IoT and AI-Based Smart Solutions for the Agriculture Industry

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Abstract

This chapter's goal is to review how the IoT smart application solution impacts the agricultural industry around the globe. IoT needed to be implemented in the agricultural industry to increase the efficiency of agricultural methods and escalate production to serve the high demand. Implementing the IoT technology will facilitate agriculture to measure and provide accurate data with various parameters like solar intensity, weather, precipitation temperature, soil moisture, and macronutrients in the soil. This chapter will explore the latest trends in IoT agricultural applications, discuss limitations of traditional agricultural methods, current challenges in the agriculture industry, and real-world examples of IoT in agriculture such as IoT in plant and animal environmental monitoring, smart water irrigation animal, and plant life data monitoring. The final part of this chapter discusses the advancement in IoT technology using drones and finally shows the roadmap for IoT implementation in agriculture.

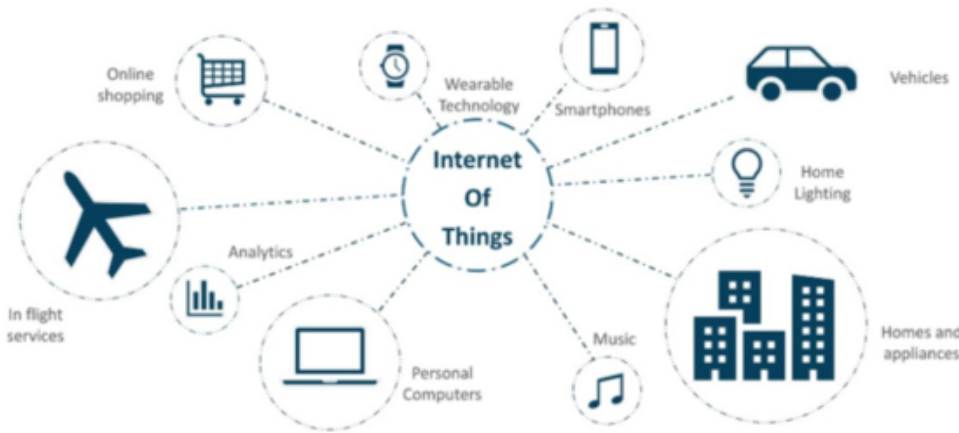Chapter Preview

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Introduction

The term "agricultural Internet of Things" (IoT), describes an interconnection where different agricultural digital assets, including physical ones like plants and animals, environmental elements, production tools such as sensors and so on, are interconnected using the agricultural data perceiving devices using defined protocols with the internet.. the aim to make agricultural processes and items intelligently identifiable, positioned, tracked, monitored and managed (Xu et al., 2022), (Suo et al 2012). Agricultural IoT's "human-machine-things" linkage enables more sophisticated and dynamic human recognition, management, and control of numerous agricultural aspects, processes, and systems. It greatly improves farmers' comprehension of the critical facets of the lifecycle of farming animals and plants, aids in the management of sophisticated farming techniques, and helps farmers deal with crop issues. (Deshpande et al., 2021; M. Shafiq et al., 2021).

The IoT will only support the future of smart technology. Current "Traditional Technology" in homes and offices is being transformed into "Next Generation Everywhere Computing" via the IoT. IoT is becoming increasingly significant, particularly in the field of contemporary wireless communications (Nayyar & Puri, 2016; Kok et al., 2020). IoT is currently having an impact on people all over the world, and from the viewpoint of a regular user, it is laying the foundation for the development of a wide range of items, including smart automation, smart healthcare, smart buildings, and smart educational institutions. As seen in Figure 1, it is also employed commercial production, shipping, farming, and business management are just a few of the sectors (Doshi et al., 2019), (Khan et al., 2020).

Figure 1. IoT application in every field
(https://igiprodst.blob.core.windows.net:443/source-content/9781668463611_301208/978-1-6684-6361-1.ch012.f01.png?sv=2015-12-11&sr=c&sig=u6aUUSugEC%2F%2B%2FLAIMHP%2FyqDMJTAW2YU6uix20tgt6TM%3D&se=2024-02-19T02%3A18%3A21Z&sp=r)
Source: Doshi et al. (2019)

The Food and Agricultural Organization of the United Nations (n.d) estimates that by 2050, the food supply must increase by 60% to feed the increasing global population, which would be projected to surpass 9 billion people. Agriculture must use IoT to efficiently use cropland as well as other resources, which seem to be sometimes in short supply, to feed such a large population. Because of unforeseen weather circumstances brought on by global warming, farmers are experiencing enormous losses; however, the IoT Innovative Farming tool will help them take immediate action to avoid this from occurring.

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