

Instrument interface for low-voltage lab (LoLa) inverter testbed

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In future power systems, many rotating generators, e.g., coal power plants, will be replaced by inverter-interfaced renewable sources. Unfortunately, not all ancillary services, such as frequency control or a desired short circuit behaviour, can be satisfactorily provided by these renewable sources. Therefore, the use of inverter-interfaced storage units which provide ancillary services has been advocated. Consequently inverters will play a central role in future power systems.

Given their prominent use in future power systems, inverters are an essential part of research and teaching activities of the ASN Group at the University of Kassel. In the future, it is desired to run inverter-dominated grids in the ASN laboratory, so students and researchers can run experiments on physical hardware.

Goals

So far, the hardware and low-level control software of a lab-scale inverter has been developed within the ASN Group. In this thesis, a measurement and control interface shall be developed and tested. In summary, the following tasks can be formulated.

- Literature review
 - Grid forming inverters
 - Communication and control interfaces for programmable instruments
- Implement interface between controller and computer
 - Gateway
 - QcoDeS instrument driver
- Develop laboratory experiments in the form of Jupyterlab notebooks
- Perform tests with two real-world inverters