National Institute of Technology Rourkela

Defence Seminar

Seminar Title	: Analysis and Implementation of AI Approaches towards Terrain Exploration and Control of Humanoid Locomotion
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Venue	: Seminar Room, Department of Mechanical Engineering
Date and Time	: 20 Mar 2025 (4.00 PM)
Abstract	: Exploring an optimal path for Humanoid locomotion is a challenging task that demands a smooth and collision-free path. The current research discusses various path-planning algorithms to achieve the objectives. The classical-based Linear regression model, memory-less Gravitational Search Algorithm (GSA) models, and memory-based Harris-Hawk optimization (HHO), Archerfish Hunting Optimization (AHO), and Slime Mould (SM) models are introduced for effective path planning of the NAO robots. The modifications to the standard approaches, hybridization of the different standalone models, and tuning of the different standalone models using the classical approach are performed to evaluate the effectiveness of the different models. Path exploration is performed simultaneously in both environments with static-only and static and dynamic obstacles. The Petri-net model is used for path planning to overcome collisions with dynamic obstacles in a dynamically complex environment. Also, the camera-vision approach is introduced to perform path exploration in an environment with uneven floor conditions. To further evaluate the performance, the different models are compared with the existing approaches developed using different approaches in other complex environments. Improvements of more than 5% were recorded using the different controllers. The different modified and hybrid models showed optimal performance compared to the existing research. Further, the improved models showed an efficient path exploration compared to the standard models in various complex terrains.