# Chapter 14
# Green and Smart Irrigation: Farming Inspiring Internet of Agricultural Things (IoAT) and Blockchain

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## ABSTRACT

*Smart agriculture is an advancement centered on utilizing information and communication technology within machinery, equipment and sensors to supervise farms through network-based systems. IoT and cloud computing are likely to fuel expansion and announces robots and artificial intelligence in farming practices. These pioneering shifts are disrupting traditional agricultural methods and come with various challenges. The goal of green farming is to deliver the agricultural industry with the foundation it uses cutting-edge technologies like big data, cloud computing and the Internet of Things (IoT) to track, monitor, automate and analyze activities. Its importance is increasing as a result of things like the expanding world population, the need for more climate-resilient agriculture, the adoption and sophistication of information and communication technology, the increasing demand for higher crop yields, and the efficient use of natural resources.*

## 1. INTRODUCTION

There are many nations rely heavily on agriculture for their economic growth which accentuates the need of excellently handling water resources for plants, crops and maintaining agricultural land (Torky & Hassanein, 2020). With remote sensing techniques progressively integrating with IoT devices to provide

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autonomous operations through the communication and data aggregation capabilities of sensors, sensor systems are essential to the implementation of precision agriculture (Saba et al., 2023). Real-time sensor situations are utilizing machine learning approaches expanding the applicability of these techniques beyond agriculture to include transportation, healthcare, military operations, mobile phones and home appliances (Awan et al., 2020).

In contemporary agriculture, fields can be monitored by robots and drones, while temperature and moisture sensors can be automated to cater to the specific requirements of crops. There are various systems and devices contribute to making farms more efficient, environmentally conscious and economically viable (Mohanty, 2021). The adoption of precision agriculture, encompassing these technologies which provide notable benefits. The globe is constantly seeing incredible advancements in technology and the agricultural sector is no exception. The demand for food and agricultural goods rises in in agriculture becoming a transformative force which reshaping traditional agricultural methods and establishing sustainable approaches that are more productive and efficient than traditional cooking methods (Bapatla et al., 2021).

## 1.1 Background of Study

The farmers benefit from IoT-based solutions that increase productivity and lower yield costs in the modern. With combining cloud platforms and contemporary wireless communication technologies, smart agriculture is advanced and has the ability to increase production efficiency and product quality. Though, a dependable and long-lasting strategy that includes sensing, identification, transmission, monitoring, and feedback capabilities is needed to accomplish agricultural activities successfully (Noor et al., 2023). In order to ensure network integrity and carry out genuine tasks in a dispersed fashion, secure technologies are essential. To enable effective and lightweight communication paradigms, agricultural systems must include strong machine learning model functions. Even though agriculture uses over 80% of all the water in the agricultural sector worldwide, traditional irrigation techniques and low water usage efficiency between 35% and 40% from poor management provide significant barriers to sustainable crop production in drylands. This is made worse by the fact that, in comparison to other economic sectors, irrigation in agriculture yields a poorer return per unit of water used (Cheema et al., 2022).

## 1.2 Objectives of this Chapter

The objectives of this chapter are to explore the potential of integrating Blockchain and the Internet of Agricultural Things (IoAT) into a smart irrigation system to address groundwater scarcity and promote sustainable farming to:

- overview of the challenges associated with groundwater scarcity in agriculture.
- explain the concept of smart irrigation and its role in addressing the issue.
- explore Blockchain and IoAT technologies and their applicability in agriculture.
- discuss the benefits and potential challenges of integrating these technologies.
- insights into the future of sustainable farming practices.