

Smart Farmer - IoT Enabled Smart Farming Application

ABSTRACT

The agriculture industry is developed a lot with the help of technology; it became data-centered and smarter. The rapid growth of the Internet of Things based technologies reshaped many industries, including agriculture. Such a radical change dismantles existing farming practices and creates new opportunities along with some challenges. The IoT systems contributed in many fields and proven. It is time for farmers need to introduce the Smart Agricultural systems for higher crop yield. With a compilation of data from sensors and modern electronic gadgets, the farmer can monitor agricultural fields. Smart Agriculture can forecast weather data, switching ON the pump motor and switch ON the bulb for artificial light due to less light intensity, for farms acknowledging the dampness of soil of moisture levels. The IR sensor detects the pest and humans by their temperature; the sensors are interfaced to process module Arduino-UNO. The Smart agriculture system can be operated from anywhere with the help of networking technology. Climate changes and rainfall has been erratic over the past decade. Due to this in recent era, climate-smart methods called as smart agriculture is adopted by many Indian farmers. One of the important applications of IOT is Smart Agriculture. It reduces wastage of water, fertilizers and increases the crop yield. Smart agriculture is an automated and directed information technology implemented with the IOT (Internet

of Things). IOT is developing rapidly and widely applied in all wireless environments. In this system, sensor technology and wireless networks integration of IOT technology has been studied and reviewed based on the actual situation of agricultural system. Temperature sensor, Moisture sensor and pH sensor which senses the temperature, moisture content and pH in the soil. A combined approach with internet and wireless communications, Remote Monitoring System (RMS) is proposed. Major objective is to collect real time data of agriculture production environment that provides easy access for cultivation and increases the crop yield. By monitoring the field using the IP address Nutrient deficiency in the soil are detected and rectified.

INTRODUCTION

Despite a growing population, the agriculture industry must rise to meet demand, regardless of environmental challenges like unfavorable weather conditions and climate change. In IoT-based smart farming, a system is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, IR sensor) .and automating the irrigation system. The farmers can know the field conditions from anywhere. IoT-based smart farming is highly efficient when compared with the conventional approach. The benefits which farmers are obtaining by adapting the IoT program are innumerable. It has helped farmers to reduce costs and increase crop yields. The primary purpose of the system is to maintain the ideal environment for the growth of crops.

With the usage of smart phones and computers, users can access the data through the mobile site. Users can keep track of the crops and control the water pumps, lights, and fans in the control panel of the user interface. The primary aim of an intelligent irrigation system is to provide and maintain the optimum conditions for the crops. Through cultivating in an environment with sufficient water supply and ideal temperature, the growth of plants can be improved. Thus, the productivity of the agriculture field will increase as well. Using an IR sensor, we can detect the pest, birds, and humans through their temperature sensing and informs them to the user. By using this technology, we can increase productivity and can feed more people in the future. IoT transforms the agriculture industry with advancements and helps farmers to contend with their challenges. The applications can notify the IoT issues; it is cost-effective, and production of the crop will be increased. Many countries like India, majority of the population depends on farming, and its national income comes from farming. In spite of this and even the modern technology is found everywhere, the agriculture area is following the old conventional technology. Our farmers still resort to traditional methods like manual distribution of seeds, two crops per year pattern, unscientific systems of cultivation. The monsoons are irregular, and unevenness of availability of water throughout the year poses a major problem. All this leads to inadequate yield and low productivity. The implementation of scientific methods in

the field of agriculture can bring about radical changes in the productivity of crops, due to improved efficiency in the farming techniques. Of the various advantages that IOT brings to the table, its ability to innovate the current scenario of farming methods is absolutely ground-breaking. Mostly, we come across ideas that suggest A wireless sensor network that collects data from the various sensors present in the field and sends the data to the main central server. This method focuses on studying the environmental factors to improve crop yield. But it turns out, monitoring environmental factors alone are never adequate to increase productivity of crops since a lot of other factors have a role to play.

LITERATURE SURVEY

1.ZuraidaMuhammad, Muhammad Azri AsyrafMohdHafez, NorAdniMat "Smart Agriculture Using Internet of Things with Raspberry Pi”

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.

HARDWARE REQUIREMENTS

- 1)Raspberry Pi4 Model B
- 2)DHT22
- 3)Soil moisture sensor
- 4)Arduino UNO R3
- 5)Jumper wires
- 6)Microcontroller

SOFTWARE REQUIREMENTS

- 1)Arudino

ADVANTAGES

- This would save money on labour expenditures while also preventing water waste in daily needs.

- In Malaysia, employing IoT-based irrigation systems saves roughly 24.44 percent per year when compared to traditional irrigation systems. By census study
- It leads to most good significant impact on farmer

2. Divya J., Divya M., Janani V "IoT based Smart Soil Monitoring System for Agricultural Production”

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.

EXISTING SYSTEM

IOT based smart agriculture system proves to be very helpful for farmers. Indeed, even in the wake of reaping, ranchers additionally face issues away of gathered yield. In order to give answer for every issue, it

is important to create coordinated framework which deals with all components influencing the profitability in each stage.

HARDWARE REQUIREMENTS

- 1)pH sensor
- 2)Humidity sensor
- 3)Temperature sensor
- 4)Wi-Fi router

SOFTWARE REQUIREMENTS

- 1)Arduino UNO R3

ADVANTAGES

- Through an embedded-based soil monitoring and irrigation system that will reduce manual field monitoring and provide information via a mobile app.
- In absence of farmer by calculating soil moisture indication given to embedded system through motor it irrigate water.
- It advice the farmer to pesticide by periodical climate.

3. Ramya Venkatesan and AnandhiTamilvanan about a Sustainable Agriculture System Using IOT.

Monitor the agriculture fields. As well as performing live video streaming for monitoring the agriculture field from the server itself, through raspberry pi camera. The agriculture fields are monitored for environmental temperature, humidity at soil moisture sensor. IOT and wireless sensor node helps to decrease the efforts, for observing the

agricultural fields. IOT also avoids the loss of agriculture parameters database and save in the storage device or cloud for long life. It also provide continuous monitoring in all places including the critical areas. Agriculture product rely on environment This work developed a system a system which will automatically factory like relative humidity, PH of soil, temperature etc. The proposed system model is developed in order to get more yields by identifying the causes.

EXISTING SYSTEM

Threshold values for climatic conditions like humidity, temperature, moisture can be fixed based on the environmental conditions of that particular region. The system also senses the invasion of animals which is a primary reason for reduction in crops. This system generates irrigation schedule based on the sensed real time data from field and data from the weather repository. This system can recommend farmer whether or not, is there a need for irrigation. Continuous internet connectivity is required. This can be overcome by extending the system to send suggestion via SMS to the farmer directly on his mobile using GSM module instead of mobile app.

HARDWARE REQUIREMENTS

- 1)Raspberry Pi
- 2)Camera
- 3) Temperature sensor

- 4) Humidity sensor
- 5) Soil moisture sensor
- 6)pH paper

SOFTWARE REQUIREMENTS

- 1)Arduino UNO R3
- 2)Cloud application

ADVANTAGES

- Recorded video useful for online tutorial class on farming
- The recorded footage used to future purpose for future generation
- It intimate the farmer to irrigate on time, hold the record of climatic changes, nutrition about soil and water.

4. Prof K.A.Patil,N.R.Kale proposes about a model forSmart Agriculture using IOT.

Climate changes and rainfall has been erratic over decade. Due to this, climate-smart methods called smart agriculture is adopted by many farmers. In the existing system, village farmers may have planted the same crop for centuries, but over period, weather patterns and soil conditions and epidemics of pests and disease have been changed. By using the proposed system approach, which senses the local agricultural parameters, identify the location of sensor, transfer the data crop fields and crop monitoring. The Received updated information allows the farmers to cope with and even benefit from these changes. The Complete real-time and historical environmental information is expected

to help to achieve efficient management/monitoring and utilization of resources.

EXISTING SYSTEM

Threshold values for climatic conditions like humidity, temperature, moisture can be fixed based on the environmental conditions of that particular region. The system also senses the invasion of animals which is a primary reason for reduction in crops. This system generates irrigation schedule based on the sensed real time data from field and data from the weather repository.

HARDWARE REQUIREMENTS

- 1)Raspberry Pi
- 2)Arduino UNO R3
- 3)Sensor for particular usage(soil,temperature,moisture)

SOFTWARE REQUIREMENTS

- 1)Arduino
- 2)Cloud application
- 3)Data base of record

ADVANTAGES

- By comparing the previous year record of cropping , farmer enhance the soil quality and quantity
- Management of cropping are efficiently done through these process.

5.Muthunoori Naresh, P.Muna swamy explains about the Smart Agriculture System using IOT

In the existing system agriculturists used to figure the ripeness of soil and presumptions to develop certain kind of products. They didn't think about the level of water, dampness and climatic conditions. The profitability relies totally upon the last phase of the harvest in which they depend. In this proposed system, they improved the efficiency of the product which appraises the nature of the harvest. To go up against the challenges in the field, IOT is used in providing accuracy and conservative cultivation. They also used wireless sensor networks in precision Agriculture by separating the solitary plants for checking in the tens or several square feet .Also used different kinds of sensors such as Temperature sensor, Humidity sensor, Soil moisture sensor, Water level sensor and ARM processor.

EXISTING SYSTEM

Agricultural activities continue to be one of the prominent livelihood strategies. Production of food crops is not dependent on any formally acquired knowledge of farming. Especially in rural areas, farmers following the traditional methods to produce their food crops with the help of the environment. Using the conventional techniques for agriculture, the labour work required for the farm is more to build a good crop yield. For an excellent crop yield, we need to protect the crop against pests. This pest control is done through traditional methods where farmers used to spray pesticides to kill the problems from the field by using sprays. There is a loss in the crop yield.

HARDWARE REQUIREMENTS

- 1) Temperature sensor
- 2) Humidity sensor
- 3) Soil moisture sensor
- 4) Water level sensor
- 5) ARM processor

SOFTWARE REQUIREMENTS

- 1)Arduino
- 2)Cloud application
- 3)Data base of record

ADVANTAGES

- The accuracy was improved
 - They also used wireless sensor networks in precision Agriculture by separating the solitary plants for checking in the tens or several square feet .
 - It leads more profit to farmer and country
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