

## Postdoctoral fellowship at the University of Bordeaux, France

**Title:** Safety and reliability of distributed engineered systems.

**Objective:** To develop new modelling tools, design methods and scalable algorithms for monitoring, fault-tolerant control, safety verification and reliability of distributed and large-scale engineered systems.

**Description:** This post-doctoral research work will address the reliability of distributed networked systems characterized by integrated computational, networking and physical capabilities, their ability to sense and interact with their environment and to generate and process control data which can be communicated and exchanged via their network. Such engineered systems (Cyber Physical Systems) are a key enabler to sustain the growth in future technological developments (aerospace and automotive systems, energy distribution, manufacturing, distributed robotics, medical devices...). The European research and industrial community has focused on such systems as paradigms for the future of systems. The motivation behind this research is to initiate foundational, original research on monitoring and control of complex distributed systems at the Bordeaux University by converging established expertise from computer science (LaBRI lab) and from electrical engineering and control (IMS lab). The candidate will first develop appropriate modelling tools associating paradigms from control theory and computer science. The aim is first to establish theoretical foundations for development of layered architectures for networked, distributed and hybrid control that can capture both continuous and discrete dynamics. This will enable model-based monitoring and fault-tolerant distributed control for reliable deployment of a large number of advanced distributed control systems on shared, distributed and heterogeneous platforms. Modeling will be a big challenge as it should represent both computing resources and physical processes, and their behavioral interactions. The main challenge is to have a tighter coupling between the physical and the networking layers which can be further exploited to investigate model-based fault monitoring, fault tolerance and fault management and recovery issues. These problems are complex tasks, since they depend on the deployment of sensors in the system and are thus related to the design of the architecture and its optimization. One of the biggest challenges is the curse of dimensionality, and to avoid the complexity obstruction.

**Requested skills:** The candidate should have developed good knowledge covering analysis and design (modelling, monitoring and control) of engineered systems, based on methods and tools from control theory and/or computer science.

**Duration:** 12 months (can be extended 12 months), starting with January 2018.

### For more information, please contact:

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