

THE POINT OF THE PROJECT

This project aims towards building a smart agriculture house containing electronic sensors and API data-feeders in order to achieve a smarter way of monitoring plants. It's equipped with state-of-the-art security measurements and immediate alarms and protective actions. It also has a functionality of saving water and electricity by calculating the needs of these supplements based on the factors provided by the sensors and data-APIs.

For instance, supplying water may be skipped if it's rainy outside or the soil is rich enough in water. Artificial lights may also go off if natural light is reaching the planets in order to save electricity.

This project is environment friendly and helps against global warming, the features it has such as water efficiency and light/dark detection helps us to use water or electricity only when needed, this plays an important role of protecting the environment by minimizing carbon emission which is a very serious problem with today's agriculture.

SMART AGRICULTURE

System is designed by Razi Falah.

Information hub for this project can be found in github at [@razifalah/agriculture-project](https://github.com/razifalah/agriculture-project).

Code is written in c++ language and the electronic components are guided by the esp32 wrover development board.



The following pages include technical information, but for now enjoy this english poem about the environment:

The sun is shining, The sky is blue,

The birds are flying, And the breeze is so cool.



THE BRAIN POWER OF THE SYSTEM

ESP32 WROVER DEV

ESP32 FAMILY OF MICROCONTROLLERS

BY RAZI FALAH



ESP32-WROVER is a powerful, generic Wi-Fi + Bluetooth module that targets a wide variety of applications, ranging from low-power sensor networks to the most demanding tasks, such as voice encoding, music streaming and MP3 decoding. This module is provided in two versions: one with a PCB antenna, the other with an external antenna connector. ESP32-WROVER features a 4 MB external SPI flash and an additional 8 MB SPI Pseudo static RAM (PSRAM)

The esp 32 has shown that it's the best microcontroller unit for this particular project, it's equipped with built-in wifi and bluetooth devices that allows us to minimize component wiring without compromising quality.

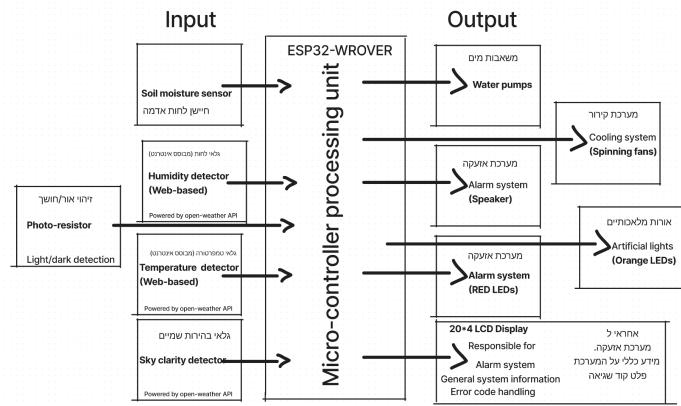
From the esp32 collection I've chosen the esp32-wrover-dev. That is because this specific processor is one of the most equipped and efficient. It was manufactured by the well-known Chinese company called "espressif" which gives it extra credibility and forms a layer of trust. Which we need to complete this project effectively.

A word from  **ESPRESSIF**

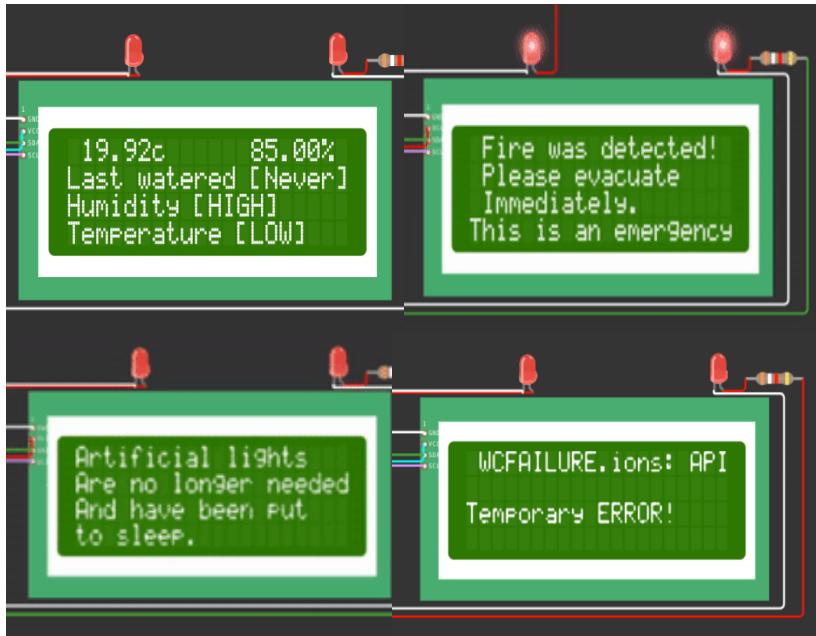
Espressif Systems is a public multinational semiconductor company established in 2008, with offices in China, the Czech Republic, India, Singapore and Brazil. We have a passionate team of engineers and scientists from all over the world, focused on developing cutting-edge wireless communication, low-power, AIoT solutions. We have created the popular ESP8266, ESP32, ESP32-S, ESP32-C and ESP32-H series of chips, modules and development boards. By leveraging wireless computing, we provide green, versatile and cost-effective chipsets. We are committed to offering solutions that are secure, robust and power-efficient. At the same time, by open-sourcing our technology and solutions, we aim to enable developers to use Espressif's solutions globally and build their own smart-connected devices.

BLUE PRINT

The blueprint of this system explains how wiring the sensors would work, as input there are 4 sensors that are responsible for providing the esp32 with real-time data in order to predict what the appropriate action the system should take in order to keep plants healthy and minimize electricity and water consumption. in the following pages you can find information about those sensors.



Can be viewed at: <https://github.com/RaziFalah/agriculture-project/blob/main/information/blueprint.md>



MAIN MENU

The main menu will be viewed by 20*4 LCD display, which will output information like alarms, weather, water supplying status, humidity and temperature. It's also responsible for messages from the system, for example if the artificial lights have turned off for whatever reason the system will output this message on this LCD screen.

The delay is set to be about 5 seconds, if some error or emergency happens a red LED will light and an error message will pop-up.

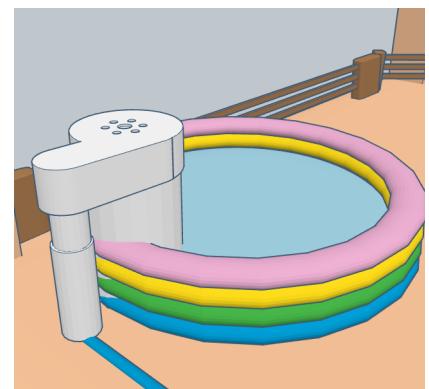
WATER

In this feature there will be a connected water supply tube to every plant in the system, the water will be supplied depending on Whether the soil is dry or not. There will be a weather check using an API when the day is rainy the water supplying will be skipped.

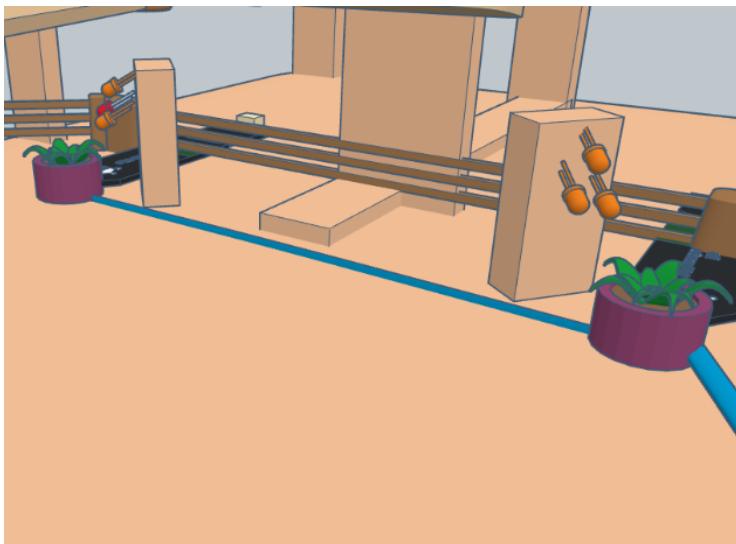
Also many other factors play in, retrieved data like humidity, temperature Also plays an important role in crafting a decision.

SUPPLYING UNIT

The water pump will use around 5 volts of power in order to operate, it will be connected to a water tank which is designed to hold and save rain water, in order to achieve better water efficiency and saving.

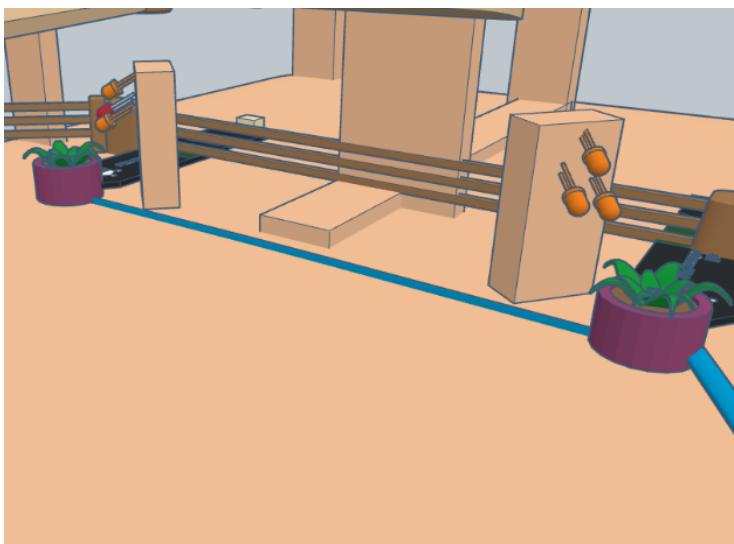


Estimation only



ARTIFICIAL LIGHTS

As mentioned before artificial lights will be used only when they're needed, determined by a photoresistor, time table and weather API. This helps to save electricity and avoid unnecessary waste. Electricity consumption is a leading factor of carbon emission and reducing how much electricity we use helps with reducing carbon emission, thus protecting the environment from global warming.



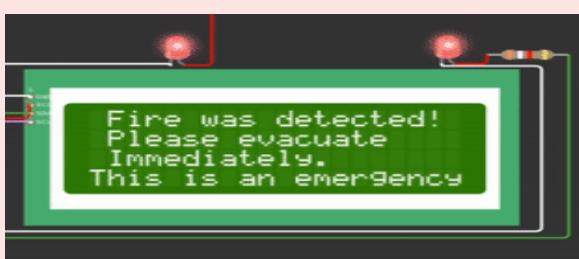
AUTOMATIC CEILING

When the artificial lights are not needed, the automatic ceiling opens in order to supply plants with natural lights and save electricity. However, the automatic ceiling closes when the weather is poor outside to avoid damage to the plants or the structure of the agricultural smart house.

If this happens at day time, the system will be forced to provide artificial lights.

EMERGENCIES

The system is equipped with gas leakage and fire detectors. If any abnormalities happen to be detected, the system will instantly output this message on the LCD screen and ALARM speakers. Emergency LEDs will be activated as well.



Sonic alarm component