Acquire

napari workshop on multi-dimensional optical microscopy

Alan Liddell, Chan Zuckerberg Initiative

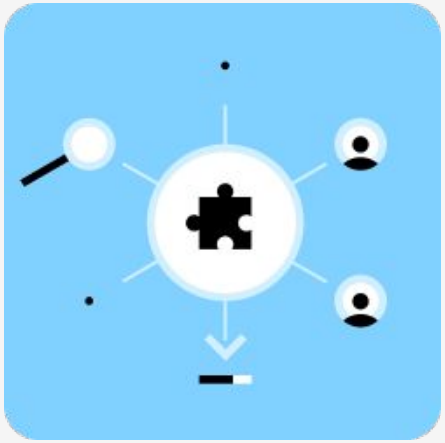
2023-09-27

CZI Imaging Tech

How CZI is involved in the napari Community

napari viewer
visualization & analysis interface

CZI: Supports some core developers and contributes to repo



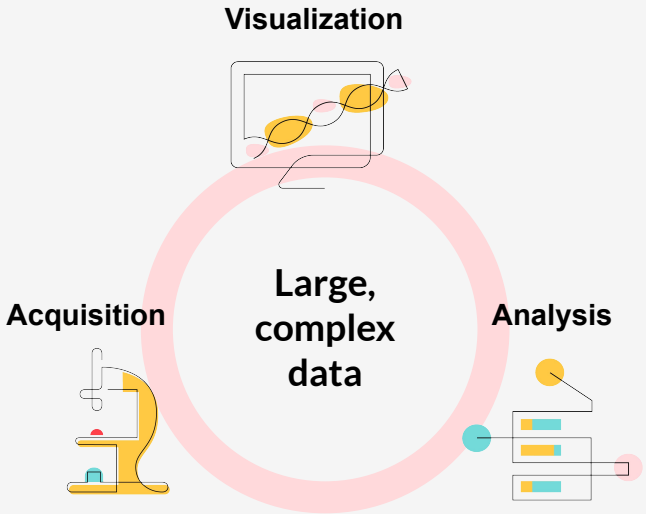
napari hub
discovery & sharing
of image analysis plugins

CZI: Develops in service to the community and funds plugin grants

Give researchers access to reproducible, quantitative image analysis.

Acquire

- Exploratory project started in 2022
- 2-camera simultaneous streaming
- High speed camera streaming (2 GiB / s)
- Cloud-optimized large data storage (Zarr)

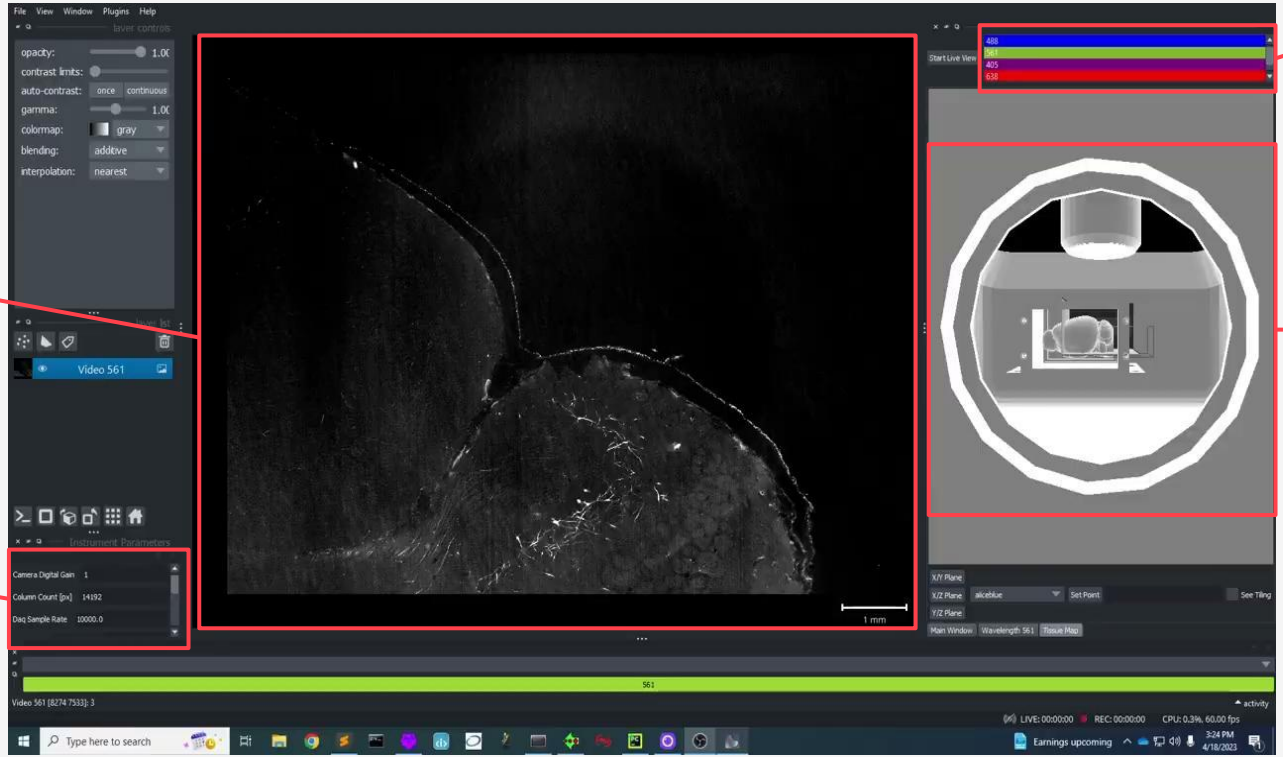


https://github.com/acquire-project/acquire-python

Collaboration with
Allen Institute
& SF Biohub

Acquire + napari

Leverage the viewer and widget support



Live streaming to napari

Instrument parameters

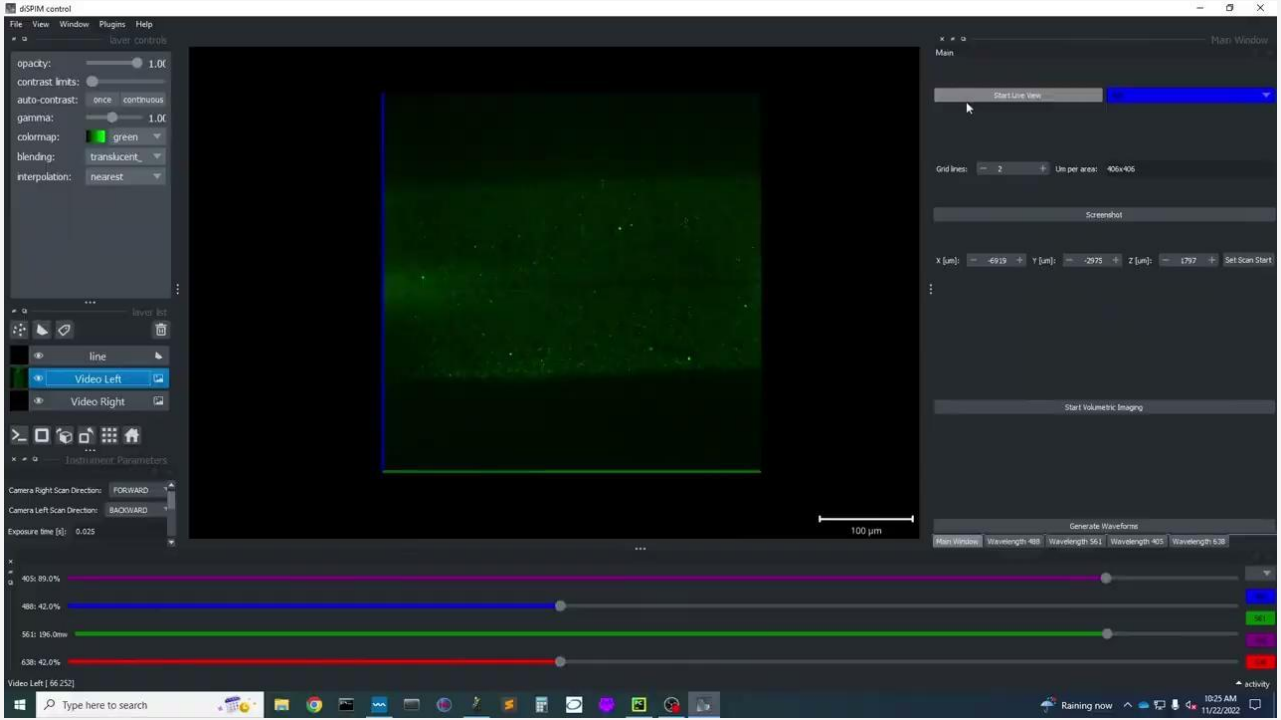
Laser control

Sample stage location

By Micah Woodard @ Allen Institute

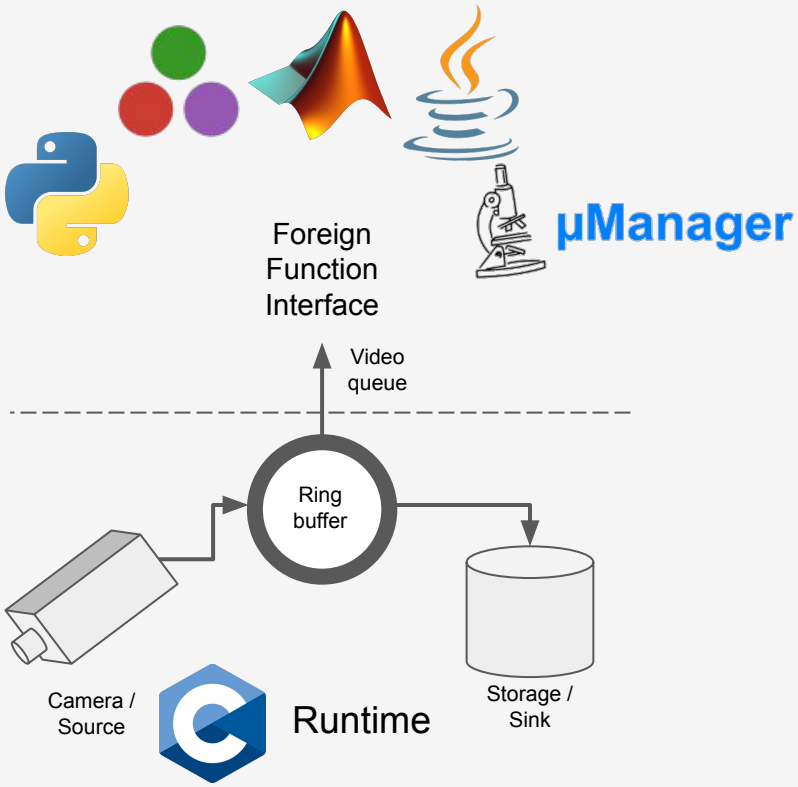
Acquire + napari

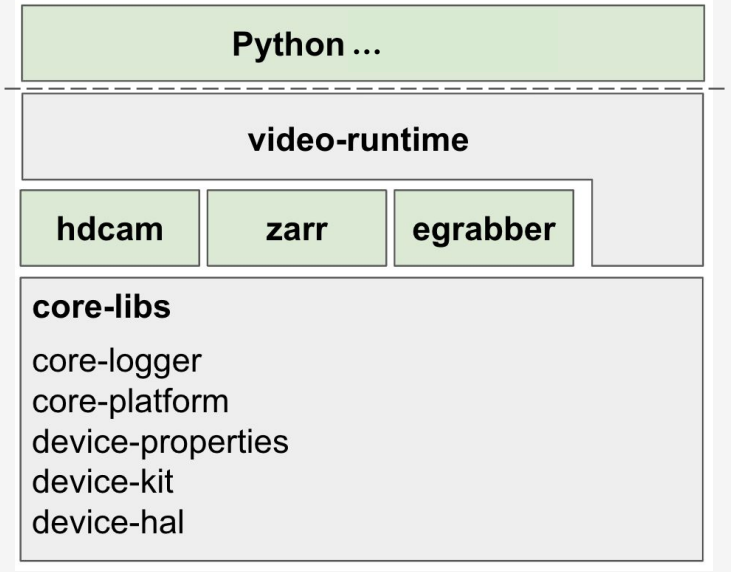
Simultaneous two-camera acquisition



By Micah Woodard @ Allen Institute

Acquire architecture





Using Acquire in Python, part 1

```
import acquire

runtime = acquire.Runtime()
dm = runtime.device_manager()
config = runtime.get_configuration()

# configure stream 0
stream = 0

config.video[stream].camera.identifier = dm.select(acquire.DeviceKind.Camera, "simulated: radial
sin")
config.video[stream].camera.settings.binning = 1
config.video[stream].camera.settings.exposure_time_us = 5e4
config.video[stream].camera.settings.pixel_type = acquire.SampleType.U8
config.video[stream].camera.settings.shape = (1024, 768)
config.video[stream].storage.identifier = dm.select(acquire.DeviceKind.Storage, "Zarr")
config.video[stream].storage.settings.filename = "output.zarr"
config.video[stream].storage.settings.chunking.max_bytes_per_chunk = 32 * 2**20
config.video[stream].max_frame_count = 100
```

Adapted from this demo notebook

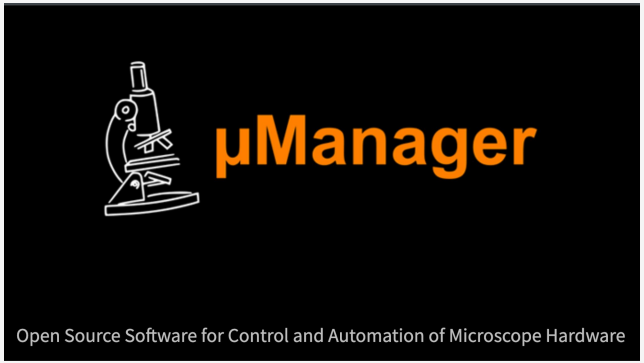
Using Acquire in Python, part 2

```python
import logging

# start the runtime
runtime.start()
print(runtime.get_state()) # DeviceState.Running

# inspect and work with the data
if a := runtime.get_available_data(stream):
    packet = a.get_frame_count()
    for f in a.frames():
        frame_data = f.data()  # frame_data is a numpy array
        # do work with frame_data
        del f  # manually release frame
    del a  # manually release available data

runtime.stop()
```

Adapted from this demo notebook

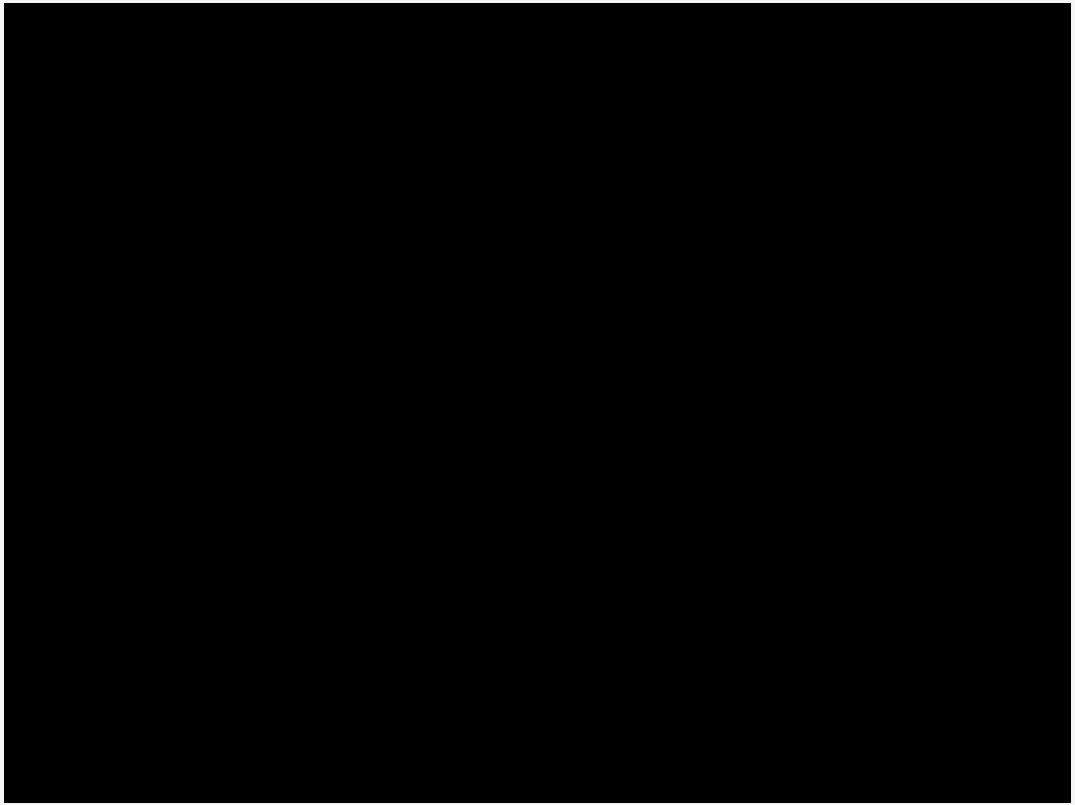
Acquire with µManager

Enable a wider user base to access Acquire



Micromanager
Widely used open-source, Java-based image acquisition software

1. Simultaneous 2 camera acquisition
2. Access to existing device control
3. Enables streaming to OME-Zarr within µManager



Acknowledgement

CZI Imaging tech team
Allen Institute for Neural Dynamics
Politecnico Milano

Learn more about Acquire

Acquire Github repos

ExA-SPIM in *Nature* (preprint)