Intelligent Condition Monitoring of Air Blower using Internet Of Things

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Air Blowers are used in industries run with heavy equipment for cooling and ventilation purpose. Condition monitoring of air blower is a crucial task and involves skilled expert. Many times this is prone to human errors and involves huge skilled man power. Intelligent Condition Monitoring involves machine learning algorithms that are trained with existing data and used for test cases. Internet of Things for Intelligent Condition Monitoring of Air Blower involves sensors that use concepts of Vibration analysis and send the values to the server. The automated program run on server displays the condition status of various air blowers placed in different location in the industry identified by unique id. The proposed system collects data from industry using multiple air blowers and analyses the condition of the blower. The conditions are broadly classified into three categories: Low, Good and High. The manager can make decisions basing on these conditions. This proposed system Intelligent Condition Monitoring of Air Blower using Internet Of Things can be used in any large industry which is using huge number of air blowers. Using IOT a central system can be developed where many industries can be geographically distributed are connected to a single system for Condition Monitoring.

Keywords: Intelligent Condition Monitoring (ICM), Internet Of Things, Vibration analysis, Intelligent Condition Monitoring of Air Blower using Internet Of Things(ICMABIOT)

1. INTRODUCTION

An air blower is a machine utilized for make flow of air at significant pressure. The air flow generated is used for different purposes such as small car cleaning blowers, vacuum cleaners, air conditions etc., depending on the application requirement air flow and pressure may vary. The primary function is to provide and accommodate a large flow of air or gas to various parts of a building or other structures. This is accomplished driving a motor or turbine which is coupled to shaft and hub and rotating a number of blades.

Condition Monitoring is a strategy of sensing the equipment health, analyzing the sensed information to quantify and classify the equipment condition. By adopting the suitable condition monitoring techniques, machinery failures could be identified and remedied before they get extreme enough. Continuous Monitoring and diagnosis improves reliability, maintainability and availability of rotating machines. CBM helps to avoid unnecessary maintenance tasks by taking maintenance actions only when there is an alarm level of abnormal behavior in the machine components.

Machine condition maintenance with continuous monitoring is gaining significance in industry as the need of the day to decrease the possibility of production loss due to machine breakdown and to increase trustworthiness. To make use of of vibration and acoustic emission (AE) signals is quite common in the field of intelligent condition monitoring of rotating machinery. These signals can be used to identify the incipient failures of the machine components, through the online monitoring system.

2. LITERATURE REVIEW

Kinclaid [1] described the evolution of condition monitoring as an interesting chronological perspective. Van Tung Tran and Bo-Suk Yang [2] presented a brief maintenance philosophy taxonomy. Jardine [3] explained condition based maintenance strategy in detail.

Stellman [4] applied PCA concepts on gear boxes, Allgood and Upadhyaya [5] performed PCA concepts in diagnosis and prognosis of DC motors. Fodor [6] presented a complete review of dimension reduction techniques. Garga [7] explained an example of using dimension reduction techniques in machinery fault diagnosis. Grimmelius [8] used regression analysis for refrigeration plants and ARMA model was established by Yang [9] for diagnosis the power equipment. Both regression and ARMA model used by Sinha [10] is used in predicting the trend of vibrations from a steam turbine.

3. Intelligent Condition monitoring of air blower using Internet Of Things(ICMABIOT)

Intelligent Condition Monitoriing of Air Blower using IOT creates new architecture. This is capable of analysing the data using Machine learning algorithm based on Tensor Flow. This evaluates the condition of machinery by automating the knowledge based on training sets. This allows users to connect remotely to system to assist them in the smooth and efficient running of machinery and alerts when there is a problem[11].

Continuous monitoring is needed. The fan in your blower can experience a few different problems like Motor issues , problems with loose or bent fan blades and bearing defects. Any of these problems can cause your blower's fan to either slow down or stop turning completely.

The proposed architecture of Intelligent Condition Monitoring of Air Blower using IOT(ICMABIOT) is as follows.

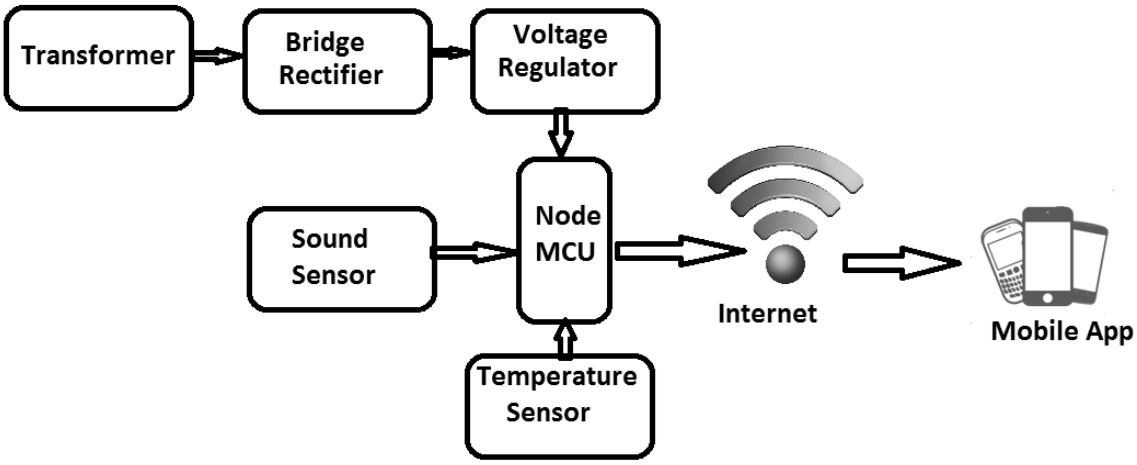

Fig 1 : Architecture of ICMABIOT

3. Results

The simulated design of ICMABIOT is as shown in Figure 2. Transformer apparatus is used for reducing the voltage of an alternating current from 230V of current to 12V. Bridge rectifier is used to reduce the 12V of AC current is changed to !2V of DC. V**oltage regulator** is a system designed to automatically maintain a constant voltages level. Node MCU acts as the microcontroller that is mainly used as interface to view the output. Here the proposed system uses two sensors temperature sensor and sound sensor to detect faults in air blower.

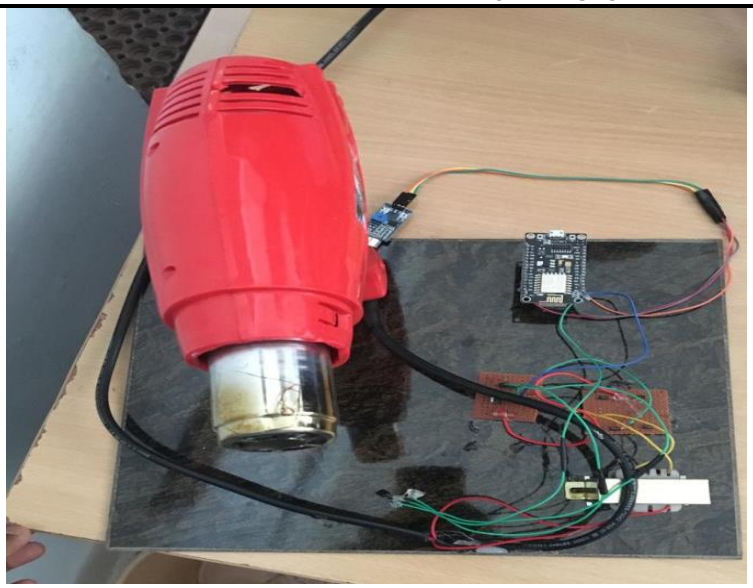

Fig 2 : Simulated Design of ICMABIOT

The instance of scenario of mobile application is shown in Figure 3.

Fig 2 : Simulated Design of ICMABIOT

4. Conclusion

Every Industry using Rotating machinery requires innovations like ICMABIOT that reduce manpower requirement to a great extent. This automated system uses sensors at each air blower and can be used in any industry using air blowers. The developed system detects and displays the conditions of air blower at any place and at any time. This can be extended to any rotating machinery that are used in industries.

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