

## Master 2017

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### **Development of a Portable 3-Phase Energy Analyzer Measurement System.**

#### ***ABSTRACT - Masterthesis***

Analysis of power networks is an important contribution to maintain functionality of electrical power networks as well as to reduce energy costs. Besides administrative regulations regarding net quality, users are interested in live evaluation of network state, power consumption and long time event logging. In this thesis, a handheld device with embedded controller and graphical user interface will be developed.

This task will cover following topics:

- Literature and market research: Power Quality and Energy Analysis
- Regulations research, f.i. DIN EN 61000-4-30:2016-01; VDE 0847-4-30:2016-01
- Implementation of 3-phase measurement circuit including digitization
- Connection to Raspberry Pi
- Implementation of following measurements:
  - Base Measurements
    - Single Phase
    - Three Phase
    - RMS Voltage, Current
    - Neutral Current
    - Ground Current
  - Real Time Display of Measurements
    - Basic Waveform Display
    - Total Harmonic Distortion
    - Power and Energy
    - Live Phasor Diagram
    - Voltage and Current Harmonics
    - Interharmonics
    - K-Factor
  - Advance Measurements
    - Unbalance
    - Interharmonics
    - Timed Snapshots
    - Long Term RMS Logging
    - Waveform Recording

- Implementation of following measurements, cont:
  - Flicker
  - EN50160 Analysis
  - EN 61000-4-30
- GUI, visualization of live phasor-diagram
- data logging of specific events with timestamp in text file
- evaluation of continuous data logging on SD card/external storage capabilities
- evaluation o logging to SQL database
- verification by measurement
- Documentation