The UNIVERSITY of OKLAHOMA
School of Aerospace and Mechanical Engineering

The School of Aerospace and Mechanical Engineering

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MS Thesis Defense

A Graduate Program Presentation by
Mohammed Ameer Moinuddin Ansari

ENHANCING PERFORMANCE AND REDUCING EMISSIONS IN NATURAL GAS ASPIRATED ENGINES THROUGH MACHINE LEARNING ALGORITHM

November 27th, 2023, 11:00 a.m.
Hitachi Conference Room in Felgar Hall 214
Zoom Link:
https://oklahoma.zoom.us/j/4708491441?pwd=NSszR3FLNFZJYTZ4MkFpMkNITUg5Zz09

Meeting ID: 470 849 1441
Passcode: 84220094

Abstract:

In an era demanding both energy efficiency and sustainability, this thesis presents a machine learning-based approach to optimize Natural Gas Fired Reciprocating Engines (NGFRE), known for their performance and significant emissions. Utilizing the AJAX DPC-81 engine compressor, the research explores 40% to 75% operational loads, employing sensors for real-time data collection on performance, emissions, and vibrations. The study adjusts the Air Management System (AMS) and implements vibration analysis, providing insights into engine stability. Machine Learning techniques like Linear Regression, Artificial Neural Networks (ANN), and Support Vector Machines (SVM) are integrated with a Programmable Logic Controller (PLC) for enhanced data analysis and predictive capabilities. Key findings include a significant reduction in emissions at varied engine loads, demonstrating the potential of ML in improving NGFRE performance and reducing environmental impact. This research paves the way for future innovations in intelligent engine systems, aligning energy optimization with ecological considerations.

Bio:

Mohammed Ansari, a graduate of Osmania University in India with a Bachelor's degree in Mechanical Engineering, is currently advancing his research at the Sustainable Energy and Carbon Management Center (SECM). Under the mentorship of Dr. Pejman Kazempoor, his work primarily focuses on optimizing energy systems for enhanced efficiency and reduced environmental footprint. Mohammed recently concluded an internship with an oil and gas company in the Midland/Odessa region.