National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Leveraging Smart Socks for Real-Time Knee-Ankle Associated Fall Monitoring and Assessment of Fall Risk
Speaker	: Prof. Ravi Kant Avvari (1201377)
Supervisor	: Dr. Nivedita Patra
Venue	: BM Department Seminar Room
Date and Time	: 28 May 2025 (03:30 PM)
Abstract	: Falls, particularly among older adults and individuals with mobility impairments, are a significant cause of injury and disability. This study explores the potential of smart socks equipped with mems-based inertial sensors for continuous monitoring of knee and ankle movement patterns to assess fall risk in real time. One of the initial studies were performed on 25 healthy adult volunteers (curating base data), free from cardiovascular diseases, arthritis, or physical disabilities, for three distinct walking patterns (slow, normal, and fast) on a smooth, level surface. Following signal analysis, statistical observations were made. Key gait parameters, including heel strike, toe-off, and mid-swing events. The analysis indicates a significant correlation between body mass index (BMI) and gait dynamics. Results demonstrate that swing time is greater in normal-weight individuals compared to overweight individuals, suggesting higher gait variability and better adaptability in the normal-weight group. These findings highlight the potential impact of BMI on locomotor control, which may influence clinical assessments of mobility impairments, fall risks, and rehabilitation outcomes. Future studies could expand on these findings by incorporating machine learning techniques for automated gait classification and extending the dataset to include individuals with mobility impairments. Keywords: Gait Analysis, Inertial Sensor, Kalman Filtering, Fall Assessment, Rehabilitation. ALL ARE CORDIALLY INVITED