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SOUTENANCE DE THÈSE DE DOCTORAT

ÉCOLE DE GÉNIE

Soutenance de thèse de Md Jahidur Rahman
Doctorat en ingénierie
En extension avec l'UQAC

« Integration of distributed generation along with energy storage system to reduce the high penetration impacts of renewable energy sources into the power grid. »

Le **jeudi 15 février 2024**
à 13 h au local E-104 du campus de l'UQAT à Rouyn-Noranda et par vidéoconférence

HUMAINE
>>>> CRÉATIVE
AUDACIEUSE

MD Jahidur Rahman, M. Sc.

Doctorat en ingénierie

2024

Doctorat en ingénierie

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2017

M.Sc in Electrical Engineering

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2013

B. Sc. in Electrical and Electronic Engineering

Stamford University, Dhaka, Bangladesh

IIntegration of distributed generation along with energy storage system to reduce the high penetration impacts of renewable energy sources into the power grid.

The objective of this study is to explore critical aspects of distributed generation (DG), renewable energy integration, and energy storage systems, focusing on enhancing power network efficiency while minimizing power losses and environmental air pollution. This doctoral thesis acknowledges the environmental and economic benefits of DG while highlighting the inherent challenges in managing fluctuating Renewable Energy Sources. A control algorithm for a high-penetration hybrid diesel-wind-based energy storage system is designed to maintain dynamic stability in power flow and control network frequency. This thesis introduced a control algorithm employed with a Fuzzy Logic controller for a wind-based energy storage system using the power-sharing method. Subsequently, an adaptive notch filter synthesis is developed to mitigate input current fluctuations and nonlinear control techniques are used to evaluate the performance of the system with different configurations. The key advantage of these nonlinear controllers is their ability to compensate for reactive power and harmonic currents, resulting in a disturbance-free power network and a reduction in the Total Harmonic Distortion rate of the inverters, ultimately enhancing the overall efficiency of the power grid.