# Wind turbine generator detection

## Overview

Existing methodologies for fault detection in wind turbine systems are typically classified into three main categories: (i) model-based approaches, which rely on physical or math-ematical models of the system; (ii) data-driven techniques, which leverage historical and real-time. Existing methodologies for fault detection in wind turbine systems are typically classified into three main categories: (i) model-based approaches, which rely on physical or math-ematical models of the system; (ii) data-driven techniques, which leverage historical and real-time. To improve the reliability and maintainability of wind farms, this work proposes a novel hybrid fault detection approach that combines expert-driven diagnostic knowledge with data-driven modeling. The framework integrates autoencoder-based neural networks with Failure Mode and Symptoms Analysis. Offshore wind turbines are normally inspected and maintained at fixed intervals (generally 6-month intervals) and the program (list of tasks) is prepared using experience or risk-reliability analysis, like Risk-based inspection (RBI) and Reliability-centered maintenance (RCM). This time-based. Effective fault detection systems are essential for minimizing high maintenance costs and preventing catastrophic failures. To address this need, this paper presents a semi-supervised framework designed to identify anomalies in wind turbines using only healthy operational data. This study focuses on data-driven fault detection methods, which have gained significant attention across various industrial sectors due to the rapid development of industrial. Abstract—Effective health monitoring of Wind Turbine Gen-erators (WTGs) using anomaly detection techniques can signif-icantly enhance operational reliability.

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## Fault detection in wind turbine generators using a meta-learning ...

This study introduces a fault detection method for WT generators utilizing a 1D convolutional neural network (1DCNN) based on meta-learning principles. We incorporate the ...

## IEEE_SDEMPED2025_Anomaly_Detection_RevisedVersion (1)

Proposed Long Short-Term Memory based autoencoder (LSTM-AE) framework effectively detects early-stage anoma-lies in wind turbine generators (WTGs) by leveraging SCADA electrical time-series ...





## Artificial intelligence in wind turbine fault diagnosis: A systematic

Over the past decade, fault diagnosis technology in the wind energy sector has advanced rapidly, yet existing reviews exhibit methodological and data source fragmentation.

## Frontiers , Fault detection of a wind turbine generator bearing using

This paper discusses the work carried out to develop methodology for identifying faults in a wind turbine generator bearing using interpretable machine learning models and using the results ...

## Proactive fault detection in wind turbine generators using SCADA

This paper presents a proactive fault detection framework for wind turbine generators (WTGs) to enable early intervention, improve reliability, and minimize downtime associated with ...

## Fault Diagnosis of Wind Turbine Based on Convolution Neural ...

Wind power affects the local climate to some extent because it consumes wind power, which is an important factor in climate change. As a result, many scientists have focused on the destruction of ...

## Wind Turbine Fault Detection Through Autoencoder-Based Neural

To improve the reliability and maintainability of wind farms, this work proposes a novel hybrid fault detection approach that combines expert-driven diagnostic knowledge with data-driven ...

## Fault detection in wind turbines using health index monitoring with

Effective fault detection systems are essential for minimizing high maintenance costs and preventing catastrophic failures. To address this need, this paper presents a semi-supervised framework ...

## Fault detection of wind turbine system based on data-driven

Specifically, these approaches are applied to fault detection in wind turbine systems, with performance evaluation conducted using multiple statistical measures. The data utilized in this study ...

## Fault Detection in New Wind Turbines with Limited Data by

## Generative

Intelligent condition monitoring of wind turbines is essential for reducing downtimes. Machine learning models trained on wind turbine operation data are commonly used to detect ...

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