Digital technologies in microgrids

Are microgrids a viable solution for integrating distributed energy resources?
With the growing urgency to decarbonize power systems and accommodate the increasing penetration of renewable energy sources,microgrids have emerged as a practical solutionfor integrating distributed energy resources (DERs),such as solar photovoltaics,wind turbines,and energy storage systems.
What are microgrids & how do they work?
The concept of microgrids (MGs) as compact power systems,incorporating distributed energy resources,generating units,storage systems,and loads,is widely acknowledged in the research community. Globally,nations are adopting MGs to access clean,affordable,and reliable energy solutions.
What is a microgrid digital twin (mgdt)?
A microgrid digital twin (MGDT) refers to the digital representation of a microgrid(MG),which mirrors the behavior of its physical counterpart by using high- delity models and simulation platforms as well as real-time bi-directional data exchange with the real twin.
Could a digital twin revolutionize smart microgrid systems (SMGs)?
Recent advancements in communication technology (CT) have ignited significant interest in the cutting-edge concept of the digital twin (DT),which holds the potentialto revolutionize smart microgrid systems (SMGs).

A microgrid, regarded as one of the cornerstones of the future smart grid, uses distributed generations and information technology to create a widely distributed automated energy delivery ...

AI-Driven Microgrids: A Review of Enabling Technologies and Future Prospects July 2025 International Journal of Latest Technology in Engineering Management & Applied Science 14 (6):630 ...

Digital twin (DT) technology is a promising solution for achieving optimized microgrid control with enhanced efficiency, reliability, and sustainability. In this article, we focus on a real-world ...

Section 3 contains a discussion of the assimilation of Industry 4.0 technologies for micro grid, where the significance and applications of IoT, cloud computing, big data, AI and ML, edge/fog ...

This paper provides a comprehensive review of the future digitalization of microgrids to meet the increasing energy demand. It begins with an overview of the background of microgrids, ...

This paper provides a structured framework for constructing Digital Twin-enabled Smart Microgrids, emphasizing automation to enhance device intelligence.

Digital microgrids represent the forefront of energy innovation, integrating advanced IoT, AI, and blockchain technologies to optimize distributed energy resources and enhance grid resilience. These ...

Microgrid is one of the reliable power systems that integrates complex renewable energy sources. Along with

the increasing global demand for electricity and the widespread adoption of ...

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ABSTRACT Following the fourth industrial revolution, and with the recent advances in information and communication technologies, the digital twinning concept is attracting the attention of both academia ...

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