**E-Garden**

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**Abstract**

This Project goal is monitoring growing of plants focusing in Indoors environments as apartments, houses with few luminosity but not excluding the efficient for rural areas and community garden where an automatic system must necessary. This would be possible due the use of different sensors. It was used Arduino platform, a lamp and sensors of air and soil temperature; humidity; and light. The humidity sensor will control the water bomb. The light sensor will control the lamp.

This project will help homeowners who don’t have much time to care their plants. In addiction, this irrigation system avoid waste of water because the water pump will turn on only when will be necessary, so it helps the environment. Therefore, it will be easier and shipper to irrigate plants through of this irrigation system.

**Introduction**

***Structure***

As it was stated previously, this project has goal of control and monitoring growing of plants through of a simplified irrigation system that can be care indoor and outdoor. There are many advantages in our prototype. It was implemented to help homeowners who do not have much time to care of their plants and to help the environment with waste of water.

Another advantages are easy to be used, low budge, easy maintenance, could be expandable with more floors, space enough to have and care of more plants, portable plants which can be care both indoor and outdoor and could be used with fish becoming a big water tank which has many benefits.

The infrastructure was built with *Arduino Uno platform*; *Shield Ethernet for Arduino Uno platform*; three sensors: *Soil Temperature/Moisture Sensor - SHT10*, *Grove - Light Sensor* and *DHT22 temperature-humidity sensor*; one *Woods 0151 18/2-Gauge SPT-2 Clamp Lamp with 8.5-Inch Reflector, 150-Watt, 6-Foot Cord*; one *Fountain Pro Pump Aquarium 47 GPH FountainPro WT55LVp*; one *TaoTronics® LED Plant Grow Light For Hydroponic Garden Greenhouse(12W,E27, 3 Bands)*; one *water tank 11,5’’ x 14’’ x 12’’*; one *garden hose with eighteen* Mini Skater Adjustable Irrigation Drippers Micro Drip Sprinklers Watering Emitter Drip System on 1/4" Barb for 4mm/7mm Tube and one *PowerSwitch Tail II Isolated DC Actuated AC Power Switch*.

***Light Sensor***

The light sensor that was chose is Grove light sensor module incorporates a Light Depend Resistor (LDR). Typically, the resistance of the LDR or Photoresistor will decrease when the ambient light intensity increases. This means that the output signal from this module will be HIGH in bright light, and LOW in the dark.

The function of light sensor is save energy during the time that the user stipulated. Our light sensor will save energy in the period from 8am until 7pm and it is possible change this period. So, the light sensor and the lamp will not work in the next hours.

The amount of environment light emitted is analyzed and read by photoresistor (LDR) that will be show in percentage through of program. This reading happens in each five seconds based in the program’s clock. It is analyzed if the amount of light is greater or less than 50% (this percentage the user could change) therefore, if the amount of environment light is greater than 50%, the lamp will turn off and if the amount of environment light is less than 50%, the lamp will turn on. So, it is possible improve the photosynthesis through this method.

The photoresistor is to stay in a place where is close of the plants and where it is not possible absorb the lamp’s light. This sensor is linked with the main system and it is controlled by Arduino.

***Humidity and Temperature Sensor***

The sensors that were chose are DHT22 temperature-humidity sensor which collect the air humidity and Soil Temperature/Moisture Sensor - SHT10 which is used inside of soil and collect the soil humidity. Both sensors work seem, the difference between them is that the SHT10 has a pin that can be used by a clock and the DHT22 does not have. The SHT10 works with 3 or 5V logic and has four wires: RED is connected with VCC (3-5V DC), BLACK or GREEN is connected with ground, YELLOW is connected with clock and BLUE is connected with data.

The function of humidity sensors is collecting humidity data during 24 hours per day and sends it to the Arduino that will show it in percentage through of the program. With this sensor in our prototype, it will be possible control the water pump.

The amount of humidity that is absorbed by soil and air is read in the sensors. The humidity data is sent to Arduino that control the water pump and will show the amount in percentage. If the amount of humidity is less than 90%, the water pump will be turn on and if the amount of humidity is greater than 90%, the water pump will be turn off. According with this method, the plants will be irrigated when is necessary, therefore there will not waste of water and it will help the environment. Also both sensors are colleting the temperature. The SHT10 is colleting the soil temperature and the DHT22 is colleting the air temperature.

Next Steps/Improvements

There are many services on the Internet that offer Live Streaming Data Monitoring capabilities. One of these services is calling for Ploty which is a website that shows graphics based in data received through of Arduino Uno. The Arduino could send data like humidity, temperature and luminosity to Ploty website to do the soil and air humidity graphic; soil and air temperature graphic in Celsius and Fahrenheit; and luminosity index graphic. Therefore, the user could monitoring and controlling his irrigation system. This method will help the users who don’t have much time to care of his plants.

Another next step could be an automatic control through of the year seasons. There are seasons that are hotter and have more luminosity than others, for example Summer has more luminosity and is hotter than Winter. So, the project could detect what is the current season to adapt when it is necessary to have more or less luminosity and to increase or to decrease the water pump operation.