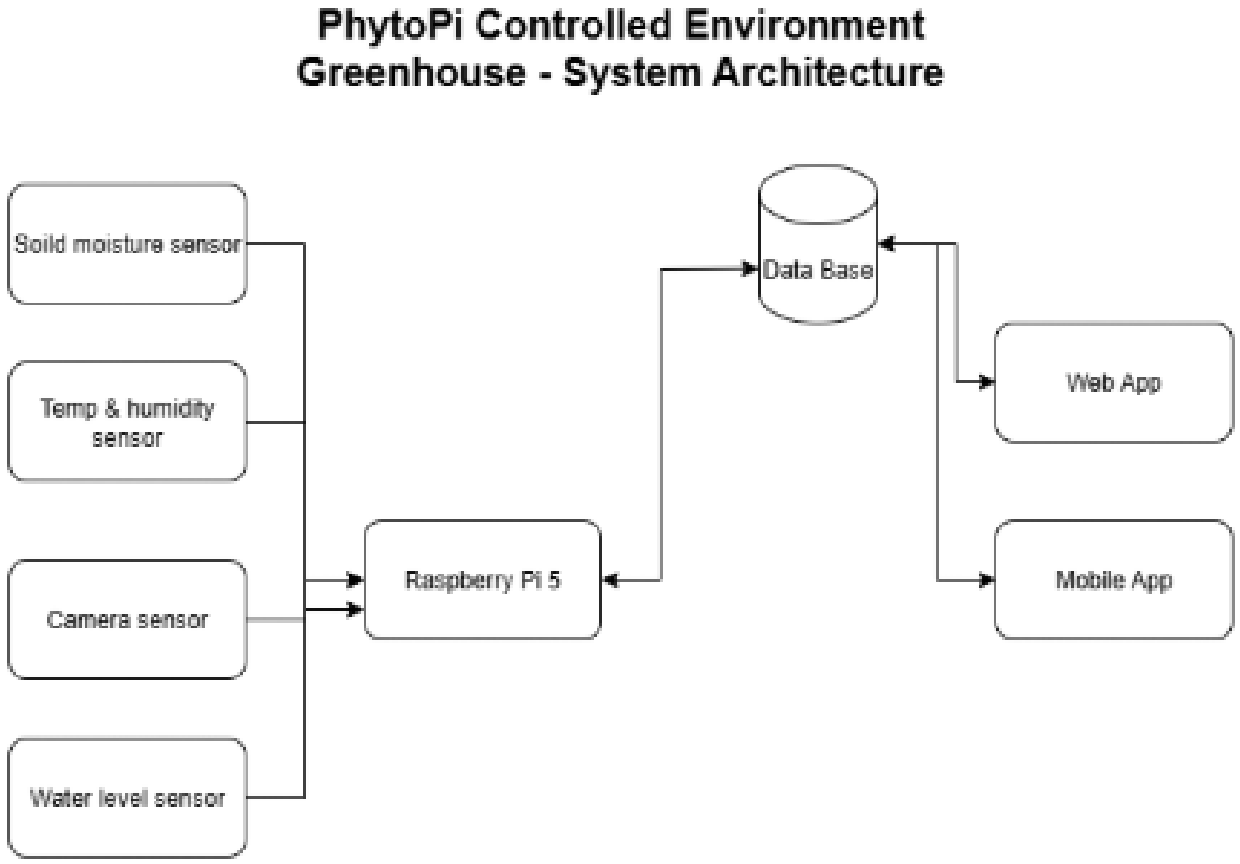
Development of an IoT-based plant monitoring system.
Hardware: Raspberry Pi 5, environmental sensors, camera, light and ventilation.
Software: Cloud-hosted database, API server, mobile application interface.
Notifications: Basic alerts for water, light, or environmental issues.

Out of Scope

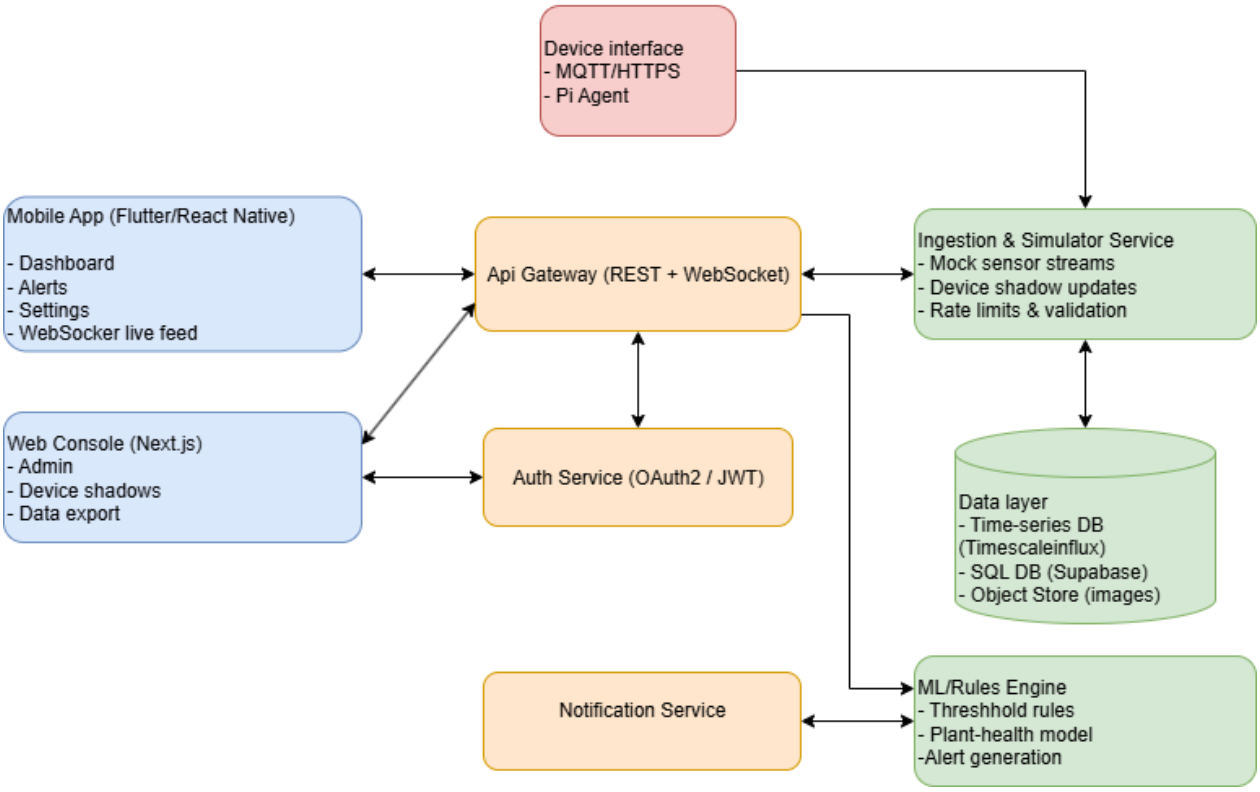
Full-scale agricultural deployment.
Multi-species disease detection models.
Commercial-grade greenhouse systems.

IoT Devices Selected:

Capacitive Soil Moisture Sensor (DFRobot SEN0193).
DHT22 Temperature & Humidity Sensor.
Camera module for visual inspection + AI image analysis.



PhytoPi - Cloud & App Software Architecture



3.**Deliverables**

Fully functional MVP prototype of controlled environment box.
Cloud-based backend API + database.
Mobile app/dashboard for plant monitoring and alerts.
Documentation (design docs, wiring diagrams, source code repo).
Presentation/demo for capstone showcase.

4.**Timeline and Milestones**

Phase	Timeline	Milestones
Planning & Research	Sept 2025	Requirements finalized, plant choice + BOM approved
System Design	Oct 2025	Architecture diagrams, UI mockups, sensor selection
Implementation 1 (Cloud + App)	Nov–Feb 2026	Backend + mobile app MVP (simulated data working)
Implementation 2 (Hardware)	Feb–Mar 2026	Enclosure build, Raspberry Pi + sensors integrated
Testing & Integration	Mar 2026	Data end-to-end (sensor → app), bug fixes
Finalization & Showcase Prep	Apr 2026	Demo system ready, documentation + presentation complete

Key Deadlines:
End of Oct 2025 → Architecture & design approved.
End of Feb 2026 → Cloud + app MVP functional.
End of Mar 2026 → Full hardware/software integration complete.
April 2026 → Final showcase.

5.**Resource Requirements**

Personnel: 2 students (shared responsibilities).
Hardware: Raspberry Pi 5, sensors, LED grow light, fans, enclosure, water pump, camera.
Software: React Native app, NestJS/FastAPI backend, Postgres DB, hosting (Supabase/Render).
Facilities: Workbench space, power, university internet.

6.**Roles and Responsibilities**: Clearly define the roles and responsibilities of each party involved in the project.

- **Nolan Tuttle (Hardware + Integration Lead):**
  - Enclosure design/build.
  - Wiring sensors, Raspberry Pi configuration.
  - Pump/light/fan automation.
- **Daniel Grijalva (Software + Cloud Lead):**
  - Backend API, database, mobile app.
  - Rules engine (alerts).
  - Cloud deployment + UI polish.

Both sharing planning, testing, documentation, and presentation.

7.**Quality Standards**

- Mobile app stable with <1 sec refresh delay on live values.
- Sensor accuracy within tolerance.
- Uptime ≥95% during demo.
- The final system is able to support at least one bean plant through full growth cycle.

8.**Communication**

- **Weekly syncs** (in person or call).
- Shared GitHub repo for code + hardware docs.
- Google Docs/Notion for task tracking.

9.**Payment Terms** (if treated like client project)

- 30% at design approval (Oct 2025).
- 30% at MVP delivery (Feb 2026).
- 40% at final acceptance (Apr 2026).
- Currency: USD; method: bank/PayPal.
- 5% penalty for late payments >14 days.

10. Terms and Conditions

- IP produced belongs to the team unless stated otherwise.
- Equipment remains project property post-demo.
- Liability limited to scope of prototype.

11. Acceptance Criteria

- Functional IoT enclosure (sensor → Pi → cloud → app).
- At least 2 automated alerts (water, light, or temp).
- Mobile app shows real-time and historical data.
- Successful April 2026 live demo.

12. Change Management

Changes logged in Jira. Team reviews timeline/impact. Advisor approval needed for scope/time changes.

13. Client Approval

Approval confirmed via signature or email. Project proceeds after approval.