 ISSN 2362-0412

Machine Monitoring System to Predict Potential Failures

Anjalee W.M.A. Jayarathna*, K.G.S.H. Gunawardana

Department of Engineering Technology, Faculty of Technology,

University of Ruhuna, Karagoda, Uyangoda, Kamburupitiya, Sri Lanka.

*Corresponding author: *anjaleeanuththara1996@gmail.com*

ABSTRACT

Fault prediction and maintenance of equipment plays a critical role in today's industry. Failures should be identified as soon as possible because if the equipment continues to run under abnormal conditions, it could damage equipment and the employees. Many of the previous studies were focused on developing mathematical model predicting the machine's operating conditions. During past years, machine learning techniques have been widely applied in machine fault diagnoses. Many studies have demonstrated that analyzing the vibration spectrums of machines can be a useful tool for detecting faults at early stage. Moreover, analysis of acoustic waves generated from machines could also be a reliable methods in detecting faults. This study is focused on developing an external data acquisition unit and fault detection system that utilize acoustic waves produce by the machine in identifying the potential faults. Further, the proposed unit is a portable unit that can be used in wide range of machines. The primary objectives of this research are to acquire acoustic signals at higher sampling rate and analyze the data using machine learning algorithm. In this study acoustic data is collected using a sound sensor module and Arduino development board. However, the vibration signal could not be detected accurately at higher sampling rates with the KY-037 acoustic sensor module and Arduino Thus, Case Western University bearing data are used in machine learning algorithm to study the accuracy of the fault prediction. The data is converted to frequency domain and it is extracted the frequencies and amplitudes of dominant peaks as the main features for the machine learning algorithm. Those selected features are analysed using K-Nearest Neighbor and Support Vector Machine classification algorithms. The overall accuracy of 90.1% and 81.8% were obtained using KNN and SVM algorithms.

Keywords: *Acoustic Signal, Data Acquisition, Fast Fourier Transformation, K-Nearest Neighbor, Support Vector Machine*