

OpenVIM

Open-source-video microscope

Choosing components

OpenVIM is modular and can be used with a large variety of different parts. This page details the parts that have been used successfully with OpenVIM. The biggest consideration when choosing parts is that the necessary MicroManager drivers are available [Micro-Manager supported hardware](#).

Lenses

- [Keyence VHZ20R](#) - Extremely high depth of field lens, excellent for low magnification imaging of aquatic embryos, 20-200 X digital magnification.
- [Keyence VHZ100R](#) - High depth of field 100 - 1000 X digital magnification lens)
- [Keyence VHZ500R](#) - 500 - 5000 X digital magnification, good for imaging Protozoa.
- [Qioptiq Optem Micro Lens](#) - Highly modular lens system with a wide range of magnification using combinations of auxillary lenses and TV tubes.

Lighting

- [CCS LDR2-42-SW2](#) - An angled 42 mm OD LED ring light for focussed dark field lighting
- [Keyence CA-DRW4F](#) - A non-focussed 43 mm OD LED ring light.
- [Schott EasyLED gooseneck lights](#) - A useful lighting apparatus for imaging different types of specimen, although less suited to repeatable lighting.

Motorised stages

- [Marzhauser SCAN IM 130 x 85](#) - The Marzhauser Scan Tango XY stage is a very reliable and robust stage with very good technical and MicroManager support. Platform independent MicroManager support. Controlled with the [Tango Desktop controller](#)
- [Prior ES111 Optiscan stage](#) - A cost effective stage with platform independent MicroManager support. Controlled with previous versions of the [ES11 Controller](#).
- [Prior ES107 Inverted Optiscan stage](#) - An inverted XY stage, good for samples requiring high magnification to get the necessarily small working distance required, for example using the VHZ500R lens. Note that this lens requires different support leg offsets in the aluminium base owing to its greater

footprint.

Cameras

- [Allied Vision Technologies Pike 421B](#) - An excellent camera for darkfield imaging, used with dc1394b FW800 connection. Great MicroManager support owing to new developments with the IIDC driver. Allows custom ROI, recording of full 14 bits and precise manipulation of frame rates via control over packet size. Image capture time is recorded with high precision. Recently discontinued due to sensor no longer being available, but Allied Vision Technology USB 3.0 equivalents available.
- Allied Vision Technologies Pike 421C. As above, but colour model.
- Allied Vision Technologies Pike 210C. A lower resolution model of the Pike 421C colour camera.
- [The Imaging Source](#) - various colour and monochrome models from the DMK range used.
- [QImaging Retiga \(R3 and R6\)](#) - USB 3.0 cameras available in monochrome and colour, with excellent image quality. However, note that drivers for MicroManager are only available for Windows.

Incubation chambers

- [Okolab Cryo Boldline](#) - allows heating and cooling of samples in multiwell plates, with humidification (to reduce evaporation) and excellent data logging facilities. Can also be used with [gas mixing modules](#), including combined mixing of nitrogen, oxygen and carbon dioxide. OKO-Labs can design gas mixing units to user specifications if required.
- [Okolab electrically heated chamber](#) - Allows heating of sample within multiwell plates using electrical filament heaters built into an incubation chamber. System integrates this with data logging and controlled temperature humidification. This particular model is discontinued.

Vibration reduction

- [World Precision Instruments WPI-BM6 platform](#). A great small, economical and portable solution for isolating an OpenVIM.
- [Micro-G TMC Vibration Control table](#). A good solution for mounting OpenVIM systems, potentially multiple, together with some purpose built cable mounting, space for waterbaths and/or gas mixes supplying incubation systems underneath.

Focus block

- [Focus block for holding optics](#)

Custom parts

OpenVIM requires some custom components and these are best created in partnership with a workshop. We also recommend having any aluminium parts hard anodised (find a local metal finisher) as otherwise aluminium will corrode over time.

Aluminium base

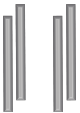


Material : HE9 aluminium plate - 20 mm x 300 mm x 220 mm

Material cost :

Machining : Four tapped holes added to underside for attaching threaded feet (aids in level and keeping stable), and four untapped holes with centres matching the mounting points of the motorised stage - to which the aluminium legs will attach.

Aluminium legs x 4

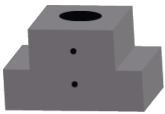


Material : HE9 aluminium pole - 25 mm diameter x 600 mm

Material cost : Approx £45

Machining : Both ends of each leg should be tapped to allow attachment to the motorised stage and aluminium base - via machine bolt

Aluminium optic support block



Material : HE9 aluminium block - 50 mm x 100 mm x 50 mm.

Material cost : Approx £30

Machining : Four vertical holes for attaching to the aluminium base via machine bolt, one large vertical hole to receive the stainless steel optic pole and two horizontal threaded holes for grub screw tightening of the stainless steel optic pole.

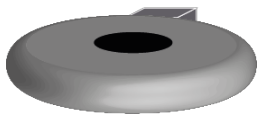
Stainless steel optic pole

Material : 304 stainless steel pole, 15 mm diameter x 900 mm

Material cost : Approx £18

Machining : No machining necessary, unless cutting to length is required

Delrin lens support mount

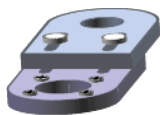


Material : Delrin thermoplastic - 150 mm diameter x 100 mm length

Material cost : Approx £50

Machining : Delrin machined to a circular profile using a lathe. The profile should be circular (diameter to suit the optics carrier chosen - see below) have a central hole for receipt of the lens (see below), a horizontal slit for tightening, using a recessed machine bolt, and a lip on the upper side so that it is supported by the optics carrier component that is chosen.

Acrylic lighting mount



Material : Acrylic 10 mm x 200 mm x 100 mm

Machining : Acrylic lighting mount, best produced using a CNC machine. Profile tailored to suit the light chosen and it is mounted on the stainless steel optic pole, secured using a grub screw and subsequently can be moved both vertically and laterally for optimisation and convenience.
