# A Review Paper on Smart Plant Management System using IoT

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**Abstract -** The IoT-based smart plant monitoring and irrigation system is a project that utilizes Blynk app, Node MCU ESP8266, soil moisture sensor, DHT11, PIR motion detection sensor, and an automatic plant watering system based on a threshold value. The project aims to address the challenges in plant monitoring and irrigation by collecting data about the plant's environment and soil moisture levels using IoT technology and sensors. The collected data is analyzed by a microcontroller to trigger an automated irrigation system when the soil moisture level falls below a set threshold value. The system also includes a PIR motion detection sensor to detect motion and indicate the presence of animals or humans in the plant area using the Blynk app. This allows users to monitor and control the irrigation system and take appropriate action when necessary. The project details the hardware and software components of the system, the methodology used in the development process, and the testing and validation results. The system's effectiveness in providing accurate and timely irrigation to plants, reducing water usage, and improving plant health is evaluated. The proposed project has the potential to provide an efficient and sustainable solution to plant irrigation in both small-scale and large-scale applications, while also addressing concerns related to animal or human intervention in the plant area.

***Key words*:** Internet of Things (IOT), Node MCU ESP8266, Soil moisture sensor, DHT11 sensor, PIR Motion sensor, Blynk App.

## 1.INTRODUCTION

Agriculture is the backbone of the Indian economy, contributing 27% to GDP and employing 70% of the population. However, the industry still requires technological involvement and advancements for sustainable growth. The proposed IoT-based smart plant monitoring and irrigation system using DHT11, soil moisture, PIR motion, and a relay to operate the pump addresses the challenges in plant monitoring and irrigation. The system collects data on the plant's environment and soil moisture levels using sensors and triggers an automated irrigation system when the soil moisture level falls below a set threshold value. Additionally, the system's PIR motion detection sensor can detect the presence of animals or humans in the plant area, providing an added layer of security. The automated irrigation system based on soil moisture ensures that plants receive water only, when necessary, thereby reducing water wastage and promoting sustainable agricultural practices. The proposed system has the potential to revolutionize the agriculture industry by improving plant health, increasing yield, and conserving water resources.

## 2.LITERATURE SURVEY

**Zuraida Muhammad, Muhammad Azri Asyraf Mohd Hafez, Nor Adni MatLeh, Zakiah Mohd Yusoff, Shabinar Abd Hamid,** the term "Internet of Things" refers to the connection of objects, equipment, vehicles, and other electronic devices to a network for the purpose of data exchange (IoT). The Internet of Things (IoT) is increasingly being utilised to connect objects and collect data. As a result, the Internet of Things' use in agriculture is crucial. The idea behind the project is to create a smart agriculture system that is connected to the internet of things. The technology is combined with an irrigation system to deal with Malaysia's variable weather. This system's microcontroller is a Raspberry Pi 4 Model B. The temperature and humidity in the surrounding region, as well as the moisture level of the soil, are monitored using the DHT22 and soil moisture sensor. The data will be available on both a smartphone and a computer. As a result, Internet of Things (IoT) and Raspberry Pi-based Smart Agriculture Systems have a significant impact on how farmers work. It will have a good impact on agricultural productivity as well. In Malaysia, employing IoT-based irrigation systems saves roughly 24.44 percent per year when compared to traditional irrigation systems. This would save money on labour expenditures while also preventing water waste in daily needs.

**Divya J., Divya M., Janani V.,** Agriculture is essential to India's economy and people's survival. The purpose of this project is to create an embedded-based soil monitoring and irrigation system that will reduce manual field monitoring and provide information via a mobile app. The method is intended to help farmers increase their agricultural output. A pH sensor, a temperature sensor, and a humidity sensor are among the tools used to examine the soil. Based on the findings, farmers may plant the best crop for the land. The sensor data is sent to the field manager through Wi-Fi, and the crop advice is created with the help of the mobile app. When the soil temperature is high, an automatic watering system is used. The crop image is gathered and forwarded to the field manager for pesticide advice.

**H.G.C.R. Laksiri, H.A.C. Dharmagunawardhana, J.V. Wijayakulasooriya** Development of an effective loT-based smart irrigation system is also a crucial demand for farmers in the field of agriculture. This research develops a low-cost, weather-based smart watering system. To begin, an effective drip irrigation system must be devised that can automatically regulate water flow to plants based on soil moisture levels. Then, to make this water-saving irrigation system even more efficient, an IoT-based communication feature is added, allowing a remote user to monitor soil moisture conditions and manually adjust water flow. The system also includes temperature, humidity, and rain drop sensors, which have been updated to allow remote monitoring of these parameters through the internet. In real time, these field weather variables are stored in a remote database. Finally, based on the present weather conditions, a weather prediction algorithm is employed to manage water distribution. Farmers would be able to irrigate their crops more efficiently with the proposed smart irrigation system.

**Anushree Math, Layak Ali, Pruthviraj U,** India is a country where agriculture plays a vital role. As a result, it's critical to water the plants wisely to maximise yield per unit space and so achieve good output. Irrigation is the process of providing a certain amount of water to plants at a specific time. The purpose of this project is to water the plants on the National Institute of Technology Karnataka campus with a smart drip irrigation system. To do this, the open-source platform is used as the system's fundamental controller. Various sensors have been employed to supply the current parameters of components that impact plant healthiness on a continual basis. By controlling a solenoid valve, water is provided to the plants at regular intervals depending on the information acquired from the RTC module. The webpage may be used to monitor and manage the complete irrigation system. This website contains a function that allows you to control plant watering manually or automatically. The health of the plants is monitored using a Raspberry Pi camera that gives live streaming to the webpage. The controller receives water flow data from the water flow sensor through a wireless network. The controller analyses this data to see if there are any leaks in the pipe. Forecasting the weather is also done to restrict the quantity of water given, making it more predictable and efficient.

**Dweepayan Mishra, Arzeena Khan, Rajeev Tiwari, Shuchi Upadhaye,** Agriculture is a substantial source of revenue for Indians and has a huge impact on the Indian economy. Crop development is essential for enhanced yield and higher-quality delivery. As a result, crop beds with ideal conditions and appropriate moisture can have a big influence on output. Traditional irrigation systems, such as stream flows from one end to the other, are usually used. As a result of this delivery, the moisture levels in the fields can alter. A designed watering system can help to enhance the management of the water system. This research proposes a terrain-specific programmable water system that will save human work while simultaneously improving water efficiency and agricultural productivity. The setup is made up of an Arduino kit, a moisture sensor, and a Wi-Fi module. Data is acquired by connecting our experimental system to a cloud framework. After then, cloud services analyze the data and take the necessary actions.

**R. Nageswara Rao, B.Sridhar,** Agrarian countries like India rely heavily on agriculture for their development. Agriculture has always been a roadblock to the country's development. Smart agriculture, which comprises modernising present agricultural systems, is the only answer to this challenge. As a result, the suggested strategy attempts to use automation and Internet of Things technologies to make agriculture smarter. Crop growth monitoring and selection, irrigation decision assistance, and other uses are possible thanks to the Internet of Things (IoT). To modernise and boost crop yield, a Raspberry Pi-based autonomous irrigation IOT system has been proposed. This project's main purpose is to produce crops using the least amount of water possible. Most farmers waste a lot of time in the fields to focus on water available to plants at the appropriate time. Water management should be improved, and the system circuit's complexity should be minimised. Based on the data collected from the sensors, the suggested system determines the amount of water required. Two sensors detect the humidity and temperature of the soil, as well as the humidity, temperature, and length of sunshine each day, and send the data to the base station. Based on these characteristics, the recommended systems must calculate the irrigation water quantity. The key benefit of the system is the integration of Precision Agriculture (PA) and cloud computing, which will reduce water fertiliser consumption while increasing crop yields and assisting in the evaluation of field weather conditions.

**Shweta B. Saraf, Dhanashri H. Gawali,** The Internet of Things (IoT) is the internet-based connectivity of a huge number of devices (IoT). A unique identity links each item, allowing data to be sent without human involvement It makes it possible to develop strategies for improved natural resource management. Smart gadgets with sensors, according to the IoT concept, enable interaction with the physical and logical worlds. The proposed system in this study is built on the Internet of Things and uses real-time input data. Over a wireless sensor network, a smart farm irrigation system uses an Android phone to remotely monitor and regulate drips. Between sensor nodes and base stations, Zigbee is utilized to communicate. A web-based java graphical user interface is used to process and present the server's real-time observed data. Field irrigation system wireless monitoring eliminates human interaction and enables remote monitoring and control using an Android phone. Cloud computing is a potential choice due to the large volume of data created by the wireless sensor network. This research presents and examines a cloud-based wireless communication system for monitoring and controlling a collection of sensors and actuators to determine the water needs of plants.

**Shrihari M,** the concept of automating agricultural production has been around since the early 1990s, and one of the primary challenges that both scientists and farmers confront is irrigation. Irrigation is a dynamic system that is heavily reliant on outside influences. This article describes a method that uses a custom-built mathematical model to handle data from wireless sensors on Google Cloud, resulting in a smart system. An IoT-enabled design that can scale up to big farms. According to Holistic Agricultural Studies, around 35 have been damaged by animals and people. This intelligent system uses Tensor flow and deep learning neural networks to recognize animals depending on their threat level, as well as human intruders who are not authorized on the farm, and to alert the farmer immediately. An android application is included with the device, which allows for remote access and surveillance through live video streaming.

**G. Sushanth, and S. Sujatha,** Smart agriculture is a novel concept since IoT sensors can offer information about agricultural regions and then act on it based on user input. The purpose of this study is to develop a smart agricultural system that utilises cutting-edge technologies such as Arduino, Internet of Things, and wireless sensor networks. Through automation, the research tries to make use of emerging technologies such as the Internet of Things (IoT) and smart agriculture. The capacity to monitor environmental factors is a critical component in increasing crop efficiency. The purpose of this study is to develop a system that can monitor temperature, humidity, wetness, and even the movement of animals that might damage crops in agricultural areas using sensors, and then send an SMS notification as well as a notification on the app developed for the same to the farmer's smartphone via Wi-Fi/3G/4G if there is a discrepancy. The system uses a duplex communication link based on a cellular Internet interface, which allows data inspection and irrigation schedule to be changed using an android app. Because of its energy independence and inexpensive cost, the gadget has the potential to be useful in water-scarce, geographically isolated areas.

**Vaishali S, Suraj S, Vignesh G, Dhivya S and Udhayakumar S,** From the beginning of time, agriculture has been the most important practise in human society. Traditional irrigation methods, such overhead sprinklers and flood irrigation, are inefficient. They waste a lot of water and may even make people sick by causing fungus growth in the soil due to too much moisture. Due to the scarcity of water, an automated irrigation system is essential for water conservation and, as a result, agricultural profitability. Irrigation consumes around 85% of the world's total accessible water resources. This need is projected to increase in the coming years as the population grows. To meet this need, we must employ creative methods that lower the water utilized in irrigation. Sensors in the automated system monitor the availability of water to the crops, and watering is done as needed through controlled irrigation. Because of its practically limitless storage and processing capabilities, as well as its fast flexibility, cloud computing is an intriguing solution to the massive amount of data generated. The objective is to focus on factors like temperature and soil moisture. This is a mobile integrated and smart irrigation system based on an Internet of Things-enabled application-controlled monitoring system. The main purpose of this project is to regulate the water supply and monitor the plants using a Smartphone.

**Hamza BENYEZZA,Mounir BOUHEDDA,Khaoula DJELLOUT,Amina SAIDI,** Water management currently global problem to all of us to tackle them in near future we need to plan it smartly. As we are living in a modern world filled with lots of useful sensors from which we can designed systems with water saving capabilities. The work in this paper is focusing on increasing effective use of water using field assist to farmer. Basically, it works with soil moisture sensor which gives finding of moisture level in soil and reconnects with Thing Speaks cloud via Wi-Fi module ESP8266 to observation of soil conditions. The proposed system also set with an algorithm such that on soil moisture pattern data it can predict decision on irrigation of crops. system also warns farmers about empty water source if it occurs. Benefits of using this system also include weather prediction through website. The device has the potential to be beneficial in water-scarce, geographically isolated places due to its energy independence and low cost. The fact that the technology is simple to use for farmers adds to its utility. It also saves water by preventing waste.

**Shiny Rajendrakumar, Prof. V K Parvati, Prof. Rajashekarappa,** Agricultural Irrigation is very important to produce crops. Many methods have developed to save water in different ways. In traditional irrigation systems we require an operator or farmer to put water on crops, but he does not come to know which crop requires how much amount of water to get proper number of yields. Irrigation means planting the crops with water. There are so many traditional irrigation methods, but all these methods consume large amounts of water. Automated irrigation is the method which saves the water from up to 97% as compared to traditional methods. By using these modern methods like ICT productivity can be improved without unnecessary wastage of water.

## 3.ACKNOWLEDGEMENT

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