41028

Occultist Invasive (Group 3)

OVERVIEW

Product Description	
Market Need	The world needs this product as millions of herbs are getting thrown away each year without achieving their full potential. This is extremely wasteful and is exactly what Sunflower can combat, as it gives the Herbs the opportunity to flourish. Sunflower even does this without any water waste, since our product gives each herb the exact amount of water that it needs. It is especially useful for people buying fresh herbs in pots who do not know how to maintain them in good condition. Either the plant will lack water or be drowned in it. Hitting that sweet spot of water amount is close to impossible. Our product keeps the herbs alive even when the user is on vacation or just happens to not be home for a long period of time. The product is CO_2 neutral besides the production of its components.
Key Features/ Functionality	The product is powered by a sun tracking solar panel. The panel follows the brightest light source by moving in two axes powered by two servomotors. The main chassis contains three pots with four water injectors each placed at the bottom. These are connected to three pumps that supply water from a water tank inside the chassis, through a tube, to the Herbs in their pots. One hygrometer in each pot measures the current soil moisture and sends it as feedback to the pumps. This way the system maintains a certain soil water level. On top of the chassis there is a UV growth LED, which can be turned on in the app manually. It is also possible to set a specific time interval that will be repeated daily. The pumps, UV lamp, and servomotors are all powered by a battery inside the chassis. The battery is charged by the connected solar panel.

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Other Product Compatibility, Ecosystem, etc.	We have made an app where it is possible for the user to choose a specific herb to each pot. The user can choose plants from our database or add new plants to the list manually if they cannot find their plant in our default list. The information about the plants' water need is sent from NodeRED which is connected to the ESP32 board by the MQTT. This makes it possible to keep the optimal soil moisture for the specific plant. NodeRED also sends information back to the app.
Stakeholders	Customers, sellers, external suppliers.
Target User	The target group is both singles and families who like plants and in general follow a sustainable lifestyle. The product is aimed at people with medium to high income who live in either houses or apartments. The product could be most relevant for people who do not have enough space or opportunity to keep herbs in a garden.
Other Stakeholders	Environmental organizations.

DESIGN

Brand	Occultist Invasive
Connectors (Power, USB, Lighting, Audio)	There are no connections to external power supplies, everything is powered by the battery.
Visual Interface (Screen size and type, LEDs)	The user is only interacting with the product through the app. Though it is possible to switch the product on/off physically.
Touch Interface (Mechanical actuators/switches, touch sensitivity, haptics)	There is a physical on/off switch placed at the product. The user must place the three hygrometers in the herbs' soil.
Audio Interface (Microphones, speakers)	There is no audio interface.

SOFTWARE ARCHITECTURE AND DATA PROCESSING
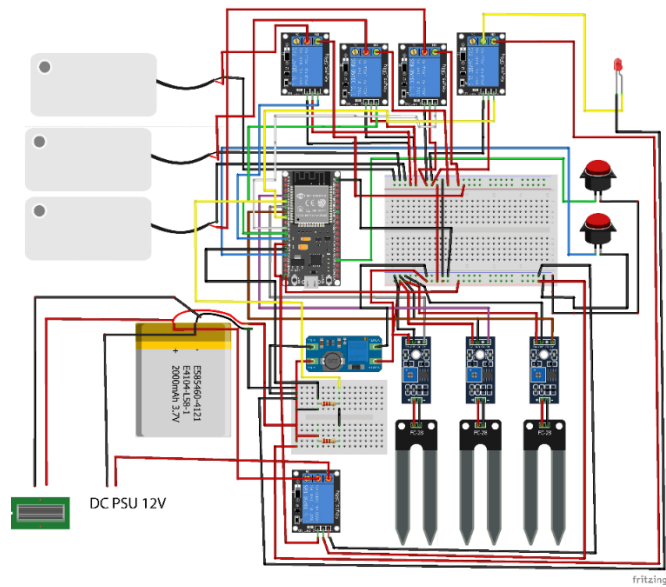
Block Diagram of Data Flow

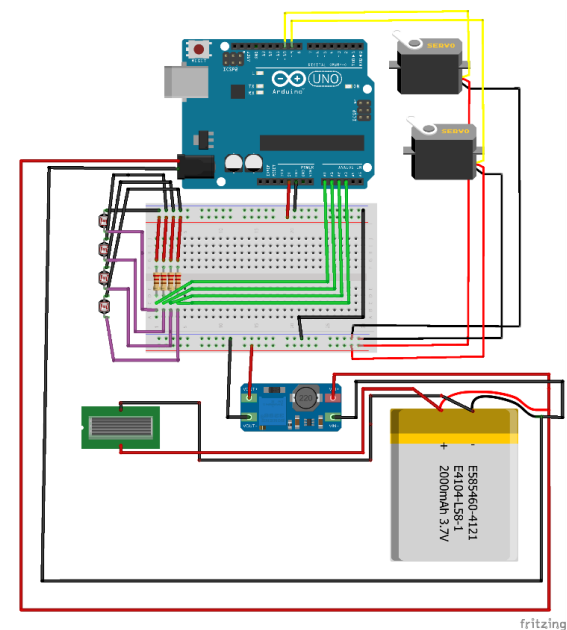Block Diagram showing how data will be collected, transferred, processed, and shared.
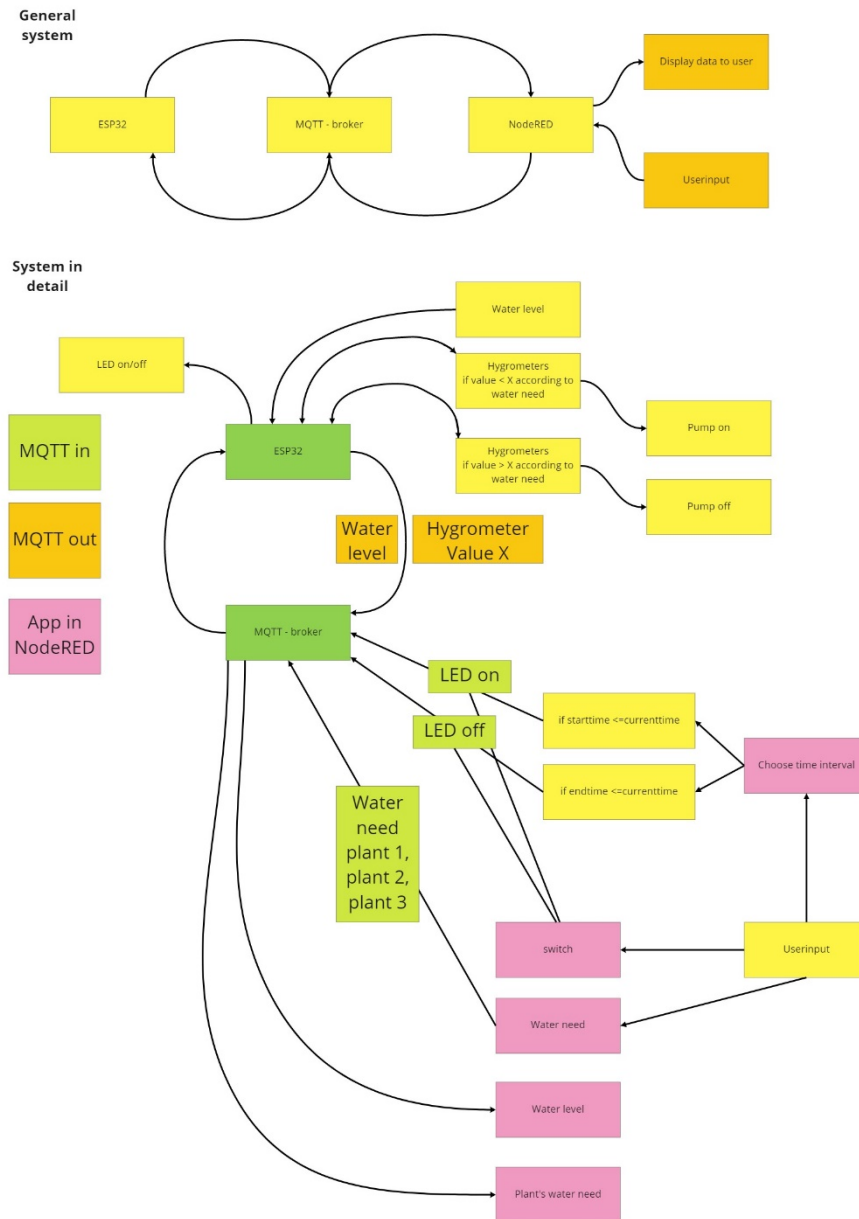
ELECTRICAL, HARDWARE AND SENSORS

Block Diagram of Electrical Hardware

Fritzing diagram of the watering pump with growth light system

DC PSU 12V

Fritzing diagram of solar panel

Input/Sensor Requirements	The four light resistors must detect the amount of sunlight and move the solar panel according to the sun's position. The energy absorbed by the solar panel must be stored in a battery. The Arduino board is powered by the battery. A converter converts the electrical voltage from the battery to the Arduino board from 12 V to 5 V. The UV light is connected to the battery as well, but the Arduino board determines when the light should be turned on and off. Using the Arduino board, the water pump and the moisture meter are operated. There must be an indicator of the battery, which will stop powering the other components if the battery is running low. It is important that the battery never runs out of power.
Output/Actuator Requirements	If the plants do not get the right amount of sun during the days, then the UV light can be turned on in the app. You can save a time interval which will be repeated every day if you do not want to turn it on/off manually. There is a moisture meter in each plant, which measures the humidity. The moisture meter informs the water pump when the herbs should be watered.
Critical BOM Components	Solar cell, battery, water pumps, hygrometer, LED screen and UV light.
Communication Requirements	The product must communicate with MQTT and NoteRED.
Power Requirements	The system is powered by a rechargeable battery. The battery is charged by a solar panel, so the battery does not need to be connected to a power supply.