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Design and Implementation of an Automated Rain Detection and Alert System for Smart Weather Monitoring

Arun Kumar[1], Prince Kanaujiya[2], Pradeep Kumar[3]
B. Tech Students, Department of Electrical Engineering[1,2]
Assistant Professor, Department of Electrical Engineering[3]
R. R. Institute of Modern Technology, Lucknow

Abstract: *This paper presents the design and implementation of an Automated Rain Detection and Alert System for smart weather monitoring. The proposed system utilizes rain sensors, microcontrollers (e.g., Arduino/ESP8266), and IoT connectivity to detect precipitation in real time and send instant alerts to users via SMS, mobile apps, or web dashboards. By integrating threshold-based detection algorithms, the system ensures accurate and timely warnings, enhancing preparedness for adverse weather conditions. A prototype was tested under varying rainfall intensities, demonstrating high reliability (XX% accuracy) and low latency (under YY seconds). The system's low-cost, energy-efficient design makes it suitable for urban and agricultural applications, offering a scalable solution for smart weather monitoring. Future enhancements could include AI-based predictive analytics and integration with broader meteorological networks. The system integrates cost-effective hardware components with efficient software algorithms to accurately detect rainfall and issue timely alerts. This solution is particularly beneficial for agricultural sectors, transportation systems, and urban planning where rain events can significantly impact operations. The prototype was evaluated under various environmental conditions to validate its performance and reliability.*

Keywords: Rain detection, smart weather monitoring, IoT, alert system, real-time sensing

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