

## Description for the general public

Over the last decade, decentralization has emerged as a major trend in the field of control systems. Growing interest in this control concept derives from functionality of modern devices that can be perceived as compact modules since they are fully equipped with sensors, actuators, and computing units. Furthermore, the decentralization is a natural response to the demands of systems providing robustness and, above all, ability to adapt to various tasks. In many applications, the design of control system based on the traditional centralized architectures is not only problematic but sometimes also unfeasible. In particular, centralized systems fail in large-scale structures and advanced robotic systems where, due to the complexity of the feedback loops, the computational burden and the amount of instrumentation employed exceed reasonable limits.

The project aims at designing novel collaborative distributed control methods that enable an efficient stabilization of modular structures and machinery. Theoretical work on distributed control will be carried out within the context of semi-active and active actuation of mechanical systems. For several engineering applications, including an active vehicle suspension and a multi-link robot, the performance of the developed controllers will be studied numerically. Experimental works will be performed with uniquely designed platform involving a modular suspension system which will confirm the efficiency of the designed control strategies. The project team will focus on designing novel control procedures that fully exploit the potentiality of modern control instrumentation. In addition to that, simplified solutions, involving low-cost control components and readily available semi-active materials, will be retained. The project will be performed in collaboration with scientists of INRIA Rhone-Alpes (Grenoble, France) and Amiens University (Université de Picardie Jules Verne, Amiens, France).