

Abstract

EcoSense: A Smart IoT-Based Digital Twin Monitoring System for Enhanced Farm Climate Insights [†]

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The convergence of digital technology and agriculture has given rise to innovative solutions aimed at augmenting productivity, sustainability, and efficiency in agriculture. One transformative idea that has garnered significant attention is the “Digital Twin” (DT), transcending boundaries and finding applications in various sectors, including agriculture. This contribution introduces the design and implementation of a Smart IoT-Based Digital Twin Monitoring System that gathers real-time Total Volatile Organic Compounds (TVOC), signifying the total concentration of volatile organic compounds present in the air, contributing to indoor air pollution. Equivalent Carbon Dioxide (eCO₂) provides an indication of the amount of CO₂ in the air. Noise pertains to unwanted or disruptive sound in the environment. Humidity denotes the amount of water vapor present in the air. Temperature is a measure of the warmth or coldness of the air, water, or any substance. Its monitoring is crucial in various applications, including climate studies, weather forecasting, and industrial processes. Air Quality pertains to the state of the air in the environment concerning the presence of pollutants, particulate matter, and other substances. Its monitoring is essential for public health and environmental protection. The collected data are sent to the cloud for storage and analysis. This climate information is indispensable for the farmer to make informed decisions at the opportune moment, take actions based on the gathered data, and predict crop yield. Our intelligent system has the potential, in the future, to make decisions and manage automatic irrigation using solenoid valves based on the real-time collected data.

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