National Institute of Technology Rourkela

Progress Seminar

Seminar Title	: Development of AI-assisted noise-resilient Systems for Heart Sound-Based Cardiovascular Disease Diagnostics
Speaker	: Subhashree Sahoo (Rollno : 521cs3013)
Supervisor	: Dr. Puneet Kumar Jain
Venue	: Convention Hall (CS)
Date and Time	: 10 Dec 2024 (17.00 PM)
Abstract	: Cardiovascular diseases (CVDs) are among the leading causes of death worldwide, with their prevalence rising steadily. Early and accurate detection is crucial, yet advanced diagnostic tools such as ECG and echocardiography are often inaccessible due to high costs and limited availability, especially in rural areas. Auscultation offers a cost-effective alternative but is hindered by environmental noise. This study addresses these challenges by proposing two novel approaches: a noise-resilient heart sound classification method using Enhanced Quantum Local Binary Pattern (EQLBP) and a robust segmentation technique for seismocardiography (SCG) signals. EQLBP improves heart sound analysis by dynamically selecting reference pixels and identifying uniform patterns, further enriched with statistical features derived from discrete wavelet transform and validated on publicly available datasets. For SCG signals, a custom-developed dataset captures chest vibrations during activity, employing adaptive thresholding and machine learning models to mitigate motion artefacts effectively. This approach ensures precise segmentation and provides insightful analysis of cardiac activity under real-world conditions. These advancements enable efficient and accurate classification of heart sounds and SCG signals, offering a computationally efficient solution for out-of-clinic environments. This work supports the development of accessible, cost-effective diagnostic tools, particularly for remote and underserved areas, improving early CVD detection and patient outcomes.