

Short-term prediction of wind speed

Student Project Proposal

Background

In the Vestas control system, wind speed is measured from an anemometer or estimated from rotor speed and power. An anemometer, which is typically mounted on a wind turbine's nacelle, can only measure wind speed and direction at a single point in space where the device is deployed and, thus, insufficient to observe the effective wind speed affecting the entire rotor. The wind speed estimation is filtered through the inertia of the rotor and is thus reacting relatively slow. Both measure/estimate wind speed that has already hit the turbine and the control is therefore only reactive.

Scope

Investigate methods to generate ultra short-term predictions of the rotor effective wind speed (e.g., in the range of 2-30 sec). The prediction can be anything from simple linear extrapolations to advanced methods, e.g., machine learning-based, and shall be based on available wind turbine sensors such as generator speed and power, blade loads, pressure and temperature. It might also be relevant to include some meteorological data as well as knowledge about wind turbulence structures.

The implemented methods can be tested on real data sets and possibly in closed-loop with wind turbine controllers in simulation.

Keywords

Control, Estimation, machine learning, wind modelling.

APPLY

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