Seed Incubation Plant

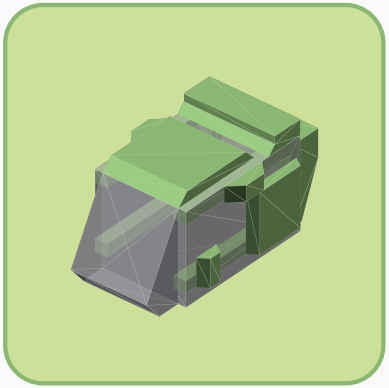
GROUP 10

Team Members

19. Anjana Roy	**KTE22EC020**
25. Aswatheertha T T	**KTE22EC026**
26. Athira Madhusoodanan	**KTE22EC027**
28. Daniel V Mathew	**KTE22EC029**

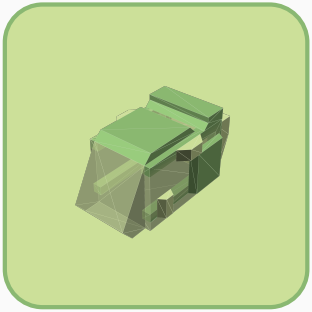
Guide Name & signature

Prof. David Solomon George



Seed Incubation Plant aims to optimize the germination and growth process of seeds by providing a controlled and monitored environment. While the **Environment Monitoring and Control Unit** (EMCU) part of the incubator takes care of environmental factors such as temperature, humidity, lighting, O_2, etc, the **Growth Monitoring Unit** (GMU) closely monitors and collects growth related information from each of the germinating saplings. By the help of **SINC**, a companion app, the status of the incubator can be closely watched.

Objectives



- Implement the sensor and actuator sides of the EMCU, thus driving it into a cohesive system.

- Implement an ESP32 CAM based Growth Monitoring Unit (GMU) powered by a TinyML model.

- Take the development of SINC, a companion app, to the alpha stage.

Title:	**Internet of Things (IoT) Based Greenhouse Monitoring and Controlling System Using ESP-32**
Authors:	J. Seetaram, A. Bhavya, C. Tarun and V. Sameera
DOI:	10.17148/IJARCCE.2024.13605
Publisher:	*International Journal of Advanced Research in Computer and Communication Engineering*
Result:	The system successfully performed real-time monitoring and automated environmental control. Demonstrated fully autonomous and remote operation, reducing human intervention.

Relevant Features & Insights:

- IoT-enabled remote control with real-time sensor data visuals.
- User-friendly UI designed on Blynk for farmers.
- Focus on sustainability, resource optimization, and precision agriculture.

Work Plan

Week 01 - 02	Refinement of Enclosure design, data collection for TinyML model, and setting up the specification for the communication protocol and UI of SINC.
Week 03 - 04	Reimplement the Electronics Bay, including the connections that binds Multiplexer and Relay boards. Implement the outer frame of the Enclosure. Starts developing GMU and SINC app.
Week 05 - 06	Implement Thermal / Exhaust system along with the Top and Side Hatches. Testing the User Interface of SINC app.
Week 07 - 08	Implement Air Moisture and Lighting systems along with the Rail Mechanism for GMU. Testing of TinyML model on ESP32 CAM module. Testing of SINC app to its full specification.
Week 09	Integration of subsystems and further testing. Report preparation and documentation.

Reference

[1] J. Seetaram1, A. Bhavya, C. Tarun, and V. Sameera, **"Internet of things (iot) based greenhouse monitoring and controlling system using esp-32,"** *International Journal of Advanced Research in Computer and Communication Engineering*, vol. 13, pp. 29–35, 2024. DOI: 10.17148/IJARCCE.2024.13605.

[2] A. Battikh et al., **"Greenhouse automation using esp32: A comprehensive study on monitoring and controlling environmental parameters for optimal plant growth,"** in *2nd International Engineering Conference on Electrical, Energy, and Artificial Intelligence (EICEEAI)*, 2023. DOI: 10.1109/EICEEAI60672.2023.10590110.

[3] J. Mukherjee et al., **"Non plant specific smart greenhouse with convective drying unit,"** in *International Conference on Trends in Quantum Computing and Emerging Business Technologies (TQCEBT)*, 2024. DOI: 10.1109/TQCEBT59414.2024.10545221.

[4] D. S. Kulkarni and S. Bhudhwale, **"Real-time environmental monitoring in smart agriculture using tinyml and machine learning,"** in *2024 International Conference on Intelligent Systems and Advanced Applications (ICISAA)*, 2024, pp. 1–6. DOI: 10.1109/ICISAA62385.2024.10829307.

Thank You