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Experimental analysis using IoT-Based Smart power quality analyzer system with remote data access and GSM alerting mechanism

Abstract

Power Quality Analyzers (PQA) play an important role in monitoring and controlling health of the electrical systems. They can report the fluctuations in the field measurements with different power quality issues as well as due to load variations. Internet of Things (IoT) is a potential technology to design Smart PQAs for remote monitoring and easy integration of the field information on the cloud platform using gateway units. This paper focuses on the development of a Smart PQA system using low-cost IoT hardware and software design solutions. The hardware development is completed using Arduino Mega 2560 microcontroller in combination with ESP32 Wroom Wi-Fi gateway and SIM900A GSM gateway. The real-time field data is gathered at the ThingSpeak platform for future analysis, while GSM-based design ensures timely alerts to the end users for any major fluctuation in the power supply. The performance of the proposed low-cost system has been compared with the readings obtained from FPGA-based conventional PQA and standard Fluke Meter when connected to different loads. The proposed system output values are tabulated and compared using graphs. The proposed system is expected to be useful for the critical assessment, monitoring, and control of power quality parameters in various commercial and residential premises.

Keywords

Electrical systems; GSM; Internet of Things; power quality analyzer; smart