



# Internet Of Things: Application Of Iot In Agriculture And Key Challenges

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**Abstract:** The evolution of internet has changed the life of human beings drastically. Now we cannot imagine our lives without internet. The Internet of Things (IoT) can be considered as future internet which will change many things. In this paper we have discussed what is IoT and how it can be used in agriculture to improve the yield to fulfill the needs of growing population. Also we will discuss the key challenges to be faced in Agriculture.

**Keywords:** Internet of Things, IoT, Agriculture, RFID.

## Introduction:

### What is IoT?

Today the Internet has become ubiquitous, has touched almost every corner of the globe, and is affecting human life in unimaginable ways. We are now entering in an era of the “Internet of Things” (abbreviated as IoT) .

The Internet of Things (IoT) is a paradigm in which smart objects actively collaborate among them and with other physical and virtual objects available in the Web in order to perform high-level tasks for the benefit of end-users. In IoT intelligence is embedded in devices. These “smart” devices have the ability to interact with humans and other smart devices, as well, which led to the development of “Internet of Things” (IoT). The phrase "Internet of Things" (IoT) was coined at the beginning of the 21<sup>st</sup> century by the MIT Auto-ID Center with special mention to Kevin Ashton (Ashton 2009) and David L. Brock (Brock 2001). The IoT has added a new potential into internet by enabling communications between objects and human, making a smarter and intelligent planet. This has led the vision of “anytime, anywhere, anyway, anything” communications practically in true sense. The rest of the paper is organized as follows. Section II gives the brief introduction of architecture used in IoT. Section II describes how IoT can be used in Agriculture. Section III presents the functions of IoT in Agriculture. Section IV describes the key challenges in design and implementation of IoT in Agriculture. Finally, Section V concludes the paper.

## Section II - IoT in Agriculture:

The IoT is changing the agriculture system with social and economic aspects.

As the human population continues to grow drastically as world population is predicted to touch the heights of 9.7billion by 2050. IoT is creating ways to manage and respond to the expanding food demands. The latest technology in which small wireless sensors are placed at the farm which are connected to cloud through Gateway. With this it is possible to monitor various agriculture parameters remotely instead of visiting the physical farm. A variety of sensors which placed at the farm can be used to get enormous data securely, and the collected data can be and sent to the server using different transmission media.

Internet of Things aims to increase the productivity, to minimize the waste and to effectively get rid of pests. With a well-planned matrix of strategies embedded in the connected devices, Internet of Things in agriculture can provide a leap towards catering to the needs of a constantly expanding population.

## Section III- Function of IoT in Agriculture :

1. **Soil Monitoring** - Soil is the main part of land on which productivity of crop depends. Basic parameters of soil need for increasing productivity like moisture , humidity, temperature, nutrients , pH balance, etc. can be monitored continuously.
2. **Disease Controlling** – As the crop grows there is possibility of attack by various insects which can damage the whole crop. Sensors can detect the disease in the crop and alert the farmer to spray pesticide on time.
3. **Agriculture Information System (AIS) Management.** Enabled by the global connectivity of the IoT, all the agriculture information can be collected, managed, and utilized throughout the entire value chain
4. **Water Management:** Proper water at proper time is most important for crop yield because it doesn't mean that large amount of water can increase crop production, it is not true. Over watering can damage the crop. So Smart irrigation reduce over-watering, providing optimal moisture to the landscape

## Section IV- Key challenges

India is an agricultural country. Most of the population depends on the agriculture. IoT in agriculture is in its infant stage. Improving the efficiency of agriculture is one of the most urgent need for today's growing population . There are many obstacles in applying IoT in agriculture. To begin with the main problem is the internet connectivity and availability in rural areas is one of the major challenges. Security and privacy of collected data from various edge nodes devices is the main concern. Third one is the lack of awareness about internet in farmers due to illiteracy .

There are various architectures proposed for IoT but there is lack of standardization, reliability, Quality of Service (QoS) and interoperability.

## Section VI- Conclusion:

This paper introduces the Internet of Things in Agriculture field. It describes the evolution of internet of Things, Fundamental architecture of IoT, which parameters of agriculture can be measured and improved using IoT.

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