Predictive Maintenance System based on Machine Learning for Automated Guided Vehicle and Conveyor Systems

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Abstract

Automated guided vehicles (AGV) and conveyors are important elements of smart factory. Maintenance of these systems impacts the speed and effectiveness of AGV and conveyor operations and plays a critical role in ensuring smooth operations of smart factories. Ideally, the fitness of AGV and conveyor is predicted prior to breakdowns using machine learning. Predictive Maintenance (PdM) based on machine learning has garnered significant attention in the field of as a means of preventing critical equipment breakdowns in a factory's production line while maximizing productivity hours. The appropriate selection of the machine learning process, however, determines how effective PdM applications are. This work presents a PdM system that is capable to perform fault diagnosis and predicting the remaining useful lifetime (RUL) of both the conveyor and AGV. Sensor data from the AGV and conveyor is extracted and analysed to identify the performance of conveyor and AGV. After the process of data analysis, machine learning model is built and deployed to monitor the condition and to predict the RUL of conveyor and AGV. This investigation focused on vibration and power analysis in the fault diagnosis and for predicting RUL. Results from four experiments show that there is a strong relationship between vibration and power of conveyor's motor with its operating load condition. Similarly, there is also a strong relationship between vibration of AGV and its operating load condition. The final outcome of this work is a machine learning PdM system that can calculate the workload of the motor and forecasts potential failure and RUL by monitoring the operating load condition and the health of the conveyor and AGV.

References

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