ROLE OF IOT IN SMART AGRICULTURE: A REVIEW

Abhishek Kumar Pal, Assistant Professor, Department of Computer Applications, Galgotias University

ABSTRACT

The rise of the global population increases the need for food production. In addition, reducing rural manpower and increasing production prices are now issues in food production. Intelligent farming is a concept for farm management that uses the internet of things to tackle present food production issues. This study employs the suggested reports for systemic reviews to evaluate the available literature on smart farming using IoT systematically. The study seeks to identify key equipment, platforms, network protocols, data processing technologies and the application of IoT-based smart farming to agriculture. The overview demonstrates developments in the manner in which data are handled in recent years. Traditional techniques largely reactively utilise data. New technology breakthroughs have permitted the use of data to avert agricultural difficulties and to increase the accuracy of crop diagnostics in more recent techniques.

KEYWORDS: IOT, Smart Farming, Agriculture

INTRODUCTION

The food production dilemma in the 21st century is more significant as population growth year after year grows. It is anticipated that by 2050 the globe will have between 9,4 and 10,1 billion people living in designated space for food production especially for planting and animals dependent on global biodiversity. Environmental changes induced by human beings might possibly lead to circumstances that may not allow the production of new crops. The increasing urbanisation affects work in generally food-producing regions, raises expenses and affects the sector's production capacity. In this context, smart farming is a novel farm management concept using methods and technology on different levels and sizes of agricultural production, to address food production demand difficulties and to reduce labour numbers. Smart farming, for example, may employ various kinds of sensors to gather and receive data communication networks, which can then be controlled and analysed by information systems management and data analysis solutions. This networked gadget system is generally called the internet of things (IoT). The use of smart agricultural data helps to increase output and reduce waste by enabling the measures to be taken at the proper time, amount and location.

Furthermore, IoT is being promoted by the world's top agricultural producers by establishing incentive programmes and governmental policies to finance research and training[9,10]. Several studies on IoT solutions for smart agriculture have been published in recent years, revealing that this area of study receives

regular fresh contributions and steady improvements. Existing evaluations are mainly focused on subjects such as network technology, embedded platforms, UAVs, network protocols and topologies and cloud platform enabling. For example it focuses on arable farming from 2008 to 2018, reviews communication technology and protocols, data collection and analysis. IoT designs and applications, and emphasises the obstacles and future directions of the deployment of IoT technology in arable agriculture. The review provides the technologies used to communicate and gather IoT smart farming solutions, as well as numerous cloud-based IoT platforms utilised in smart farming IoT solutions. Authors also discuss numerous use scenarios for the IoT applications for smart farming that have been found. The evaluation examines systematically the articles published between 2006 and 2016, classifying them in application areas, such as monitoring, monitoring, logistics and forecasting. Authors have also highlighted data visualisation tactics and technologies for communication and cutting edge computing within these areas. A review of works published between 2010 and 2016 is presented. In order to examine the documents analysed, the authors use a three-tier IoT architecture (perception, network, application) in terms of perception devices, network technology, and applications. This identifies embedded platforms and communication technologies that are employed in IoT solutions and the implementation of IoT solutions. Finally, the examined articles published between 2010 and 2015 show the state-of-the-art IoT solutions for intelligent farming and intelligent farming. Authors rely on three- tier IoT architecture (perception, network and application) for analysis in numerous agricultural fields of application of sensor and actuator devices and Communications technologies, including agriculture, food consumption, animal agriculture.

SMART AGRICULTURAL

Smart agriculture may be described as using additional technology to agricultural production practises in order to decrease waste and increase output.

Intelligent farms utilise technical resources that are used in several production phases such as plantation monitoring, soil management, irrigation, pesticide control, delivery tracking, etc. Temperature, light, humidity, pressure, ground concentration chemical, unmanned flying machines, video cameras, agricultural information management systems and global positioning systems (GPS) are among these resources, as well as communications networks. Figure one shows the process of Smart Farming and.

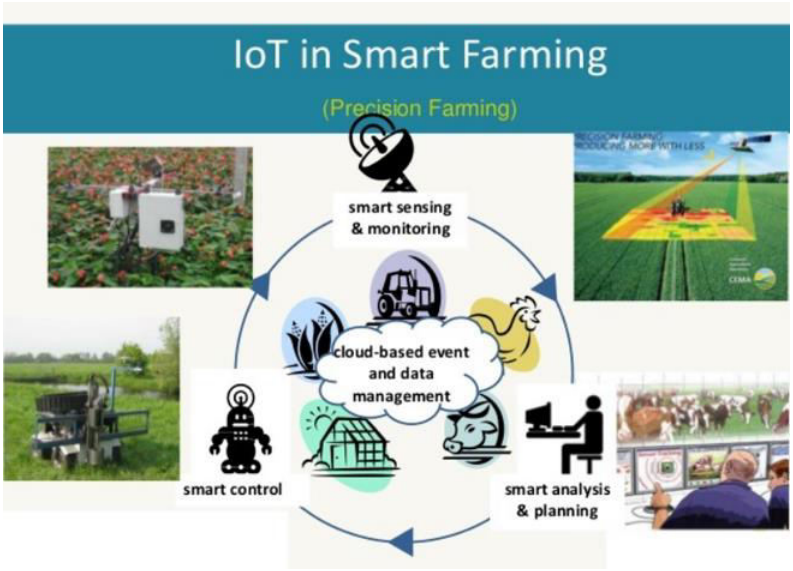

Fig.1 IoT and Smart Farming

Source: https://www.arcweb.com/blog/iot-steps-smart-farming-precision-agriculture

The integration of technology resources into the process of agricultural production is a major concern. The agricultural precision market is estimated to generate a revenue of US$10 billion in 2023 and will provide chances to technology suppliers, agricultural equipment and machinery suppliers, farmers and other stakeholders. In addition, smart farms are projected to be able to maximise food production by optimising nutrient application in soil, lowering pesticide quantities and irrigation water use.

IoT

IoT may be seen as a network of intelligent networked devices able to communicate with each other and generate useful environmental data. Virtually any equipment that is able to connect to the Internet, such as home appliances, electronics, furniture, agricultural or industrial gear, and even individuals may therefore be called a "thing" in IoT. While the IoT idea has not been new, its adoption has increased in recent years, largely due to the development of technologies supporting it. This includes improvements in hardware connectivity with the Internet and between devices, via wireless connection, cloud computing, artificial intelligence and big data, with the resulting reduction in size and power consumption. All these technical components enable to develop a network of devices that can share data and information and operate actively on the basis of network inputs.

Accordingly, IoT system design resembles the design of conventional computer systems; however, it must also take into consideration specific features such as restricted device computing capabilities, device identification, distant objects detection and control.

CONCLUSION

This article conducted a comprehensive analysis of smart agriculture's state-of-the-art IoT adoption and highlighted key components and applicability. In recent works, this review showed a shift in the treatment of

data: while previous work has shown that most decision support systems are using simple processing mechanics to manage data collected in real time, recent work has shown that an increasing number are managing systems using complementary technologies. On cloud and Big Data computing for enormous data processing. In addition, this research noted that the employment of artificial intelligence and image processing methods to enhance the management of intelligent farming has become increasingly frequent in recent work. It has been noted amongst the listed IoT applications for smart farming that the most prevalent use is crop monitoring. This research also indicated that many network protocols may be utilised concurrently in IoT systems for smart agriculture. Moreover, a comparison of kinds of network connections in IoT solutions for intelligent farming has found that wired networks are employed in inside settings (e.g. greenhouses) (e.g., arable lands, orchards). Moreover, the review covered in this paper implies that IoT technologies are increasingly relevant to smart agriculture. This evaluation may be extended by integrating more relevant papers and a supplemental project cost analysis, usability and geographic problems fundamental to IoT applications. The analysis of edge- and fog-based computing use in smart agricultural activities could also be important for future research to address challenges associated with traditional centralised cloud solutions such as high communication latencies, lack of real-time reaction support to detected events, wide bandwidths, etc.

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