Alan Joy | B-Tech CSE | SJCET Pala

Exposys Data Labs | Internship Program©

SOIL MOISTURE DETECTION

[IoT Project On Plant Watering Automation]

Abstract

The benefits of automated watering systems concern the environment as well as the human and financial aspects, uniting the fundamentals for sustainable development. But, especially, they are ideal tools for professional landscapers who are always on the outlook for ways to make green spaces more attractive and healthy.

In daily operations related to farming or gardening watering is the most important practice and the most labour intensive task. No matter whichever weather it is, either too hot and dry or too cloudy and wet, you want to be able to control the amount of water that reaches your plants.

It is programmed to sense moisture level of plants at particular instance of time, if the moisture content is less than specified threshold which is predefined according to particular plant's water need then desired amount of water is supplied till it reaches threshold. Generally, plants need to be watered twice a day, morning and evening. Thus, the microcontroller is programmed to water plants two times per day. System is designed in such a way that it reports its current state as well as remind the user to add water to the tank. All this notifications are made through mobile application. We hope that through this prototype we all can enjoy having plants, without being worried about absent or forgetfulness.

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Introduction 1

In this project, we are talking about an automated system that includes whole watering system.

An automated watering system is such a system that starts watering to plants by measuring soil moisture through soil moisture sensor. In this project we will have some extra benefits. We don’t need to control this watering, because the device will make this automatically when it will need it.

This plant are dependent on conventional breeding - watering, and provide the right amount of sun to sustain life and growth. In busy schedule of day to day life, many time people forget to water their plants and due to this plants suffers many disorders and ultimately died. In addition, the world's biggest problem in modem society is the shortage of water resources, agriculture is a demanding job to consume large amounts of water. It is very essential to utilize the water resources in proper way

Therefore, our project aims to implement a simple system, using automatic irrigation, watering a small potted plant or crop with minimal human intervention.

microcontroller ATMEGA328P is programmed such that it gives the interrupt signals to the motor via the relay.

Soil sensor is connected to the Arduino board which senses the moisture content present in the soil.

Whenever there is a change in the moisture content of the soil, the sensor senses the change, giving signal to the microcontroller so that the pump(motor) can be activated. Automatic irrigation systems are convenient, especially for those who travel.

Proposed method with Architecture 3

There are two functional components in this paper. They are moisture sensor and motor / pump.

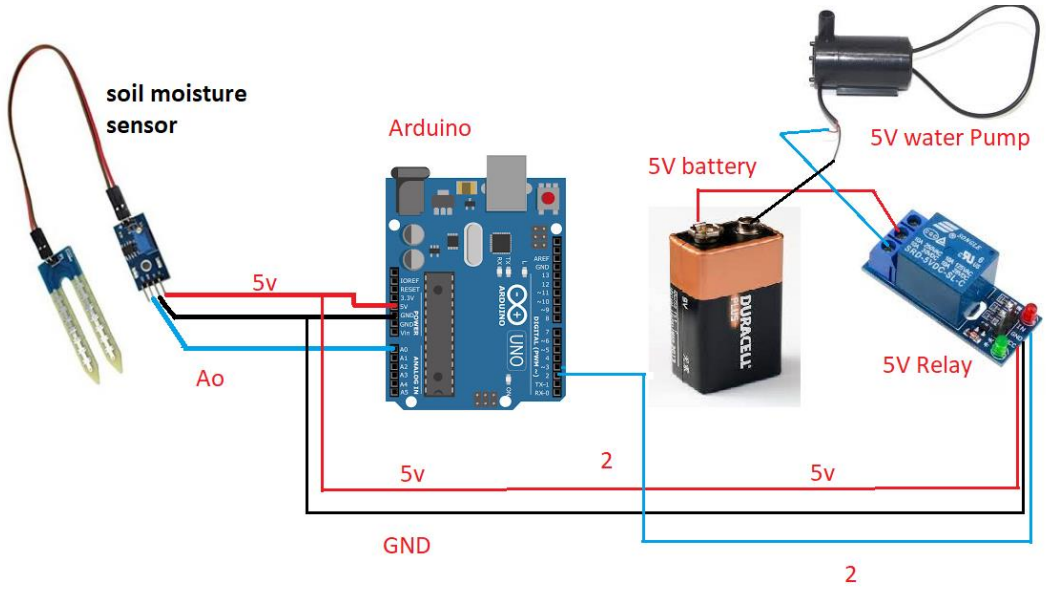
Arduino board is programmed using the Arduino IDE software. Humidity sensor is used to detect the soil moisture content.

Motor / pump is used to supply water to plants. Soil moisture and temperature predetermined range is set particularly for specific plants requirement, and according to that system is being operated.

Microcontroller (ATmega328), is the brain of the system.

Both humidity and temperature sensor is connected to the controller's input pin.

Pump and servo motor coupled to the output pin. In case of soil moisture value is less than threshold system automatically triggers water pump on till sensor meets threshold and then sets off automatically.



Methodology 4

The automatic irrigation system was designed to continuously sense the moisture and temperature level of the soil. The system responds appropriately by watering the soil with the exact amount of water required and then shuts down the water supply when the required amount of soil moisture is achieved.

The reference amount of soil moisture is already fed to the microcontroller beforehand. This reference soil moisture content was made to be adjustable for the three most common soil types (sandy, loamy and clayey soils).

The moisture sensors and temperature sensors were designed using probes made from corrosion resistant material which can be stuck into soil sample.

Voltage levels corresponding to the wet and dry status of the soil sample were computed by measuring the resistance between the moisture probes and matching them to output voltage of a comparator circuit.

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Implementation 5

When the soil Moisture sensor is sensing the soil, the data is reached the Arduino and then it sent back to the relays.

In this thesis, relays are used as a limit switch to control the 5V water pump DC motor. If soil moisture is reached above 700 percentages, relay is ON, then motor run for irrigation process.

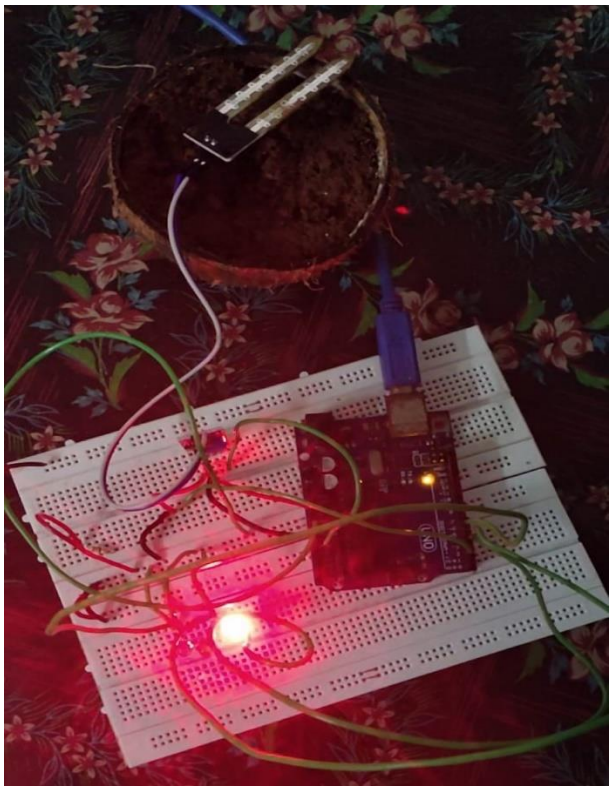
The soil moisture is reached below 700 percentages ,the relays is OFF, then water filling motor will stop.

When the power is ON, ultrasonic sensor is started to sensing the level of water.

The sensor signal is continuously sending the data to Arduino.

If the water level is above some particular measurement there will be an action takes place to stop the pumping.

* Here we used 3 LEDs to indicate three water levels that is Red for minimum water content Yellow for medium water level and Green for which indicates the water level is high in the soil. Based on the colouring code the watering pump will be operated.



Conclusion 6

This cannot doubt about the advantages of all the approaches by different researchers, however the main issue elaborated from the above discussion, is the identification of the end user for a particular approach. Same are real for the simulation irrigation schedule models. But if the irrigation schedule model has to be implemented by the water managers in the region, the solution will be easy.

This research uses the simulation models based upon soil indicators or water balance approaches and this can also use the remote sensing techniques depending upon the complexity of the simulation. The results of the system are to get knowledge how to use modern technology in agricultural fields, to design an embedded system which can completely help the gardeners, to know about the irrigation application, to reduce the physical causes and inconvenience, to maintain the loss/ frequent damage of irrigation equipment, to control the wastage of water and electricity.