

# Smart Irrigation System Using IoT

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**Abstract** - Water is one of the supreme and basic substances to continue on earth. But nowadays water shortage crisis is increasing day by day. The older irrigation system which consumes ample amount of water. So, we are in the need of new smart techniques lowering the percentage of water used in irrigation. This paper presents a smart irrigation technique that will overcome the problem of water wastage. Humidity and temperature sensor is used in this module, ON and OFF command is done by pumping system through Internet of Things (IOT). Surrounding Air and humidity is measured by DHT11, Node MCU is a open source micro-controller which gets the data from wireless sensors. It is easy to use for anyone with a smartphone and does not require maintenance once set up.

**Index Terms** - Internet of Things (IOT), Node MCU, DHT11, Micro-controller, Sensors.

## I.INTRODUCTION

India is a type of country where more than 50% of the economy is hinged on agriculture only. So due to undesigned use of water the water level is decreasing day by day, Lack of rain and shortage of earth water is also the main factor of decrement of water. In the current situation, the water shortage problem is one of the major issues, Water is essential to survive we need water from day-to-day household work to every extent we can imagine. the main problem is wastage of water in the fields, farmer used to give an excessive amount of water in the field. A higher level of water might damage certain kind of crops while higher temperature for a longer time might damage other kind of crops. So, none of these factors can prolong for a longer time. In this situation, the farmer needs to be informed to take necessary actions before the crops are damaged. This is where Irrigation Automation System will help [1]. There is a prominent need to modernize the older or conventional methods for excellent productivity & to save water.

The main objective of the system is to conserve energy and control wastage of water, It detects the level of

water, It handles the system automatically & manually. Which will help farmers to operate easily. Mostly irrigation is done by using canal or pipe system without any feedback, water is pumped into the field in the interval of time this leads to poor productivity & shortage of water too. Whereas our project "Smart Irrigation System" is different from conventional methods, here moisture sensor, temperature sensor & humidity sensor is the basic mechanism of this project. However, the sensors are costly with different varying soil and temperature type, but by the use of IOT, it does not cost that much an automated irrigation unit in togetherness with a low-cost sensor is proposed in this paper.

## II. LITRATURE REVIEW

This technique uses smart technology Arduino to check water levels, the statistical data which is given by sensors (like humidity sensor, temperature sensor, and light intensity sensors) are matched with the weather forecast to make important decisions. The system monitors the sensor information on Display and P.C Muhammad (2010) proposed a simple approach to "Automated irrigation control problem using artificial neural network controller [2]. Sanjay Kumar (2013) proposed an advance & smart technique base on Automatic motor pumping for the content of soil moisture [3]. The notable features of the system are humidity, temperature & water consumed monitoring. Farmers can easily set moisture levels and can update regularly on display. Whereas parameters like soil conductivity and soil Ph will also be included in this project. N Salini Durga (2018) proposed a "smart irrigation system based on soil moisture IOT" the sector which contributes the highest to India's GDP is agriculture. In the year 2018, Dweeeyan Mishra and team have proposed an Automated Irrigation System which makes use of only Soil moisture sensor to determine water supply to the crops. With the use of one sensor alone it would not help in efficient

monitoring and control of the system [4] But when you will see the development in this area is like nothing as compared to other fields in the current situation there is a huge increase in technologies in other fields. Sprinkle irrigation and drip irrigation techniques are also available, so techniques like this must be combined with the Internet of things (IOT) to get maximum benefit. IOT helps in making decisions and take out necessary information through the graphical application we can achieve data monitoring.

### III. COMPONENTS USED

**Node MCU:** It is an advanced API for hardware input/output device which might be dramatically reduces the work for configuring manipulative hardware. It uses a code as Arduino but rather is an interactive script called Lua. It's an open source IOT platform. It runs on a firmware of ESP8266 WiFi Soc produced by Espressif Systems. Node MCU has 16 input/output pins and hence 16 nodes will be connected to a one node. The ESP8266 is Wi-Fi Soc which is integrated with Tensilica Xtensa LX106core which is widely operated in IOT applications. (Node MCU) refers in default to the firmware instead of the event kits. ESP8266 is an inbuilt Wi-Fi module which might even be used as an individual module as a Wi-Fi module.



Fig.1. Node MCU (ESP 8266) WiFi-Module

**Soil moisture Sensor:** It is difficult to define because it means different things in different disciplines. 1. Soil moisture sensor used to measure the water content of the spores. Soil moisture sensor has two analysis, are responsible for the flow of current in the soil which result help to identify resistance value to measure the moisture level of the spores For example, a farmer's idea of soil moisture is different from that of a water resource manager or a weather predictions. Generally, soil moisture is the water that is lock up in the spaces between soil piece. The sensor has two probes that helps in calculating the volumetric content of water

[5]. Surface soil moisture is the water that is in the upper 10 cm of soil, whereas root area soil moisture is the water that is accessible to plants, which is generally, count to be in the upper 200 cm of soil.

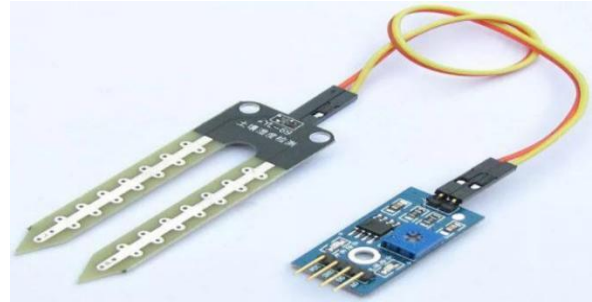


Fig.2. Soil Moisture Sensor

**Water pump:** As to pump water 12-volt submersible pump for this project which has 18-watt motor that may lift water up to 1.7 meters. This pump should be operated only it's submerged completely within the water for better results, for that we'd like to stay water within the bucket because if pump is operated without water than it'll get damaged.



Fig.3. Water pump

**Resistor:** The resistor may be a passive electrical component to make resistance within the flow of electrical current. In the majority all electrical networks and electronic circuits they will be found. The resistance is measured in ohms. An ohm is that the resistance that happens when a current of 1 ampere passes through a resistor with a 1 volt drop across its terminals.



Fig.4. Resistor

**Jumper Wires:** These are simply wire that have connector pins at each end, allowing them to be accustomed to connect two points to every other without soldering. Jumper wires are typically used with breadboards and other prototyping tools so on form it easy to vary a circuit as require. Though jumper wires are available in a very range of colour, the colour don't actually mean anything. this implies that a red jumper wire is technically the identical as a black one. But the colour are wont to your advantage so as to differentiate between sorts of connections, like ground or power.



Fig.5.Jumper wire

**Breadboard:** A breadboard is a rectangular solder less device board with many mounting holes. They are used for creating temporary model electrical connections between electronic components and single board computers or micro-controllers such as Arduino and Raspberry Pi. The connections are not permanent and they can be removed. A breadboard is a cheap, easy-to-use piece of hardware for wiring electrical circuits. These boards acquired their name because they are alike in shape to cutting boards used for cutting unsliced bread.



Fig.6.Breadboard

**Relay Module:** Relay is electromechanically switch which is operated by a relatively small amount of electric current which might control the switching activity of the large electrical current operating devices. Arduino UNO is not capable to control high value of voltage and current. The electromagnet is activated by a separate low-power signal from a micro controller. When activated, the electromagnet pulls to either open or close an electrical device.



Fig.7.Relay Module

**Arduino:** It is an open-source electronics platform supported easy-to-use hardware and software. Arduino acts like the brain of the system and processes the data information from the sensor. Also IDE software is needed for Arduino. Arduino consists of both a physical programmable board (often known as a micro-controller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload code to the physical board.



Fig.8.Arduino UNO

#### IV.PROPOSED SYSTEM

The system has three major parts; humidity sensing part, control section and therefore the output section. The humidity of soil is detected by using YL-69 soil sensor (a resistance type sensor). The control unit was achieved using ATmega328 micro-controller supported on Arduino platform. The output is irrigation system which is controlled by the control unit by switching it on and off looking on the soil moisture contents.

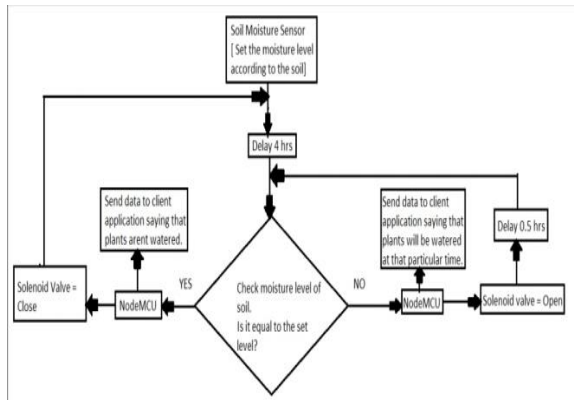


Fig.9.System overview

## V. CONCLUSION

A method to monitor moisture amount in the soil was map out and the project provided a good time to study the live method, through with their pros and cons. The advanced method can be used to which trun on/turn off the water sprinkler according to soil moisture volume thereby automating the procedure of irrigation which is the most time saving project in farming. Agriculture is one of the most water ingest venture. The method uses details from soil moisture sensors to water soil which helps to stop above irrigation or lower irrigation of soil thereby keeps away from crop harm. The farm holder can monitor the action from mobile itself. Through this project it can be wind up that there can be significant growth in farming with the use of IOT. The irrigation system helps the farmer by making his work smarter. As the demand for water increases, along with the need to protect aquatic habitats, water conservation practices for irrigation need to be effective and affordable. As multiple sensors are used water can be provided only to the required area of land.[6]. Thus, the method is a future solution to the problems faced in the live manual and awkward procedure of irrigation by allow well organised usage of water resources.

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