

The College of Graduate Studies and the College of Engineering Cordially Invite You to a

Master Thesis Defense

Entitled

DESIGN OF LOW-COST POWER QUALITY AND ENERGY MONITORING SYSTEM FOR LOW VOLTAGE DISTRIBUTION NETWORK

by

Rami Moustafa

Faculty Advisor

Prof. Hussain Shareef, Department of Electrical Engineering

College of Engineering

Date & Venue

3:30 PM

Tuesday, 29 November 2022

Room 1164, F1 Building

Abstract

The constant increase of non-linear loads and the future high integration of renewable energy sources in the power grid make power quality monitoring systems crucial to maintain maximum efficiency and reliability. However, the current devices for power quality monitoring are costly, limiting PQ monitoring systems' usage to specific applications and for a particular time. This thesis aims to present a design and the implementation of a low-cost power quality monitoring system using a single-board computer (Raspberry Pi) and highly accurate multiphase power quality monitoring ADE9000 IC. The proposed PQM system is configured to work remotely through either a wireless connection or an Ethernet connection. The acquired data is stored in the Influxdb open-source time-series database so that the data can get queried for processing purposes or visualization in real-time using Grafana. A wide range of PQ events, such as sag, swell, interruption, notch, transient, and the combination of these disturbances, are used to evaluate and train the classification algorithm. The overall accuracy of the classification algorithm is determined to be 97.7%. Moreover, the precision of measurements from the proposed PQM system is tested and found to be compatible with IEC 61000-4-30 standard Class S. Finally, the proposed solution will help in a broader implementation of power quality monitoring systems with cheaper and less complex designs.