

Plant Manager

made by: Alejandro Rizo Reyes

Introduction

My Arduino project "**Plant Manager**", is an Arduino one based project that allows the user to take care of a selected type of plant and check its status via Telegram chat.

This document summarizes the project, to see the complete guide of the programming side check the "***Programming Document - Plant Manager***". And to learn how to use it check the "***User Guide - Plant Manager***".

Objectives

To better understand this project we must first analyze the problem of taking care of a plant. Nowadays it is common to have a plant at home, and sooner than later we learn that most plants required certain conditions to grow healthy, but we as individuals cannot measure with precision the temperature, humidity and light level without equipment, that makes it inconvenient for most people, and it is also an even greater problem when we are away from our home.

This project attempts to:

- Measure several ambient variables that impact our plants development (Light, Humidity and temperature).
- Create a system that allows us to be informed of the water level so as to refill our water tank.
- Display with visual aid the plant status.
- Create several plant profiles to personalize its care.
- Connect it to a communication service so as to have all this information at any time.

Components

In order to monitorize the environment of the plant the project counts with several sensor to evaluate several ambiental conditions that are relevant to the plants health, the sensors and equipment selected to utilize in this project are:

- Arduino One R3
- DHT11 (Humidity and Temperature sensor)
- YL69 (Ground Humidity sensor)
- SEN2600 (Water level sensor)

- KY018 (Light level sensor)
- HCSR04 (Proximity sensor)
- ESP8266-01 (WiFi module)
- ESP8226-01-Adapter (Module that simplifies Arduino One connectivity with ESP8266-01)
- ESP8226-01-USB (USB to program ESP8226-01)
- LCD display
- LCD 12C-adapter (Module that reduces the quantity of cables used in the LCD connection)
- 8x8 Led Matrix
- 2 buttons
- Connection Cables
- Protoboard

Project Plant Manager

Sensors:

The project began by connecting the sensor to the protoboard with the Arduino one:

- DHT11 (Humidity and Temperature sensor) Connected to digital pin 13 of the Arduino
- YL69 (Ground Humidity sensor) Connected to analog pin A0 of the Arduino
- SEN2600 (Water level sensor) Connected to analog pin A1 of the Arduino
- KY018 (Light level sensor) Connected to analog pin A2 of the Arduino

Thanks to the extensive documentation about this basic ambient sensors, it proved to be an easy task, the only complication was to bring some data to an 0 to 100 scale so as to make it a percentage, those were the DHT11 humidity value, the YL69 humidity value and the KY018 light value, but with to the 'map' function build in arduino we were able to correct those values with ease.

Displays:

The project counts with two visual representations of the data to the user, a LCD display and a 8x8 led grid.

LCD display: Connected via 12C adapter (it was needed due to the vast quantity of cables to the arduino Uno R3 pins), we connect all the pins of the LCD display to its equivalent to the 12C adapter, then we connect ground and VCC to the protoboard and SDA and SCL ports to the main arduino, analog pins A3 and A4. This allows us to represent the type of plant that we are taking care of as well as its values of temperature, humidity and ground humidity, if any of those values were out of the recommended values for its selected plant it also displays an exclamation mark to indicate the problem.

8x8 led grid: Connected directly to the arduino One R3 digital pins 11 and 12, this led grid allows the arduino One to represent three possible figures:

- **Gear:** It is on selection mode, and indicates that we can change the plant profile so as to match the actual plant.
- **Happy Face:** All of the health values of the plant indicate that it is under good conditions.
- **Sad Face:** One or more health values of the plant indicate that there is something to be changed in its environment.

Proximity module:

The proximity module, allows the Arduino One to shutdown both visual displays until it detects a presence within 15 cm. This was implemented so as to reduce the cost and deterioration of the equipment.

Buttons:

There are two buttons present on this project, one behind the proximity module (Change Mode Button) and the other one separated from the protoboard (Select Plant Button).

- **Change Mode Button:** When the plant manager is working we can change its mode from "**Selection mode**" to "**Vigilance mode**" by pressing this button, in order to work it must be pressed until the display shutdowns or the grid led changes its picture.
- **Select Plant Module:** When the plant manager is working we can change the plant profile by pressing this button, in order to work we must press it until the messages being displayed on the LCD display changes to our desired profile. It is also needed to be on "Selection mode".

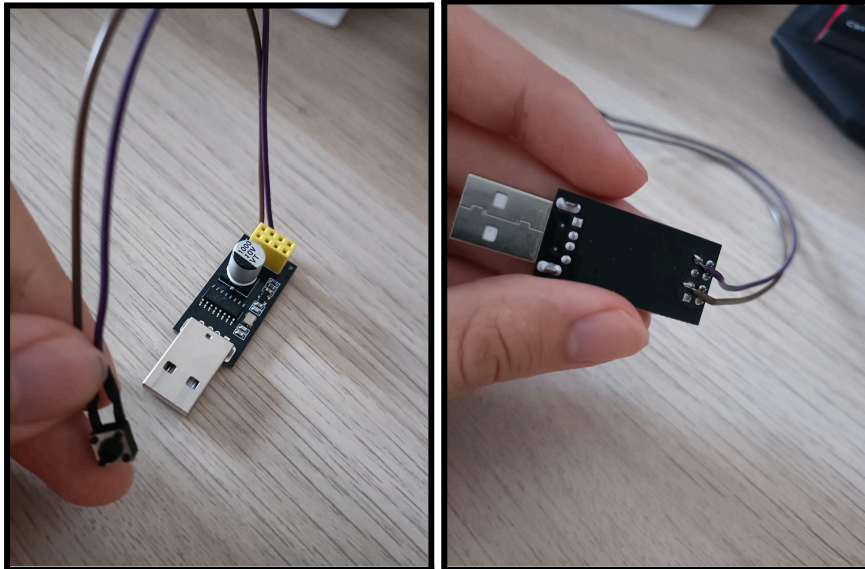
WiFi Module ESP8226-01

This module proved to be the most complicated part of this entire project, due to the lack of a Wifi antenna on the Arduino One R3 that it is being used on this project, we required an extra module so as to send data and create the the Telegram bot infrastructure, but it came with several problems:

- **How to program it**
- **Different voltage needed**
- **Telegram messages**

How to program it

So as to program it it was needed to have a specialized USB or use the Arduino board, after considering it, it was decided to use a special USB because to use the Arduino board it was needed to remove some component making it more tedious and dangerous to the infrastructure. Another problem came when the USB didn't have a button or switch to enter the programming mode on the ESP8226-01, thankfully with help of a local shop I was able to weld a button to allow the transition between the two modes.



Different voltage needed

The ESP-8226-01 requires a maximum of 3.3V, which is a problem because all of the other components use 5v, but thanks to a voltage adapter I was able to connect it easily.

Telegram messages

The ESP8226-01 via "UniversalTelegramBot" library sends messages to the chatbot

Conclusion

After all the work with this project it was able to:

- Measure several ambient variables that impact our plants development (Light, Humidity and temperature).
- Create a system that allows us to be informed of the water level so as to refill our water tank.
- Display with visual aid the plant status.
- Create several plant profiles to personalize its care.

The project proved to be a semi success, but due to complications with other projects and deadlines this project could not be completed in its entirety, the only thing left to do was to

send data from Arduino One to the ESP8226-01 module, and later send it on request via telegram. All of the other objectives were completed.

This project made me more knowledgeable with the use of Arduino and its several components. In the near future I will continue to improve this little project so as to make it the way it should have been.

Video showcase

<https://www.youtube.com/watch?v=E2gvqGHNTpE>