

**Chan
Zuckerberg
Initiative** CZ



Instituto de Ingeniería Biológica y Médica

- Tobias Wenzel
#OpenHardware
- Pablo Irarrázaval
#openMRI
- Vicente Parot
#compMicroscopy

Latin American Hub for Bioimaging through Open Hardware (LIBRE hub)





The **Latin American Hub for Bioimaging Through Open Hardware (LIBRE Hub)** is a training network for open source bioimaging hardware in Latin America with the goal to empower regional researchers through practical workshops, seminars, networking, and online resources adapted to local needs and republished in local languages.

Workshops

MRI: PROCESANDO TUS PROPIOS DATOS
Taller de 2 días de LIBRE hub

Taller teórico y práctico para conocer y utilizar software público para procesar la señal, y reconstruir imágenes, de resonancia magnética, basado en el lenguaje de programación Julia.

¡Inscríbete!

ANFITRION: PABLO IRARRAZVAL

20 y 21 de noviembre 2023
Campus San Joséquin, Pontificia Universidad Católica de Chile

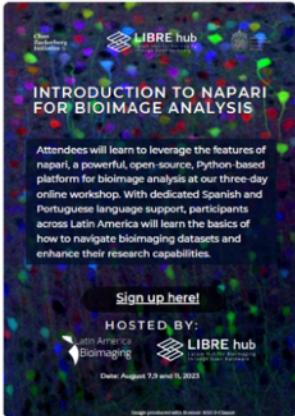


INTRODUCTION TO NAPARI FOR BIOIMAGE ANALYSIS

Attendees will learn to leverage the features of napari, a powerful, open-source, Python-based platform for bioimage analysis at our three-day online workshop. With dedicated Spanish and Portuguese language support, participants across Latin America will learn the basics of how to navigate bioimaging datasets and enhance their research capabilities.

Sign up here!

HOSTED BY:
Latin America BioImaging **LIBRE hub**
Date: August 7, 9 and 11, 2023



LOW-COST LASER ILLUMINATION FOR MICROSCOPY
2-Day in-person LIBRE hub Workshop

Attendees will learn to build a basic laser module for microscopy using a blue (488nm) fiber-coupled laser diode, a current source, and speckle diffuser. Expandable for various colors and control options.

Sign up here!

HOST: Vicente Parot Ph.D.

December 11-12, 2023
Campus San Joséquin, Pontificia Universidad Católica de Chile



STROBE ILLUMINATION FOR BIOIMAGING OF FAST PROCESSES
Hands-on Workshop by LIBRE hub

Attendees will learn how to build, use, and modify our low-cost microfluidic droplet generation workstation as part of their research.

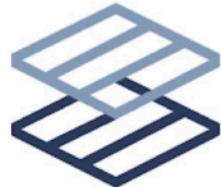
Sign up here!

HOST: Tobias Wenzel Ph.D.

24-26 July 2023
Campus San Joséquin, Pontificia Universidad Católica de Chile



Seminars and training videos - live and recorded

[Home](#)[Shorts](#)[Subscriptions](#)

LIBRE hub

@librehub · 360 subscribers · 44 videos

The Latin American Hub for Bioimaging Through Open Hardware (LIBRE_hub) is a training ...[more](#)

librehub.github.io and 4 more links



Subscribed

[You](#)[Home](#)[Videos](#)[Playlists](#)[Community](#)[Latest](#)[Popular](#)[Oldest](#)

A Breakdown of the Global Open Science Hardware (GOSH) Movement
INSTITUTO DE INGENIERÍA BIOLÓGICA Y MÉDICA
PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
LIBRE hub, Chan Zuckerberg Initiative

51:05

How the Open Science Hardware Movement started | Breakdown of...
30 views • 4 days ago

¿QUÉ HACE QUE EL LAGO SEA TAN AZUL?
¡CON LA HERAMIENTA DE OPEN SOURCE UC2!
INSTITUTO DE INGENIERÍA BIOLÓGICA Y MÉDICA
PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
LIBRE hub, Chan Zuckerberg Initiative

16:15

¿Qué hace que un lago glaciar sea tan azul? Análisis de partículas co...
473 views • 2 weeks ago

Open source FPGA tools for building research devices
INSTITUTO DE INGENIERÍA BIOLÓGICA Y MÉDICA
PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
LIBRE hub, Chan Zuckerberg Initiative

43:36

Overview of open-source FPGA tools for building research devices...
135 views • 3 weeks ago

Toward globally accessible neuroimaging: Building the OSiONE MRI Scanner In Paraguay
INSTITUTO DE INGENIERÍA BIOLÓGICA Y MÉDICA
PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
LIBRE hub, Chan Zuckerberg Initiative

36:10

Building an open-source MRI Scanner in Paraguay | A way...
96 views • 1 month ago

iibm
INSTITUTO DE INGENIERÍA BIOLÓGICA Y MÉDICA
LIBRE hub, Chan Zuckerberg Initiative

A modular, free and open source graphical interface for visualizing and processing electrophysiological signals in real-time

SACAR TORNILLOS ROTOS FÁCILMENTE

iibm
INSTITUTO DE INGENIERÍA BIOLÓGICA Y MÉDICA
LIBRE hub, Chan Zuckerberg Initiative

Imaging hyperspectral (HS) and fluorescence lifetime imaging microscopy (FLIM) interpretation for label-free pathology using phaser plot analysis with PhaserPy

ALINEACIÓN DE ELEMENTOS ÓPTICOS



LIBRE hub

CZI funded network initiative to further Open Source Hardware based Bioimaging in Latin America

7 followers Chile <https://librehub.github.io> company/librehub @librehub <https://chanzuckerberg.com/imagine...> @WenzelLab librehub@uc.cl

Unfollow

Popular repositories

LIBREhub.github.io

Public

This is repository for LIBRE_hub project web page (<https://chanzuckerberg.com/imaging/latin-american-hub-for-bioimaging-through-open-hardware/>). We use Jekyll to run our Github page. We are welcome...

● CSS ⭐ 1 ⚡ 1

fiber-coupled-laser-illumination

Public

View as: **Public** ▾

You are viewing the README and pinned repositories as a public user.

You can [create a README file](#) or [pin repositories](#) visible to anyone.

[Get started with tasks](#) that most successful organizations complete.

gitbuilding-for-beginners

Public

Forked from biodotpe/gitbuilding-for-beginners

User guide to implement and deploy GitBuilding website. Note: Spanish and Portuguese versions soon.

● HTML

strobe-microscope-2level-version

Public

Forked from matiaslh27/2_Levels_Stag

● JavaScript ⚡ 1

gitbuilding-GUI

Public

NOW INTEGRATED INTO GITBUILDING ON GITLAB. Desktop GUI for GitBuilding based on the Electron framework

● JavaScript

napari-LatAm-workshop-2023

Public

Napari training material for a workshop by the CZI funded initiatives LIBRE hub, LatAm Bioimaging, Napari

● Shell

Discussions

Set up discussions to engage with your community!

[Turn on discussions](#)

People



Invite someone

ardware



wenzel-lab

Type to search[Overview](#)[Repositories 18](#)[Projects](#)[Packages](#)[Teams](#)[People 7](#)[Settings](#)

Wenzel Lab

Wenzel Lab at IIBM, Universidad Católica de Chile, check also: <https://github.com/LIBREhub>

[Unfollow](#)[13 followers](#)[Santiago, Chile](#)[https://twitter.com/WenzelLab](#)[@WenzelLab](#)[wenzellab](#)[company/92802424](#)[https://www.printables.com/@Wenz...](#)

Popular repositories

[droplet-sorting-FPGA-controller](#)

Public

IT setup for realtime analysis of microfluidic droplets with FPGA board (RedPitaya) based on python pyprl library

[Python](#)[7](#)

[droplet-sorter-master](#)

Public

Master repository that documents how the different parts come together of the open source hardware Fluorescence Activated (Microfluidic) Droplet Sorter (FADS).

[7](#)

[modular-microfluidics-workstation-controller](#)

Public

Repository for the development of the modular parts of a free and open source microfluidic workstation.

[G-code](#)[6](#)[1](#)

[droplet-sorter-optomechanics](#)

Public

Design of positioning, lasers, filters, detectors, fixtures for open droplet sorting

[5](#)

[strobe-enhanced-microscopy-stage](#)

Public

Forked from [matiaslh27/3_Levels.Stage](#)

Strobe-Enhanced Microscopy Stage

[JavaScript](#)[1](#)[View as: Public](#)

You are viewing the README and pinned repositories as a public user.

You can [create a README file](#) or [pin repositories](#) visible to anyone.

[Get started with tasks](#) that most successful organizations complete.

Discussions

Set up discussions to engage with your community!

[Turn on discussions](#)

People



We share CAD files

Create ▾

Owned by me > WenzelLab

See also: *CAD we share? Publishing reproducible microscope hardware.* Diederich et all 2022

Owned by me
Recently opened
Created by me
Shared with me
Labels
Public

Trash

Name	Modified ▾	Modified by	Owned by
 syringe-pump <small>heat inserts WenzelLab</small>	5:35 PM May 2	Matías H	me
 custom-UC2-cubes <small>Main WenzelLab</small>	10:23 AM May 2	me	me
 strobe-enhanced microscopy stage <small>Main WenzelLab</small>	4:26 PM May 1	biodotpe	me
 Microscopy-high-load-vertical-translation-stage <small>Main</small>	3:46 PM Apr 29	Matías H	me
 Laser driver and fiber organizer <small>Main Edición Caja Matías</small>	4:10 PM Apr 22	Matías H	me
 custom-gridfinity <small>Main WenzelLab</small>	10:32 PM Apr 6	Matías H	me
 Microfluid_sorter <small>B1</small>	6:09 PM Apr 5	me	me
 parametric-gel-electrophoresis-chamber <small>Sheet-eletrode-based Parametric Gel Electrophoresis Box WenzelLab</small>	12:52 PM Apr 2	me	me
 Pipette Holder <small>Main (Vertical) WenzelLab</small>	10:38 AM Jan 12	Matías H	me

onshape - Pipette Holder Main (Ver... WenzelLab Share Search tools... alt+` c MakerTobey

Versions and history

Search history

Name Modified

- Main (Vertical) Matías H > Show change... 10:42 AM Jan 12
- Stand Matías H > Show change... 10:32 AM Jan 12
- E3 Matías H > Show change... 10:32 AM Jan 12
- Wall Matías H > Show change... 10:28 AM Jan 12
- C5 Matías H > Show change... 10:28 AM Jan 12
- C4 Matías H > Show change... 10:24 AM Jan 12
- Definitive 2024 Matías H > Show change... 10:15 AM Jan 12
- Screws Matías H > Show change... 10:14 AM Jan 12
- D3 Matías H > Show change... 10:14 AM Jan 12
- E2 Matías H > Show change... 10:14 AM Jan 12
- C3 Matías H > Show change... 10:13 AM Jan 12
- Horizontal Matías H > Show change... 10:13 AM Jan 12
- B3 Matías H > Show change... 10:13 AM Jan 12
- video Matías H > Show change... 12:36 PM Jan 2
- 2023 Matías H > Show change... 10:37 AM Jan 2
- E1 Matías H > Show change... 9:13 AM Nov 20 20
- C2 Matías H > Show change... 12:58 PM Nov 17 21
- D2 Matías H > Show change... 11:28 AM Nov 17 21
- B2 Matías H > Show change... 11:07 AM Nov 17 21

Configurations

Hanger Pin DI... 14 mm
Ellipse Width 22 mm
Ellipse Length 33 mm
Connector PI... 20 mm
Printing Supp... 0.2 mm

Features (33)

Filter by name or type

Default geometry

- Origin
- Top
- Front
- Right

Building (29)

- (*) libre = 3.002 mm
- Top Shape
- Height
- Sides Work (4)
- Structural Sheets Void (3)
- Edges (5)
- Mirror
- Plugs (2)
- Chamfer 0.4 mm.
- Type C: Off-Centered (10)

Parts (1)

Pipette

CAD collaboration and sharing (we use OnShape)

The image shows a screenshot of the OnShape CAD platform interface. The main workspace displays a 3D model of a blue pipette holder. The model is composed of various geometric features like ellipses, rectangles, and chamfers. A coordinate system with axes labeled 'Front', 'Top', and 'Right' is visible in the top right corner. On the left side, there's a vertical timeline of changes with colored circular markers indicating modification points. The top navigation bar includes standard CAD tools like Sketch, Measure, and Select. The top right corner has a user profile and search bar. The overall theme is collaborative design and sharing, as indicated by the title.



Lvl 17

LIBRE hub

@WenzelLab

↓ 1,734 ❤ 526

49 followers 4 following



Advanced



Expert



White Dwarf

+ Follow

Message



Highlighted models

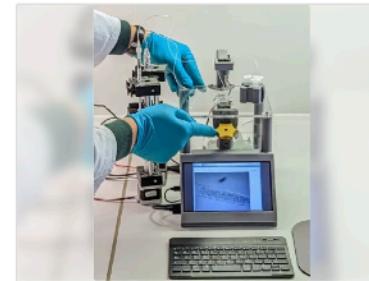
[All models](#)

Adaptable Pipette Holders

Heart 30

★ 5

↓ 86



Strobe-enhanced microscopy stage

Heart 11

★ 5

↓ 24

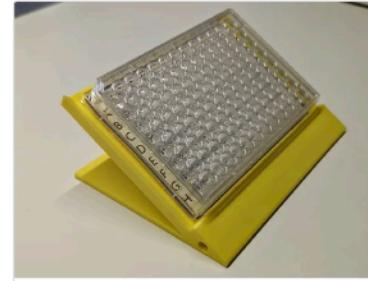


Moldular tube holders

Heart 26

★ 5

↓ 83



96 well-plate locator stand

Heart 41

★ 5

↓ 147



Open-Source Syringe Pumps

Heart 40

★ 5

↓ 49



Optical filter cubes - openUC2 (improved)

Heart 20

★ 0

↓ 49



We can help you share your designs!

Use OSH and contribute



[Image data science with Python and Napari](#)

Course preparation

Day 1: Introduction to Python and Bio-image Analysis

Day 2: Image Filtering, Segmentation and Feature Extraction

Day 3: Napari Plugins: Developers Showcase

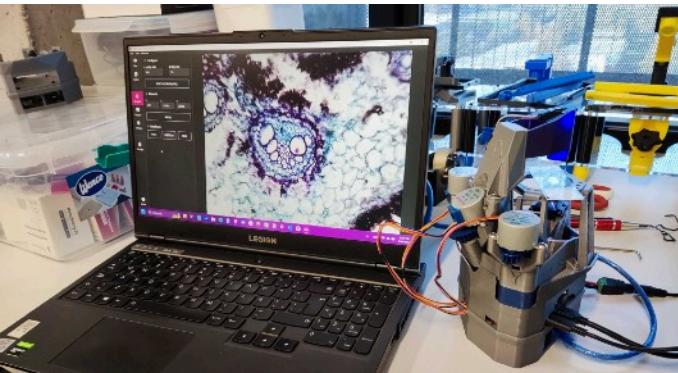


Image data science with Python and Napari

A first Latin America workshop #LIBREhub @napari #LABI - Latin America Bioimaging #MexicoBioimaging

This [Jupyter book](#) contains training resources for scientists who want to dive into image processing with Python and Napari. It specifically aims for scientists and students working with microscopy images in the life sciences. We presume the attendees have some basic python programming and image analysis knowledge. To get everyone on the same level, we start with Python programming basics. We will process images using [numpy](#), [scipy](#), [scikit-image](#), [SimpleITK](#) and [c1Esperanto](#). We will explore [Napari](#) for interactive image data analysis and the [Napari-Assistant](#) for generating [Jupyter Notebooks](#) from interactively designed image processing workflows.

Note: Before the course starts, all participants must complete the [course preparation page](#) - and make use of the Q&A session to ask questions about installation issues. The session on Python environments will be held on the day of the workshop, so we kindly ask that you familiarise yourself with the material before the workshop begins. Please arrive at least 15 minutes early to the session in order to simply use the given time effectively.



Community training in Latin America



Strobe-enhanced microscopy stage

by Pierre Padilla-Huamantinco, Matías Hurtado-Labarca, and Tobias Wenzel
Latin American Hub for Bioimaging Through Open Hardware (LIBRE hub)

Strobe-enhanced microscopy stage

Build the 3-level microscopy stage

Print the plastic parts

Laser cut the acrylic parts

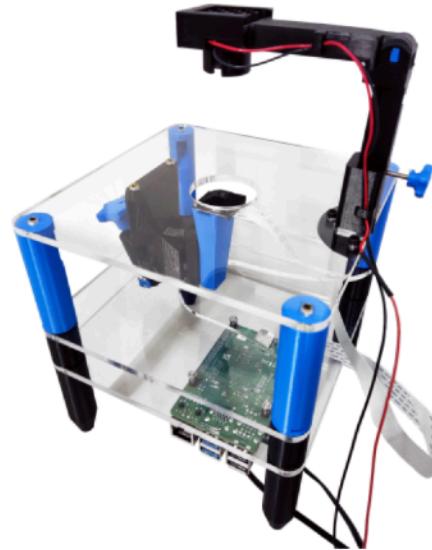
Assemble the focus mechanism

Assemble the basics optics module

Attach parts to the top plate

Attach parts to the middle plate

3-level microscopy stage



Before you start building the station, you will need to source all the components listed in our [bill of materials](#) (,) , which is given on the next page.

Instructions



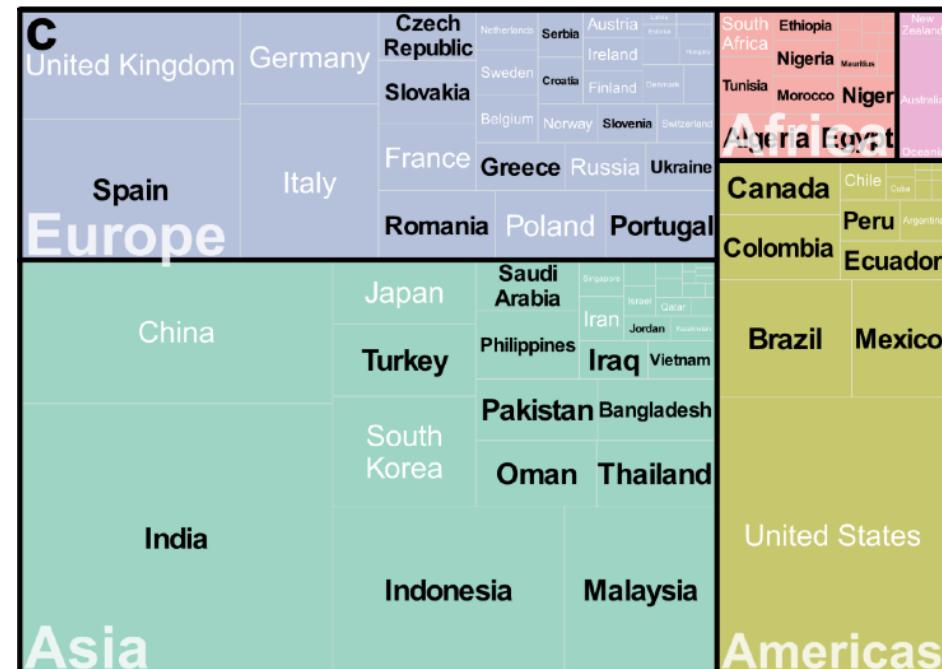
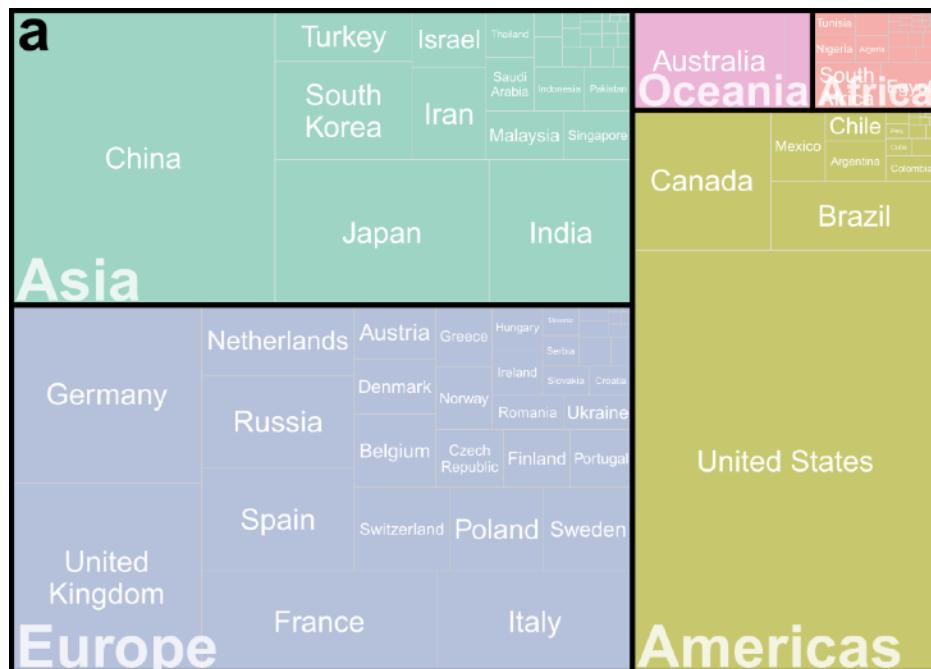
LIBRE HUB
Latam Hub for Bioimaging through Open Hardware

Instrumentation development as Open Source Hardware

- Build creative tools that address new custom problems
- Reduction of cost
- Maintaining the equipment in-house
- Easy to automate and work with useful data formats
- Better collaborations - reproducibility, user lead dev.

How does DIY hardware affect access to technology?

(...)As of 21 November 2022, the Web of Science indexed 58,889 publications on 3D printing (77% since 2018) across all search fields; 19,308 on open hardware (47% since 2018); 10,196 mentioning Arduino microcontrollers (58% since 2018); and 6,010 mentioning the low-cost Raspberry Pi computer (70% since 2018). These terms encompass popular methods or tools for DIY instrumentation (Box 1) that are seeing a rapid growth in publication numbers. (...)



Is it all about money?

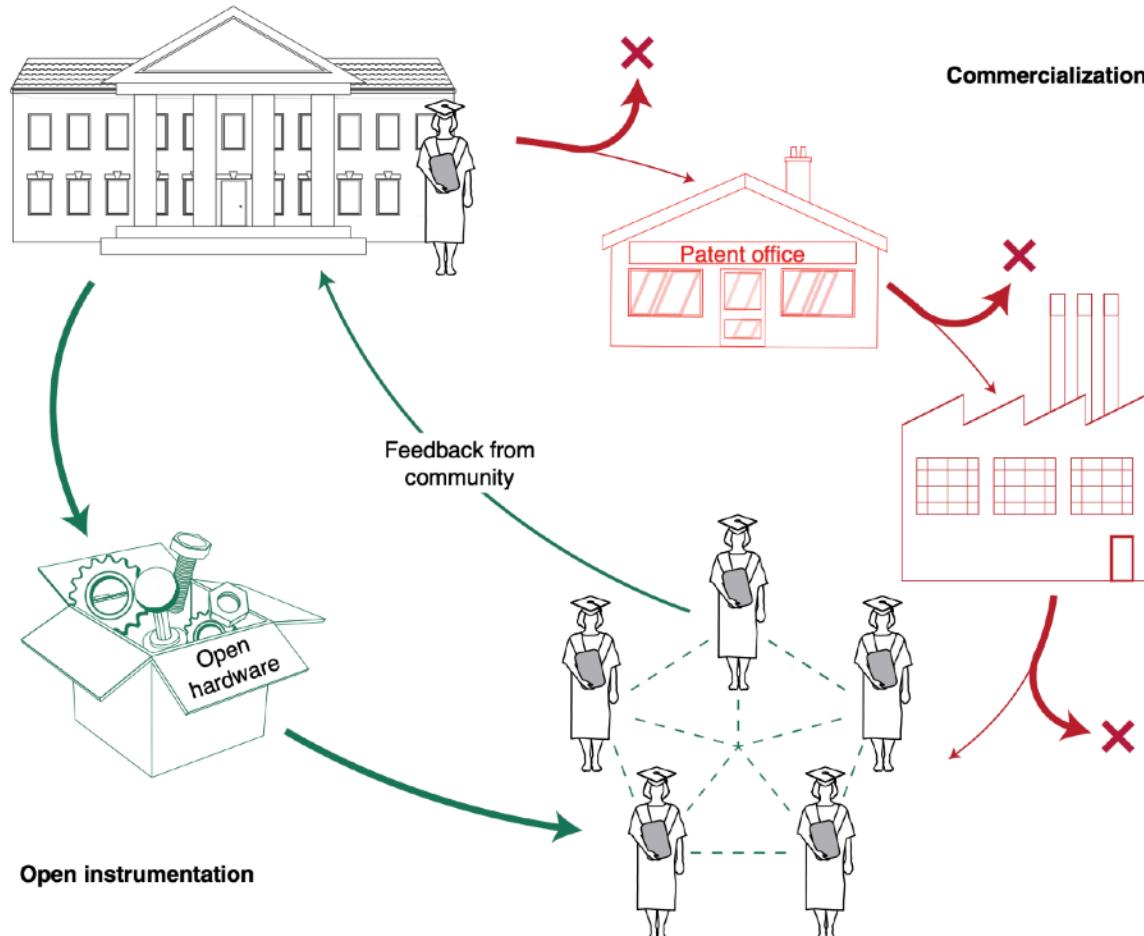
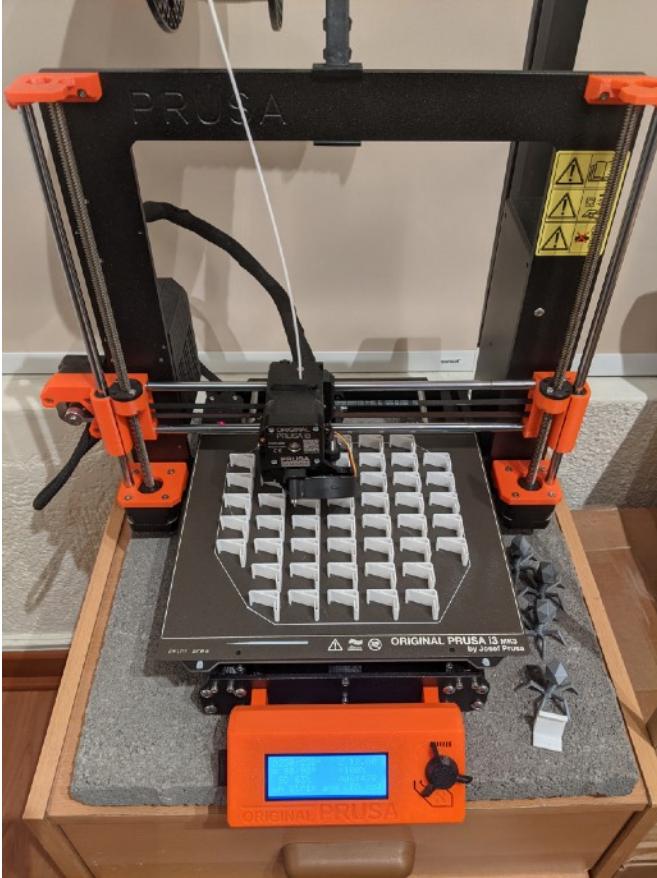


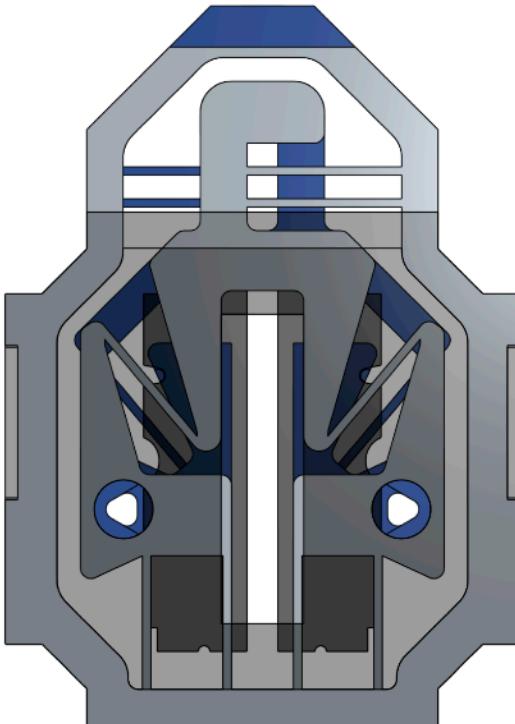
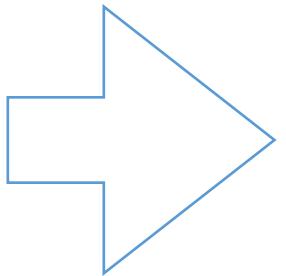
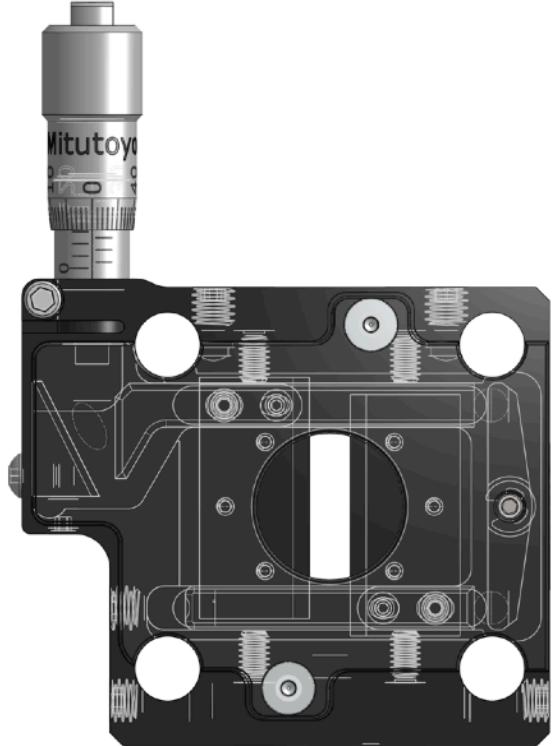
Fig. 1 | Two routes to disseminate innovation in academic instrumentation to the broader scientific community. Traditional commercialization (top right, red) involves filing patents and partnering with

Fantner, G.E., Oates, A.C.
Instruments of change for academic tool development.
Nat. Phys. **17**, 421–424 (2021).
<https://doi.org/10.1038/s41567-021-01221-3>

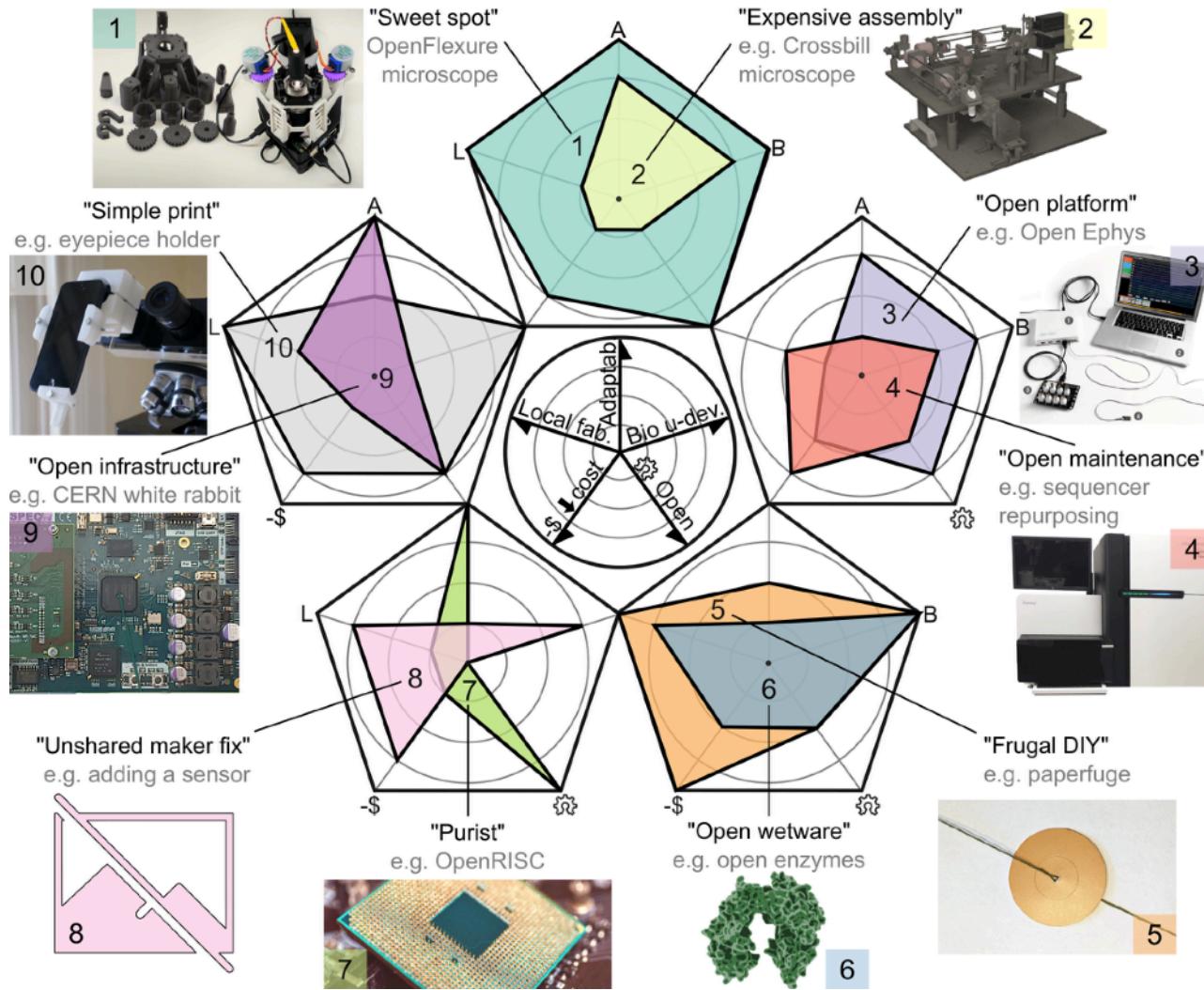
Local fabrication and availability are key &
Local development is about appropriate technology

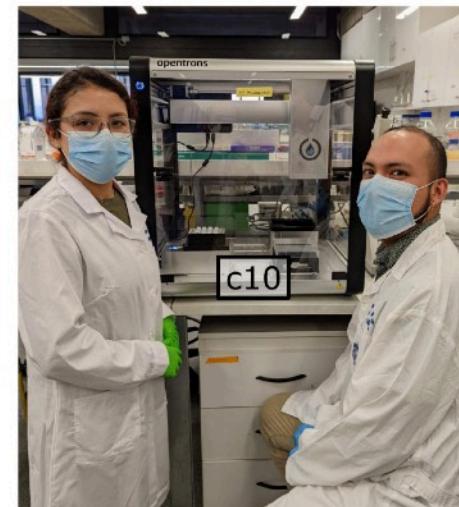
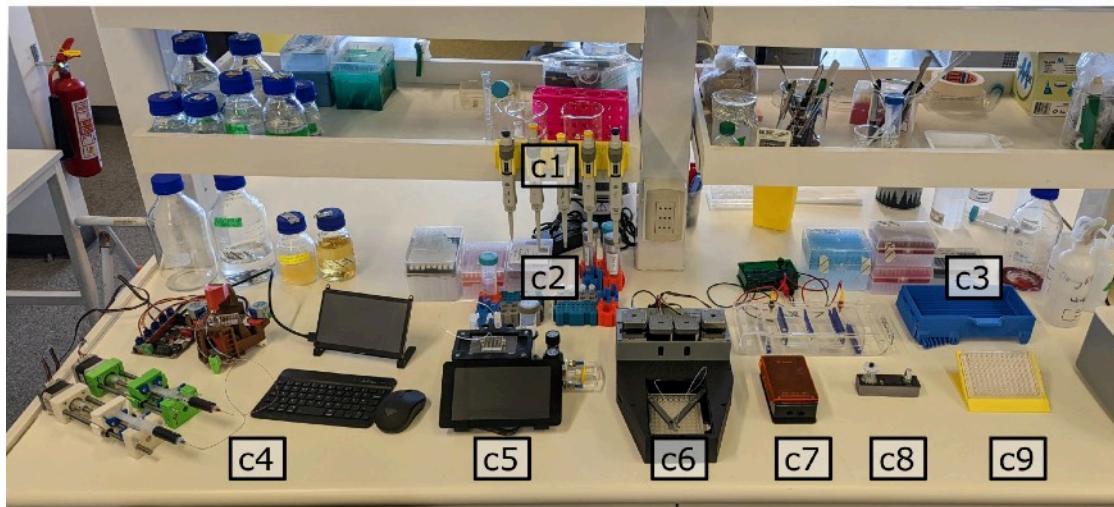
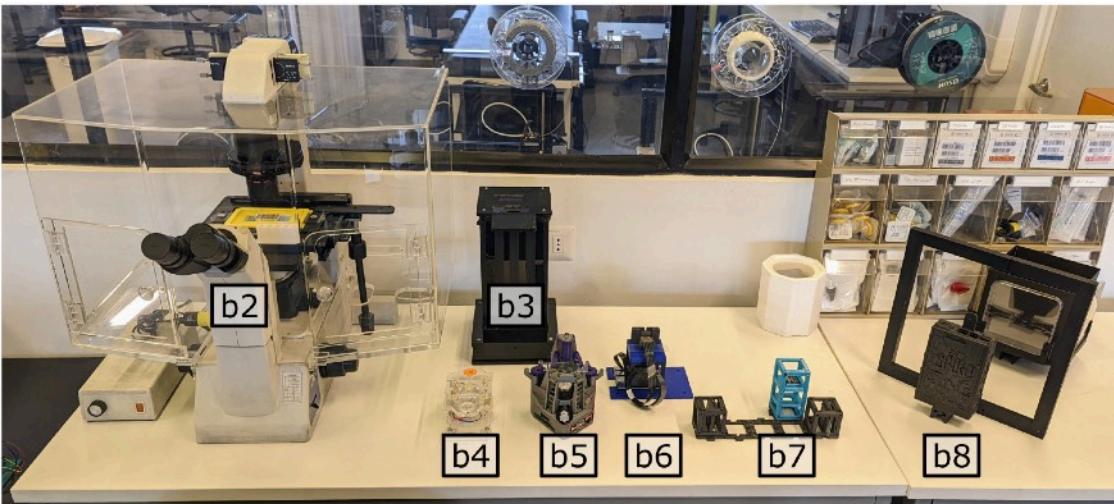
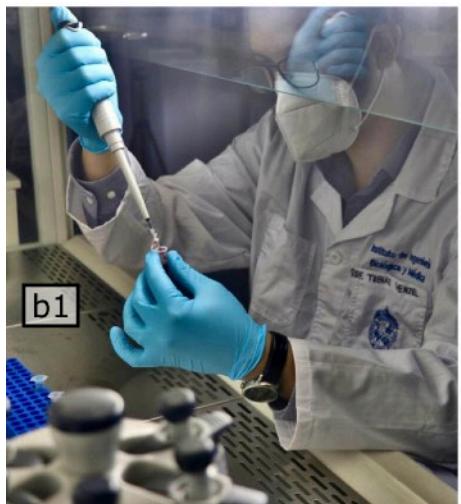


We design for digital fabrication



Types of Open Hardware





Source:
Our publication in
PLOS Bio 2023:
*Open hardware:
From DIY trend to
global
transformation in
access to
laboratory
equipment.*
T. Wenzel

From the laboratory to industry

Table 1. Examples of open hardware companies relevant for biology laboratories.

Company name	Field or product	Link
Tindie	Online marketplace for open electronics and hardware products. Sales platform for makers and small businesses	https://www.tindie.com/
SparkFun	Designs, manufactures, and sells open microcontroller development boards and breakout boards	https://www.sparkfun.com/
Seeed Studio	Integrated platform for creating hardware solutions for IoT, AI, and Edge	https://www.seeedstudio.com/
Sci-Bots	Dropbot, digital microfluidic control system	https://sci-bots.com/
Sanworks	Automated systems for neuroscience research	https://sanworks.io/
Safecast	Crowdsourced environmental data with open hardware, originally radiation in Japan now also air quality globally	https://safecast.org/
Red Pitaya	FPGA-powered boards as multifunction laboratory and engineering instrument	https://redpitaya.com/
Public Lab	Community science tools for environmental monitoring	https://www.publiclab.org/
Prometheus Science	Open hardware for biology consulting	https://prometheus-science.com/
Precious Plastic	Plastic recycling equipment	https://preciousplastic.com/
OpenTrons	Pipetting robot and addons	https://opentrons.com/
OpenQCM	Quartz Crystal Microbalance, e.g., for protein affinity measurements at molecular resolution	https://openqcm.com/
OpenFlexure Industries	Manufactures the openflexure microscope and openflexure block stage	https://openflexure.com/
Open Ephys	Electrophysiology laboratory tools	https://open-ephys.org/
OpenBCI	Brain-computer interface platform	https://openbci.com/