

Readiness report — OpenFlexure Microscope (high-res build, v7.0.0-beta5)

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Readiness: OpenFlexure Microscope (high-res build, v7.0.0-beta5)

Verdict: Ready with caveats · 2026-09-02 · est. parts cost \$250–\$310 **Cybersecurity — software & network: Review before networking**

This cold check establishes the sourcing baseline for all 31 BOM items. All required parts are currently obtainable, but several major caveats apply: the Raspberry Pi Camera Module v2 faces an active supply chain lifecycle transition with long factory lead times on the replacement SKU, the Raspberry Pi 4B is selling at a significant markup above MSRP, and specialized open-hardware components (Sangaboard and Illumination Kit) are single-sourced boutique items.

Action required

Part	Problem	Recommended action
Raspberry Pi Camera Module v2	Legacy SKU SC0023 discontinued at DigiKey; updated SKU SC2701 carries a 20-week lead time with 0 distributor stock. Camera Module v3 cannot be substituted.	Order existing stock directly from RS Components (part 913-2664, 1,311 available) before inventory is depleted.
Raspberry Pi 4 Model B	In stock in high volume at DigiKey (SC0194(9)), but heavily marked up at \$100.00 (MSRP is \$55.00).	Procure early or use an alternative RAM tier (2 GB, 4 GB dual-RAM, or 8 GB Pi 4B) to manage per-seat costs. Do not substitute Pi 3B+ or Pi 5.

Parts

Active Electronics and Compute

Part	Spec/Package	Status	Stock	Price	Source
Raspberry Pi 4 Model B	4 GB SBC, standard 85 mm x 56 mm	Available (overpriced)	12,149	\$100.00	DigiKey
Raspberry Pi Power Supply (USB-C)	5.1 V DC, 3.0 A, 15.3 W USB-C wall adapter (SC0218)	Readily available	4,499	\$6.75	Newark

Part	Spec/Package	Status	Stock	Price	Source
Raspberry Pi Camera Module v2	Sony IMX219 8 MP, 15-pin CSI-2 ribbon, 25 mm x 24 mm	Lifecycle risk	1,311	\$29.91	RS Components
Sangaboard v0.5 Motor Controller Board	Custom 3-axis stepper driver HAT/daughterboard	Readily available	In stock	\$45.20	Lectronz / TauLab
28BYJ-48 Micro Geared Stepper Motors	5 V DC unipolar 5-wire stepper, 64:1 reduction	Readily available	In stock	\$4.14 (5-pack)	StepperOnline
Illumination PCB Module	OFMv7 LED PCB with 2-pin connector and condenser kit	Readily available	In stock	\$16.35	Lectronz / TauLab
Micro SD Card	32 GB MicroSDHC UHS-I / Class 10 (SDSQUAR-032G-GN6IA)	Readily available	In stock	~\$6.00–\$10.00	RS Components / Retail

Wiring, Interconnects, and Optical Elements

Part	Spec/Package	Status	Stock	Price	Source
200 mm Pi Camera Ribbon Cable (Type B)	15-conductor, 1.0 mm pitch, Type B (reverse contacts)	Readily available	1,384	\$0.848	Newark
2-Pin DuPont Connector Female Housing	1x2 female crimp housing, 2.54 mm pitch (Pololu 1901)	Readily available	In stock	\$1.55 (25-pack)	Pololu
Pre-crimped Female-Female Jumper Cable (30 cm), Black	30 cm female-to-female 26–28 AWG wire	Readily available	In stock	\$1.45	Tinkersphere
Pre-crimped Female-Female Jumper Cable (30 cm), Red	30 cm female-to-female 26–28 AWG wire	Readily available	In stock	\$1.45	Tinkersphere
12.7 mm Achromatic Doublet Tube Lens	f = 50.0 mm, Ø12.7 mm, AR coating 400–700 nm	Readily available	In stock	€58.93 (~\$60.00)	Thorlabs
Condenser Lens	13 mm OD, 5 mm focal length PMMA lens	Readily available	In stock	\$5.81	AliExpress / TauLab Kit
Microscope Objective	Standard RMS-thread DIN finite-conjugate objective (4X/10X)	Readily available	In stock	\$17.99	AmScope

Mechanical Fasteners and Structural Hardware

Part	Spec/Package	Status	Stock	Price	Source
M3 Brass Hex Nut	M3 x 0.5 mm, 5.5 mm AF, DIN 934 brass	Readily available	In stock	£2.45 (pack of 50)	Westfield Fasteners / McMaster-Carr
M3 Stainless Steel Hex Nut	M3 x 0.5 mm, A2 stainless steel, DIN 934 (WF1255)	Readily available	63,015	£1.83 (pack of 3)	Westfield Fasteners
M3 Stainless Steel Washers	M3 Form A, 0.5 mm thick, A2 stainless, DIN 125A (WF1189)	Readily available	71,535	£33.71 (bulk 10k)	Westfield Fasteners
M3 x 10 mm Socket Head Cap Screws	M3 x 10 mm, 2.5 mm hex, A2 stainless, DIN 912 (WF2345)	Readily available	In stock	~£0.10	Westfield Fasteners / McMaster-Carr
M3 x 25 mm Stainless Steel Hex Bolts	M3 x 25 mm full thread, A2 stainless, DIN 933 (WF1662)	Readily available	In stock	In stock	Westfield Fasteners
No. 2 x 6.5 mm Self-Tapping Screws	No. 2 x 6.5 mm Pozi pan head, A2 stainless (WF825)	Readily available	1,777	£1.02 (sachet of 20)	Westfield Fasteners
Viton O-Rings (30 mm ID x 2 mm C/S)	30 mm ID x 2 mm cross-section Viton/FKM (9263K119)	Readily available	In stock	In stock	McMaster-Carr

Raw Materials, Consumables, and Assembly Tools

Part	Spec/Package	Status	Stock	Price	Source
White Polypropylene Sheet (0.5 mm thick)	0.5 mm thick white PP sheet stock (Kitronik 43142)	Readily available	In stock	£2.50	Kitronik
Black PLA 3D Printer Filament	1.75 mm opaque black PLA spool (20 g needed)	Readily available	In stock	\$9.36 (1 kg)	Toolots
PLA 3D Printer Filament (Structure)	1.75 mm standard PLA spool (380 g needed)	Readily available	In stock	\$9.99 (1 kg)	Micro Center
Light Machine Oil	3-in-One multi-purpose mineral oil (RS 252-0168)	Readily available	In stock	In stock	RS Components / McMaster-Carr

Part	Spec/Package	Status	Stock	Price	Source
#1 Pozidrive Screwdriver	PZ1 tip, 80 mm blade precision screwdriver (176-3436)	Readily available	In stock	In stock	RS Components
2.5 mm Ball-End Allen Key	2.5 mm spherical ball-end hex L-key	Readily available	In stock	\$1.29	Wiha Tools USA
Pi Camera Lens Adjustment / Removal Tool	2-prong lens removal spanner (or 3D-printed STL)	Readily available	In stock	Free (STL download / bundled)	OpenFlexure Build Server
Precision Wire Cutters	Electronic flush-cutting diagonal pliers	Readily available	In stock	\$6.99	eBay
Utility Knife	Standard snap-off blade utility knife	Readily available	In stock	\$2.69	Harbor Freight Tools
Fused Filament 3D Printer	FFF/FDM desktop 3D printer, 0.4 mm nozzle	Readily available	Capital equipment	—	General Lab Equipment

Substitutes

For part	Substitute	Differences	Verified	Judgment
Raspberry Pi 4 Model B	Raspberry Pi SC0194(13)	Dual RAM packaging variant; otherwise identical form factor, electrical constraints, and pinout.	Footprint and dimensions (85 mm x 56 mm standard SBC), electrical power constraints (5.0–5.1 V USB-C), 40-pin GPIO and 15-pin MIPI CSI-2 connector.	Acceptable drop-in replacement.
Raspberry Pi Camera Module v2	Raspberry Pi SC2701	Official updated replacement SKU for Camera Module v2. Currently carries a 20-week factory lead time.	Sensor identity (Sony IMX219 8MP), 15-pin CSI-2 ribbon connector, supply rail (3.3 V via ribbon).	Acceptable if stock is located; disqualified for immediate ordering due to 20-week lead time.
Sangaboard v0.5	Arduino Nano / Uno + 3x ULN2003 Darlington Driver Breakout Boards	Discrete breakout boards requiring custom external wiring instead of an integrated HAT/daughterboard.	Operating voltage (5 V rail), motor drive topology (unipolar 5-wire Darlington drive for 28BYJ-48 steppers). Physical mounting footprint not verified.	Acceptable documented fallback per snapshot.

For part	Substitute	Differences	Verified	Judgment
Illumination PCB Module	Standard 5 mm white LED + 220 Ω resistor	Discrete through-hole LED and resistor rather than custom surface-mount board.	Operating voltage (5 V PWM drive), optical emission. Mechanical snap-fit footprint not verified.	Acceptable documented fallback per snapshot.
28BYJ-48 Micro Geared Stepper Motors	SparkFun ROB-10551 / 10551	12 V DC bipolar motor with 4 Ω coil resistance; incompatible with 5 V rail and unipolar driver.	Electrical drive topology, voltage.	Strictly disqualified.
28BYJ-48 Micro Geared Stepper Motors	Adafruit 858	1/16 reduction gear ratio (~512 steps/rev) instead of required 64:1 (~4096 steps/rev).	Step count and gearbox ratio.	Strictly disqualified.

Always verify pinouts, mechanical tolerances, and operating ratings against manufacturer datasheets before ordering substitutes.

Cybersecurity — software & network

Review before networking — The microscope operates network-facing software including a control server and Raspberry Pi OS, but neither could be checked for vulnerabilities because software versions are not specified in the project materials.

Component	Version	How known	Support status
OpenFlexure Raspbian / Raspberry Pi OS	not determined	not determined	—
OpenFlexure Server	not determined	not determined	—
Sangaboard Firmware	not determined	not determined	—

None found.

What this means for your lab

This microscope is designed to connect to a local area network via Ethernet or Wi-Fi to provide headless access through the OpenFlexure server. Because the specific operating system image, server software version, and network configurations are not documented in the lab materials, the security posture and any default credentials of the instrument are unknown. Someone on the same network could potentially access the microscope camera stream, operate the motorized stage, or attempt remote access to the Raspberry Pi. Instructors should consult campus IT, isolate the device on a dedicated local network segment, and ensure default passwords are changed before placing it on any shared network.

Not checked

- OpenFlexure Raspbian / Raspberry Pi OS: version not determined
- OpenFlexure Server: version not determined
- Sangaboard Firmware: version not determined; no advisory database for the ecosystem

Other dependencies

- Upstream Git Repository: Active and accessible at gitlab.com/openflexure/openflexure-microscope.
- Project Documentation & Website: Online and accessible at openflexure.org.
- Community Forum: Active discussions at openflexure.discourse.group.
- Scientific Publication Reference: DOI link active at doi.org/10.1364/BOE.385729.
- TauLab Commercial Portal: Storefront active at taulab.eu/openflexure and lectronz.com/stores/taulab.
- 3D Printing Requirements: Main flexure body and stand require PLA filament printed with a 0.4 mm nozzle at 0.15 mm or 0.20 mm layer height; flexure joints require 100% solid infill. PETG, ABS, and nylon are prohibited due to creep and modulus differences. Optics tube requires opaque black PLA.
- Lens Tool File: Workaround lens removal tool STL is hosted and downloadable from build.openflexure.org.
- PCB Gerber / Fabrication Files: Sangaboard v0.5 and Illumination PCB open-source design files are hosted on the OpenFlexure GitLab repository for custom fabrication if commercial boards are bypassed.

Watch list

- **Raspberry Pi Camera Module v2:** Legacy SKUs are discontinued and the active SKU (SC2701) has a 20-week factory lead time. Once the remaining stock at distributors like RS Components sells out, procuring compatible Sony IMX219 modules will become difficult.
- **Raspberry Pi 4 Model B:** Market prices remain elevated (~\$100 vs \$55 MSRP). While stock is currently deep at DigiKey, unit pricing could impact large multi-seat lab budgets.
- **TauLab Custom Boards (Sangaboard v5 & Illumination Kit):** These are boutique, single-supplier open-hardware kits. Any supply interruptions will force instructors to fall back on manual Arduino/ULN2003 wiring and discrete LED assemblies.