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| **Title:** | IoT-Based Real-Time Data Monitoring of a Green House Farm with Offline Monitoring Capability | | |
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| **Abstract:** |  |
| Greenhouses have transformed modern agriculture by precisely managing the environmental conditions of delicate plant species to promote crop growth. A conceptual and practical framework for a low-cost greenhouse farm monitoring system has been proposed in this paper to track real-time data on greenhouse farms with online and offline both monitoring capabilities. The Internet of Things (IoT) technology has been used to develop a system prototype, which uses two sensors to collect data on environmental factors, including temperature, humidity, heat index, and soil moisture. An ESP32 microcontroller module collects and sends this sensor data to a Raspberry Pi 4 microcomputer, which displays it on a web application. The application is hosted on a local Raspberry Pi server and built with Node.js, a JavaScript runtime environment. The communication between ESP32 and Raspberry Pi is established with REST API (Representational State Transfer Application Programming Interface), a way to connect applications and components in microservices architectures. A highly robust PostgreSQL-based database is used to store the data in Raspberry Pi, which allows the collection of farm data locally without having to connect to any web storage. With an internet connection, data can be monitored from anywhere worldwide using a global server made of Vercel, a cloud-based platform that can host websites and web applications. The local Raspberry pi server would be accessible to the internet through SSH (secure shell) tunneling with Ngrok, a cross-platform application. | |