RTDS SIMULATION OF PV INVERTERS IN A SMALL POWER SYSTEM

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Objective

- Develop a model of a distribution system with multiple photovoltaic inverters.
- Implement external controls to coordinate real and reactive power output from the inverters.
- Condense our findings into a lab exercise for future engineering students.

Background

- Inverter based renewable energy sources are becoming more common.
- The introduction of these sources into the grid can cause instability in the system.

Value Proposition

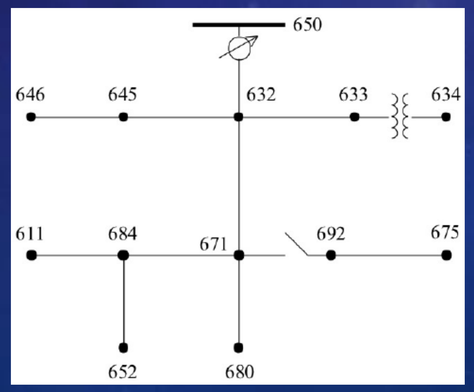
- Better understanding the effects on the power system can help us find innovative solutions to these issues.

Key Requirements

- Complete RSCAD Model of PV integrated distribution system.
- PV output controllable through SEL RTAC.
- Working HMI for RTAC PV control.
- Lab procedure documents for students

Design Validation

- Compiled RSCAD model of IEEE 13 bus system with 3 connected PV inverters.
  - Model runs on RTDS with expected power flow
- Controlled Power output for each PV inverter
  - Power flow adjusts as controls are manipulated in RSCAD.
- PV Inverter controlled through RTAC
  - Manipulate PV controls through RTAC and observe changes in RTDS
- Functioning RTAC HMI
  - Manipulate HMI controls and observe changes in RTDS
- Usable lab procedure documents
  - Invite EE student to run through lab procedure and provide feedback.



Project Status

- Customizing PV array model
  - Needs to be integrated into the 13 bus system
  - Has more variables than we need to consider for this project
  - How do we simplify the model while maintaining an accurate representation?

Steps Forward

- Understand Inverter's Protection Logic
  - How integral is the protection to the function of the model
- Build Simpler Test systems and build up
  - We need to learn what these models need to work in our system
- Place Hardware "in-the-loop"
  - A simple tie in of an RTAC to regulate power in real time would improve the system

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