

# Water plant system for plants in vase

## Purpose

The purpose of this project is to create a system to water my plants while I am on holidays in vacation. I do not have a garden, but just few plants in a vase. Most of the projects I've seen are for watering plants in a garden, so they do not fit in my situation.

Moreover, I do not have water pipe on my balcony so I had to find a different solution.

In all this I also like to have some statistics and so I added an SD logger board.

## Description

I've thought to implement it using an Arduino UNO board and few other sensors and components. It should work in this way...if the humidity of the most need plant is under a certain level, Arduino opens the valve to water the plants. But what happens if too much water arrives in the less needing plants ? ( It never happened )...You will discover why!

To module the quantity of water I created more or less tiny holes in the tube that goes in the plants. More holes more water.

However, to realize it, I cut and glue some components like a potato salad's box...some tunes...some woods sticks.

## About the code

The code that needs to be customized for your preference is in the parameters part:

```
// how many milliseconds between grabbing data and logging it. 1000 ms is once a second
#define LOG_INTERVAL 1000 // mills between entries (reduce to take more/faster data)
#define SYNC_INTERVAL 600*LOG_INTERVAL // mills between calls to flush() - to write data to the card

// how many probes to check the humidity?
#define PROBE_NUMBERS 5
// Define how many millis between next soil humidity check - 6 hour
#define HUMIDITY_CHECK_INTERVAL 21600000 // 6 hour // 60000 // 1 hour // 5000 // 5 sec // 30000 // 30s //

// Maximum time for the Open Valve - 60s
#define MAX_OPEN_VALVE 300000 // 5 min // 60000 // 60 sec // 300000 // 5 min //

// Interval between Soil humidity check
#define SOIL_HUMIDITY_INTERVAL 60000 // 10 sec

// Humudity Low limit
#define SOIL_HUMIDITY_LOW_LIMIT 400

// Humudity High limit
#define SOIL_HUMIDITY_HIGH_LIMIT 550
```

# **Components**

1 x Arduino UNO

1 x DHT11 humidity / temperature sensor

1 x moisture sensor

1 x SD Card logger board

1 x LED

1 x Plastic Water Solenoid Valve

1 x FET transistor

1 x Diode Zener

1 x battery package 5v (  $\geq 4000\text{mA}$  )

1 x battery package 12v (  $\geq 5000\text{mA}$  )

1 x push button

1 x Resistor ( 100Kohm )

1 x 20L Box or more

1 x box to cut and use as water intermediate distributor container

1 or more valve adapter

1 x Teflon tape

Various wires

# **Tools**

1 x cutter

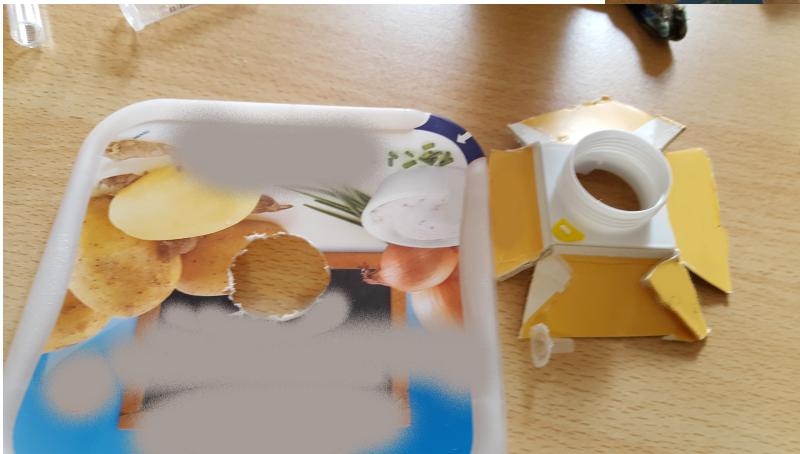
1 x small saw

1 x hot glue tool

# **Implementation**

After I assembled all the Arduino components on the breadboard, and verified that the valve opened in certain humidity condition, I started to create an intermediate container, that will collect the water from the main valve and distribute to all the vase.

To achieve it, I used a potato's salad box that I pierced with many holes how the number of vase in the bottom :



And in the top I created a bigger hole where the tube coming from the valve will be jointed through the top of juice pack.



After I cut some small syringe that will be used to connect the small tube that will go to the plants and I glued I the bottom of the box:

The end result would be something like this:





As you can see, to attach the tube to the electro-valve I had to use some adapters to match the valve size and some Teflon band to seal the connection. I also had to build a small support with enough space to drive the tubes to the plants. I did it by wood and glue.

To module how much water will go in every plant, I did some small holes in the part of the tube that goes in the vase; then I closed the extremity with the syringe's push piston or I left it open if the plant was really thirsty.

The whole setup was something like this:



## Final consideration

Not all my plants survived ! Unfortunately the valve I used needs a minimum pressure to be full opened. The pressure that my box of water did on it was only enough to open the valve partially. This means that the valve was always open, draining out very quickly the battery, but however not enough water had been provided because of the only partial opened valve!

After that I've seen that at least 2 alternatives exists.

The first is to use a better valve that doesn't have a minimum pressure requirement like this:  
<https://www.adafruit.com/products/996> but is more expensive

The second is to use a peristaltic pump. Still I do not have a clear idea on which one.