A STUDY ON THE ROLES OF IOT IN THE AGRICULTURE FOR SMART FARMING IMPLEMENTATIONS

Dr. Ashok Kumar

SOA, Sanskriti University, Mathura, Uttar Pradesh, India

ABSTRACT

The Internets of Thing (IoT) is a promising technique that may be used to modernize a multitude of industries at a low cost. Agriculture fields are being managed or monitored automatically or with minimal human involvement using IoT based technologies. The article discusses a variety of technologies that are employed in the fields of the IoT in agriculture. This covers the most significant aspects of the IoT based smarts farming's. A comprehensive evaluation of the networks technology utilized in the IoT based agricultural has been conducted, covering networks construction or layers, networking protocols, as well as protocols. The integration of the IoT based farming production with crucial technologies like clouds computing, vast data storages, or analytic was also explored. In additions, issue about security in the IoT farming have been highlights. A collection of the smart phones or sensor-based apps for many aspects of farm management is also available. Finally, numerous countries' legislation and regulations for standardizing IoT-based farming have been presented, as well as a few publicly available

success stories. Finally, a number of pressing research issues and challenges in the fields of the IoT agriculture were reviewed.

KEYWORDS: IoT, Network, Protocols, Platforms, Smart Farming, Security.

INTRODUCTION

The Auto ID center at the MIT or its related markets research papers drew attention to the Internet of Thing idea in 1999. Essentially, the Internets of the Thing (IoT) is an interconnection of numerous objects that communicate, perceive, or interacts with their internally or externally state via embedded technologies. The Internet of Things (IoT) has emerged as just a megatrend for next generations technology that has the ability to impact the whole business spectrum by allowing end device, system, and services to communicate more effectively. Smart health care, smarts cities, safety, retails, traffics congestion, industrial controls, and farming are just a lot of small fields where the Internets of Things might be beneficial. In order to create smart farming solutions, a considerable amounts of the works has been done using IoT technology in the agricultural sector. By analyzing various difficulties and difficulties in the farming's, the Internets of Thing has created a significant transformations in the agricultural environment.

With the advancement of technology, agriculturalists or technologists are now expected to use IoT to find answers to problems that farmer face, including such water crisis, cost managements, even productivity issues. Cutting-edge IoT technology has recognized all of these issue or certain solution to the rise productivity although lowering expenses. Due to the effort being finished on the wireless sensor networks, people may acquire data from detecting devices or transfer it to the central server. Sensors data offers information on various environmental variables, allowing for proper monitoring of the entire systems. Monitoring ecological situations or crops output is not only factors that influences agricultural output; there are more, including field managements, soils as well as crops monitoring, unwanted item migrations, wild animal attacks, and thefts, to mention a few. Besides, IoT allow for well-ordered scheduling of the limited resource, ensuring that best used of IoT improves productivity. the agricultural trend that provide easy or costs effectives interactions through secure but instead unblemished connectivity across personal Greenhouse, Livestock's, Farmers, or Fields monitoring Using wireless devices, Internet of Things agricultural network allow real-time crop and animal monitoring's [1].

There are several application, protocols, or prototypes in agricultural sectors as whole. Effective use of technology, network design, application, security, or difficulties are all hot topics in IoT agricultural research. Furthermore, various IoT regulations and standards have been adopted in agriculture by several governments and organizations across the world. However, significants amounts of the works has been done in the IoT agricultural setting, and a comprehensive study of IoT in the agriculture is required to comprehend

the present research state. The following Internet of Things agricultural methods have been included from the literature as a contribution to this research [2][3].

- Present key component of the Internets of Things based smarts farmings together with the related technology in the Sections II.
- Sections III delves into the networks architecture of the Internet of Things, including network architecture or layers, network topologies, and device or protocol utilized in the agricultural Internet of Things.
- In Section IV, several applications areas and related smart phone or sensors based application were addressed.
- In the Sections, security or privacy concerns in IoT based agriculture were addressed.
- The industrial trends are addressed in Section VI, which includes information on the leading technological companies that are investing in this field.
- In Section VII, various nations' IoT agricultural policies for standardization of IoT-based agriculture were addressed. This section also includes a few examples of success in this field.
- Finally, Section VIII discusses the outstanding problems and challenges of improving IoT-based agricultural technology from a variety of perspectives.

1. Relevant Technologies and Major Components for the IoT Based Smarts Farming:

Major Internet of Thing based Smarts Agriculture Components there are four main component of the IoT based Smart farmings Physical structure, data collection, data process as well as data analytic are the four main components. To prevent any unfavorable outcomes, the physical structure is most essential element in precisions agriculture. The whole system is intended to control the sensors, actuators, and gadgets. Soil sensing, temperature Sensing, climate sensing, lights sensing, or moistures sensing are all functions that a sensor may accomplish. Devices, too, provide a variety of control tasks, such as nodes discovery, devices identification, or naming services, among others. Any other devices & sensor that is control by the microcontroller may perform all of these tasks. This controlling action may be carried out by the any remotes devices and computer linked to the Internet. Images or videos process, data loadings, management information systems, or data mining's are all aspects of data processing. Any feature that may operate in parallel to offer additional services can be introduced based on the system needs. Monitoring and managing are the two primary aspects of data analytics. Field monitoring applications, on the other hand, are designed to report various field parameters such as soils richness, temperatures, pressure, humidity, gas, (air or water pressure), as well as crops disease monitoring[4].

2. Agriculture-Related IoT Technologies:

Because there are so many technologies utilized in IoT agricultural solutions that it's difficult to list them all, our talk focused on a few key technologies that have helped modernize IoT agricultural services.

- Computing in the Cloud and at the Edge in agriculture, IoT and cloud computing collaboration offers ubiquitous access to common resources. Cloud computing is critical for meeting different agricultural requirements on demand via the network and executing activities. A clouds based software's architectures has been suggested for more the correct processing or retrieval of the information's as well as agricultural activities.
- Machine learning and big data analytics Agricultural sensors produce a huge quantity of important data, which is referred to as big data. At various phases, big data analysis offers various or effective crops monitoring techniques. There has been a thorough study of the big information investigation in the farming. Neural network are the familiar for the providing optimum answers at a rapid rate.
- Robotics Agribot have been created for aim of the smart farmings, reducing the number of farmer required by the improving work pace using advanced methods. Agribots conduct basic tasks like as weeding, spraying, and planting. To improve agricultural production and effective resource use, all of these robots are controlled by IoT. For characterization and ground mapping, a multisensor robot's method has been suggested.

3. Agricultural Iot Networks

One of most important aspect of the IoT in agriculture is the IoT agricultural networks, and IoT networks for the agriculture. It aids in monitoring of agricultural data as well as the transmission and receipt of such data. The framework includes Internet of Things farming networks architectures, IoT agricultural networks platform, or the IoT farming networks topologies as well as protocols [5][6].

4. Agricultural Internet of Things Network Architecture:

The key element of IoT in agriculture is IoT agricultural networks. And IoT Agricultural Networks Architecture proposes a framework for describing the physical components of IoT agricultural networks, as well as the operating principles and methods. Because of ubiquity or interoperability of the IP, most IoT systems follows the four layer design (Networks Layer, Application Layers, Physical or Mac Layers, or Transports Layer), as proposed by Naik (Figure 1).

Following our examination of these four layers protocols, we looked at two additional approaches: IPv6 and 6LoWPAN. This is the highest degree of abstraction, allowing for

the creation of numerous user application. At this layers, communications protocols are implemented to monitor various agricultural factor such as the meteorological data, soils moistures levels, irrigations monitoring, and so on.
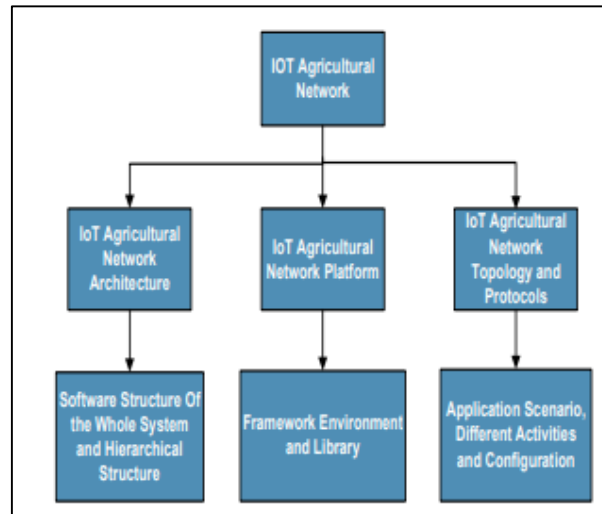

Figure 1: Illustrate the IoT Agricultural Network.

5. Agricultural Challenges in the Internet of Things:

Several researcher have worked on the IoT agriculture systems, developing or creating different IoT agricultural solutions to address a variety of technical and architectural challenges. Furthermore, there are many outstanding problems and difficulties that need to be addressed efficiently, according to the research's points of view in the literatures. There are many difficulties associated with the implementation and use of IoT smart agricultural applications. This study uncovered a number of IoT agricultural problems and challenges, both known and undiscovered[7][8].

6. Hardware Issues:

A lot of challenges arise in an IoT agriculture setting. To start with, the apparatus at the perceptual layer is primarily exposed to extreme weather conditions such as rain, greater temperatures, extreme humidity, strong winds, and a range of other possible risks that might harm electronic circuits. In order to work continuously for a long period, consumer devices rely on the sufficient battery power supplies.

7. Networking Obstacles:

These difficulties occur not just at the hardware level, but also at the network layer. Wireless connectivity is critical for adoption of the IoT based agriculture due to the increasing price of wiring. Human existence, temperature, humidity, as well as several others barriers insides space at which a wireless devices and node wishes to speak show

that accepted transmitters performance is blown out of proportion by the humans occurrence, temperature, humidity, or several others barriers insides the space where a wireless devices as well as nodes want to the communicates.

Agricultural Platforms in the Internets of Things (IoT) In comparison to other IoT end device, agriculture IoT architecture is more complex and necessitates a real-time monitoring program with much more rigorous criteria. A custom-made computing platforms with run time libraries is required for this. A services oriented architecture may also be used to create suitable platform; these services can be accessed via various APIs. Furthermore, suitable frameworks as well as libraries should be the created so that agricultural developers may makes effective utilization of existing documents, class, scripts, and others relevant information [9][10].

DISCUSSION

The Internets of Things (IoT) is promising methods that may be used to modernize a range of industries at a low cost. Agricultural fields are being managed and monitored automatically and with minimal human involvement using IoT based technologies. The article discusses a variety of technologies that are utilized in the area of the IoT in the agriculture. It covers the most important aspects of IoT based smarts farming. The networks technologies used in the IoT based agricultures have been thoroughly examined, including networks infrastructure including layers, networks topologies, or protocol. This page also provides a thorough overview of current and future advancements in IoT application areas, devices/sensors, networking devices, and just a range of other new technologies. This research analyzes a range of IoT agricultural issues and security requirements in order to get a better knowledge of IoT smarts farming security. Several essential elements of the IoT based agriculture, including technology, market trends, and national laws, have also been given to help various stakeholders. The government has started to promote the Internet of the Things in the farming, the anticipated that the Internets of Thing will soon alter the conventional farming's techniques. Several major companies have also started to invest in and develop new IoT-based agricultural management techniques. Finally, academics, experts, agriculturists, including policymakers engaged in and working in the IoT and agricultural technology are likely to find this comprehensive research to be very useful.

CONCLUSION

Scientists from all around the worlds are experimenting with the IoT technologies to the improves farming production in manner that complement current service area. Researcher have provided a thorough assessment of the state of the arts for IoT in the agricultures in this post. To that aim, we'll talk about agricultural networks design,

platform, or topology, which may assist farmers get access to IoT backbones or improves crops production. This article also provides a thorough overview of existing or future advances in the IoT smart farming, device/sensors, communications procedures, or a range of other modern technologies. For a greater understanding of the IoT based smarts farming security, this study examines diversity of the IoT agricultural problems or security needs. In addition, several key aspects of IoT based agriculture, such as technology, industry trends, or country regulations, have been provided to assist different stakeholders. The government has begun to support Internet of Things in the agriculture, or it is expected that the Internet of Things in the agricultural will soon revolutionize traditional farmings methods. It's also apparent that several large corporations have begun to invest in and create innovative IoT-based farm management methods. Finally, academics, professional, agriculturists, or policymakers who are involved or workings in the IoT area or agricultural technology are anticipated to find this thorough study to be a very valuable piece of information.

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