Details: The Tools list used in the Project.

1. Essential Tools Required (Non-Printed)

1. #1 Pozidriv Screwdriver

- Type: Pozidriv (PZ1), not Philips.
- Purpose: Used for tightening the No.2 6.5 mm self-tapping screws that hold the plastic parts together.

2. 2.5 mm Ball-End Allen Key (Hex Key)

- Type: 2.5 mm, ball-end preferred for angled access.
- Purpose: Used for tightening M3 cap-head screws inside tight areas of the microscope frame.

3. Extra M3 Nut

- Type: Standard M3 metal nut.
- Purpose: Used as a *temporary tool* to hold screws and help insert nuts into their pockets within printed parts.

4. Extra M3×10 mm Cap-Head Screw

- Purpose: Acts as a "pulling tool" to drag nuts into their "trapped nut" slots inside printed parts.

5. Precision Side Cutters / Wire Cutters

- **Purpose:**
    - Cutting LED leads, wires, and jumper cables.
    - Trimming cable ties.
    - Cutting small plastic imperfections.

6. Utility Knife (Standard Cutter, Not a Scalpel)

- **Purpose:**
    - Cleaning 3D-printed pieces.
    - Removing minor stringing.
    - Trimming polypropylene sheet (if needed).

7. Pi Camera Lens Removal Tool

- Comes with: Raspberry Pi Camera Module v2.
- Purpose: Safely remove the original Pi Camera lens to reuse it as the microscope objective.
- If missing, use the **3D-printed "workaround lens tool"** from the OpenFlexure repo.

8. Fused Filament 3D Printer (FFF/FDM)

- Any reliable printer (Prusa, Creality, Bambu, etc.)
- Requirements:

- Nozzle: 0.4 mm

- Filament: PLA

- Good bridging performance

- Purpose: Printing all the mechanical parts of the microscope.

2. Printing Material Requirements

1. PLA Filament

You need about:

- PLA Body & Mechanical Parts Any colour.
- Black PLA Optics Module Black reduces stray light inside the optics path higher image quality.
- Total PLA needed: ~400 g.

2. 0.5 mm Polypropylene Sheet (Approx. 4–10 cm²)

- Used for sample clips, LED diffuser, or flexibility components inside the assembly.

3. Light Machine Oil

- Only 2–3 drops needed.
- Purpose: Lubricate flexure screws to prevent wear and ensure smooth movement of the stage.

3. Electronics Required

Imaging & Computer

1. Raspberry Pi 4 (any RAM version)
2. Raspberry Pi Camera Module v2
3. 200 mm Raspberry Pi Camera Ribbon Cable (Type B)
4. Micro-SD Card (16–32 GB recommended)
5. Raspberry Pi Power Supply (official or 5V 3A)

Motor Control (Automated Version)

1. **Sangaboard v0.5**

    - Motor controller designed for OpenFlexure.

2. **Three 28BYJ-48 Stepper Motors (5V)**

    - For X, Y, Z stage movements.

Illumination

1. **Illumination PCB**

    - Comes in some kits.

- If not available, use the **LED workaround** described in the guide:
    - 5 mm white LED
    - Resistor
    - Jumper wires

Wiring Components

- 2 × **2-Pin DuPont Female Housings**

- 2 × **Pre-crimped Female-Female Jumper Wires (Red & Black, 30 cm each)**

- Additional jumper wires (optional, but useful)

4. Mechanical Hardware Required

Screws, Nuts, and Washers

M3 Hardware

- 3 × M3 Brass Nuts

    - For the flexure mechanism tension.

- 21 × M3 Standard Nuts

- 17 × M3×10 mm Cap-Head Screws

- 4 × M3×25 mm Stainless Steel Hex Bolts

- 8 × M3 Stainless Steel Washers

Self-Tapping Screws

- 20 × No.2 6.5 mm Stainless Steel Self-Tapping Screws

Viton Drive Bands

- 3 × Viton O-Rings, 30 mm × 2 mm

- Purpose: Transfer rotation from motors/gears to the microscope stage.

5. Optical Components

1. Condenser Lens

- Essential for focusing light through the sample.

- Usually included in official kits or bought separately.