CREW Center for Research and Education in Wind

CREW Seminar Series: Spring 2012
Co-sponsored by the School of Global Environmental Sustainability (SoGES)
Colorado State University

Current-Based Online Condition Monitoring for Wind Turbines

Abstract: Condition monitoring is an effective means to improve wind turbine reliability and performance and reduce wind turbine operating and maintenance (O&M) costs. Most existing technologies for wind turbine condition monitoring require additional sensors and data acquisition devices to implement. Most of these sensors are mounted on the surface or are buried in the body of wind turbine components, which are difficult to access during wind turbine operation. The use of additional sensors and devices increases the cost, size, and hardware wiring complexity of wind turbine systems. Moreover, the sensors and devices are inevitably subject to failure, which could cause additional problems with system reliability as well as additional O&M costs. Therefore, it is desirable to develop a nonintrusive, lower-cost, more reliable technology to fully exploit the benefits of condition monitoring for wind turbines. This seminar will present a current-based technology for online wind turbine condition monitoring. The proposed technology only uses phase current signals measured from generator stator terminals for condition monitoring of wind turbines. These current measurements have been used by existing wind turbine control systems; no additional sensors or data acquisition devices are required to implement the proposed technology. The proposed technology is able to effectively extract the features of faults or failures in wind turbines from current measurements. The proposed technology can be easily integrated into existing wind turbine control, protection and monitoring systems. The proposed technology will be demonstrated for condition monitoring of small direct-drive wind turbines with rotor imbalance, blade and bearing faults. The proposed technology offers an effective means to achieve condition-based, nonintrusive, smart maintenance for wind turbines.

By **Dr. Wei Qiao, University of Nebraska**

On **Friday, Mar 9, 2012,** at **10:00am**
Routt Hall, Colorado State University

Link for simulcast on web: http://tinyurl.com/CREWSp12Mar

If you are joining us via the simulcast, you may interact with the speaker by posting your questions and comments on Skype. To do this, please add this Skype contact to your list: CREW_collaboratory

Wei Qiao received the B.Eng. and M.Eng. degrees in electrical engineering from Zhejiang University, Hangzhou, China, in 1997 and 2002, respectively, the M.S. degree in high performance computation for engineered systems from Singapore-MIT Alliance (SMA), Singapore, in 2003, and the Ph.D. degree in electrical engineering from Georgia Institute of Technology, Atlanta, in 2008. He joined the Electrical Engineering Department of the University of Nebraska—Lincoln (UNL) as an Assistant Professor in 2008. Currently, he holds the position of UNL Harold and Esther Edgerton Assistant Professor. His research interests include renewable energy systems, smart grids, microgirds, power system control and optimization, condition monitoring and fault diagnostics, energy storage systems, power electronics, electric machines and drives, and computational intelligence for electric power and energy systems. His research has been supported by the National Science Foundation, Department of Energy, Department of Transportation, and industry. Dr. Qiao is an Associate Editor of the IEEE Transactions on Industry Applications, the Chair of the Sustainable Energy Sources Technical Thrust of the IEEE Power Electronics Society, and the Chair of the Task Force on Intelligent Control for Wind Plants of the IEEE Power & Energy Society. He is the Publications Chair of the 2013 IEEE Energy Conversion Congress and Exposition and the Technical Program Co-Chair of the 2012 IEEE Symposium on Power Electronics and Machines in Wind Applications (PEMWA 2012). He was the Technical Program Co-Chair and Finance Co-Chair of PEMWA 2009. Dr. Qiao was the recipient of a 2010 National Science Foundation CAREER Award, the 2010 IEEE Industry Applications Society Andrew W. Smith Outstanding Young Member Award, the 2011 UNL Harold and Esther Edgerton Junior Faculty Award, and the 2011 UNL College of Engineering Edgerton Innovation Award.

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Colorado State University Campus
Fort Collins, CO

Building 1 is Routt Hall.

Directions to Routt Hall (building 1)

From Interstate 25, exit at Prospect Road (#268). Travel west on Prospect approximately 4 miles to College Avenue (passing major intersections at Timberline Road and Lemay Avenue). At College Avenue, turn right (north). Continue north approximately three-quarters of a mile to Laurel Street, turn left (west). Routt Hall is at the corner of Laurel and College.

- Information on parking services and/or purchasing a visitor permit is available at: http://parking.colostate.edu/

Looking forward to your attendance!

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