Building and Testing an Automated Multiplexing Fluorescence Microscope

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Background: Recent developments in artificial intelligence have a great potential in powering the next-generation data-driven life science. Meanwhile, successful AI applications are often achieved by acquiring massive datasets for training AI models. Our group aims to build a fully automated cell imaging farm for generating massive microscopy image datasets to support AI-powered image analysis and cell modeling.

Description:

As part of the larger project for building an automated imaging farm, we would like the student to focus on building the imaging unit for the farm. It consists of a microscope based on the Squid system (https://www.biorxiv.org/content/10.1101/2020.12.28.424613v1) and a fluidics system. While most of the parts are already made, the student will learn how to assemble different parts together, adapt changes and work on the customization of the software for controlling the microscope and fluidics, as well as testing the system for performing multiplexing imaging on cells.

We are looking for highly motivated students in engineering who have a genuine interest in building automated imaging systems, and are willing to be exposed to challenges across electronics, optics, mechanics, software and cell biology.
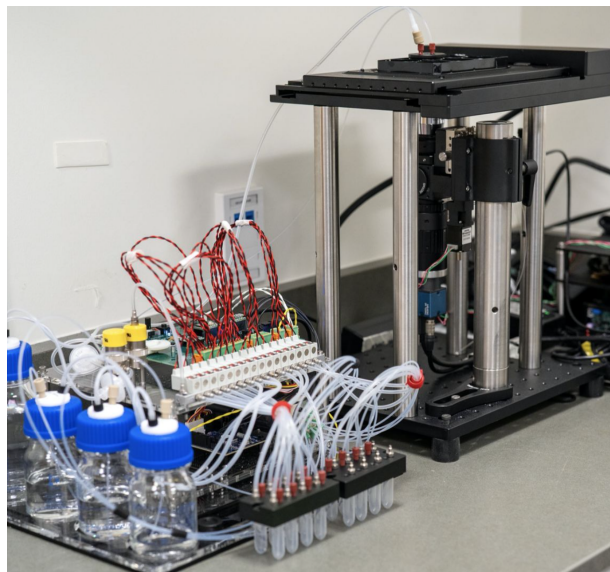

Figure 1 An earlier version of the multiplexing imaging unit. It consists of a 5-color wide-field microscope and a multi-channel fluidic system for performing automated multiplexing imaging.