UC San Diego
JACOBS SCHOOL OF ENGINEERING
Electrical and Computer Engineering

ECE196 SP23 Team9: Indoor Botany

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Indoor Botany

Problem definition

People like to grow plants at home but few can take care of the plants well. They usually have a lack of knowledge of these plants and thus causing problems including dehydration, overwatering, and over-exposure to sunlight.

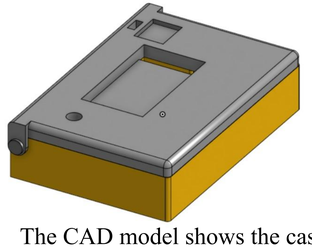
Solution abstract

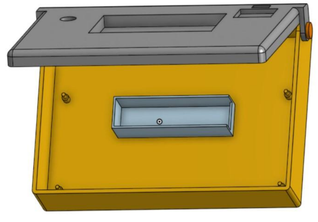
This study presents the development of a novel device aimed at assisting individuals in effectively caring for their plants at home. The device incorporates a range of sensors to monitor crucial environmental factors, such as humidity, air temperature, soil moisture, and sunlight, relating to the plants. Through our software application, the users can conveniently access and analyze the collected data on their mobile phones or computers. This enables immediate awareness of the plant's conditions, empowering users to take prompt action as needed. Additionally, our device offers more interactive features, including plant-related quizzes and monitor for information display, designed to enhance users' understanding of their plants.

Testable Hypothesis

This project will have two ways of checking whether the device that we have created was a success; We will check whether or not the device is interactive and engaging as a teaching web app, as well as have a general quiz which test's the user's plant knowledge after a couple of days.

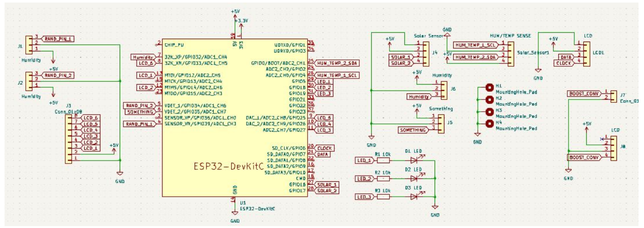
CAD Design

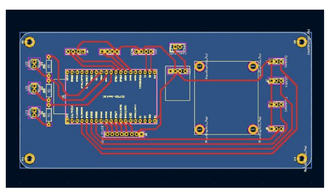


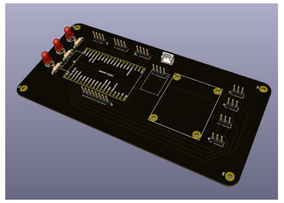


The CAD model shows the casing where the pcb would be inserted into. There are holes on top of the casing to insert the LCD and the sunlight sensor, as well as a hole to insert the wire connection for the solar panel. Inside of the casing is a box to fit the 3.7V battery

PCB Design

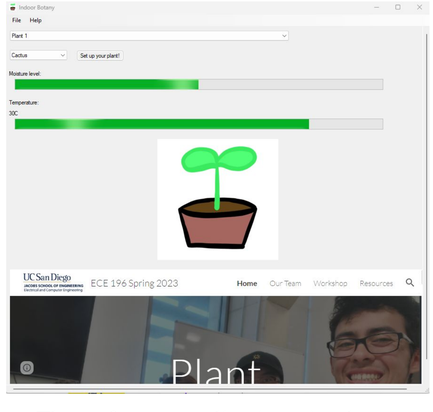


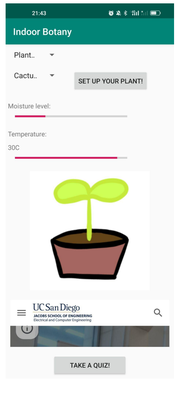




The PCB is designed for the ESP32, power regulator, and multiple sensors. It contains 8 socket connectors for sensor implementation, and LEDs to show the states of the device.

Full-stack App Development

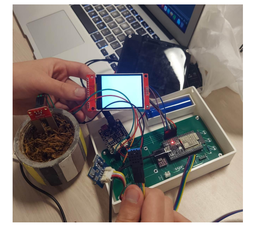


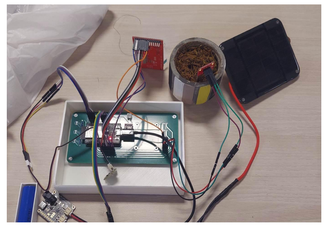


The software application simultaneously displays the analysis of sensor data and the current condition of the plants. It showcases our team's website and also includes a built-in plant quiz feature, allowing users to expand their knowledge about plants.

Prototype

Below shows us testing our sensors with a pot of soil. Most of the wires will be encased, only exposing a long set of wires for the moisture sensor to be inserted into the pot,





Test results

The quiz will be used to check whether or not the user understands how to care for the plant on their own. The quiz is set up to be easy, but not possible to guess what the answer is. It proves to be effective in practice

Proposed workshop

The workshop aims to introduce the basics of software development, API application, and related object-oriented programming (OOP) in Python. We want participants to be able to create simple but efficient apps for their projects, thus improving the user experience and the completeness of the projects. From the workshop, the participants can get to know how to develop software apps in Python for multi-platforms, with a tool called BeeWare. Additionally, the participants would practice how to combine Python API with the apps, providing more functional and powerful features to the apps.