A CRITICAL REVIEW ON USE OF IOT AND WSN IN AGRICULTURE

Ravi Kumar, Assistant Professor, Department of Computer Applications,

Galgotias University

ABSTRACT

With respect to food supply, rising demand means the increasing desire for food of better and greater quantity. As a result, there is a greater need for industrialization and intensification in the agricultural sector. There are many novel ideas that may be used to improve agricultural practises with the use of the Internet of Things (IoT). Researchers at scientific organisations and institutes constantly develop new technologies to use to agriculture. The present research does a systematic literature review (SLR) by surveying the various IoT applications across several farm sectors. The primary SLR is produced by examining peer-reviewed academic publications. Only 67 articles were meticulously chosen and categorised according to their quality. This is the fundamental purpose of this comprehensive research study, which is designed to gather all available research on IoT agricultural applications, sensors/devices, communication protocols, and network kinds. Furthermore, it also touches on the primary concerns and difficulties that are now being examined in the agricultural industry. And last, a set of IoT solutions has been offered that ties together the variety of existing solutions in agriculture. In addition, national IoT-based agricultural strategies have also been proposed. Lastly, concerns and problems have been made available to stimulate the IoT agricultural researchers with new ideas and approaches.

KEYWORDS: IOT, Agriculture, Sensors, Review.

INTRODUCTION

From the late 1980s through the early 2000s, the internet's broad adoption has provided almost limitless advantages for companies and individuals throughout the world. Real-time production and consumption of services is the greatest advantage of this invention. This recent Internet of Things (IoT) technology provides new and exciting benefits, and the alterations in working environments present ways to increase user perceptions and abilities. The wide variety of IoT solutions available in numerous sectors, such as healthcare, retail, traffic, security, smart homes, smart cities, and agriculture, ensures that you will find a suitable solution for almost every scenario. Agriculture offers a great application for IoT, since it is continually monitored and controlled. IoT has several uses in the agricultural production chain, with the first stage using IoT at the manufacturer level. These agricultural applications of IoT may be broadly classified into distinct monitoring categories. IoT-based sensors and devices monitor the availability of each application and provide alerts for each of them. Agricultural sensor networks (WSNs) may be used to gather important data from sensors on the farm. The use of cloud-based services empowers academics

and agriculturalists by automating the analysis of distant data. Today's latest technology provides extra resources when it comes to management and decision-making. Landslide risk monitoring system with little user involvement has been created, which can be deployed quickly in difficult situations without human interaction. More noteworthy is that the system has been programmed to cope with network node failures and rearrange low-quality connections by itself. It is suggested in that there should be an IoT management system that monitors many environmental aspects such as wind, soil, atmosphere, and water across a vast region. Other ways to think about it include: These agricultural monitoring solutions were recognised according to the particular subdomains they belong to. When all of the above-mentioned subdomains are correctly recognised, they can be seen to include soil monitoring, air monitoring, temperature monitoring, water monitoring, disease monitoring, location monitoring, environmental conditions monitoring, pest monitoring, and fertiliser monitoring. Additionally, the IoT paradigm enables the development of affordable electronic devices and communication protocols that enhance human interactions in the real environment. IoT, the network of connected devices, keeps tabs on various environmental variables, including noise, air, water pollution, temperature, and harmful radiations, creating detailed and up-to-date maps of pollution levels. Most importantly, data on various environmental factors is sent to the user through trigger alerts or messaging to government agencies.

WSN and IOT

Researchers have suggested several IoT-based agricultural solutions that may help farmers increase crop yield while using less human resources. In addition, several IoT-based agriculture initiatives have been implemented to raise the quality and yield of crops. As shown in this section, many IoT-based agricultural approaches have been discovered in the literature. Carnegie Mellon University has been employing wireless sensor technologies to build a plant nursery. Carbon dioxide, humidity, temperature, and light sensing modules are incorporated into a WSN-based polyhouse monitoring system. An innovative WSN-based system that uses GPS technology and ZigBee protocol is suggested that monitors several agricultural factors. To raise production, a real-time rice crop monitoring system has been devised. In addition to collecting rainfall and temperature information, a [Crop Monitoring System] is able to both monitor for and alleviate crop loss, as well as boost crop output. In , a microcontroller that serves as a weather station is used to provide a low-cost monitoring system for temperature, as well as other agricultural parameters. This technology is the most suitable for real-time field data monitoring. Even more disadvantageously, this system's communication range is restricted and smartphones are needed to be Bluetooth-paired to continuously monitor.

ISSUE IN IOT BASED AGRICULTURE

Many IoT-based agricultural technologies need additional security measures. Users often experience many challenges because of their inadequate security levels, including the loss of data and on-field parameters. Because of IoT privacy and security risks, these topics have been studied extensively.

Physical interference such as assault by animals and predators or alteration in physical address put IoT devices at danger in the agricultural industry. More importantly, because of low energy consumption and memory limitations, it is difficult to construct large and advanced algorithms. Those kinds of precision farming services like IoT-enabled location information and location-based services are available to the general public, and therefore they may be used by cybercriminals for capture of devices. Attackers attempt to hack into IoT devices, but have difficulty penetrating cryptographic systems. Other communication levels may potentially be the victims of wireless signal blocking and denial-of-service (DoS) attacks. Stolen sessions, hijacked users, corrupted databases, and DDoS assaults are some of the major cloud security problems.

CONCLUSION

This article has offered a systematic literature review that highlights one kind of research publications from the field of IoT-based agriculture and provides a discussion of the conclusions and conclusions reached. A systematic process was used to locate 67 separate studies for the study. The paper goes on to give a study into various IoT agricultural applications, sensors/devices, and communication protocols. This is the most encouraging piece of information: governments throughout the world are backing this study, and several nations have started to implement IoT agricultural legislation. Aside from this, IoT-based agriculture has put all the core components in perspective. Researchers working in the IoT-based agricultural area have explored possible future developments.

REFERENCES

1. Adinarayana, J., Sudharsan, D., & Tripathy, A. K. (2009). Rinfol - A one stop information system for rural development - A prototype. *ASABE - 7th World Congress on Computers in Agriculture and Natural Resources 2009, WCCA 2009*, 440–446. https://www.scopus.com/inward/record.uri?eid=2-s2.0-72749104945&partnerID=40&md5=e64d082e454bdce4a6b04be48db9db7a

2. Anam, H., Habib, A., Jafri, S. I., Amin, Y., & Tenhunen, H. (2017). Directly printable frequency signatured chipless RFID tag for IoT applications. *Radioengineering*, *26*(1), 139–146. https://doi.org/10.13164/re.2017.0139

3. Fan, K., Gong, Y., Du, Z., Li, H., & Yang, Y. (2015). RFID secure application revocation for IoT in 5G. *Proceedings - 14th IEEE International Conference on Trust, Security and Privacy in Computing and Communications, TrustCom 2015*, *1*, 175–181. https://doi.org/10.1109/Trustcom.2015.372

4. Fan, K., Liang, C., Li, H., & Yang, Y. (2014). LRMAPC: A lightweight RFID mutual authentication protocol with cache in the reader for IoT. *Proceedings - 2014 IEEE International Conference on Computer and Information Technology, CIT 2014*, 276–280. https://doi.org/10.1109/CIT.2014.80

5. Kaur, J., Grewal, R., & Saini, K. S. (2015). A survey on recent congestion control schemes in wireless sensor network. *Souvenir of the 2015 IEEE International Advance Computing Conference, IACC 2015*, 387–392. https://doi.org/10.1109/IADCC.2015.7154736

6. Lee, Y., Kim, J., Lee, H., & Moon, K. (2017). IoT-based data transmitting system using a UWB and RFID system in smart warehouse. *International Conference on Ubiquitous and Future Networks, ICUFN*, 545–547. https://doi.org/10.1109/ICUFN.2017.7993846