National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: RF Signal Classification of Human Activities from Radar Signature using CNN Model.
Speaker	: Abinash Sahoo
Supervisor	: Prof S Hiremath
Venue	: Advanced Comm Lab
Date and Time	: 16 Jul 2025 (03.00PM)
Abstract	: Radio frequency (RF) classification for human activity recognition (HAR) utilizes wireless signals, such as Wi-Fi and radar, to detect and categorize movements by analysing signal reflections. Traditional methods, including Doppler shifts and channel state information (CSI), face significant limitations: Doppler-based techniques are sensitive to environmental noise. At the same time, CSI encounters challenges with feature extraction and performance degradation due to occlusions. To tackle these problems, this study uses short-time Fourier transform (STFT) spectrogram images as input for convolutional neural network (CNN) models and machine learning (ML) classifiers. The findings reveal that the CNN framework significantly outperforms conventional ML techniques, including methods like support vector machines (SVM), decision trees (DT), random forests (RF), and k-nearest neighbor (KNN), which achieve mean accuracies of 96.83%, 95.43%, 95.08%, and 94.43%, respectively. In contrast, the CNN model records accuracies of 97.89%, 98.15%, and 98.67%, for the IR-UWB 10 GHz, FMCW 24 GHz, and FMCW 77 GHz datasets, resulting in an overall mean accuracy of 98.23%.