Power system substation asset monitoring and condition analysis in future power systems

Summary

Traditionally, the power system asset management is based on interval-based approach and not on actual asset condition. In this PhD project the objective is to thoroughly assess the applicability of existing and alternative measurement options, sensors, IoT and cyber security aspects to enable reliable and usable asset management approaches considering the actual asset condition. This PhD is part of a research and development project between TalTech and Estonian Transmission System Operator.

Research field:	Electrical power engineering and mechatronics
Supervisor:	Prof. Dr. Jako Kilter
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

Power system asset management in current power systems is mostly related to interval-based approach and the actual condition of the asset is not observed nor relevant. This approach in future power system is seen as obsolete as the finances available should be used as much as possible in an appropriate manner. In view of this, the objective of this research is to understand current and alternative approaches for substation asset condition monitoring and what are the main influencing factors to increase the observability of asset condition. These include collecting, assessing and making decisions on available assets conditions using the available measurement data but also considering applicability of new sensors technology, IoT and cyber security. Here, the various sensitivities and alternatives shall be determined and as much as possible highlighted considering the limitations in actual power systems. All these aspects shall enable secure, reliable and cost-effective asset life monitoring and management in future power systems including recommendations for appropriate system design enabling the most optimal techno-economical solution.

Responsibilities and tasks

This is a full time PhD position and student is expected to do research 90% of the time. Other 10% is related to teaching, i.e. supporting lectures and course works in courses related to power system substations and power system optimization. Research results shall be presented through publications and presentations. In minimum two journal papers and one conference paper shall be published during PhD studies.

Qualifications

The applicants should fulfill the following requirements:

- Holds a master's degree in Electrical Engineering or Data Analysis/Management (with emphasis on technical assets) or a similar degree with an academic level equivalent to a master's degree
- Have obtained excellent study results and has good knowledge on different mathematical analysis methods (probabilistic and risk assessment theory and methods)
- Have knowledge on power system assets and their operational characteristics
- Have knowledge on power system assets conditon monitoring
- Have experience with programming languages, e.g. MATLAB

- Is able to understand, speak and write texts in English language with high profiency

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