

MicroManager—An Open Software Platform for Control of Motorized Microscopes and Cameras

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<http://micro-manager.org/>

Abstract

Image analysis starts with image acquisition. Taking images with modern microscopes requires software capable of interfacing with the camera and many other parts, such as shutters, filter wheels, motorized stages, lasers, etc. The sequence in which these parts change state as well their timing is critical to successful experiments, and the operator needs a comfortable yet simple to understand interface to carry out complex experiments. Although several commercial solutions existed when we started, none of these were cross-platform, extendable to new hardware, or easy to integrate with other software and hardware. We therefore developed an Open Source image acquisition platform called μ Manager. Its core, written in C++, has a simple interface to device adapters (interfaces between μ Manager and devices). Device adapters are discovered and loaded at run-time. This pluggable device support has encouraged companies and scientists to write code for a wide array of equipment, (currently more than 20 camera companies, all major microscopes, many peripherals, more than 120 device adapters). An upper level API exposes device control to environments such as Matlab, Java and Python. We developed a user interface running as an ImageJ plugin. Written in our lab with continuous feedback by biologists, it is easy to use and has facilities for configuring complicated, multi-dimensional acquisitions. An API at the UI level makes the μ Manager extensible through scripts and plugins. Plugins for photo-bleaching/photo-conversion and super-resolution are being developed now. μ Manager runs on more than 2,500 microscope systems world-wide.

Biography



Nico Stuurman grew up in the Netherlands and studied Chemistry at the University of Amsterdam. He obtained a Ph.D. in Cell Biology at the same University in 1991, based on his studies of the nuclear matrix with Dr. Roel van Driel.

He then studied the structure and function of nuclear lamins in *Drosophila* as a post-doc, first with Paul Fisher at SUNY Stony Brook, and then with Ueli Aebi at the BioZentrum in Basel, Switzerland.

Nico was a staff scientist at the University of Leiden from 1997-2001 and then joined the laboratory of Ron Vale at the University of California San Francisco where he combines his interest in computer programming and microscopy in various projects including the Open Source software Micro-Manager. He taught microscopy in the Physiology and Neurobiology courses at the MBL in Woods Hole and is co-organizer of the Bangalore Microscopy course in India.