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Intelligent condition monitoring of wind turbine blades: a preliminary approach

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Abstract

Exploring new areas for wind energy production brings new challenges for improvement of wind farms, making them more reliable and suitable for increasing of the power grids. In this regard, it is important to study and propose reliable solutions for contactless intelligent condition monitoring of the wind turbine blades. The article is intended to contribute to the study of various aspects of this actual multidisciplinary topic problem. In this context, the paper follows a systemic approach based on relevant general-purpose pragmatic quality criteria. It reports on the preliminary results obtained when analyzing the problem of building an embedded intelligent monitoring of the state of wind turbine blades using contactless strain sensors. For this reason, the numerical modeling of the blade deformations was performed in order to get the pattern of the maximum deformations of the blade. At the same time, from the pragmatic quality point of view, the required dataset, parameters of interest and intended data protocols were defined. Finally, a detailed structure of the edge computing module, as well as a preliminary framework for an embedded intelligent monitoring and decisionmaking system for predictive maintenance are presented.

Keywords: *wind turbine blade, condition monitoring, predictive maintenance, contactless strain sensor, machine learning*

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