



SCADA Project



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 that 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.

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Broader Impacts: This project represents a strong collaboration between industry and academia, with two NSF ATE 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. By including 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 energy sector, 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.

Objectives

- 1) Update the SCADA curriculum previously completed by CREATE to reflect changes in technology and solicit industry input from Next Era and others to re-validate the curriculum
- 2) Develop curriculum modules to allow faculty to integrate SCADA concepts into existing renewable energy courses and programs
- 3) Provide faculty professional development in SCADA systems using the existing CREATE webinar platform and summer workshop model.
- 4) Deploy SCADA equipment at two-year college campuses to facilitate integration of this technology into existing two-year college renewable energy programs.

Schools that have expressed interest in the SCADA project include:

1. Southwest Indian Polytechnic Institute – Albuquerque
2. Mesalands Community College – Tucumcari, New Mexico
3. Texas Tech- Lubbock, Texas
4. Texas State Technical College – Sweetwater Texas
5. Colorado State University
6. Pueblo Community College
7. Northeastern Junior College – Sterling Colorado
8. Florida International University – Miami
9. Indian River State College – Ft. Pierce Florida
10. Kalamazoo Valley Community College
11. Western Michigan University
12. Lake Area Technical Institute – Watertown South Dakota
13. Lake Regions State College & Cankdeska Cikana Community College Devils Lake North Dakota
14. High Plains Technology Center – Woodward Oklahoma
15. Cloud County Community College – Sterling Kansas
16. Northeast Community College – Norfolk, Nebraska
17. Wayne State College- Wayne, Nebraska
18. Eastern West Virginia Community and Technical College, Moorefield, WV
19. Clemson University- South Carolina
20. Spartanburg Community College – South Carolina
21. Asheville-Buncombe Technical Community College – South Carolina

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Our Team



Dr. Kenneth Walz – PI
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Dr. Walz is the Director and Principal Investigator for the Center for Renewable Energy Advanced Technological Education (CREATE). Dr. Walz earned his B.S. degree in Science Education, and Ph.D. in Environmental Chemistry and Technology at the University of Wisconsin. He completed his dissertation working on advanced lithium-ion batteries with Rayovac and Argonne National Laboratory. He also worked as a visiting scientist with the University of Rochester Center for Photo Induced Charge Transfer. Since 2003, he has taught chemistry, engineering, and renewable energy at Madison College in Madison, Wisconsin. Dr. Walz is an alumnus of the Department of Energy Academies Creating Teacher Scientists (DOE ACTS) Program at the National Renewable Energy Laboratory (NREL). He is also an adjunct professor with the Department of Civil and Environmental Engineering at the University of Wisconsin. He serves as Secretary for the Wisconsin Distributed Resources Collaborative and as an advisory board member for the Wisconsin K-12 Energy Education Program (KEEP). Dr. Walz has been recognized as Professor of the Year by the Carnegie Foundation and the Council for Advancement and Support of Education, and as the Energy Educator of the Year by the Wisconsin Association for Environmental Education.



Dr. Kathleen Alfano – Co-PI
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Dr. Alfano has a Ph.D. from UCLA in Higher Education with a cognate in administration and evaluation. Her B.S. is in chemistry and she worked as an analytical chemist in industry before pursuing a career in education. She served as founder and Director of CREATE, a multi-college consortium based at College of the Canyons, from 1996 to 2016. At College of the Canyons she is a Faculty Emeritus and was a Dean of Professional Programs and Academic Computing from 1996-2000. She currently acts as Co-PI for the

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CREATE NSF ATE Support Center, PI of two NSF ATE mentoring projects, co-PI on both the Energy Storage and SCADA NSF ATE projects and as a mentor with the AACC/NSF MentorLinks project. Dr. Alfano served as a Program Director at the National Science Foundation and Co-lead of the ATE program in 2007-2008. Dr. Alfano was the only community college representative on the National Academy of Sciences Committee on Workforce Trends in the U.S. Energy and Mining Industries which released their report in March 2013.



Dr. Kevin Cooper, Co-PI
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Kevin Cooper holds multiple patents and publications in advanced technology fields, including robotics, sensor technology semiconductor processing, chemical detection techniques, optics, and energy generation. Currently, he is the Dean of the Advanced Technology at Indian River State College. Prior to IRSC, Kevin worked in semiconductor industry and as a small business owner. Kevin obtained a doctorate in chemical engineering from Arizona State University and degrees in chemical engineering and applied physics from the Georgia Institute of Technology. Dr. Cooper's current research focuses on autonomous based systems utilizing HSI and LiDAR for characterization of ecological and hydrological conditions. In addition, Dr. Cooper is the Principal Investigator of an NSF ATE Center focused on nuclear workforce development.



Ben Reid, Co-PI
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Ben Reid has a Masters of International Business from the University of Florida and worked as a marketing manager launching products for major companies before his career in education. From 2007-2012 he was a business faculty member and center director, serving as the director of the Center for Promotional Development at California State Polytechnic University and the Banner Center for Energy at Indian River State College. In 2013 he started Impact Allies Inc, which provides STEM evaluations and project management. Between these two roles, Reid is involved in every category of National Science Foundation (NSF) Advanced Technological Education (ATE) awards at Institutions of Higher

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Education. With a mixed background of marketing, teaching, management, evaluation and entrepreneurship, Reid strives to help NSF-ATE projects through planning, implementation, assessment, curriculum development, relationship building, capacity building and scaling.



Gabrielle Temple, Project Manager
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Ms. Temple is the Project Manager for the National Science Foundation Center for Renewable Energy Advanced Technological Education (CREATE) and the Co-PI on the National Science Foundation Energy Storage Project (ESP) at Madison Area Technical College in Wisconsin. She has spent the last nine years as the Project Manager for the National Science Foundation CREATE Center at College of the Canyons in California, and has more than fifteen years' experience working on NSF grants. During her time as Project Manager for CREATE, Ms. Temple coordinated three successful international projects funded through NSF to explore the renewable energy achievements in Australia, New Zealand, Denmark, Virgin Islands and Germany. Ms. Temple started her career in the private sector in accounting and finance before coming to College of the Canyons. Ms. Temple earned her B.A. in Communications with an emphasis in Public Relations at California State University Bakersfield and a M.A. in Strategic Communications from National University. In addition to her grant administration duties, Ms. Temple is an Instructor in Communication Studies at College of the Canyons in California.



Chris Akelian, Curriculum Consultant

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Mr. Akelian attended Cuesta College for two years before joining the Navy for 6 years as a Sonar/Computer Technician for a Torpedo rocket launcher. He earned his B.S. degree in Electronics Engineering with an emphasis in Computer Engineering from Cal Poly San Luis Obispo and an M.S. degree in Electrical Engineering with an emphasis in Digital Signal Processing from San Diego State University. Chris also has over a decade of industry experience, including several years at Hughes Network Systems in San Diego working on Digital Communications and Digital Video Processing systems. He has been an instructor at Electronics and Robotics instructor at Cuesta College since

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1996. Chris has been involved with the CREATE program for more than 20 years, working with emerging technologies and academic program development in areas that include Robotics, Electronics, Computer Technology, Solar, and SCADA systems. Chris has served as a reservist in 3 branches of the Military including the Navy, Coast Guard and Army National Guard which he recently retired as a Chief Warrant Officer 4 (Signal Corp) after 42 years of total service.



James Auld, NextEra
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James Auld, J.D., serves as Director of External Training Initiatives for NextEra Energy and Florida Power & Light. Primary duties include external workforce development initiatives. James works closely with colleges and universities to ensure a robust pipeline of well-educated and highly skilled energy professionals. James works with colleges to advance training programs and develop curriculum. James also collaborates with colleges and universities on grant initiatives. James was the 2015 recipient of the HI-TEC Industry Recognition Award. HI-TEC is a National Science Foundation consortium of colleges across the nation committed to advanced technology education. “The Industry Recognition Award recognizes key industry personnel for outstanding contributions to the promotion of technology education. Nominees for these awards must have had a demonstrated impact on technology education on both the local and national levels.”

James is committed to promoting workforce development programs and ensuring their sustainability.



Dr. Jean Sando, Evaluator
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Dr. Sando serves as the external evaluator for the project. She has a Ph.D in Curriculum and Instruction from Indiana State University. She is the former Associate Vice President for Academic Affairs and as Assistant Vice President for Assessment at Minnesota State University Moorhead. She has acted as a review panel member for the U.S. Department of Education’s Strengthening Institutions program and has been an external evaluator for one national and two regional NSF/ATE centers. Dr. Sando is the co-author of, “Stepping Ahead: An Assessment Plan Development Guide” with Gloria Rogers, Ph.D. which has been distributed over 10,000 faculty members throughout the country. She has also worked in a variety of

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areas in higher education including corporate, foundation and government development and grant management. Currently she is teaching and researching in a local high school in reading development.

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