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(57) Abstract :

The present invention relates to a comprehensive smart orchard management system that integrates Internet of Things (IoT) sensors with autonomous drone technology for efficient agricultural operations. The system comprises a network of wireless sensor nodes deployed throughout the orchard to monitor environmental parameters including soil moisture, temperature, humidity, light intensity, and nutrient levels. An autonomous drone equipped with multispectral imaging cameras, precision spraying mechanisms, and real-time data processing capabilities performs aerial surveillance, crop health assessment, targeted pesticide application, and fruit harvesting operations. The system employs machine learning algorithms for predictive analytics, enabling early detection of plant diseases, pest infestations, and optimal harvesting times. A centralized cloud-based platform processes and analyzes collected data to provide actionable insights to orchard managers through a user-friendly mobile application interface, thereby optimizing crop yield, reducing operational costs, and promoting sustainable agricultural practices.

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