Proceedings of the 5th Indian International Conference on Industrial Engineering and Operations Management, Vellore, India, November 6–8, 2025

Proceedings of the International Conference on Industrial Engineering and Operations Management

Publisher: IEOM Society International, USA DOI: 10.46254/IN05.20250297
Published: November 6, 2025

IoT-Enabled Smart Irrigation for Enhanced Water Management and Climate Resilience

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Abstract

Taking into account the impacts of climate change and the immediate issues in sustainable agriculture, this project

aims to tackle both challenges, proposing a Smart IoT Greenhouse and Irrigation System for improved climate, plant growth, and water efficiency. Such a system automates aspects of irrigation based on real-time climate information and soil moisture levels. The system predicts rainfall using weather data APIs, and weather dependent irrigation logic halts irrigation if rain is expected subsequently saving water. Irrigation is activated post rainfall, if the soil moisture content assessed through sensors is found to be low, and aims to cater to the plant's needs. Furthermore, the project looks into the problem of insufficient sunlight during the rainy season. The system uses light sensors to detect low light and turns on artificial lights automatically to sustain optimal greenhouse photosynthetic activity and real-time update. Through IoT sensors, predictive analytics, and automated system responses, modern agriculture can be considered smart, scalable, and efficient, enabling the designation of IoT as the system's backbone. This proposed solution reduces water consumption, improves crop yield, and strengthens resilient approaches to sustainable farming under uncontrollable weather conditions.

Keywords

Smart Agriculture, IoT, Climate-Resilient Farming, Smart Irrigation, Soil Moisture Sensors, Weather Prediction