

THESIS SUBJECT 2021

Thesis Title: Hybrid artificial intelligence for self-reconfiguration of production systems in the context of smart industry

Thesis Director(s): Abdourahim Sylla – Gülgün Alpan

Doctoral school: I-MEP2

Beginning of the thesis: October 2021

Funding: I-MEP2 Funding

Summary of the thesis project:

In a market characterized by an ever-increasing demand for personalized products, industrial companies are facing new challenges related to adaptability, flexibility and scalability of their production systems. To help them, reconfigurable production systems have been proposed. These are systems designed to adapt to market changes (introduction of new products and increased demand). However, the existing work mainly concerns design issues. The operational issues requiring real-time decisions in a dynamic environment are hardly discussed. For instance, given a set of product variants to be manufactured or assembled, which configuration to choose while taking into account the health state of the machines? Several criteria must be taken into account, in particular technical, economic, social and environmental ones. Real-time operational decisions are very complex and require knowledge and data from different sources. Uncertainties due to the lack of knowledge or inaccurate data add further complexity to the problem. Considering an Industry 4.0 context, this thesis aims to develop an integrated approach for intelligent decision support tools. These tools, based on artificial intelligence techniques (knowledge-based system and machine learning), should be capable of integrating knowledge and data from different sources to support the self-reconfiguration of production systems.

Profile and skills required:

The candidate should hold a Master degree in industrial engineering or computer science, with knowledge on production systems and skills in data analysis and knowledge modeling. Skills in ontology development, constraint satisfaction problems (CSP), advanced machine-learning algorithms or multi-criteria decision support methods are an advantage.

To apply, please send us the following documents:

- a Curriculum Vitae (CV);
- a cover letter;
- the transcripts of Master 1 and Master 2;
- a list of references we can contact.

Application deadline: May 18, 2021

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