The Ampère laboratory (UMR CNRS 5005) at Ecole Centrale de Lyon in Ecully (France) has vacancies for

**PhD students in data-based modeling and control of MEMS sensors**  
*(3 years)*

**Project description**

These vacancies are open in the scope of the project NEXT4MEMS. The objective of this large-scale project is the development of a novel industrial sector aiming at the production of a new generation of MEMS inertial sensors with higher performance (as e.g. required by the aerospace industry). To cover the multiple facets of this ambitious project, the project consortium consists of the French leaders in the inertial sensor industry (*Tronics Microsystems, Thales, iXblue, Asygn*) and two academic laboratories that will be in charge of the related fundamental research challenges: *Ampère* for the control engineering aspects and *ONERA* for the aerospace aspects. The project NEXT4MEMS is sponsored by *BPI France* (the French bank for public investments) within the PSPC funding scheme (aiming at enhancing the long term competitiveness of the French industry).

The level of sensor accuracy required in NEXT4MEMS can solely be obtained if the sensor is operated in a finely optimized feedback loop integrated in the electronic instrumentation. The Ampère researchers will therefore team up with the engineers of Asygn whose expertise lies in the development of this electronic instrumentation and the related computer-aided design (CAD) tools. In this cooperation with Asygn, Ampère will be responsible for the development of systematic methodologies for the design of highly performing model-based control systems for MEMS sensors. The developed methodologies will also be used to enhance the CAD tools of Asygn with new functionalities ranging from data-based modeling to controller design and system robustness analysis.

The research in this project will require fundamental developments in multiple control engineering areas such as data-based modelling, optimal and robust control, monitoring, fault detection and performance restoration. Moreover, due to the close interplay with microelectronics, it will also involve the design of both analog and digital electronic systems, the conception of new system architectures and the analysis of the industrial dispersions to characterize the system uncertainty.
Research team description

The Ampère research team for this project is led by A. Kornienko, X. Bombois and G. Scorletti, who are, respectively, Assistant Professor, CNRS Research Director and Full Professor at Ampère. Their expertise covers the different control engineering aspects present in this research project (data-based modeling and its interplay with robust control, robust control and its extension to linear parameter varying and nonlinear systems, convex optimization and SDP). Moreover, the research team has also past experience in projects combining microelectronics and control engineering.

The Ampère team in the NEXT4MEMS project will be strengthened by three postdoc researchers and three PhD students. They will be hosted by the Ampère laboratory whose expertise ranges from control engineering and electrical engineering to biology. The Ampère lab consists of 160 people, among which 20 academic staff members in control engineering.

Requirements

We are looking for candidates who have:

- A MSc degree in systems and control, electrical engineering or applied mathematics
- A strong interest in control engineering
- The ability of performing fundamental and applied research at an internationally recognized level
- The ability of integrating a team in an multidisciplinary project environment
- Strong analytical, communication and writing skills
- A very good command of the English language. The command on the French language is an asset

Appointment and employment perspectives

We offer a challenging job in a multidisciplinary project environment including several industrial and academic partners through a fixed-term appointment for a period of three years. We are relatively flexible with respect to the appointment start date since a number of PhD positions have to be filled in the course of this four-year project.

Since this challenging project involves both fundamental and applied research components, such a position offers an ideal stepping stone towards either an academic career or a career in the industry (in particular in the new industrial sector that the project aims to develop).

Information and Application

For further information on these job offers, the research subjects or the NEXT4MEMS project, please contact A. Kornienko (anton.kornienko@ec-lyon.fr), X. Bombois (xavier.bombois@ec-lyon.fr) and/or G. Scorletti (gerard.scorletti@ec-lyon.fr). Applications must also be sent to these email addresses and must include a cover letter, a detailed curriculum vitae, electronic copies of the BSc and MSc grades and a recommendation letter (if available).