

An Internet of Things Approach for Continuous ECG Monitoring and Automated Emergency Alerts

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Abstract: Cardiovascular diseases are among the leading causes of sudden death worldwide, often due to the lack of timely diagnosis and continuous monitoring. Conventional ECG monitoring systems require patients to stay in hospitals or clinics for observation, which limits accessibility and continuity of care. This study presents the development of a cost-effective Internet of Things (IoT)-based ECG monitoring system designed to provide real-time cardiac health supervision from any location. The proposed system employs an AD8232 ECG sensor for signal acquisition and a NodeMCU ESP8266 microcontroller for wireless data transmission. The collected ECG data are uploaded to the Ubidots cloud platform, where authorized users can visualize and analyse the cardiac waveform using a web interface or mobile application. In case of abnormal signal patterns, the system automatically sends alert notifications to medical professionals and caregivers, enabling immediate response. Experimental validation on multiple users demonstrated reliable ECG signal capture and accurate cloud synchronization, confirming the system's effectiveness in remote cardiac monitoring. This IoT-integrated framework offers a practical approach to early detection of heart irregularities and supports continuous patient observation, thereby reducing the risk of critical cardiac events and improving the accessibility of preventive healthcare.

Keywords: ECG Monitoring, Internet of Things (IoT), NodeMCU ESP8266, AD8232 Sensor, Remote Health Monitoring, Ubidots Cloud Platform

