Predictive Maintenance of Industrial Duct fans Using Machine Learning

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Problem Statement

Obstructions or debris in fan and air passage system of industrial duct fans leads to improper flow of air in to the building leading to discomfort and eventually suffocation. Condition monitoring of such duct fans is an increasing concern as construction of masonry structures is taking place.

Proposed Solution

A predictive maintenance algorithm which alerts the operations personnel on the condition of duct fan is proposed. The algorithm differentiates between obstruction to airflow and dust deposit on the impeller blades. Besides this, the status(running/stalled) of the duct fan is continuously logged to cloud for remote monitoring.

Existing Scenario

- Although HVAC airflow problems have many causes, most of them are being mitigated by HVAC preventative maintenance.
- Many a times the duct work and fan blades get clogged that calls for maintenance leading to downtime.
- Since preventive maintenance is performed while the equipment is performing normal, this leads to breakdowns and additional costs.
- The clogging of duct fans is a function of run time and level of dust being accumulated. This is not being considered while carrying out maintenance activities.
- The system doesn’t proactively alert the operations personnel based on the performance of duct fans.
- There is no framework to continuously monitor the minute performance of duct fans from remote location.

Proposed Solution- Features

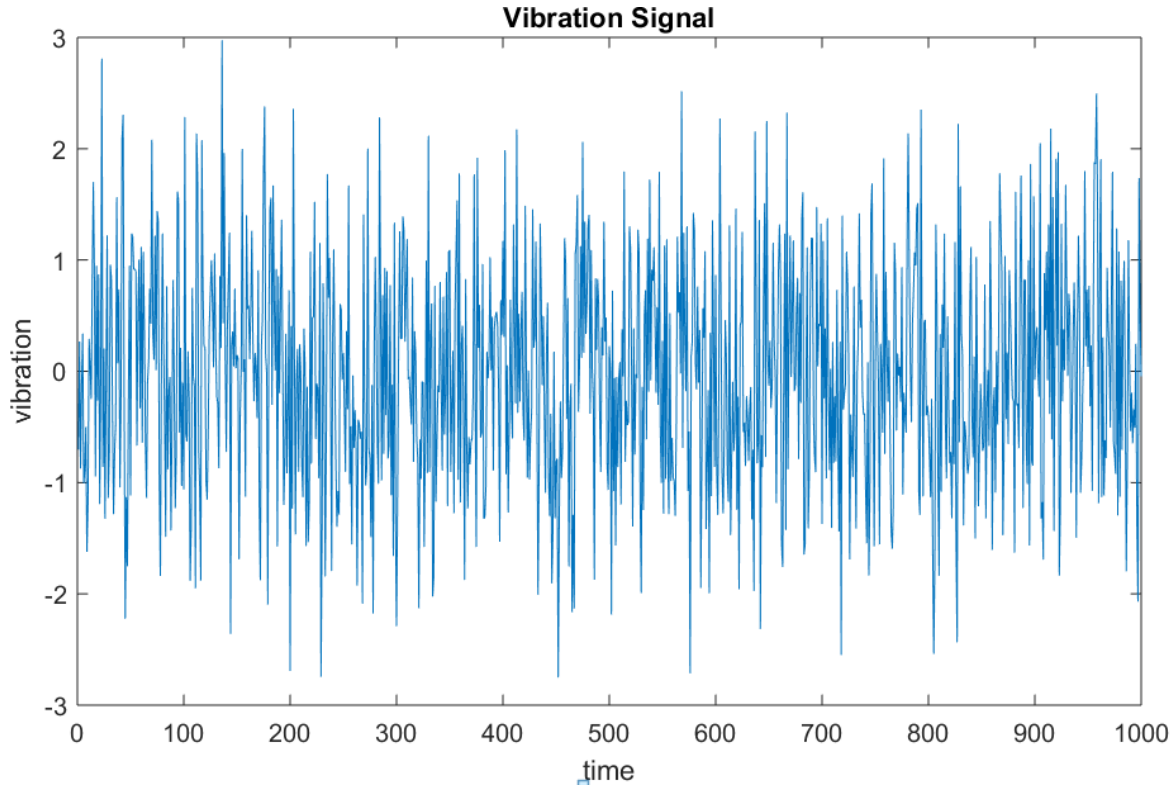
A predictive maintenance algorithm which alerts the operations personnel on the condition of duct fan is proposed. The algorithm differentiates between obstruction to airflow and dust deposit on the impeller blades. Besides this, the status(running/stalled) of the duct fan is continuously logged to cloud for remote monitoring.

- Dust accumulation on fan blades
- Obstruction of airflow through fan
- Fan Motor status(On/Off)
- Loose connection in ducts/fan structure
- Any anomaly behaviour

Target Customer Segment

Technology Architecture

- MATLAB/Simulink shall be used to develop the control algorithm and Stateflow for scheduling the events.
- Vibration of the motor fan is monitored using accelerometer and spectral analysis is performed initially
- A machine learning algorithm shall be developed to classify vibration signal with respect to dust accumulation/obstruction to air flow



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Thank You