SMARTFARMER - IoT ENABLED SMART FARMING APPLICATION

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LITERATURE SURVEY

Prathibha S R et al. [1] offered a system that uses a CC3200 microcontroller unit and also employed a GPRS module to send the air temperature values and air humidity values using temperature and humidity sensors to the farmer via MMS. It also has a camera which takes pictures and sends the images to the farmer. According to their approach, the system can be only implemented for green house and temperature dependent plants which is a major drawback. The system only sends the details of the sensors to the farmer but is not capable of taking actions such as automatic irrigation based on the values of the sensors.

Rahul Dagar et al. [2] have offered a model which can only be implemented in Poly Houses (closed spaces), which uses a number of sensors such as water volume sensor, pH sensor, moisture sensor, temperature sensor and motion detector sensor. This system takes actions according to the values produced by the sensors. But, their system has no benchmarks produced for the values under which the server takes appropriate actions. Each crop has different threshold values which need to be satisfied for better yield. Also, the system works only for closed spaces under their proposed strategy.

Vaishali Puranik et al. [3] proposed a method that incorporates two sensors. Soil moisture sensor measures the moisture and if less than threshold value it irrigates the crops. They have also developed a rectification process of any error in the irrigation system by notifying the farmer and technician if the irrigation system is not working properly. The second sensor, pH sensor measures the Nitrogen value of the soil and compares with the threshold value. If there is any deficiency or excess, the system sends an alert to the farmer. The model was unreliable because it is using the same threshold value for all crops but each crop has a different level of moisture and fertilizers needed. Also the number of sensors used is very minimal and is not sufficient to increase the crop yield for the farmers.

Abhiram MSD et al. [4] have elucidated an approach by using NodeMCU and moisture, temperature, humidity and rain intensity sensors. The system is connected with the Blynk application where the farmer can see the readings and actions of the sensor. The major limitation of the proposed method was that the threshold values must be manually set by the farmer who may or may not know the accurate values for getting better crop yields. Also the rain intensity sensor can provide false positives in cases where it is not raining and the water from the pump motor is detected wrongly as rain water.

Nor Adni Mat Leh et al. [5] have proposed a model in which Arduino Mega is connected with a soil sensor and DHT11 sensor. The sensor values are sent to the Blynk application using the Internet where the farmer can see the readings. According to the values from the sensors, water pumps are turned on. The suggested approach has a drawback because the system is wholly dependent only on the soil moisture and a fixed threshold value.

A. Anitha et al. [6] have offered a system that uses an Arduino UNO microcontroller unit employed with an ESP8266 WiFi module to send the values of the sensor readings to a cloud storage ThingSpeak. Here, the farmer can view the reading using the Internet. Based on manually fixed threshold values the motor pumps are switched on or off automatically. The major drawback of this system is the manually fixed thresholds which are kept common for all crops. Each plant variety requires different types of conditions to produce more yield.

Sameer Qazi et al. [7] have done a survey on IoT-Equipped and AI-Enabled Next Generation Smart Agriculture which discusses about the available advancements in the field of smart agriculture systems through IoT technologies and AI techniques in detail and have done a critical review of these two available technologies and challenges in their widespread deployment; and an in-depth discussion about the future trends including both technological and social, when smart agriculture systems will be widely adopted by the farmers globally . The authors of the paper have also discussed wireless sensor network (WSN) technology and use-cases of IoT in SAS and the smart irrigation technologies used currently in the world. They have also presented an overview of the use of UAVs, which is a current driving force behind AI-powered solutions for SAS and discussed these solutions in detail, which are possible via DL applications.

Muhammad Ayaz et al. [8] have published the journal, Internet-of-Things (IoT)-Based Smart Agriculture: Toward Making the Fields Talk. This journal is a compendium of knowledge that can help the researchers and agriculture engineers implementing the IoT-based technologies to achieve the desired smart agriculture .It discusses about the role of IoT in advanced agriculture practices, like vertical farming (VF), hydroponics, and phenotyping, to manage the issues of increased urban population and highlights various technologies and equipment, like sensors, robots, tractors, and communication devices, being used to implement IoT in this industry. It also explores scenarios which cannot be handled even by using the latest technologies.

Muhammad Shoaib Farooq et al. [9] have done a Survey on the Role of IoT in Agriculture for the Implementation of Smart Farming . This paper presents major components of IoT based smart farming along with relevant technologies and a detailed discussion on network architecture of IoT that involves network architecture and layers, network topologies used; and devices and protocols used in agriculture IoT . The authors have also covered the security and privacy issues in IoT based agriculture and also the open issues and challenges to improve IoT based agricultural technologies from different aspects.

Maanak Gupta et al. [10] have published the journal, Security and Privacy in Smart Farming: Challenges and Opportunities. This journal presents a holistic study on security and privacy in a smart farming ecosystem. The journal also outlines a multi-layered architecture relevant to the precision agriculture domain and discusses the security and privacy issues in this dynamic and distributed cyber physical environment. It identifies potential cybersecurity issues in smart farming and illustrates scenario specific cyber attacks, which have been categorized into data, network, supply chain, and other common attacks. It presents an extensive evaluation of the current cybersecurity research, countermeasures in smart farming, and also enlists the focus, contributions and weaknesses of current research works. It provides a clear view of the open security research challenges in different areas including next generation network security, trustworthy supply chain and compliance, adversarial machine learning and AI, and access control, trust and information sharing.

LITERATURE SURVEY

S. No.	Authors	Title	Hardware Used	Proposed Work	Disadvantages
1	Prathibha S R, Anupama Hongal, Jyothi M P	IoT Based Monitoring System In Smart Agriculture	CC3200 microcontroller unit, GPRS module, temperature, humidity sensors and camera	Offered a system that uses a CC3200 microcontroller unit and also employed a GPRS module to send the air temperature values and air humidity values using temperature and humidity sensors to the farmer via MMS. It also has a camera which takes pictures and sends the images to the farmer.	The system can be only implemented for green house and temperature dependent plants which is a major drawback. The system only sends the details of the sensors to the farmer but is not capable of taking actions such as automatic irrigation based on the values of the sensors.
2	Rahul Dagar, Subhranil Som, Sunil Kumar Khatri	Smart Farming – IoT in Agriculture	Water volume sensor, pH sensor, moisture sensor, temperature sensor and motion detector sensor	Offered a model which can only be implemented in Poly Houses (closed spaces), which uses a number of sensors such as water volume sensor, pH sensor, moisture sensor, temperature sensor and motion detector sensor.	The system has no benchmarks produced for the values under which the server takes appropriate actions. Each crop has different threshold values which need to be satisfied for better yield. Also, the system

				This system takes actions according to the values produced by the sensors.	works only for closed spaces under their proposed strategy.
3	Mrs. Vaishali Puranik, Mrs. Sharmila, Mr. Ankit Ranjan, Ms. Anamika Kumari	Automation in Agriculture and IoT	Arduino UNO, Soil moisture sensor, pH sensor, temperature sensor, humidity sensor and GSM module	Proposed a method that incorporates two sensors. Soil moisture sensor measures the moisture and if less than threshold value it irrigates the crops. They have also developed a rectification process of any error in the irrigation system by notifying the farmer and technician if the irrigation system is not working properly. The second sensor, pH sensor measures the Nitrogen value of the soil and compares with the threshold value. If there is any deficiency or excess, the system sends an alert to the farmer.	The model was unreliable because it is using the same threshold value for all crops but each crop has a different level of moisture and fertilizers needed. Also the number of sensors used is very minimal and is not sufficient to increase the crop yield for the farmers.

4	Abhiram MSD, Jyothsnavi Kuppili, N.Alivelu Manga	Smart Farming System using IoT for Efficient Crop Growth	NodeMCU, moisture, temperature, humidity and rain intensity sensors.	Elucidated an approach by using NodeMCU and moisture, temperature, humidity and rain intensity sensors. The system is connected with the Blynk application where the farmer can see the readings and actions of the sensor.	The major limitation of the proposed method was that the threshold values must be manually set by the farmer who may or may not know the accurate values for getting better crop yields. Also the rain intensity sensor can provide false positives in cases where it is not raining and the water from the pump motor is detected wrongly as rain water.
5	Nor Adni Mat Leh, Muhammad Syazwan Ariffuddin Mohd Kamaldin, Zuraida Muhammad, Nur Atharah Kamarzaman	Smart Irrigation System Using Internet of Things	Arduino Mega, soil sensor and DHT11 sensor	Proposed a model in which Arduino Mega is connected with a soil sensor and DHT11 sensor. The sensor values are sent to the Blynk application using the Internet where the farmer can see the readings. According to the values from the sensors, water pumps are turned on.	The suggested approach has a drawback because the system is wholly dependent only on the soil moisture and a fixed threshold value.

6	A. Anitha, N. Sampath and M. A. Jerlin, "Smart Irrigation system using Internet of Things," 2020 International Conference on Emerging Trends in Information Technology and Engineering (ic-ETITE), 2020, pp. 1-7, doi: 10.1109/ic-ETITE 47903.2020.271.	Smart Irrigation system using Internet of Things	Arduino UNO, ESP8266 WiFi module, DHTll temperature and humidity sensor, water level sensor, soil moisture sensor.	Offered a system that uses an Arduino UNO microcontroller unit employed with an ESP8266 WiFi module to send the values of the sensor readings to a cloud storage ThingSpeak. Here, the farmer can view the reading using the Internet. Based on manually fixed threshold values the motor pumps are switched on or off automatically.	The major drawback of this system is the manually fixed thresholds which are kept common for all crops. Each plant variety requires different types of conditions to produce more yield.

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