SoilSense

Automated Nutrient Monitoring and Irrigation System

Problem Definition

- Manual soil testing is time-consuming and inconsistent
- Inefficient water and fertilizer usage causes financial losses
- Environmental harm from resource waste
- Lack of real-time data affects crop health and yield
- Need for continuous monitoring solutions

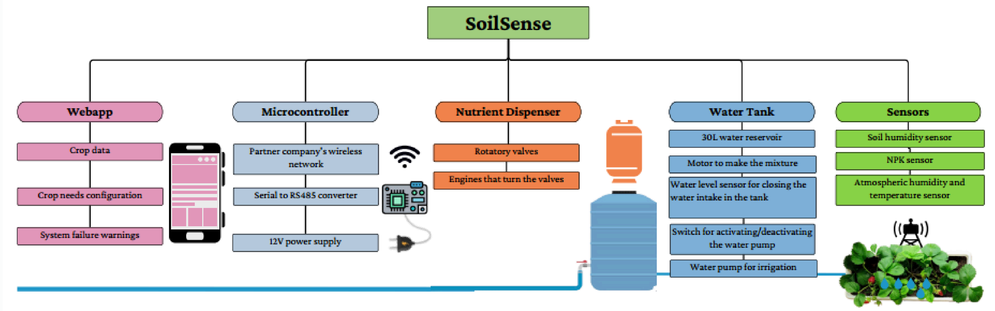
Beneficiaries

- Farmers seeking precision agriculture solutions
- Agricultural businesses requiring scalable monitoring
- Gardeners wanting automated plant care
- Public bodies implementing sustainable practices
- Universities conducting agricultural research

Solution Proposal

SoilSense is an automated system for real-time soil monitoring and smart irrigation. It uses sensors to measure nutrients, moisture, and sunlight, then adjusts watering and fertilization based on crop needs, no manual input required. A microcontroller handles decision-making, while a web app and central database enable tracking, analysis, and long-term insights.

Solution Conception



Costs

The prototype costs 400€ to manufacture. SoilSense offers strong ROI by cutting water and fertilizer use, boosting yields, and reducing labor. It enables sustainable farming and higher-quality crops long-term.

Partner

We are partnering with Frutas Classe to bridge engineering and agriculture, providing real-world testing and validation for our project.

Frutas Classe

Competitors

Various companies offer soil and irrigation monitoring solutions, focusing on automation and environmental sensing. Two key competitors stand out:

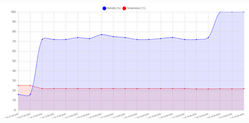
- Netafim: Offers sensors that monitor soil humidity and automate irrigation.
- Parrot: Provides sensors that measure light, temperature, humidity, and soil fertility.

Results

NPK and humidity sensors

Mixing nutrients for irrigation

Nutrient levels



Humidity and temperature results

- Reads soil nutrient levels(N, P, K) and monitores ambient temperature and soil humidity.
- Calculates the amount of nutrients needed to establish soil balance and irrigates according to the requirements.
- Displays the levels of nutrients, soil temperature, and moisture in a user-friendly interface, and instantly shows the amounts of nutrients and water used during irrigation.

Team:


David Pombo


Elisa Pedro


Margarida Canas


Miguel Vidal


Pedro Pereira


Tânia Ranchordas

Advisors: Prof. Pedro Vítor & Prof. João Gaspar

Learn more here: