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HACK

MIT-WPU' 25

ले छलांग

ONE HACKATHON. THIRTEEN TRACKS.

MILLION PROBLEMS. BILLION MINDS.

Crop Care

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Precision Agriculture with Soil Moisture and Nutrient Detection

A comprehensive overview of our innovative solution for real-time soil analysis, optimizing resource management and promoting sustainable agricultural practices.

Problem Statement

Traditional farming faces inefficiencies due to a lack of real-time insights. Leveraging IoT with AI, ML, XR, and smart sensors can enable data-driven, cost-effective, and sustainable smart farming.

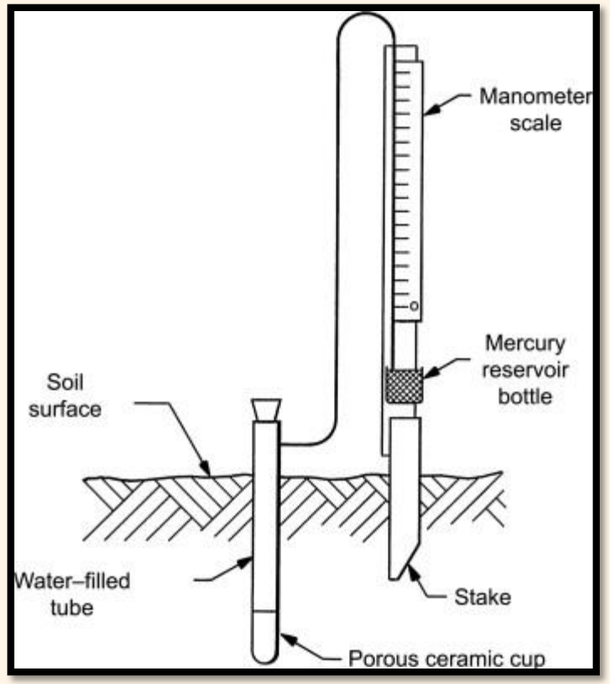
Need Statement

Affordable, real-time & IoT-based soil testing solution for farmers.AI & ML-powered automation for quick and accurate recommendations.

Existing Moisture Sensors

Tensiometers

Measures water tension, slow

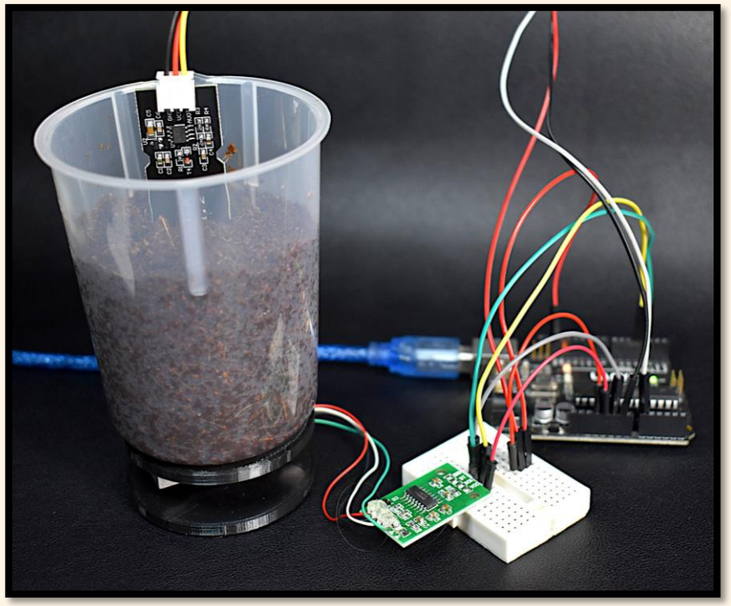


Time Domain Reflectometry

Accurate, but expensive

Capacitive Sensors

Inexpensive, influenced by salinity



Our Solution

- Real-time data collection
- Measures moisture levels
- Accessible for all farmers
- Real-time IoT-based soil testing system using Raspberry Pi & sensors.
- Machine Learning-based soil type identification from soil images.
- Automated crop & fertilizer recommendations based on soil parameters.
- Web dashboard for easy access & visualization.
- Affordable and scalable for Indian farmers.

Proposed Solution

1 **Integrated Sensors**

Robust, simultaneous measurements

2 **Wireless Networks**

Real-time data distribution

3 **Hyperspectral Imaging**

Mapping over large areas

Impact and Benefits

Sustainability

Reduced waste, minimizes pollution

Supports PM-KISAN & Soil Health Card initiatives.

Can be integrated into FPOs (Farmer Producer Organizations) & AgriTech startups.

CSR Adoption: Corporates can fund deployment under sustainable farming initiatives.

Productivity

Improved yields & crop quality

Economic Benefits

Lower input costs, increased profit

How it Works

1

Sensor Selection

Choose best tech for moisture & nutrients

2

Performance Eval

Accuracy, reliability, stability

3

Probe Design

Compact probe for measurements

4

Data Processing

Integrate sensors with microcontroller

Technical & Hardware Approach

- Raspberry Pi (Main controller)
- Soil Sensors (NPK, pH, Moisture, Temperature)
- Camera Module (For Soil Image Analysis)
- WIFI Module (For IoT connectivity)

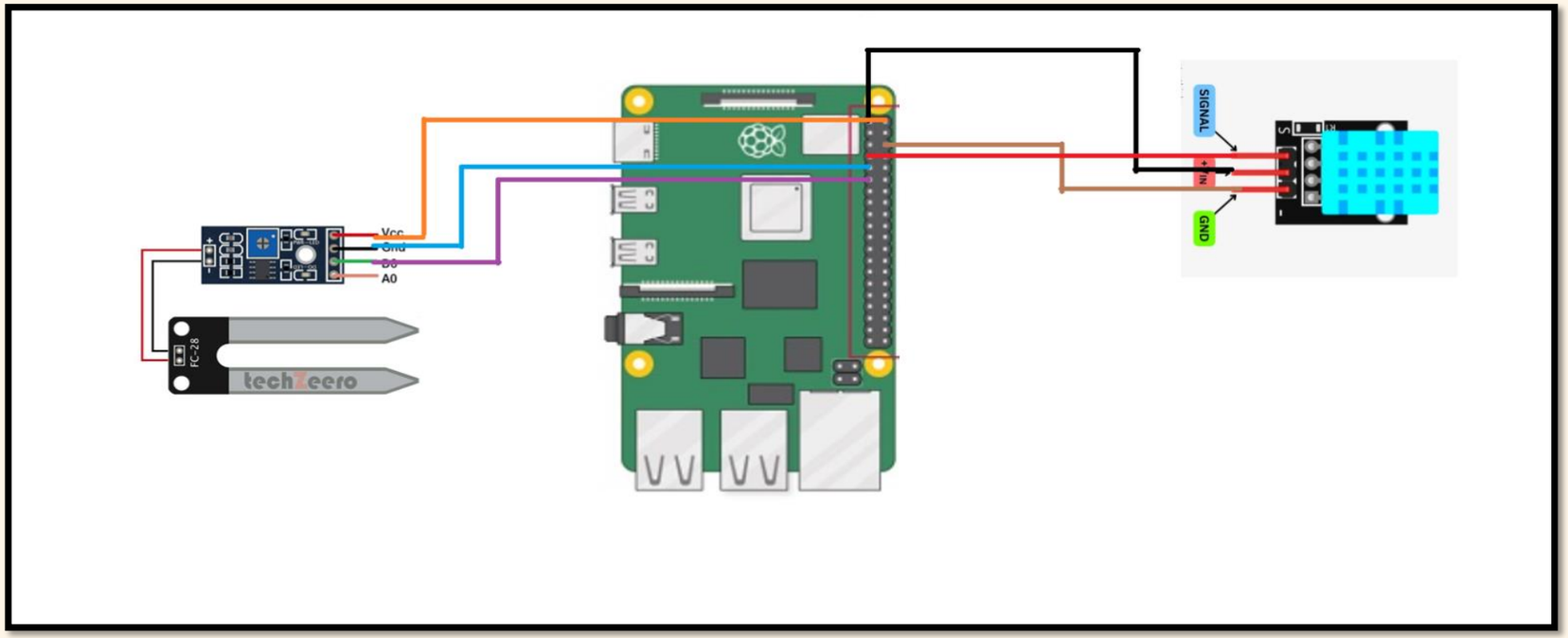
Explanation:
Raspberry Pi & Sensors collect soil parameters.
Camera captures soil image for ML-based classification.

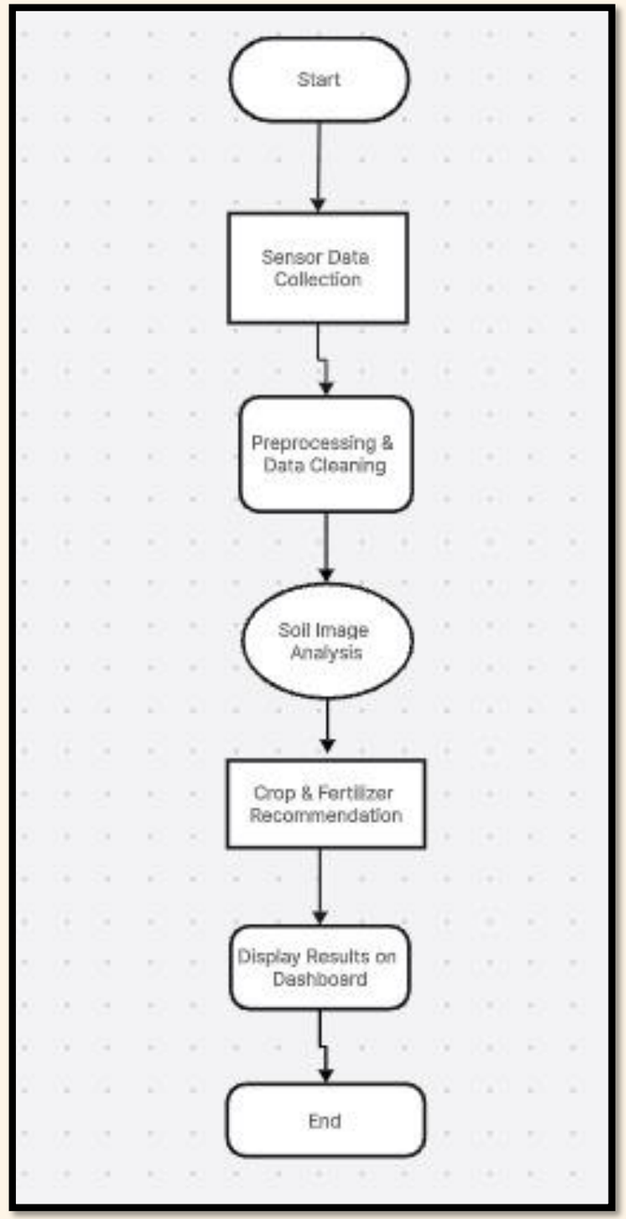
Software & ML Approach

- Machine Learning Model : Soil Type Identification Model (Trained on 1000+ images).
- Crop & Fertilizer Recommendation Model (Trained on 800+ datasets).
- Algorithm Used : CNN (For soil image classification).
- Decision Tree/Random Forest (For recommendations).
- Web Dashboard : Built using HTML, CSS, Flask, and Python for real-time data display.

Explanation:
Custom-built ML model predicts soil type from images.
Database-driven Crop & Fertilizer recommendations.
Flask Web App for real-time data visualization.

BLOCK DIAGRAM FOR INTERFACING OF MODULES



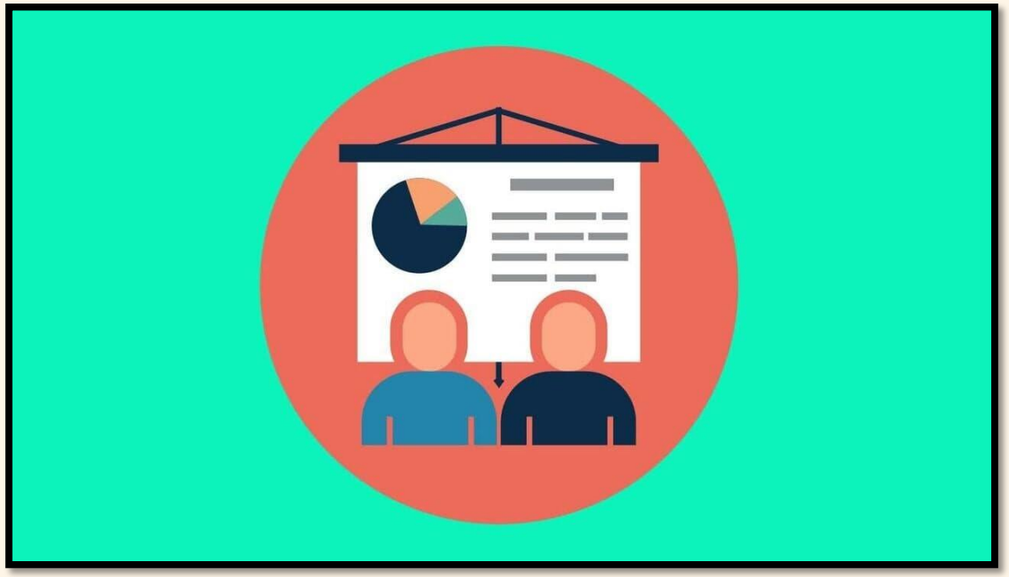


UNIQUE SELLING POINTS

Features	Your Solution	Bhu Parikshak	NutriSens	Bhu-Vision (KRISHI-RASTAA)	AI-IoT Soil Testing Machine	Techno Surge Industries	AQUASOL Soil Test Kit
Real-Time Monitoring	Yes, every 5 seconds	No	No	No	No	No	No
Result Time	Within 2 minutes	90 seconds	5 minutes	Not mentioned	30 minutes	Varies	Varies
Soil Type Detection	Yes	No	No	No	No	No	No
Fertilizer and Crop Recommendation	Yes, using AI-based analysis	No	No	Yes (Limited Advisory)	Yes (12 Soil Parameters)	No	No
Environmental Insights	Yes, includes humidity, temperature, and rainfall data	No	No	No	No	No	No
Connectivity	Cloud-based with real-time dashboard	Bluetooth	No	Yes (IoT-based)	Android App	No	No

Dashboard and Visualization	Yes, user-friendly dashboard with insights	No	No	Yes	Yes	No	No
Portability	Moderate, requires sensors and connectivity	Highly Portable	Highly Portable	Moderate	Moderate	Highly Portable	Highly Portable
Cost Efficiency	Competitive, considering real-time data and analysis	Moderate	Low	Moderate	High	Low	Low
Ideal For	Farmers needing real-time insights and automated recommendations	Small farmers needing quick tests	Budget-conscious farmers for occasional testing	Large-scale farms	Medium to large farms	Small farmers	Small farmers

Commercialization & 5-Year Business Plan



1.B2C (Direct to Farmers)Sell IoT Soil Testing Kits at ₹8000-₹12000/unit.
2. Offer subscription-based ML analysis (₹300 ₹1500/test).
3. B2B (AgriTech Startups & Govt Partnerships) Collaborate with Govt. schemes like PM-KISAN & Soil Health Card.
4. CSR & NGO Model Tie-up with corporates for CSR initiatives in sustainable farming.

Year 1: Research and Development (R&D) & Prototyping
Year 2: Prototype Refinement & Pilot Testing
Year 3: Product Development & Manufacturing Setup
Year 4: Product Launch & Market Penetration
Year 5: Expansion & Innovation

THANK YOU