LITERATURE SURVEY ON SMART FARMING

[1] Manasa Sandeep, C. Nandini2, Bindu L, Champa P, Deepika K H, Anushree N S (2018) proposed a paper titled “IOT based smart farming system”in International Research journal of Engineering and Technology.Proposed system developed an automated irrigation system and rooftop management system for the farmer on the basis of wireless sensor network.This system monitors the parameters temperature, humidity, rainfall and moisture of the soil. An algorithm is used with threshold values of soil moisture to be maintained continuously. System starts or stops the irrigation based on the moisture content of soil.

Hardware:

Arduino Uno, Soil moisture sensor, Image capturing module.

Software:

Mobile application, Bluetooth module.

Advantages:

The entire system gives the field automation in agriculture, which makes farmer’s work easier. It helps in increasing the agricultural production and reduces the time and money of the farmer.

Disadvantages:

Rooftop is useful for smaller farms as it is costly to implement.

[2] M.W.P Maduranga, Ruvan Abeysekera(2020) proposed a paper titled “Machine Learning Applications in IOT Based Agriculture And Smart Farming” in International Journal of Engineering Applied Sciences and Technology.This paper introduces Smart Farming using IOT technologies and Machine Learning. The IoT generates big amount data with different characteristics based on location and time. To improve productivity of agriculture through intelligent farm management, the data analyzing must be well analyzed and processed. High performance computing capability in ML opens up new opportunities for data-intensive science as the amount of data collected increases; ML algorithms could be applied to further enhance application intelligence and functionality.

Hardware:

Microcontroller, multiple types of sensors (from simple temperature sensors to cameras), actuators.

Software:

wireless interfaces could be WiFi, LoRaWAN, Zigbee etc.

Advantages:

1. IoT based data-driven farm management techniques can help increase agricultural yields by planning input costs, reducing losses, and using resources more efficiently.

2. The IoT can easily collect and manage large amounts of data collected from sensors and integrate cloud computing services such as agricultural maps and cloud storage.

Disadvantages:

Without having quality data, predictive models using ML algorithms cannot be created.

[3] Jash Doshi, Tirthkumar Patel, Santosh Kumar Bharti (2019) proposed a paper titled "Smart Farming using IoT, a solution for optimally monitoring farming conditions". This method is to propose a technology which can generate a messages on different platforms to notify farmers. The product will assist farmers by getting live data (Temperature, humidity, soil moisture, UV index, IR) from the farmland and gives different types of messages to the farmer about the present conditions so that the farmer can take quick action. The quick actions taken by the farmers will help them increase the productivity in their farming and proper use of natural resources.

Hardware:

ESP32s, DHT11 Temperature and Humidity Sensor, Soil Moisture Sensor, SI1145 Digital UV Index/IR/Visible Light Sensor.

Software:

Serial Monitor, Blynk mobile

Advantages:

Remote monitoring for farmers, water and other natural resource conservation, good management also allows improved livestock farming, the things which are not visible to necked eye can be seen resulting is accurate farmland and crop evaluation, good quality as well as improved quantity, the facility to get the real- time data for useful insights.

Disadvantages:

1. The smart agriculture need availability on internet continuously. Rural part of the developing countries did not fulfil this requirement. Moreover, internet is slower.
2. Fault sensor or data processing engines can cause faulty l decisions which may lead to over use of water, fertilizers and other wastage of resources.

[4] Stephen C. Kerns, Joong-Lyul Lee (2017) proposed a paper titled "Automated Aeroponics System Using IoT for Smart Farming"in 8th International Scientific Forum. Aeroponics farming is an efficient and effective process for growing plants without using soil.The Aeroponics system uses IOT technologies. It is designed in three phases: mobile application, Service platform and IOT devices with sensors. Applying IOT technology to an Aeroponics system decreases the water wastage, increasing plant yield, minimizing rate of growth and reducing the workforce.

Hardware:

Raspberry PI Zero, DHT11 temperature and humidity sensor, Atlas scientific pH probe and EZO circuit, water level sensor.

Software:

HTML5, CSS Flexbox, Javascript, and SVG.
Apache 2.4.26, MariaDB 10.1.25, and PHP 7.1.7.

Advantages:

1. Proposed system is expected to be a promising application to help farmers increase the production of organic crops in a smart farming system.
2. Increase productivity in farming.

Disadvantages:

1. Rural part of the developing countries did not have continuous internet connection.
2. Moreover, internet is slower.

[5] Vu Khanh Quy , Nguyen Van Hau , Dang Van Anh, Nguyen Minh Quy , Nguyen Tien Ban ,Stefania Lanza , Giovanni Randazzo and Anselme Muzirafuti(2022) proposed a paper titled "IoT-Enabled Smart Agriculture: Architecture, Applications, and Challenges". This study presents a survey of IoT solutions and demonstrates how IoT can be integrated into the smart agriculture sector. The vision of IoT-enabled smart agriculture ecosystems by evaluating their architecture (IoT devices, communication technologies, big data storage, and processing), their applications, and research timeline are used to achieve the objective.

Hardware:

FGPA/processor, Energy module, RAM, I/O interface module, location sensor, optical sensor, mechanical sensor, electrochemical sensor, airflow sensor.

Software:

ZigBee, Wi-Fi, Sigfox and LoRa

Advantages:

1. IoT in smart agriculture, aiming to enhance productivity, reduce human labour, and improve production efficiency.
2. Provide clean and green foods, support food traceability.

Disadvantages:

1. Most IoT devices are expected to be deployed outdoors (in fields and farms). Harsh work environments lead to the rapid degradation of IoT devices' quality and can lead to unexpected manufacturer failures.
2. One of the most important problems of policies regards the validity and legal status of farm data.

[6] Nermeen Gamal Rezk1 & Ezz El-Din Hemdan2 & Abdel-Fattah Attia & Ayman ElSayed2 & Mohamed A. El-Rashidy(2021) proposed a paper titled “An efficient IoT based smart farming system using machine learning algorithms”. This paper suggests an IoT based smart farming system along with an efficient prediction method called WPART based on machine learning techniques to predict crop productivity and drought for proficient decision support making in IoT based smart farming systems. The crop productivity and drought predictions is very important to the farmers and agriculture’s executives, which greatly help agricultureaffected countries around the world.

Hardware:

Sensors and actuatorsWSN

Software:

Machine learning, Mobile applications

Advantages:

3. The projected method is robust, accurate, and precise to classify and predict crop productivity and drought in comparison with the existing techniques.
4. The proposed method proved to be most accurate in providing drought prediction as well as the productivity of crops like Bajra,Soybean, Jowar, and Sugarcane.

Disadvantages:

1. This method includes multiple steps of process for monitoring.
2. It is quite complex.

[7] Sehan Kim, Meonghun Lee, and Changsun Shin(2018) proposed a paper titled “IoT Based Strawberry Disease Prediction System for Smart Farming”. In this paper, a model predicting the infection risk of Botrytis cinerea, a major disease, was then developed. The purpose of the FaaS system is to improve crop productivity and provide convenient convergence technology applications for farm households that operate smart farms. In this study, a strawberry disease infection prediction model was developed by implementing the IoTHub network layer for wireless communication as well as the FaaS middle layer for data collection, processing and analysis. The FaaS system is classified into three layers: the network layer, FaaS layer, and application layer; the IoT-Hub network model supports the oneM2M platform, which is the low-level layer and the LoRa.

Hardware:

oneM2M-based IoT devices, FaaS

Software:

LoRaWAN

Advantages:

1. Greater stability and accuracy in identification of diseases.
2. Increase in productivity.

[8] A.R. Al-Ali, Ahmad Al Nabulsi, Shayok Mukhopadhyay, Mohammad Shihab Awal, Sheehan Fernandes, Khalil Ailabouni (2019) proposed a paper titled "IoT-solar energy powered smart farm irrigation system" in Journal of electronic science and technology. The design of an IoT based solar energy system for smart irrigation is essential for regions around the world, which face water scarcity and power shortage. The proposed system utilizes a single board system-on-a-chip controller (the controller hereafter), which has built-in WiFi connectivity, and connections to a solar cell to provide the required operating power. The controller reads the field soil moisture, humidity, and temperature sensors, and outputs appropriate actuation command signals to operate irrigation pumps. The controller also monitors the underground water level, which is essential to prevent the pump motors from burning due to the level in the water well. The proposed system has three modes of operations, i.e. the local control mode, mobile monitoring control mode, and fuzzy logic- based control mode.

Hardware:

Relay board and sensors

Software:

myRIO

Advantages:

3. It utilizes a single board system-on-a-chip controller and also uses wifi Connectivity.
4. The remote monitoring website makes the system very accessible, and it can be monitored through the web via a computer, or a mobile phone.
5. In future, this design can be scaled up to suit actual farm sizes, and support their operations without requiring human intervention.

Disadvantage:

The prototype system was tested when isolated from a utility power supply, and the operation was completely dependent on solar power.

PROPOSED WORK:

The proposed IOT based system helps the farmer in monitoring different environment parameters such as soil moisture, disease attack, climatic conditions, temperature, humidity using various sensors.

Farmers can also monitor the working of the sensors with the help of mobile application/web application even the farmer is not near his field.

It mainly focuses on watering the crop, the application decides whether to water the crop or not based on the information given by the sensor.

This method is efficient in reducing wastage of water. The proposed skills are Python, IBM Cloud, IBM IoT Platform, IBM Nodered, IBM Cloudant DB.

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