Chapter 6
IoT and Its Real-Time Application in Agriculture

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ABSTRACT

In the 21st century, we are standing among a plethora of technologies and tools that prove the concepts of real-life applications. One such example is the internet of things (IoT) that uses sensor technology for communication. IoT is the network of physical devices that is used in various applications such as vehicles, home appliances, and telecommunication that are used to exchange data. In this chapter, the authors proposed the theoretical framework for IoT-based farming. The major challenge in farming is to deliver the product at the best possible price and quality to the end consumers. Now, in the current scenario, only 50% of the farm produce is reaching the consumer due to wastage of products, high cost, and local black marketing. The work is to focus on providing the solution based on past data analytics and current market conditions, which will help to reduce the cost and provide a minimal price to the farmer. The IoT is used for data collection, which will help to reduce the middle hops and agents between the farmer and consumer.

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INTRODUCTION

The Internet of Things (IoT) is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software sensors, actuators, and connectivity which enables these objects to connect and exchange data (Poulter & Cox, 2021). The IoT device is a piece of hardware with a sensor that transmits data from one place to another over the internet. There are various types of devices includes wireless sensor software, actuator, and computer devices. They can be embedded into mobile devices, industrial equipment, environmental sensors, medical devices, (etc.). The use of IoT devices transfers the data from one place to other with the potential provider insights that lead companies to cost reduction, efficiency gains, and new business opportunities. There are various IoT hardware is present to collect the data and it can detect the changes in an environment (Sinha et al., 2021). A sensor can measure a physical phenomenon (like temperature, pressure, etc.) and transform it into an electric signal. The sensor requires some basic requirements for a good sensor such as (i) It should be sensitive to the phenomenon that it measures, (ii) It should not be sensitive to other physical phenomena, and (iii) It should not modify the measured phenomenon during the measurement process. There are different sensors are present such as (i) Temperature Sensor, (ii) Pressure Sensor, (iii) Proximity Sensor, (iv) Accelerometer and Gyroscope Sensor, (v) IR Sensor, (vi) Optical Sensor, and (vii) Gas Sensor. Here RFID tag sensors will be used to recognize objects and collect real-time information. In agriculture, the sensors are used to monitor the chemical fertilizers, allows the soil to recover its lost nutrients, and allows better use of natural resources such as light, soil, air, water. Each thing is uniquely identifiable through its embedded computing system but it can interoperate within the existing Internet Infrastructure. The Internet of things has consisted of three main components:

1. The things (or assets) themselves.
2. The communication networks connecting them.
3. The computing systems make use of the data flowing to and from our things.

IoT is the technology that forms the basis of the new world that we will come to inhabit. Anything in the physical realm that is of interest to observe and control by people, businesses, or organizations will be connected and will offer services via the Internet. The physical entities can be of any nature such as buildings, and farmland and the resources like air, and water are connected with the IoT technologies (Jaihind et al., 2019). There are several real-world concepts such as hiking, route finding, and weather forecasting, (etc.) that require IoT devices. The term IoT is defined as the system that is built for bigger things rather than smartphones and wireless devices that are connected by communication infrastructure with a range of software and work according to the sensed environment without human intervention (Sinha, & PriyaDarshani, 2021). These applications had wide use in Climate Science, Neuroscience, Environmental Science, Precision Agriculture, Epidemiology/ Health care, Traffic Dynamics, Crime data, (etc.). These applications need sensor networks to collect data for the necessary analysis and prediction. The use of the internet of things in smart agriculture is one of the research areas because it refers to the use of cameras, sensors, and other devices wherein every action has done corresponds to related data (Patil & Kale, 2016). India's start-up ecology is the 3rd largest technical initiative that is based on the ecology of world data. There are about 60% to 65% of start-ups are present in Indian uses the IoT system and among that 70% of them are not even more than 7 years old. These start-ups focus on the customers as well as agricultural and industrial areas. The Industrial sector contributes 31% of the Indian GDP