



OPPORTUNITY OPEN SOURCE CONFERENCE 4.0

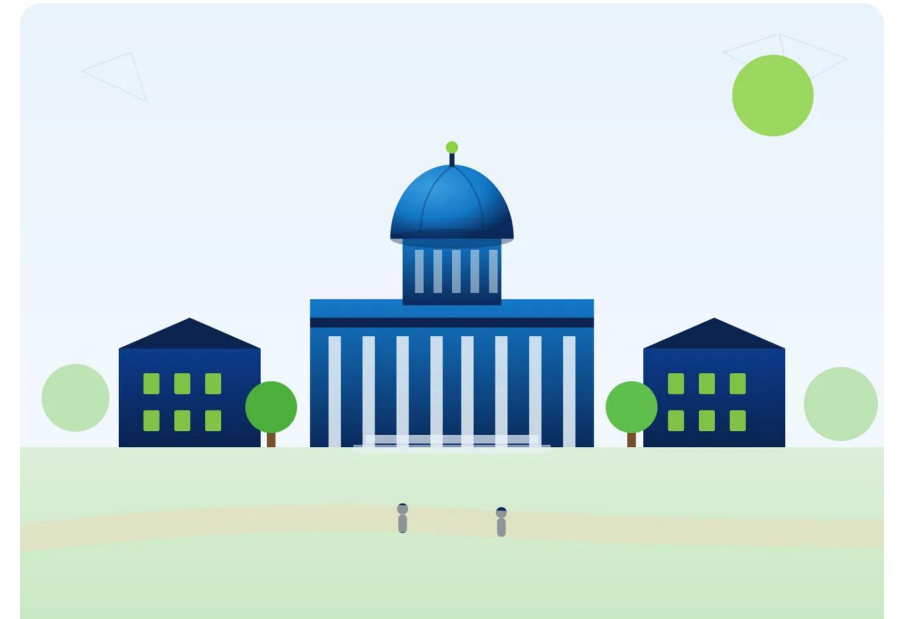
Navigating the Open Source Landscape

A Beginner's Guide to Starting Your Open Source Journey

Aveek Basu, Till Kamppeter

Chair - Opportunity Open Source Conference

IIIT Allahabad, Prayagraj • 28–30 August 2026



IIIT ALLAHABAD — THE HOST CAMPUS

What is Open Source?

Open source means the source code is freely available **for anyone to view, use, modify, and redistribute.**

Unlike proprietary software — where the code stays locked away — open source invites a global community to inspect, improve, and share the work, in its original form or with changes of their own.

96%

of all commercial codebases now contain open source components — up from almost none two decades ago.

Source: Synopsys / Harvard Business School, “The Value of Open Source Software,” 2024



Access to Source Code

Anyone can read and inspect exactly how the software works.



Free Redistribution

No fee or barrier to sharing the software onward, as-is or modified.



No Restriction on Fields

Usable by a student, a startup, or a Fortune 500 — equally.



Community Collaboration

Improvements come from thousands of contributors worldwide.



Derived Works

Anyone may build new projects on top of existing ones.

A Short History of Open Source



Fast forward: the Linux kernel alone has grown past 40 million lines of code, with 2,000+ developers contributing to a single release.

Is Open Source Only About Software?

No. While open source is best known in software, its core principles — transparency, collaboration, and shared access — now shape hardware, science, education, and civic projects around the world.



OpenStreetMap

A crowd-built, freely usable map of the world — maintained by 10M+ registered contributors.



Arduino & Risc V

Open hardware platforms that let anyone build, remix, and manufacture electronics and 3D printers.



Wikipedia

The largest reference work ever created, openly editable and freely licensed for reuse by anyone.



Liter of Light

An open-source lighting design bringing daylight to off-grid homes — see the next slide.

Case Study: Liter of Light

Liter of Light is an open-source design for a low-cost light tube — a plastic bottle filled with water — that refracts sunlight to daylight the interior of homes with thin roofs. Because the design is open and free to replicate, local volunteers anywhere can build and install it themselves, with no factory, patent, or supply chain required.

Daylighting this way costs a fraction of running an electric bulb — and the entire build guide, bill of materials, and training curriculum are published openly for anyone to adapt.



850,000+

households lit, across 15+ countries since 2011

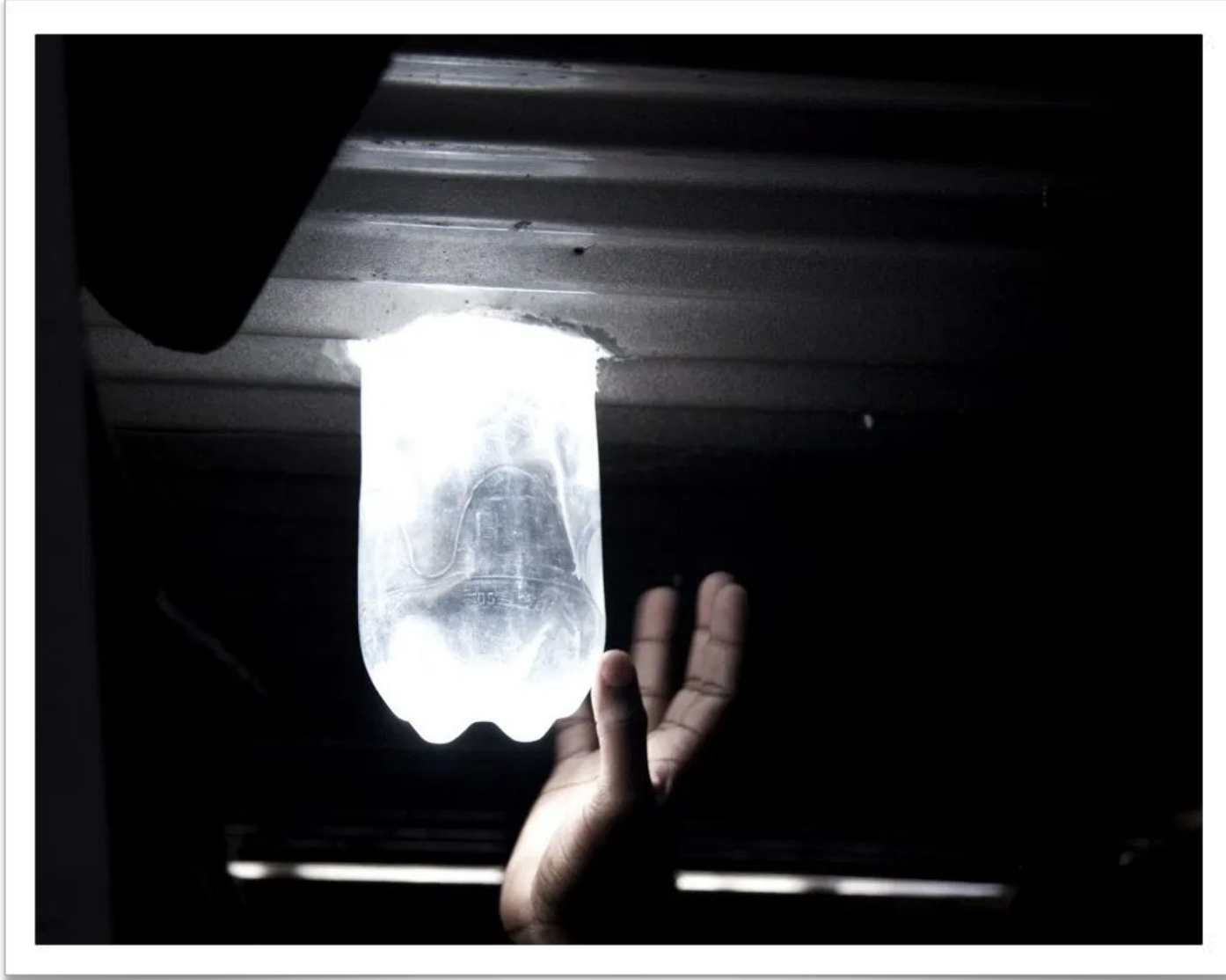
~55W

of equivalent daylight from
one bottle of water

Zero

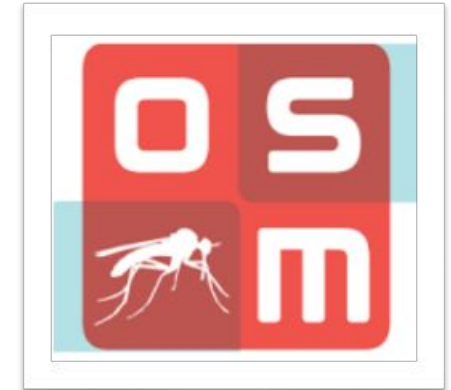
electricity, patents, or licensing
fees involved

Case Study: Liter of Light



Open Source In Not Limited To Software

No, open source is not limited to software. While open source is most commonly associated with software, the principles of open source such as transparency, collaboration, and shared access to information can be applied to a wide range of fields beyond software.



Benefits of Open Source



Collaboration & Community

A global pool of developers reviews, hardens, and improves the code — often leading to higher quality and faster bug discovery than closed teams achieve alone.



Cost Effective

Free to use and adopt, with no licensing fees — lowering the total cost of ownership even after accounting for support and customization.



Flexibility of Usage

Modify it to fit your exact need, and avoid vendor lock-in — you're never dependent on one company for updates or support.



Built to Last

A healthy project keeps evolving even if its original creator moves on, because the community — not any one person — owns its future.

\$8.8 trillion — the value open source software creates for the businesses that use it (Harvard Business School, 2024).

Challenges of Open Source



Compatibility

Projects may not plug in cleanly with existing tools, formats, or codebases without extra integration work.



Thin Documentation

Brilliant projects still stall out when docs are missing, outdated, or too technical for a newcomer to follow.



Sustainability

Many projects run on volunteer time and unpredictable sponsorships — maintainers can burn out or move on.



Support

There's no vendor SLA — timely patches and fixes depend entirely on an often-stretched community.

This is exactly where new contributors can help most — documentation and “good first issues” are often the biggest gaps.

How to Get Started in Open Source

01



Pick Your Interest

Open source spans everything from aerospace to astronomy — start by identifying the area you actually care about.

02



Join the Community

A project's real strength is its people. Join their chat or forum and start listening before you start typing.

03



Learn the Basics

Get comfortable with version control (Git), the project's language, and its release rhythm.

04



Find Your good-first-issue

Read the intro tutorials, then look for issues labeled “good first issue” — usually small, well-scoped, and welcoming.

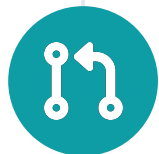


Contributing to Open Source



Read the Guidelines

Every project has its own contribution rules — code style, testing expectations, and how to communicate.



Ship Your First PR

Start small — even a README fix counts. Fork the repo, branch, commit, and open a pull request for review.



Communicate

Explain your change clearly, be patient during review, and treat feedback as a normal, useful part of the process.



Celebrate

Once your change merges, you're officially an open source contributor. Welcome — go find your next issue.

The Typical Flow

- 1 Fork the repository
- 2 Create a feature branch
- 3 Make your change + commit
- 4 Open a Pull Request
- 5 Address review comments
- 6 Merged — you're in the history!

Successful Open Source Projects



Linux

Powers the vast majority of the world's top supercomputers, most of the cloud, and every Android phone.



VS Code

Microsoft's editor has 19,000+ contributors and is the most-used code editor among developers today.



Kubernetes

The open-source standard for running containers at scale, born at Google, now led by the CNCF.



Firefox / Chromium

Two open-source browser engines quietly power most of how the world reads the web.

630M

repositories on GitHub

1.13B

public OSS contributions in 2025

230

new repos created every minute

#1

India now leads the US in GitHub contributors

Source: GitHub Octoverse 2025

Career Opportunities in Open Source



Networking

Open source communities connect you directly with industry professionals, maintainers, and potential employers — conferences like this one included.



Portfolio Building

Your contributions are public by default.
Consistent, quality work becomes a resume that speaks for itself, visible to any recruiter.



Employment

Companies like Red Hat, Mozilla, and Canonical actively weigh open source contributions in hiring — and it opens freelance work too.

A GitHub profile full of real contributions is one of the strongest signals you can put in front of a hiring manager — stronger than a resume line.

Participating in Open Source Programs



Google Summer of Code

A 12+ week paid mentorship. GSoC 2026 welcomed 1,141 contributors across 185 organizations, chosen from 15,245 applicants in 131 countries.



LFX Mentorship

The Linux Foundation's paid, term-based mentorship connecting newcomers with maintainers across major LF-hosted projects.



Google Season of Docs

Pairs technical writers with open source projects to close the single biggest gap most projects have: documentation.



Outreachy

A paid remote internship focused on bringing people from groups underrepresented in tech into open source and open science.

These programs exist specifically for beginners — no prior open source experience is assumed.

The Linux Foundation

Founded in 2000, the Linux Foundation is a non-profit organisation that hosts, funds, and governs many of the world's most important open source projects — from Kubernetes to Node.js — and has been central to open source's growth from a niche movement into critical global infrastructure.

linuxfoundation.org/projects — browse the full list of LF-hosted projects

Hosting & Governing Projects

Licensing & Compliance

Community Building

Security Initiatives

Training & Certification

Policy & Advocacy



Est. 2000

Non-profit consortium

96%

of commercial codebases contain OSS built on this ecosystem

1000+

member organizations, from startups to global tech giants

40M+

lines of code in the Linux kernel alone — and growing

A Beginner's Guide, One Click Away

The Linux Foundation's free, self-paced course walks you through everything covered today — version control, licensing, and how real projects actually operate day to day.



Introduction to Open Source Software Development, Git, and Linux (LFD102)

training.linuxfoundation.org/training/beginner-guide-to-oss-development-lfd102



goodfirstissue.dev

A live feed of beginner-friendly issues across thousands of projects.



opensource.guide

GitHub's own plain-language handbook for first-time contributors.



summerofcode.withgoogle.com

Explore all 185 GSoC 2026 mentoring organizations and their projects.

REAL-WORLD DEEP DIVES

Three Projects, Up Close

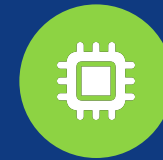
From a stethoscope built for rural clinics, to the software behind a billion print jobs, to the operating system inside your next wearable — open source, in production.



Shak



OpenPrinting



Zephyr RTOS

Case Study: Shak

Shak is an open hardware and software toolkit built to bring specialist-grade respiratory screening to the last mile — combining a digital stethoscope, an AI lung-sound analysis model, and a companion mobile app into one field-ready kit.



Digital Stethoscope + AI Lung Analysis

Captures heart and lung sounds and screens them through an AI model trained to flag common respiratory abnormalities.



Mobile App for Data Analytics

Every reading is logged, visualized, and trackable over time — turning a single checkup into a longitudinal health record.



IoT Hardware Kit

A low-cost, field-ready device designed to work in clinics with limited connectivity and limited specialist access.



~80%

of specialist posts at rural community & primary health centres in India sit vacant

~4,000

cardiologists serve a population of 1.3 billion — this is the gap kits like Shak are built for.

Context: NITI Aayog Frontier Tech, 2025–26 rural-healthcare reporting

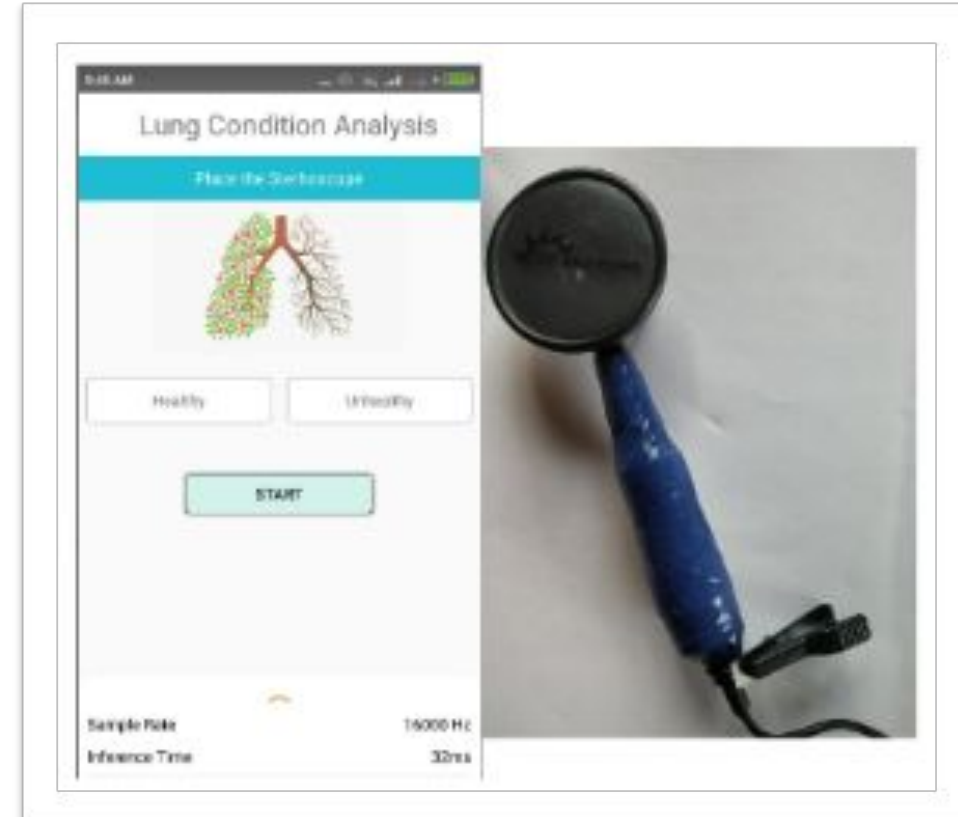
Case Study: Shak



IoT Hardware Kit



Powered Mobile App for Data Analytics



Digital Stethoscope & AI Powered Lung Analyser

What is OpenPrinting?

OpenPrinting is a Linux Foundation-hosted community that builds the printing and scanning architecture much of Linux and UNIX-style computing relies on — quietly, in the background, every time you hit “Print.”



New printing architectures, technologies, and interface standards for Linux and UNIX-style operating systems



Collaborates with the IEEE-ISTO Printer Working Group (PWG) on Internet Printing Protocol (IPP) projects



Works with the SANE project to make IPP scanning a reality across Linux



Maintains cups-filters, which lets CUPS run on any Unix-based (non-macOS) system



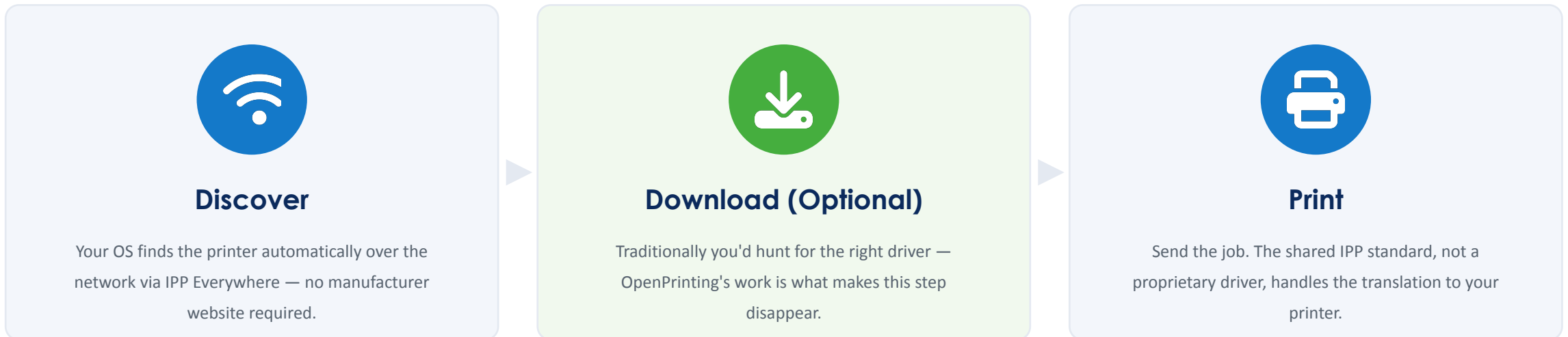
Responsible for the Foomatic printer-driver database



Building the Common Print Dialog Backends project for a consistent print experience

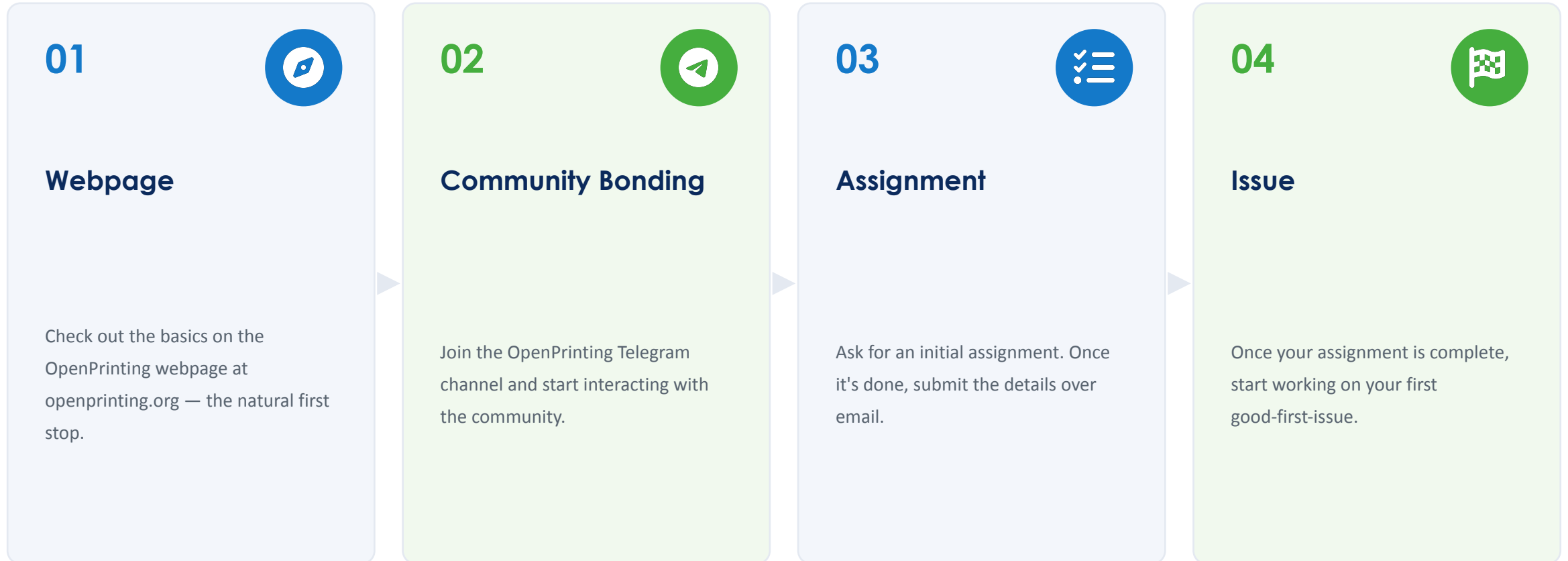
Driverless Printing, Explained

“Driverless” means your computer talks to the printer using a shared IPP standard — not a manufacturer-specific driver. Plug in almost any modern printer, and it just works, no download required.



No drivers to hunt for. No CDs. No manufacturer app — just a shared, open standard everyone implements the same way.

Start Contributing to OpenPrinting

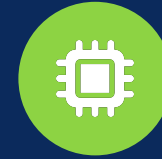


openprinting.org

What Is Zephyr RTOS?

Zephyr is a small real-time operating system (RTOS) for connected, resource-constrained, and embedded devices — with an emphasis on microcontrollers. It supports multiple hardware architectures and is released under the permissive Apache License 2.0.

It ships with a kernel plus every component you'd need to build full application software: libraries, device drivers, protocol stacks, file systems, and firmware update support — all in one project.



10 Years

old in 2026 — Zephyr's first release shipped in July 2016

800+

engineers contributed to the Nov 2025 release alone

Apache 2.0

permissive license — free for commercial products

A Linux Foundation project — content adapted under CC BY-SA 4.0

Why Teams Choose Zephyr



Small, Yet Scalable

- Under 8KB flash, under 5KB RAM
- Runs on tiny sensor nodes...
- ...up to complex multi-core systems



Flexible, Yet Secure

- Heavily customizable
- 1,000+ boards, hundreds of sensors
- Certification-ready, built for LTS



Open-Source Ecosystem

- Permissively licensed (Apache 2.0)
- Vendor-neutral governance
- Backed by 50+ member companies

Use Cases for a Real-Time OS



Asset Tracking



Industrial IoT



Wearables



Worker Safety



Automotive



Healthcare

Products Running Zephyr Today



Oficon Hearing Aids

Bluetooth LE

Low Power

Real-time audio processing on a device that has to run all day on a tiny battery.

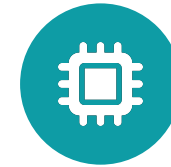


Vestas Wind Turbines

CANbus

Industrial Control

Zephyr coordinates real-time control systems inside utility-scale wind infrastructure.



Framework Laptop 13

Embedded Controller

USB-C / Power Mgmt

Runs the embedded controller managing power delivery and USB-C on a modern, repairable laptop.

zephyrproject.org/products-running-zephyr

Boards, Sensors & Architectures

1,000+

supported boards, and growing

220+

sensor drivers already integrated

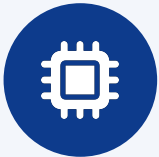
3

major CPU architecture families

50+

member companies backing
development

Supported Hardware Architectures



Cortex-M, Cortex-R &
Cortex-A



x86 & x86_64



Xtensa, 32 & 64-bit

docs.zephyrproject.org • github.com/zephyrproject-rtos/zephyr

A Vibrant, Industry-Backed Ecosystem



The project is steered by a governing board and technical steering committee, with day-to-day work spread across development tools, training, firmware, libraries, and application layers — all contributed by member companies and independent developers alike.

Platinum Members Include

Google

Intel

Meta

NXP

Qualcomm

Renesas

Nordic Semiconductor

Silicon Labs

Analog Devices

Wind River

50+

member organizations, from silicon vendors to hyperscalers

Start Contributing to Zephyr



Getting Started Guide

The official step-by-step guide to your first build and flash.



Hundreds of Code Samples

Dig into ready-made examples covering nearly every subsystem.



Devicetree Bindings

A full catalog of available bindings for supported hardware.



Write Your Own Driver

No driver for your board? A similar one likely exists — it's more approachable than you'd think.

zephyrproject.org • github.com/zephyrproject-rtos • lists.zephyrproject.org • chat.zephyrproject.org

LOOKING AHEAD

Where Open Source Goes From Here

Two forces are reshaping the movement right now — AI models built in the open, and India's own open source ecosystem coming into its own.



Open Source AI



OSS in India



Your Next Step

Open Source Meets AI

The same open source principles that built Linux are now reshaping AI. “Open-weight” models — downloadable, runnable, and fine-tunable by anyone — are no longer the budget alternative to closed frontier models. In 2026, they're closing the gap fast.

2.96M

public model repositories on Hugging Face, up from 2.43M in seven months

13 weeks

median time for open-weight models to catch up to closed frontier capability

8x cheaper

typical open-weight API pricing versus closed-model equivalents

Apache / MIT

the license of choice for most 2026 flagship open-weight releases

Source: Hugging Face State of Open Models (Summer 2026); Memeburn open-weight statistics, 2026

Why it matters for you: fine-tuning an open model, filing a bug against an inference runtime, or improving a benchmark dataset is open source contribution too — and it's one of the fastest-growing corners of the ecosystem.

Open Source in India: A Rising Force

India's developer base is now the largest contributor community on GitHub — and a growing local movement is turning that scale into homegrown open source projects, not just consumption.



FOSS United

A non-profit growing India's FOSS ecosystem through city-level meetups, FOSS Clubs on campuses, the FOSS Hack hackathon, and the annual IndiaFOSS conference.



Digital Public Infrastructure

Aadhaar, UPI, DigiLocker, and DIKSHA run on open APIs and open-standard specifications that let any bank or developer build on top — open principles at population scale.



96% on Open-Source Rails

Of India's 590M+ 4G subscribers, 96% access the internet through an open-source-based mobile OS.

Sources: FOSS United; CivicDataLab, State of FOSS in India; GitHub Octoverse 2025

Common Myths About Open Source



MYTH

Free to use means free to build.



REALITY

Someone still funds every maintainer's time — through sponsorships, foundations, or employers who depend on the project.



MYTH

Anyone can push straight to main.



REALITY

Nearly every serious project routes changes through review and pull requests — the same rigor you'd expect anywhere else.



MYTH

It's only for hobby projects.



REALITY

Open source runs most of the cloud, the majority of the internet, and a growing share of the Fortune 500's production stack.



MYTH

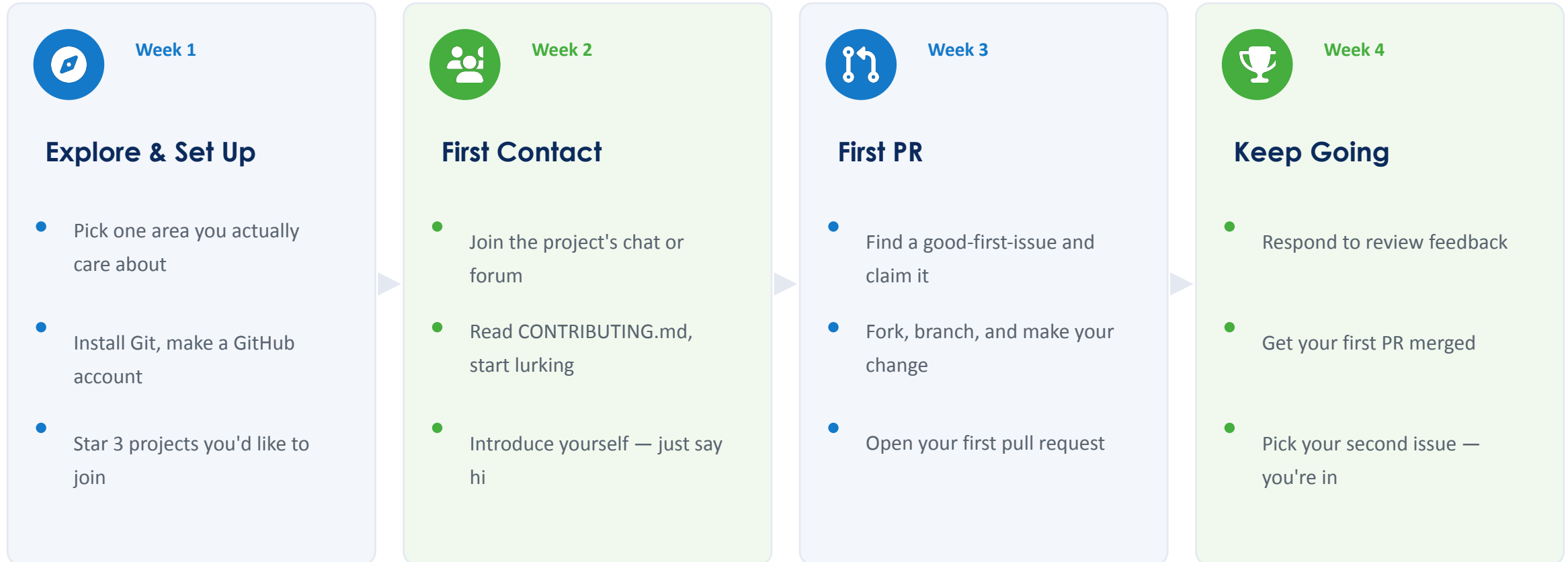
It won't help your career.



REALITY

Recruiters actively look for public contribution history — it's one of the few resume lines a stranger can verify themselves.

Your 30-Day Open Source Challenge





Thank You

Go find your good-first-issue.

Aveek Basu & Till Kamppeter

basu.aveek@gmail.com till.kamppeter@gmail.com

Opportunity Open Source Conference 4.0 • IIIT Allahabad • 28–30 August 2026

Includes material from the OpenPrinting and Zephyr Project communities, used under their respective open licenses