Karlsruhe Institute of Technology

Institute for Automation and Applied Informatics (IAI)

ENERGY LAB

HITACHI

Bachelor Thesis

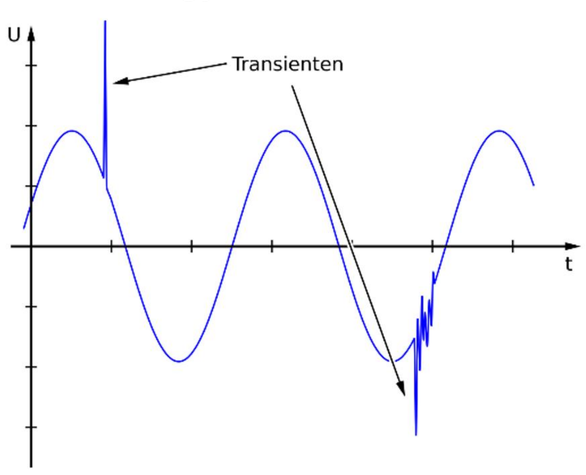
Impact of power network disturbances on measurements in smart grids

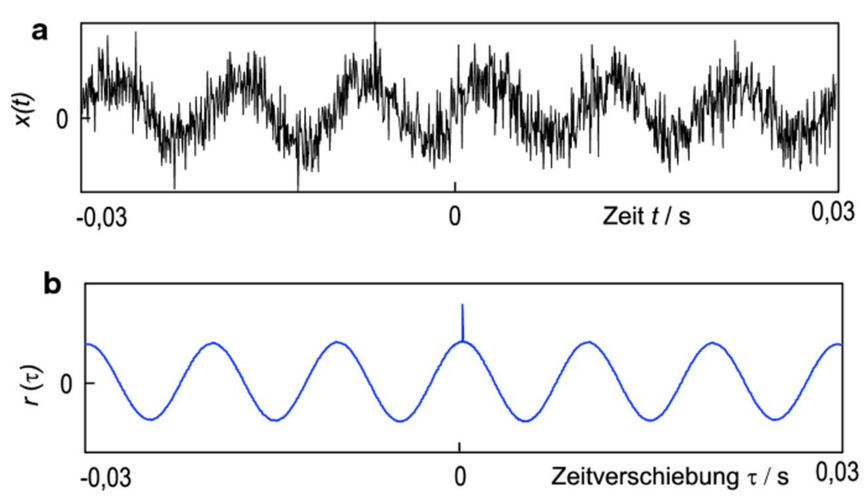
Background

Smart power grids are characterized by decentralized energy generation and dynamic load distribution. To reliably control and monitor this complex interaction, distributed and precise measurement systems are required. Using transducers, these systems measure voltages and currents and derive quantities, such as the grid frequency which are then forwarded to a central control unit.

Scope of work

The focus of this work is to investigate and to quantify the effect of typical disturbances in the low voltage power grid on the data produced by such measurement systems. Therefore, different sensors and measuring devices must be integrated into an experimental setup at the Energy Lab at KIT to mimic realistic operation conditions. Using the set-up, measurement data has to be generated, read out, evaluated and brought into relation to the disturbances. Finally, possibilities for reducing the effects on measuring technology are to be discussed.





The work takes place in close cooperation with the Distribution Automation (DA Solution) department of Hitachi Energy in Mannheim and provides an insight into the professional environment of product development.

Preliminary outline of the work

1. Compilation and characterization of typical disturbances in distribution networks such as noise, disturbances with high transients, high frequency disturbances caused by PV inverters, etc.
2. Creation of a measurement concept using provided measurement systems
3. Conduction of series of experiments with variation of interference variables and of the measurement system
4. Processing, evaluation and analysis of measurement data
5. Discussion of technical possibilities for reducing measurement deviation in view of the experimental results

Most of the work is carried out in the Energy Lab (Campus North of KIT). In addition, two phases of one week each must be planned in the laboratory of Hitachi Energy in Mannheim.

This sounds exciting? Then get in touch!

Die Arbeit darf natürlich auch in deutscher Sprache geschrieben werden.

Contact

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System, Framework

- Experimental facilities at KIT Campus North (Energy Lab)

Studies

- Electrical engineering or similar disciplines

Required skills

- Hands-on experience with laboratory equipment (e.g. as part of your study, trainings or hobby)
- Programming (python/matlab) and office tools for data analysis and evaluation

Preferred and helpful skills

- Knowledge of measurement sys-tems, data acquisition, monitoring and control in power systems (aka. Smart Grid concepts)
- Knowledge in either energy, metrology or high frequency engineering

Languages

German, English

Starting date

As soon as possible.

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