

A Review On: Advancing Sustainable and Smart Farming Practices, A Comprehensive Exploration of IoT and Sensor Technologies in Agriculture

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Abstract: *Agriculture, which is critical to global livelihoods, is undergoing a significant transformation due to the incorporation of modern technologies, most notably the Internet of Things (IoT) and artificial intelligence (AI). This study investigates the critical role of IoT in enabling real-time data collection through networked devices equipped with sensors and actuators. With these instruments, key environmental elements such as soil moisture, temperature, and crop health may be monitored precisely. In contrast, AI improves agriculture by allowing for intelligent decision-making via data analytics, predictive modeling, and automation. This study comprehensively investigates how IoT and AI influence precision agriculture, with the goal of optimizing all aspects of farming to increase output while decreasing resource inputs. Efficiency case studies show tangible benefits for farmers, such as greater yields and more efficient resource management. However, challenges such as initial installation costs, concerns about data security, and the need for increased education and training are recognized. Furthermore, the study examines future improvements, predicting the ongoing evolution of IoT and AI technologies and their seamless integration into agricultural practices. To summarize, this study highlights the revolutionary potential of combining IoT and AI in agriculture, underlining the importance of widespread adoption in maintaining sustainable and resilient farming systems, particularly in light of rising global food demand*

Keywords: Sustainable farming, smart farming practices, Agricultural technology, and Precision agriculture