

## **Hiwi Job / Bachelor / Master Thesis**

### Stability and control analysis of inverters with respect to communication technologies

#### **Background of the research:**

On the top of power system technology, requirements regarding transmission and management of information flow becomes gradually more important. Proper information flow is all the more necessary in the future power system which will integrate more components with such requirements. Therefore, the development of power components themselves is determined by the development of ICT technologies. Since both the power system layer components and ICT layer components are and will be even more dependent on each other, the evaluation of the components from both layers, as well as, evaluation of the interfaces between these layers should be investigated.

#### **Particular context:**

Analysis of the inverters control (power system layer) usually neglects communication technologies (ICT layer) i.e. communication protocols, communication links, processing times, bandwidth, latency etc. Thus, the influence of real features of different communication protocols on the control of inverters should be explored. The assessment of commonly used industrial protocols (for communication with inverters) and their influence on power system stability is considered as very important field for the development of effective operation between power system layer and ICT layer.

The cooperation with laboratory will be established as the part of the research. We will test particular communication technologies at the available test bench. Appropriate scenarios for chosen power system applications will be developed and evaluated in the laboratory environment. Moreover, the application in the laboratory will be simulated in software environment for the concept confirmation. Combining the results of the literature review, laboratory tests and simulations, we will be able to derive appropriate requirements of the communication technologies (for stable inverters operation) with respect to investigated power system stability and control application, as well as looking at the broader perspective of the power system stability and control (beyond the particular application).

#### **Basic steps of the project:**

- Literature review on current and future communication technologies (limitations, prospects etc.) in the power system,
- Analysis of different power system stability and control applications with respect to available components in the laboratory (in order to implement chosen application in laboratory environment),

- Modelling of the laboratory setup with the chosen application in the simulated environment (e.g. MATLAB) and evaluation of communication features (bandwidth, latency etc.) in the developed simulated test case,
- On the basis of the literature review, software simulation and laboratory results – development of communication requirements (mainly with respect to investigated power system application and for broader perspective).

### **Your profile:**

- Motivation for research, desire to learn new things,
- Power system knowledge including some concepts of power system stability,
- Basic telecommunication knowledge,
- Communicative English.

### **Contact: (Feel free to contact me for more information!)**

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