Current Based Health Monitoring and Fault Diagnosis System for Wind Turbine

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Abstract: **Wind turbines framework is generally utilized for renewable power generation. The support expenses of wind turbines constitute a huge part of the aggregate cost of the produced power. Therefore health monitoring and fault diagnosis system for wind turbine is necessary. This paper proposes a current based health monitoring and fault diagnosis system for wind turbine by using signal generated from wind turbine. In proposed system we used current-signal from wind turbine generator for fault analysis. We used ADC for analog to digital conversion, which is important for signal processing. After analog to digital conversion we used power spectrum density method and peak detection for fault analysis.**

Keywords: **Fault detection, Health monitoring, wind turbine, Signal processing.**

1. INTRODUCTION

Wind turbine is a source of electricity generation. The wind power industry has growing greatly during the past few years. Health monitoring is becomes important because it’s a renewable energy source. Mostly wind turbines are operated in variable speed conditions due to the varying wind speeds, and fail more often than other rotating machines. Wind turbines are located on high towers and installed in far flung regions. Therefore the excessive preservation cost is on this areas where in transportation is inconvenient. Defective element can't be replaced without problems because wind turbine hooked up on high towers. Wind turbine will fail if they in difficult environmental conditions [3] ; therefore they require more studies in situation primarily based preservation for wind turbine to lessen their maintenance cost situation primarily based approach can be developed the usage of various signal available for special circumstance.

As a consequence, want to expand new situation monitoring techniques that don't require additional sensors and hardware. Considering the fact that generator modern-day alerts have already been used to control the wind turbine, the present day-based totally situation monitoring technique, which does not require additional hardware, indicates extremely good financial bbenefit and presents an opportunity to the vibration-primarily based situation tracking approach.

Thus, need to develop new condition monitoring techniques that do not require additional hardware.

2. PROPOSED METHODOLOGY

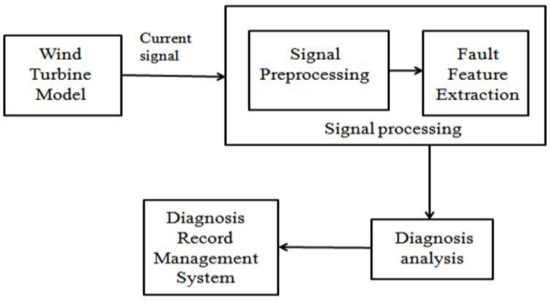


Fig.1: Block diagram of proposed methodology

1. Current signal acquisition:

For current signal acquisition we used current transformer for measurement purpose. The current transformer basically consists of an iron core upon which primary and secondary windings are wound. The primary winding of the transformer is connected in series with the load and carries the actual current flowing to the load, while the secondary winding is connected to a measuring device or a relay. The number of secondary turns is proportional to the current flowing through the primary. The ratio of primary current to the secondary current is known as the current transformation ratio of the CT. Usually the current transformation ratio of the CT is high.

2. Signal processing:

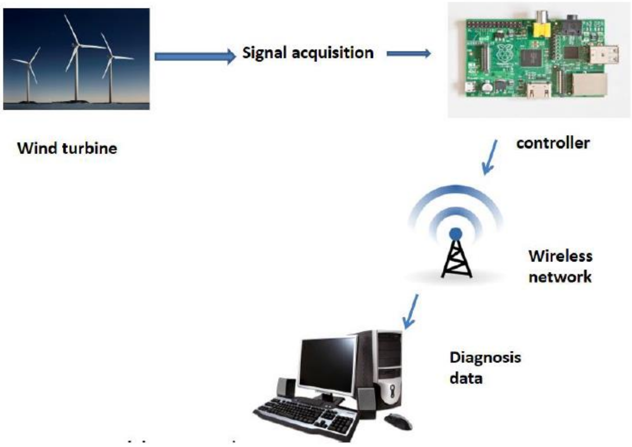
Frequency of Signal produced from wind generator is not constant with time. Therefore there is need of signal preprocessing. In signal preprocessing we used analog to digital conversion.

3. fault detection:

We used ADC for analog to digital conversion, which is important for signal processing. After analog to digital conversion we used power spectrum density method and peak detection for fault analysis.

3. OVERVIEW OF THE SYSTEM

In proposed system, health of wind turbine monitored by using current signal from generator. the resampling algorithm non-stationary current signal is converted into stationary signal. Fault features are extracted from resampled signal using algorithm. After processing of the current signal data is send to the sub-station of the wind turbines.



Wireless communication network can be used in this system to centralized monitoring. Because wind turbine are located in remote area, and high towers. By using wireless network.

4. RESULT

Input signal:

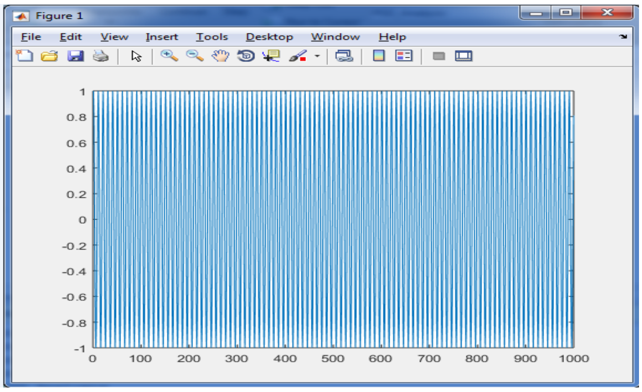


Fig.2: pure input signal

Results getting on matlab when input is pure signal,

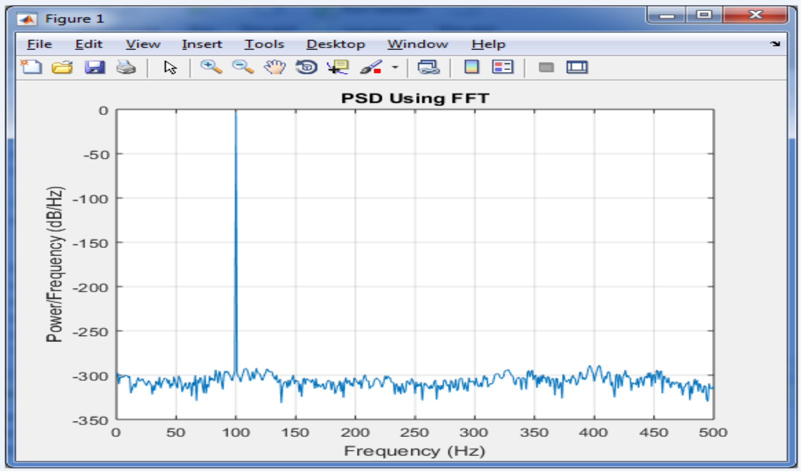


Fig.3: PSD analysis of pure signal

In other case when input is noisy signal,

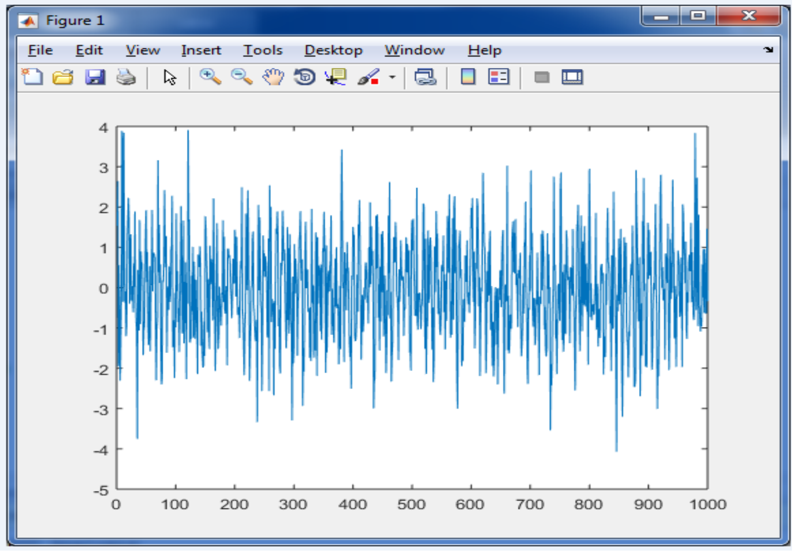


Fig.4: input noisy signal

As resulting,

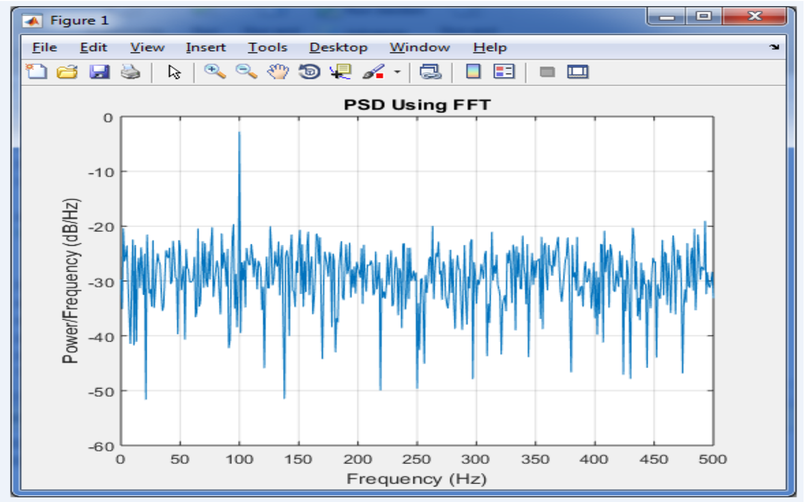


Fig.5: PSD analysis of noisy signal

Result on computer,

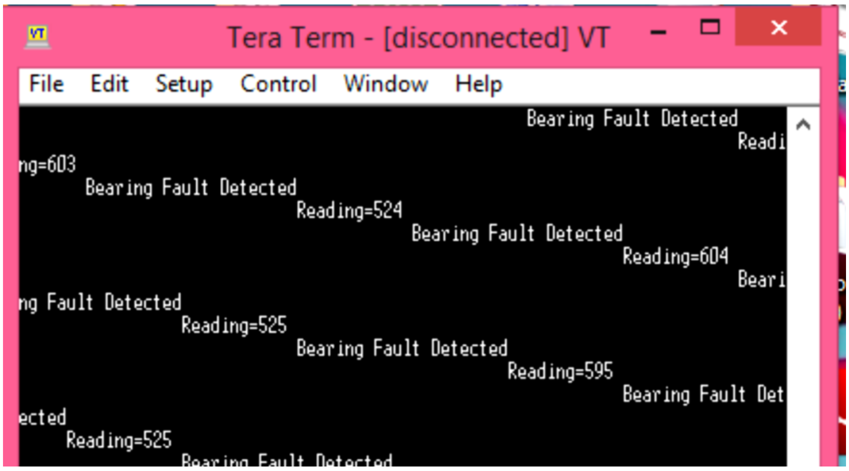


Fig.6

5. FUTURE SCOPE

In proposed method we can diagnose the generator faults means alternately these are the mechanical faults like the bearing fault. Here challenging to develop all type of fault in wind turbine system by using one embedded system with detection of specific fault. For overcome the economic problem.

6. CONCLUSION

In this paper we proposed a current-based health monitoring and fault diagnosis system for wind turbine. In this system we can overcome the problems in existing system. In this approach generator current signal is used for fault diagnosis. By using signal processing we can reduce hardware complexity and improve reliability of system.

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