AIRBORNE WIND ENERGY CONFERENCE 2026

Reliable and Functional Electrical Systems for AWE

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WP3: Device Reliability	**WP4: Plants and Scaling**	WP5: Socio-economic Transformation

KITEMILL

KITEPOWER

Secondment: TBD

Supervisors: Dr. Christoph Hackl, Dr. Stephanie Uhrig

HM

Electrical (Sub)Systems for AWE

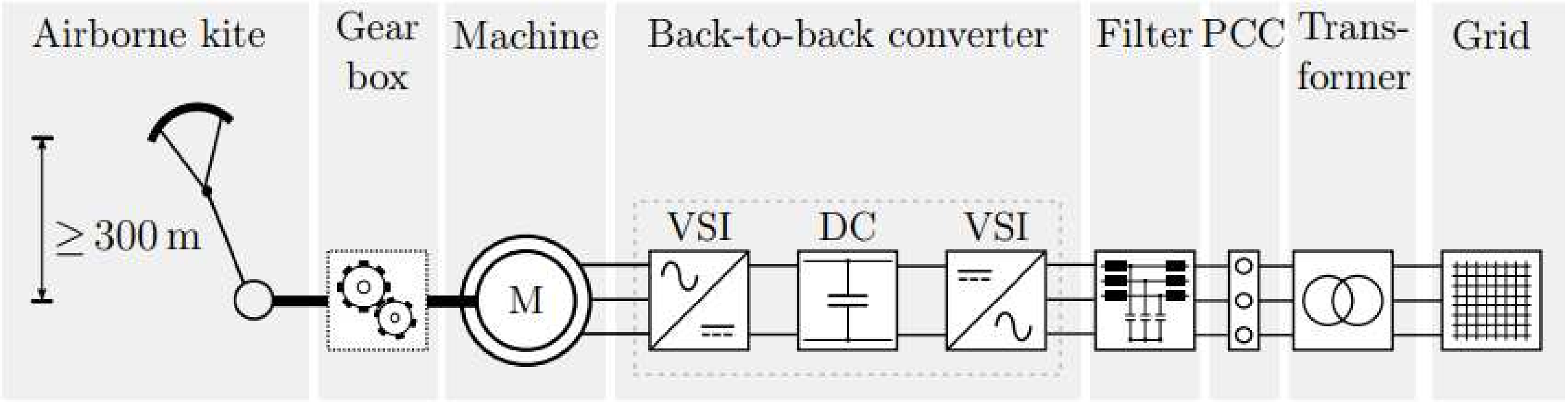
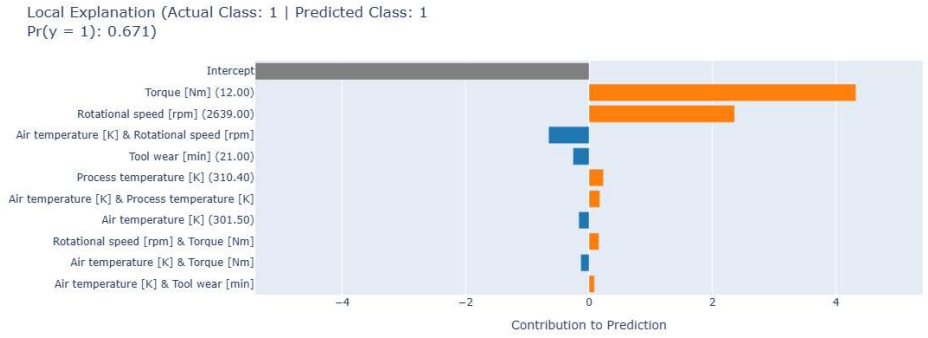
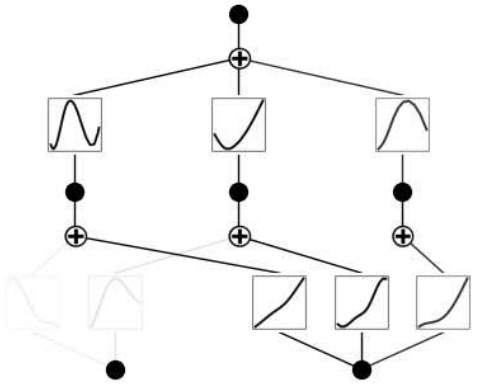


Figure extracted from: H. M. G. Eldeeb, “Modelling, Control and Post-Fault Operation of Dual Three-phase Drives for Airborne Wind Energy,” Dissertation, Technical University of Munich.

Research Tracks: Reliability

- Online Fault Detection and Correction
- Data-Driven Physics-Informed Explainable Models for parameter identification to have better models for better control of the electrical subsystems.
- Physics-Informed Kolmogorov Arnold Networks (PIKAN) and Explainable Boosting Machines (EBM)





Research Tracks: Functionality

- Reliable grid forming, inertia emulation and virtual synchronous machine (VSM) operation with AWES.
  - The angle and height at which the kite is flying is a degree of freedom that we could potentially take advantage of.
  - Pumping Cycle is a challenge that other renewable sources don‘t have.

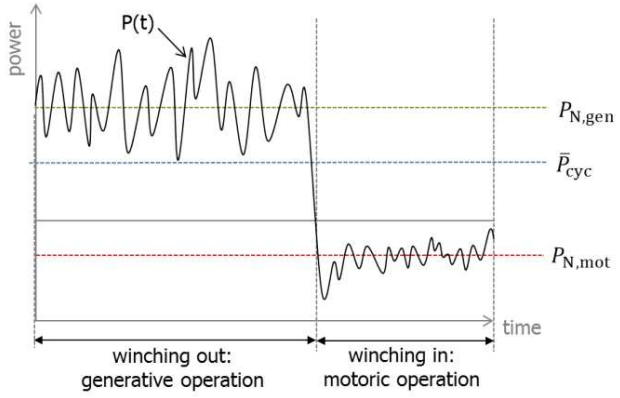


Fig. 1. Schematic power-time characteristic of the kite over one flight cycle

Figure Extracted from: Urbanek, S., Heide, D., Bagaber, B., Lohss, M., Specht, B., Paulig, X., ... & Ponick, B. (2019, May). Analysis of external rotor electric drives for an all-automatic airborne wind energy system. In 2019 IEEE International Electric Machines & Drives Conference (IEMDC) (pp. 1599-1606). IEEE.

In Summary…

- Improved Reliability to facilitate scaling in the near future.
- Enhanced Functionalities to meet future grid requirements so that the scaling is stable in the future too.

Thank you!

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