

## **OLIVE, an Open-source LIVE imaging microscopy framework**

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Here we present an open-source microscope control framework that abstracts away the hardware differences and acquisition nuances across different microscope modalities.

Numerous open-source acquisition frameworks [1-3] for extensive selections of microscope modalities have been proposed over the decade. However, it is still challenging to have a single application and framework to accommodate acquisition differences.

Currently, we prioritize OLIVE to support (but not limited to) our available systems:

- 1) Lattice lightsheet microscope for live-cell volumetric imaging with FPGA facilitated device synchronization.
- 2) PC-based large tissue tiled-stacks Bessel lightsheet microscope with Arduino backed scanning control.

OLIVE aims to bridge across these schemes by taking advantage of Python's interpreting nature and its flexible role as a glue language, allowing users to tackle varieties of hardware and their control flow on-demand without directly facing compilation complexities. This design philosophy also allows hardware and control support to expand through Python namespace packages gradually and the ability to piece together new control flow like lego bricks without redesign the software for a new microscopy design.

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