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Rensselaer

US DOE Digitizing Utilities Prize: Track 2 – Data Analysis Automation

Toward the Development of a Real-Time Monitoring System for a Transmission Operator based on High-Sampling-Rate Data

Team: Red Hawks; Members: Christoph Lackner (GPA)
Denis Osipov (RPI), Joe Chow (RPI)



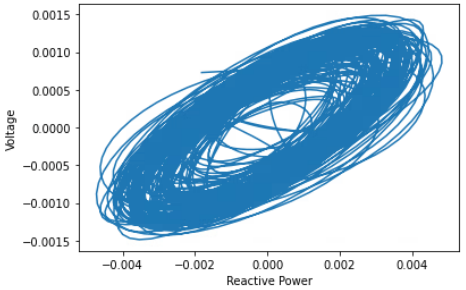
Team Expertise: 30+ combined years of experience with synchrophasor data. Accomplishments include:

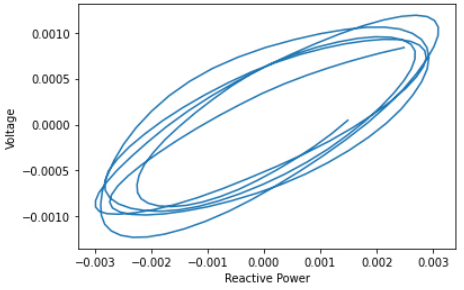
- Cross power spectral density method for locating and characterizing power oscillation sources (first place in 2021 IEEE-NASPI Oscillation Source Location Contest)
- Power control equipment performance analysis from disturbance and ambient PMU data
- Development of production-grade tools, SciSync, for online and offline analysis of synchrophasor data

Solution and Implementation:

- Utilized a Jupyter hub to develop the algorithms and perform data analysis
- Developed a variational mode decomposition (VMD) method to analyze ambient synchrophasor measurements at solar PV plants and Static Compensators at subtransmission voltage level.
- Used second intrinsic mode from VMD to capture reactive power regulation capability.

Results: regulation curve obtained for a PV plant





3-minute window first 3 second

Regulation droop is estimated at 23.3%

Impact and Future Plans

- Results useful for benchmarking equipment for checking with models and for preventive maintenance
- Tools developed on the PingThings PredictiveGrid Platform will be ported into GPS's SciSync Tool, an open-source software for general usage by utilities.