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Real-Time Signal Quality-Aware ECG Telemetry System for IoT-Based Health Care Monitoring

In this paper, we propose a novel signal quality-aware IoT-enabled ECG telemetry system for continuous cardiac health monitoring applications. The proposed quality-aware ECG monitoring system consists of three modules: ECG signal sensing module; automated signal quality assessment module; and signal-quality aware ECG analysis and transmission module. The main objectives of this paper are: design and development of a light-weight ECG signal quality assessment method for automatically classifying the acquired ECG signal into acceptable or unacceptable class and real-time implementation of proposed IoT-enabled ECG monitoring framework using ECG sensors, Arduino, Android phone, Bluetooth and cloud server. The pro-posed framework is tested and validated using the ECG signals taken from the MIT-BIH arrhythmia and Physionet Challenge databases and the real-time recorded ECG signals under different physical activities. Experimental results show that the proposed SQA method achieves promising results in identifying the unacceptable quality of ECG signals and outperforms existing methods based on the morphological and RR interval features and machine learning approaches. This study further shows that the transmission of acceptable quality of ECG signals can significantly improve the battery lifetime of IoT-enabled devices. The proposed quality-aware IoT paradigm has great potential for assessing clinical acceptability of ECG signals in improvement of accuracy and reliability of unsupervised diagnosis system.