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(57) Abstract :

Abstract SmartNode is an IoT-based Environmental Sensing and Response System designed for real-time monitoring, data collection, and adaptive control in diverse environments. Built around the 207 ESP32 and a modular sensor framework, it supports 201 LDR, 203 DHT11/22, 205 BMP180,206 MQ-series gas sensors, and more. Its plug-and-play design allows easy integration of new sensors, while collected data is processed and sent to the cloud for access through mobile or web applications. Features such as OTA updates and bi-directional communication improve flexibility and efficiency. SmartNode enables early detection of hazards like gas leaks, fire risks, and climate changes, making it valuable for disaster monitoring, smart agriculture, urban sensing, and home automation. It also supports automated responses and user-defined alerts to improve safety and convenience. With its low cost, low power use, and scalable architecture, SmartNode is suitable for both small personal projects and large environmental monitoring networks. Its modularity ensures easy upgrades and long-term adaptability, offering a practical step toward smarter, safer, and more sustainable environments.

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