Large scale pneumatic actuator made by 3D printing hydrogel

Academic Year: 2025–2026
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Host Laboratory: Institut des Sciences du Mouvement UMR7287, SBI Team
Location: Aix-en-Provence (IUT Aix campus)
Duration: 4 - 6 months
Salary: Yes
Recommended Level: BAC+4/5 (Engineering or Master)
Required Skills: Prototyping (3D printing), Programming (Python, Javascript), Automation, Material science

Summary

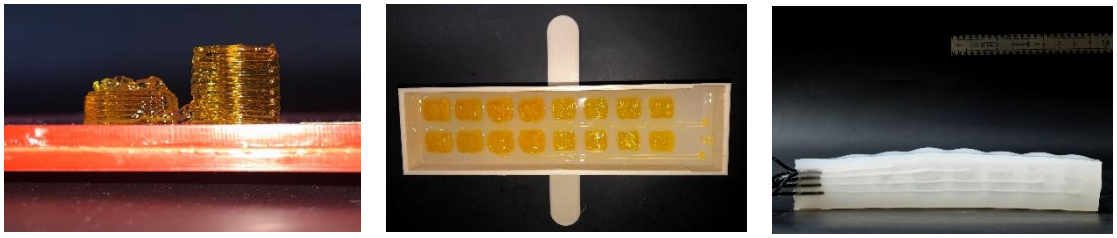

Figure 1: Moulage silicone pour la fabrication d'actionneur pneumatique à grand nombre de cellules.

We designed a new class of pneumatic actuators based on *Mimosa Pudica* pulvinus (pulvinus: plant muscle). These actuators are resilient to damage and allow for complex motion due to a large number of actuator (each cell can be actuated independently). They are made of silicone by molding around a hydrogel mold. The internship goal is to leverage on a 3D printing machine made in the lab to create cellular pneumatic actuatoras made of multiple cells (up to 512).

Tasks:

1) The intern will have to optimize the silicone molding process by adding a mixing nozzle to the existing device.
2) Print a 64 and a 512 cells pneumatic prototype for investigation of motion capabilities and mechanical properties control.
3) The experimental bench is existing and the student will leverage on it to obtain data.

PhD Thesis offer: This internship could lead to a PhD thesis.

Work Environment:

The Institut des Sciences du Mouvement (ISM) is a multidisciplinary research unit. The laboratory's research focuses on the study of locomotion in living organisms from various perspectives. The Bio-Inspired Systems (SBI) team at ISM aims to study principles and strategies derived from biological systems to inspire and design innovative technological systems.