

Enabling Efficient Monitoring in Smart Grid Distribution Systems using IoT

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Abstract:

This work presents an innovative method for enabling effective monitoring in Internet of Things (IoT) based smart grid distribution systems. With the increasing complexity and dynamic nature of modern power distribution networks, there is a growing need for real-time monitoring and control mechanisms to ensure reliable and efficient energy distribution. The proposed system leverages IoT technology to create a network of interconnected devices, sensors, and communication infrastructure within the smart grid distribution system. Real-time data on multiple parameters, including voltage, current, power quality, and system stability, is gathered and transmitted by these devices. The IoT-based system enables seamless integration and communication between the different components of the smart grid, facilitating comprehensive monitoring and control capabilities. The proposed smart grid includes a high-performance Single Ended Primary Inductance Converter (SEPIC) with a Firefly-optimized Artificial Neural Network (FF-ANN) for maximum power point tracking (MPPT). Together with the stable output voltage, this algorithm effectively keeps an eye on other variables like maximum voltage and current. The performance and efficiency of smart grid distribution systems could be greatly improved by the suggested IoT-based monitoring system.

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I. Introduction

Solar power has grown in popularity around the globe since it is abundant and has no harmful effects on the environment. However, as conversion technology progresses, solar power production gets more affordable. Monitoring at the consumer level is currently required to make the solar system accessible [1] [2]. More appropriate energy sources possibly entirely replace non-renewable energy sources in the next years. The Solar PV System generates sufficient electricity [3]. As a result, the way it performs needs to be monitored in real time. Real-time tracking of smart grid parameters and remedy discovery via IoT. An IoT device is one that communicates between a machine and the cloud. The proposed system has capable of securely retrieve data from the web due to the deployment of IoT [4][5].

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