

PROJECT SUMMARY

Overview:

This project will bring together industry and academic partners to advance the integration of Supervisory Controls and Data Acquisition (SCADA) technology for the renewable energy sector. The project will result in the creation of an open source SCADA system that will be deployed and shared amongst participating colleges and universities nationwide. SCADA technology will be advanced through a series of professional development workshops for college and university faculty, and SCADA instructional activities will be integrated into existing courses and curricula for undergraduate energy technician education programs.

Intellectual Merit:

SCADA systems are core technology for the operation of many key industrial processes, including oil and gas refining, food and beverage production, water treatment, and electric power production. SCADA systems allow engineering technicians to control systems in real time, and log data for monitoring of system performance. SCADA data analytics allow for system optimization, preventive maintenance scheduling, and for rapid detection and correction of faults/alarms to prevent or minimize system downtime. There has been a tremendous growth in renewable energy over the past decade, evidenced by the proliferation of thousands of biofuel, wind turbine, and solar panel installations across the country. Since each of these devices has its own individual SCADA communications output, this has also resulted in an explosion of data for renewable energy system operators.

Although a fair number of energy technician programs were started at two year colleges in the years immediately following the great recession, the vast majority of these do not currently address SCADA technology. Furthermore, these two year college programs generally lack both the hardware and software infrastructure necessary to teach SCADA topics. This project will develop an open source SCADA system that will provide educators with access to a freely available platform for teaching SCADA technology. The SCADA network will grow to encompass dozens of participating colleges, providing hands-on experiential learning for students who will install SCADA hardware to transmit information from existing renewable energy installations. The aggregated data will have much greater value than the individual data points, and big data analytics will be employed to uncover patterns, extract meaning, and develop operational responses. The project will result in optimized operation of renewable energy installations at participating schools, while also training a new generation of students in SCADA technology through a real world application. The open source system will not conform to any single hardware manufacturer, but rather will be broadly adaptable to any system, thus creating a training tool applicable to any industry or employer using SCADA technology.

Broader Impacts:

This project represents a strong collaboration between industry and academia, with two NSF Advanced Technological Education Centers, multiple two and four year colleges, the world's largest renewable energy company, and several investor owned utilities and electrical providers among the project partners. Colleges participating in the project include institutions that serve large populations of under-represented students, and schools from rural areas struggling with economic development. Renewable energy technology has the potential to provide students with good paying jobs in STEM careers that cannot be easily exported, while also providing an economic lift to the communities where these individuals live. With women in prominent roles among the project's leadership team, and as part of the professional development activities aimed at faculty, the project will also help to diversify the workforce in the engineering and energy fields. The project will prepare the next generation of professionals for the electric utility industry, helping to replace a rapidly aging demographic of STEM professionals facing impending retirement. The project will have enormous impact on the renewable energy sector, ultimately benefitting society by providing more reliable and lower cost energy to consumers, while creating a more resilient energy grid, and reducing the environmental impact of America's energy sector.