Postdoctoral position

embedded intelligence for the dynamic maintenance of a fleet of entities within the context of cyber-physical systems

University	Université de Valenciennes et du Hainaut-Cambrésis (UVHC)
Research lab :	SurferLab (*Distributed intelligence for transportation systems laboratory @ Valenciennes*) and LAMIH UMR CNRS 8201.
Starting date :	As soon as possible (18 months)

Contact : Damien Trentesaux, Damien.Trentesaux@univ-valenciennes.fr

1. Context

SurferLab is a joint research lab. Its main partners are Bombardier Transport, Prosyst (SME) and UVHC. It is built around a basic principle: to embed processing capabilities based on artificial intelligence in complex mobile systems (train, car, plane, truck, AGV, ...) to implement and optimize various functions being control, monitoring or diagnosis (health monitoring). We are therefore trying to make these systems more intelligent, more autonomous and capable of adapting to the unexpected. We consider that these systems are immersed in a fleet in interaction with a control or maintenance center. The approach adopted is thus of cyber-physical type (CPS) and concerns a priori all modes of ground transport.

SurferLab is hosted by LAMIH UMR CNRS 8201 (http://www.univ-valenciennes.fr/LAMIH/).

The players in the joint laboratory consider that, since the complex systems studied are naturally mobile in their environment, the dimension "embedded systems" is of high importance. Indeed, the usual design choices that lead to put "on ground" the maximum functions to the detriment of "embedded" on-board functions reach rapidly their limits because the "grounded" functions are disconnected from the informational context and events that concern them.

2. Scientific objectives

The postdoc will have to generalize scientifically speaking the concepts developed in the SurferLab that were initially applied to and dependent of the railway transportation sector. This generalization concerns other transportation modes (cars, planes…).

The postdoc will be also in charge of the mounting of national and international projects with the core partners of Surferlab and other industrial and academic partners to be identified. He will work in close contact with the industrial partners and will share half of his time hosted by the industrial partners, in locations very close to the university (15 km max).

The postdoc will have to make several publications in journals and conferences.

Some key references related to the SurferLab approach :

- *Gandibleux J., Cauffriez L., Branger G., Improving the reliability/availability of a complex system by an active monitoring based onto "augmentation concept": Application onto a railway system. Bérenguer, Grall & Guedes Soares (Ed.), Advances in Safety, Reliability and Risk Management - ESREL 2011, Taylor & Francis, Troyes, pp. 2706-2713, September.*
- *Le Mortellec A., CLarhaut J., Sallez Y., Berger T., Trentesaux D., Embedded Holonic Fault Diagnosis of Complex Transportation Systems. Engineering Applications of Artificial Intelligence, vol. 26, n°1, pp. 227–240, 2013, http://dx.doi.org/10.1016/j.engappai.2012.09.008*
- *Sallez Y., Berger T., Deneux D., Trentesaux D., The lifecycle of active and intelligent products: The augmentation concept, International Journal of Computer Integrated Manufacturing, vol. 23, n° 10, 2010, pp. 905-924, http://dx.doi.org/10.1080/0951192X.2010.490275*
- *Zambrano Rey G., Carvalho M., Trentesaux D., Cooperation Models Between Humans and Artificial Self-Organizing Systems: motivations, issues and perspectives. 6th International Symposium on Resilient Control Systems (ISRCS), IEEE, San Francisco, 2013, 156 – 161, http://dx.doi.org/10.1109/ISRCS.2013.6623769*
- *Trentesaux D., Knöthe T., Branger G., Fischer K., Planning and Control of Maintenance, Repair and Overhaul Operations of a Fleet of Complex Transportation Systems: A Cyber-Physical System Approach. Service Orientation in Holonic and Multi-agent Manufacturing, 594, Studies in computational intelligence, Springer, 2015, pp. 175-186, http://dx.doi.org/10.1007/978-3-319-15159-5_17*

3. Funding

The funding is 28.8k€ (gross) per year and is available for 18 months, potentially extended to 24 months. The recruitment is to be made as soon as possible.

4. Requested skills

The postdoc to be recruited must have led applied research, potentially with industrialists from the transportation sector (railway and others).

Basic technical skills in programming are compulsory (C, C#, Java). Basic knowledge in maintenance, safety, embedded systems or information systems are appreciated.

Good communication abilities, as well as good organization abilities are required since the postdoc will have to work within a team of industrialists and academics. Skills in French are appreciated.

5. Application

Please send to Damien.Trentesaux@univ-valenciennes.fr the following elements. Skype meeting if possible will be organized to discuss with the best applicant.

- One page CV,
- A cover letter explaining the application,
- A copy of the PhD and administrative elements proving the defense,
- A support letter written by the thesis supervisor and if possible, by researchers that worked with the applicant.