

Power Quality Monitoring and Data Collection

Bachelor thesis project

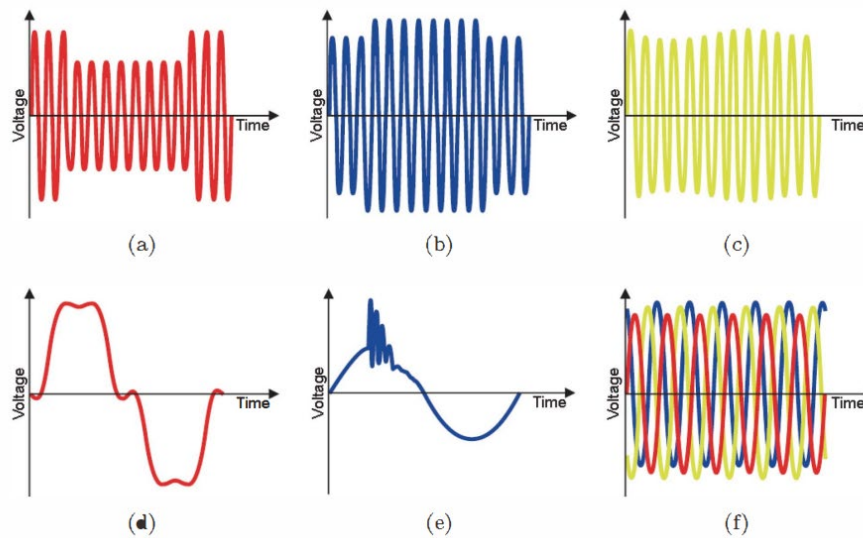


Figure 1. Basic PQ conducted phenomena: voltage dip (a), surge (b), fluctuations (c), harmonic voltage distortion (d), transient voltage (e), and unbalanced 3-phase supply (f).



Figure 2. The photo of the Power Quality monitoring device.

Summary:

Enabling Wi-Fi communication in a newly developed Power Quality (PQ) monitoring device, and testing the PQ of various grids.

Problem definition:

Power quality refers to the stability and consistency of the electrical power supplied to a system, which takes into account factors such as harmonic distortion, frequency stability, and waveform purity. Poor PQ can lead to inefficient operation of equipment, increased energy costs, and in severe cases, damage to the electrical devices.

University of Twente.

Power Quality Monitoring and Data Collection

Bachelor thesis project

Therefore, it is important to monitor PQ in various grids, and be able to predict the behaviour of the grid before the occurrence of an unexpected event. To this end, PQ monitoring devices can be used, such as the one shown in Fig. 2. The PQ monitor allows to collect data such as line current and voltage RMS, active and reactive power, frequency of the voltage, power factor, temperature and humidity among others. It is however required that the device communicates with a web server through Wi-Fi in order to collect the data for further analysis. Moreover, so far, it has only been tested in very stable environments and it is required to collect data about different, varying environments and test the behaviour of PQ monitor under various circumstances, such as those in Fig. 1.

Method:

The student will work in the lab with a PQ monitor and a grid emulator. The student might also need to write code in a programming language (C, C++, Matlab or Python).

Research objectives:

The main objective of this study is to characterize power quality of different electrical environments, simulated using grid emulator, as well as real-world, by collecting the data and organizing it in a clear structure. To that end it is required to implement the data collection using Wi-Fi communication.

Courses and supervision:

The student needs to be able to understand embedded programming in order to enable communication of the PQ device with a server through Wi-Fi. The student should also be able to work independently in power electronics lab, and understand the principle behind grid emulator, as well as the concept of power quality.

Contact:

Karol Niewiadomski, k.niewiadomski@utwente.nl, Niek Moonen, d.j.g.moonen@utwente.nl

University of Twente.