# One Day Workshop on Recent Development of Electrohydraulic system and Control

📅 **30th September 2023**    🕐 **6.00PM to 9.00PM**

**Organized by: Centre for Robotics and Mechatronics, NIT Meghalaya, India**

In Collaboration with

**IEEE Joint CSS-IMS Chapter, Kolkata, India**

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### Resource Person

**Prof. Kaushik Das Sharma,**
Professor & Head, Department of Applied Physics,
University of Calcutta, India

Title of the Talk: **A Novel Disturbance Rejection Factor Based Stable Direct Adaptive Fuzzy Control Strategy**
Abstract: The lecture will discuss a unique disturbance rejection factor based design of direct stable adaptive fuzzy logic controllers for a class of non-linear systems with large and fast disturbances. The adaptive fuzzy controllers are realized by employing hybrid combinations of Lyapunov theory based local adaptation and harmony search algorithm based global optimization technique. These hybrid adaptive fuzzy controllers are designed with the objective of optimizing both the structure and free parameters of it with guaranteed stability and, at the same time, simultaneously achieving satisfactory tracking performance and disturbance rejection. The novelty of the proposed work lies in the fact that, in a bid to perform the disturbance rejection, the nature of the disturbance itself is used in designing the tracking control law.

**Dr. Jayanta Das**
Associate Professor, Department of Mechanical Engineering at IIT(ISM), Dhanbad, India

Title of the Talk: **Energy saving in off-road vehicles using leakage compensation technique**
Abstract: The lecture will discuss on enhancing the energy efficiency of linear actuators used in heavy earth moving equipment, particularly in the booms of excavation equipment. Two hydraulic circuits are compared in terms of energy efficiency, with one using a conventional proportional directional control valve (PDCV) and the other using an innovative solution of proportional flow control valve (PFCV) with artificial leakage between the two ends of the actuator. The PFCV reduces energy loss in the form of heat by bypassing the extra flow from the pump during position control, unlike the PDCV that uses a pressure relief valve. The hydraulic circuit using PFCV is found to be 8.5% more energy efficient than the conventional circuit using PDCV.
The lecture also discusses the position control of the actuator, which is achieved using a PID controller tuned by a fuzzy controller. The simulation of the hydraulic circuit is carried out using MATLAB/Simulink, and the results are compared with experiments. Overall, the proposed approach could lead to significant improvements in the energy efficiency of linear actuators used in heavy earth moving equipment, thereby reducing their environmental impact and operating costs.

## Program Schedule

| Session | Theme | Timing |
|---|---|---|
| | **Inaugural Session** | 06.00 PM -06.15 PM |
| **Lecture-1** | A Novel Disturbance Rejection Factor Based Stable Direct Adaptive Fuzzy Control Strategy | 06.15 PM -07.30 PM |
| **Lecture -2** | Energy saving in off-road vehicles using leakage compensation technique | 07.30 PM -08.45 PM |
| | **Valedictory** | 08.45 PM - 09.00 PM |

Target Participants:: Faculty Members from UGC/AICTE approved institutions, Research organization, Research Scholars, PG Scholars, participants from Government Sector, Industries (Bureaucrats/ Technicians/ Participants from Industries etc.) and staffs, B. Tech students also encourage to participate this workshop.

**Registration:** All registered candidates will receive **Participation Certificates** after attending the workshop. Interested candidates may register using the following link (There is no registration fees required).
https://docs.google.com/forms/d/e/1FAIpQLSfyJkamCKRlrJDGs20HNQ13hLRBhNxDbMcZvrQcTvaZhKb0zw/viewform?usp=sf_link