National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Real-time Implementation of Premature Ventricular Contractions Detection Using Binarized Neural Network.
Speaker	: Vikas Kumar Sinha.
Supervisor	: Sougata Kumar Kar.
Venue	: VLSI Lab
Date and Time	: 06 Jan 2025 (05.30PM)

Abstract : Electrocardiogram (ECG) is a widely utilized diagnostic tool for identifying heart-related disorders. In the ECG, R-peak is the peak amplitude of the QRS complex. These R-peaks in the ECG waveform play an essential role to identify any cardiac disorder, and therefore, they must be detected and classified accurately. This paper introduces a binarized neural network (BNN) classifier for ECG beat classification, which utilizes an enhanced absolute curve length transform (A-CLT) and an adaptive threshold-based approach. Using a large dataset of annotated ECG signals, the BNN classifier is trained to identify R-peaks and categorize them based on their reliable temporal, statistical, and morphological characteristics. The outcomes show that the proposed BNN classifier effectively detects premature ventricular contractions (PVCs) in ECG signals from the Massachusetts Institute of Technology Beth Israel Hospital arrhythmia database (MITDB), attaining an accuracy of 93.03% and a sensitivity of 87.24%. The high accuracy and the classifier's computational economy represent the potential for accurate and dependable ECG analysis in environments with limited resources, including wearable health monitoring systems and clinical applications.