

Comparative analysis of sprinkler irrigation system with drip irrigation system through IOT

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Abstract— The fact that water is increasingly scarce in many regions over the last couple of years and that it needs to be a well-planned irrigation system would help farmers further. The main aim of this paper is to compare sprinkler irrigation system output analysis with IoT module and the drip irrigation system. Here is a contrast with the IoT module with the drying irrigation system of the percentage return of different crops for the sprinkler irrigation system. The results show that water wastage can be avoided with this system and human manual irrigation labour can be decreased. The sensor is used for soil reading, such as soil humidity and the temperature of the ground. In places where water is scarce and worthwhile to meet its requirements to allow the lowest use of water, the system would be more beneficial.

Keywords— sprinkler irrigation; drip irrigation; IoT; soil sensor; node MCU.

I. INTRODUCTION

The irrigation of water in the soil, or the agricultural area, is the artificial application. It is the substitute or complement of another source of water for rain water. It is used in dry conditions and in ample precipitation times. Water is used by the plant's root in the drip irrigation through or below the surface of the soil. The low rate ranges about 20 litres an hour. With regular irrigation, soil moisture is kept at an acceptable level. The most effective drip irrigation system is available in a wide range of crops. In fruits, in particular, planting vegetables, bulbs and orchards. Irrigation by sprinklers, water is sprayed in the air in this process and the flow of water under pressure is created by a spray through small apertures. A good method for irrigation on rough land and on shallow soils with the sprinkler irrigation system. We'll build a system which helps farmers understand the condition of their fields in their homes or in any part of the world. It gives the agricultural lands an automated method of irrigation. Automation is currently one of the main functions in human life.

It offers not only warmth, but also effectively decreases energy and saves time. Industries now use automation and control devices that are cost-effective and not suitable for farm use. This is a smart, low-cost smart irrigation technology that farmers can use. To optimize water use for agricultural crops, an automated irrigation system has been developed. This project is planned to reduce water use and increase productivity. This system can best be used in areas with minimal water use. The IoT is a technology that is used in a mobile device to control the device's work. The internet is about linking and communicating objects, placed at various locations that are probably remote. This is a type of network technology

that sends information from various sensors and allows everything that connects to the Internet for information exchange.

II. PROPOSED METHODOLOGY

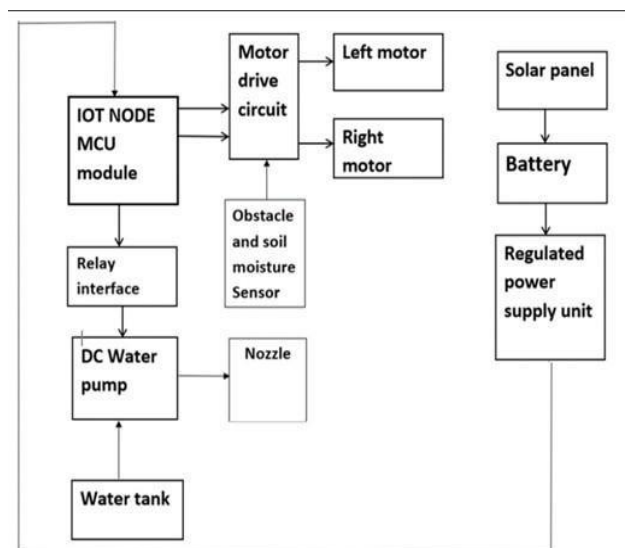


Fig. 1. Working of the system

A. NODE MCU (WI FI MODULE)



Fig. 2. Node MCU

These modules are available in various types and pinouts. These modules typically do not have on-board booting resistors, weak decoupling condensers, a voltage regulator, a reset circuit, nor a USB serial adapter. They are somewhat tricky when comparing these features with development boards. Ensure the module has adequate electricity. A 3.3V and $\geq 250\text{mA}$ power supply is sufficient to allow stable use of the ESP8266. It is not

recommended to use the power from USB to Serial adapters, which usually do not have enough power to reliably operate ESP8266 in any case. It is recommended an external supply or control unit along with filter condensers.

B. Soil moisture sensor

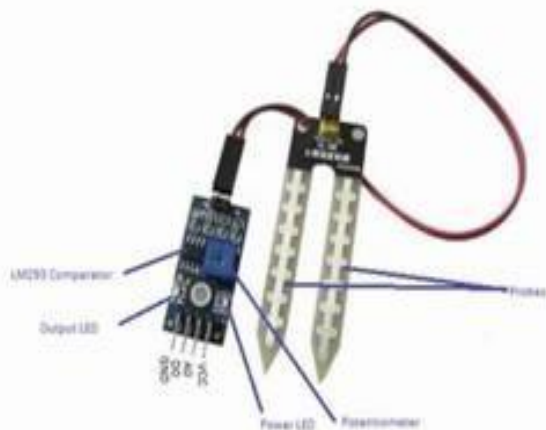


Fig. 3. Soil moisture sensor

Soil humidity sensors measure the amount of soil water. The analogue value of the sensor output decreases if the ground is dry. If you're not at home or watering for a long time it will tell your plant is thirsty using this sensor. This sensor is an automated watering instrument. Prevent the plants from wilting when there is no water. In order to make your plants more relaxed, the Arduino controller makes the garden smarter.

C. Water pumping

A low pump, consisting of a tube, shaped like a spiral and mounted on a rotating axis driven by an engine, is a spiral pump. Water is then collected by the tube and pumped into the tube upwards because of the rotation. The coil pump is widely used for irrigation and land drainage as well as many low-lift pumps.

III. PERFORMANCE ANALYSIS

A. Wetting Patterns

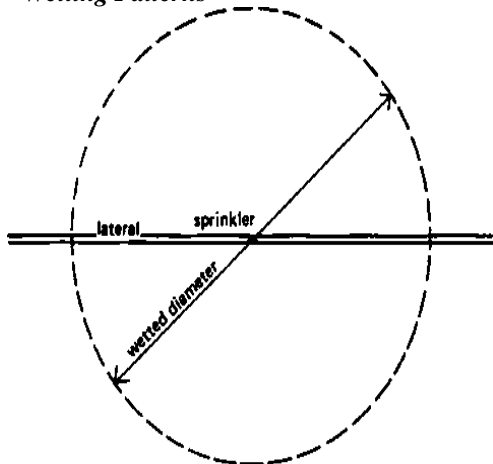


Fig 4. Wetting pattern for a single sprinkler (TOP VIEW)

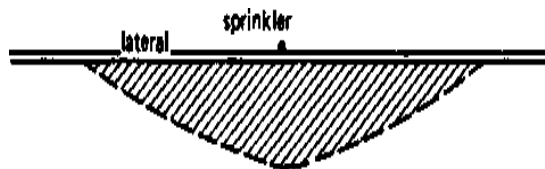


Fig 5. Wetting pattern for a single sprinkler (SIDE VIEW)

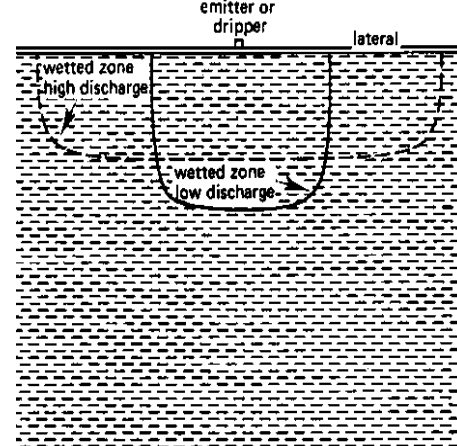


Fig 6. Wetting patterns for sand and clay soils with high and low discharge rates (CLAY)

Percentage improvement in yield for crops irrigated using sprinklers relatives to the same crops with drip irrigation

TABLE 2. YIELD FOR DIFFERENT TYPES OF IRRIGATION

Crops Irrigation	Sprinkler Irrigation	Drip
Cotton	50	38
Chilly	28	24
Bean	27.2	15.8

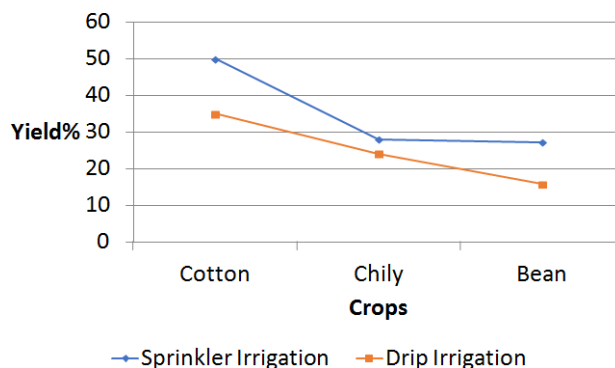


Fig. 7. Yield percentage of different crops in irrigation system

Here we have compared the improvement in the yield of crops for sprinkler irrigation with respect to drip irrigation. The efficiency of yield improvement for crops in sprinkler irrigation is higher than the drip irrigation.

Technical Specifications of moisture sensor:

Supply voltage: 3.3V or 5V
Operating current: less

than 20mA.

Output voltage: 0-2.3V [2.3V is completely immersed in water voltage value], 5V power supply, the greater the humidity, the greater the output voltage.

Sensor Type: Analog Output

IV. CONCLUSION

In order to effectively minimize the waste of water used in relation to drop irrigation, the IOT based Smart sprinkle prototype was developed. The use of IOT as a forum for our design provides a great deal of versatility without direct contact with the user. It eliminates some boring fieldwork and allows more people to occupy agriculture. The inconvenience of the time-based irrigation method has been solved by a water saving system.

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