

## **A SCADA system for an Experimental Renewable Energy Setup**

**Briana Kemp<sup>1</sup>, Erdem Erdemir<sup>2</sup>, S. Keith Hargrove<sup>3</sup> and Erkan Kaplanoglu<sup>2</sup>**

*1, Department of Electrical Engineering, Tennessee State University, Nashville, TN USA*

*2, Department of Computer Science, Tennessee State University, Nashville, TN USA*

*3, Department of Mechanical Engineering, Tennessee State University, Nashville, TN USA*

### **Extended Abstract**

The goal of this research is to enhance the renewable energy systems curricula at Tennessee State University, by providing an experimental setup to improve our students' knowledge on how different renewable energy systems work together, how much power they can produce and how the environment variables (speed of the wind turbine, the purity of the water) affect the energy harvesting efficiency. This setup uses a Supervisory Control and Data Acquisition (SCADA) system which is a computer system for gathering, analyzing and storing voltage and current sensors data from various renewable energy modules and real-time monitoring these data to determine how much power is being produced for each module.

The experimental setup with the SCADA system is designed to collect voltage and current sensors data from various renewable energy modules, which are wind turbine, solar cells, bio-energy and hydrogen fuel cells simultaneously. All data from each energy modules is collected by an Arduino micro-controller and is sent to the SCADA system using USB-Serial Communication. A java based user interface for the SCADA system is developed to show users the real-time power production and consumption for each module. The students also use this user-friendly graphical interface to analyze the data and learn the basics of a simple power management.

The objective for the development of this experimental setup is for experiential learning and applied research for undergraduate students by providing students with hands-on experience that prepares them to enter the workforce in the emerging field of renewable energy systems. The setup is also used to support the renewable/alternative energy courses for instruction and learning, but also for applied research activities.