Detection of wind power generation equipment

High-reliability wind turbine system design can facilitate its good operation and improve the utilization rate of wind energy, so as to increase the penetration and competitiveness of wind power generation (Liu et al., 2020a, Jia et al., 2021).

Anomaly detection is of great significance in condition-based maintenance of power plant equipment. The conventional fixed threshold detection method is not able to perform early detection of equipment ...

Wind power capacity worldwide reached a total of 650.8 GW in 2020. The total of 59.7 and 50.2 GW were added in 2019 and 2018, respectively, which amounts to more than 6% of the world"s electricity demand. ... Fault detection on wind turbine has been addressed in the literature mainly considering two approaches, ... as annual expected power ...

Lightning risk management technology research committee for wind power generation systems. In Recent Trends Suggestions Lightning Risk Manage Wind Power System; Technical Report for the Institute of Electrical Engineers of Japan Number 1422; IEEJ Electronic Library: Tokyo, Japan, 2019; pp. 4-8. Ministry of Economy, Trade and Industry.

IET Renewable Power Generation Research Article DNN-based approach for fault detection in a direct drive wind turbine ISSN 1752-1416 Received on 28th December 2017 Revised 17th April 2018 Accepted on 11th May 2018 E-First on 28th June 2018 doi: 10.1049/iet-rpg.2017.0867 Wei Teng1, Hao Cheng1, Xian Ding1, Yibing Liu1, Zhiyong Ma1 ...

that the installed capacity global wind power is expected to increase to 840 GW by the end of 2022. Any renewable Energy requires the advances in the re-liability, availability, maintainability and safety in order to be competitive in the electrical energy market [46], wind power is no exception. Wind power generation often faces

The problem of energy depletion has brought wind energy under consideration to replace oil- or chemical-based energy. However, the breakdown of wind turbines is a major concern. Accordingly, unsupervised learning was performed using the vibration signal of a wind power generator to achieve an outlier detection performance of 97%. We analyzed the ...

In the case of the NREL dataset, although the gearbox damage was more complex than in a typical operational wind turbine and the dataset provided refers to only one speed and load operational condition, the SBPF ...

This paper discusses the work carried out to develop a machine learning based methodology for detecting

faults in a wind turbine generator bearing. Explanation of the working of the machine ...

Wind power ramp events (WPREs) are a common phenomenon in wind power generation. This unavoidable phenomenon poses a great harm to the balance of active power and the stability of frequency in the ...

1 INTRODUCTION. Wind energy has the advantages of being abundant, pollution free, widely distributed and renewable. According to a Global Wind Energy Council (GWEC) report [], the globally installed wind power generation capacity is about 837 GW in 2022, helping the world avoid over 1.2 billion tonnes of CO 2 $text{CO}_2$ each year--equivalent to ...

As a core equipment of thermal power generation, steam turbines incur significant expenses and adverse effects on operation when facing interruptions such as downtime, maintenance, and damage ...

Wind power generation systems produce electricity by using wind power to drive an electric machine/generator. The basic configuration of a typical wind power generation system is depicted in Figure 2. Aerodynamically designed blades capture wind power movement and convert it into mechanical energy.

Modern wind turbines operate in continuously transient conditions, with varying speed, torque, and power based on the stochastic nature of the wind resource. This variability affects not only the operational performance of the wind power system, but can also affect its integrity under service conditions. Condition monitoring continues to play an important role in ...

It is crucial to realize efficient early warning of wind turbine failure to avoid equipment breakdown, to prolong the service life of wind turbines, and to maximize the ...

With the rapid development and increasing energy production capacity of high-power wind turbines, a corresponding increase in maintenance requirements has been observed. Reducing the failure rate of wind turbines is a critical objective, alongside decreasing affiliated operation and maintenance costs. This review focuses on the status monitoring, fault ...

1 INTRODUCTION. Wind power, as a renewable energy source, has witnessed a remarkable surge, growing at an average annual rate of 30% over the past two decades, positioning itself as a key player in the global energy landscape [].Since offshore wind speeds are more consistent and powerful, more power is produced when wind turbines are built there.

(20-25 percent in onshore wind parks and 25-30 percent in offshore wind parks) of the LCOE for this technology [1]. As a result, optimizing maintenance procedures is a critical aspect in achieving low-cost wind energy. Power generation losses due to downtime (caused by unscheduled equipment repairs) and the costs associated with

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With the development of wind power generation technology, the quality and life of wind turbine blades have an significant impact on power generation efficiency and safety. In order to detect blade surface damage as soon as possible and deal with it in time, in this paper, an improved Shuffle-YOLOv5 wind turbine blade defect detection method is proposed, which improves the ...

With the rapid development of wind power generation, the capacity of a single wind turbine unit, which is the equipment necessary to convert wind into energy, has becomes larger. Therefore, the size of the ...

Novelty detection is a statistical method that verifies new or unknown data, determines whether these data are inliers (within the norm) or outliers (outside the norm), and can be used, for example, in developing ...

The experimental and simulation results verify the adaptability of the early fault vibration detection model of wind power transmission in the early fault processing results, which can provide a ...

With increasing global investment in offshore wind energy and rapid deployment of wind power technologies in deep water hazardous environments, the in-service inspection of wind turbines and their ...

IET Renewable Power Generation; IET Science, Measurement & Technology; IET Signal Processing; ... the accuracy and speed requirements for power equipment detection have been getting more precise and instantaneous. ... extracted wind speed, air temperature, and other feature information. The decision tree algorithm of the C4.5 classifier is used ...

Wind power generation has experienced rapid expansion because of its environmental and economic benefits. It is predicted that wind power installations could reach 2110 GW by 2030 [].Doubly-fed induction generator (DFIG)-based units are common among various wind turbine (WT) technologies because of their advantages of only using small ...