

SOIL NUTRIENT ANALYSIS USING AURDINO

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Abstract— This project on 'Automatic Plant Watering System using Arduino' is been done for the automatic watering of the plants using Sensor technology. Nowadays, everything has become automatic thus saving man power and human efforts. This system introduces sensor technology along with the microcontroller to control the watering of plants by turning the motor pump ON/OFF. The soil moisture sensor connected along with the Arduino UNO(microcontroller) senses the moisture present in the soil and the information is been sent to the microcontroller thus ,it sends signal to drive the motor with the help of relay. The temperature and humidity sensor(DHT11) monitors the system when the soil moisture sensor fails to work. In our experiment we have connected all the mentioned electronic components and have successfully tested the working of the system. The primary application of this system is mainly for farmers ,where they water the plant excessively which leads to water logging. In agricultural lands where there is shortage of rainfall ,this system can be implemented to achieve great results irrespective of the type of soil .Survey has been done on how much water can be saved by implementation of this system.Thus, these type of automated systems can be developed further for saving our water resources.

Index Terms—Microcontroller, Humidity Sensor

I. INTRODUCTION

Water is the elixir of life, a precious gift of nature to mankind and millions other species on the earth. All living organisms require water to grow and reproduce. It is estimated that 70% of the total available fresh Water is being used for agriculture purpose. Earlier days only less amount of water was used for this purpose since the global population was less. But now the demand for water resources is increased as there are about 7 billion people living in the world. By the increase in global population it is appraised that it will reach 9 billion people by the year 2050. With the advancement of electronics and technology, lives of human beings have become much easier and simpler. Everything has

become automatic, reducing the human efforts and activities. In countries like India where agriculture is our backbone efforts must be taken to save water in an efficient way. The climatic conditions are isotropic where we cannot predict the requirement of water by the plants at regular intervals And here comes the sensor technology.

Here we introduce one such system to save water named as Automatic Water Monitoring system. According to this system we use a microcontroller along with the soil moisture sensor which senses the moisture present in the soil and the motor pump is switched ON/OFF depending on the requirement of the plants. When we don't water the plants it leads to the mineral loss in the soil and ends up with rotting the plants. At present era, the farmers use modern techniques like using manual control sprinklers, flood type feeding system usually wet in which farmers irrigate the land at regular intervals. During this process more water is being absorbed by the soil and thus remains wet for long time producing infections on plants which gets dried. With water deficiency, fungal infections take place in plants. These problems can be rectified by using Automatic monitoring technology. In addition to soil moisture sensor we have used temperature and humidity sensor (DHT11) which helps to monitor the plant when the soil moisture sensor fails to work.

II. MATERIALS USED

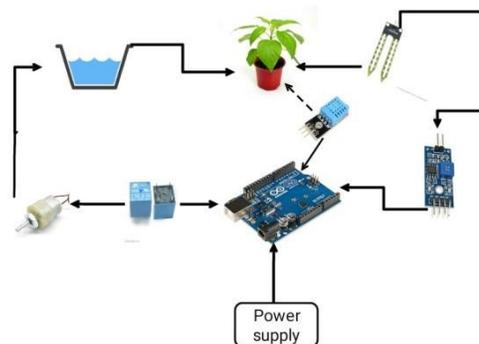


Fig.1.Block Diagram

The components used in this project are pictured above, they are

- Arduino UNO,
- Soil moisture sensor(LM 393),
- DHT 11 sensor,
- Servo motor,
- Water pump,
- Relay module
- Diode and transistors

III.WORKING PRINCIPLE

The main working principle behind this system is in connecting the soil moisture sensor along with the Arduino UNO which is also connected to other electronic components. Measurement of the soil moisture is done by the soil moisture sensor which forwards the information and parameters regarding it to the microcontroller (ArduinoUNO). The microcontroller then controls the pump by turning the switch ON. If the moisture present in the soil is below the threshold level then the micro controller sends the signal to the relay module which in turn runs the pump and water is supplied to the plants.. The buzzer produces a beep sound to indicate that water is supplied to the plants. Once enough water is supplied the pump stops working. The power supply to the Arduino must range between 7v-12v.The soil moisture sensor is been connected to the analog pin of the Arduino UNO such that the exact value of the moisture present in the soil is obtained. When the soil moisture sensor fails to work the DHT 11(temperature and humidity sensor) monitors the watering of the plants. This sensor detects the present temperature and the humidity of the surrounding environment and sends signal to the micro controller which in turn sends the command to the relay as well as the pump which is connected with the servo motor to carry out automated irrigation system. The value of these sensors and the status of the motor pump is displayed on the LCD screen.

IV. ANALYSIS/SURVEY

The proposal of our project is justified by this analysis. The rainfall in Tamil Nadu is seasonal. According to the recent survey by Tamilnadu water supply and drainage board The annual rainfall in the state is 960 mm. Approximately 33% from south west monsoon and 48% from north east monsoon.

Table 1.Analysis

Season	Month	Average rainfall in mm
Winter rain	Jan-Feb.	47
Summer rain	May	138
SW monsoon	June-sept.	322
NE monsoon	Oct-nov.	470-970

Surface water:

The total surface water potential of the river basins of Tamilnadu is assessed as 853 TMC.

- 39000 tanks with storage capacity-347 TMC.
- 79 reservoirs with storage capacity-243 TMC.
- Others states -2 TMC.

The average run off (surplus flow) to the sea from the 17 basins of TN state is computed as 177.12 TMC.[4]

Ground water status:

By the recent survey of TN-ENVIS, the total ground water available is 22,423 MCM(million cubic metre) and the net ground water draft i.e., the quantity of water withdrawn is 13,558 MCM. Thus the available balance for use is 8875 MCM. Over the past five years, the percentage of safe blocks has been declined from 35.6% to 25.2%. Over exploitation has already occurred in more than a third of the block (35.8%) and eight blocks (2%) have become saline [5].

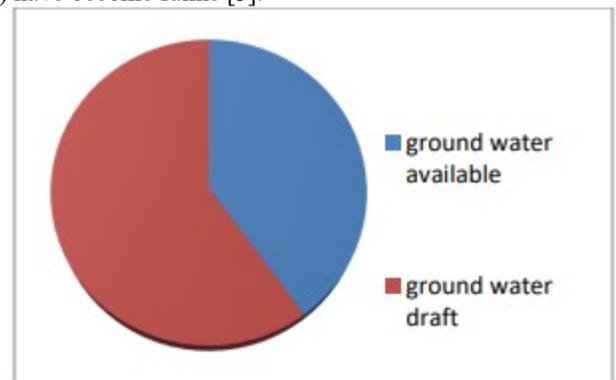


Fig.2 Analysis chart

This analysis shows that both seasonal rainfall and the surface water couldn't satisfy the demands of the people. The farmers on the farm land are solely dependent on rain and bore wells for irrigation but at most of the times they do not get the adequate water for their agricultural activities. We fail to preserve the surplus water that runs off to the sea. As the population grows and more food is required, better water management is essential. This proposed project will make the farmer to use water in an efficient way.

V.RESULT

The figure below represents results of our experiment on automatic plant watering system based on Arduino microcontroller and sensor technology. Presence of every module has been reasoned out and tested. Whenever a need for water was recognized by the sensor, microcontroller sends the signal to the ground water available ground water draft pump to start watering the plant until enough quantity of water is supplied to the plant. This project has been tested and applied in the roof gardens and the system is under observation to test the stability of the system for a longer period. This helps in minimizing the manual intervention of the farmers and prevents excessive loss of water.

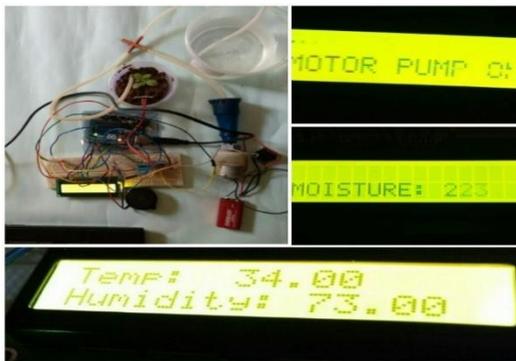


Fig.3 Experimental Result

VI.CONCLUSION

In present days especially farmers are facing major problems in watering their agriculture fields due to the scarcity of water and irregular power supply to the rural areas. "Agriculture is the backbone of India." We engineers has to take steps to solve the problems faced by the farmers as they still practice the conventional method for agricultural activities. Thus this project has been designed and tested successfully for the benefits of the farmers and other people. It has been developed by integrated features of all the hardware components used. By means of this system, it is possible to control the amount of water released from the process of watering the

plant. This project can be further developed by including the Bluetooth connectivity or a GSM module so that people can control the water supply and monitor its status when they are out of town. The servo motor can also placed before the pump which rotates by an angle of 0° - 45° for the supply of water. Water level indicator sensor can also be introduced in the circuit to sense and measure the level of water in the tank and sends signal to switch off the pump to save the water.

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