Team Details

Team Name: WIZARD WARRIORS
Team Leader Name: S.T.AKHILEASH
Problem Statement: ENHANCING AGRICULTURE USING AI

PROTOTYPE DESCRIPTION

- The integration of Artificial Intelligence (AI) and the Internet of Things (IoT) into agriculture brings groundbreaking advancements in precision farming, smart irrigation, automated equipment, predictive analytics, and crop monitoring. This prototype leverages AI and IoT to optimize resources, enhance yields, and reduce environmental impact.

- In precision farming, IoT sensors collect real-time data on soil, crops, and environmental conditions, which AI analyzes to provide actionable insights. Smart irrigation systems use this data to regulate water usage efficiently. AI-driven automated equipment performs tasks like planting, harvesting, and weeding with high precision, reducing labor costs and boosting efficiency.

- Predictive analytics forecast weather, pest infestations, and disease outbreaks, enabling proactive measures. Crop monitoring systems provide real-time insights on growth and nutrient levels through IoT sensors. This prototype represents a major advancement in sustainable and efficient farming, harnessing AI and IoT to address modern agricultural challenges.

OPPORTUNITIES

How Different from Existing Ideas

- **Comprehensive Integration**: Unlike existing solutions that often use AI or IoT separately, this approach integrates both technologies for a holistic and synergistic farm management system.
- **Real-Time and Predictive Insights**: Provides continuous real-time monitoring and advanced predictive analytics, enabling proactive decision-making and timely interventions.

Problem-Solving Capability

- **Resource Optimization**: Efficiently manages and monitors resources, reducing waste and ensuring optimal use of water, fertilizers, and pesticides, thereby lowering costs and improving yields.

- **Risk Mitigation**: Predictive analytics anticipate adverse weather events, pest infestations, and disease outbreaks, allowing farmers to take preventive measures and reduce potential losses.

FEATURES OF PROTOTYPE

Precision Farming

•**Real-Time Data Collection**: Use IoT sensors to gather information on soil conditions, crop health, and environmental factors.

•**AI Analysis**: Leverage AI algorithms to interpret data and generate actionable insights.

Smart Irrigation

•**Efficient Water Management**: Utilize IoT sensors and AI to optimize water usage based on soil moisture and weather conditions.

•**Automated Control Systems**: Implement smart irrigation systems to regulate water distribution.

Predictive Analytics

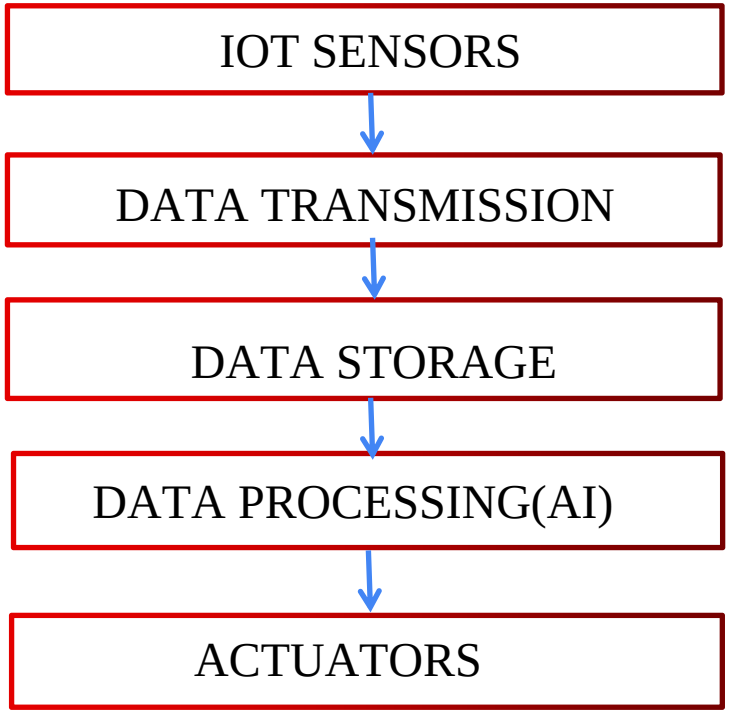
•**Data Integration**: Aggregate data from various IoT devices.

•**Forecasting Models**: Use AI to predict weather patterns, pest infestations, and disease outbreaks.

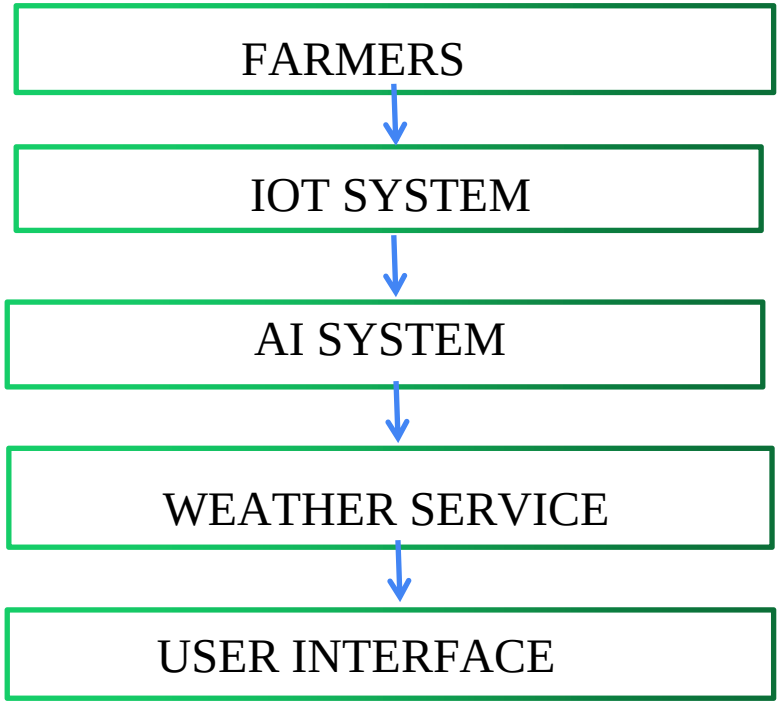
•**Proactive Measures**: Provide early warnings and recommendations for preventive actions.

•**Real-Time Insights**: Analyze data to offer real-time insights and recommendations for crop management.

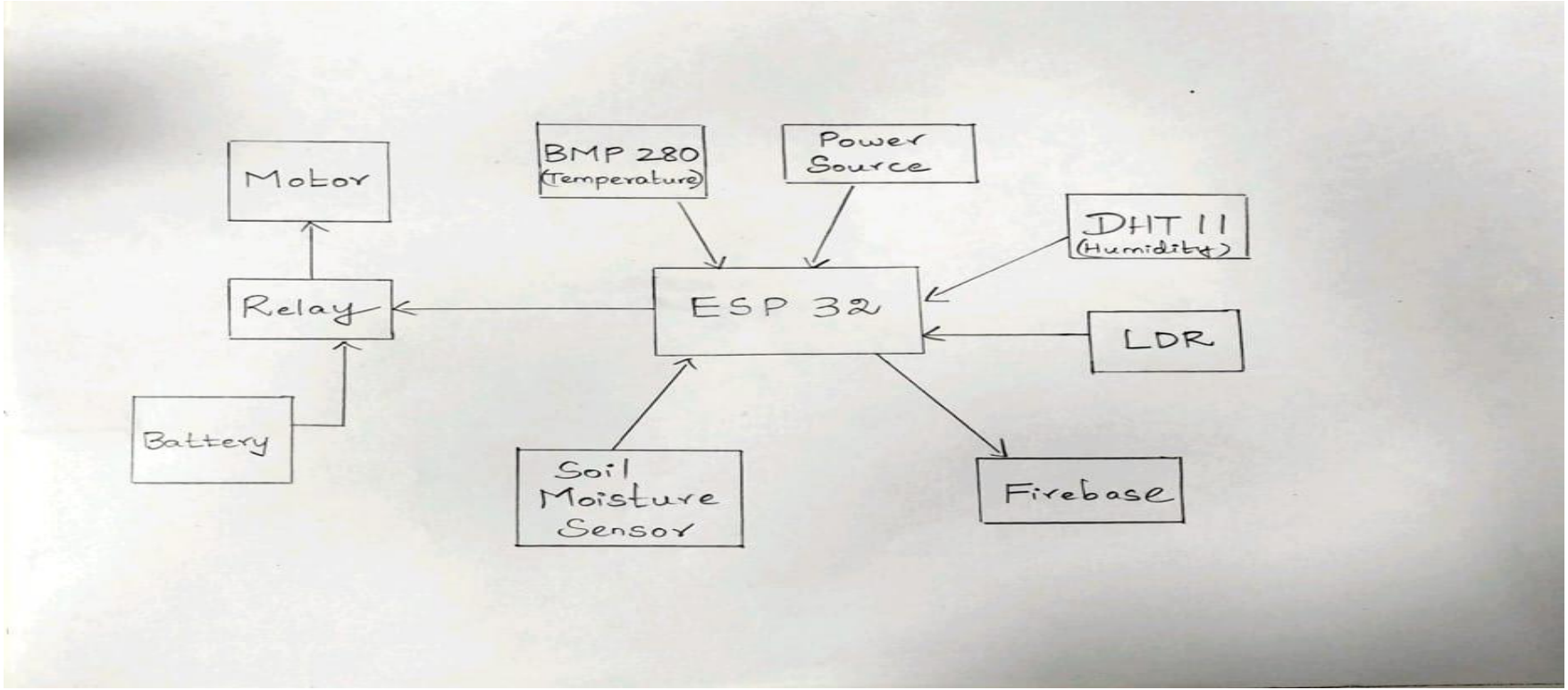
PROCESS FLOW DIAGRAM



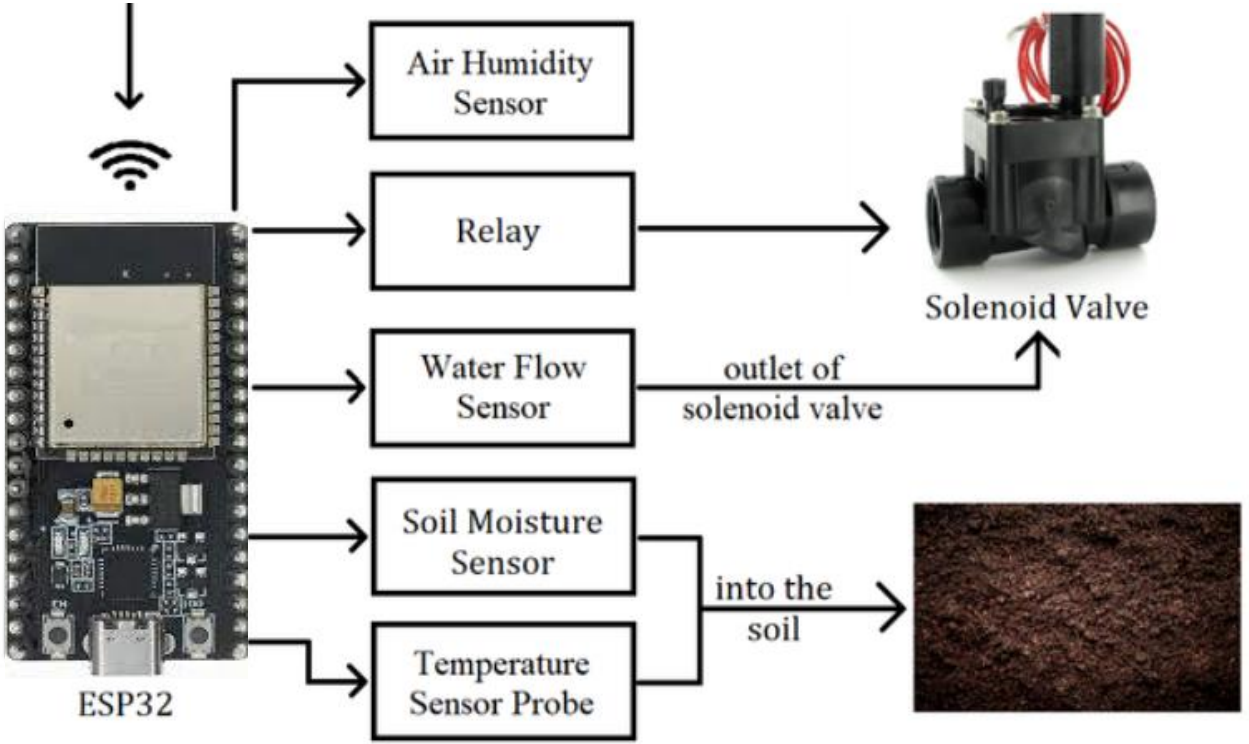
USE-CASE DIAGRAM



Wireframes/Mock diagrams of the proposed solution



Architecture diagram of the proposed solution



Technologies to be used in the solution

HARDWARE	SOFTWARE
ESP32	ARDUINO IDE
SOIL MOISTURE SENSOR	FIREBASE
MOTOR OR SOLENOID VALVE	PANDAS
HUMIDITY SENSOR(DHT11)	TENSORFLOW
LDR SENSOR	GITHUB
TEMPERATURE SENSOR(BMP280)	LIBRARIES FOR SENSORS
POWER SOURCE	SCIKIT

PROTOTYPE COST

HARDWARE	COST
ESP32	700
SOIL MOISTURE SENSOR	150
MOTOR OR SOLENOID VALVE	200
HUMIDITY SENSOR(DHT11)	100
LDR SENSOR	60
TEMPERATURE SENSOR(BMP280)	400
POWER SOURCE	50

Total Cost Production = 1660

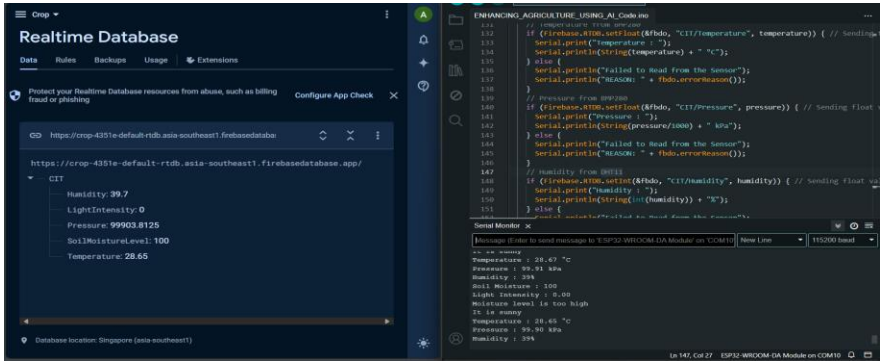
ESTIMATED IMPLEMENTATION COST OF COMPONENTS FOR 1 ACRE

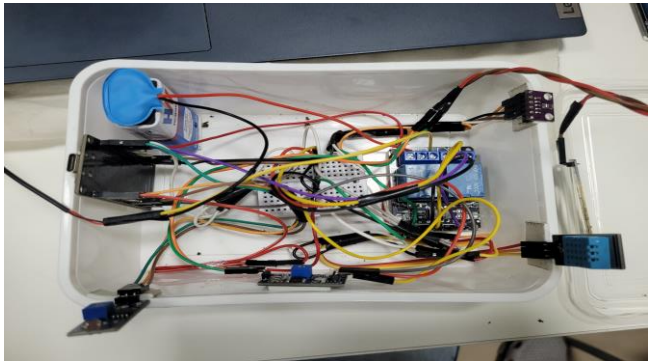
Component	Quantity	Unit Price Range (INR)	Total Cost Range (INR)
ESP32	1	₹415 - ₹830	₹415 - ₹830
Soil Moisture Sensor	10	₹83 - ₹415	₹830 - ₹4150
Motor or Solenoid Valve	5	₹830 - ₹4150	₹4150 - ₹20750
Humidity Sensor (DHT11)	2	₹83 - ₹415	₹166 - ₹830
LDR Sensor	2	₹83 - ₹250	₹166 - ₹500
Temperature Sensor (BMP280)	2	₹250 - ₹830	₹500 - ₹1660
Power Source	1	₹830 - ₹4150	₹830 - ₹4150
Total			**₹7057 - ₹33420**

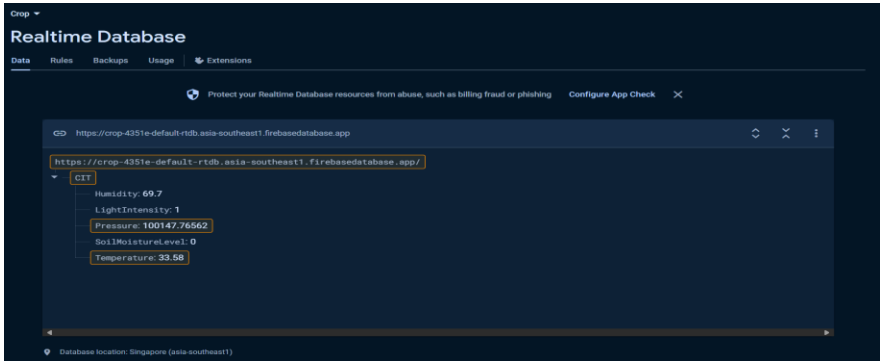
ESTIMATED IMPLEMENTATION COST OF COMPONENTS FOR 1 ACRE

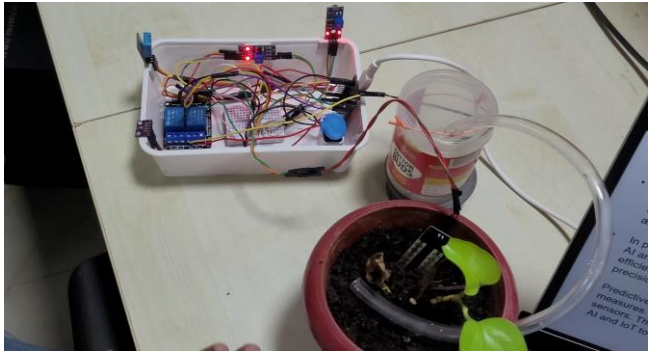
Category	Cost Range (INR)
Components	₹7057 - ₹33420
Additional Costs	₹7470 - ₹24900
Grand Total	**₹14527 - ₹58320**

Snapshots of the prototype









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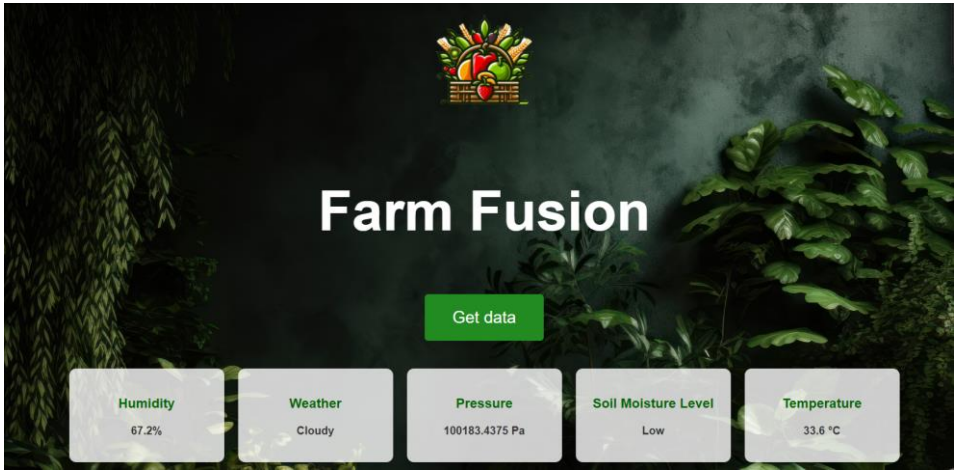

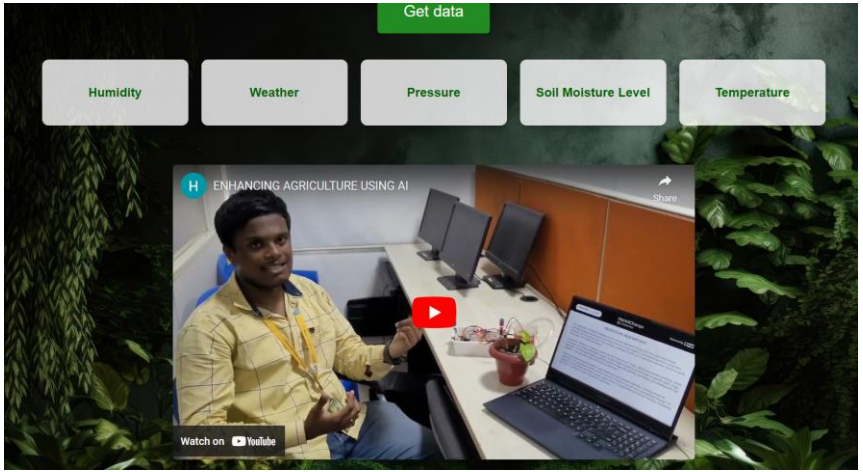

Prototype Performance Report/Benchmarking

Parameter	Actual Value	Our Prototype	FarmLogs	CropX
Humidity (%)	69.5	69.7	71	65
Light Intensity	52	51	55	50
Pressure (Pa)	100140	100152	100204	100098
Soil Moisture Level (%)	46	45	48	39
Temperature (°C)	33.30	33.32	34.43	3.68

Additional Details/Future Developments (if any)

Robotics and Automation:

Autonomous Vehicles: Develop autonomous tractors, harvesters, and drones that can perform various agricultural tasks with minimal human intervention.

Robotic Weeding: Implement robotic systems for automated weeding, reducing the need for chemical herbicides and manual labor.

Integration with Blockchain Technology:

Supply Chain Transparency: Use blockchain to track and verify the entire agricultural supply chain, ensuring transparency and traceability from farm to table.

Smart Contracts: Implement smart contracts for automated transactions and agreements between farmers, suppliers, and buyers.

Community and Farmer Engagement:

Training Programs: Provide comprehensive training programs for farmers to understand and effectively use the AI and IoT systems.

Collaborative Platforms: Create platforms for farmers to share data, best practices, and success stories to foster a collaborative agricultural community.

Prototype Resources:

1. GitHub Public Repository Link:
   Github Repository of our Prototype
2. Demo Video Link (3 Minutes):
   YouTube Video Demonstrating our Prototype
3. Final Product Link:
   Google Drive link of our Prototype
4. Website Link:
   Link to the Prototype Website


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