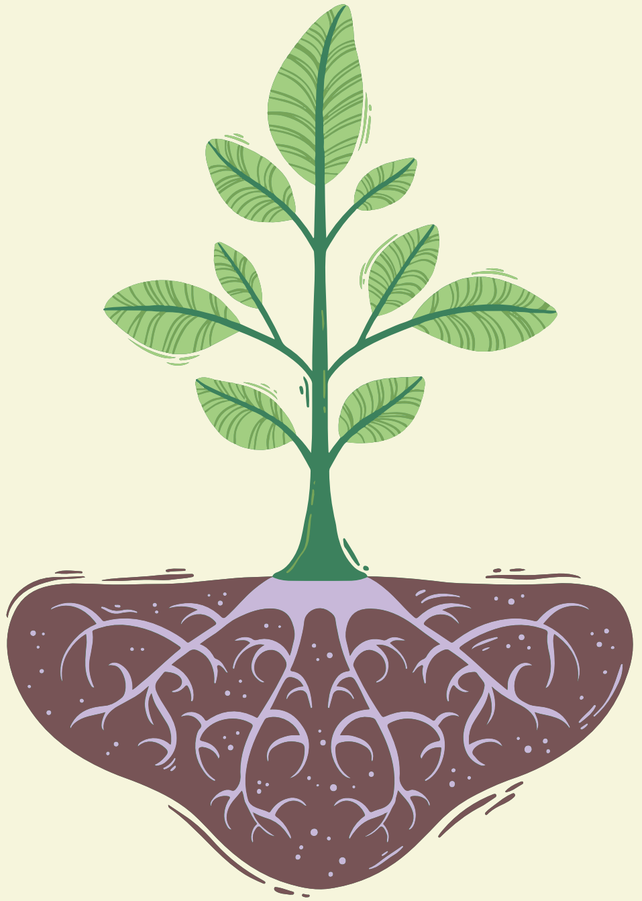
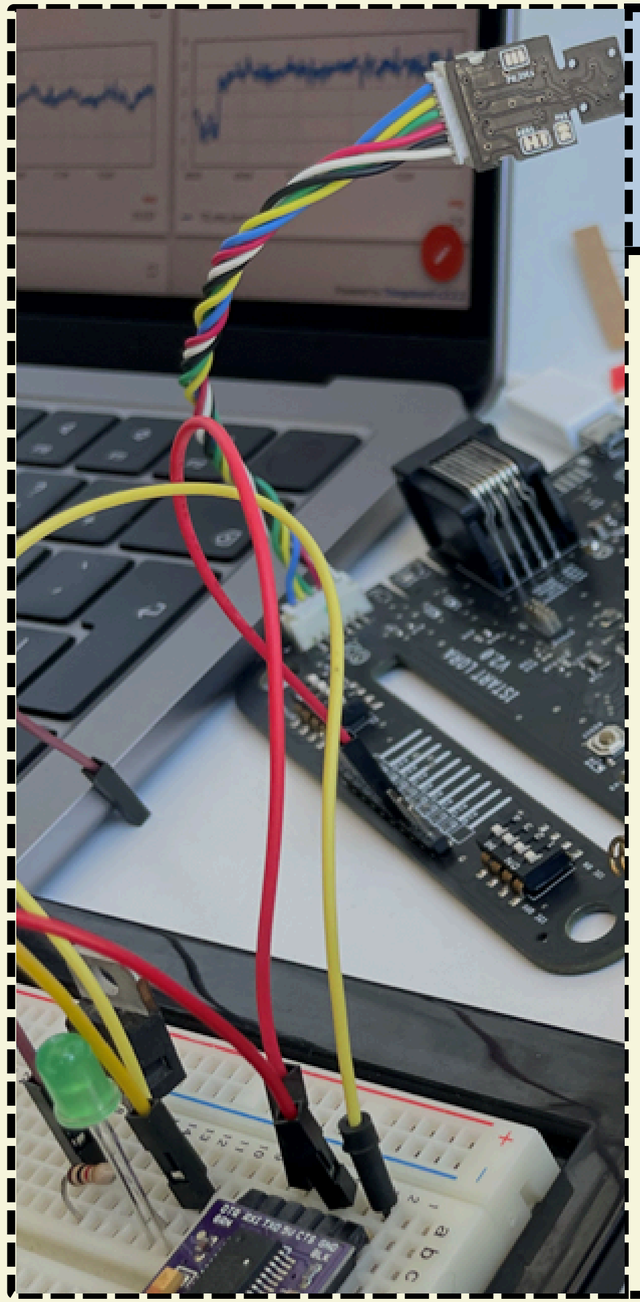
TÉCNICO LISBOA

SoilSense: Automated Nutrient Monitoring and Irrigation System

ElectroCap Pitch Deck





Advisors and Mentor

Scientific Advisor: Prof. Pedro Vítor/
Prof. João Gaspar

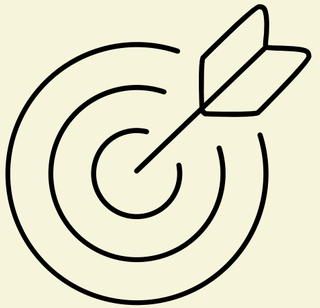
Coordinator: Prof. Pedro Vítor

Mentor: Engenheira Sónia Isaque

Introduction

As technology advances, agriculture must evolve with smarter, more efficient solutions.

SoilSense's Objective is to monitor soil conditions in real time and automate irrigation and nutrient delivery.



Problem definition

Time-consuming methods

Most current soil assessment methods require **manual testing**, which is time-consuming and ineffective at consistently measuring the nutrient levels in the soil.

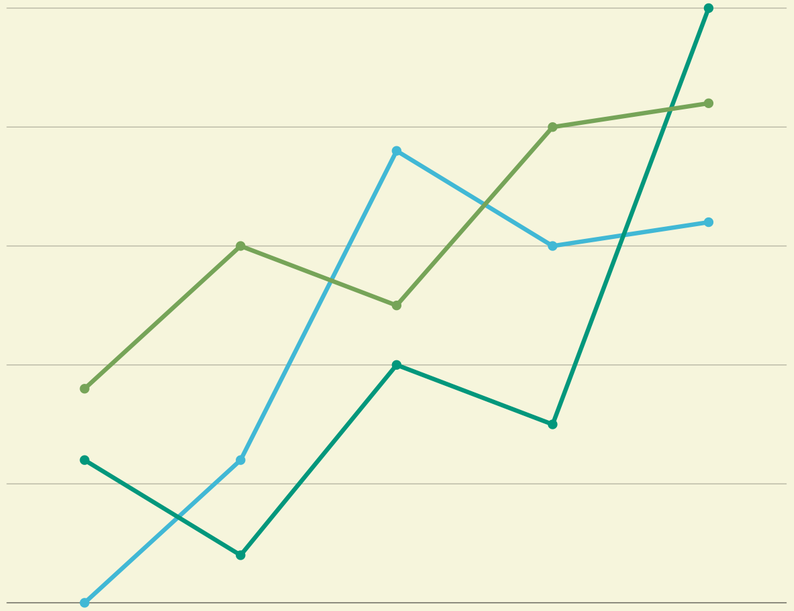
Inefficient resource use

This results in inefficient use of **water and fertilizers**, leading to financial losses and environmental harm.

Problem definition

The lack of real time data in agriculture

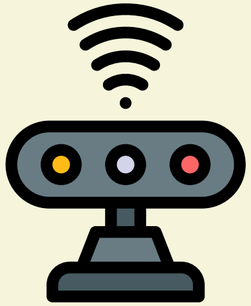
Impacts crop health, quality and yield, necessitating continuous monitoring and automated solutions.



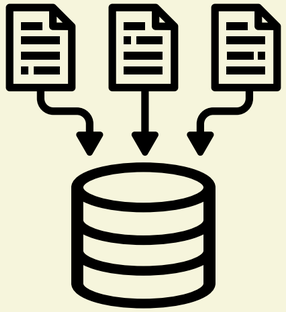
Technological solution:

Objectives

Measure sun exposure, moisture and the **amount of nutrients** in the soil



Register all important information in a database (e.g. amount of nutrients used)



Automatically provide the amount of moisture and nutrients for each crop

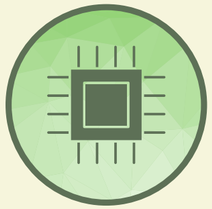
Inform the user in case of malfunction

Technological solution:

Main Areas

Sensors: Measure the amount of nutrients in the soil

Microcontroller: Sends instructions to the nutrient disposer



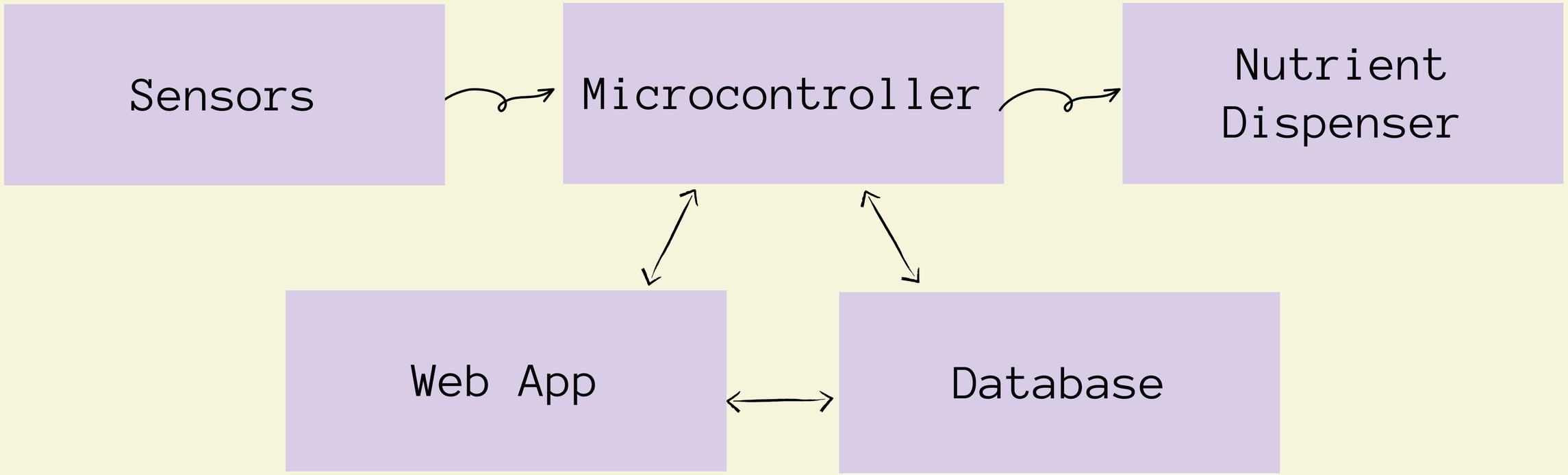
Nutrient dispenser: Store nutrients to mix with water

Database: To store information about the nutrient usage

Web App: Interface between the user and the database

Technological solution:

Architecture



Solution beneficiaries

- Farmers
- Agriculture business
- Gardeners
- Public bodies
- Universities

Partners

Frutas Classe

We are partnering with Frutas Classe, whose expertise is invaluable to our project, bridging the gap between engineering and agriculture.

They provide access to a **testing environment and agricultural materials.**

Competitors and previous work

NETAFIM™ An Orbia business.	Campbell SCIENTIFIC	Parrot	DAVIS	TORO
A sensor that monitors humidity and automates irrigation control.	A portable sensor that monitors humidity and automates irrigation control.	A wireless sensor that measures light, temperature, humidity, and soil fertility.	A soil monitoring system with automated irrigation and meteorologic analysis.	A soil sensor for automated irrigation systems.

Results

NPK and humidity sensors

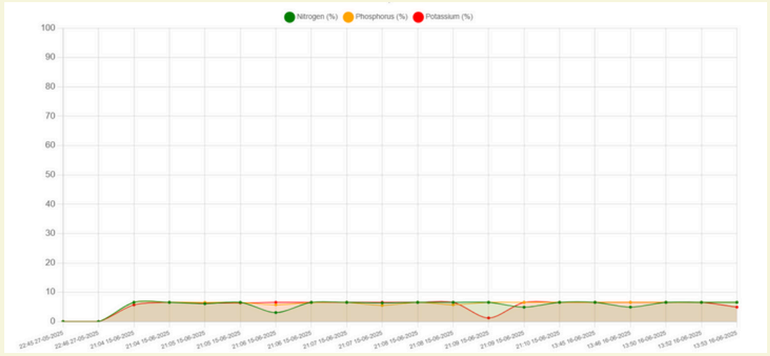
Mixing nutrients for irrigation

Results

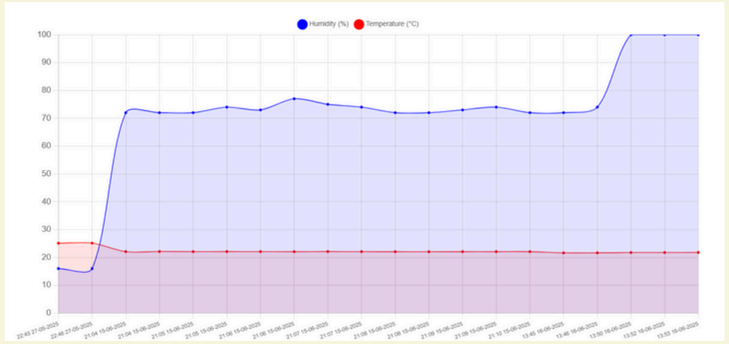
The system succesfully:

- Reads soil nutrient levels(N, P, K) using a real NPK sensor 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.

Calculates the amount of nutrients needed to establish soil balance and irrigates according to the requirements.



Nutrient levels



Humidity and temperature results

Costs and Benefits

- 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.

Meet our team

David Pombo

Elisa Pedro

Margarida Canas

Miguel Vidal

Pedro Pereira

Tânia Ranchordas

Contribution of each team member

ELISA PEDRO	DAVID CARDOSO	PEDRO PEREIRA
Scientific Research	**Hardware**	**Webapp**
Participated in the presentation of the project proposal	Participated in the presentation of the project proposal	Participated in the presentation of the project proposal
Participated in the creation of questions and in the process of interviewing beneficiaries	Participated in the preparation of the requirements list	Participated in the preparation of the requirements list (outlined web app functionality)
Wrote the blog posts and interviews	Searched and elaborated the list of materials for the prototype	Designed the project’s logo
Contributed to the web app maintenance and the data communication between ESP32, the database, and the front-end interface.	Developed the prototype	Developed and sketched initial dispenser model drafts.

Contribution of each team member

MARGARIDA CANAS	TÂNIA RANCHORDAS	MIGUEL VIDAL
Monitorization and testing	**Website and blog**	**Software**
Participated in the presentation of the project proposal	Participated in the presentation of the project proposal	Participated in the presentation of the project proposal
Participated in the creation of questions and in the process of interviewing beneficiaries	Designed and developed the SoilSense website	Participated in the preparation of the requirements list
Established contact with partners in order to combine the monotirization process	Uploaded the blog page and interview content, integrating them into the website	Created visual materials for EletroDay
Developed the webapp	Created visual materials for EletroDay	Wrote the blog posts and interviews

SoilSense

Thank You

Website

https://web.tecnico.ulisboa.pt/ist1107474/

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