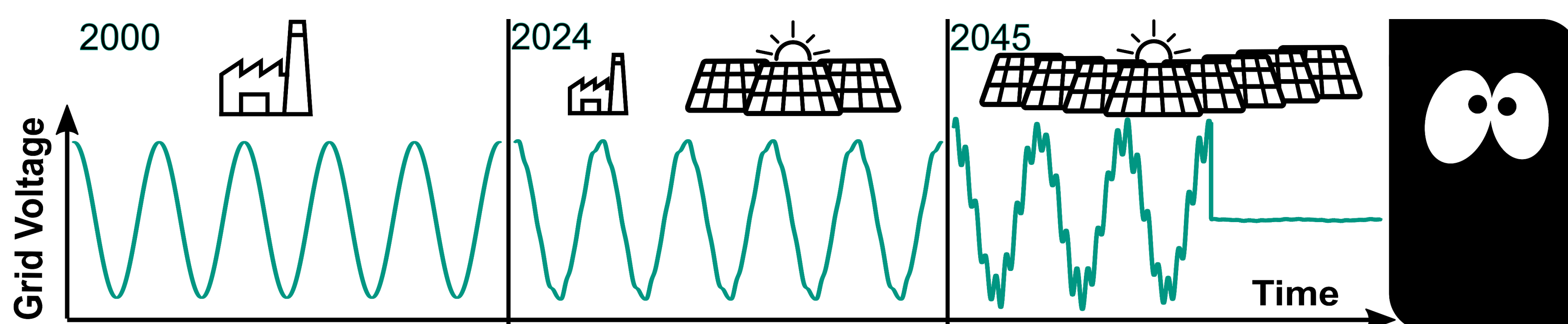


Master Thesis / Bachelor Thesis

E-Experiment – Inverter in Simulation

Scientific Title: Simulation Analysis of Inverter Current Depending on Grid Disturbances

Our electrical power grid faces major changes in order to realize the energy transition towards renewable generation. For example, large central power plants are replaced by many widespread generators such as photovoltaics and wind turbines. This can cause issues with power quality and security of supply [1, 2].



This thesis aims to understand the behavior of PV inverters using simulations [3] and map it to observations in measurements. Special focus in our case are different frequency components in the inverter current and supply voltage. The measurements you will compare to are already available.

This sounds exciting? Then get in touch!

The proposed thesis consists of the following parts:

- You will focus on the simulation and only use measured data already available.
- Familiarization: Simulation soft- and hardware and inverter modeling.
- First simulations: How does a simple combination of standard simulation blocks behave? How much do they already agree with measurements?
- Improvement: Adapt the model in order to better reproduce the measured behavior.
- Extension for Master thesis: Behaviors under more than one grid condition.

We are happy to answer any questions you might have. Feel free to ask for an appointment or just give us a call!

Die Arbeit darf natürlich auch in deutscher Sprache geschrieben werden.

References

- [1] DIN EN 50160:2020-11 „Merkmale der Spannung in öffentlichen Elektrizitätsversorgungsnetzen; Deutsche Fassung EN 50160:2010 + Cor.:2010 + A1:2015 + A2:2019 + A3:2019“
- [2] Li, C. “Unstable Operation of Photovoltaic Inverter From Field Experiences,” *IEEE Transactions on Power Delivery*, 2018, 33(2), 1013–1015. <https://doi.org/10.1109/TPWRD.2017.2656020>
- [3] Kyesswa, M et al. A Digital Framework for Locally and Geographically Distributed Simulation of Power Grids. *ENERGY TECHNOLOGY*, 2023. <https://doi.org/10.1002/ente.202201186>

Advisor:

Ellen Förstner, M. Sc.

Programming language:

Matlab, RSCAD

System, Framework(s):

Windows

Required skills (Wish list):

- Student of computer science or mechanical engineering
- First experiences with real time simulations (e.g. lecture, Hiwi)

Language(s):

German, English

Starting date:

As soon as possible

For more information, please contact:

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