Thesis project available

Prognostics and Health Management (PHM)

(duration: 8-10 months)

❖ Title of the research:

Development and implementation of methods for the detection of defects in CERN Large Hadron Collider components and systems.

❖ Context of the research

CERN's Accelerator Complex requires adequate tools to operate, maintain and drive the consolidation of the essential technical services, to fulfil the physics program and deliver the required luminosity for the experiments. Since 2016, the Engineering department (EN) started a program to design and develop a performance framework to structure, collect and analyse systems and equipment operational data, failures and interventions.

One of the framework module focuses on the detection of defects related to material and accelerator components based on not-destructive testing (NDT) and image processing and analysis.

The thesis project aims at developing and implementing artificial intelligence methods such as artificial neural networks, deep learning methods and convolutionary neural networks for the defect detection.

The thesis will be developed in collaboration with CERN, where the master thesis student will stay for some periods.

❖ Objective of the research

Methodology investigation, development and pilot case examination, with software implementation of the method explored.

❖ Work Phases

- Analysis of the information available for the development of the method (NDT tests, images, measured signals, physical models of the degradation processes,…);
- Analysis of the possible solution methods for the machinery defect detection;
- Selection of the most promising solution method;
- Development of the selected solution method;
- Analysis of the obtained results.

❖ Required skills

- Good knowledge of images processing technologies and techniques;
- Interest in developing innovative algorithms of machine learning to tackle real applications;
- Good knowledge of Matlab and Python programming.

For further information, please contact:

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