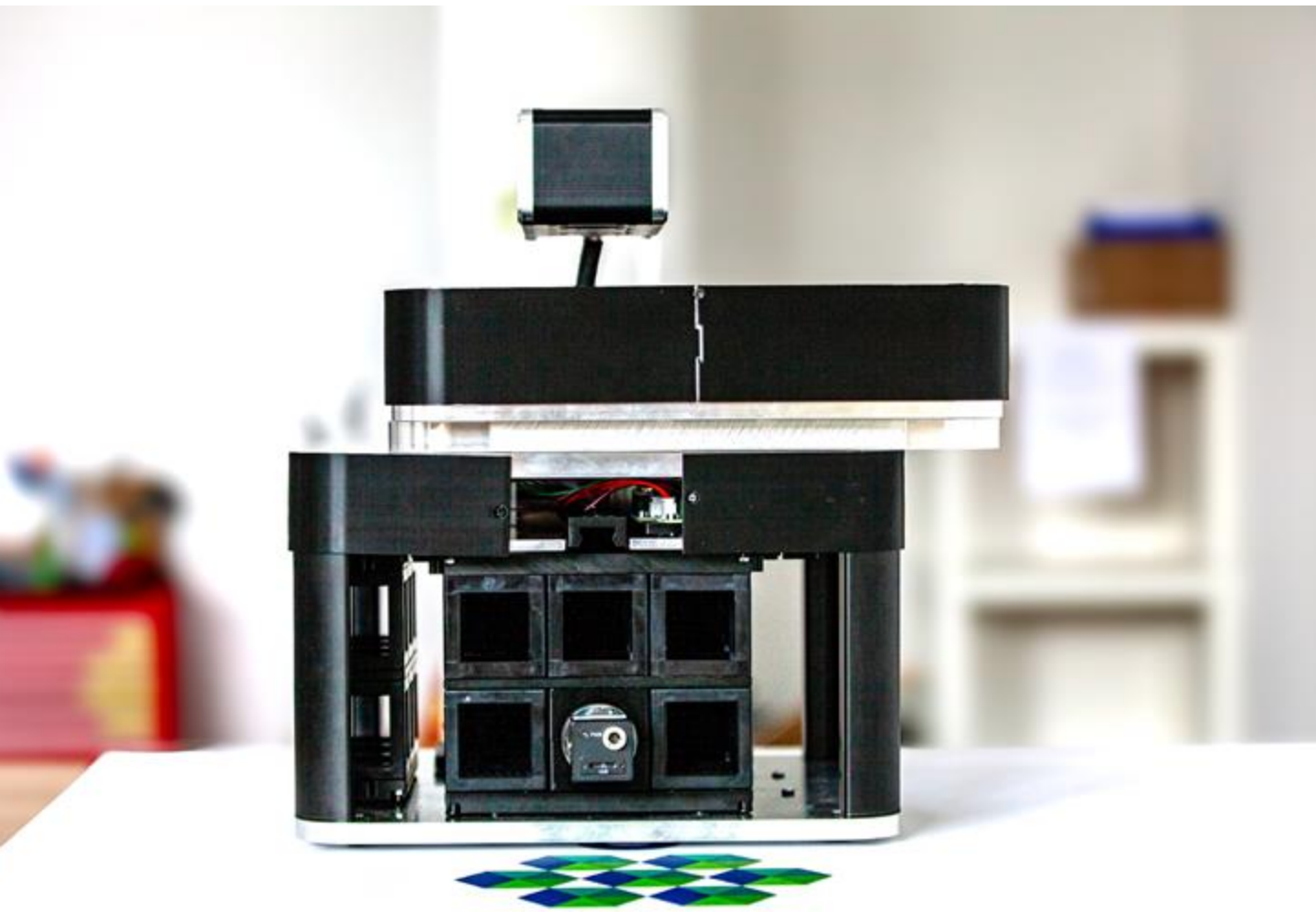
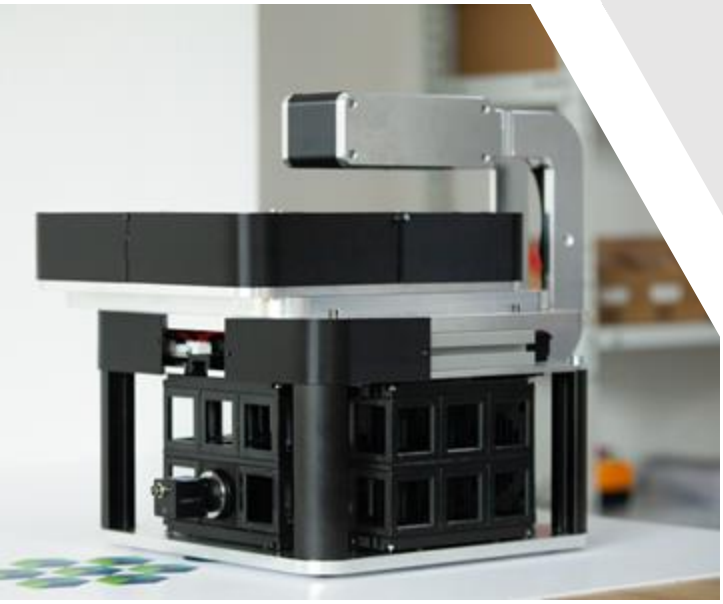
openUC2

FRAME

follows
Function





FRAME

stands for **Fast and Rigid Automated Microscope Engine** and is the next generation of innovative, flexible, fully automated XYZ scanning microscope platform that separates optical pathways from mechanical movement, enabling incomparable flexibility. With standardized interfaces you can effortlessly integrate and exchange optical setups without realignment.

Key Features

- Modular and Open design with standardized Interfaces (UC2)
- Fully automated XYZ motion + Objective Revolver
- Open-source hardware and software
- Prototyping and Proof-of-Principle
- Compatible with all openUC2 Kits and Boxes

FRAME Follows Function

Modular Soft- and Hardware

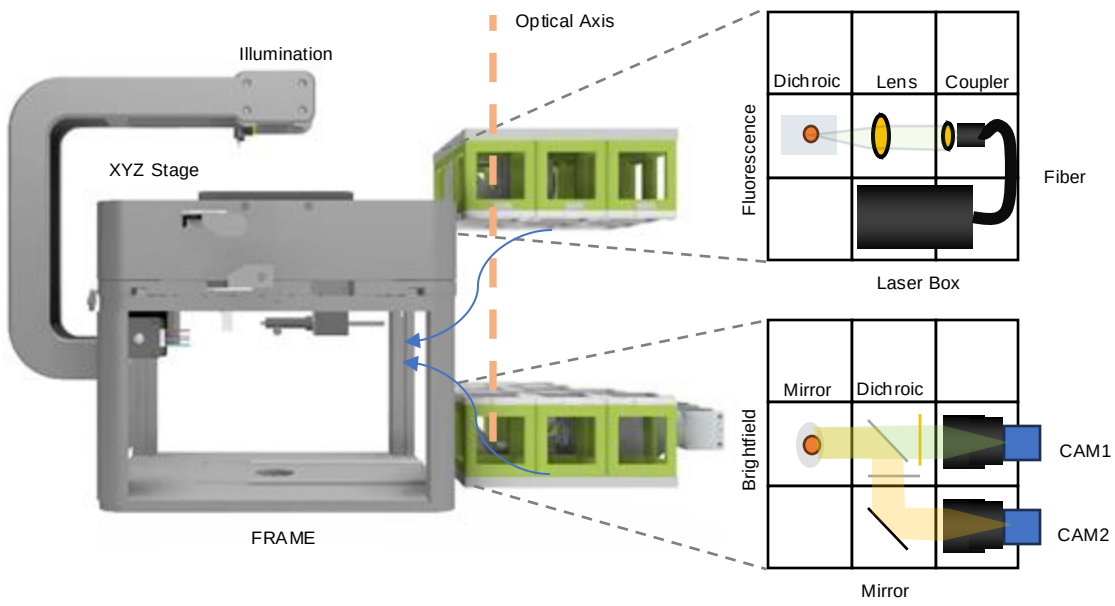
FRAME's modular concept lets you easily assemble, test, and exchange optical setups. Pre-test optics externally, insert them directly into the stable FRAME system, and instantly capture high-quality images.

- Quick and flexible configuration
- Precise, stable, and repeatable optical alignment
- Compatible with custom and third-party modules
- Current collaborations: FLIMLabs for fluorescence lifetime imaging (FLIM) and ARKITEKT.live for decentralized lab automation
- Browser-Based Control via Raspberry Pi & Docker
- Simple setup and universal accessibility
- Effortless control from any browser
- Integrated SDK for expanding functionality and automation into external services (e.g. robots)
- Open API ensuring simple device interaction
- Modular electronics leveraging CAN Bus and UC2-ESP32 firmware (https://youseetoo.github.io)

Integration and Automation

FRAME effortlessly integrates into existing automated laboratory environments. The open-source software and versatile SDK facilitate custom connections to robotics, pipetting platforms, and external applications.

- Compatible with standard lab equipment and workflows
- Robust API for easy integration
- Optimal for automated sample processing
- Tested with Opentrons and Dorna.ai

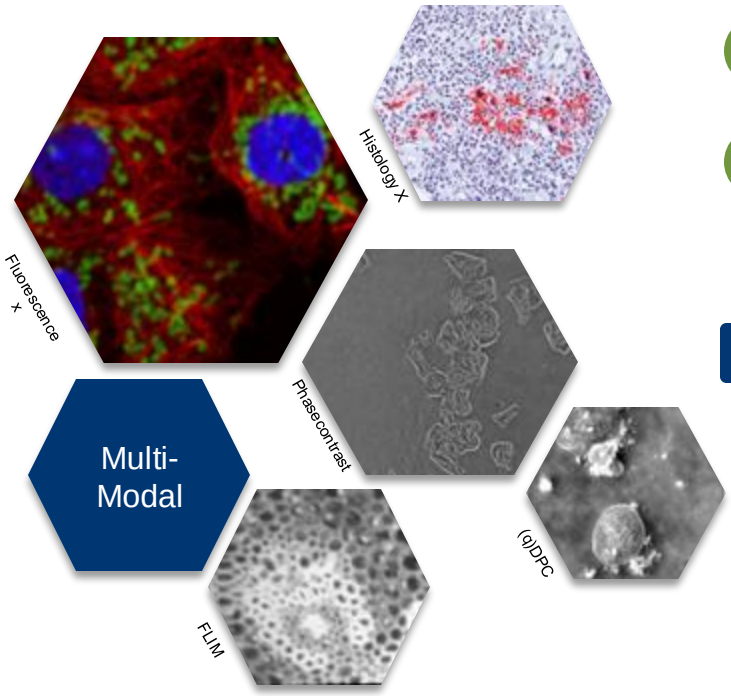


FRAME

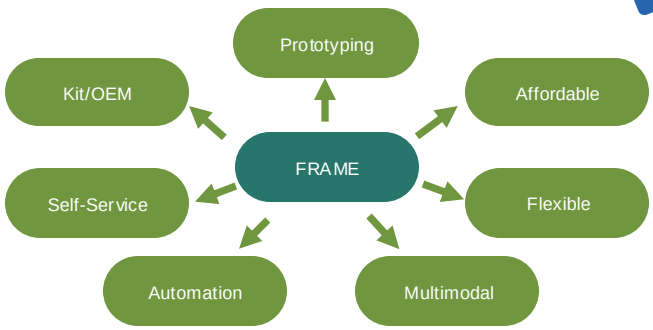
Plug-and-Play Optical Modules

FRAME's modular approach means you can assemble, test, and swap optical setups with ease. Pre-test your optics externally, slide them into the stable FRAME system, and immediately start capturing high-quality images. This provides

- Rapid configuration
- Compatibility with the openUC2 cube formfactor
- Stable and reproducible optical alignment
- Compatible with custom and third-party modules
- Currently partnering with FLIMLabs for FLIM imaging



Highlights



Open Control

FRAME effortlessly integrates into your existing laboratory automation workflows. Its open-source software and comprehensive SDK allow smooth interfacing with robotics, pipetting stations, and external software systems.

- Fully compatible with existing laboratory equipment
- Robust API enabling seamless integration
- Ideal solution for automated sample handling

Intuitive Browser-Based Control
Control experiments from any browser-enabled device, without complex installations.

- Easy, rapid deployment and user-friendly interface
- Interactive microscopy experiments via Jupyter Notebook integration
- Compatible with Napari Plugin Ecosystem for advanced data visualization and analysis
- Open, easy-to-use API for hardware interaction

Flexible Modular Electronics
Built on modular electronics utilizing CAN Bus communication and the versatile UC2-ESP32 firmware (https://youseetoo.github.io).

- Fully compatible with all openUC2 modules and boxes
- Effortlessly expandable for new functionalities
- Simple integration of motors, sensors, lasers, LEDs, and other peripherals

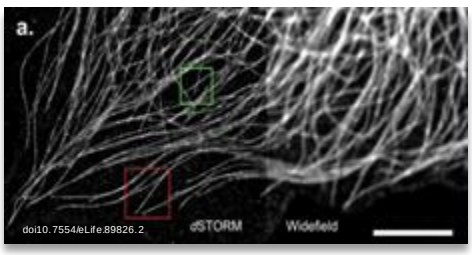
Applications:

- Labelfree and labeled Cell-Based Assays & Live Cell Imaging:
  - Proliferation and Confluence Analysis
  - Cell & Particle Tracking (with ext. software)
  - Scratch Assays
  - Apoptosis
  - Transfection Efficiency
  - Reporter Gene Assays
  - Neurite Growth and Angiogenesis
  - 3d Cell Culture and Spheroids
  - Histological Sections and whole Slides
  - Complex Time Lapse Studies
  - High-Throughput Screening
- Smart Microscopy (AI-driven Analysis, coming soon)
- Advanced Techniques: FLIM and Super-Resolution Microscopy (via modular extensions)
- Multidimensional Imaging (XYZCT channels, 3D + Time + Colour Channel)
- Rapid Prototyping implementing Novel Optical Approaches

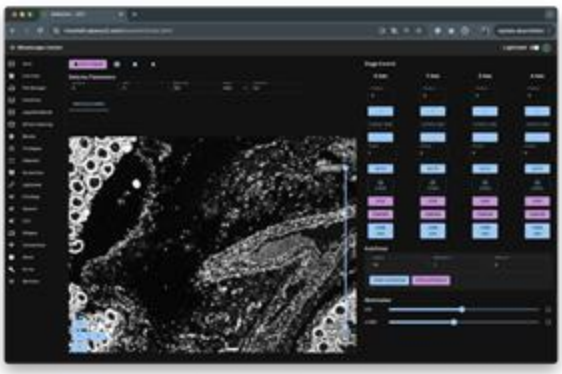
openUC2

Specifications

Standard Objectives (*automated motorized two-position turret*)	4x/10x/20x/60x Customization possible
Excitation Wavelengths (*single-laser, dual laser or quad laser configuration*)	405 nm (e.g. DAPI) 488 nm (e.g. GFP) 520 nm, (e.g. mCherry) 635 nm (e.g. AlexaFluor®647)
Emission Wavelengths	Custom Cube Setup (typically DAPI 488 nm, GFP 520 nm, mCherry) 635 nm, AlexaFluor® 647)
Imaging Modes	Brightfield, Colored Brightfield, Phase Contrast, Fluorescence
Operating Range (XYZ)	130 x 90 x 10 mm
Labware Supported	Microplates (6x-384x), cell culture flasks (T25, T75), Petri- and cell culture dishes, microscope slides (4-fold holder), count- and flow chambers, adapter for customized formats
Camera Compatibility	Single/Dual-camera in cube assembly (e.g. RGB for Histology, Monochrome for Fluorescence), overview camera
Optical Interface	UC2 Cube system in 3x3x2 grid, 3x1x2 from the sides or 3x1 from above
Control Software	ImSwitch running in Docker self-hosted or on internal Raspberry Pi; REST-API; USB Serial and Camera driver (HIK Robotics), PS Controller
Data Format	OME-ZARR, OME-TIF, JPEG, MP4, PNG, customized
Software Interface (SDK & API)	Comprehensive, for integration and automation
Dimensions & Weight	300x300x300 mm[3, 11], <16 Kg (without Top Illumination part)
Electric Input	Power Supply: 110/230V, 50/60Hz 12V, 5A (optional: battery-driven)
Environmental Conditions	10-40°C, <95% humidity



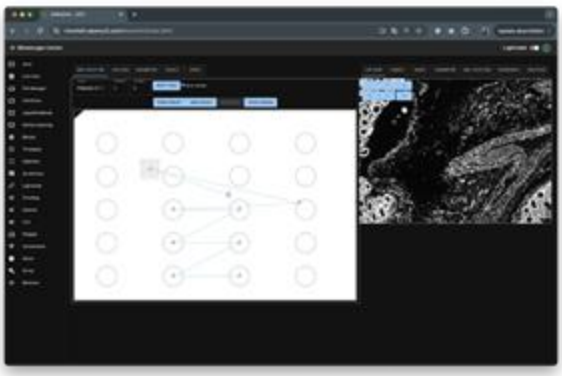
Smart Microscopy



The FRAME microscope can be operated fully autonomously. Docker simplifies remote updates and even remote operation. Observing your cells at home and check their current state has never been easier. A modular, browser-based operating software provides a user interface for the most important operations and can be extended with image processing algorithms. The software provides an internal Jupyter Notebook Engine to script simple experiments using well-established technology

Test it under:

https://imswitch.openuc2.com/imswitch/index.html



OpenUC2 GmbH
Hans-Knöll-Str. 6,
07745 Jena,
Germany
info@openuc2.com
www.openuc2.com

GitHub /openuc2