



Algorithm and Device to Detect and Differentiate AF from Other Arrhythmias

TECHNOLOGY NUMBER: 4633



OVERVIEW

Real-time, dynamically adjustable signal transformation for arrhythmia detection.

- Enhanced frequency, time, and phase domain feature extraction
- Healthcare, wearable medical devices, remote patient monitoring

BACKGROUND

Arrhythmias, or irregular heartbeats, are common and potentially dangerous conditions that can lead to serious health complications such as stroke or heart failure. Historically, electrocardiograms (ECGs) have been employed to detect arrhythmias; however, traditional methods often use static, linear approaches for signal analysis, making them less effective in capturing complex, transient anomalies. Shortcomings of existing technologies include limited real-time capabilities and an inadequacy in dynamically adjusting to varying signal conditions. As a result, there is a significant need for advanced, real-time signal processing mechanisms that can provide more accurate and timely detection of arrhythmias, improving patient outcomes and facilitating better management of cardiovascular diseases.

INNOVATION

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Category

Software

Life Sciences

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University of Michigan researchers have introduced an apparatus for detecting arrhythmias that leverages a real-time dynamically adjustable signal transformation stage to condition the electrocardiogram signal. This is followed by a sophisticated analysis stage that transforms the conditioned signal into frequency, time, and phase domain representations. The evaluation stage then extracts relevant features and normalizes the energy across these domains to form a comprehensive dispersion metric, which is crucial for accurate arrhythmia classification. The apparatus significantly outperforms traditional methods by offering enhanced real-time processing, adjustable signal conditioning, and multi-domain feature extraction. Potential real-world applications of this technology include wearable medical devices, remote patient monitoring systems, and advanced healthcare diagnostics, ultimately improving early detection and management of cardiac conditions.