Post Open Source

D. Cuartielles, PhD, MaU / Arduino

He venido a hablar de mi libro

MALMÖ UNIVERSITY

ARDUINO

Cuando en MaU

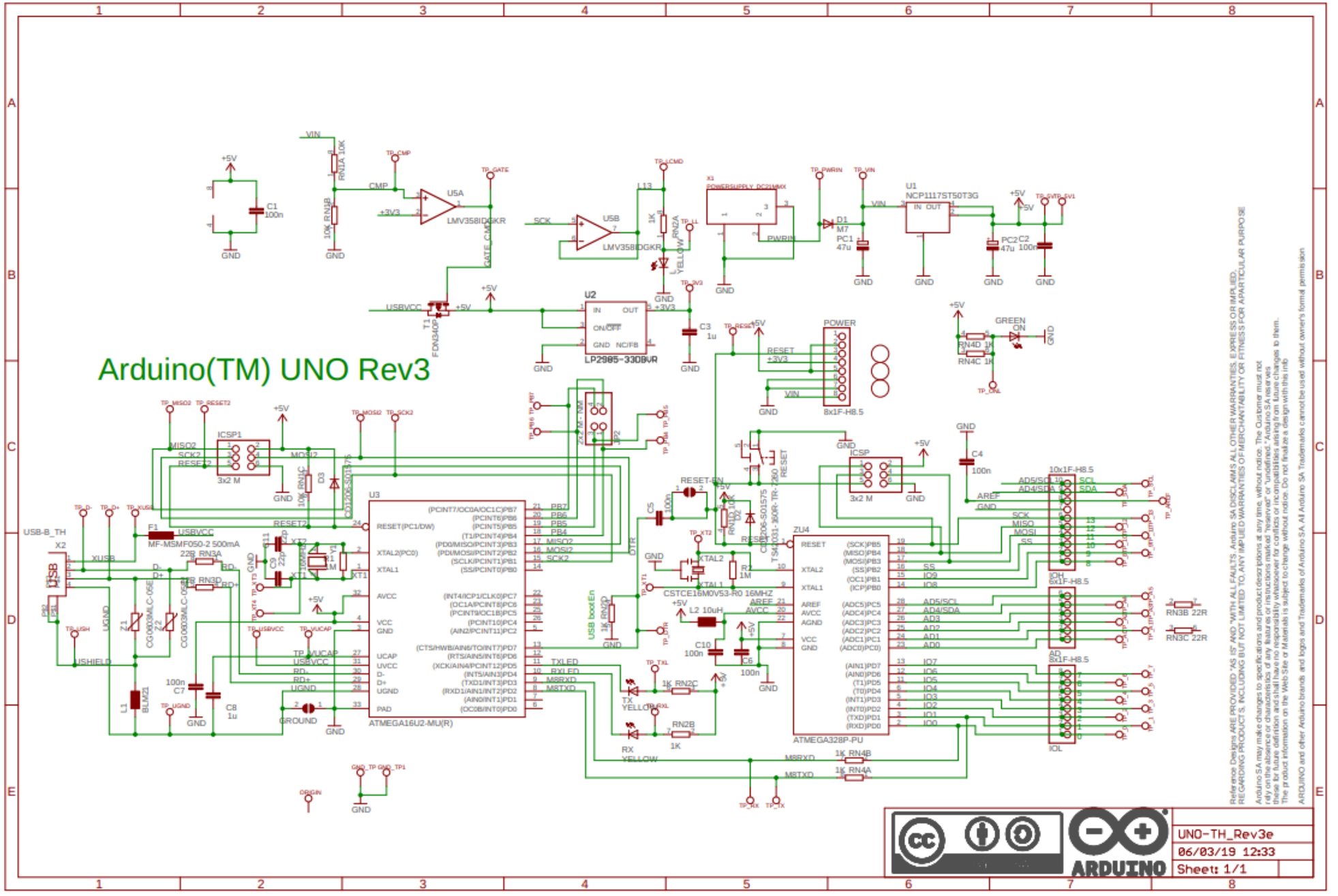
- Director del Interaction Design Masters
- Co-director del Full Stack Laboratory
- Investigador en Sustainable Digitalization Research Centre
- Trabajo en el proyecto europeo RIECS

Cuando en Arduino

- Director de Investigación
- Proyecto europeo de desarrollo de placas biodegradables DESIRE4EU
- Trabajo en iniciativas dentro del campo de Edge AI (TinyML)

¿Qué es Arduino?

Cuartielles, 2024



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NCP1117ST50T3G
VIN
IN OUT
GND
+5V
PC2
47u
C2
100n
TP_5V
TP_5V1
RN4D 1K
RN4C 1K
TP_ONL
GREEN
ON
AREF
SCK
MISO
MOSI
SS
SDA
SCL
TP_SDA
TP_SCL
C4
100n
10x1F-H8.5
AD
8x1F-H8.5
IOL
AD5/SCL
AD4/SDA
SS
IO9
IO8
IO7
IO6
IO5
IO4
IO3
IO2
IO1
IO0
AD3
AD2
AD1
AD0
RN3C 22R
RN3B 22R

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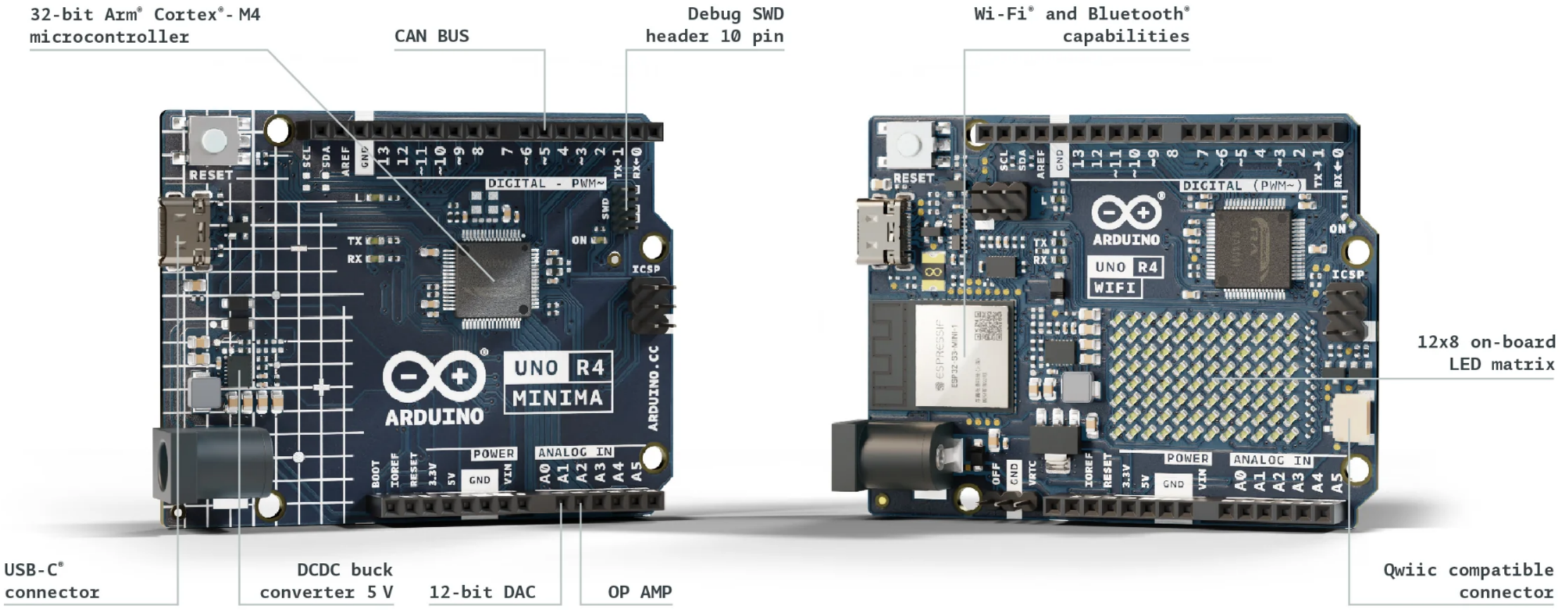
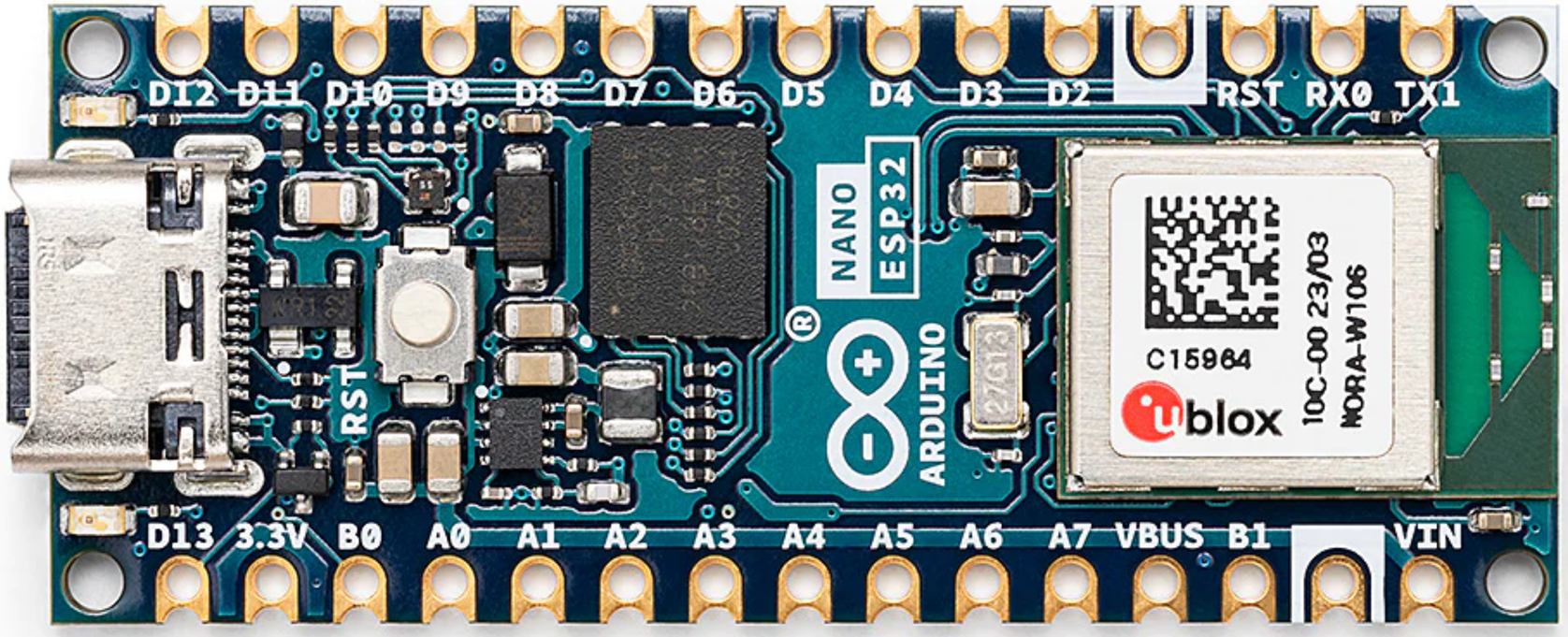
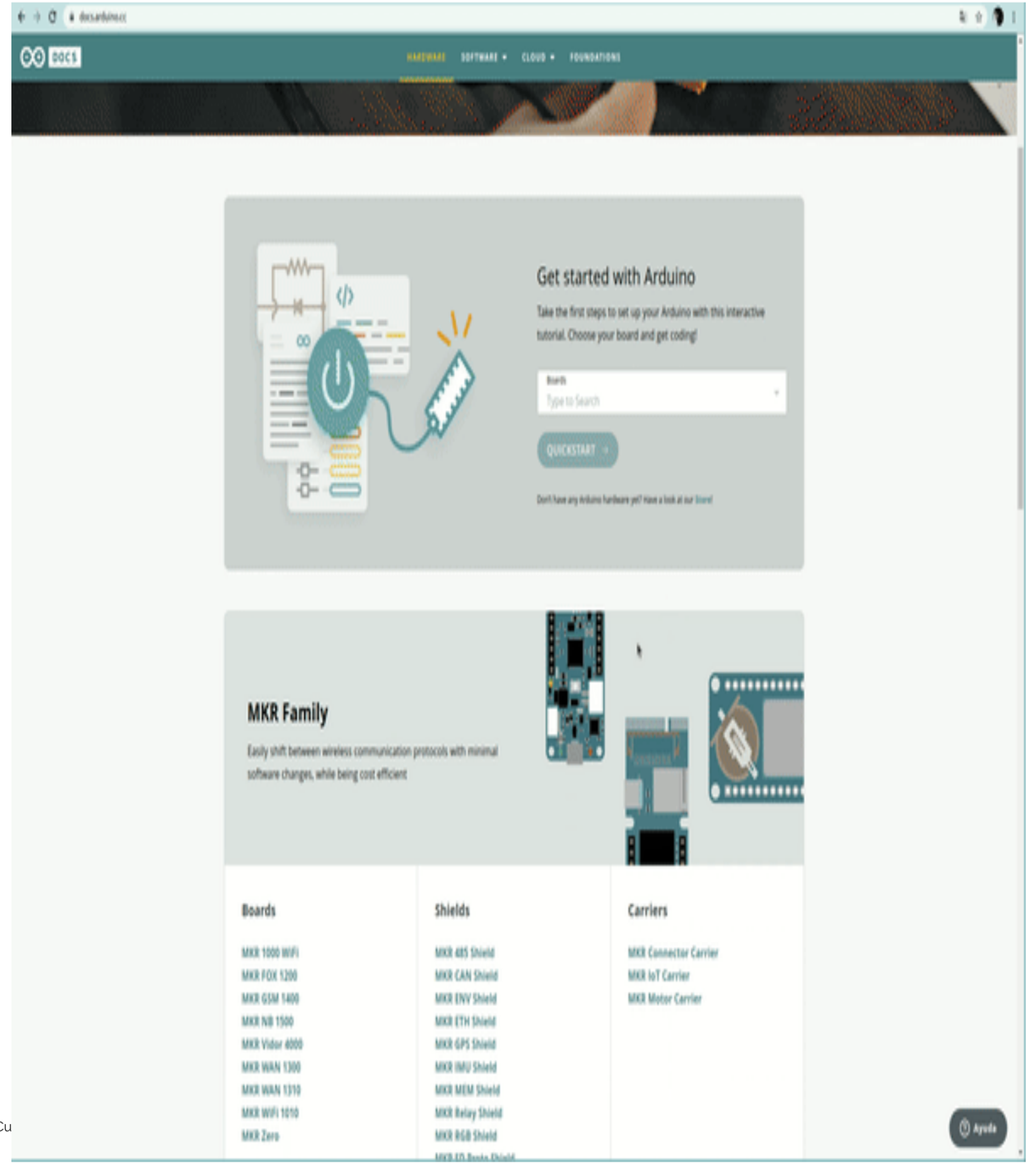

32-bit Arm® Cortex®- M4 microcontroller
CAN BUS
Debug SWD header 10 pin
Wi-Fi® and Bluetooth® capabilities
12x8 on-board LED matrix
USB-C® connector
DCDC buck converter 5 V
12-bit DAC
OP AMP
Qwiic compatible connector
RESET
DIGITAL - PWM~
DIGITAL (PWM~)
ARDUINO
UNO R4
MINIMA
WIFI
POWER
ANALOG IN
ICSP
ARDUINO.CC



Cuartielles, 2024



ontent/blob/main/LICENSE.md

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94 Discussions Actions Projects Wiki Security

docs-content / LICENSE.md

karlsoderby Add license + update readme

Preview Code Blame 175 lines (89 loc) · 18.3 KB

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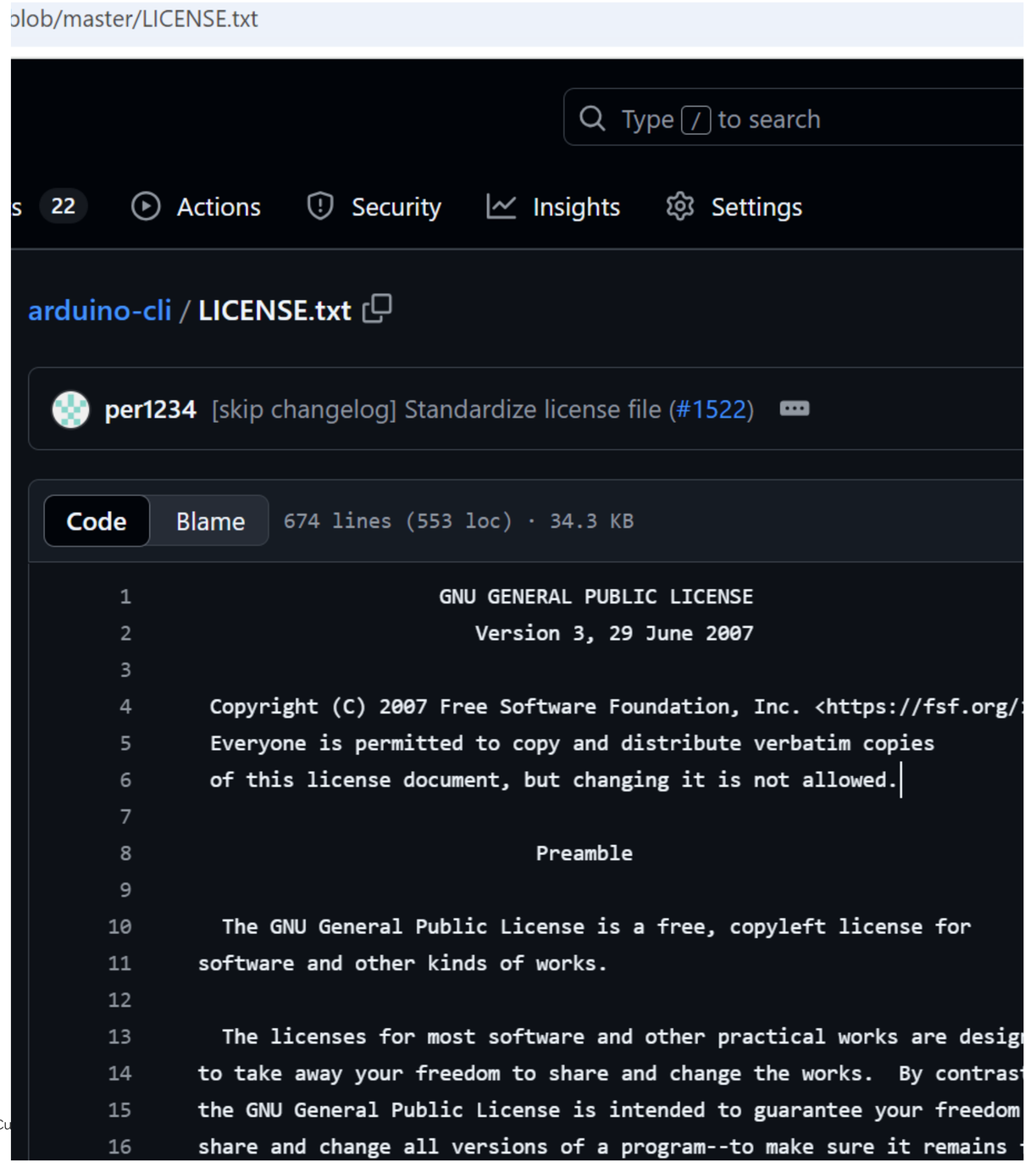
blob/master/LICENSE.txt
Type / to search
22
Actions
Security
Insights
Settings
arduino-cli / LICENSE.txt
per1234 [skip changelog] Standardize license file (#1522)
Code
Blame
674 lines (553 loc) · 34.3 KB
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Preamble
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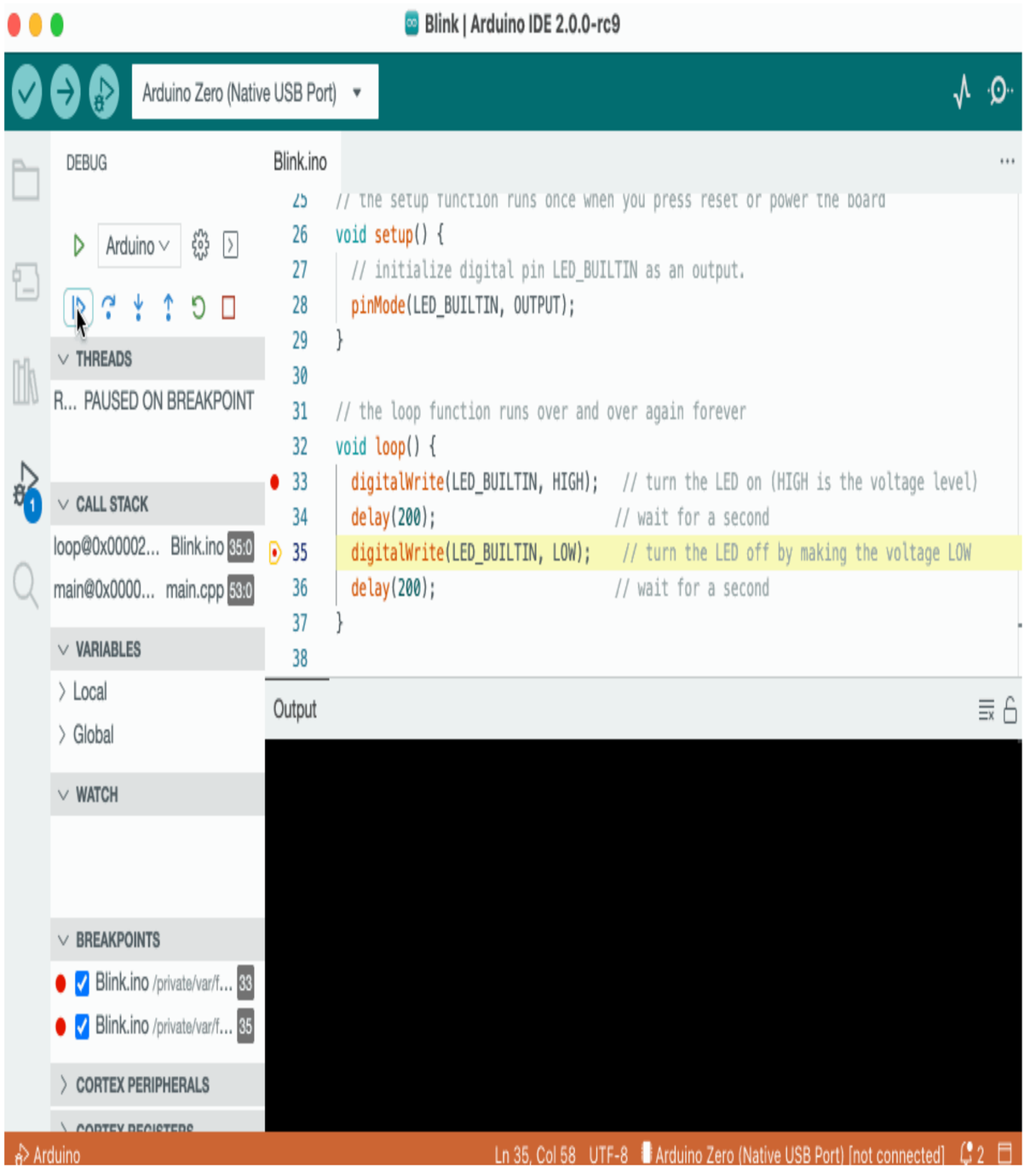
the GNU General Public License is intended to guarantee your freedom
share and change all versions of a program--to make sure it remains


Blink | Arduino IDE 2.0.0-rc9
Arduino Zero (Native USB Port)
DEBUG
Blink.ino
Arduino
THREADS
R... PAUSED ON BREAKPOINT
CALL STACK
loop@0x00002... Blink.ino 35:0
main@0x0000... main.cpp 53:0
VARIABLES
Local
Global
WATCH
BREAKPOINTS
Blink.ino /private/var/f... 33
Blink.ino /private/var/f... 35
CORTEX PERIPHERALS
// the setup function runs once when you press reset or power the board
void setup() {
// initialize digital pin LED_BUILTIN as an output.
pinMode(LED_BUILTIN, OUTPUT);
}
// the loop function runs over and over again forever
void loop() {
digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)
delay(200); // wait for a second
digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW
delay(200); // wait for a second
}
Output
Arduino
Ln 35, Col 58 UTF-8
Arduino Zero (Native USB Port) [not connected]

← All docs

Libraries

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- [ ] BSD 3-Clause "New" or "Revised" License
- [ ] BSD 3-Clause Clear License
- [ ] BSD Zero Clause License
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- [ ] Creative Commons Attribution 4.0 International

Artistic License 2.0 | Add filters from the sidebar or refine by typing keywords | Clear

Sort by Stars

Found 6 libraries

UNCATEGORIZED

FaBo GPIO40 PCA9698 ☆ 4 Stars 5 Forks V1.0.0

A library for FaBo GPIO.

FaBo<info@fabo.io> Akira 01/03/2019

UNCATEGORIZED

FaBo PWM PCA9685 ☆ 2 Stars 2 Forks V1.0.0

A library for FaBo PWM.

FaBo<info@fabo.io> Akira 12/11/2018

SENSORS

FaBo 206 UV Si1132 ☆ 2 Stars 3 Forks V1.1.0

A library for FaBo UV I2C Brick

FaBo<info@fabo.io> Akira 12/17/2018

UNCATEGORIZED

FaBo Motor DRV8830 ☆ 1 Stars 2 Forks V1.0.0

A library for FaBo Motor.

FaBo<info@fabo.io> Akira 12/19/2018

SENSORS

FaBo 223 Gas CCS811 ☆ 1 Stars 2 Forks V1.0.0

A library for CCS811 that getting values of CO2 and TVOC.

FaBo<info@fabo.io> Akira 1

Help

Resumiendo, Arduino es …

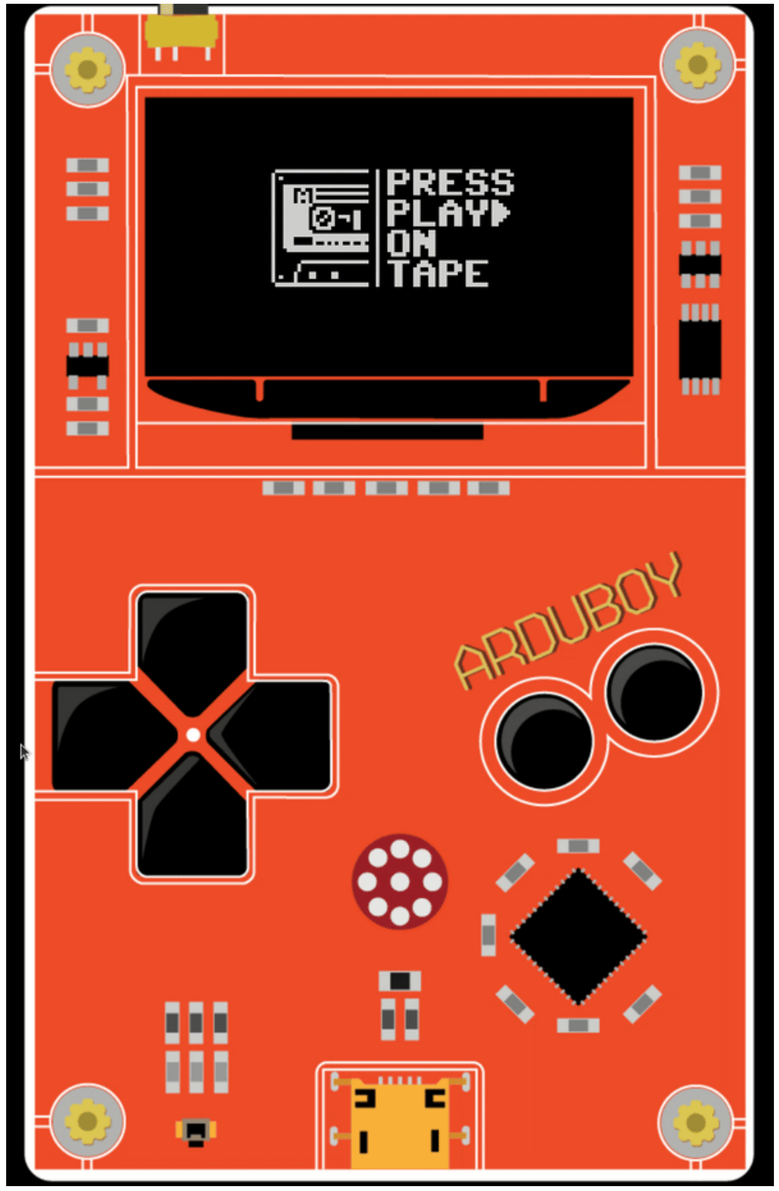
- **Una comunidad** de gente interesada en electrónica embebida
  - Donde las herramientas son abiertas y accesibles
- Una colección **de placas electrónicas** usadas para prototipar y para casos de aplicación reales
- **Un IDE** descargado una vez cada 2,5 s
- **Documentación** sobre el montaje y programación de electrónica
- **Una empresa**, 150+ empleados, presente en todos los mercados, con oficinas en 4 países

Empresa y open source … hardware → ¿Cómo funciona eso?

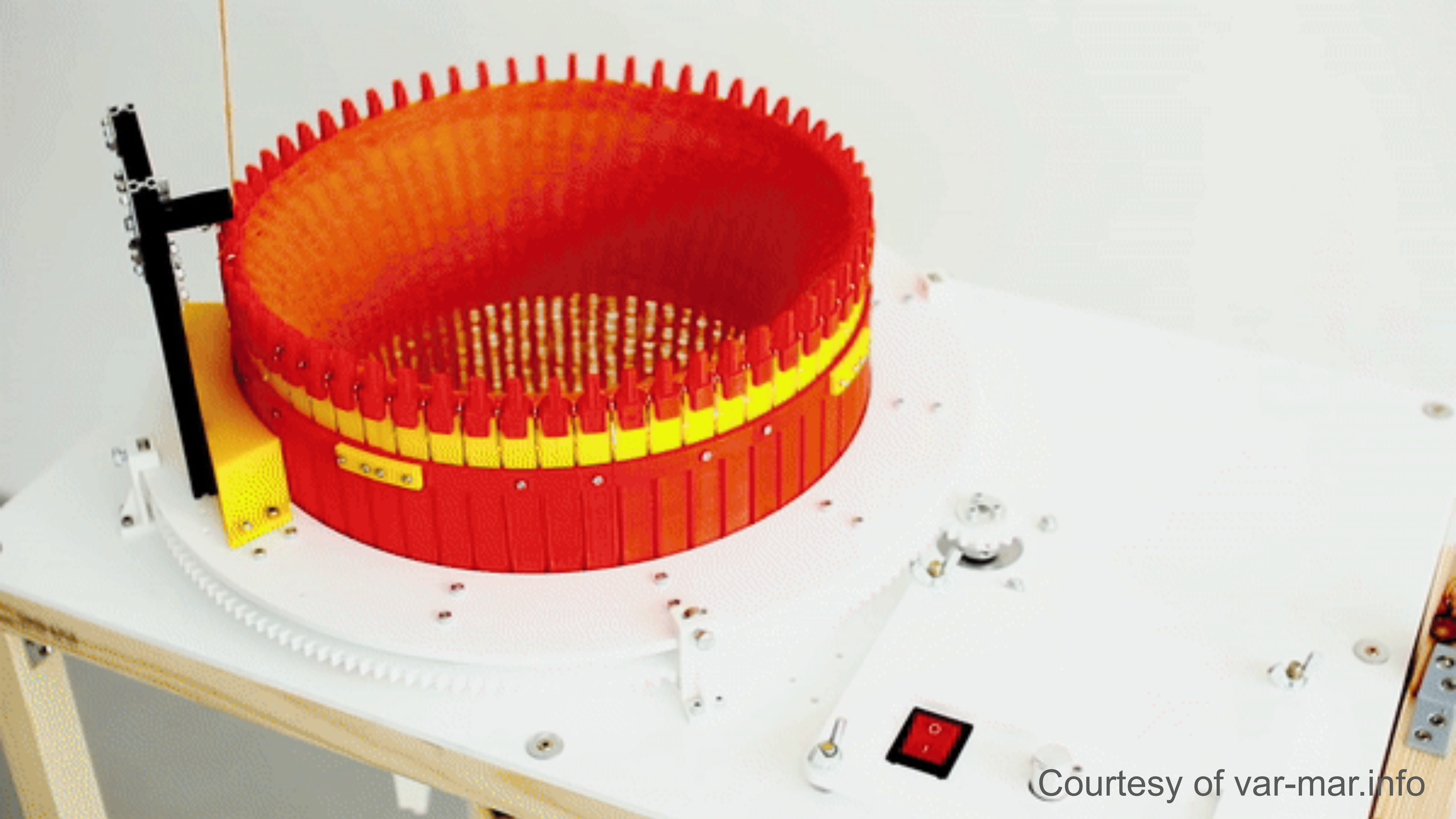
Compartir es amar

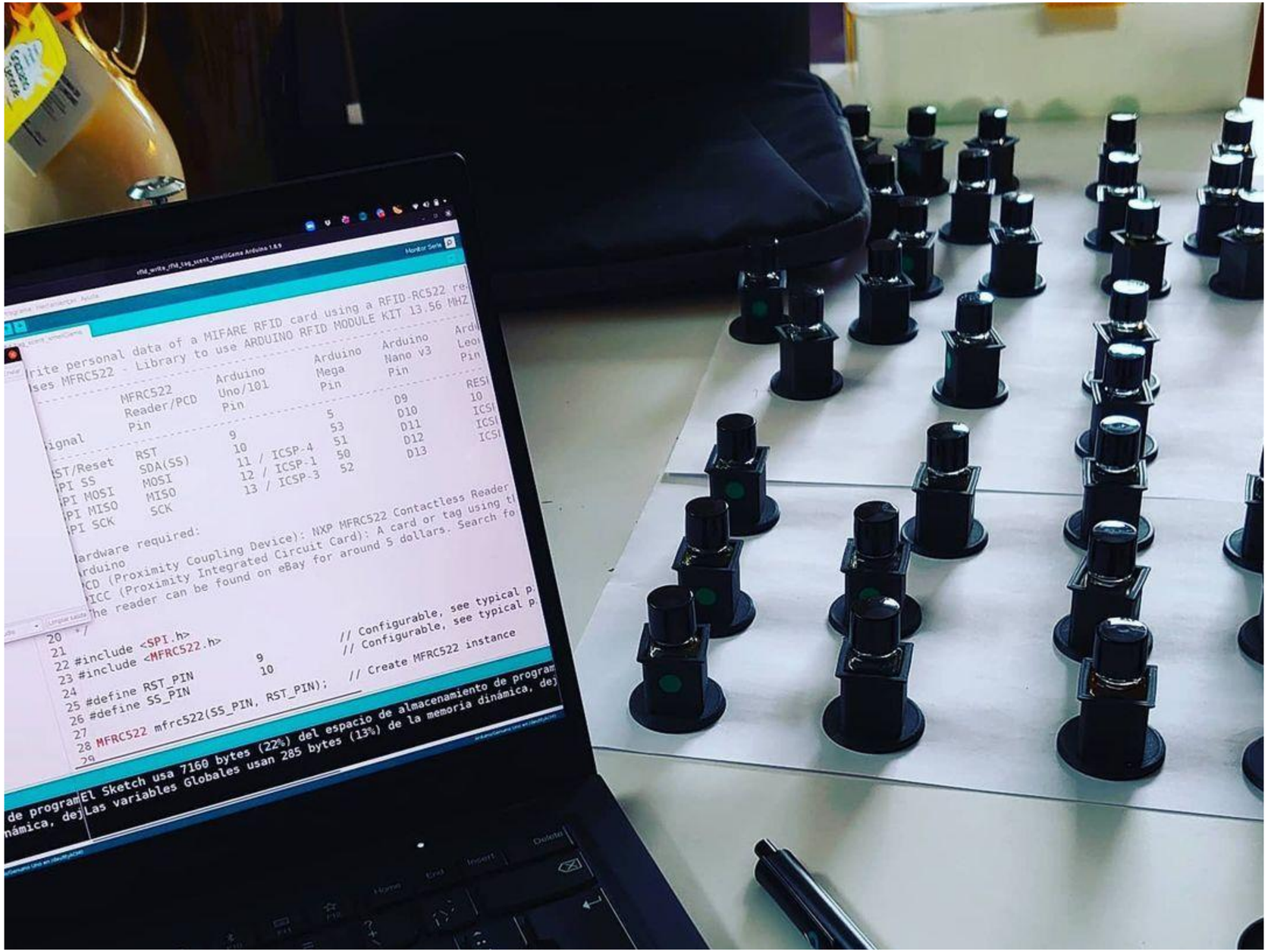
- Libre vs Código Abierto vs Creative Commons
- *Open* implica:
  - Que otros **se beneficien de tu trabajo**
  - Realizar **tareas de limpieza** (y mantenimiento)
  - **Documentar** tu proyecto apropiadamente
  - Tomar **decisiones ejecutivas** sobre qué va o no
  - **Responder mensajes** en un tiempo razonable
- La apertura **es percibida** como **marketing vs valentía**

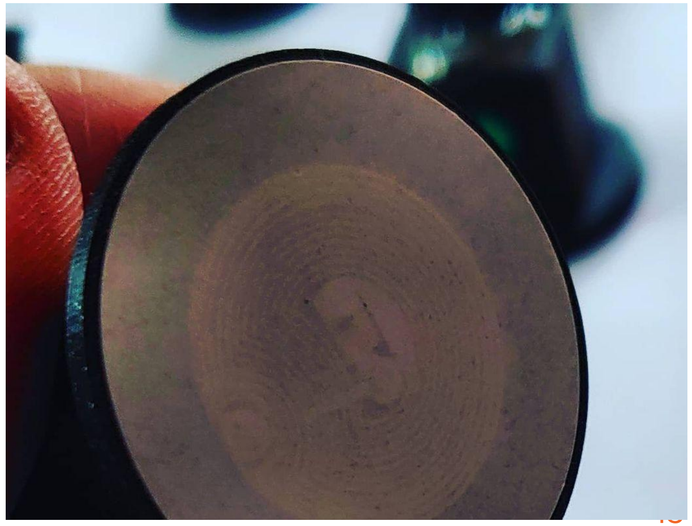
La diferencia entre Arduino y los proyectos anteriores que le llevó a crear una gran comunidad



Courtesy of Arduboy


Courtesy of var-mar.info





Courtesy of Prof. Simon Niedenthal

THE CHALLENGE

Airports clearly give security the utmost importance: stringent rules must be rigidly followed – but also quickly updated as needed, without creating vulnerabilities.

Stockholm-based company RIoT Secure was founded to address the current and potential security issues our world faces, as billions of objects are connected to the Internet and IoT emerges as one of the strongest growing trends of our time. For them, working with SAS (Scandinavian Airlines) Ground Handling provided the ideal high-constraint project to prove security can be embedded at the core of any IoT solution.

In airports, service vehicles are tracked both for billing purposes and to ensure compliance with safety and security protocols – which constantly evolve. For example, **geo-fencing boundaries** must be checked in real time to avoid anyone entering forbidden zones, and staff must use **RFID-based security badges** to access and operate the equipment.

Therefore, in designing a new solution, the critical requirement RIoT Secure was asked to meet was to ensure that **all network communications were secure**, and that **firmware updates could be performed over-the-air**, instantly and across the entire fleet of vehicles.

> “SAS Ground Handling can now ensure their equipment are securely connected to the cloud, and that they can enhance the safety and security protocols implemented at the edge in a matter of seconds.”
>
> AARON ARDIRI, CEO OF RIOT SECURE

OUR SOLUTION

RIoT Secure developed a secure device lifecycle management platform based on Arduino MKR boards, for communications and over-the-air updates specifically targeting resource-constrained microcontrollers.

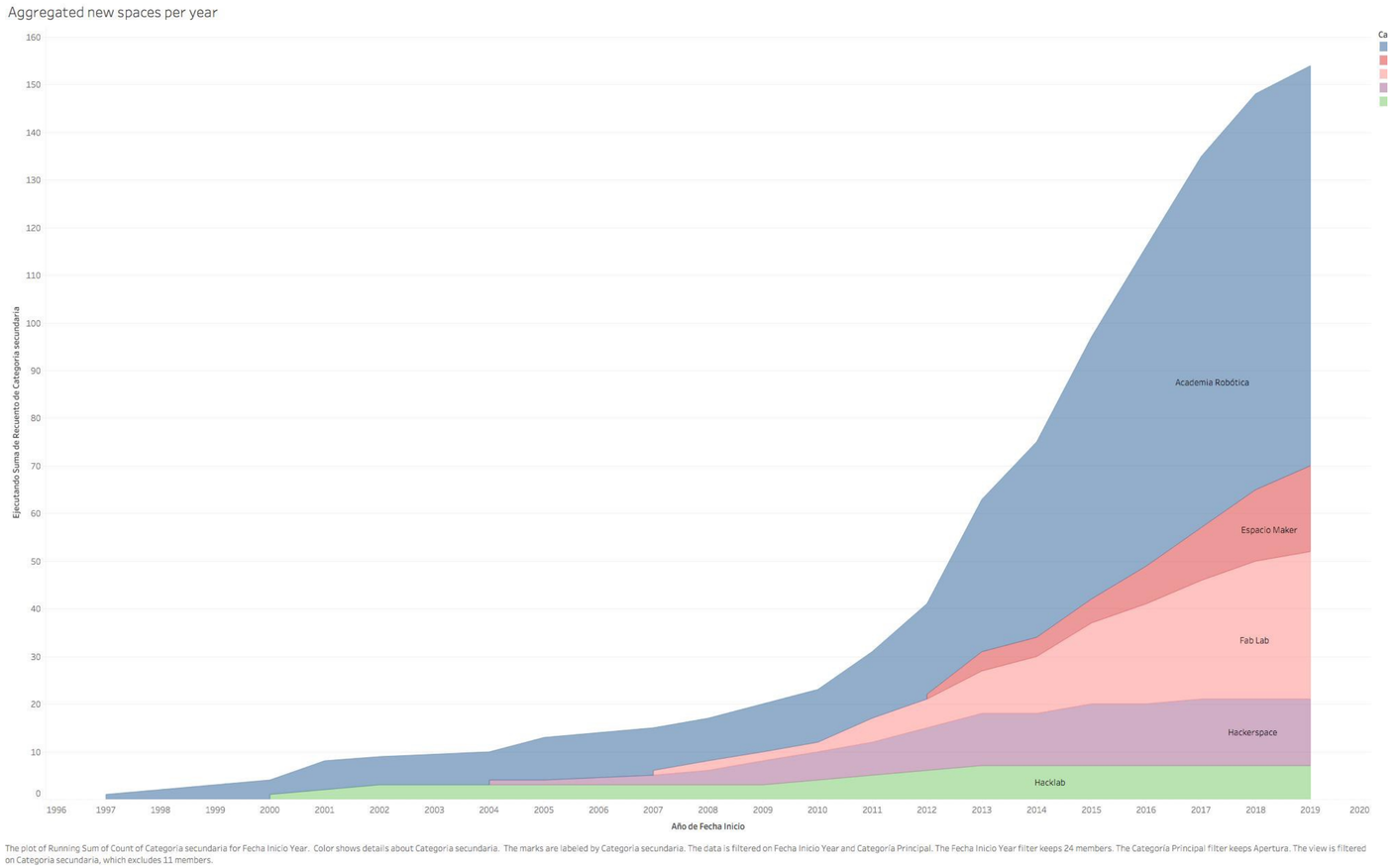
The industrialized PCB includes at least two microcontrollers: one or more task-focused supporting the safety and security logic and edge processing, while the Arduino MKR provides secure network communication.

The task-focused microcontrollers utilize an AtMega2560 interface via UART to **receive GPS positions** to check geo-fencing, RFID badge swipes and GPIOs to **drive external relays**, which control a beacon light and can **limit vehicle speed**. At the same time, the microcontroller sends and receives data in **binary optimized packets**, completely independent of the underlying communications technology. When a **firmware update** is available, it is downloaded and then the appropriate microcontroller is reprogrammed.

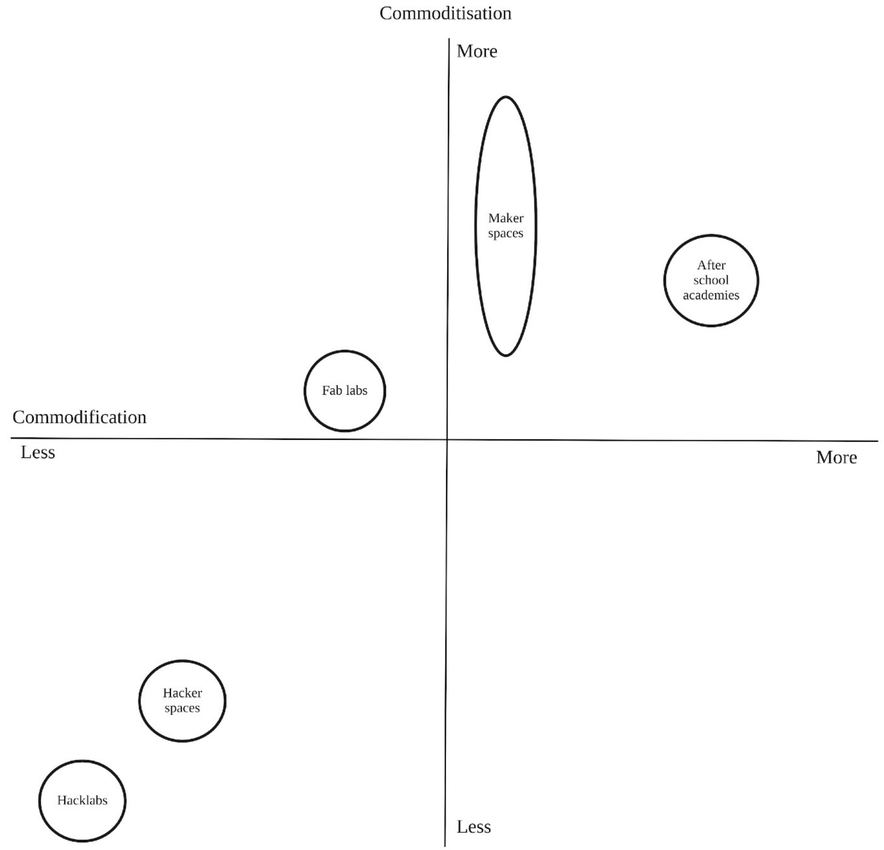
Courtesy of Lulea University

Empresa y open source … hardware → ¿Cómo funciona eso?

Comodificación y Comoditización



The plot of Running Sum of Count of Categoría secundaria for Fecha Inicio Year. Color shows details about Categoría secundaria. The marks are labeled by Categoría secundaria. The data is filtered on Fecha Inicio Year and Categoría Principal. The Fecha Inicio Year filter keeps 24 members. The Categoría Principal filter keeps Apertura. The view is filtered on Categoría secundaria, which excludes 11 members.



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In collaboration with César García - La Hora Maker

2024 - Cuartielles - Post Open Source

Implicaciones de proyectos como Arduino

- Cualquier objeto físico cuyo diseño pueda ser expresado en forma legible por humanos, se puede compartir
- Por esto se crearon las licencias Open Source Hardware (Hardware Abierto)
- El **CERN financió el primer documento legal** que fue aceptado por una comunidad de práctica relativamente grande (pero TAPR llegó antes)

Explore projects

All | Most starred | **Trending**

Filter by name | Language | Updated date

W

Projects / **White Rabbit Switch - Software** GNU General Public License v2.0 or later

Development of software for the White Rabbit switch, and in particular the embedded Linux system running in the ARM9 processor. More info at the Wiki page

☆ 1 0

Updated

W

Projects / **White Rabbit Switch - Hardware V4**

This project covers the hardware development of version 4 of the White Rabbit switch (WRS-v4). More info at the Wiki page

☆ 1 0

Updated

DI/OT

Projects / **DIOT Zynq Ultrascale-based System Board**

DI/OT Zynq Ultrascale-based System Board with White Rabbit support. More info at the Wiki page

☆ 3 0

Updated

W

Projects / **White Rabbit core collection**

A collection of cores needed in the White Rabbit node and switch. Includes White Rabbit PTP Core (WRPC).

☆ 3 1

Updated

F

Projects / **FMC DIO 5ch TTL a**

FmcDIO5chTTLa is a 5-bit port digital IO card in FMC form-factor. Each single-bit port can be configured individually as input or output. The I/Os on LEMO 00 connectors are TTL compatible. Commercially available. More info at the Wiki page

☆ 1 0

Updated 2

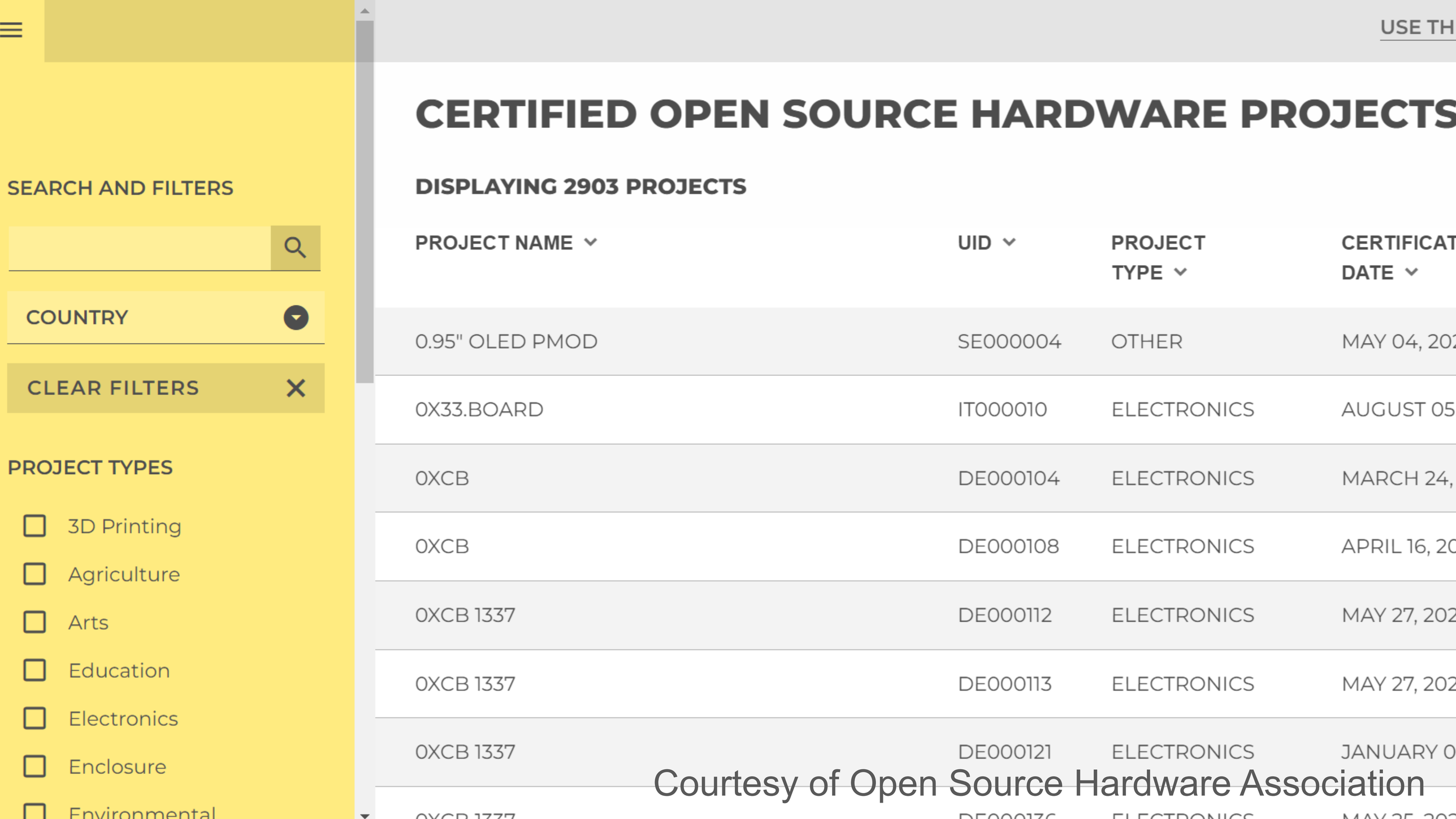
P

Projects / **PXIe controller COM Express based**

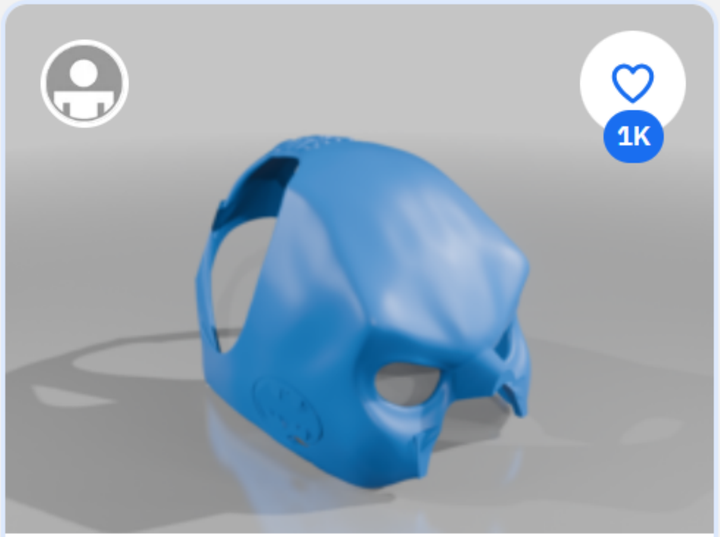
COM Express based PXIe system controller. COM Express Compact Pin-out type 6, 16-lane PCIe GEN3. PXIe trigger line

☆ 0

Updated 2

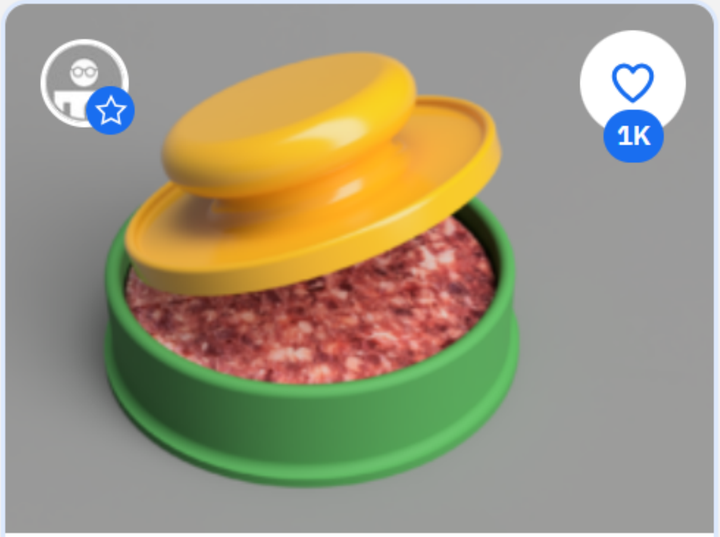

USE TH
CERTIFIED OPEN SOURCE HARDWARE PROJECTS
SEARCH AND FILTERS
COUNTRY
CLEAR FILTERS
PROJECT TYPES
3D Printing
Agriculture
Arts
Education
Electronics
Enclosure
Environmental
DISPLAYING 2903 PROJECTS
PROJECT NAME
UID
PROJECT TYPE
CERTIFICAT DATE
0.95" OLED PMOD SE000004 OTHER MAY 04, 202
0X33.BOARD IT000010 ELECTRONICS AUGUST 05
0XCB DE000104 ELECTRONICS MARCH 24,
0XCB DE000108 ELECTRONICS APRIL 16, 20
0XCB 1337 DE000112 ELECTRONICS MAY 27, 202
0XCB 1337 DE000113 ELECTRONICS MAY 27, 202
0XCB 1337 DE000121 ELECTRONICS JANUARY 0
Courtesy of Open Source Hardware Association

Sliding Cascade click-close wallet

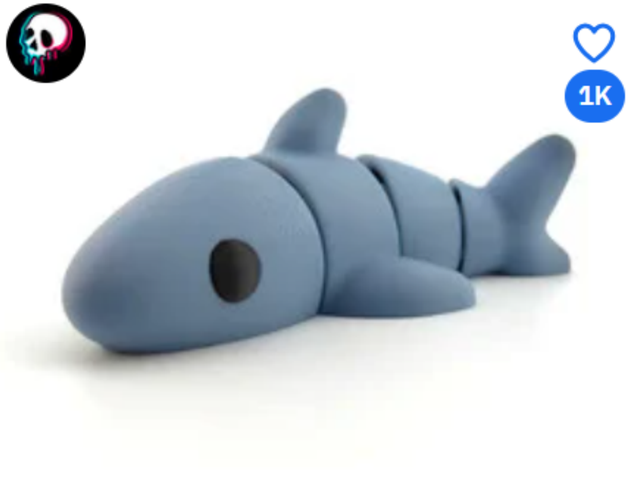


Batdog Batman mask for dog

Springy Flower Collection



Hamburger press



Articulating Shark

Ya hay arquitecturas abiertas

- Risc-V es el ejemplo de una arquitectura abierta de procesador que pueden correr Linux nacido de la idea de crear un “sistema de computación abierto”
- En paralelo, hay comunidades que comparten los diseños de chips dedicados (openCores)
- El potencial reside en la posibilidad de crear sistemas muy eficientes por su especificidad

Dr. Teresa Cervero (Source: BSC)

The BSC wants the next MareNostrum 6 to use RISC-V processors

Initially, the BSC tried to use Arm-based processors for its supercomputers. They even used the chips from Samsung's Galaxy 4 smartphones. "We extracted the chips from the phones and connected thousands of them," said Valero.

After Brexit and the SoftBank acquisition of Arm, Valero understood that the E.U. had a problem: there wouldn't be any more proprietary European processors. "That was until seven years ago, when RISC-V appeared, which is like the Linux of hardware; this opened the possibility for anyone in the world, including Europe, to make processors. Because America, Europe, or China don't decide the instruction set, the instruction set is global."

Fuente: https://www.eetimes.com/european-union-seeks-chip-sovereignty-using-risc-v/

El Hardware Abierto aún no ha ido a juicio

- Hasta donde yo se, **no ha habido juicios** donde se haya puesto a prueba el valor real de la licencia
- No hay una colección de productos realmente exitosos
- Se presentan retos en lo que se refiere a **autoría frente a responsabilidad**

¿Qué viene después de la apertura?

- Las Cosas pueden ser fácilmente explotadas por la economía de mercado
- El Código Abierto es ya el motor de la economía digital
- Riesgos:

Trabajo, lo abierto como control

Autoría automática

El lobby del software

La libertad de la educación superior

¿Es la apertura una meta en sí misma?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Creating Meaningful Toolboxes When People Meet
TEKHNOLOGIA OMNIPOTENS REGNAT
·XIII·
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Contexto: Plataformas digitales

Estudio plataformas tecnológicas, su naturaleza, su gobernanza, y riesgos potenciales. Las plataformas:

- Están hechas de software, hardware y documentación
- Crecen como una simbiosis entre desarrolladores y receptores (participantes)
- Su gobernanza evoluciona en función a circunstancias externas o no a la tecnología
- Son no-humanas, transformables y transferibles

Código abierto como bien común

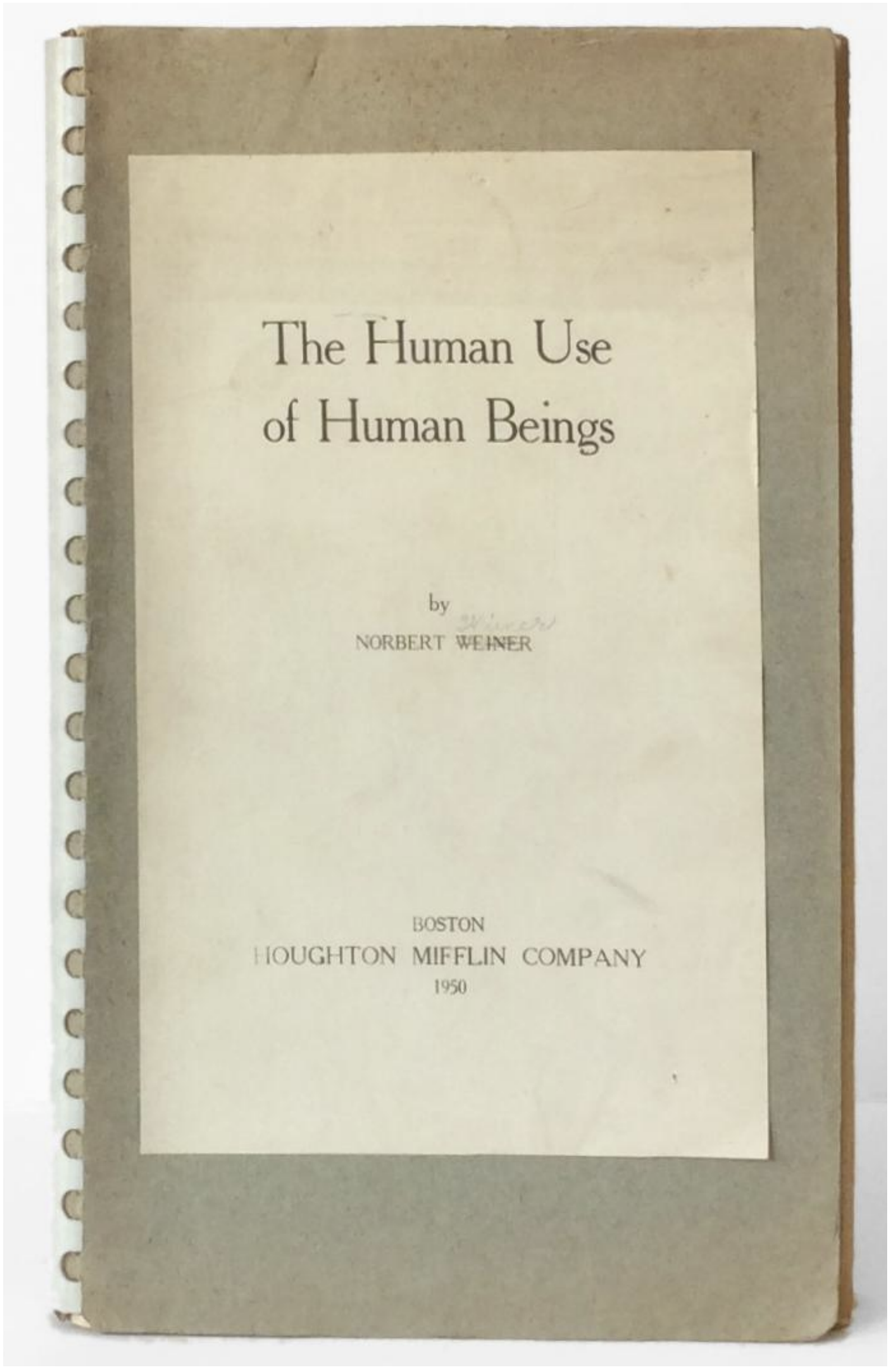
El cuerpo de software cuya versión no compilada se comparte de manera que cualquier persona (o máquina) pueda usarlo y modificarlo.

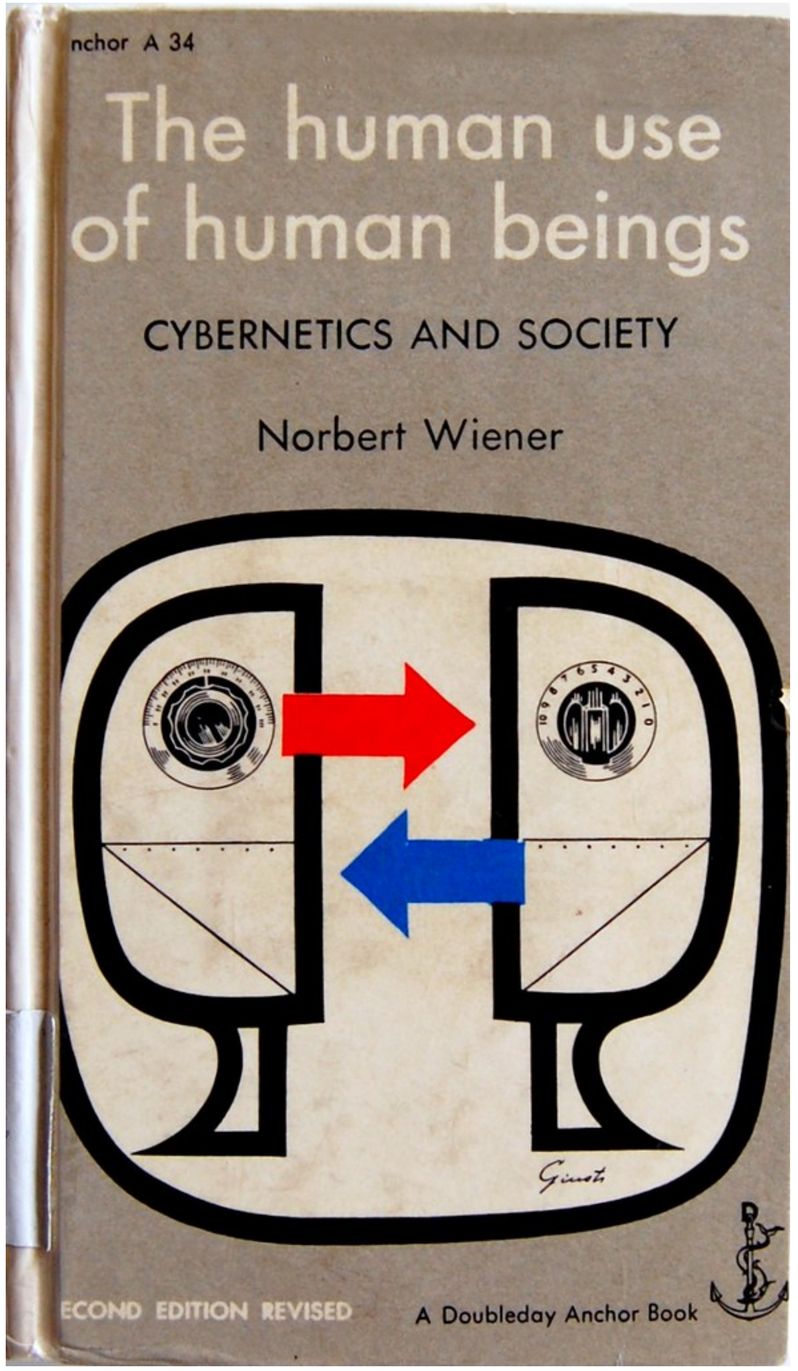
- Hereda características del **Software Libre**
- Da origen a una **nueva comunidad** de práctica
- Más del **90% de los servidores de Internet** corren código abierto
- Modelo de gobernanza: **dictador benevolente**
- **Libertad de fork**
- Es el motor de la **economía digital**

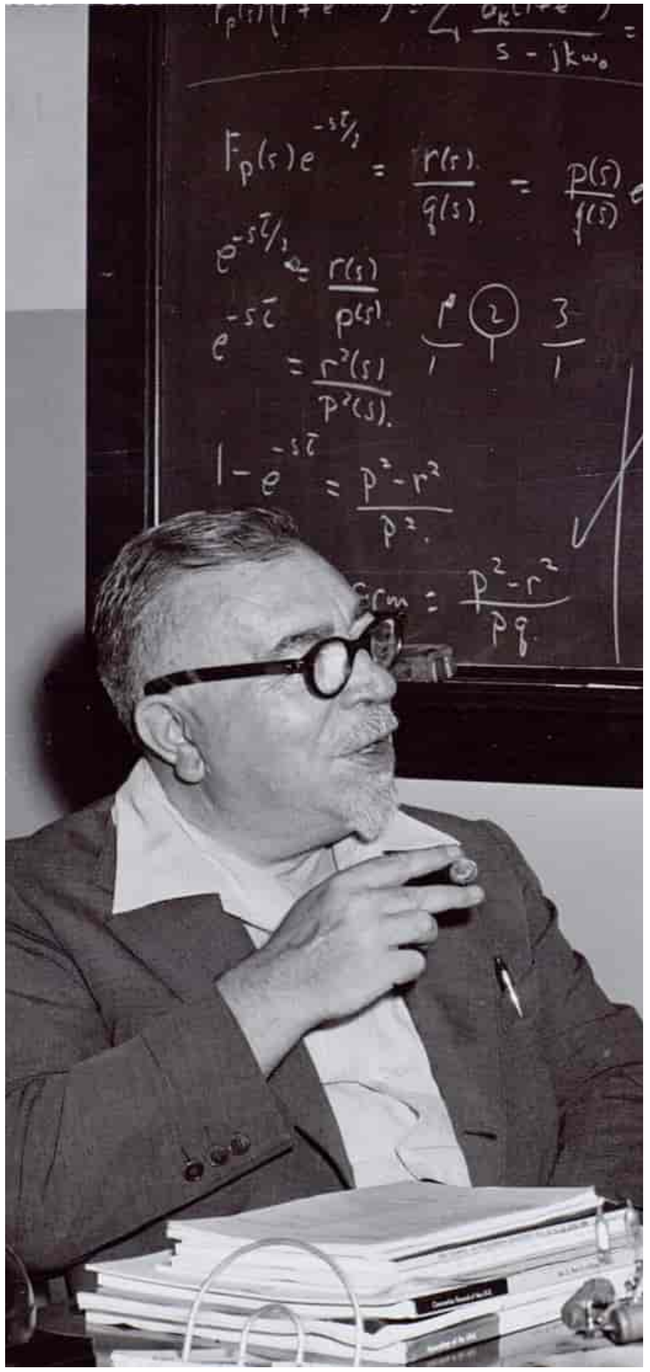
Post Open Source

Define el momento en que el código abierto pasa a ser explotado por el sistema económico capitalista como cualquier otro bien común.

Esta explotación comienza siendo ejercida por humanos, para pasar a ser automatizada.


The Human Use
of Human Beings
by
NORBERT WIENER
BOSTON
HOUGHTON MIFFLIN COMPANY
1950


nchor A 34
The human use
of human beings
CYBERNETICS AND SOCIETY
Norbert Wiener
ECOND EDITION REVISED
A Doubleday Anchor Book



Caso 1: Trabajo digital

- Trabajar con código abierto es una obligación ya no una opción
- Las herramientas de control también están hechas de CA
- En cierto modo, el CA se hace a sí mismo (con LLMs ya es literal)
- La autoría se diluye entre muchos, y con ello la responsabilidad
- Los humanos pasamos a ser redundates, somos un recurso en una tabla de SCRUM, se deshumaniza la producción
- **Resiliencia: ¿Cómo puede un* defenderse del abuso?**

Caso 2: Autoría automática

- **¿Puede la IA capitalizar la producción humana a través de la automatización?**
- ¿Podemos limitar esto a través de licencias?
- ¿Cual es nuestro rol una vez nos eliminan del proceso de creación? ¿Seremos meros auditores?

Unsurprisingly, last week's debate has carried over into this week, and at least one lawsuit appears to be in the works. Nora Tindall, developer and co-author of "Programming Rust," has said that she has reached out to both the Electronic Frontier Foundation and the Free Software Foundation to pursue a class-action lawsuit following GitHub's admission that they trained Copilot using "all public GitHub code."

> oh my gods. they literally have no shame about this.
>
> GitHub Support just straight up confirmed in an email that yes, they used all public GitHub code, for Codex/Copilot regardless of license. pic.twitter.com/pFTqbvnTEK
>
> — ✨ Nora Tindall, automated relay 🪐 (@NoraDotCodes) July 7, 2021

The argument hasn't qualitatively changed from last week, with many developers arguing that the code that Copilot creates is, in essence, a "derivative" work. Meanwhile, yet another piece came out this week, again not only positing that GitHub Copilot is not infringing your copyright but also arguing that the move to restrict it from using copyleft licenses may actually be ill-advised.

Caso 3: El lobby del software

- Una gran parte del CA de Linux está financiado por grandes empresas
- ¿Podemos confiar en que no influenciarán el proceso de creación desde su posición de poder? ¿Estamos seguros de que no controlarán lo que vaya a hacer el software?
- **¿Cómo deben de posicionarse los productores de SW medianos y pequeños?**

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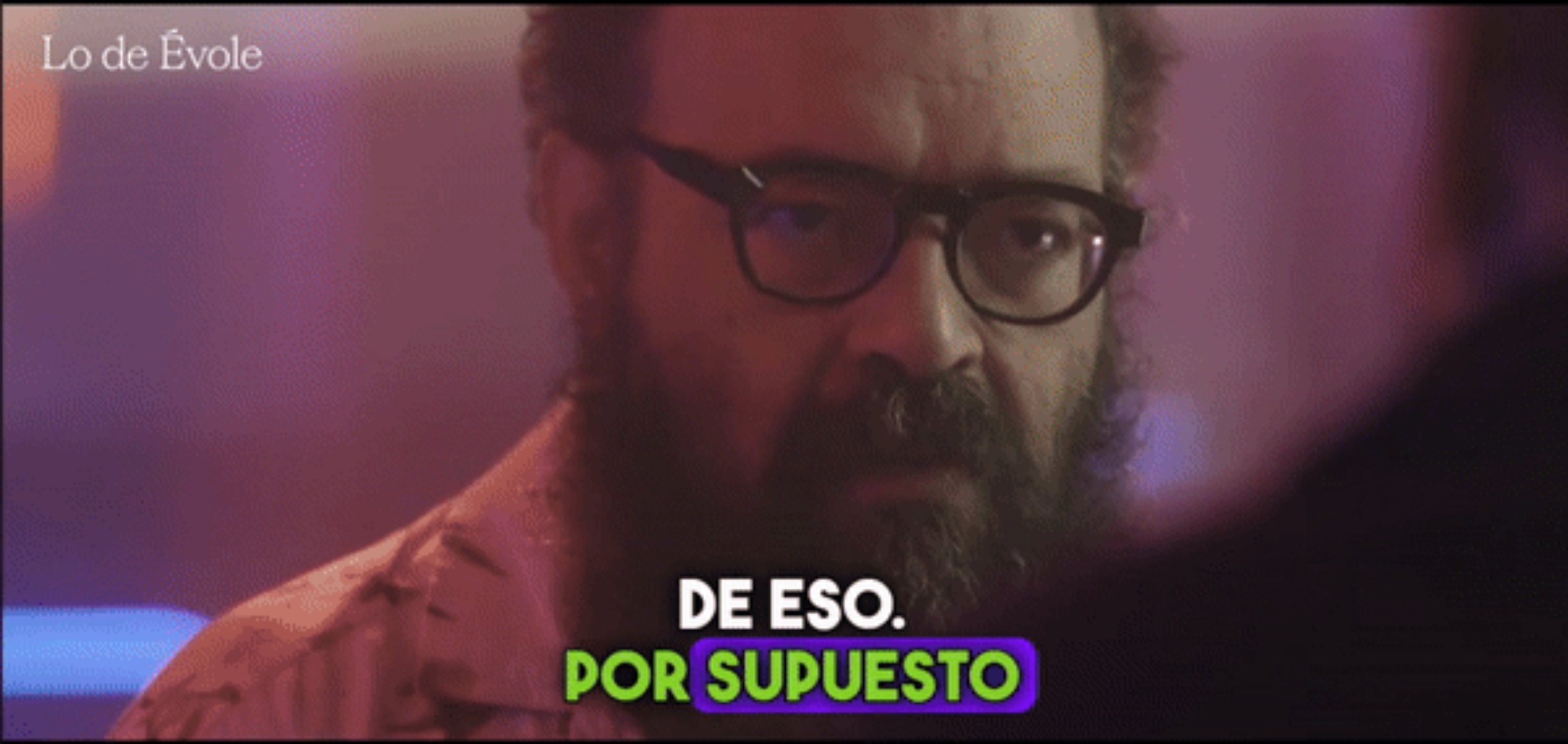
Caso 4: Mecanismos de distribución capitalistas

- Aunque la producción sea abierta, así como los medios de producción, y aunque sean a coste cero (gratis), los productos finales no lo son
- Los mercados de distribución están controlados de forma unilateral por plataformas en manos de muy pocas corporaciones globales
- Los mercados de Apps son la expresión última de control por CA
- **¿Podemos realmente confiar que, desde su rol como guardianes de mercados transfronterizos, operarán bajo cualquier clase de código ético?**

Caso 5: Sistemas complejos

- Es prácticamente imposible para pequeños productores tener una influencia en la forma en que las infraestructuras de CA se construyen
- Estos sistemas se operan desde gigantes sistemas de Cloud deslocalizados controlados por unos pocos
- **El concepto de Nube Pública aparece y nos roba lo público a los demás**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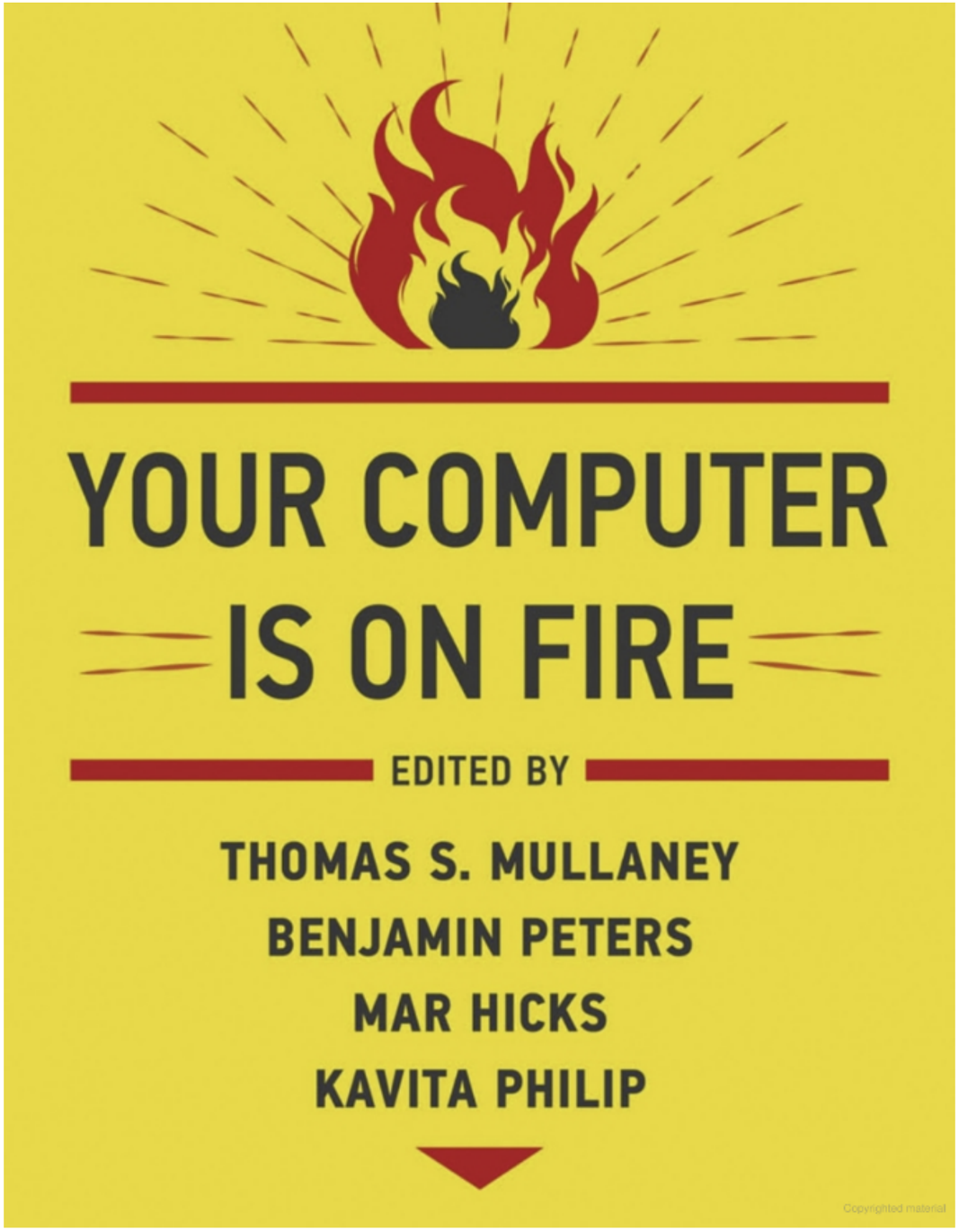
Caso 6: Nuestro código no es sostenible

- El CA no ha sido optimizado de forma ecológicamente sostenible, corren en infraestructuras caras (granjas) y requiere una gran cantidad de recursos
- Los paradigmas de computación ubicua y de sociedad conectada n han tenido la sostenibilidad en cuenta hasta recientemente
- **¿Existen otras formas más eficientes y sostenibles de producir código?**



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1

THE CLOUD IS A FACTORY

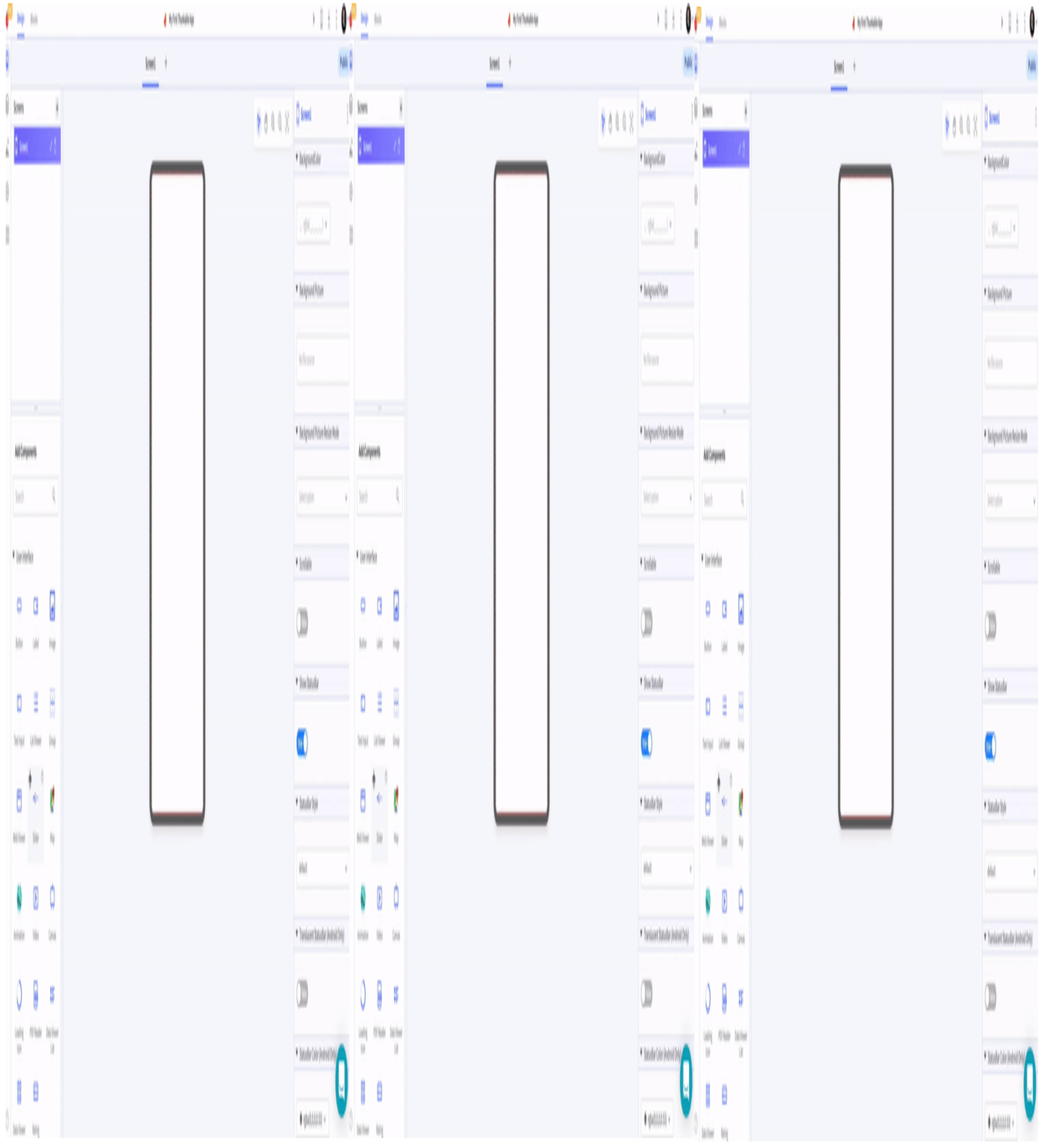
Nathan Ensmenger

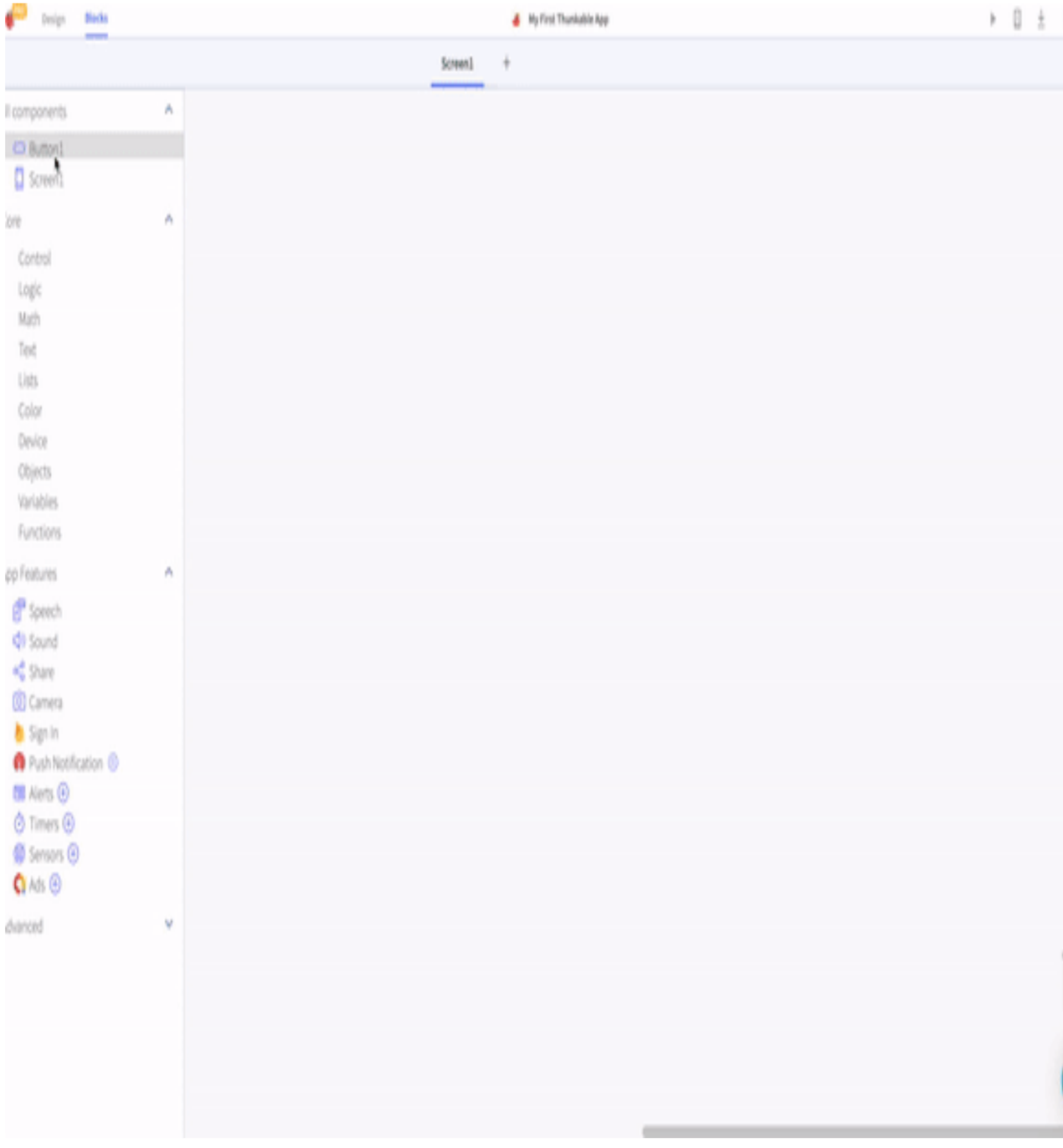
Caso 7: Educación superior en riesgo

- Las universidades producen graduados para satisfacer las necesidades del mercado
- El mercado está controlado por unos pocos, que ejerce influencia en la agenda académica
- Las universidades están bajo presión por comprar los productos y servicios de esas compañías que podrían ofrecer trabajos a sus estudiantes
- Este modelo podría generar nuevos modos de trabajo, pero mayormente en el Norte Gobal

Caso 8: Zero Code, espejismo de conocimiento

- Las empresas están necesitadas de producir software, mucho más que nunca antes
- No hay una forma única de entender el concepto de Zero Code
- Muchas plataformas Zero Code se construyen sobre el CA, pero no nos proporcionan acceso a lenguajes de programación abiertos
- Nos atrapan en soluciones verticales no transferibles

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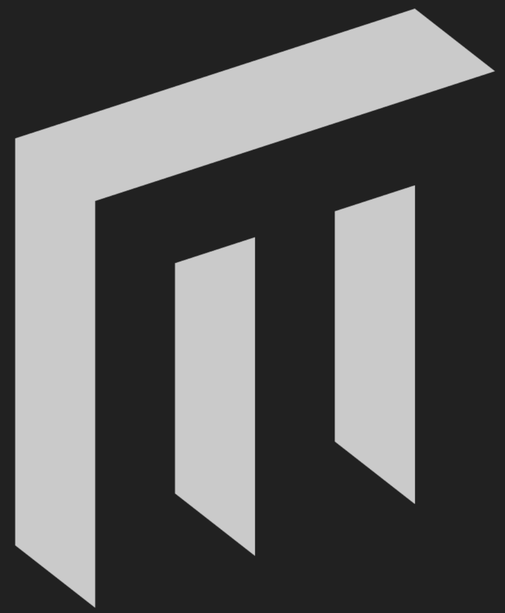
¿No necesitamos repensar la idea de apertura?

That’s a wrap! 



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