

Review of: "Internet of Things in Smart Grid: A Comprehensive Review of Opportunities, Trends, and Challenges"

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Potential competing interests: No potential competing interests to declare.

The paper presents a detailed exploration of IoT integration within smart grids, focusing on the challenges and opportunities presented by this technology. While the authors provide a comprehensive review of IoT applications, they do not sufficiently address the issue of scalability, particularly in terms of how the proposed system handles an increasing number of connected devices. Detailed performance metrics, such as transaction processing times and network latency under varying device loads, would offer valuable insights into the scalability and practical deployment of the proposed solutions. However, I have the following concerns:

1. The scalability of the IoT-integrated smart grid is not sufficiently addressed. The paper discusses the integration of numerous IoT devices but lacks detailed performance metrics or stress testing results that demonstrate how the system can handle an increasing number of connected devices. Including specific metrics such as transaction processing times, network latency, and throughput under varying device loads would provide valuable insights into the practical deployment and scalability of the proposed solutions.
2. While the paper covers various applications of IoT in smart grids, there is insufficient analysis of the computational costs associated with these integrations. For example, the overhead for real-time data processing, device interactions, and data storage is not fully explored. Providing performance metrics, such as execution times for data processing tasks and the energy consumption of these operations, would help in evaluating the efficiency and economic feasibility of the proposed IoT deployments.
3. The paper mentions security challenges in IoT-integrated smart grids but does not provide a detailed analysis of privacy-preserving mechanisms. Although the importance of secure communication is acknowledged, the practical implementation of encryption methods, secure data storage, and privacy-preserving data sharing needs further elaboration. A detailed analysis of the computational overhead associated with these security measures, especially under different load conditions, would be valuable in assessing their feasibility and impact on system performance.
4. The discussion on IoT integration is primarily theoretical and would benefit from more concrete examples or case studies demonstrating real-world applications. Details on how the proposed solutions integrate with actual smart grid devices and manage real-time data are necessary. Providing case studies or examples, along with performance metrics such as latency, data throughput, and fault tolerance, would significantly enhance the practical applicability of the proposed solutions.

5. The paper summarizes the contributions of IoT in smart grids but lacks quantitative results to support these claims. Including specific performance metrics or analyses that compare the proposed solutions with existing ones would strengthen the validation of the system's effectiveness. Metrics related to energy savings, improved grid reliability, or reduced operational costs due to IoT integration would provide tangible evidence of the benefits.