RESEARCH TOPIC FOR THE PARISTECH/CSC PHD PROGRAM
(one page maximum)

Field: Information and Communication Sciences and Technologies

Subfield: (Applied Physics, Chemistry, Mathematics, Mech. Eng....) Industrial Engineering

Title: Towards the definition of I4.0 KPIs

ParisTech School: Arts et Métiers Sciences et Technologies

Advisor(s) Name: Ali SIADAT, Virginie GOEPP, Nathalie KLEMENT
Advisor(s) Email: ***ali.siadat@ensam.eu***, ***virginie.goepp@insa-strasbourg.fr***, ***Nathalie.klement@ensam.eu***
Research group/Lab: LCFC, ICube, LISPEN
Lab location: Metz, Strasbourg, Lille
(Lab/Advisor website): ***http://lcfc.ensam.eu/***, ***http://icube.unistra.fr/en/***

Short description of possible research topics for a PhD:
The Industry4.0 context drives the manufacturing companies towards the implementation of Reconfigurable Manufacturing Systems (RMS) enabling agility. In this context, assessing the performance of such systems becomes even more crucial. Generally, this requires to define a set of relevant KPIs (Key Performance Indicator) like these defined in the ISO 22400 standard and to manage them preferably on-line and dynamically.
Several indicators should be defined to help the manager to know the state of his system: indicators about reconfigurabitility or performance indicators. For instance, these indicators could help the manager to decide how to reconfigure his system, or simply to modify the allocation of resources.
Nowadays, thanks to Industry 4.0 new concepts such as decentralized control system, many information, data, are available at any moment and everywhere. How to exploit these data to better define the considered system, follow it through a dashboard, help the manager to take the right decision at the right time? This can be done through Cyber Physical Production System.
Therefore, the objective of this PhD would be to define what could be “I4.0 KPIs” that is to say which should be the relevant set of KPIs for RMSs and how to manage them dynamically that is to say how to make them change according to the system configuration.

Required background of the student: (What should be the main field of study of the applicant before applying?)
Industrial engineering, Information system, operational research

A list of 5 (max.) representative publications of the group: (Related to the research topic)

1. Wu, X., Goepp, V., Siadat, A. “Concept and engineering development of cyber physical production systems: a systematic literature review” International Journal of Advanced Manufacturing Technology, 2020, 111(1-2), pp. 243-261
2. Wu, X., Goepp V., Siadat A. “The integrative link between cyber physical production systems and enterprise information systems” accepted to the 49th International Conference on Computers & Industrial Engineering conference (CIE 49), October 18-21, 2019, Beihang University, Beijing, China
3. Nieto, F. D. M., V. Goepp and E. Caillaud (2017). "From Factory of the Future to Future of the Factory: Integration Approaches." Ifac Papersonline 50(1): 11695-11700.
4. A. Beauville dit Eynaud, N. Klement, L. Roucoules, O. Gibaru and L. Durville. “Framework for the design and evaluation of a reconfigurable production system based on mobile robot integration”. In : Submitted to JMS (2020), 2nd revision.
5. Kenza AMZIL, Esma YAHIA, Nathalie KLEMENT and Lionel ROUCOULES “Causality learning approach for supervision in the context of Industry 4.0”, Springer2021, In the International Joint Conference on Mechanics, Design Engineering and Advanced Manufacturing (JCM 2020)