

Smart Grid Using IOT

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Abstract: *The Smart Grid (SG) represents a transformative evolution of traditional power systems, integrating advanced Communication, Information Technology (IT), and Internet of Things (IoT) technologies to enable efficient, reliable, and real-time energy management. SG incorporates billions of smart devices, including meters, appliances, sensors, and actuators, facilitating enhanced monitoring, control, and optimization of energy flow from production to consumption. With the growing adoption of Renewable Energy Sources (RES) and the shift to distributed Multi-Agent Systems (MAS), the SG demands robust communication protocols and standards, such as IEC 61850, MMS, and XMPP, to meet ubiquitous, reliable, and secure data transmission needs. This review examines the applications, communication requirements, and IoT protocols in SG, analyzing their performance in meeting critical Quality of Service (QoS) parameters like security, scalability, and reliability. It highlights challenges in protocol selection for SG's dynamic environment and identifies gaps in existing solutions. Furthermore, it explores IoT-based energy meter implementations, which leverage ESP8266 and Arduino for real-time energy monitoring and cloud integration, providing cost-effective automation and reducing manual intervention. The paper emphasizes future trends and stakeholder requirements, presenting a holistic approach for integrating IoT technologies to advance SG functionalities and address emerging challenges in energy systems.*

Keywords: Smart grid, Internet of Things, Electricity grid, Advancement in smart grid.