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ATLAS: A Small, Light Weight, Time-Synchronized Wind-Turbine Data Acquisition System*

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ABSTRACT

Wind energy researchers at Sandia National Laboratories have developed a small, light weight, time-synchronized, robust data acquisition system to acquire long-term time-series data on a wind turbine rotor. A commercial data acquisition module is utilized to acquire data simultaneously from multiple strain-gauge, analog, and digital channels. Acquisition of rotor data at precisely the same times as acquisition of ground data is ensured by slaving the acquisition clocks on the rotor-based data unit and ground-based units to the Global Positioning Satellite (GPS) system with commercial GPS receiver units and custom-built and programmed programmable logic devices. The acquisition clocks will remain synchronized within two microseconds indefinitely. Field tests have confirmed that synchronization can be maintained at rotation rates in excess of 350 rpm. Commercial spread-spectrum radio modems are used to transfer the rotor data to a ground-based computer concurrently with data acquisition, permitting continuous acquisition of data over a period of several hours, days or even weeks.

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