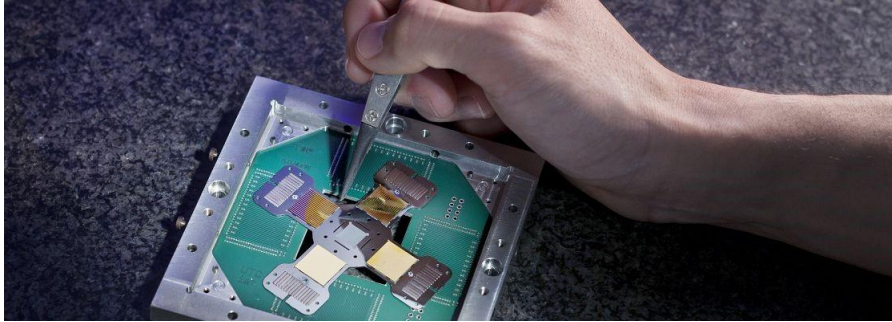


Microrobotics and micromechatronics



Nowadays products development needs to consider the sustainable challenges and the growing need of products miniaturization to integrate more and more functions in a reduced volume. This leads to the development of innovative compact products with a high integration level and a limited energy consumption. In this context, microrobotics and micromechatronics systems play key positions for the development of such products especially for micromanipulation tasks needed for the manufacturing, assembly or characterization.

This proposed study program aims to introduce students to the microrobotics and micromechatronics domain. It provides knowledge and experimental skills in the design, modeling, realization and control of microrobotics or micromechatronics systems. In this program, a focus is done on minimalist and energy efficiency designs via digital actuation and multifunction actuators for micro-conveyance application. The important role of the control and its adaptation to distributed micro-robotics systems are also highlighted as well as the locks and difficulties to conduct experiments at the considered scale.

Subjects

Digital actuation

Multi-functions actuators for micro-conveyance application

Microrobots control

Fabrication, integration and instrumentation at micro/meso-scale

Mentor



Christine Prelle is a full professor at the ROBERVAL laboratory since 2012 (previously lecturer since 1998 in the same laboratory). She obtained a PhD from INSA Lyon in 1997 on the design of an electropneumatically actuated parallel robot arm. She is the director of the ED71 Doctoral School since July 2017. Her current research concerns the design of distributed actuation and sensing in micromechatronic devices. She is the author of more than a hundred publications in the field of actuation and measurement for micromechatronic devices. She coordinated the Franco-German project MICROCOSM co-financed by the Hauts-de-France region and the ERDF from 2014 to 2018 (ERDF 2014-2020, no. PI0001205), participated in the ANR projects READMI (ANR-13-BS03-0003) and ALVEO (ANR-15-CE10-03) 002) and coordinates μ -SPIDER project (ANR-19-CE33-0002), financed by the French Research National Agency.

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Laurent Petit is an associate professor at the ROBERVAL laboratory since 2010. He obtained a PhD from UTC in 2009 on the design and characterization of a micro digital electromagnetic actuators array. He is in charge of a Master degree on mechatronics systems. His current research concerns the design and characterization of micromechatronic systems, compact electromagnetic actuators, and digital actuation. He is author of more than fifty publications in the field of micromechatronic devices and electromagnetic actuators. He coordinated the ALVEO project (ANR-15-CE10-0002) co-financed by the French Research National Agency and the Hauts-de-France region and the SRATI project financed by the Alliance Sorbonne Université through the MSTD program and participated in the Franco-German project MICROCOSM and in the ANR projects READMI (ANR-13-BS03-0003) and μ -SPIDER (ANR-19-CE33-0002).

Student profile

Master in mechanical, mechatronics, or electrical engineering, or final undergraduate in mechanical, mechatronics, or electrical engineering.