

Master of Science – Biomedical Engineering Thesis Proposal

Master Thesis: Organ-on-Chip automation hardware design: development and integration of a miniature robotic XY stage for a miniature microscope

Context: Organs-on-Chip (OoC) are in vitro miniaturized and simplified model systems of organs (Figure 1). Since 2009, the OoC approach to synthesising viable non-perfused small in vitro organs progressed significantly and is currently the most commonly used approach. The method of choice is to grow an OoC in a gel. Most OoC engineering in academic research is carried out manually and is, therefore, labour-intensive. The perfusion is critical to nourish cells with nutrients and transport drugs. Methods to generate perfused OoC e.g. using a tilting station, have been developed but the perfusion flow rate profile does not mimic human organ in vivo blood flow rate profile. We aim to develop a robotic XY stage for a miniature microscope. The question of whether a robotic XY stage (Figure 2) can be compact and stable enough to integrate in existing OoC perfusion devices and OoC incubator plate hotel is your opportunity to work on an exciting project, which has an impact on research as well as the pharmaceutical industry. Task description: You will be responsible for designing, integrating, and testing a robotic stage on existing perfusion OoC devices.

Nature of the Thesis

Experimental: 80% Programming: 0% Documentation: 20%

Specific Requirements

Passion for CAD or robotics or experience with SolidWorks.

Supervisor

Cédric Schicklin BIROMED-Lab https://biomed.dbe.unibas.ch

Contact

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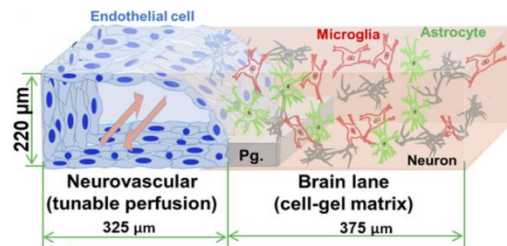


Figure 1: Schema of a perfused Organ-on-Chip in vitro culture. Medium flow is represented by the orange arrows.

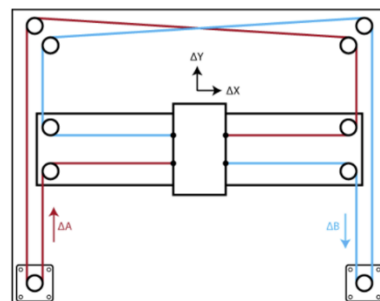


Figure 2: Example of an XY linear stage. Xing Yuan et al. 2021