

Master Internship

Controlled Microfluidic Syringe Pump

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Place: [LMF](#), ENS Paris-Saclay, France

Context

Microfluidics is a field that studies the manipulation of microliter volumes on a chip, often coupled with imaging techniques like microscopes. The technique allows one to observe and control the behavior of microbiological systems at single-cell level.

Research question

Syringe pumps are particularly well suited to generate well-defined, small volume, flows in microfluidic devices and are thus widely used in the field. Based on an existing design, a 3D-printed syringe pump was developed and adapted to the laboratories needs for experiments with bacteria in microfluidic devices. Goal of the internship is to improve the existing prototype. Depending on your interests, you will work on:

1. The current prototype does not have a controlled flow-rate. Rather, the flow-rate is estimated by the pump's geometry and the motor speed. We would like to extend this setup by a flow-rate sensor for low volumes in a control loop running on a microcontroller. The task involves design of a control setup and implementation in a microcontroller.
2. Improve the stability of several components of the pump. This involves coming up with improved 3D printer designs.
3. Improved PCB board. The task involves design of a PCB board and subsequent fabrication.
4. Experimental validation of the pump's parameters.

Team

You will be part of an interdisciplinary research team at ENS Paris-Saclay, working on synthetic biology, distributed computing, and circuit design.

Required skills

Most important is a curious, driven attitude. An ideal candidate is inclined to embedded systems design, coding (in Python and C), and has basic knowledge of control theory and circuit/PCB design.

You'd like to join?

Write a short statement of interest to: mfuegger@lsv.fr and thomas@thomasnowak.net. If you have questions do not hesitate to contact us.