Title: Collaborative Industry – Academic Synchrophasor Engineering Program

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Project description

Texas Tech University (TTU) in collaboration with the Center for the Commercialization of Electric Technologies (CCET), Group NIRE (National Institute for Renewable Energy), South Plains Electric Cooperative (SPEC), and National Instruments (NI) has established a research collaborative team focused on the integration of synchrophasor technology into TTU's curriculum. TTU has a unique set of resources and capabilities to quickly and effectively implement synchrophasor related coursework into graduate and undergraduate degree programs. TTU has worked with each project partner to:

- Develop new graduate and undergraduate synchrophasor based courses in the existing Wind Energy program. The new courses will introduce students to the operation of the synchrophasor, data analysis, and the stability and operation of the utility grid with wind turbine sources;
- Develop a topic in synchrophasor in the senior level project lab course in the Electrical and Computer Engineering (ECE) department where students will have access to synchrophasor equipment and grid data;
- Modify the existing graduate level Power Systems course in the Electrical Engineering department to incorporate synchrophasors theory and how to interpret the data from a synchrophasor in relation to the analysis of the grid;
- Establish a scholarship program where students will have the opportunity to apply for internships with utilities or technology companies.

The objective of the project is to develop a curriculum and training program relating to synchrophasor systems that will facilitate research and create a skilled workforce. The project will focus on the following three areas:

1. creating a scholarship program for students interested in energy and synchrophasors,
2. developing an internship program that will enable students to apply for internships with companies in the energy field, and
3. developing a curriculum that will introduce and train students in the area of synchrophasor systems.

TTU has developed a new course in the Wind Energy Program that focuses on the design, deployment and analysis of synchrophasors data. The class is dual listed at both the undergraduate and graduate level. The course is offered in class and via distance education. TTU also added a section in a currently existing Power Systems class to cover synchrophasors integration into the grid. Lab projects were developed for students working in undergraduate project lab's 2, 4 and 5. The projects were to design, develop and test a low cost synchrophasors system. For project lab 2, the students were sophomores and a total of six students worked on the project in two groups. The students in project lab 4 and 5 were seniors and three students worked on the project. TTU is also developing a low cost synchrophasor that will be used as a training device for the wind energy synchrophasor class.

TTU has also established a synchrophasor scholarship for students who are interested in working in the energy, renewable energy or power systems area. After a strong marketing plan for the DOE scholarship program, nine applicants applied for the scholarship. In November, the scholarship committee consisting of Dr. Stephen Bayne, Dr. Michael Giesselmann, Dr. Andy Swift, Miss Neha Marathe (PhD student from the wind program) from Texas Tech University, and Mr. Mark Harral from NIRE met to review the applications. The GPAs for the students who applied ranged from 3.0 to 4.0. There were five students from Electrical Engineering; two students from Wind Energy; one student from Mechanical Engineering, and one student from Computer Engineering.

The review committee evaluated all applications and decided to give scholarships to all the students who applied. One student was given a scholarship of $4000, and the other students were given a scholarship of $2000 each. All students except one accepted the scholarship. The student who declined the scholarship said that he had accepted a job at a company, which was not in the area of energy.

An Internship Program led by Group NIRE was also started at TTU. The internship committee spoke to five companies that are interested in offering TTU students internship positions related to the DOE grant. In January 2014, Group NIRE emailed and called thirty-five human resources representatives to support the DOE grant. At this time, 8-10 internship positions are available for which students will have to interview and compete for these positions.

Any project where synchrophasors data is collected will be great to collaborate with this project. The more real-time synchrophasors data collected, the better it will be for students in the program. TTU is currently collaborating with the DOE Discovery Across Texas project.

Expected Educational Outcomes

Below are the expected educational outcomes from the program:

- Train undergraduate and graduate students in understanding Synchrophasor operation and deployment
- Train undergraduate students in the design of Synchrophasor systems, in a lab environment

Give students the opportunity to work in the Synchrophasor area by providing internships with companies, thereby providing valuable experience