

Student project proposal

Project title

Communication protocol for hybrid AC/DC networks (collaboration between DESL and PEL)

Project type

MSc thesis BA semester project **MSc semester project**

Project responsible and e-mail

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Project description

The project consists of 2 parts:

A centralised controller computes the optimal set points for the resources in the hybrid AC/DC network. The set points are streamed to a recourse agent, who translates them to the required protocol to communicate with each resource. The goal of the project is to define the communication procedure for the Active Front Ends (AFEs) that interface the AC and DC networks. First, the communication protocol has to be defined. This includes the identification of the transmitted data: set points, mode of operation, start-up and shutdown procedures and emergency procedure. The resource agent is a Nation Instrument cRIO real-time controller coded in the Labview environment. The communication between the cRIO and the AFE will be through CAN bus. The AFE is controlled using a TI DSP development board is coded in the PLECS environment.

The second part of the project concerns communication with a PV emulator that will directly inject DC power into the DC grid. The PV emulator has a dedicated resource agent that will use the same protocol as in task 1. However, the PV emulator has to receive additional set points at a high rate from an irradiance sensor using an ethernet connection to match its power injection to the real solar irradiation. Therefore, a UDP communication has to be established and the software running on the PV emulator (also based on the TI DSP development board) has to be updated to receive and interpret the GHI set points.

Tasks of the student

- Identify the communication procedure and the transmitted data.
- Develop the resource agent (based on the NI cRIO) to receive UDP packages and translate it to CAN bus.
- Implement the communication into the TI DSP to receive and interpret the transmitted data.
- Include the communication to send irradiance set points to the PV emulator.

Requirements

- Familiarity with the Labview and/or PLECS environment

