Docket #: S15-086

Actively Calibrated Capacitively Coupled Electrostatic Device for High Voltage Measurement

Stanford researchers have designed a capacitively coupled electrostatic device (CCED) for measuring high voltage. The CCED is compact, low cost, safe, easy to use, accurate, and actively calibrated. Current distribution line level Phasor Measurement Units (PMUs) or synchrophasors can be prohibitively expensive to install and can be unreliable due to line to ground paths. Alternatives are unable to reach the metering quality required due to changes in conductor and ground geometry. This invention addresses these shortcomings by integrating ungrounded, capacitively coupled devices with advanced signal processing and multiple sensors for calculating the device capacitance as well as line voltage phasor.

Stage of Research

Researchers have built and tested the line mounted device at low voltages. The next stage is to build and test a GPS enabled, distribution voltage level CCED with inexpensive wireless technology and self-powering electronics. If extensively deployed, this high voltage CCED will ease the integration of wind and solar power in the high-voltage grid, and increase the amount of energy that can be reliably transmitted.

Applications

- Medium to high voltage distribution line monitoring for:
  - Outage restoration and event analysis
  - Congestion management
  - Alarming and setting system operating limits, event detection and avoidance
  - Resource integration

Advantages

- Low cost
- Easy to deploy - ungrounded
- Accurate - low error and actively calibrated, able to remove interference coupling between lines
- Safe, eliminates line to ground path

Publications

- U.S. Published Patent Application 20160305987, "Actively Calibrated Capacitively Coupled Electrostatic Device for High Voltage Measurement ".
- Raffi Avo Sevlian, Juan Lizarazo, and Ram Rajagopal. “An Actively Calibrated Capacitively Coupled Electrostatic Device for High Voltage Measurement,” 2015 IEEE Power and Energy Society General Meeting, July 2015 (Denver, CO).

Patents

- Published Application: 20160305987
- Issued: 10,175,268 (USA)

Innovators

- Raffi Sevlian
- Ram Rajagopal

Licensing Contact

Evan Elder

Associate Director, Licensing and Strategic Alliances, Physica

Email