Intelligent Condition Monitoring Methods for Electrical Machines and Drive Systems

Summary

Within the thesis, the PhD candidate will learn the diagnostics methods used for electrical machines and related signal processing algorithms. The candidate will also learn advanced methods for diagnostics using artificial intelligence, digital twins and bordering IT methods for the electrical machines. We will provide necessary hardware and software for simulation and testing the diagnostics tools. The candidate is responsible for developing and implementing the diagnostics procedures. At the end of the thesis, working demonstrator will be built and tested.

Research field:	Electrical power engineering and mechatronics
Supervisor:	Dr. Toomas Vaimann
Availability:	This position is available.
Offered by:	School of Engineering Department of Electrical Power Engineering and Mechatronics
Application deadline:	Applications are accepted between June 01, 2020 00:00 and July 03, 2020 23:59 (Europe/Zurich)

Description

The thesis will be carried out in cooperation with Aalto University in Finland, with department of Electrical Engineering and Automation. The candidate, if eligible, could have access to a double degree within both organizations.

The main tasks of the thesis are:

- Different diagnostic and prognostic methods
  - Different methods for diagnostics and prognostics of electrical machine will be studied and implemented. During the study, most promising will be selected for integration with novel intelligent diagnostic strategies.
- Advanced diagnostic methods
  - Different diagnostic methods related to the usage of artificial intelligence, digital twins, virtual sensors and bordering IT methods will be analyzed. The best one will be selected and implemented for diagnostics and prognostics of electrical machines.
- Intelligent diagnostic strategies for electrical machines and drives
  - Selected methods will be merged to build a system for remote diagnostic and prognostic of electrical machines.
- Building the system
  - An experimental setup with adequate sensors will be built in the lab based on the selected methods. Environments used and developed within topical and ongoing research projects will be used for implementation.
- Testing and validation
  - Finally the system will be tested and validated through exhaustive measurement and analyses.

Within the PhD studies, the candidate will present his/her work in international conferences and publish journal papers required to complete the thesis.

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