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Predictive Maintenance of Bearings Through IoT and Cloud-Based Systems

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Abstract: Predictive maintenance of bearings is mainly achieved through the analysis of vibration signals. There are numerous methods and software available in the market that require a computer terminal for signal analysis. However, within the spirit of Industry 4.0 technologies such as IoT, big data, and machine learning, bearing monitoring and vibration signal analysis could apply for IoT cloud-based systems. Indeed, there are billions of bearings around the world waiting to be monitored, and if all the extracted data could be stored and subsequently analyzed in the same IoT cloud-based system, the advantages will be countless. The massive real-time data can be used as an input to develop an interconnected system that performs more accurate failure predictions. Several machine learning methods can be used to predict the health of a bearing in a more accurate way; as the system itself will learn and develop its own capabilities. If IoT cloud-based systems are used, predictive maintenance will be more robust and reliable. Furthermore, it will allow manufactures to run a more efficient maintenance plan. The aim of this study is to give an insight on how predictive maintenance on mounted bearings can be achieved using the Internet of Things and cloud-based systems. Vibration signals during service of a double-row self-aligning ball bearing have been monitored and analyzed in MindSphere, a Siemens cloud-based system. The proposed method offers a condition monitoring system of a mounted bearing for failure detection and prediction. Additionally, through monitoring the condition of the rotating system, it is possible to control the process to ultimately avoid any further damage. The authors believe that integrating IoT technologies in manufacturing processes to predict and schedule maintenance is an actual trend that has seen an increase in implementation across several countries and manufacturing companies.

Keywords: Predictive Maintenance, bearings, Internet of Things, Cloud-based systems, vibration analyzes

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