Chapter 6
Cloud–Based Predictive Maintenance and Machine Monitoring for Intelligent Manufacturing for Automobile Industry

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ABSTRACT

The concept of predictive analysis plays complex information retrieval and categorization systems are needed to process queries, filter, and store, and organize huge amount of data, which are mainly composed of texts. As soon as datasets becomes large, most information combines with algorithms that might not perform well. Moreover, prediction is important in today’s industrial purposes since that could reduce the issues of heavy asset loss towards the organization. The purpose of prediction is necessary in every field since it could help us to stop the cause of occurring the error before any vulnerable activities could happen. Predictive maintenance is a method that consumes the direct monitoring of mechanical condition of plant equipment to decide the actual mean time to malfunction for each preferred machine. The authors try to estimate the fault that could occur in the machines and decide the time that could cause a critical situation. This prediction should be done effectively, and for this purpose, they have stepped into the concept of machine learning.

DOI: 10.4018/978-1-5225-9023-1.ch006
A BRIEF INTRODUCTION TO INTELLIGENT MANUFACTURING

In this modern era new technologies, innovation and developments are increasing day by day that leads to mass production of voluminous data. This huge volume of data seems to be more informative, which leads to the production and enhancement of the manufacturing process in various industries. This could save the asset of a production industry. The main role of prediction is best suitable in the field of health monitoring that helps in continuously monitoring the health of the patient without the need of a caretaker near them. Motivated by the quality of life and less expensive healthcare systems, a change in existing healthcare system should be focused to a home centred setting including dealing with illness to preserving wellness. Innovative user-centred preventive healthcare model can be regarded as a promising solution for this transformation. It doesn’t substitute traditional healthcare, but rather directed towards this technology. The technology used in the pervasive healthcare could be considered from two aspects: i) as pervasive computing tools for healthcare, and ii) as enabling it anywhere, anytime and to anyone. It has progressed on biomedical engineering (BE), medical informatics (MI), and pervasive computing. Biomedical engineering is the integration of both engineering and medical science that helps in the improvement of the Equipment used in the hospitals. Medical informatics comprises of huge amount of medical resources to enhance storage, retrieval, and employ these resources (Bond, J. (2015)). The advancement has been done to monitor the health of the patients and provide the details to the caretakers, who are near by the remote areas. This could be done in a real-time with the help of the internet access. Due to the condition of monitoring the patient at a real-time, the caretaker can provide the suggestions regarding their essential signs of their body situation through a video conference.

Another key aspect of predictive maintenance deals with the condition monitoring or condition-based maintenance. Condition based monitoring deals with the analysis of the machine or anything without interrupting its regular work. Moreover, monitoring the condition of equipment is like decision making strategy, which could avoid any types of faults or failures that happens at the near future to that equipment and its components. This is like the Prognostic and Health Monitoring (PHM) that is mentioned above. Prognostic is nothing but analysing the upcoming situation that could occur for the patient. Similarly, for the machines it could be stated as Remaining Useful Life (RUL). The latest advancement of computerized control, information techniques and communication networks have made potential accumulating mass amount of operation and process’s conditions data to be harvested in making an automated Fault Detection and Diagnosis (FDD) and increasing more resourceful approaches for intelligent defensive maintenance behaviour, also termed as predictive maintenance.

According to the estimation about 20 to 30 percent of the periodically monitored Equipment for predictive maintenance have been affected from its production and quality that must be examined regularly. In fact, monitoring the Equipment in a weekly or monthly manner does not prove to be enough for detecting certain abnormalities in the machines (Boschrexroth.com. (2017)). If we change the Equipment from periodical to continuous monitoring, then it could lead to lower the cost of expenditure for the machines considerably. This could save the expenditure from on-line monitoring systems on PC and accelerometer. Artificial Neural Network (ANN) could be used effectively in this type of evaluation for detecting the abnormal patterns of the sensor validation and for trend evaluation.