

Senior Design Project Description for SPRING 2017

Project Title: Low-Cost Secondary Voltage (and Current) Sensing for Control and Verification of CVR and Volt-var Optimization Applications (EPRI_VAR)

Supporter: EPRI

Supporter Technical Representative: ASSIGNED

Faculty Mentor: ASSIGNED TBD (check one)

Single Team Dual Team (check one)

Personnel (EN/ET): 2 E, Cp, Cv, 2 M, SE

(Complete if the number of students required is known)

Expected person-hours: (250 per student)

Description of Project:

This project will develop a transducer for measuring secondary voltage (and current) very accurately on a distribution system secondary. Volt-var optimization aims to regulate voltage and vars in an integrated manner to provide the most efficient flow of energy on the distribution system while achieving all requisite objectives (ANSI voltage, minimal vars required from the transmission system, minimal distribution losses). They typically achieve this level of integrated control by monitoring key measurements and statuses at each of the control points on the distribution system. These include the substation bus, each capacitor bank, and each voltage regulator. Conservation Voltage Reduction (CVR) extends traditional Volt/VAR control from an application that endeavors to regulate voltage to the middle of the acceptable range to an application that regulates average voltage to a lower level to reduce overall demand. It has been called, "Distribution System Demand Management" and has been put forth in many states as an alternative approach for meeting renewable generation targets. The goal of this project is to develop a low-cost voltage (and current transducer) that will accurately measure distribution system secondary voltage that can be used for control and verification of the secondary voltages.

Initial Project Requirements (e.g. weight, size, etc.):

The accuracy of this measurement should be less than .5%. It is also desired to measure the current as well with accuracy of .5%. The voltage transducer should cost no more than \$25 and can be integrated into an existing sensor that EPRI has developed. The circuit should be able to be completely powered down between measurements and It should be powered using a single 10V supply. The main outcome of this project is to produce a highly accurate measurement of a secondary voltage that is not dependent on temperature or loading.

Expected Deliverables/Results:

A complete and tested transducer will be produced by this project.

List here any specific skills or knowledge needed or suggested (If none please state none):

Background in circuit design, power electronics, and basic power systems.