

Post Doc position for participating in

Usain-BOT project

Ultra-sound activated inertial microrobots for piloted drug delivery

Bio-inspired artificial microswimmers have been part of the robotics landscape for twenty years now. They share with their natural counterparts an essential flaw: they are slow. This hinders their use in a complex, crowded and quickly flowing media such as blood. Targeted drug delivery through the blood network is nevertheless one of the main motivations of researchers in the field. The Usain-BOT project proposes a paradigm shift: a fast activation triggered by a mechanic instability will make inertial fluid mechanics – that governs macroscopic swimmers – enter into the microscopic realm. The resulting gain in velocity will allow upstream motion, efficient steering, and controllability.

The project will be specifically dedicated to the build-up of a swarm of microswimmers capable to swim and tumble fast enough (1 cm/s expected) to flow against the blood stream. A single ultrasound device will allow both quick activation and localisation of these non-biomimetic swimmers.

The central mechanism for propulsion is the buckling instability of hollow elastic shells, that are already used in clinical routine as ultrasound contrast agents.

In partnership with the French Spatial Agency (CNES) we are looking for a candidate for a 2-year post-doc position. The post-doc will develop experiments on ultra-sound contrast agents as well as experiments on model systems at the macro scale, to be run in microgravity conditions (parabolic flights). He/she will benefit from a well established collaborative network within and outside the lab with experts in shell mechanics (C. Quilliet, G. Coupier), ultrasounds (B. Arnal, E. Bossy), numerical simulations (S. Aland, Freiberg, Germany) and contrast agents development and characterization (M. Versluis, Twente, the Netherlands).

The candidate should have experience in leading research through designing and running experiments. Experience in ultrasounds, microfluidics and/or solid mechanics is a plus.

The gross monthly salary is 2416.36 € over 13 months.

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