

System and Method for Fault Diagnosis of 3-Phase Uncontrolled Rectifier in Wind Energy Conversion System

Application Number: 202411028446

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ABSTRACT

Embodiments disclose a method and a system for fault detection, isolation, and identification of 3-phase uncontrolled rectifiers, using Machine Learning (ML) models, in any renewable energy system including Wind Energy Conversion Systems (WECS) and the like.

KEY APPLICATION AREAS

1. Renewable Energy Systems.
2. Wind Energy Conversion Systems (WECS).
3. Power Electronics & Power Conditioning.
4. Smart Grid & Grid Integration.
5. Machine Learning-Based Fault Diagnosis.
6. Industrial Power Monitoring & Predictive Maintenance.

POTENTIAL USE

1. Real-time fault detection, isolation, and classification in 3-phase uncontrolled rectifiers without shutting down the system.
2. Condition monitoring of renewable energy converters using existing sensor data and machine learning.
3. Fault diagnosis in wind energy conversion systems (WECS) to improve reliability and reduce downtime.
4. Predictive maintenance of power conditioning units using Random Forest-based analytics.
5. Smart grid power electronics monitoring with continuous operation and uninterrupted power flow.
6. Detection of single, double, triple diode, and boost converter faults in renewable energy power converters.
7. Industrial monitoring of 3-phase rectifier systems across power generation, conversion, and distribution applications.