National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: Comparative Analysis of Fog Computing Frameworks for IoT Application Offloading
Speaker	: Prasenjit Maiti (Rollno : 515cs1006)
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Venue	: Convention Hall (CS-208), CSE Department
Date and Time	: 25 Sep 2025 (5.00PM)
Abstract	: The rapid growth of Internet of Things (IoT) devices has intensified the demand for low-latency and high-throughput data processing, which traditional cloud infrastructures often fail to meet. Fog computing extends computation and storage to the network edge, yet challenges persist in resource allocation, node placement, and application offloading due to heterogeneous resources and dynamic workloads. This thesis investigates the Fog Node Placement Problem (FNPP) and develops both capacitated and uncapacitated placement strategies, introducing hybrid meta-heuristic algorithms (FNP_GA, FNP_PSO, FNP_GASA, and FNP_GAPSO) to minimise average network latency. In addition, a multi-objective fog network planning model is formulated to balance delay and capital expenditure, solved using the NS-SCGA algorithm within a four-tier fog&ndashcloud architecture. A hierarchical IoT application offloading strategy is also proposed, modelling applications as Directed Acyclic Graphs (DAGs) and employing static and dynamic heuristics to optimise makespan, response time, and deadline miss ratio. Extensive simulations validate the proposed approaches, demonstrating significant improvements in latency reduction, cost efficiency, and scalability compared to existing frameworks. The integration of optimised node placement, cost-aware network planning, and DAG-based scheduling provides a comprehensive framework for enhancing the quality of real-time IoT services in heterogeneous fog&ndashcloud environments.