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SMART AGRICULTURE MONOTORING SYSTEM USING IOT

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Abstract—IOT is a revolutionary technology that represents the future of communication and computing. These days IOT is used in every field like smart homes, smart traffic, control smart cities etc. It is proposed to develop a Smart agriculture System that uses advantages of cutting edge technologies such as Arduino, IOT and wireless sensor network. IOT and smart agriculture using automation. Monitoring environmental conditions is the major factor to improve yield of the efficient crops. The feature of this includes development of a system which can monitor temperature, humidity, moisture and even the movement of animals which may destroy the crops in agricultural field through sensors using Arduino board and in case of any discrepancy send a SMS notification as well as a notification on the application developed for the same to the farmer's smartphone using Wi-Fi/3G/4G.

Keywords—soil Moisture Sensor, Ph Sensor, Ardunio, Temperature Sensor

I. INTRODUCTION

Internet of Things (IoT) is the interconnection or network of physical devices that is interrelated computing devices, digital and mechanical machines, people or animals, objects that can sense, accumulate and transfer data over web without any human involvement. Everything is provided with unique identifier. It is a progressed examination and mechanized frameworks which uses detecting, organizing, enormous information and man-made consciousness innovation to convey total framework for an administration. Basically IoT is about extending the power of internet beyond smart phones and computers. IoT has changed today's world. Smart cities, smart car, smart homes everything around us can be turned into a smart device with the help of IoT. It also has applications in agriculture, business sectors, healthcare, transport and logistics.

There are four main components of IoT-

- Low power embedded system- High performance and less battery consumption are the inverse factors that play an important role in design of electronic system.
- Availability of Big Data- As IoT is highly dependent on sensors that are real time. So the usage of electronic devices is spread throughout every field that is going to trigger a massive flux of data.
- Network connection- For communication, internet connectivity is necessary where each physical object is assigned by an IP address. A network connection is build between the devices with the help of these addresses.

Advantages of IoT

1. Utilization of Resources Efficiently
2. Minimization of Human Efforts
3. Time-saving
4. Increase Data Collection

Disadvantages of IoT

1. Security
2. Privacy
3. Complexity

II. AIM AND OBJECTIVES OF IOT WORK

A. AIMS

A Seminar aim is a we intend to apply IOT in agriculture especially in Indian Farming as Indian still tends to use primitive methods of farming which are quite inefficient and require a lot of man-power. IOT serves as a powerful, reliable and cost effective technology to implement the idea of "Smart Village" that aims to empowerment of villages with advance connectivity through web service, measurement of environment factors like soil moisture, temperature, humidity and implementing cloud computing along with read time monitoring using GSM system.

B. OBJECTIVES

1. To update farmers with the new technology and to avoid manual labor.
2. To reduced wastage of water and enhance productivity of crops by providing them ideal condition.
3. To meet the difficulties such as server weather conditions and advancing climate change, and environmental consequences resulting from intensive framing practice.
4. Design a model and connect it to the android app and cloud server.
5. Increase output If farmer are well informed about farming activities like when to plant particular crops, vegetables and more. And also how much soil contains

moisture and when to water. Then they will not make mistake is cropping and planting any things. Thus they will have greater output. Through IoT we can inform farmer about this things.

III. RELETD WORK

[1] Proposes an electronic system which includes the applications of IoT. The system monitors aspects such as moisture and can control the moisture level based on a threshold value..

[2] Proposes collecting data from IoT sensors and send it to the server over Wi-Fi module. The system is implemented for a poly-house.

[3] Aims to develop a product that uses low power Bluetooth and Low Power Wide Area Networks (LPWAN)communication modules for smart farming. MQ Telemetry Transport (MQTT) communication method is used in monitoring and control systems, which is an IoT dedicated protocol, thereby enhancing the possibility of development of agricultural IoT.

[4] Gives research information about decision tree algorithms in data mining for analyzing the soil dataset and predict soil fertility and thus crop production.

[5] Gives out a method for testing the soil fertility depending on the values collected by the sensors. The soil fertility once determined, is used to suggest the best suitable soil fertilizer for the crop.

IV. SMART AGRICULTURE TECHNOLOGY METHODLOGY

In this project, we are using sensors which include temperature and soil moisture. Soil moisture sensors are fixed under the ground in field . Initially the water level reading is taken and decisions are made according to it. The temperature sensor (DTH11) is fixed at the center of the field to get the overall reading of temperature of the soil. Readings are taken in Degree and Fahrenheit. These sensors are connected to Arduino where we will get the readings. All sensors will send data to Arduino and data will be forwarded to Arduino. Whenever any sensor reaches a threshold value, message alert is sent to the user and action is taken according to it.

A. Internet Of Things

In today's world the Internet plays a vital role in all domains. In the agricultural domains, the proposed method is used to monitor the agriculture fields with the help of IoT. Sensors are used for analysing the various parameters in agricultural domain based on the wireless sensor network technology. The cloud database IoT technologies have several tools and hardware's to collect the data.

B. Cloud Computng

Cloud computing provides sharing of resources with an economic cost. Cloud computing service providers offer the services within an economical cost. It has been used for storage of agriculture data. It is used in agriculture sector along with IoT. Cloud computing offers an edge to farmers to use knowledge- based repositories that contain a treasure of information and experiences related to farming practices as well as on equipment options available in the market with the necessary details. In most cases, all this comes along with expert advice from a wide range of sources (for example, on farming and the processing of agricultural products).

C. Big Data

Big data is an enormous amount of information collected from different sources and for the longer period like sensor data, social networking data, and business data. The major challenge is capture, storage, analysis, and search. It is used for business data processing along with big data analytics to search for hidden patterns in the data. Big data in agriculture domain is used for supply chain management of agro products, to minimize the production cost. They have no. of. Techniques are used to predict and analyse the data. The techniques are classification algorithm, clustering algorithm, Association rule mining. These algorithm examples are SVM, decision tree algorithm, C4.5, Restreet and J48, k-nearest neighbour, Naive Bayes, Neural networks, K-means clustering methods, Apriorism algorithm, Fp- growth algorithm. It was focusing on the information and processes the data with the help of e-agriculture.

D. Mobile Computing

Mobile Computing has affected lots in number in our day to day life due to its availability and has a cheaper cost of communication. It is in use in almost every field including agriculture sector. System based on mobile computing has been proposed for sending daily, seasonal messages to farmers regarding the product information and weather information. Then it will be stored in the cloud and big data analytics concepts are used to analyze the data. Finally, the report will be sent to the farmer through mobile computing technologies.

E. Smart Phones

Despite its availability concerns for remote fields, cellular communication is the major technology in rural areas; mobile phones are a very common source and primary mode of communication whenever the need arises to contact or update most of the farming community. Mobile-phone-based agriculture services (m-services) are far from their assumed potential; according to an analysis done by GSM Association, only at 8 per cent . However, the flexibility and functionality, such as the camera, GPS, microphone accelerometer, Proximity, and gyroscope, attract the IT experts.

F. Bluetooth

Bluetooth is a wireless communication standard that connects small-head devices together over shorter distances usually cooperating in a close proximity. Due to its advantages of low power Bluetooth is a wireless communication standard that connects small-head devices together over shorter distances usually cooperating in a close proximity. Due to its advantages of low power requirements, easy to use and low cost, this technology is being utilized in many smart farming applications. Further, Bluetooth making advancements in many IoT systems with the release of Bluetooth Low Energy (BLE) or commonly known as Bluetooth Smart.

G. LTF,4G AND 5G

The LTE technology is used to describe 4G wireless network, which is an extension of the existing 3G wireless standards. As such an extension, 4G shifts the paradigm from hybrid data and voice networks to a data-only IP network. Furthermore, 4G uses multiple input multiple-output (MIMO) and orthogonal frequency division multiplex (OFDM) to acquire more data throughput than 3G. OFDM is a transmission technique that uses many closely spaced carriers modulated with low data rates. LTE-Advanced (LTE-A) bridges the gap between 4G and 5G by introducing high bandwidths, and it promises nearly three times greater speed than does the basis LTE network and comprises carrier aggregation, increased MIMO, coordinated multipoint, relay station, and heterogeneous network. The introduction of 5G networks will result in fast and resilient access to the Internet and support for smart city realization. Such networks will introduce new architectures, such as cloud RAN and virtual RAN, which can facilitate an increasingly centralized network establishment and make the best use of server farms through localized data centers at the network issue.

H. Sensor

Sensors are at the core of every device in the IoT system. From connected cars to traffic lights and smart homes, almost every device today has sensors that gather and send data to the cloud. This interconnectivity is what makes possible the Internet of Things system.

I. Wireless Sensor

Among all the equipment for smart farming currently available in the market, wireless sensors are the most crucial and play a key role when it comes to collecting the crop conditions and other information. Wireless sensors are being used standalone wherever required, further integrated with almost every portion of advanced agricultural tools and heavy machinery, depending on application requirements.

J. Monitoring Of Climat Condition

Probably the most popular smart agriculture gadgets are weather stations, combining various smart farming sensors. Located across the field, they collect various data from the environment and send it to the cloud. The provided measurements can be used to map the climate conditions, choose the appropriate crops, and take the required measures to improve their capacity (i.e. precision farming).

K. Crop Management

One more type of IoT product in agriculture and another element of precision farming are crop management devices. Just like weather stations, they should be placed in the field to collect data specific to crop farming; from temperature and precipitation to leaf water potential and overall crop health.

L. Cattle Monitoring Any Management

Just like crop monitoring, there are IoT agriculture sensors that can be attached to the animal on a farm to monitor their health and log performance. Livestock tracking and monitoring help Collect data on stock health, well-being, and physical location. For example, such sensors can identify sick animals so that farmers can separate them from the herd and avoid contamination. Using drones for real-time cattle tracking also helps farmers reduce staffing expenses. This works similarly to IoT devices for petal.

M. Precision Farming

Also known as precision agriculture, precision farming is all about efficiency and making accurate data-driven decisions. It's also one of the most widespread and effective applications of IoT in agriculture. By using IoT sensors, farmers can collect a vast array of metrics on every facet of the field microclimate and ecosystem: lighting, temperature, soil condition, humidity, CO2 levels, and pest infections. **Mothive** offers similar services, helping farmers reduce waste, improve yields, and increase farm sustainability.

N. Ent-To-End Farm Management System

A more complex approach to IoT products in agriculture can be represented by the so-called farm productivity management systems. They usually include a number of agriculture IoT devices and sensors, installed on the premises as well as a powerful dashboard with analytical capabilities and in-built accounting/reporting features. This offers remote farm monitoring capabilities and allows you to streamline most of the business operations. Similar solutions are represented by Farm Logs and Crocipodin addition to the listed IoT agriculture use cases, some prominent opportunities include vehicle tracking (or even automation), storage management, logistics, etc.

V. LITERATURE SURVEY

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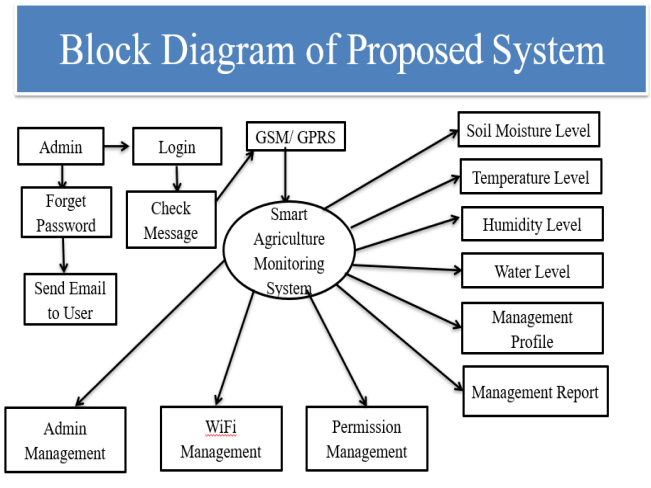
VI. PROPOSED METHOD

The development of a smart agriculture system using sensors, microcontroller within an IOT system is presented. The aim of implement is to demonstrate the smart and intelligent capabilities of the microcontroller to allow the decision to be taken on watering the plants based on the continuous monitoring of the environmental conditions in the field. These sensors continuously monitor the parameters and send it to the Arduino board for further processing which acts as an IOT gateway. This gateway has been given the wireless capability by installing a WiFi module which will be updating the data to the cloud. The IOT gateway also has the GSM capability through the module connected

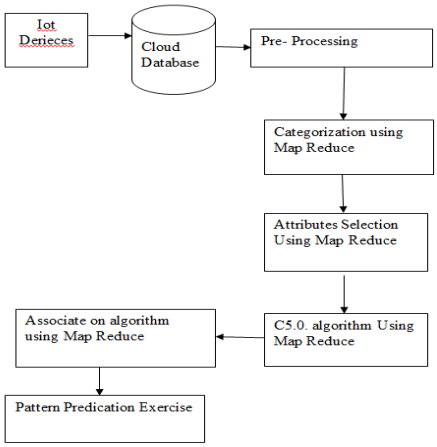


Block diagram of propose system

VII. DESIGN

Our life is turning into more smart and simple because of the IoT technologies and applications gradually. From the literature it is clear that in the agriculture field the IoT, cloud and big data concepts are used separately to predict the crop yields. As a novelty, a smart agricultural model is proposed by integrating the above concepts to deliver the prediction attributes to the farmers through the mobile computing technology. IoT leads to the development of the numerous applications in all domains like medical, manufacturing, industrial, education, governance, transportation etc. This technology Is used in the agriculture field to collect the data through the sensors and stored in the cloud database through the internet.

Cloud database is used in the agriculture sector. It is an efficient and well defined application Cloud based system is integrated with the mobile phone.



VIII. TECHNICAL FEASIBILITY

A. Hardweare Tools:

1. Soil moisture sensor
2. Water sensor
3. Temperature sensor
4. Humidity
5. DC motor

B. Software Tools:

1.Arduino

IX. EXCEPTION OUTCOME

1. IOT severs as a powerful, reliable and cost effective technology to implement the idea of Smart measurement of environment factors like Soil Moisture, temperature, humidity and implementing cloud computing along with real time monitoring using GSM system.
2. Sensor information could be useful. Monitoring the health status of the crop and animals or weather and ambient conditions continuously can be ensured by using a large amount of sensors. Sensors to measure temperature/humidity are also important for the farmer for identifying if crops are degrading or the likelihood of pest or disease development.
3.Using a network of sensors or at least connecting more sensors to each other is also a basic criterion for a well-functioning, improved system.

4.Communication of machinery with the farm management information system, where each machine and each tractor should be able to communicate with the farm, and the high data transmission rates could ensure that data exchange never would cause delays in the field work

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Under these responsible and talented personalities I was efficiently able to complete my seminar in time with success.

Conclusion

IOT based smart agriculture system can prove to be very helpful for farmers. Farming can be made more efficient & accurate with the implementation of IoT device. IoT can be used in different domains of agriculture . For climate conditions like humidity, temperature, moisture can be fixed based on the environmental conditions of that particular region. This IOT based agriculture monitoring system make use of wireless sensor networks that collect data from different sensors developed at various sensor. The farmer can view and understand the pattern of changing environmental. we can control water wastage then we are automatically controlling electricity wastage also. That water we can use in the summer in farm to water crops or in irrigation. The system has high efficiency and accuracy to fetch the live data of soil and temperature. IOT based smart farming being proposed the report and it assist the farmers to increase the agriculture yield and take efficient care of food production . Which can be control multiple operation of agriculture field wireless and remotely anytime.

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