

## A Study on Smart Irrigation System Using IoT for Surveillance of Crop-Field

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### **Abstract—**

*In India, agriculture plays a crucial role for development in food production. In our country, agriculture depends on the monsoons which aren't sufficient source of water. therefore the irrigation is employed in agriculture field. Internet of Things (IoT) may be a milestone within the evolution of technology. IOT plays a crucial role in many fields, one among that's Agriculture by which it can feed billions of individuals on Earth in future. the target of this paper is getting to overcome this challenge, the entire system is micro control based and may be operated from remote location through wireless transmission so there's no got to concern about irrigation timing as per crop or soil condition. Sensor is employed to require sensor reading of soil like soil moisture, temperature, air moisture and deciding is controlled by user (farmer) by using microcontroller. the info received from sensors are sent to server database using wireless transmission. The irrigation are going to be automated when the moisture and temperature of the sector is reduced. The farmer is notified with the knowledge regarding field condition through mobile periodically. this technique are going to be more useful in areas where there's scarcity of water and can be worth efficient with satisfying its requirements.*

**Keywords—** *Arduino IDE, IoT, LED, humidity sensor, dielectric constant, wireless transmission*

### I. INTRODUCTION

In India, where 60-70% economies depends on agriculture, there's an excellent got to modernize the traditional agricultural practices for the higher productivity. Thanks to unplanned use of water the bottom water level is decreasing day by day, lack of rains and scarcity of land water also leads to decrement in volume of water on earth. Nowadays, water shortage is becoming one among the most important problems within the world. We'd like water in each and each field. In our day to day life also water is important. Agriculture is one among fields where water is required in tremendous quantity. Wastage of water is that the major problem in agriculture. Whenever more than water is give to the fields. There are many techniques to save lots of or to regulate wastage of water in agriculture. The target of the system is to a) conserve energy & water resources b) handles the system manually and automatically c) detects the extent of water. Thanks to the climatic changes and lack of precision, agriculture has resulted in poor yield as compared to increase. Irrigation is usually done using canal systems during which water is pumped into fields after regular interval of your time with none feedback of water level in field. This sort of irrigation affects crop health and produces a poor yield because some crops are too sensitive to water content in soil. a sensible irrigation system,

contrary to a traditional irrigation method, regulates supplied water. The feedback mechanism of a sensible irrigation system may be a moisture sensor and temperature and humidity sensor. Evapo-transpiration (ET), thermal imaging, capacitive methods, and neutron scattering method and gypsum blocks are a number of the technologies that enable moisture sensing. Capacitive sensors, however instantaneous, are costly and wish tube calibrated often with varying temperature and soil type. Neutron probe based moisture sensors are very accurate but present radiation hazards, calibration difficulty and are costly. an outsized agriculture field presents is with different a part of areas, hence, moisture measurement at one locating within the field doesn't make much sense. Consequently, what's required may be a distributed number of sensor nodes and scattered pumping units to pump water to those specific locations covered by the sensor units. an automatic irrigation unit, in conjunction with a coffee cost moisture sensor, is proposed during this paper.

## II. LITERATURE SURVEY

Water is an important resource in our day to day life so it is important to conserve water and reduce its wastage as low as possible. As we have a limited source of water right now but new methods are emerging everyday on conservation and reduction of water usage. These techniques can be more useful with places with scarcity of water and help them manage resources in better way.

Control of irrigation automatically by using wireless sensor network [1] this paper has proven that by using sensors and with the help of IOT we can get water savings up to 90% efficiency which is not good but great, which is much efficient than the traditional way of farming.

Study on an Agricultural Environment Monitoring Server System using Wireless Sensor Networks [2] this is a very well organized system using sensors to check the yield of the crops, and usage of wireless data transfer techniques from the sensors and store the results in its database which in turn helps us to compare and increase the crop yield.

A Test-bed on Real-time Monitoring of Agricultural Parameters using Wireless Sensor Networks for Precision Agriculture [3] the main purpose of this paper is to detect the moisture of the soil and accordingly switch the relay. This system uses python programming for controlling the entire system. It uses raspberry Pi to control the system whereas we use Arduino Uno in this project.

A wireless design of low-cost irrigation system using ZigBee technology [4] this paper proposes a system which will help farmers to make decisions using real time information generated regarding the field and associated crops, which in turn enables farmers to perform multi cropping practices and hence increasing both yield and income.

## III. PROPOSED SYSTEM

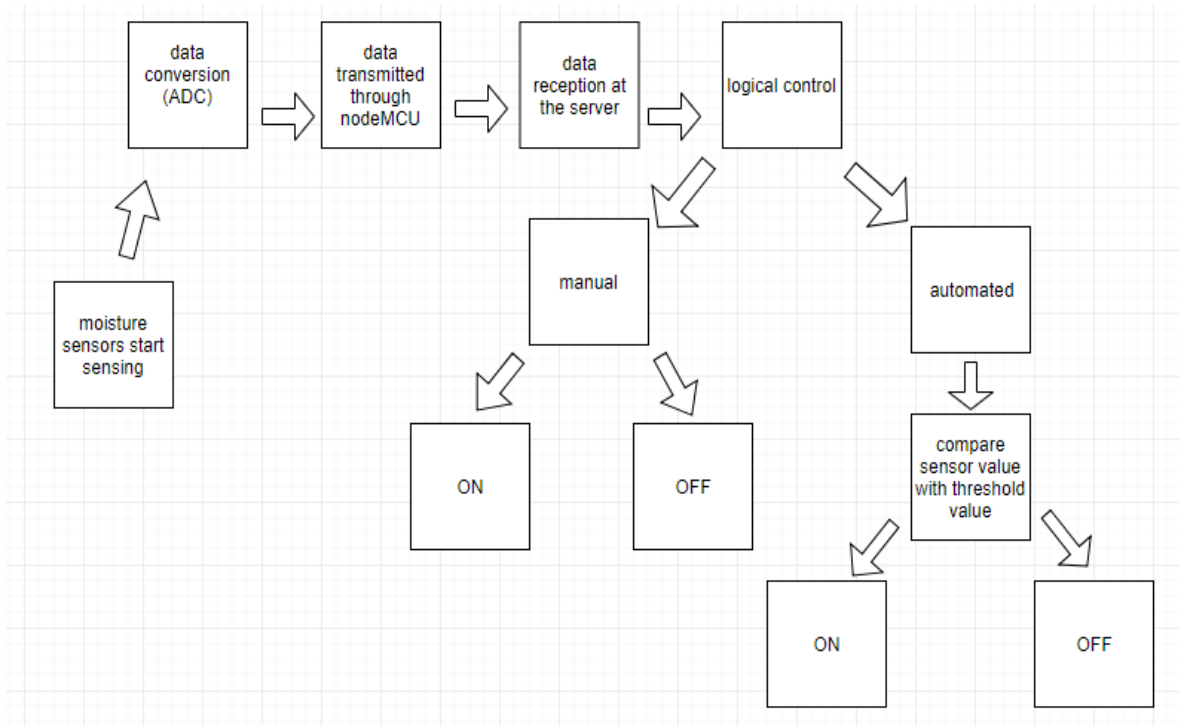


Fig. 1: Block diagram of Smart Irrigation System Using IoT

NodeMCU is a low-cost open source IoT platform. Node MCU is a lua based firmware for ESP8266 WIFI SOC from Espressif. The NodeMCU *firmware* is a companion project to the popular NodeMCU dev kits, ready-made open source development boards with ESP8266-12E chips. It is used as a logic control device in this circuit. It commands all the operation and it is programmed using Arduino IDE.

Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying and weighing of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. This sensor has two probes through which current passes in soil, then read the resistance of soil for reading moisture level. We know that water makes the soil more prone to electric conductivity resulting in less resistance in soil where on the other hand dry soil has poor electrical conductivity thus more resistance in soil. The pump can be controlled both automatically and manually according to user requirement.

#### IV. CONCLUSION

The automated irrigation system implemented was found to be feasible and price effective for optimizing water resources for agriculture production. This irrigation system allows cultivation in places with water scarcity thereby improving sustainability. The irrigation system helps the farmer by making his work smarter. Because the demand for water increases, alongside the necessity to guard aquatic habitats, conservation practices for irrigation got to be effective and affordable. As multiple sensors are used, water is often provided only to the specified area of land. This system

reduces the water consumption to greater extent. It needs minimal maintenance. the facility consumption has been reduced considerably. The crop productivity increases and therefore the wastage of crops are considerably reduced. The extension work is to form interface much simpler by just using SMS messages for notifications and to work the switches.

#### V. FUTURE SCOPE

As the technology is advancing day by day we are able to calculate various parameters precisely and accurately. We can include PH sensors to measure the acidity or basicity of the soil. We can also calculate the rate of evapo transpiration. We can also use photosensitive diode to measure the sunlight for backyard irrigation as it contains chlorophyll. We can deploy buzzers in the field with motion detector sensors to protect the crops from cattle and birds .Henceforth, reducing the human labours and increasing the productivity of the crop. The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermostat to measure the surrounding air, and spits out a digital signal on the data pin. It measures relative humidity. Relative humidity is the amount of water vapor in air vs. the saturation point of water vapor in air. At the saturation point, water vapor starts to condense and accumulate on surfaces forming dew. It detects water vapor by measuring the electrical resistance between two electrodes.

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