



# WATER REQUIREMENT IN AUTOMATED IRRIGATION SYSTEM USING ARTIFICIAL NEURAL NETWORK TECHNOLOGY

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**ABSTRACT-** Agriculture plays a significant role in the economy and its contribution is based on measurable crop yield which is highly dependent upon irrigation. In a country like India, where agriculture is largely based on the unorganized sector, irrigation techniques and patterns followed are inefficient and often lead to unnecessary wastage of water. This calls for the need of a system which can provide an efficient and deployable solution.

In this project, we provide an Automatic Irrigation System based on Artificial Intelligence and Internet of Things, which can autonomously irrigate fields using soil moisture data. The system is based on prediction algorithms which make use of historic weather data to identify and predict rainfall patterns and climate changes; thereby creating an intelligent system which irrigates the crop fields selectively only when required as per the weather and real-time soil moisture conditions. An automated irrigation gadget which keeps and monitors the selected soil moisture content through automatic watering. NodeMCU is used as controller unit. This cost lets in the machine to use suitable amount of water which sidesteps over/underneath irrigation. IoT is used to preserve the farmers updated approximately the grade of motor, records from the soil moisture sensor, DHT11 sensor is often updated on the ThingSpeak web page through which a farmer can test whether or not the water motor is on/off at any given time. Also, the sensor readings are transmitted to an issue talk channel to generate graphs for evaluation.

**Keywords:** Agriculture, Smart Farming, Artificial neural network.

## INTRODUCTION

Agriculture is the backbone of a country's economic activity. The monsoon rains are irregular and unevenness of availability of water throughout the year poses a major problem. All this leads to inadequate yield and low productivity. We need a new and effective technology which would improve the productivity, profitability and sustainability of our major farming systems. Farming in India is done using the mundane ways. The fact that most of our farmers lack proper knowledge makes it even more erratic. Farmers have to bear huge losses and at times they end up committing suicide. Since we know the significance of proper soil moisture and its quality, air quality and irrigation, in the growth of crops, such parameters cannot be ignored. Irrigation requirement depends on Soil moisture, temperature and usage of water. In India most of the Irrigation system are manually operated one's. These outdated techniques are replaced with automated techniques. Automated Irrigation is not new, but the problem of using right amount of water to irrigate the plants still exists. Nowadays shortage of water is one of the major problem in the world. Proper usage of water in Irrigation is very important because of the main reasons are shortage of rain, unplanned use of water results in water wastage. This System has a distributed network of sensors i.e., Temperature Sensor and Soil moisture Sensor which are placed in the root zone of plants. These sensors can be used for monitoring and recording the physical conditions of the environment and to provide right amount of water at the right intervals of time. In addition, an Algorithm was developed with some desired threshold values of temperature, soil moisture and water level that were programmed into a micro controller-based gateway to control the quantity of water. The study signifies that the ANN works on the principle of prediction i.e., it can predict the influent water quantity and it helps us to provide the future days of data that would help us to store the water for upcoming days. Simulations were done using C++ Neural Network toolbox. The collected data from the controller will send to IOT and stores the data to web. The entire information will be sent to the User's Smart Phone Hence this proposed system aims at detecting status of the sensors and ON/OFF status of the motor required by the plants without using any labour. We propose e-agriculture system for monitoring soil. This system can monitor soil status. The experimental setup and the preliminary results of the part of the application used for data measurement and data collection as well as initial concepts for improving the monitoring system. The proposed architecture is designed in order to improve the quality in agricultural production and would decrease the management and farming costs. The environmental parameters such as temperature, humidity and moisture should be continually monitored and controlled in order to monitoring plant conditions. In recent days, the farmers have been using irrigation technique through the manual control in which the farmers irrigate the land at regular intervals by turning the motor ON/OFF when required.

## LITERATURE SURVEY

### **1. Water usage optimization of smart farm automated irrigation system using artificial neural network.**

In this paper, the researchers use Neural Networking optimizing the water usage in the smart farm by incorporating it to the proposed Smart Farm Automated Irrigation System (SFAIS) by implementing an expert system. were done using the MATLAB Neural Network.

## 2.Irrigation system using a wireless sensor network and GPRS.

This system has a distributed wireless network of soil-moisture and temperature sensors placed in the root zone of the plants. In addition, a gateway unit handles sensor information, triggers actuators, and transmits data to a web application.

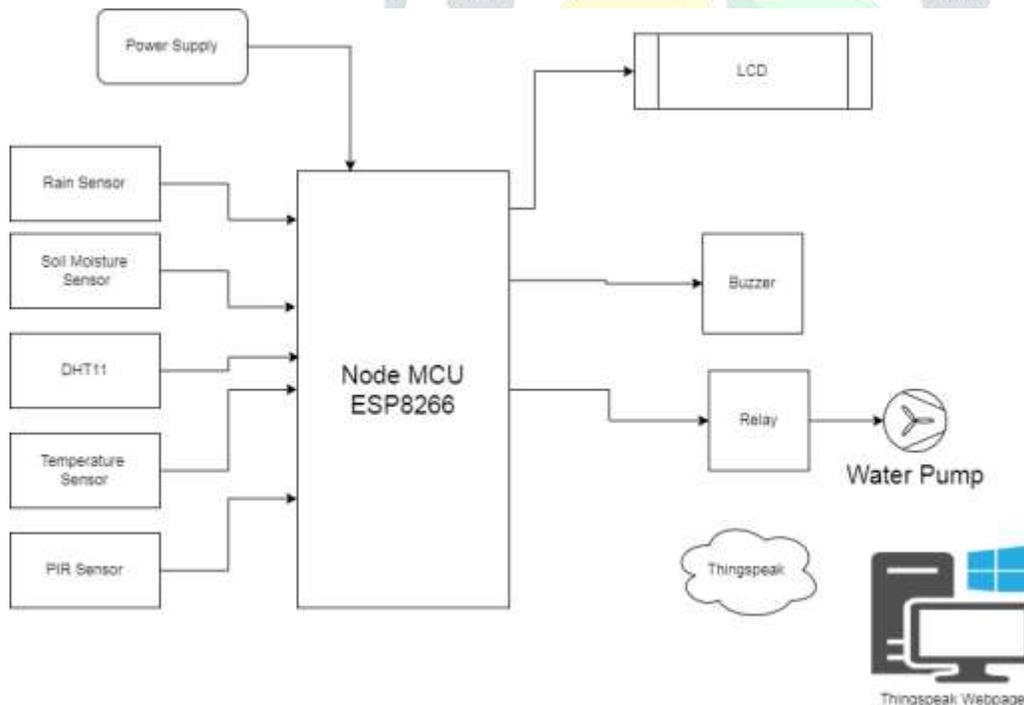
### PROBLEM STATEMENT

- Irrigation of plants is usually a very time-consuming activity to be done in a reasonable amount of time.
- Water consumption is very high in advanced agriculture.
- Rainfall levels have been dropping.
- There is an increasing demand for more food supplies.

### OBJECTIVES

- Development of system to predict and analyse water requirement using artificial neural network.
- Development of automated irrigation system to supply water according to predicted value.
- Usage of water in a more efficient way.

### BLOCK DIAGRAM



**Fig 1: Block diagram of the project**

The automated irrigation system mainly consisting four sensors namely temperature sensor, soil moisture sensor, PIR sensor, and rain sensor. These sensors are used for monitoring and recording the physical

condition of the environment. Motor is connected through relay. The data to the user is send through thingspeak webpage. When temperature is below the threshold value, the motor will be OFF and above the threshold value, the motor will be ON. The theft or animal detection can be done through PIR sensor. The Rain sensor detects the rain and stop the motor if the threshold values are satisfied or else the motor starts again. Thingspeak stores the data and provides the same data to the ANN. When all data is provided to the ANN, based on that data, it calculates the quantity of water required. The main objective of using this ANN is to know quantity of water required for the upcoming days, so that we need to store the water in order to utilize in future days.

## SENSOR THRESHOLD LEVEL

Sensors	Threshold pointes			
Temperature	<27 <sup>0</sup> c	Motor off	>27 <sup>0</sup> c	Motor on
Soil Moisture	<807	Motor off	>807	Motor on

**Table 1: Threshold values of sensors**

The Thingspeak is used to send the motor status to the user. ANN analysis the stored data and calculates the amount of water required for the coming days.

Once the motor is turned on/off, then the values of moisture sensor and the amount of water taken to reach the threshold value are sent to the web (Thingspeak). Thingspeak is used to store all the sensor data and amount of water consumption for the particular Temperature/moisture.

## ADVANTAGES

- The advantage of using the smart irrigation IOT technique is that it reduces overall water consumption.
- To improve the crop performance.
- To reduce the manpower and low cost.
- It is smart irrigation.

## CONCLUSION

This Study presented a detailed methodology for developing Successful ANN model for prediction of water characteristics. The Smart Irrigation System implemented is cost effective for optimizing water resources for agricultural productions. The Smart Irrigation System proves to be useful as it automates and regulates the watering without any manual intervention. Using this system, we can monitor the status of all the sensors (soil moisture, temperature, PIR, rain and water level) and also ON/OFF status of the motor.

## REFERENCE

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