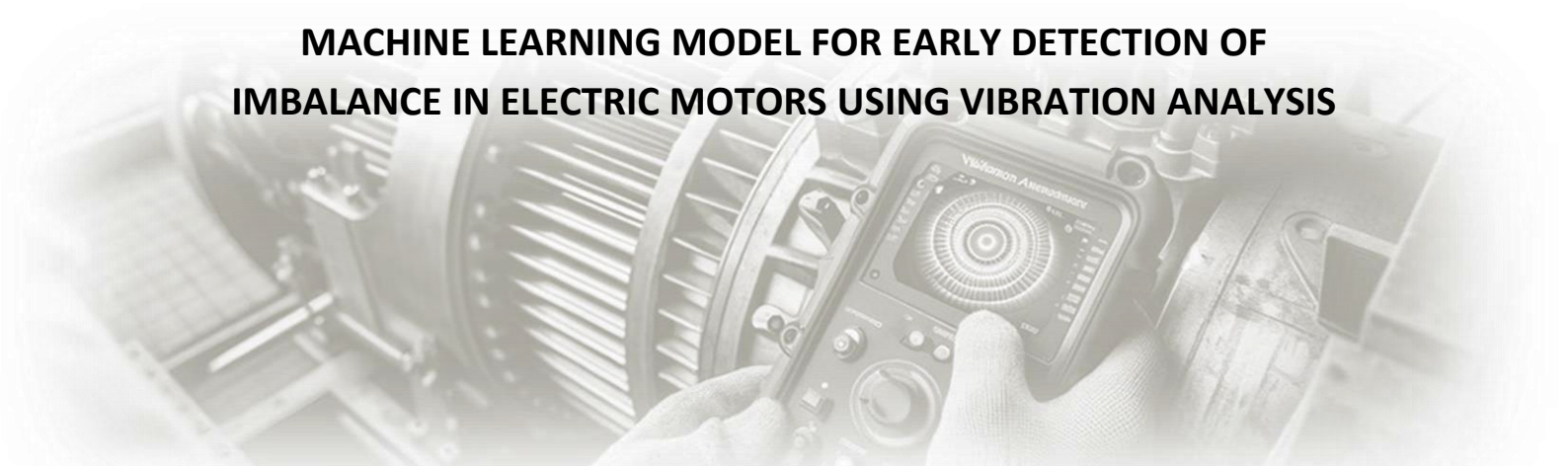
MACHINE LEARNING MODEL FOR EARLY DETECTION OF IMBALANCE IN ELECTRIC MOTORS USING VIBRATION ANALYSIS



This research study analyzes the development of a machine learning system capable of detecting imbalances in electric motors using vibration analysis. The objective is to evaluate the model's accuracy in identifying imbalances in electric motors early, determining which vibration features at specific motor points most accurately indicate the problem we aim to address. Methods include data collection of electric motor vibration data, preprocessing to obtain the most characteristic data for the problem, and implementation of machine learning algorithms such as random forest, logistic regression, and SVM. These algorithms process vibration data to train the model and enable it to learn, identifying when a motor has or does not have issues, which is then tuned for optimal performance in its predictions. Results demonstrate the superior performance of the random forest model with 96% precision, 97% recall, and a 96% F1-score for effectively detecting patterns indicative of imbalance. This approach promises to enhance industrial operational efficiency by proactively addressing one of the main issues: imbalances in electric motors. This ultimately improves operational costs, reliability, and functionality across industrial sectors.