# Chapter 12
# Smart Agriculture Using WSN and IoT

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## ABSTRACT

*In India, the agriculture sector has an adverse effect and day by day the crop production is getting reduced. So, it is important to identify and implement a solution for the problem in order to increase the production. Smart technologies are introduced in this domain to improve the agriculture industry. The technologies like IoT, big data, cloud-based services, and GPS are gaining its importance in the field of agriculture. There is a rising need due to the requirement of higher precision in crop analysis, transformation of live data from the field and automated farming techniques for further improvement. The expected result of this is to have smart agriculture industry with the implementation of these smart techniques. In this chapter, the authors have discussed the challenges and benefits of IoT and various types of sensor for data acquisition.*

## INTRODUCTION

The smart devices are used for smart agriculture and the limitation to use it are its high cost and less alertness regarding the latest technologies among the farmers. The increase in the cost involves the usage of smart devices, and thus increasing the overall price of the end product which limits the farmers in adaption of new technologies. To increase the productivity of food products in the global market and

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to reduce human work load, time and cost farmers can easily migrate towards Internet of Things. Traditional approach in measuring the climatic factors manually are done and being checked every day. IoT technology is very efficient and reliable helps in gathering information these climatic conditions like climate, humidity, temperature level and fertility of soil. IoT provides online Crop monitoring system helps a farmer to connect with farm from remote at any time. Wireless sensor networks integrated with micro controllers are used for monitoring, automating the process and to control the farm processes. Now a day, there is large number of enhanced technologies with different tools and techniques make agriculture sector to work efficient. IoT integrates many devices to transfer the collected data into information without human intervention. Challenges in the field of agriculture start from the initial stage of cultivating the crops in the farm till the distribution of the crop to the consumer with the best possible price. Agriculture is the most important field for the development of a country.

Climatic changes and unstable rainfall due to global warming are affects the cycle of agriculture for the past decades. Following the traditional methods still decreases the production of raw materials gradually. Due to these effects in recent years, many smart technologies are combined to form a technique called smart agriculture which is been adopted by Indian farmers recently. Technologies like IOT (internet of things) integrate wireless sensor networks for remote monitoring to help large amount of applications to give its output more quickly and accurately. Developing countries like India are in situation to migrate new technologies and implementations for the quick production of food resources. Many projects are implemented in wireless sensor network which gather data by different sensor devices connected to several nodes and send it back through the wireless protocol. Environmental factors are predicted based on the collected information. Measuring and monitoring these environmental factors can help to predict the climatic condition but will not provide the final solution to improve the production of crops. There are large numbers of other aspects may drop the productivity to a larger extent. In order to eradicate the problem an automated system should be developed in field of agriculture. So, to provide a clear answer to such a complex problem, it is essential to implement an integrated model which takes care of all climatic features influencing the productivity in all stages. But there are difficulties in implementing a complete automation model in agriculture due to various technical issues since the data obtained are dynamic and subject to change. Though many research is done, no product is developed to provide it as a solution to the farmers to get aided. IoT has been incorporate with next massive thing in Internet (Olakunle et. al, 2018). This special aspect features and emerging prior services, IoT architecture, protocol and applications.

IoT provides a combination of various sensors and objects that can speak directly with one another without human interaction. The Things in the IoT incorporates physical devices, such as sensor devices, which observes and gathers all types of communities. The zenith rises of the IOT led to the consistent global connection of people, sensors, objects and services. Since time immemorial, human being has different traditional techniques in growing crops according to the requirement and financial structure. There are different methods of agriculture that depends on variety of attributes like weather, soil, temperature, moisture. There are two important techniques used in traditional farming namely shifting cultivation (slash and burn) and nomadic herding. Semi commercial systems comprises of rice based, root crop based, grain legume based, agrisilvicultural, silvopastoral and agrisilvopastoral methods. The knowledge about the smart farming and integration (L. Dan et. al, 2015) of different methods are done for improving the performance in crop production over time lead to the development of the country in agriculture field.

Commercial systems also include plantations, agro forestry and ranching. With new development of internet people can get connected to one another through internet but advancement in technology like

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