Agricultural Reviews, 39(4) 2018: 338-340
Print ISSN:0253-1496 / Online ISSN:0976-0539

AGRICULTURAL RESEARCH COMMUNICATION CENTRE
www.arccjournals.com

Internet of things in agriculture: A review

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Received: 17-08-2018 Accepted: 19-12-2018 DOI: 10.18805/ag.R-1836

ABSTRACT

Agriculture, farming or Animal husbandry is a vital occupation since the history of mankind. The name agriculture represents all entities that came under the linear sequence of links of food chain for human beings. As humans are the smartest living species on this planet, so their smartness always provokes them to change and to innovate. This provoking has led to invention of wheel, advancements in living standards and styles, languages, life spending methodologies and countless more achievements. As we know in present era there is need of soil and temperature monitoring system which is based on the technology of Internet of things. Similarly some time due to extra water level those crops are under danger our condition so for those type of issues there is need of soil moisture and environmental temperature monitoring system so by using of that system farmer can take decision for their crops. Right now there is some technology are available which are based on GPRS but according to us GPRS is not a good solution because GPRS technology have some connectivity issue.

Key words: Internet of things, Precision agriculture, RFID technology, WiFi, WSN.

INTRODUCTION

Internet of things: Internet of Things (IoT) is a broad term that describes the interconnection of different daily life objects through the internet. In the concept of IoT every object is connected with each other through a unique identifier so that it can transfer data over the network without a human to the human interaction. IoT has referred to as a network of everyday objects having ubiquitous computing. The ubiquity of the objects has increased by integrating every object with embedded system for interaction. It connects human and devices through a highly distributed network. IoT is basically the world wide interconnection of devices. The aim of IoT is to connect every person and every object through the internet. In IoT, every object is assigned a unique identifier, so that every object is accessible through the internet. The IoT is evolving, growing and becoming popular day by day; in the today's world, around 5 billion objects have been connected through the internet.

In 2020, it is estimated that near about 50 billion objects will be connected to the internet. IoT is providing tremendous opportunities for novel applications, which is now widely used in many aspects of life such as intelligent home monitoring system, products supply chain management, precision agriculture and much more.

ENABLING TECHNOLOGIES FOR IOT

Internet of things (IoT) is a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies. With the Internet of Things the communication is extended via Internet to all the things that surround us. The Internet of Things is much more than machine to machine communication, wireless sensor networks, sensor networks ,2G/3G/4G,GSM,GPRS, RFID,WI-FI,GPS, microcontroller, microprocessor etc. These are considered as being the enabling technologies that make "Internet of Things" applications possible.

Every object in IoT is addressable, recognizable, readable and locatable through the internet by using RFID (Radio Frequency Identification), Wireless Sensor Network (WSN) or other means. The concept of IoT is using many in different domains such as; precision agriculture products supply chain management, Smart Grid, environmental monitoring, cloud computing and many more. IoT is gaining much importance these days as every object in the network will become a computer. The idea of IoT has become successful due to the invention of recent technologies like sensors, RFID and WSN.

Ji-Chun Zhao *et al.*, (2010) studied the applications of IoT in agriculture. The authors proposed a monitoring system based on internet and wireless sensor networks. An information management system was designed to provide the data for research in agriculture. The authors developed software for monitoring of the fields like data acquisition about the fields, data processing models, and system configuration module. The developed application provides accurate control for the monitoring of the green house.

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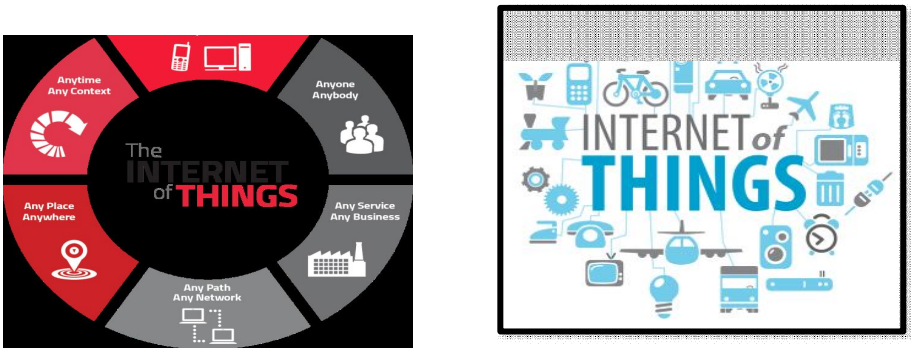

Fig 1: Internet of things.

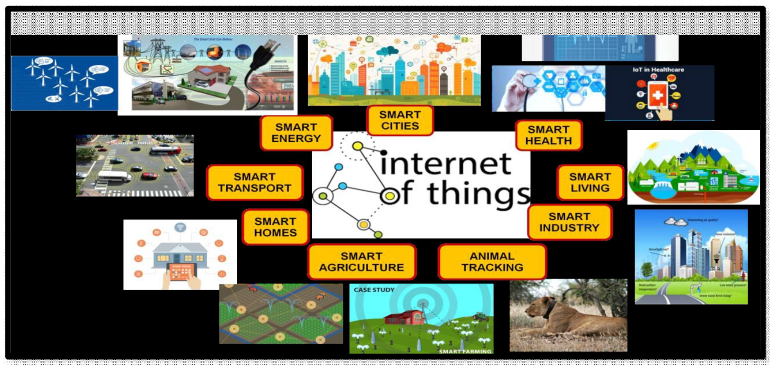

Fig 2: IoT applications.

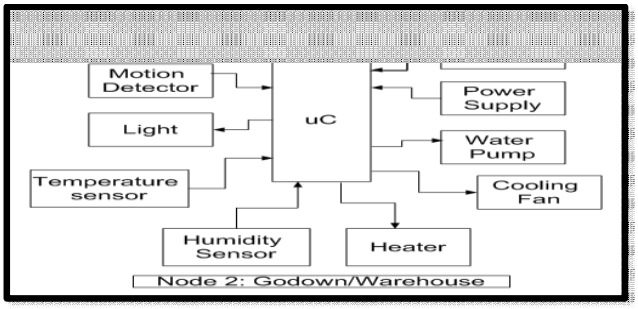

Fig 3: Sensor node.

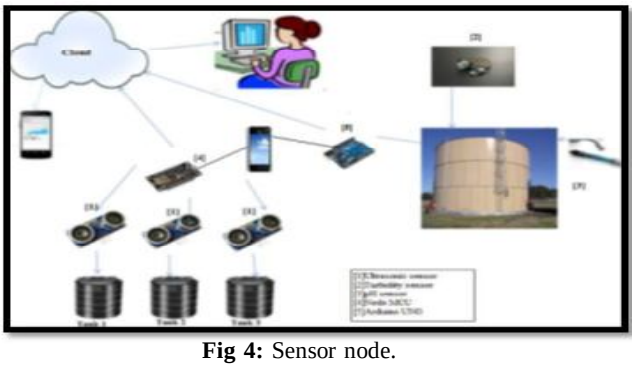

Fig 4: Sensor node.

Agrawal and Lal Das (2011) discussed the possible future applications and challenges faced by the IoT technology. They presented some key challenges in IoT applications such as: standards, privacy, security, authentication and identification, trust and ownership, integration, coordination, and regulation. They stated that the use of RFID (Radio Frequency Identification), Wireless Sensor Network (WSN) and mobile communication technologies would reduce the gap between theoretical and practical implementations of IoT applications.

Hussain *et al.*, (2012) proposed the application of Internet of Things (IoT) technology in animal stock chain management. By using the RFID technology, anyone can be tracked or monitored. They discussed some operational principle of IoT. RFID technology is used for the unique identification of objects; each object in the RFID is labeled with EPC code. The authors proposed the use of this technology for maintaining all records for livestock management.

Vani and Rao (2016) concluded monitoring and measurement of agricultural parameters in real time are crucial for developing the agriculture. Designed and developed a system for monitoring and measurement of soil moisture using Cloud IoT and Android system. The system was tested under laboratory conditions. The device is to record the real- time data using Cloud technology and Blynk application on Mobile system. Using mobile computing technology the person can observe the data anywhere and can react quickly based on the soil moisture.

Thinagaran Perumal, and Md Nasi (2015) presented "Internet of Things (IoT) Enabled Water System". They implemented "water monitoring system using IOT" for real time scenario. This resolution is of low cost which includes

system of integrated sensory that permits inner observation for quality of water. Using Internet, relevant and warning data are transferred to a cloud server and these data can be received by user terminal which are owned by consumers. The water measurement's end result is shown on cloud. A Thing speak as a segment of alert system is integrated also. This type of organization can be utilized fairly effectively by residential users as by industrial users or more water utilities. By using Internet of Things this type of organization can give early alert system for potable water quality.

Divya Kaur (2016) presented a paper on "IoT based Water Tank Control system "for prevent the water wastage. Making a control system to automatically control the water pump requires careful observation of what people do as their daily activity to make sure that the tank is full. In almost all over India every state has a State Water Supply body which is responsible for development and regulation of water supply in state. Due to scarcity of water the release of water is controlled and done at certain time(s) in a day. So this paper is aimed at presenting the project in embedding a control system into an automatic control system into an automatic water level controller using wi-fi module.

Rawal. (2017) designed system to monitor moisture levels in the soil. The proposed system can be used to switch on/off the water sprinkler according to soil moisture levels thereby automating the process of irrigation which is one of the most time consuming activities in farming. Agriculture is one of the most water-consuming activities. The system uses information from soil moisture sensors to irrigate soil which helps to prevent over irrigation or under irrigation of soil thereby avoiding crop damage. The farm owner can monitor the process online through a website. Considerable development in farming with the use of IoT and automation. Thus, the system is a potential solution to the problems faced in the existing manual and cumbersome process of irrigation by enabling efficient utilization of water resources.

CONCLUSION

The Internet of things (IoT) and WSN are significant technologies in the 21st century which has rapidly developed covering hundreds of applications in the civil, health, and agriculture areas. New innovative IoT applications can be developed to increase the quality, quantity, sustainability and cost effectiveness of agricultural production. The internet of things offers new solutions for improving water resources monitoring and management, to maximize efficient use of precious resource.Provide real time data and accurate.

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