2024 3rd International conference on Power Electronics and IoT Applications in Renewable Energy and its Control (PARC) | 979-8-3503-0940-9/24/$31.00 ©2024 IEEE | DOI: 10.1109/PARC59193.2024.10486496

2024 3rd International Conference on Power Electronics and IoT Applications in Renewable Energy and its Control (PARC)

23-24 February, 2024

Department of Electrical Engineering
GLA University, Mathura, India

Organized by:
GLA University, Mathura, India

Technically and Financially Co-Sponsored by

2024 3rd International conference on Power Electronics and IoT Applications in Renewable Energy and its Control (PARC) | 979-8-3503-0940-9/24/$31.00 ©2024 IEEE | DOI: 10.1109/PARC59193.2024.10486640

2024 3rd International Conference on Power Electronics and IoT Applications in Renewable Energy and its Control (PARC)

23-24 February, 2024

Department of Electrical Engineering

GLA University, Mathura, India

Table of Content

Microgrid System Modelling and Performance Analysis: Analysis from Case Studies

Publisher: IEEE

Cite This PDF

Snehashis Ghoshal ; Arindam Mondal ; M. Prakash **All Authors**

Abstract:
Microgrid represents an independent electrical system that seamlessly integrates diverse energy sources, energy storage units, and electrical loads. It operates autonomou... **View more**

Metadata

Abstract:
Microgrid represents an independent electrical system that seamlessly integrates diverse energy sources, energy storage units, and electrical loads. It operates autonomously or in coordination with the primary power grid to ensure a dependable and efficient electricity supply to specific regions or communities. This research conducts a comprehensive examination of foundational microgrid systems through three diverse case studies, emphasizing small-scale microgrids with varying energy sources and control methodologies. The primary objective is to gain insights into the performance and optimization of distributed resources under diverse operational conditions. Case studies include a DC microgrid with backup storage and PV panel, a hybrid AC microgrid with PV and energy storage, and a unique PV array and fuel cell combination. The findings underscore the importance of advanced control methods, efficient energy storage, and diverse renewable sources in microgrid optimization. The research contributes valuable insights for addressing challenges in renewable integration, rural electrification, grid resilience, and community-based microgrids, establishing a foundational knowledge base for future advancements in sustainable and reliable energy solutions.

Published in: 2024 3rd International conference on Power Electronics and IoT Applications in Renewable Energy and its Control (PARC)

Date of Conference: 23-24 February 2024

DOI: 10.1109/PARC59193.2024.10486058

Date Added to IEEE *Xplore*: 04 April 2024

Publisher: IEEE

Conference Location: Mathura, India

ISBN Information:

Electronic ISBN:979-8-3503-0940-9

Print on Demand(PoD) ISBN:979-8-3503-0941-6

Snehashis Ghoshal
Department of Electrical Engineering, Dr. B.C.Roy Engineering College, Durgapur, West Bengal, India

Arindam Mondal
Department of Electrical Engineering, Dr. B.C.Roy Engineering College, Durgapur, West Bengal, India

M. Prakash
Department of Electrical Engineering, NIT Nagaland, Chumukedima, Nagaland, India

Contents

A microgrid is a self-sufficient electrical network that combines different energy sources, storage units, and electrical loads. It functions independently or alongside the main grid to supply dependable electricity to a localized area. By utilizing a mix of sources like traditional generators and renewable energies such as solar, wind, and hydro power, it can capture, store, and distribute electricity efficiently [1, 2]. Microgrids feature advanced control systems that manage and optimize electricity distribution, ensuring a balanced interplay between energy generation and usage while maintaining grid stability. These systems swiftly make decisions based on factors like energy demand, supply availability, grid conditions, and economic considerations [3]. A defining feature of a microgrid is its dual operation in grid-connected and islanded modes. When connected to the larger grid, it facilitates power exchange, bolstering system stability. Conversely, it detaches from the primary grid, autonomously powering local loads using its internal energy resources. [4]. Microgrids embody decentralized electricity operations on a smaller scale compared to centralized grids. By merging various energy sources and smart grid tech, they offer increased efficiency, reliability, resilience, and access to cleaner energy. These systems consist of essential components working together to ensure dependable and efficient electricity generation, distribution, and use [5–9]. These essential components of a microgrid collectively contribute to its enhanced energy efficiency, reliability, resilience, and capacity to incorporate cleaner and renewable energy sources into the energy mix. Optimal resource dispatch particularly with a storage facility enhances the flexibility of a microgrid system [10].

Authors

Snehashis Ghoshal
Department of Electrical Engineering, Dr. B.C.Roy Engineering College, Durgapur, West Bengal, India

Arindam Mondal
Department of Electrical Engineering, Dr. B.C.Roy Engineering College, Durgapur, West Bengal, India

M. Prakash
Department of Electrical Engineering, NIT Nagaland, Chumukedima, Nagaland, India

Figures

References

Keywords