AvoTech

A system for the detection of Avocado diseases at an early stage
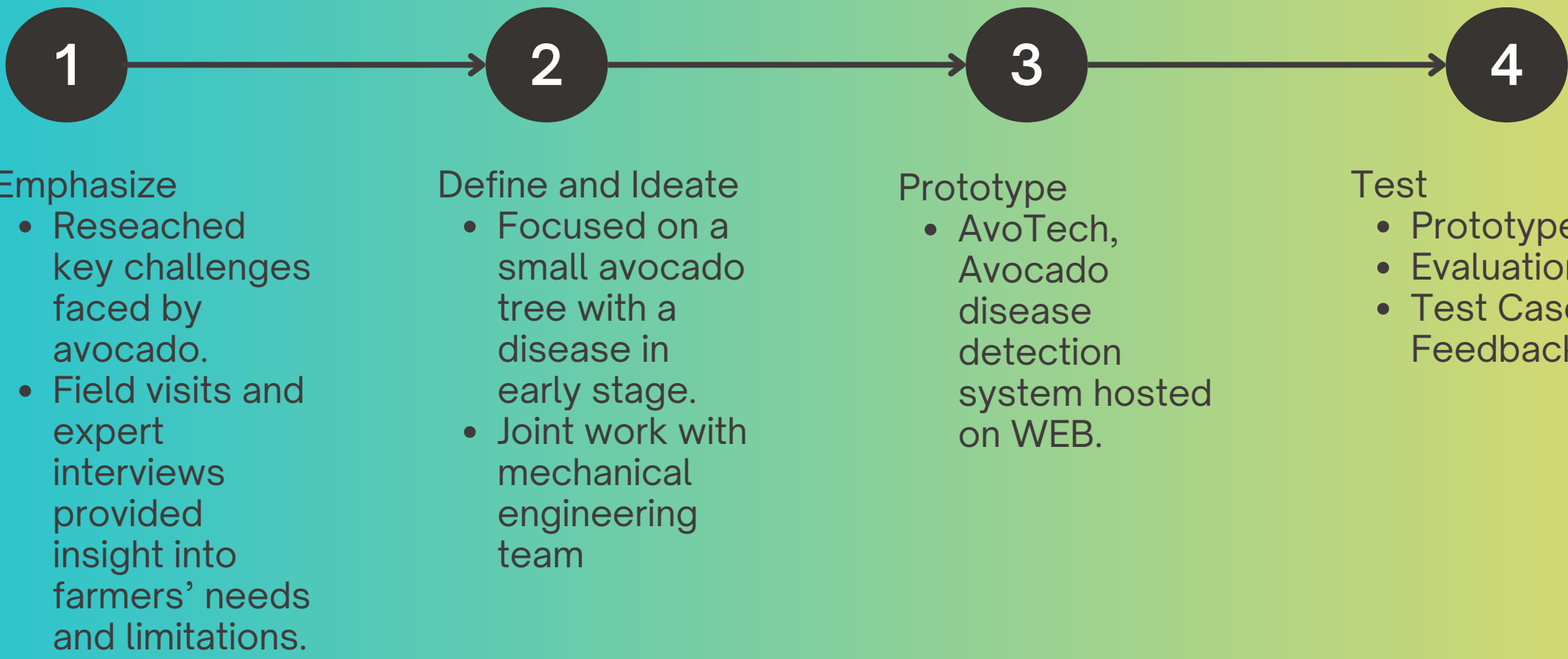
Rabea Lahham and Bahaldeen Swied
Advisor: Dr. Naomi Unkelos-Shpigel

1 Motivation

- Climate change
- Avocado trees are vulnerable to diseases that harm yield and quality.
- This project introduces an IoT-based system with sensors, **AI image processing**, and machine learning to detect diseases early.
- By analyzing real-time data and leaf images, the system delivers accurate and timely insights to support farmers in protecting their crops.
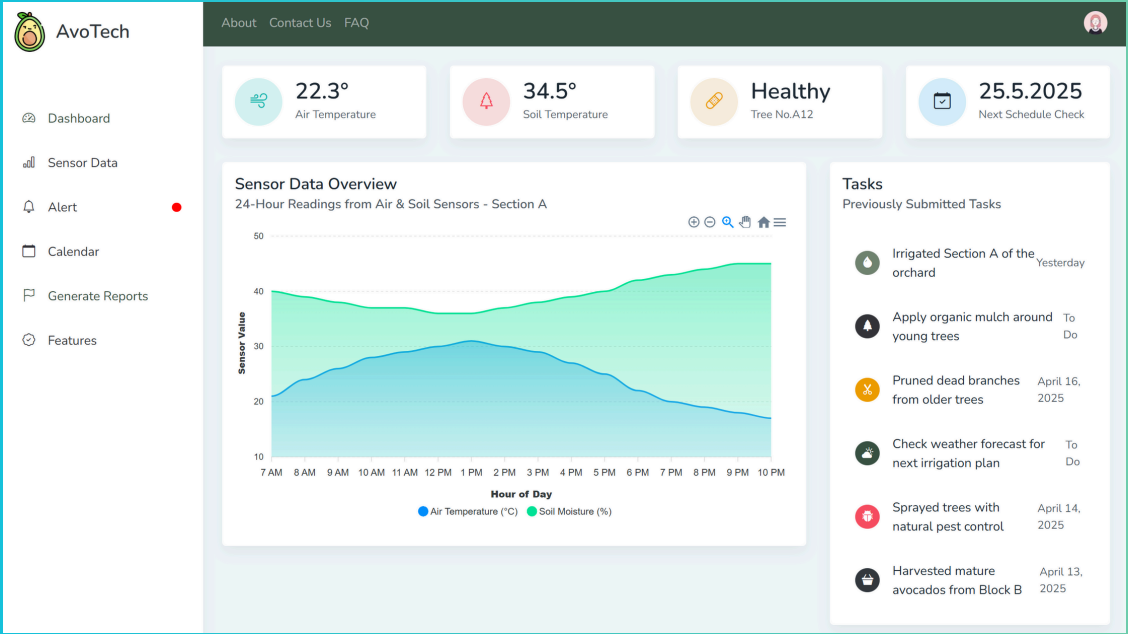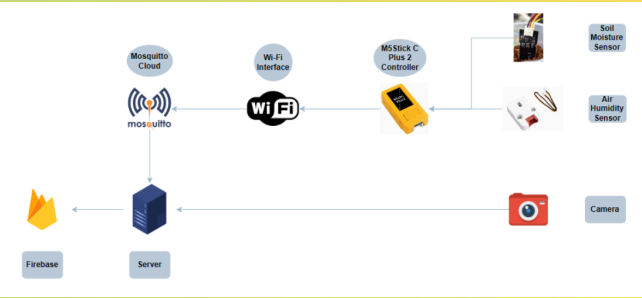

2 Design Thinking Method

1 Emphasize
- Reseached key challenges faced by avocado.
- Field visits and expert interviews provided insight into farmers' needs and limitations.

2 Define and Ideate
- Focused on a small avocado tree with a disease in early stage.
- Joint work with mechanical engineering team

3 Prototype
- AvoTech, Avocado disease detection system hosted on WEB.

4 Test
- Prototype
- Evaluation
- Test Cases + Feedback

3 The Suggested Solution

- Real-time data collection using sensors that monitor soil moisture, temperature, humidity
- Images of avocado trees captured
- Data is stored in the cloud and analyzed using **AI-powered algorithms**
- Machine learning models detect disease patterns and improve accuracy over time
- Multiple checks daily, enabling early detection and sends alerts to farmers
- Timely, data-driven insights to protect tree health and boost productivity
- GPT-4o mini, which achieves 82.0% on Massive Multitask Language Understanding, outperforming Gemini Flash (77.9%) and Claude Haiku (73.8%) in reasoning tasks involving both text and vision.

4 Evaluation

Farmers from Hamat Gader and the Galil region tested the system:
The farmer from Hamat Gader said: "Your system can really help me save money on water and fertilizer expenses."
The farmer from the Galil region noted: "This system is very good and can save me a lot of time, because it tells me how to treat the tree before it even gets sick."
Future improvements:
- Supporting more crop types
- Integrating advanced sensors (e.g., for fertilizer measurement)

SUS Score: 87.14

based on responses from 7 farmers