



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** V **Month of publication:** May 2022

DOI: <https://doi.org/10.22214/ijraset.2022.43170>

www.ijraset.com

Call:  08813907089

E-mail ID: ijraset@gmail.com

Smart Irrigation Technique Using IOT

Mrunal Wabale¹, Prachi Phadatare², Rutuja Kharche³, Samruddhi Shelke⁴, Prof. P. R. Patil

^{1, 2, 3, 4}TSSM's Bhivarabai Sawant College of Engineering and Research

⁵Guide

Abstract: Agriculture plays an imperative role in the country's development. In our country, more than 72% of people depend upon farming which is one third of the population invests in farming. Thus, the challenges and issues concerning agriculture need to be focused to hinder the country development. The only recommended solution to this issue is modernizing agriculture using smart technologies. In agriculture, irrigation is one of the processes which support crop production by supplying needed water to the soil. A Sensor-based automated irrigation system provides a promising solution to manage agricultural activity. This research article provides a vast study on the irrigation system in smart agriculture.

Keywords: Smart Agriculture, Smart Irrigation, Internet of Things, Sensors, Water Management, ESP32, Automation.

I. INTRODUCTION

Agriculture is the main source of food production in our country. In India, agriculture contributes 18% of the country's Gross Domestic Product (GDP) which employs more than half of the total population. Monitoring of crops depend upon three main factors namely the water supply to the crop, the amount of sunlight received and the humidity. The farmer needs to be informed to take necessary actions before the crops are damaged. This is where Irrigation Automation System will help. It is in this stage that a kind of acknowledgment needs to be given to the farmers whenever the status of any connected device changes. If the farmer is busy, then an action will be taken and will be informed to the farmer before the situation becomes critical. Automation in irrigation system helps to farmers to manage their work much easier and helps to take decisions even in the absence of farmers. IoT, sensors, smart phone tools are the technologies which helps farmers to know the status of their land, amount of water needed, temperature of soil, humidity, weather conditions, ph level. IoT is automating all the aspects of farming and agricultural methods to make the process more efficient and effective. The aim of this study is to analyze recently developed IoT technologies in the agriculture and farming industries to present summary of sensors, technologies, and sub-verticals such as water management and crop management. Smart agriculture allows to farmers to produce yields using minimum resources such as water, fertilizer and seeds. Farmers can deploy sensors to understand their crops, conserve resources and reduces the influences of environment in crops. In smart agriculture, one of the main sensors is soil moisture sensor. It is used to measure the volumetric water content (moisture) presents in the soil. The threshold value is fixed, and the soil moisture value level measured and checks with threshold as above and below levels. Then the gathered data is compared with the actual data base. According to that predefined data the irrigation is supplied automatically. The irrigation can be done both continuous and periodic wise based on the weather condition. Automatic irrigation is used to overcome the unnecessary water flow. Mostly the water is supplied through drip irrigation or the sprinkler. The humidity sensors are helps to measure the surrounding air temperature and relative humidity. Regarding smart irrigation system, researchers have proven that water usage is minimized when an automated irrigation system that relies on soil moisture as a parameter is implemented. A customized sensor-based system can be used which reduces the power consumption in the aspect of water source as well as the cost incurred during the irrigation process.

II. LITERATURE SURVEY

- 1) *Farm Field Monitoring and Irrigation Automation Using IoT:* In this paper it mainly focuses on the irrigation purpose. By working under the mentioned sensors, the irrigation management can be performed perfectly. The collected value from the sensor and the irrigation controller are coordinate with Wi-Fi network. With the help of that specified application, the person can able to know the present situation of the land. Based on the current valuation, the water can be irrigated. As reported by weather forecasting, the water supply can be done to the farm field either periodically or continuously. Here naive Bayes algorithm is used to get the accurate result, the user can get the proper value like how much level of water needs to irrigate. With the guidance of that application, the farmer can built the decision at which condition they want to supply water.
- 2) *Wireless Sensor Network and Internet of Things (IoT) Solution in Agriculture:* This paper illustrates the automatic irrigation to improve the water conservation. Here RFID and WSN are used along with the ZigBee protocol. In this paper it replaces the function of human to human and human to machine to the Machine to Machine process.

If the soil is dry then the RFID based on ZigBee Platform is used to send ID to the reader, then it recognize the node. After that, it sends the exact value of data for irrigation processes without human intervention. The farmer can get the information through system or mobile. Here the water can be supplied throughout the land by sprinkle method. In the automatic irrigation method 50% of the water can be reduced when compared to the manual irrigation. By applying this procedure, the yield of the crop is heightened

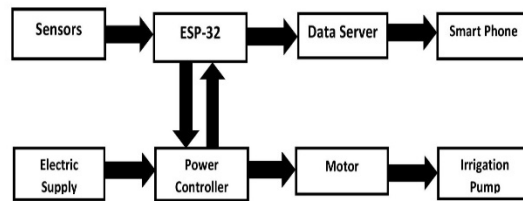
- 3) *Smart Irrigation System using ESP32*: The whole project is based on ESP32 as the main brain of the system. All the sensors relays are interfaced with the ESP32 controller. The ESP32 is designed for low power IoT applications in mind. It's high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating capabilities makes it ideal for most Portable IoT devices.
- 4) *A Decision Support System for Managing Irrigation in Agriculture*: Here it examined the SIDSS. Depends upon the moisture level in soil and environmental condition, the water is supplied on weekly bases. This paper is focused only on the citrus cultivation. Traditionally the decision can be taken by the experienced farmers for better irrigation, but now decision support system, is used for better irrigation. two machine learning techniques PLSR and ANFIS are used under DSS. By using this method a person who does not have any idea about the agriculture can also able to irrigate the correct amount of water to the farm field.
- 5) *IoT Based Auto Irrigation System Using Soil Moisture Sensor*: In this paper the automatic irrigation is constructed with the support of pump motor. The motor will turn ON or OFF automatically. The signal received from the microcontroller and the soil moisture is used to turn ON the water pump. While begin the process, the power is supplied to the microcontroller. The level of the moisture and the humidity is noted. According to the moisture content, the water is supplied. If the sensed value is less than fixed value, the irrigation motor will turn ON. This can be controlled over the app or system using the internet connectivity. It is used to overcome the unnecessary water flow.

III. METHODOLOGY

Aim is to develop a wireless three level controlled smart irrigation system to provide irrigation system which is automatic for the plants which help in saving water and money. The main objective is to apply the system for improvement of health of the soil and hence the plant via multiple sensors. Here we have to build an IoT based Irrigation System using the ESP32 Module and Moisture Sensor. It will not only automatically irrigate the water based on the moisture level in the soil but also send the data to a dedicated server to keep track of the land condition.

IV. PROPOSED SYSTEM

This system is a combination of hardware and software components. The hardware part consists of different sensors like soil moisture sensor, photocell sensor, etc whereas the software part consists of an android based application connected to the arduino board and other hardware components using Internet of Things (IoT). The android based application consists of signals and a database in which readings are displayed from sensors and are inserted using the hardware. The improvement in irrigation system using wireless network is a solution to achieve water conservation as well as improvement in irrigation process. This research tries to automate the process of irrigation on the farmland by monitoring the soil water level of the soil relative to the plant being cultivated and the adaptively sprinkling water to simulate the effect of rainfall. Moisture Sensor The Soil Moisture Sensor is used to measure the volumetric water content in the soil. This makes it ideal for performing experiments in plants by having constant information about the amount of water currently present in soil and accordingly providing water to the plants for proper nourishment. This includes constant checking of moisture content in soil and sending the readings to the android application. If the moisture content is less than the threshold value (which is pre-fed into the arduino board), a prompt message is sent to the device and automatically a sprinkler connected to the arduino will start sprinkling water on the affected area. B. pH Sensor pH sensor checks alkalinity and acidity of the soil. It is important to maintain a hydroponic nutrient solution at a pH level where the nutrients are consistently available to the plant. If the content of the soil solution is too acidic or too alkaline it can cause lock up – a situation which restricts certain elements essential for growth from being absorbed by the root structure. Deficiencies in the required elements become apparent in the plants growth and can lead to plant death. Additionally the pH of the water we drink is crucial to our health. C. Photocell Sensor Photocell sensor picks up the light readings. These readings will be transferred to arduino where they will be compared with the threshold value. If it is less than the threshold value we can provide some artificial light to the plants. D. Arduino Arduino is an open source computer hardware and software company, project and user community. It is the best board to get started with electronics and coding.



A. System Requirement

1) Software Requirement: -

- a) Operating System
- b) Android Studio
- c) Programming Language: Java and XML

2) Hardware Requirement

- a) Sensors
- b) Solar panel
- c) Microcontroller
- d) Power Supply

B. Advantages Of Smart Irrigation System

- 1) *Good for Low Rainfall Areas:* Water is an essential element for all living beings, plants cannot get proper growth in less water supply. Some regions are having less rainfall which sometimes leads to drought and famine which can be corrected from a proper water supply. Irrigation is the best way to cover this problem.
- 2) *Improves Soil Fertility:* Irrigation helps in maintaining the soil moisture which helps in the germination of seeds and implements growth and helps in good yield. It preserves the structure of topsoil.
- 3) *Produce Hydroelectric Power:* It can be utilized to produce hydroelectric power.
- 4) *Improves Living Standard of Farmers:* Irrigation helps good yield and gives ways to grow cash crops like tobacco, sugarcane, etc which help in increasing finances and living standards of farmers and also help in the country's economy.
- 5) *Prevent Weeds:* Irrigation helps in preventing weeds.
- 6) *Prevent Deforestation and Famine:* It can act as a shield against famine and banks of the channels can prevent deforestation.

C. Disadvantages Of Smart Irrigation System

- 1) High initial cost
- 2) Overflow of water can cause diseases
- 3) Not suitable for some crop
- 4) Wind effect is considerable
- a) *High Initial Cost:* Irrigation development is costly, and needs more labor for field layout.
- b) *Overflow of Water can Cause Diseases:* overflow of water, if stagnated, may lead to diseases causing organisms like providing breeding places for mosquitos and other organisms.
- c) *Not Suitable for some Crops:* Some crops do not need a continuous water supply which can be not suitable for summer crops.

V. SCOPE OF THE WORK

A more advanced way of this portal can be made by providing farmers to grow their crops more efficiently. For future work, we will investigate the performance of the proposed model with long-term irrigation tests with more plants. Our initial tests were conducted in an indoor environment where temperature changes are negligible. Additionally, we will extend our test bed to outdoor environments to observe the behavior of the model in different environmental conditions.

For modern agriculture, a smart irrigation system is one of the best techniques that give more production in minimum duration. To many extend, this smart irrigation system is designed and fully automated to minimize manual handling in agriculture.

And one of the good things is that it is very comfortable for users (or farmers) to understand the concept of IoT and sensors for smart irrigation.

It can help you to learn how various sensors can be deployed and utilization of their data to generate events and control irrigation systems.

VI. CONCLUSION

The smart irrigation system implemented is cost effective for optimizing water resources for agricultural production. The proposed system can be used to switch on/off the water sprinkler depending on the soil moisture levels thereby making the process simpler to use. Through this project it can be concluded that there can be considerable development in irrigation with those of IOT and automation. Thus this system is a solution to the problems faced in the existing process of irrigation.

REFERENCES

- [1] IoT Based Smart Plant Irrigation System with Enhanced learning by, Kemal Cagri Serdaroglu
- [2] Super Smart Irrigation System using Internet of Things by, Bharath Ravi Prakash & Sanket S Kulkarni
- [3] Smart Irrigation System Using IoT by, J.Karpagam Professor, P.Bavithra, Infranta Merlin & J.Kousalya
- [4] Smart Irrigation System Based On Crops Using IoT by, Shyam Peraka, Reddy Sudheer, Allu Ravi Teja, Esai Naveen Kumar, Bandi Narsimha Rao
- [5] An IoT Based Smart Irrigation System by, Md. Rezwan Hossain Naeem, Shadman Gawhar, Md. Belawal Hoque Adib, Sanjid Ahmed Sakib, Abir Ahmed and Nafiz Ahmed Chisty



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)