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2022 IMPACT PRIZE

IS AWARDED TO

Yu Ding, Jianhua Huang, Hoon Hwangbo, Giwhyun Lee, Abhinav Prakash & Rui Tuo

Use of alternative sources of energy is key for protection of both the environment and economic prosperity of the society. Making use of wind power in particular has posed challenges in multiple areas of science. Indeed, the Paris Agreement, entered during the 2021 United Nations Framework Convention on Climate Change, requires that we double wind power growth immediately, or triple it by 2030. Lowering costs of wind turbines and increasing their productivity in service is crucial for making wind energy competitive in the energy markets. Yet, evaluating the effectiveness of wind turbine design innovations in the field has been difficult due to high uncertainty in natural wind flow and impracticality of imposing operator control over it.

For more than a decade, Dr. Ding and his research colleagues have expanded efforts to develop novel data science approaches that address the challenge of devising accurate and effective quantification methods of wind turbine performance. Their approach, which relies on a paradigm shift from purely physical law-based methods toward analytics-driven field-wide observational methods of performance inference, boasts high accuracy while breaking the disciplinary barriers in turbine performance evaluation and comparison. In the method, the hybrid power curve model connects the multivariate wind/environmental inputs with the power output, while mitigating the scalability issues that often plague kernel-based function regression methods in real-life applications.

Through publications, software packages, field work, lectures, and webinars, Dr. Ding and his colleagues have ensured that new performance quantification ideas and methods, grounded in data analytics, are accessible to a broad audience in academia and the wind industry. Their work has affected practices within quantitative departments in a number of wind power companies worldwide. Groups in EDP Renewables North America, Smart Blade Germany, and engineers at the National Renewable Energy Laboratory, have testified on the value of the innovation, its robustness in a variety of use cases, and production benefits achieved and documented thanks to the ideas, methods, and tools of Dr. Ding and his team.

For their key roles in the development and deployment of a new paradigm for the accurate quantification of wind turbine output that has accelerated engineering innovation in this field, INFORMS is pleased to award the 2022 Impact Prize to Yu Ding, Jianhua Huang, Hoon Hwangbo, Giwhyun Lee, Abhinav Prakash, and Rui Tuo.

Alexander Nikolaev
Prize Committee Chair

October 2022

Radhika Kulkarni
2022 INFORMS President