


# Chapter 1

# Future Trends in IoT, Control Systems, and Remote Sensing Integration for Precision Agriculture

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## **ABSTRACT**

*This chapter discusses how IoT and remote sensing are revolutionising precision agriculture through the provision of real-time information to inform the management of crops and other resources. Specifically, this chapter explores the main technologies with focus on how they have been adopted within contemporary agriculture production systems. New technologies like, IoT sensors, satellite, UAVs, and LiDAR are helping farmers to keep an eye on the condition of the soil, status of crops, and the prevailing weather condition at a given time; in this way productivity is increased, resources are not wasted, and the environment is kept sustainable. The chapter discusses these technologies from a developmental perspective, from the early rudimentary uses to the sophisticated types of the current generation and then show how these technologies can transform farming. However, the prospective of applying big data has its limitations; they include the following: high initial costs, data integration problems and limited technological access in developing regions.*

## **INTRODUCTION**

### **Contextual Overview**

Precision agriculture (PA) means the practice of production management in agriculture with the help of technology to make improvements in resource utilization in crop production. It blends satellite imagery, sensors, and automated machinery to control field variability in crops, soil and climate in the farm field. The objectives of PA are the increase of yield, the reduction of consumption, the avoidance of impact and the question of the global demand for feeding. The current status of farming have been pressed to the limit of conventional farming by increasing global population and shifting climate patterns which has enhanced the use of smart farming (Sharma, Mishra, & Srivastava, 2023). New technologies such as IoTs and remote sensing more importantly have revolutionized agriculture by enabling the monitoring and managing of the farmlands. These technologies assist farmers in the decision-wise farming, accurate crop management, effective use of water for irrigation, and timely interference of pests & disease control. Since farmers rely on data science for enhancing production, there are effects like water use efficiency (Singh, Berkvens, & Weyn, 2021), low chemical usage, and soil health, which are important targets for the production of food in the future.

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