

Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : Fouladirad Given names : Mitra

Status (prof., assistant prof., ...): Professor

Laboratory : Charles Delaunay Institute FRE CNRS 2018-
System Modelling and Dependability Laboratory Website address :
<http://icd.utt.fr/en/index.html>

Institution : University of Technology of Troyes (UTT) Website address :
www.utt.fr

Scientific competence :

Machine Learning, Data analysis, degradation modeling, estimation of failure times and residual lifetimes for wind turbines. Maintenance and monitoring policies optimization, sensitivity and reliability analysis.

Two major publications in the field proposed for the PhD :

Ghambouch, H., Fouladirad, M. and Grall A. The use of real option in condition-based maintenance scheduling for wind turbines with production and deterioration uncertainties The use of real option in condition-based maintenance scheduling - Nguyen, K.T.P., Fouladirad, M. and Grall A. New methodology for improving the inspection policies for degradation model selection according to prognostic measures, IEEE Transactions on Reliability 2018

Website address of the personal page : n.a.

Supervisor's email : mitra.fouladirad@utt.fr

Description of the research work proposed for a PhD

Topic # (see list) : VI-2

Title : Machine learning and Prognostic for wind turbines

Subject :

In wind production industry, the failure prediction and maintenance planning are major elements to reduce economic and energy losses. To predict the failure of the wind turbine or one of its components it is necessary to have knowledge about the future behavior of the system. In this purpose, a health indicator should be extracted and a mathematical model could be associated to its evolution. Its operating environment should be characterized and based on these models the future behavior can be estimated. Based on the available historical data a mathematical model can be proposed to predict the future behavior of the system in connection with covariates and influencing factors, to forecast the failure and to evaluate the associated uncertainties. Machine learning techniques permit to build a health indicator and to treat efficiently the available information in order to promise a modeling structure which ought to be adequate for lifetime prognosis. Moreover, these methods permit a better condition-monitoring of complex systems (where the system health indicator is monitored during its lifetime by numerous sensors) and lead to more reliable and sustainable systems. Monitoring data on the system or on its environmental conditions are used for maintenance planning in order to avoid failure and optimize power generation.

Keywords :

Machine Learning, classification, stochastic modelling, estimation, degradation, wear, reliability, maintenance planning, gamma process

Expected collaborations :

Alpes Grenoble University (Grenoble - FRANCE), Electricité de France (EDF - R&D - Paris - FRANCE), Hong Kong University (China), Norwegian University of Science and Technology of Trondheim (Trondheim - NORWAY).

Background required from the applicant :

Knowledge in Probability and Statistics, basic knowledge of programming would be appreciated

Existence of a PDF file detailing the proposal ("yes" or "no") : YES

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