SolarHybrid Solutions

Intelligent Wind Power Generation System

Overview

Wind farms’ power-generation efficiency is constrained by the high system complexity. A novel deep reinforcement learning (RL)-based wind farm control scheme is proposed to handle this challenge an.

Can artificial intelligence control wind power systems?

As the scale of the wind power generation system expands, traditional methods are time-consuming and struggle to keep pace with the rapid development in wind power generation systems. In recent years, artificial intelligence technology has significantly increased in the research field of control and design of offshore wind power systems.

What is intelligent wind power network?

The intelligent wind power network provides end-to-end network connections from the wind turbine area and wind farm booster station to the regional centralized control center. Basic architecture of Huawei's intelligent wind power network Wind Turbine Area.

Can intelligent algorithms improve wind turbine control?

Intelligent Algorithms are recognized as powerful optimization tools, they are widely applied in MPPT (maximum power point tracking) control of wind turbines. Research has shown that control strategies optimized through intelligent algorithms significantly enhance the performance and efficiency of wind turbine systems [21, 22].

What is wind power generation?

Wind power generation involves converting wind energy into mechanical energy, which is then transformed into electrical energy. In a wind farm, numerous large wind turbines are installed at a location where there is ample wind resources, forming a cluster that supplies power to the grid.

What is a wind power generation system (WPGS)?

This scholarly paper offers a wind power generation system (WPGS) that

utilizes a configuration of parallel five-phase permanent magnet synchronous generators (PMSGs). The control mechanism for this system is based on a fifteen-switch rectifier (FSR) topology, which is specifically designed for grid-connected applications.

Can deep reinforcement learning improve wind farm power generation efficiency?

High-fidelity CFD simulations are conducted for performance validation. Wind farms’ power-generation efficiency is constrained by the high system complexity. A novel deep reinforcement learning (RL)-based wind farm control scheme is proposed to handle this challenge and achieve power generation optimization.

Intelligent Wind Power Generation System

[Hybrid ANFIS-PI-Based Robust Control of Wind Turbine Power Generation]

In this paper, the proposed WTPGS system is designed in MATLAB/Simulink software where a hybrid controller (ANFIS-PI) is implemented in the machine-side converter ...

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[Review on the Application of Artificial Intelligence ...]

To promote the application of AI in the control and design of offshore wind power systems, and to further the development of offshore wind ...

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[IoT-enabled intelligent fault detection and rectifier optimization in]

Download Citation , On Mar 1, 2025, Fengyu Yang and others published IoT-enabled intelligent fault detection and rectifier optimization in wind power generators , Find, read and cite all the

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[Intelligent backstepping control of power grid-connected wind ...]

To enhance the control performance of the proposed wind system, an Adaptive Neuro-Fuzzy Inference System (ANFIS)-based Backstepping control (BSC) methodology is ...

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Research on Low-Voltage Ride-Through and Intelligent

The research findings provide a valuable theoretical foundation and technical reference for the intelligent and efficient operation of wind power generation systems.

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Multivariate analysis and optimal configuration of wind ...

The wind-solar complementary power generation system is composed of solar photovoltaic array, wind turbine generator sets (WTGS), intelligent controller, valve-controlled sealed lead-acid ...

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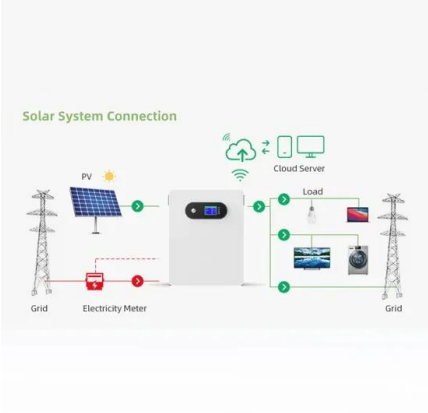

Intelligent backstepping control of power grid-connected wind power

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AI Applications in Wind-Energy Systems

Large-scale expansion of wind-power generation hinges on optimized control and operation of wind turbines and power systems -- which, in turn, hinges on crucially accurate ...

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Hybrid ANFIS-PI-Based Robust Control of Wind Turbine Power ...

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WO/2025/058163 INTELLIGENT WIND POWER GENERATION SYSTEM

The objective of the present invention is to provide an intelligent wind power generation system capable of increasing wind power generation efficiency and power generation time by ...

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Design of Intelligent Wind Pumping Power Generation System ...

This study designed and implemented an intelligent wind-powered water pumping and electricity generation system based on a microcontroller. The system utilizes optimized ...

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[Achieving wind power and photovoltaic power prediction: An ...]

A new intelligent prediction system is proposed, which can perform high-precision adaptive prediction of wind and PV power at the same time with high generalization ability, and ...

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[The Application of Internet of Things Technology in Intelligent Wind]

This article provides important information on the Internet of Things technologies used in intelligent wind power generation, including wind speed and direction sensors, turbine health ...

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[An intelligent deep learning based prediction model for wind power]

His research interests include asset management in smart grids, power system reliability and resilience, and development of innovating techniques for integrating renewable ...

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[WO/2025/058163 INTELLIGENT WIND POWER GENERATION ...]

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[A Review of Intelligent Systems for the Prediction of Wind Energy ...]

This paper analyzes several types of intelligent systems for the prediction of wind energy using Machine Learning (ML) algorithms to achieve efficient power generation ...

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[A new energy power generation intelligent optimization control system]

The present invention discloses an intelligent optimization control system and method for renewable energy power generation, and relates to the field of renewable energy technology. ...

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[Intelligent approach to maximum power point tracking control ...]

In the variable-speed generation system, the wind turbine can be operated at the maximum power operating point for various wind speeds by adjusting the shaft speed. These ...

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[The Application of Internet of Things Technology in Intelligent ...]

This article provides important information on the Internet of Things technologies used in intelligent wind power generation, including wind speed and direction sensors, turbine health ...

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[Optimal design of combined operations of wind power-pumped ...]

Multi energy complementary system is a new method of solving the problem of renewable energy consumption. This paper proposes a wind -pumped storage-hydrogen ...

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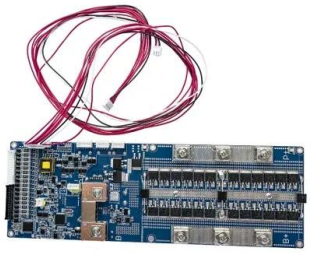

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Wind power generation involves converting wind energy into mechanical energy, which is then transformed into electrical energy. In a wind farm, numerous large wind turbines are installed ...

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[Smart control and management for a renewable energy based]

To monitor maximum energy points efficiently, the P& O algorithm was used to control photovoltaic and wind power systems. The battery storage system is organized via PI ...

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[Intelligent wind farm control via deep reinforcement learning and ...]

Wind farms' power-generation efficiency is constrained by the high system complexity. A novel deep reinforcement learning (RL)-based wind farm control scheme is ...

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[Intelligent Condition Monitoring of Wind Power ...]

Modern wind turbines operate in continuously transient conditions, with varying speed, torque, and power based on the stochastic nature of the ...

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[Hybrid ANFIS-PI-Based Robust Control of Wind Turbine Power Generation]

Abstract This paper introduces a novel hybrid controller designed for a wind turbine power generation system (WTPGS) that utilizes a permanent magnet synchronous ...

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[Adaptive optimal secure wind power generation control for ...]

The performance of a wind turbine (WT) relies heavily on the control systems implemented on both the turbine side and the generator side. These systems deal with highly ...

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[Maximum power point tracking algorithms for wind ...]

Wind energy is one of the most important clean energies and the variable speed constant frequency technology is widely used in wind energy ...

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[Review on the Application of Artificial Intelligence Methods in the]

To promote the application of AI in the control and design of offshore wind power systems, and to further the development of offshore wind energy, an exhaustive systematic ...

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