National Institute of Technology Rourkela

Registration Seminar

Seminar Title	: Digitalization of ECG Images and Analysis for Abnormality Detection
Speaker	: Anindita Jena (Rollno : 522cs6007)
Supervisor	: Puneet Kumar Jain
Venue	: CS Convention Hall
Date and Time	: 05 Mar 2025 (15.00 PM)

Abstract : Cardiovascular diseases (CVDs) are the leading cause of death worldwide, claiming millions of lives each year. Early detection and timely intervention are critical to reducing mortality, particularly in cases of heart attacks, arrhythmia, and other heart-related conditions. However, access to specialized healthcare facilities and expert diagnostic services for cardiovascular diseases remains limited in many rural areas. While ECG machines are often available, the lack of trained professionals to interpret these vital heart readings creates a significant gap in early diagnosis and treatment. To address this issue, we propose developing a telehealth monitoring system where users can scan ECG images and receive instant diagnostic feedback through an AI-powered mobile app. The system will leverage advanced image processing techniques to digitize and analyze ECG images captured accurately via mobile devices. The app will utilize convolutional neural networks (CNNs) for real-time artefact detection and image restoration, ensuring clean and high-quality ECG signals for analysis. Following preprocessing, deep learning models will be employed to extract critical ECG features, such as the QRS complex, P-wave, and ST segment, allowing for precise detection of abnormalities. A multimodal feature fusion pipeline will combine these ECG features with patient demographic data, medical history, and other available diagnostics, creating a comprehensive input for the AI model. The classification of cardiovascular conditions will be performed using state-of-the-art deep learning algorithms optimized through cross-validation techniques to ensure accuracy and robustness across diverse data sets. This app will provide automated ECG analysis and connect patients with nearby hospitals for follow-up care in case of abnormal results. The objectives are designed to focus on creating an accessible, cost-effective, and scalable solution that enhances heart health diagnostics, empowering users with real-time insights and seamless connectivity to hospitals.