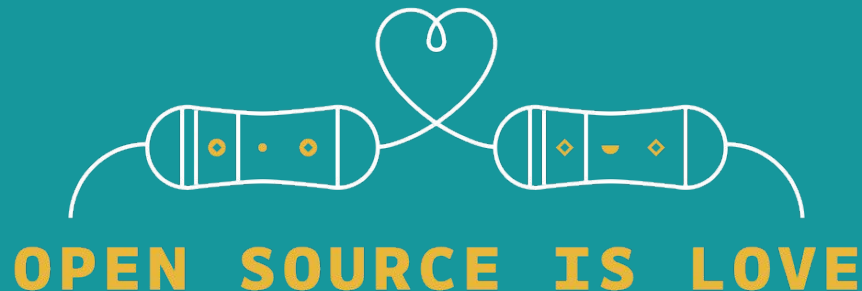# Arduino
Open Source Report 2024

Another busy year has passed in the Arduino world, and it's about time to publish our annual retrospective on the Arduino open source ecosystem.
In this report you'll learn about the activities of the **Arduino team** from the past year, as well as the contributions from our passionate and vibrant **community**.

This report is a snapshot of the ecosystem as of December 31st, 2024.

OPEN SOURCE IS LOVE

Introduction

One more busy year

The Arduino name designates a company, an open source project, a community.

We're **tens of millions of people** sharing a passion for embedded electronics. But we're also thousands of **companies** manufacturing boards, shields and accessories, and developing software for them. We're educators, students, hackers, consultants, engineers, designers, entrepreneurs. In these 18 years we have all been collaborating every day to share knowledge and solutions, building an incredibly vast amount of resources around which an **entire industry** has grown.
As Arduino company, we believe in the values that make this community great: **openness**, **transparency**, **collaboration**, **sharing**.
This yearly report documents our **efforts and investments** to support the growth of the ecosystem. As you will see in the document, **2024** has been one more busy year in terms of open source development.

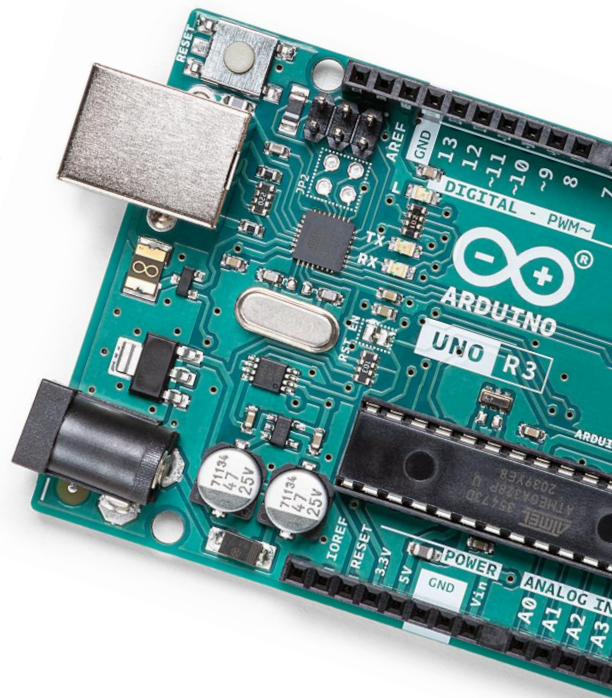To comment on this report, join us in the Arduino Forum.

How to support the Arduino project

There are several ways to support the Arduino team:

- **Buy original Arduino boards** (their cost funds our investment in open source development for the benefit of the entire ecosystem, including other hardware manufacturers)

- **Subscribe to an Arduino Cloud plan** (for a few $/month you can fund our open source development and also get web dashboards, smartphone app as a remote control for your projects, remote firmware upload, variable synchronization across devices, mobile push notifications and more)

- **Make a donation**

- Join the development and **become a contributor**!

But in addition to the Arduino team, do not forget to **support the authors of your favorite libraries**. Many of them accept donations through GitHub or other means, and all of them appreciate your gratitude in any form.

Activities carried out by the Arduino team

In this section we'll go through the main projects delivered directly by the Arduino team.

The first Arduino core based on Zephyr®   **NEW**

In 2023 we joined the Zephyr® Project as Silver members. Zephyr is an open source project at the Linux Foundation that builds a secure, connected and flexible RTOS for future-proof and resource-constrained devices.

Funding and supporting Zephyr is important for us because it helps keeping embedded development open, collaborative and accessible while increasing security and robustness.

- In 2024, we worked hard to contribute to Zephyr with **114 patches** submitted and merged to the upstream codebase. Most of them allowed to bring the new dynamic loader llext from experimental to a stable and widely used subsystem.
- In December 2024, we released the beta of the first Arduino core based on Zephyr. This is a big milestone as it provides a solid foundation for the entire open source Arduino stack.
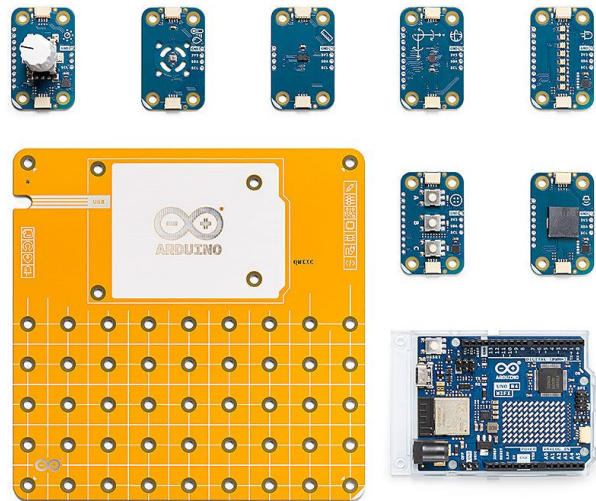

Data source: Zephyr repository

Open-Source Hardware boards   NEW

During this year we released **SEVEN new open-source hardware boards**, as part of the Plug and Make Kit:

- **Modulino® Movement**
- **Modulino® Distance**
- **Modulino® Thermo**
- **Modulino® Knob**
- **Modulino® Buzzer**
- **Modulino® Pixels**
- **Modulino® Buttons**

For each of them, the full schematics and CAD files are available on the docs.arduino.cc website.

HOW TO GET INVOLVED:

- **Remix these boards, innovate and share your builds!**
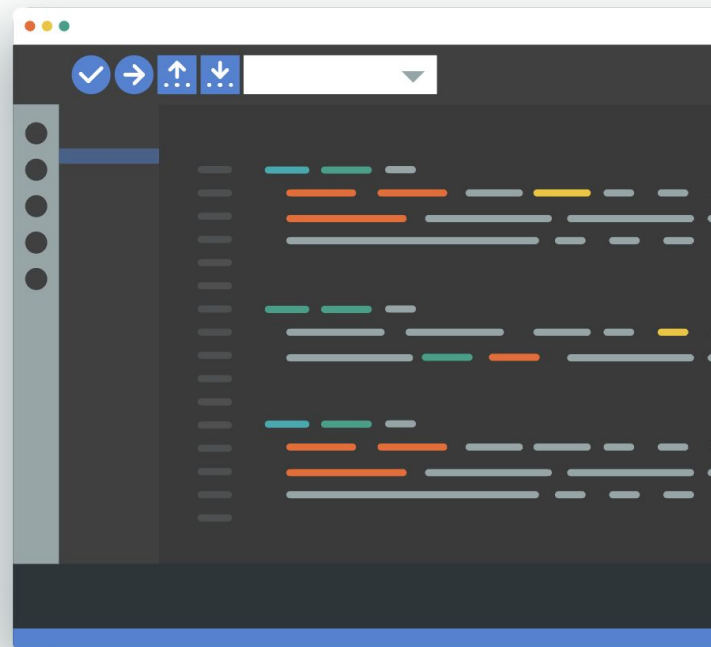
Arduino IDE 2

In 2022 we released the Arduino IDE 2, marking a big milestone in Arduino history. Since then, we never stopped working in it: the Arduino Tooling Team works on the IDE full time interacting with the community to make sure the IDE is robust, maintained, easy to use.

In 2024, 5 new versions were released with many improvements to UX and reliability, as well as new features.

HOW TO GET INVOLVED:

- **Test the IDE 2 to spot issues and bugs**
- **Contribute the translation in your language**
- **Join the development and help testing bugs, fixing them and developing new features!**

Data source: GitHub

Arduino CLI

The open-source Arduino CLI command line tool provides access to all the features of the IDE, including compilation, upload to boards, library management and more. This tool allows you to manage your Arduino sketches without leaving your editor of choice, as well as integrate it in your scripts and custom applications.
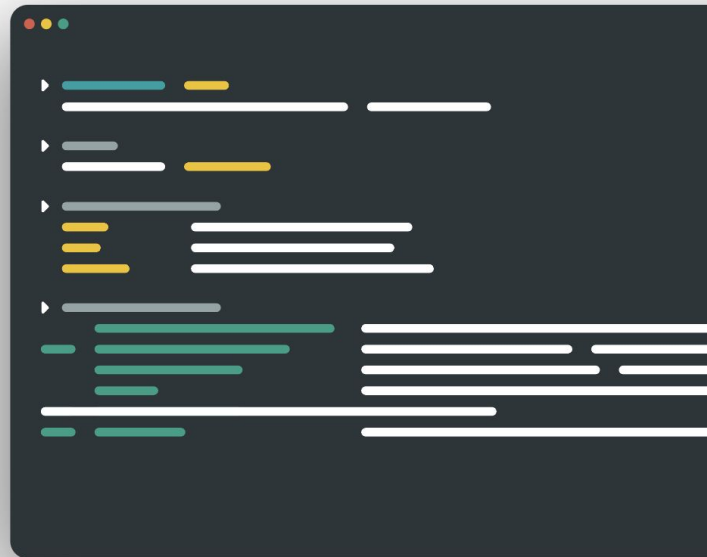
We have been working on this tool on a daily basis to add new features, and during this year we released 18 new versions!
And even more importantly, we released the **1.0.0 stable** version which is a huge milestone!

HOW TO GET INVOLVED:

- **Contribute the translation in your language**
- **Jump into the development and help testing bugs, fixing them and developing new features!**

Data source: GitHub

Arduino Lab for MicroPython

In 2022 we had released a new IDE for MicroPython was released as an experimental project. Since then we have received very good feedback from the community so we have been improving it to add new features and improve reliability.

In 2024 we have released 3 new versions of the Arduino Lab for MicroPython!

In addition, we also released an update to the Arduino Runtime for Micropython.

HOW TO GET INVOLVED:

- **Test the application in real-world situations and report feedback**
- **Join the development and roadmap discussion on GitHub**

Arduino Cloud CLI & Create Agent

The **Arduino Cloud CLI** supports, among other things, mass device provisioning and **Over-the-Air updates**: this allows anyone to **upload sketches on remote devices** without leaving the command line.
During 2024, we have been improving this tool and we released 11 new versions.

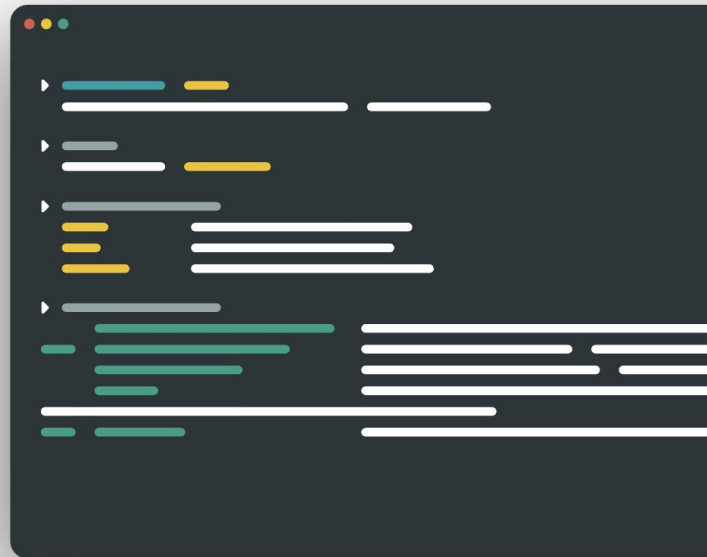The **Arduino Cloud Agent** is the core of the Arduino Cloud services and it's fully open source.
During 2024, we released 17 new versions of it, improving its security and compatibility with the latest OS versions.
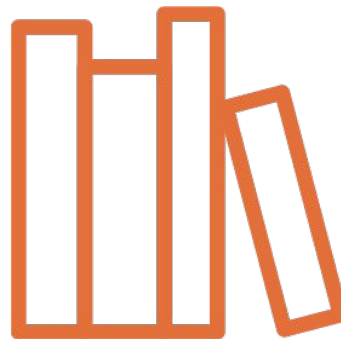
HOW TO GET INVOLVED:

- **Help testing bugs, fixing them and developing new features!**

Data source: GitHub

Official libraries

We released **19 new official libraries**:

- – Arduino_SecureElement
- – Arduino_PowerManagement
- – Arduino_10BASE_T1S
- – Arduino_Opta_Blueprint
- – Arduino_OPC_UA
- – Arduino_PortentaMachineControl
- – Arduino_LowPowerPortentaH7
- – Arduino_LowPowerPortentaC33
- – Arduino_Cellular
- – Arduino_NiclaSenseEnv
- – Arduino_Alvik
- – Arduino_AlvikCarrier
- – Arduino_CloudConnectionFeedback
- – Modulino
- – arduino-modulino-mpy
- – arduino-nicla-sense-env-mpy
- – Arduino_MAX17332
- – arduino-alvik-mpy
- – ucPack-mpy

Also, during 2024 we performed **69 new releases** of the official libraries with bug fixes and new features.
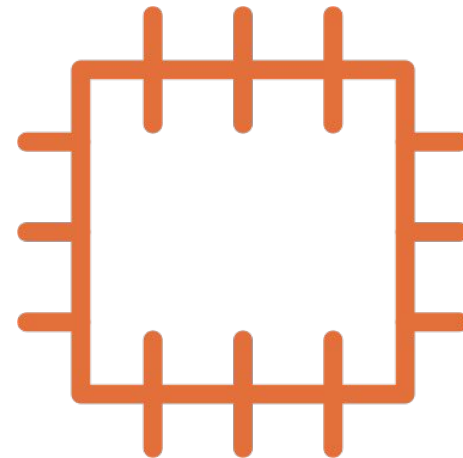
HOW TO GET INVOLVED:

- ● **Please help us fix bugs, review pull requests and improve the examples shipped with libraries to better document their functionality!**

Data source: Arduino Library index, MicroPython Package Index

Official cores

During 2024 we performed **10 new releases** of the official cores for RP2040, STM32, nRF52, Renesas with bug fixes, new features and support for more boards.

HOW TO GET INVOLVED:

- **There are still many pending issues and feature requests, so you're really more than welcome to help us in GitHub.**

Data source: GitHub

Security

Last but not least, a lot of work has been carried out by our dedicated security team that works full-time to inspect code, handle reports, and secure the infrastructure including the way assets are developed, compiled and distributed.

During 2024, we have been improving security of our open source code thanks to proactive audits as well as prompt reaction to reports we received directly and in the form of CVEs.
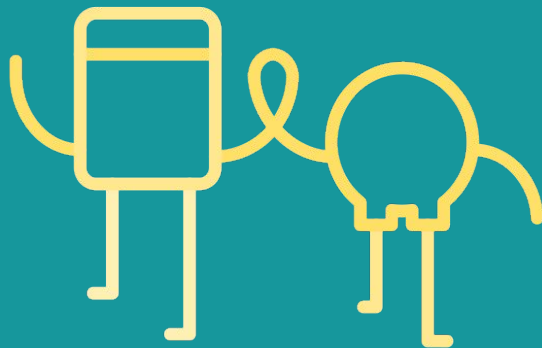
HOW TO GET INVOLVED:

- **Help us inspect repositories to find vulnerabilities, and get in touch with our security team according to the security policy.**

Contributions to external projects

Open source is about sharing and giving back, so we care a lot about contributing to upstream projects. During 2024, we have been dedicating significant development time to contribute to the following excellent projects:

- Zephyr
- MicroPython
- Arduino core for ESP32 boards
- Arduino core for Silicon Labs boards
- microROS

Highlights from the community

We're now going through the main contributions from the community in 2024.

+18%

YoY new libraries

Community contribution matters

1.198 new contributed libraries have been added to the Library Manager (once more, this growth is higher than the previous year!), bringing the total number to **7,669**. The Arduino library ecosystem is having an impressive growth.

Data source: Arduino Library Index

Libraries are a vibrant big thing

This number represents the incredibly active and continuous efforts of the Arduino library developers, growing each year.

This number is higher than 2023, which means the Arduino community is more active than ever.

6775

New versions of libraries in 2024

Data source: Arduino Library Index

You will never walk alone

368 new open-source tutorials were added to
[Arduino Project Hub](#) during the year (+80%
compared to 2023!).

Note that we perform quality review and
moderation to avoid duplicates, so this number
does not include all the submissions but only
represents the projects that were approved and
published by the Project Hub maintainers.

Data source: Arduino Project Hub

Many cores contributions

+69 new versions of contributed Arduino cores were released during the year (more than previous year).

Note that since there's no official platform registry, this number may not include platforms that we don't know about.

Data source: GitHub

Top contributors of new libraries

Author	Number of libraries added in 2024
Trema.ru	67
Rob Tillaart	46
Turkish Technnology Team Foundation (T3)	42
BEST MODULES CORP.	26
M5Stack	24
Digital Codesign	23
AlexGyver	19
Mathieu Carbou	18

Author	Number of libraries added in 2024
DashIO Connect	14
Soldered	14
Dejwk	11
Bonezegei (Jofel Batutay)	10
Brayden Anderson	9
Maker Zone Australia	9
Xose Pérez	9
Johan Böhlin	8
Pokerobo Team	8

Author	Number of libraries added in 2024
ams-OSRAM	8
Makerlab.vn	7
Narwhalsss360	7
TDK/Invensense	7
Adafruit	6
Frank Häfele	6
Rop Gonggrijp	6
Sensirion	6
vovagorodok	6

Data source: Arduino Library Index

Most active library maintainers

Maintainer	Number of releases in 2024	Maintainer	Number of releases in 2024	Maintainer	Number of releases in 2024
Mathieu Carbou	393	SparkFun Electronics	67	Lee Leahy	38
AlexGyver	372	Johan Böhlin	62	Ricardo Lima Caratti	36
Rob Tillaart	344	J. Camilo Gomez C.	59	stm32duino	35
Trema.ru	145	hideakitai	59	Joshua Phelps	34
Adafruit	122	ams-OSRAM	54	Abhijit Bose (aka. Boseji)	33
Mobizt	102	momizi	44	Ayush Sharma	33
Maker Zone Australia	90	Jofel Batutay	41	Dejwk	33
Hung.Pham	79	Larry Bank	41	Digital Codesign	32
M5Stack	67	Xose Pérez	41	Rei Vilo	32

Data source: Arduino Library Index

(This ranking is based on the frequency of releases, which does not necessarily reflect the complexity of each release.)

More contributions

The Arduino community is much more than this, and given its size it is nearly impossible to track all the contributions that are shared daily in **unofficial community platforms** and **independent websites**. This includes **software contributions** such as code examples and full open-source sketches, but also **knowledge contributions** such as documentation and tutorials, and last but not least **hardware design contributions** such as derivative or complementary products (shields, accessories, derived boards).

Tracking and representing such a variety in a future edition of this report, both in quantitative and in qualitative form, would be a valuable addition to recognize the tremendous efforts of thousands of people and companies contributing to the success of the Arduino ecosystem.

That's a wrap
Thank you!

The Arduino Team