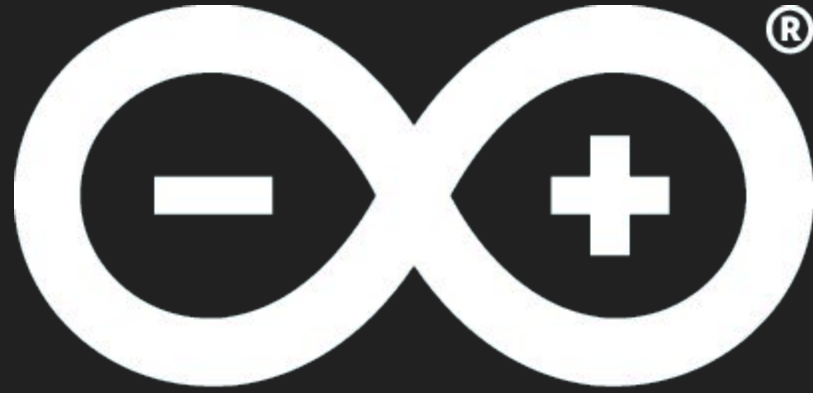




**MALMÖ**  
**UNIVERSITY**



**PRO<sup>TM</sup>**

# Keynote SciTinyML Latam

# Agenda for day (the optimistic alternative)

- Who am I
- What is Arduino
- Sharing models
- 5 neat projects

- What is Arduino Pro
- Idea - prototype - production
- Maker Pro
- The production checklist
- 4 cases

- The IoT paradigm
- Edge computing
- Moore's law != good enough comp

- Components' shortage
- Bootstrapping dylemma
- Zero coding, but where
- TinyML, but here
- Legal matters
- Community management





[Home](#) > [Journals](#) > [HardwareX](#) > [Forthcoming Special Issues](#) > [Special Issue on Open Source Machinery and Laboratory Instrument using the Arduino Software and Hardware Ecosystem](#)



ISSN: 2468-0672

## HardwareX

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# Special Issue on Open Source Machinery and Laboratory Instrument using the Arduino Software and Hardware Ecosystem

June 2022

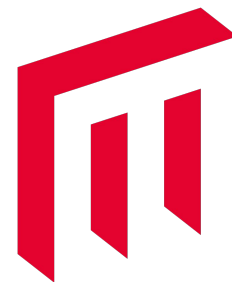
Since its creation in 2005, Arduino has impacted our thinking around open tools and digital education. Arduino continues to inspire students and professionals in a spectrum covering from embedded to embodied technology. The principles behind the Arduino ecosystem (open software, hardware, and documentation) offer a platform perspective to the creation of digital devices, as well as SDKs, IDEs, Cloud services, and alternative ways of learning. Our society values, more than ever, open tools for the advancement of science, technology, and economy. This HardwareX special issue will highlight open projects, at the service of society, emerging from the Arduino ecosystem.

### Guest editors:

Dr. David Cuartielles, Malmo University, IoTaP research group, Interaction Design, Co-founder of Arduino, [david.cuartielles@mau.se](mailto:david.cuartielles@mau.se)

<https://bit.ly/arduino-hardwarex>

Who am I?



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UNIVERSITY**



**ARDUINO**

# What is Arduino?



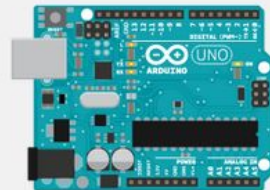


Search the Arduino Website

Home Buy Download Products Learning Forum Support Blog

LOG IN SIGN UP

WHAT IS ARDUINO?



BUY AN ARDUINO



LEARN ARDUINO



BLOG

MAKE BATMAN DANCE AT THE RYTHM OF A GAS SENSOR



THE OPEN SOURCE WAY TO THE CONNECTED HOME

Casa Jasmina is a two-year pilot project in the space of domestic electronic networking, or, the Internet of Things in the Home.



Arduino's sister brand for products sold outside the US.

ARDUINO ZERO, SIMPLE AND POWERFUL 32-BIT BOARD! SHOP NOW

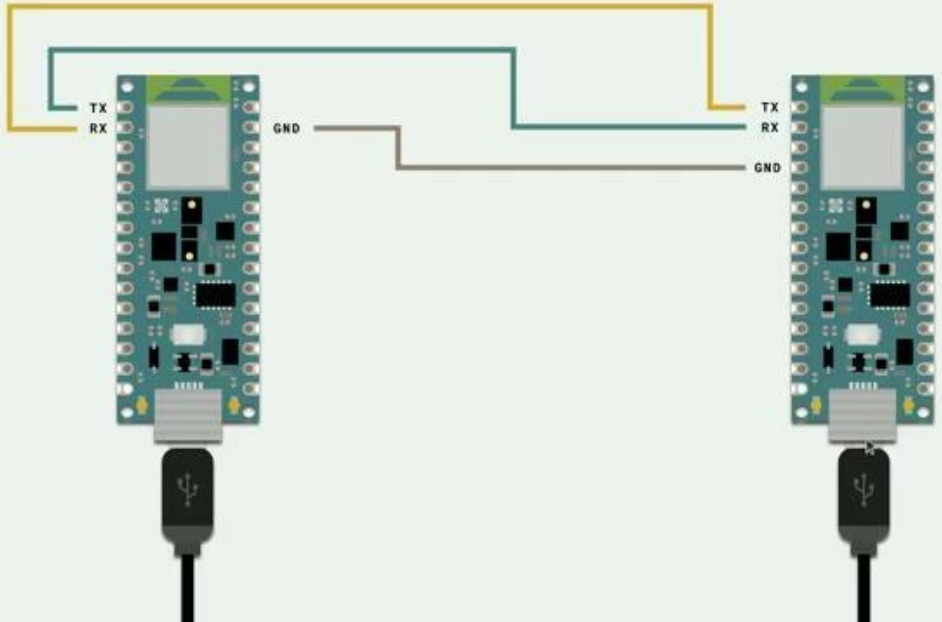


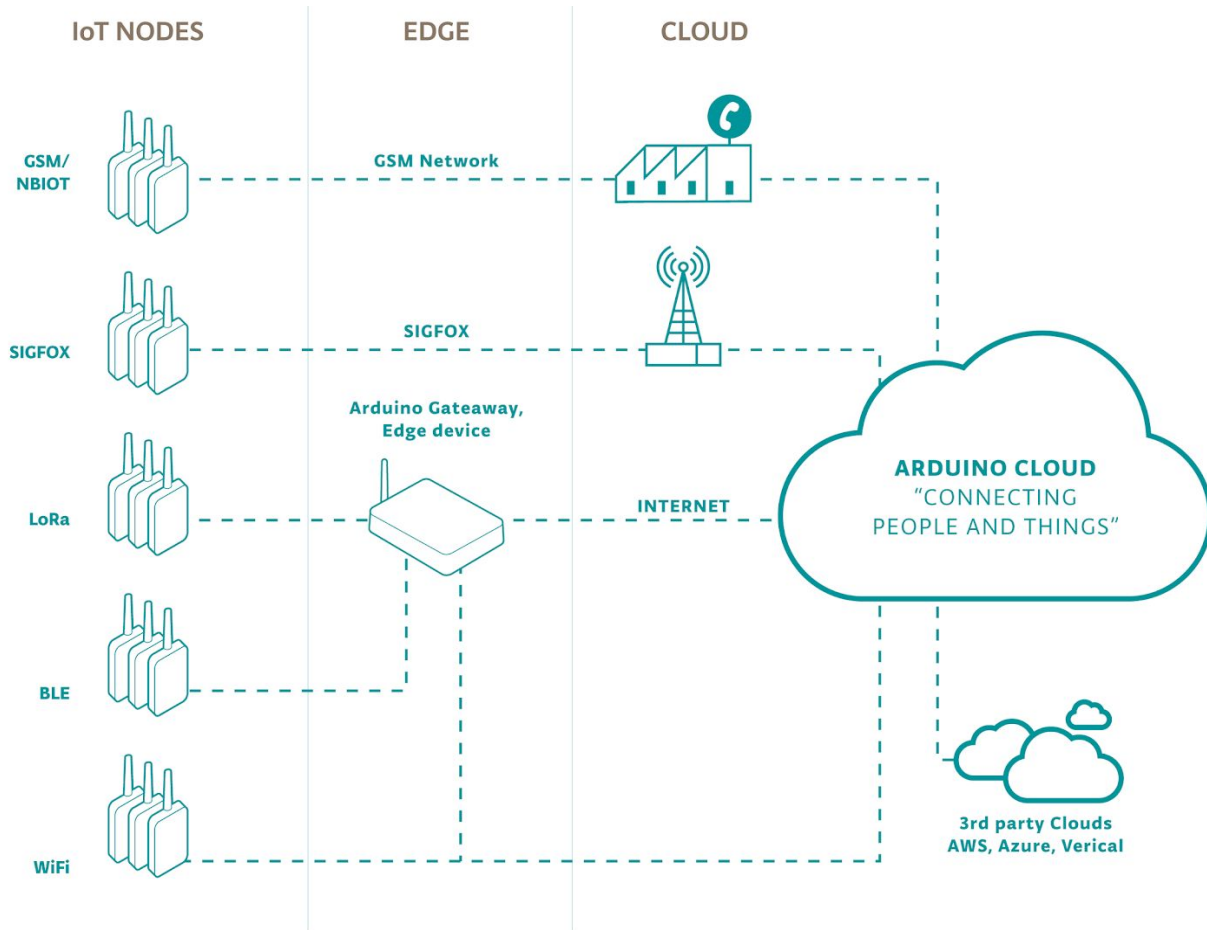
```
void setup() {  
  pinMode(13, OUTPUT);  
}  
  
void loop() {  
  digitalWrite(13, HIGH);  
  delay(1000);  
  digitalWrite(13, LOW);  
  delay(1000);  
}
```



RECEIVER

TRANSMITTER





# Philosophy 101: Sharing is caring

- Free vs Open Source vs Creative Commons
- Openness implies:
  - Allowing others to **profit from your work**
  - Performing **housekeeping** (clean the materials)
  - **Documenting** your project properly
  - Making uncomfortable **decisions on what stays** and goes
  - **Responding** to PRs, issues and bugs in a reasonable time
- Openness is **perceived** by some **as just a marketing tool**

Knowing all of that ...  
would you do it  
again?

**YES! EVERY SINGLE  
STEP ... IT HAS BEEN  
A GREAT RIDE!**

# Sharing is caring: the good stuff

- We have **helped shaping the current model** for hardware licensing
- Openness implies:
  - **Profiting from the work of others**
  - Enabling unthinkable collaborations
  - Lifelong learning (from the community)
  - Resilience when confronting large issues
  - Friendships for life
- Openness is **perceived** by most **as a brave move**

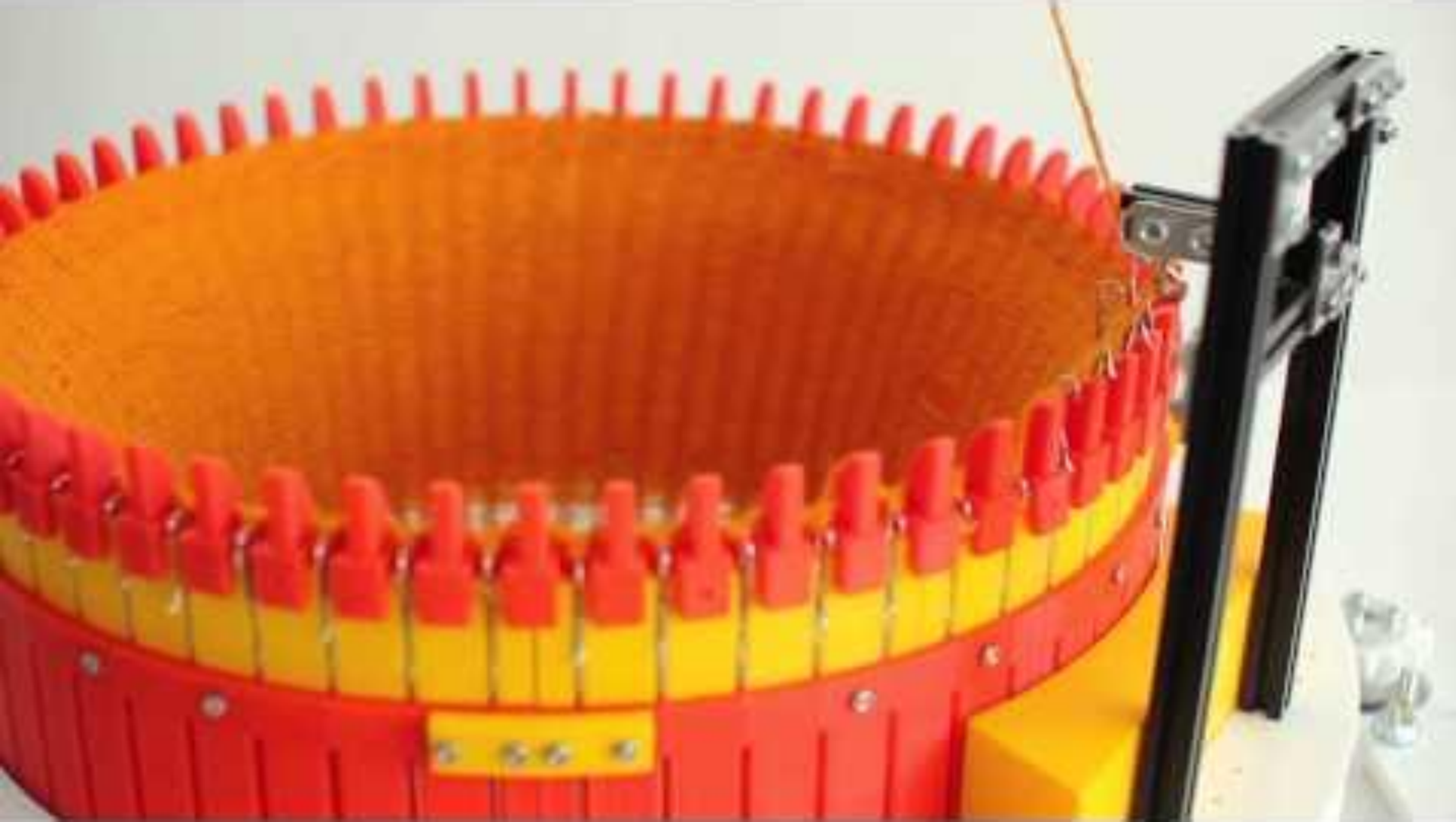
# 5 neat projects

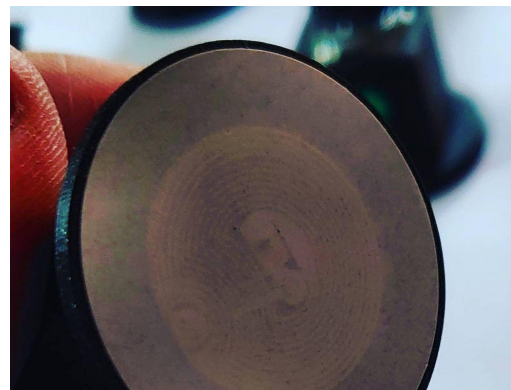
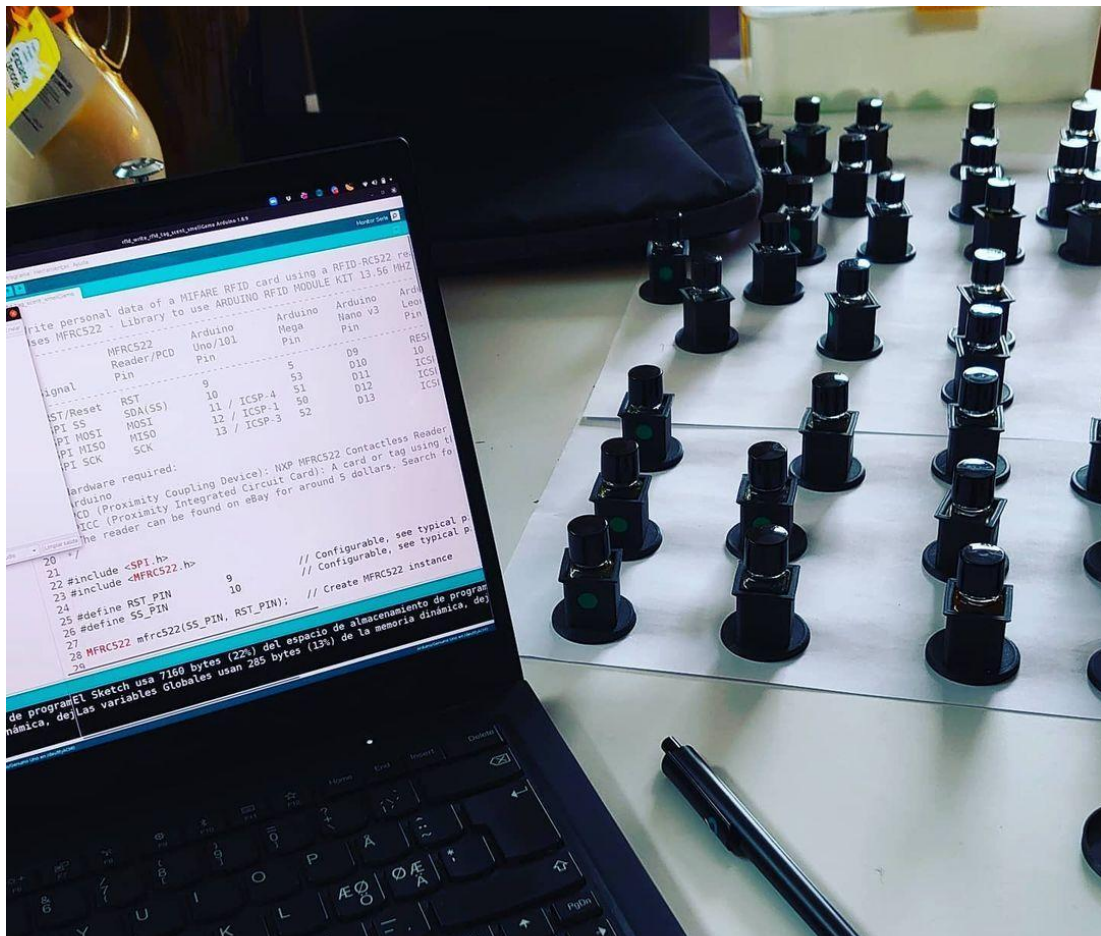


**LIFETEST #9**  
**READY FOR**  
**DRIVING**  
**WITH MUSIC**





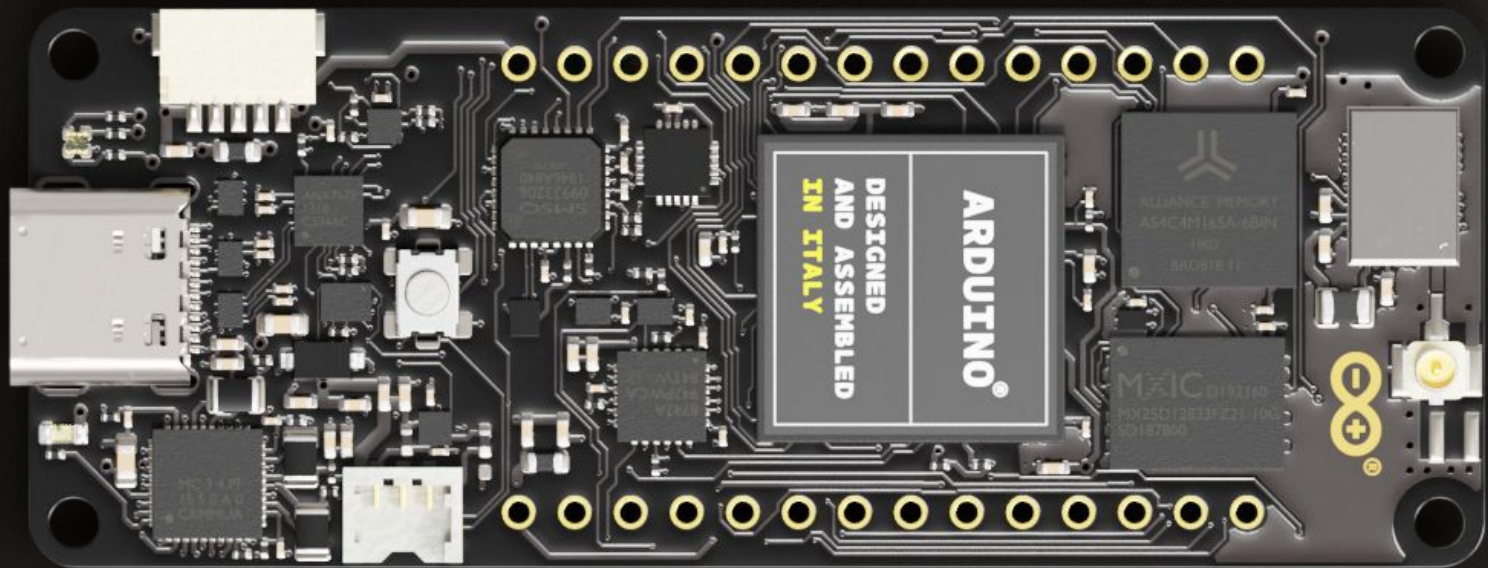


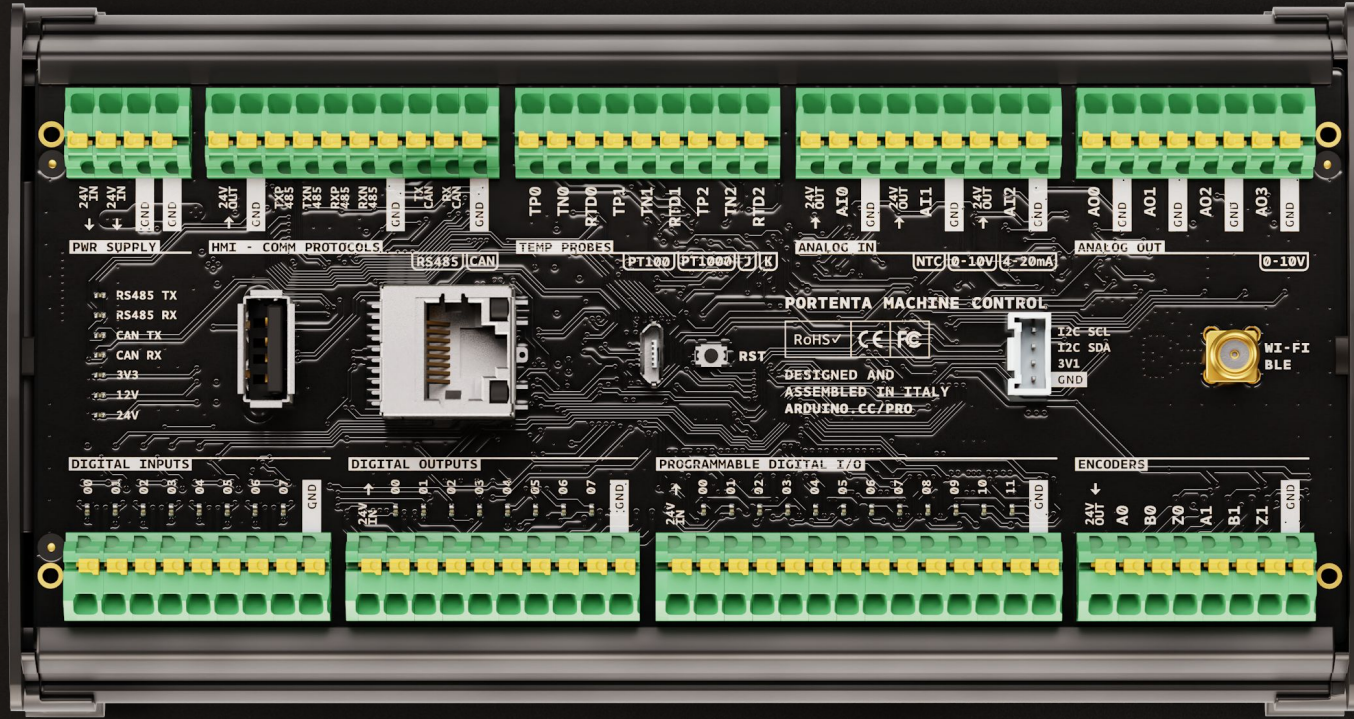




# What is Arduino Pro?







24V IN  
24V IN  
GND  
GND  
24V OUT  
GND  
TXN 485  
RXN 485  
TXP 485  
RXP 485  
CAN RX  
CAN TX  
GND  
GND  
TP0  
TN0  
RTD0  
TP1  
TN1  
RTD1  
TP2  
TN2  
RTD2  
24V IN  
GND  
AI0  
24V OUT  
GND  
AI1  
24V OUT  
GND  
AI2  
GND  
AO0  
GND  
AO1  
GND  
AO2  
GND  
AO3  
GND

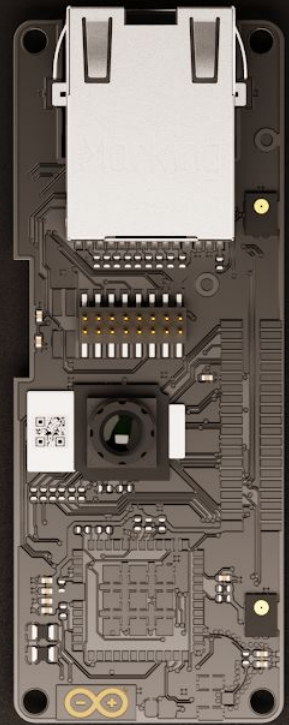
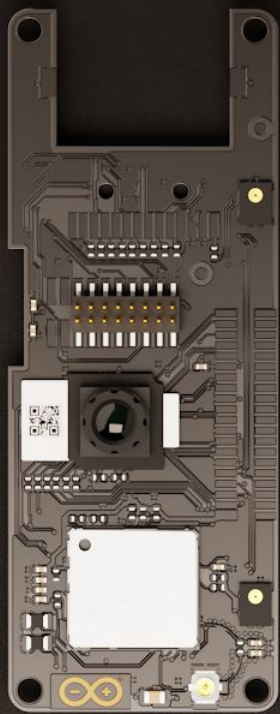
PWR SUPPLY HMI - COMM PROTOCOLS RS485 CAN TEMP PROBES ANALOG IN NTC (0-10V) (4-20mA) ANALOG OUT (0-10V)

RS485 TX  
RS485 RX  
CAN TX  
CAN RX  
3V3  
12V  
24V  
RST  
PORTENTA MACHINE CONTROL  
ROHS  
CE  
FC  
DESIGNED AND ASSEMBLED IN ITALY  
ARDUINO\_CC/PRO  
I2C SEL  
I2C SDA  
3V1  
GND  
WI-FI BLE

DIGITAL INPUTS DIGITAL OUTPUTS PROGRAMMABLE DIGITAL I/O ENCODERS

00 01 02 03 04 05 06 07  
GND  
24V IN  
24V IN  
GND  
GND  
00 01 02 03 04 05 06 07 08 09 10 11  
GND  
24V OUT  
A0  
B0  
Z0  
A1  
B1  
Z1  
GND







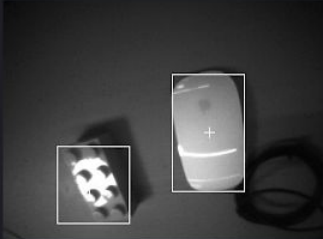
BlobDetection.py - OpenMV IDE

Line: 39, Col: 1    Frame Buffer    Record    Zoom    Disable

```

1  import pyb #Import module for board related functions
2  import sensor, image, time
3
4  sensor.reset()
5  sensor.set_pixformat(sensor.GRAYSCALE)
6  sensor.set_framesize(sensor.QVGA)
7  sensor.skip_frames(time = 2000)
8
9  thresholds = (100, 255)
10 ledRed = pyb.LED(1)
11 ledGreen = pyb.LED(2)
12 ledBlue = pyb.LED(3)
13
14 clock = time.clock()
15
16 while(True):
17     clock.tick()
18     img = sensor.snapshot()
19
20     # Find blobs
21     blobs = img.find_blobs([thresholds], area_threshold=200, merge=False)
22
23     # Draw blobs
24     for blob in blobs:
25         img.draw_rectangle(blob.rect(), color=255)
26         img.draw_cross(blob.cx(), blob.cy(), color=255)
27
28     # Toggle LEDs
29     if len(blobs) > 0:
30         ledGreen.on()
31         ledRed.off()
32     else:
33         ledGreen.off()
34         ledRed.on()
35
36     time.sleep(50)
37
38     print(clock.fps())
39

```



Histogram    RGB Color Space

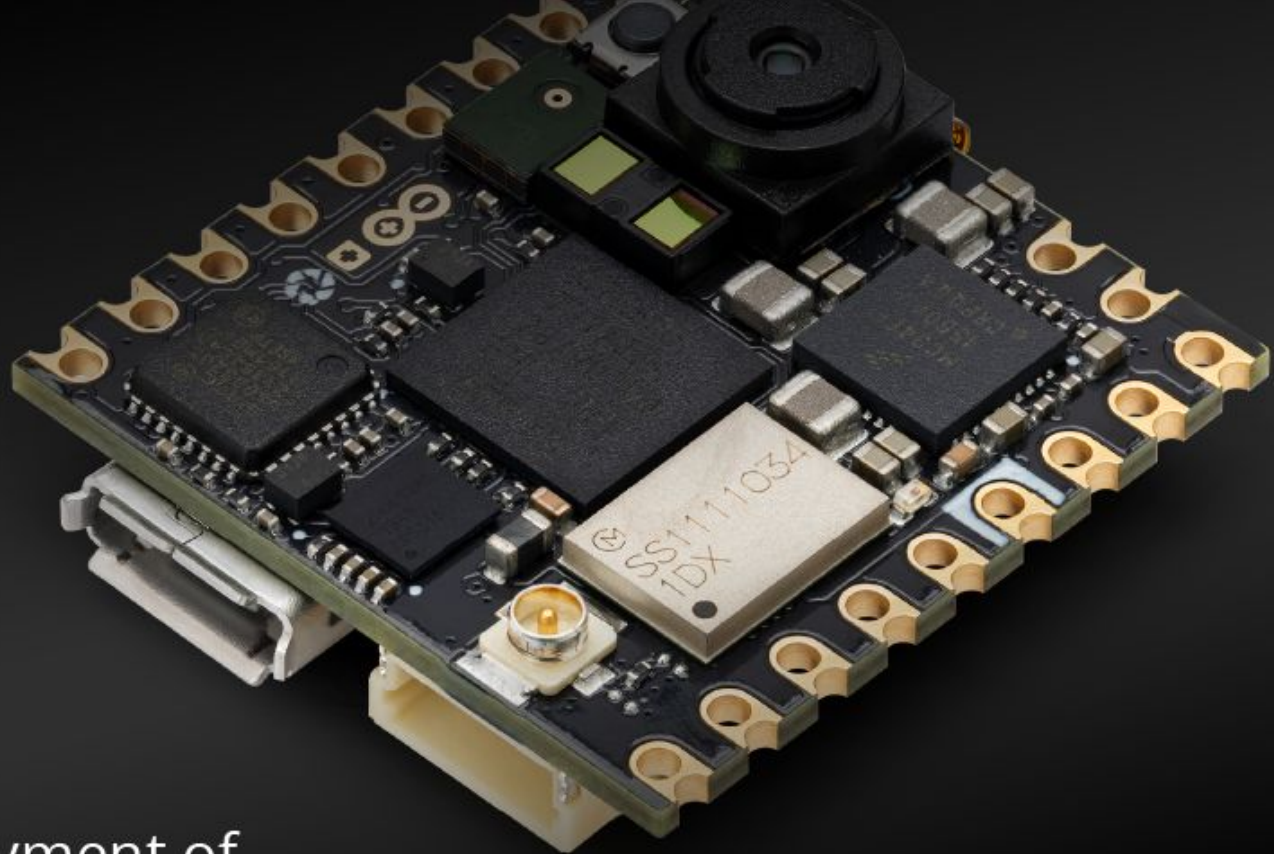
Res (w:320, h:240)

Mean 66    Median 49    Mode 41    StDev 50  
Min 0    Max 255    LQ 33    UQ 74

Mean 66    Median 49    Mode 36    StDev 50  
Min 0    Max 255    LQ 36    UQ 77

Mean 66    Median 49    Mode 41    StDev 50  
Min 0    Max 255    LQ 33    UQ 74

Search Results    Serial Terminal    Board: H7    Sensor: HM01B0    Firmware Version: 3.6.8 - [latest]    Serial Port: cu.usbmodem3782337430391    Drive: /Volumes/NO NAME    FPS: 9.0



# Nicla Vision

Speed up deployment of  
machine vision at the edge



Idea - prototype -  
product

# There is different prototyping cultures

- A prototype is the **illustration of** some of the **features** of an idea
- Designers, engineers, and product managers have **different views** of what a prototype could be
- A prototype can be anything: from a post-it representing the screen of a device, to a release candidate of a piece of hardware almost ready to be launched
- What matters is to **set the level of expectations** right

# Products are good to go

## ... or aren't they?

- According to researchers of the Spanish Center for Research (CSIC) end users have got used to have products which are not finalised
- It is now normal to have devices which functionality varies over time, which software is not final or even capped
- While making hardware upgrades in consumer electronics has been hard for quite a while, OTA software is nowadays a very common thing. From cars to thermostats, we have seen many products come with hidden features, ready to be unblocked for some money more

## Nest Thermostat Teardown

CONTRIBUTORS: NATE

FAVORITE 6 SHARE

### Introduction

Awhile ago I read about [Nest](#), a newfangled thermostat with a color display and some interesting 'learning' techniques for keeping your home warmed or cooled, as sensible as possible. Did I mention the beast has IR proximity, PIR movement, humidity, magneto scroll, and a mini USB connector? Oh. It does.

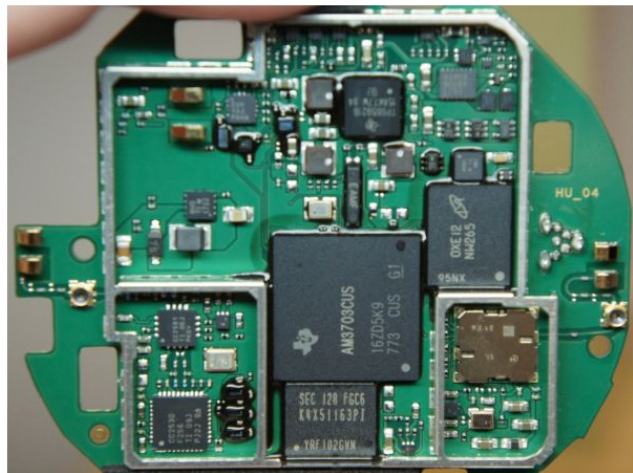


It's kind of awesome, but it comes at a price. Pre-orders were \$249 + shipping but I'm a sucker for new technology so I got in line. A few weeks after I placed my pre-order I got a piece of spam email from Nest offering a free professional installation. That's great, but I was not planning on my Nest ever seeing the light of day - I wanted to take it apart and see how it worked. So on a whim, I replied to the email:

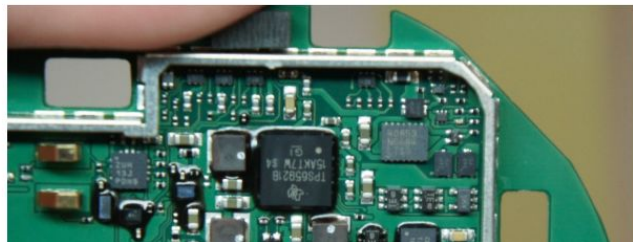
Although I failed to capture them on the camera, there was two flexible PCB antennas in a vertical configuration. One antenna was marked 'Zigbee'. Now this has my interest piqued. I assumed there was [two antennas for better reception](#) but perhaps one antenna is Wifi and one antenna is for something else? Zigbee? No way. Really? Could Nest be [planning on adding other equipment control such as lighting or re Fridgeration?](#) After using the Nest and its accompanying website, I certainly hope so.

### The Electronic Bits

With the RF shield removed, we can finally see what lies within.



Here's what we were waiting for. This is an astronomical amount of silicon for a thermostat!



**But all' this' gonna  
change with the  
current trends and  
regulatory changes  
around the right to  
repair**



# Maker Pro

# A [not so new] view about business

- A **maker** is a **contemporary artisan**, with knowledge in digital fabrication techniques, electronics, interactive technologies, etc.
- **Maker Pro** is a term that showed up in the mid 2010's to name those people who were interested in **pursuing a professional career** out of those skills
- One of the new emerging professions is the **Creative Technologist**, a person with technology and design skills, a hacker looking for bootstrapping or demoing new ideas



## Why Does Airbus Have A Makerspace?

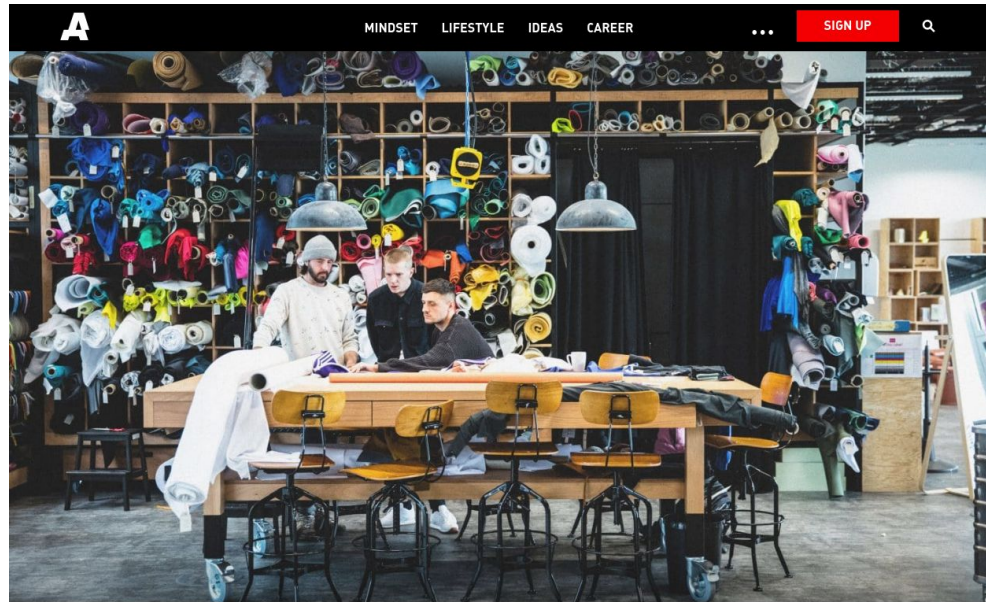


By Alvaro Jara Rodelgo

March 8th, 2019

Why Airbus shows interest in the maker movement? As a multinational high end technology company, we may think that all aeronautic innovations require very complex processes and so the make it yourself approach does not fit. This is only partially true. Yes, most of the developments have a high degree of complexity. However, this does [...]

Continue Reading



IDEAS

# TAPPING INTO FEARLESS CREATIVITY: STORIES FROM THE ADIDAS MAKERLAB

June 6, 2017

From IT to materials and design, a multitude of departments across adidas are challenging themselves in dedicated creative spaces.

# The production checklist

# Making products is easy (the simple version)

## ... sending them out is hard

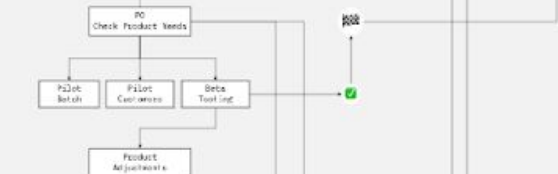
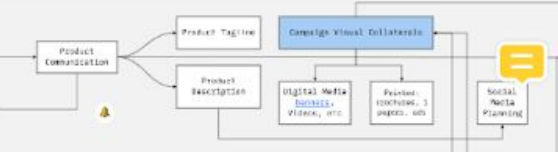
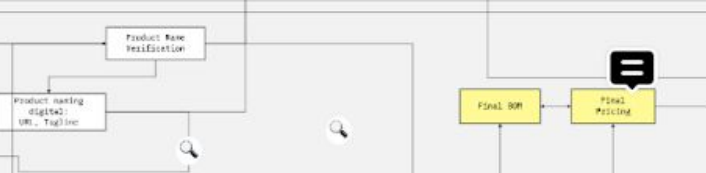
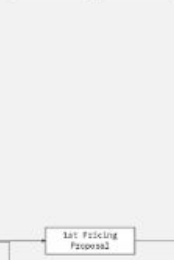
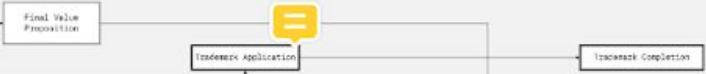
- Conceptualise your idea, put it in words
- Test paper prototypes with potential users
- Make implementation prototypes of core features
- Supply chain: check the life of your parts
- Perform design for manufacturing, talk to the people running the machines
- Supply chain: plan production schedules, book times (also for the lab)
- Make a test run
- Prepare user manual & datasheet, send to certification
- Find committed beta-testers
- Work with the firmware & software
- Design packaging
- Plan distribution at all levels
- Create marketing campaign
- Make a lot of parts
- Profit

PRODUCT DEFINITION

PRODUCTION / DEVELOPMENT PHASE

LAUNCH QUEUE

PRE SALES 5-6 weeks prior



# Examples of products



LADE - DAVE  
ENRIK - FLUK  
DERRICK - JETTA  
AMP PARTY  
DEC DEC  
ML -  
BB -  
YE -  
MA -  
BLACK TWEAR  
SUNGLASSES  
MATCHES MEN  
LC ANIMATION  
DANCE RIVER  
PITLER  
VANITY FAIR  
CLARRES  
SUNG  
PETER SHES  
COMMISSION - DUNNY  
FLYING  
THE  
LONDON



## Solución Industrial basada en Open Source Hardware



Una solución versátil con hasta 10 entradas y salidas. Programe utilizando soluciones de software gratuitas, como Arduino IDE. **Arduino NANO** es una solución perfecta para muchas aplicaciones de monitoreo y control.

[10 IOs en detalle >>](#)

## Arduino Leonardo - 20 E/S Controlador Lógico Programable

## Solución Industrial basada en Open Source Hardware



**Múltiples opciones de comunicación disponibles:**  
- Wifi

Puede usar esta solución inalámbrica para comunicarse con otros dispositivos y enviar y recibir información.

- GPRS

Si no hay una opción para conectarse con soporte físico, esta solución es perfecta para su instalación o máquina.

**Hasta 20 entradas y salidas**

**Entradas y salidas Digitales, Analógicas y Relé** para asegurar el funcionamiento con múltiple opciones.

Protocolos industriales disponibles:  
RS485 - RS232 - SPI - I2C - Modbus RTU

[20IOs en detalle >>](#)

## Arduino Mega - Gama Ethernet de Controladores Lógicos Programables

## Soluciones industriales con placas originales Arduino



Hasta 58 entradas-salidas disponibles.

Múltiples protocolos y otras opciones a su disposición como:

**LoRa** - Long Range.

**WiFi**

**GPRS** - Si no hay opción de tener un soporte físico.

**DALI** - Protocolo de iluminación para soluciones específicas.

[Gama Ethernet >>](#)


## ¿Necesitas automatizar, monitorear o controlar? Hazlo con el PLC Arduino

Un controlador industrial programable de Arduino para todo tipo de proyectos.  
...y basado en hardware de código abierto!

El primer equipo basado en la tecnología de Arduino diseñado para uso profesional. Monitoreo, Control y Automatización.

Eres libre de crear tu propia aplicación y ser también el dueño de tu solución.

- ✓ Seguridad y robustez. Hasta 58 entradas y salidas
- ✓ Placas Arduino siempre originales.
- ✓ Protocolos Industriales
- ✓ RS232, RS485, I2C, SPI, Modbus, Ethernet, Full-Half Duplex

[MIRA LA GAMA DE PRODUCTOS >>](#)


### Hasta 58 Entradas y Salidas

Digital, Analógico y Relé



### Protocolos Estándar

RTC, µSD, Ethernet, USB, Full/Half Duplex RS485, RS232, I2C, Modbus



### Sin costes de software

Programable con Arduino IDE

## Autómata Industrial basado en Arduino

Automatización industrial basada en hardware de código abierto.

#### Autómata Modular

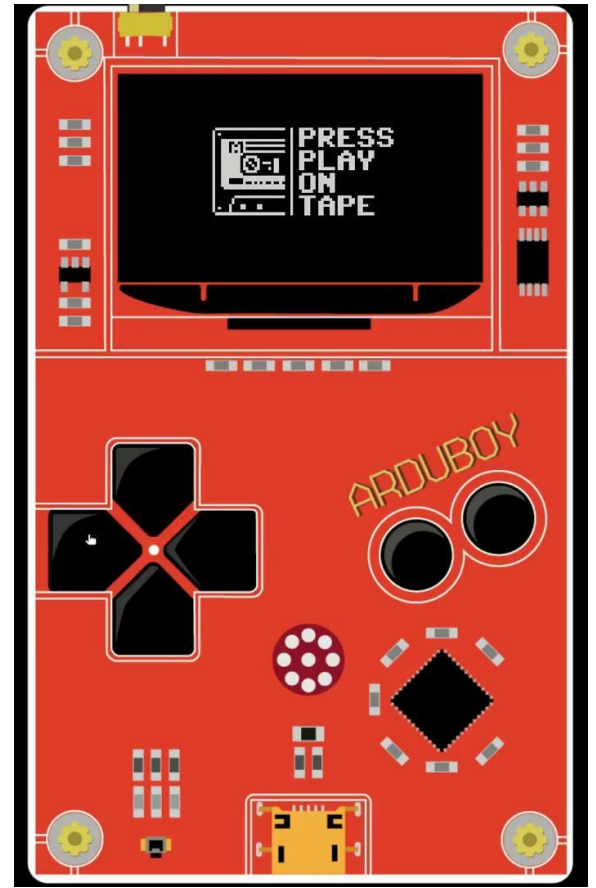
Este autómata basado en Arduino (Open Source Hardware) está especialmente diseñado para su uso en un entorno profesional. Este autómata dispone de hasta 58 Entradas/Salidas, también dispone de diferentes sistemas de comunicación lo que le ofrece una gran flexibilidad y control. El PLC M-DUINO ofrece la posibilidad de expandirse con 127 módulos mediante el sistema I2C, lo que significa que puede gobernar hasta 7100 E/S en modo maestro esclavo, además de módulos adicionales de sensores, etc.

#### Software de Programación

Se puede programar con la actual Arduino IDE platform.

#### Conexión y codificación instantánea

El PLC M-DUINO se puede programar a través del puerto USB. También se puede configurar el autómata para ser programado de forma remota mediante el puerto Ethernet. Esto ofrece acceso inmediato a la programación, mantenimiento y control. También permite la utilización del Monitor (en el Arduino IDE) para ver el estado de todas las variables, entradas, salidas, etc. Este equipo es totalmente compatible con Ardbox y TouchBerry Pi de forma instantánea lo que le ofrece una solución industrial completa.



## 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

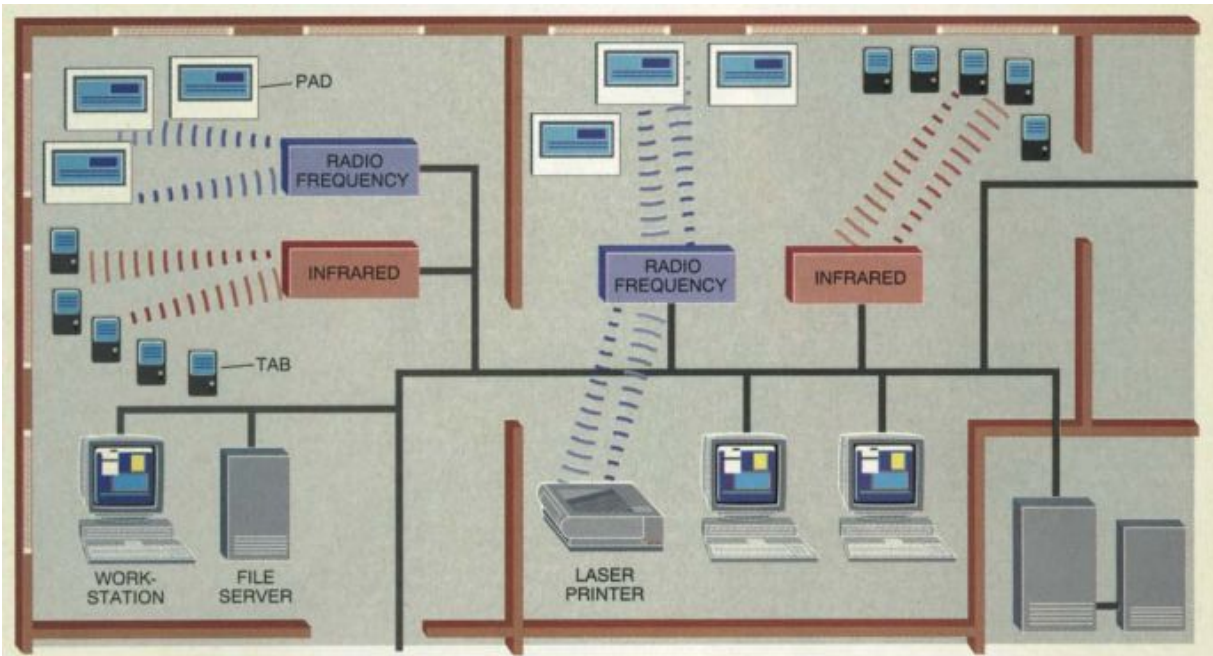
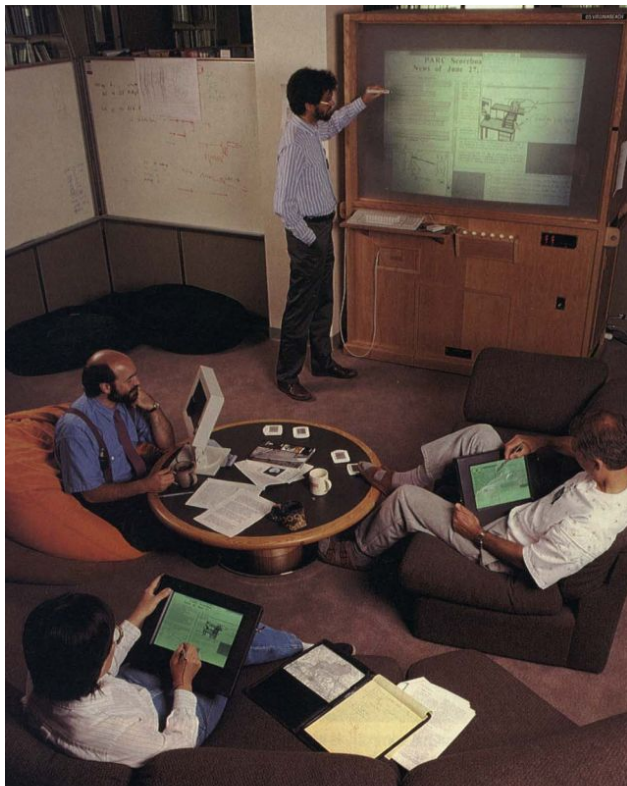
RIoT Secure developed a secure device lifecycle management platform based on Arduino MKR boards, for communications and over-the-air updates specifically targeting resource-constrained microcontrollers.

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.

# The IoT paradigm





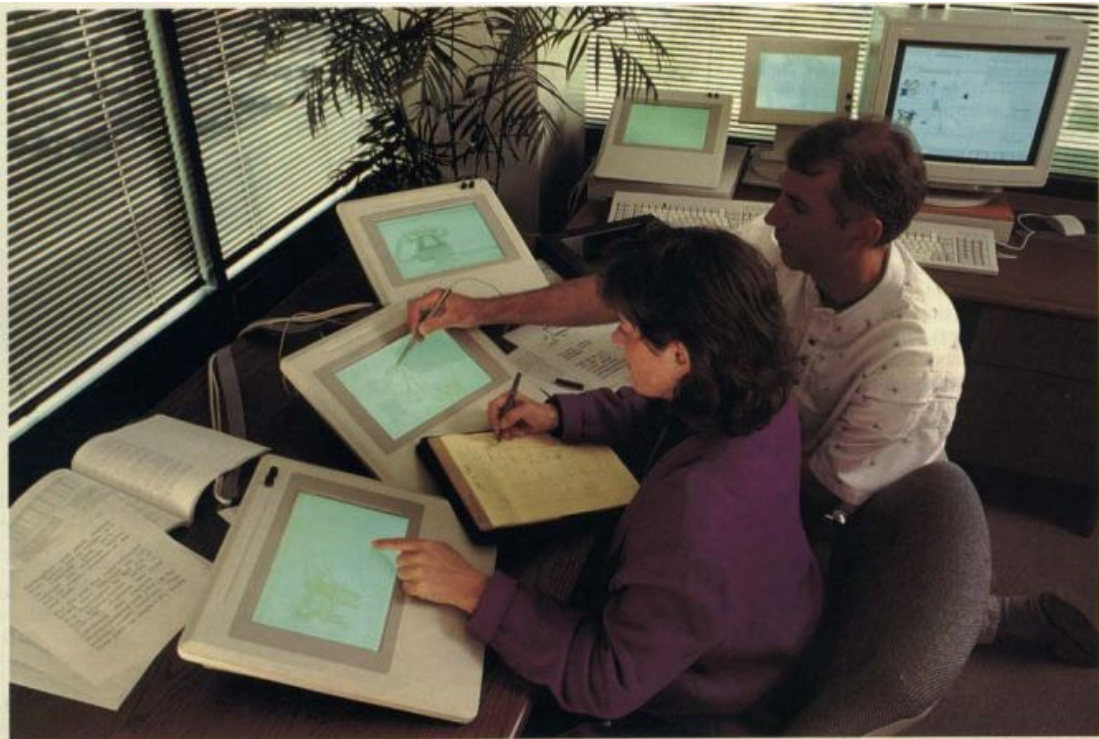
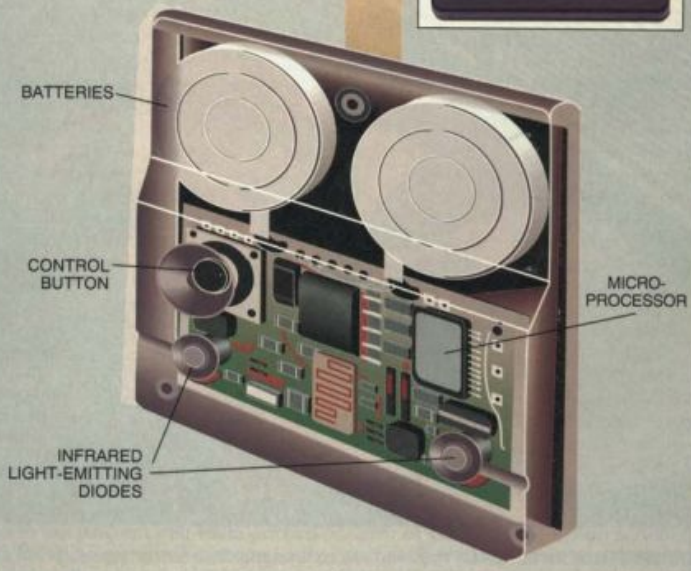
WIRED AND WIRELESS NETWORKS link computers and allow their users to share programs and data. The computers pictured here include conventional terminals and file servers, pocket-size machines known as tabs and page-size ones

known as pads. Future networks must be capable of supporting hundreds of devices in a single room and must also cope with devices—ranging from tabs to laser printers or large-screen displays—that move from one place to another.

## The computer of the XXIst century

## The Active Badge

This harbinger of inch-scale computers contains a small microprocessor and an infrared transmitter. The badge broadcasts the identity of its wearer and so can trigger automatic doors, automatic telephone forwarding and computer displays customized to each person reading them. The active badge and other networked tiny computers are called tabs.



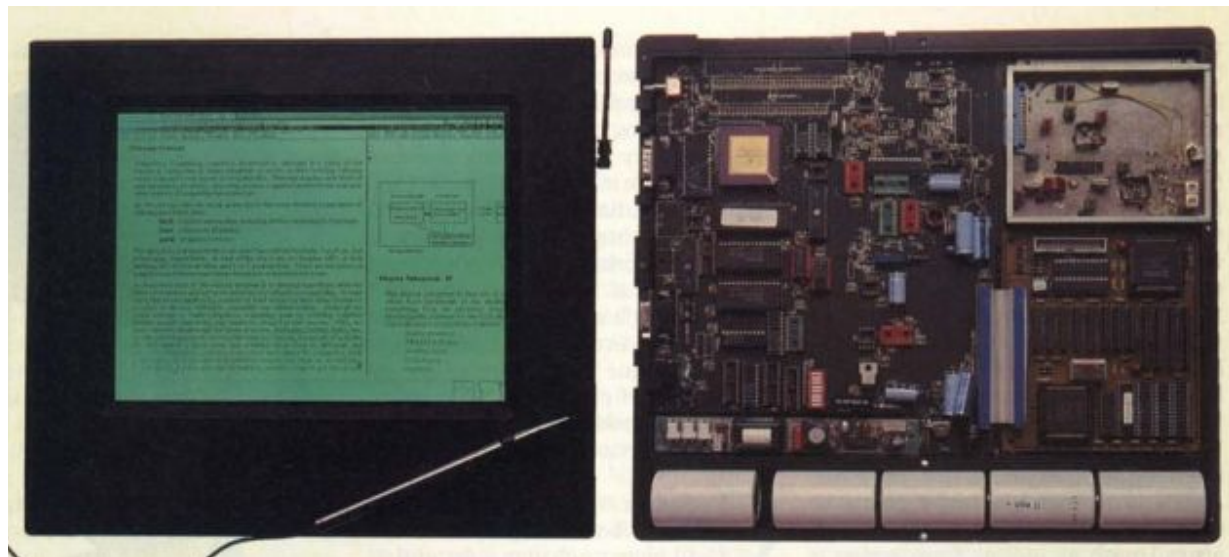
COMPUTER SCRATCHPADS augment the conventional screen in this office at the Xerox Palo Alto Research Center. Proto-

type pads are wired to conventional computers; thus far only a handful of wireless models have been built.





**RADIO TRANSCIVER** links pads and other movable computer devices to the wired network. This unit, intended to be mounted on the ceiling, contains antennas in its crossed arms and two light-emitting diodes to signal its status.



# Ubiquitous Computing

## Main characteristics

- The computer's purpose should be helping you making other things
- The best computer is a silent and invisible helping tool
- The more tasks you can achieve intuitively, the smarter you will become: the computer should augment your conscious mind
- Technology should create a calm state



# Kevin Ashton, 2009

The fact that I was probably the first person to say "Internet of Things" doesn't give me any right to control how others use the phrase. But what I meant, and still mean, is this: Today computers—and, therefore, the Internet—are almost wholly dependent on human beings for information. Nearly all of the roughly 50 petabytes (a petabyte is 1,024 terabytes) of data available on the Internet were first captured and created by human beings—by typing, pressing a record button, taking a digital picture or scanning a bar code. Conventional diagrams of the Internet include servers and routers and so on, but they leave out the most numerous and important routers of all: people. The problem is, people have limited time, attention and accuracy—all of which means they are not very good at capturing data about things in the real world.



And that's a big deal. We're physical, and so is our environment. Our economy, society and survival aren't based on ideas or information—they're based on things. You can't eat bits, burn them to stay warm or put them in your gas tank. Ideas and information are important, but things matter much more. Yet today's information technology is so dependent on data originated by people that our computers know more about ideas than things.

If we had computers that knew everything there was to know about things—using data they gathered without any help from us—we would be able to track and count everything, and greatly reduce waste, loss and cost. We would know when things needed replacing, repairing or recalling, and whether they were fresh or past their best.

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## RELATED CONTENT

[RFID-Powered Handhelds Guide Visitors at Shanghai](#)

We need to empower computers with their own means of gathering information, so they can see, hear and smell the world for themselves, in all its random glory. RFID and sensor technology enable computers to observe, identify and understand the world—without the limitations of human-entered data.

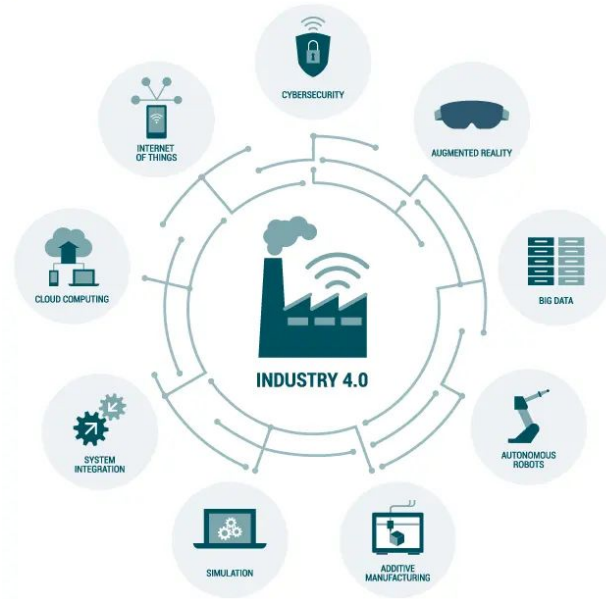
Read it at: <https://www.itrco.jp/libraries/RFIDjournal-That%20Internet%20of%20Things%20Thing.pdf>

# Industry 4.0

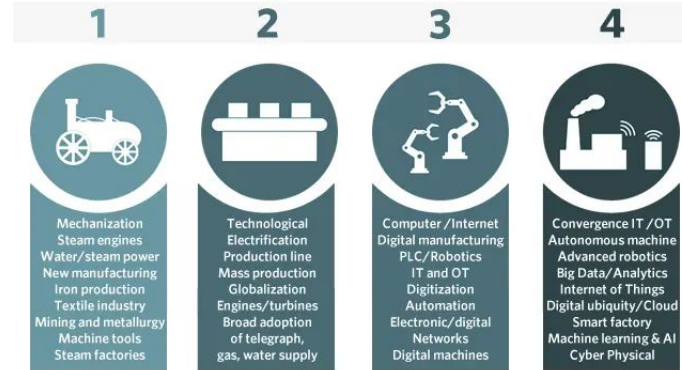
## INDUSTRY 4.0 - the digital transformation



3rd platform, innovation accelerators, OT and manufacturing meet in transformation



## FROM INDUSTRY 4.0 TO FOURTH INDUSTRIAL REVOLUTION



# Industry 4.0 (4th Industrial Revolution)

## Main characteristics

- Bigger levels of automation
- Industrial IoT and digital twins
- Migration of centralised control mechanisms to others where the products themselves define the manufacturing process
- Data models and closed-loop control systems
- Personalisation of the end products

# Edge computing: the opportunity

Demonstrator:  
Recognition of handwritten digits on an Arduino UNO



[www.aifes.de](http://www.aifes.de)

Have we found any good cases of edge computing or are we still just scratching the surface of what it could do?

**From a pedagogical perspective, have we figured out the best way to achieve transdisciplinary outreach?**

# Moore's law under the microscope or good enough computing



Do we really need even faster computers to execute more complex tasks? Or complexity just needs to be properly programmed?

# Challenges

Supply chain:  
problems started  
with Fukushima,  
followed by the  
pandemic, the war,  
and a demand  
increase of 26% y2y

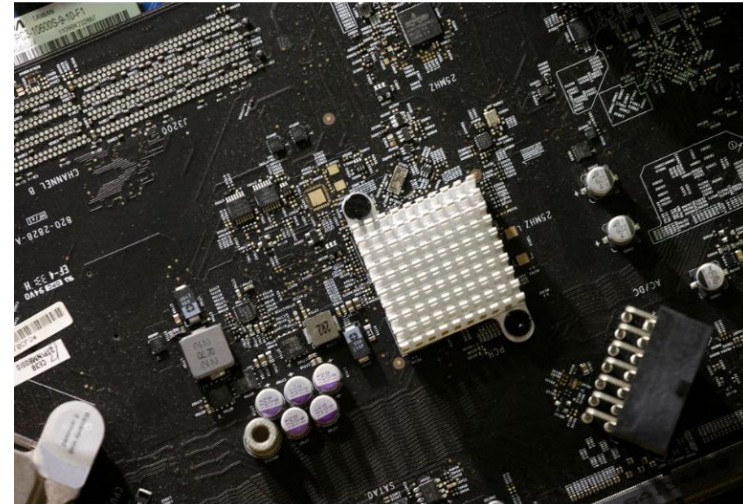
February 14, 2022  
11:42 AM GMT+1  
Last Updated 2 months  
ago

Technology

## Global chip sales hit record in 2021, will grow 8.8% in 2022 -SIA

By Jane Lanhee Lee

2 minute read



A view of a chip on an electronic device at a shop in Brussels, Belgium, February 8, 2022. REUTERS/Yves Herman/File Photo

Feb 14 (Reuters) - The Semiconductor Industry Association (SIA) on Monday said that **global chip sales hit a record in 2021 at \$555.9 billion, up 26.2% on the year, and it forecast 8.8% growth for 2022 as chip makers continue to build up production capacity to meet demand.**

b.

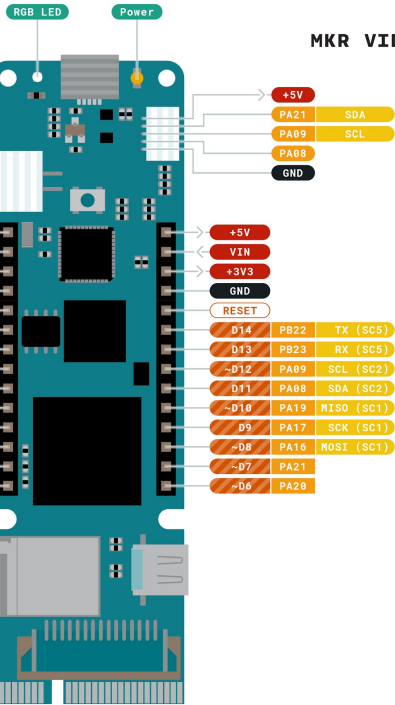
bunnie:studios

(bunnie's blog)

The nominal reason given was that the machine used to set the frequency of the chips was broken or otherwise unavailable, and due to supply chain problems it couldn't be fixed anytime soon. Thus, we had to go to the factory to get the parts. But, in order to order direct from the factory, we had to order 18,000 pieces minimum – over 9x of what I needed. Recall that one wafer yields 58,000 chips, so this isn't even half a wafer's worth of oscillators. That being said, 18,000 chips would be about \$12,000. This isn't chump change for a project operating on a fixed budget. It's expensive enough that I considered recertification of the product to use a different oscillator, if it weren't for the degradation in standby time.



Li-Po 3.7 V



- Ground
- Internal Pin
- Digital Pin
- Microcontroller's Port
- Power
- SWD Pin
- Analog Pin
- High Density Connector
- LED
- Other Pin
- Default



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**Digi-Key ELECTRONICS**

All Products 10CL006YU256C6G

Product Index > Integrated Circuits (ICs) > Embedded - FPGAs (Field Programmable Gate Array) > Intel 10CL006YU256C6G

0 Item(s)

FREE DELIVERY on Orders over 430 kr!

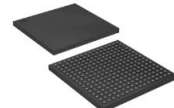


Image shown is a representation only. Exact specifications should be obtained from the product data sheet.

### 10CL006YU256C6G

Digi-Key Part Number: 544-3374-ND  
 Manufacturer: Intel  
 Manufacturer Product Number: 10CL006YU256C6G  
 Description: IC FPGA 176 I/O 256UBGA  
 Detailed Description: series Field Programmable Gate Array (FPGA) IC 176 276480 6272 256-LFBGA  
 Customer Reference:   
 Datasheet: [Datasheet](#)

### 0 In Stock

Due to temporary constrained supply, Digi-Key is unable to accept backorders at this time.

### Product Attributes

TYPE	DESCRIPTION	SELECT
Category	Integrated Circuits (ICs) Embedded - FPGAs (Field Programmable Gate Array)	<input type="radio"/>
Mfr	Intel	<input checked="" type="radio"/>
Series	Cyclone® 10 LP	<input type="checkbox"/>
Package	Tray	<input type="checkbox"/>
Part Status	Active	<input type="checkbox"/>
Number of LABs/CLBs	392	<input type="checkbox"/>
Number of Logic Elements/Cells	6272	<input type="checkbox"/>
Total RAM Bits	276480	<input type="checkbox"/>
Number of I/O	176	<input type="checkbox"/>
Voltage - Supply	1.2V	<input type="checkbox"/>
Mounting Type	Surface Mount	<input type="checkbox"/>
Operating Temperature	0°C ~ 85°C (TJ)	<input type="checkbox"/>
Package / Case	256-LFBGA	<input type="checkbox"/>
Supplier Device Package	256-UBGA (14x14)	<input type="checkbox"/>

Report an Error

View Similar

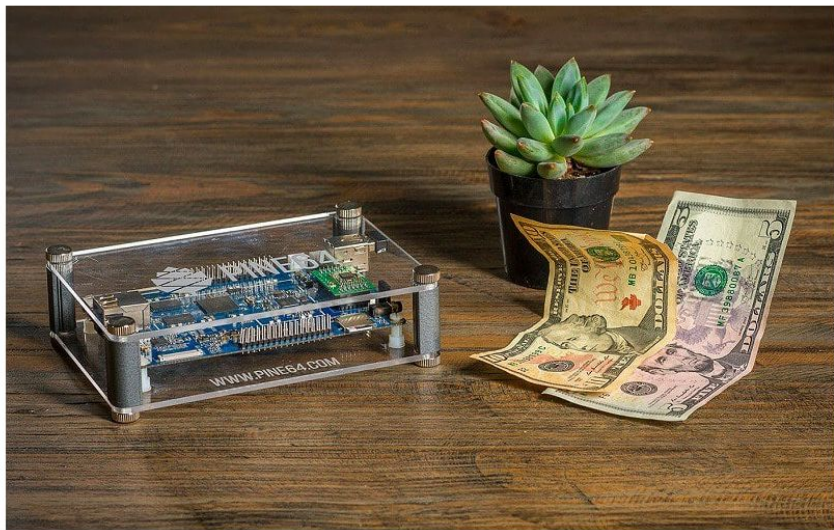
**Bootstrapping dylemma:  
making up to a certain  
amount can be handled  
directly by the maker, who  
will assume part of the cost**



# PINE A64 Creators Receive Death Threats over Kickstarter Campaign



Ashley Allen / 6 years ago



The creators of the **PINE A64**, a Raspberry Pi-esque single board computer, which demolished its **\$31,416 Kickstarter funding goal**, raising a whopping \$1.7 million, have received abuse and death threats – with one person even showing up at the company's office, threatening to kill staff if he didn't receive his \$22 board – over minor delivery delays.

In an e-mail to Kickstarter backers, PINE64 co-founder Johnson Jeng revealed that the company has, understandably, been overwhelmed the sheer number of orders and that the demand has put a strain on production and shipping:

**KICKSTARTER**

34

April 2 Updates

Posted by PINE64 Inc. (Creator)

For backers only

Hey Guys,

I'm going to try and explain this as easy as possible in laymen terms so everyone can TRY to understand. Those that understand, thank you for understanding and those that do not.. well, we're very sorry.

First things first. When we set out to build a single board computer at \$15-\$29, we were set out to create a community of developers and help bring a \$15 computer to the masses (note that it costs us \$15 to make them), to be introduced to education, developers, innovators, and more. from a simple sub \$50,000 goal to create our first batch of boards and with a mental preparation that we will probably sell no more than 5000-10,000 boards, became a campaign that sold over 45,000 boards collectively in less than 50 days. Now, what does this mean? We had put a February/ March / April delivery date because we know that we are able to deliver our expected amount, and to date, we have shipped over 10,000 boards.

Now to delay issues..





Zero coding: sure it works,  
but where will you apply it?  
Devices? Ecosystems? And  
which paradigm? Blocks?  
Wizards?

# Advanced ML for every solution

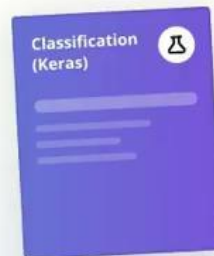
Edge Impulse is the leading development platform for machine learning on edge devices, free for developers and trusted by enterprises.

[Get started](#)[Schedule a demo](#)

Raw data



Label data



Train model



Screens +

Screen1

Add Components

Search

User Interface

- Button
- Label
- Image
- Text Input
- List Viewer
- Group
- Web Viewer
- Slider
- Map
- Animation
- Video
- Canvas
- Loading Icon
- PDF Reader
- Data Viewer List
- Data Viewer
- Rating



Screen1

BackgroundColor

rgba(0,0,0,0.53)

Background Picture

No file source

Background Picture Resize Mode

Select option

Scrollable

false

Show StatusBar

true

StatusBar Style

default

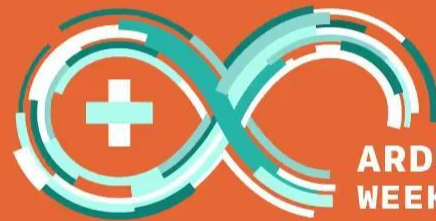
Translucent StatusBar (Android Only)

false

StatusBar Color (Android Only)

rgba(0,0,0,0.53)





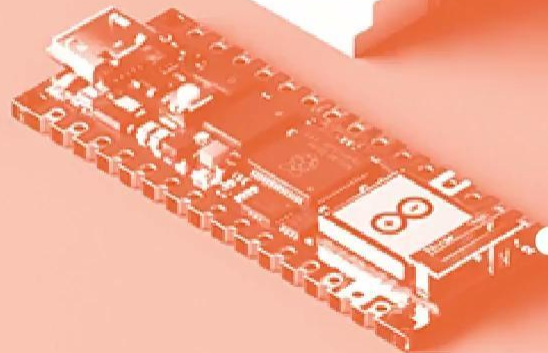
ARDUINO  
WEEK2022

# “The new Arduino Braccio ++”

by David Cuartielles

 WEBINAR

 FROM SWEDEN



[< BACK TO THINGS](#)

# LabMonitor

Last synced a few seconds ago

[EDIT SKETCH](#)

Properties

Dashboard

Webhooks

Board

UV-A Level

17.24

0 50

UV-B Level

21.4

0 50

Environment Light

419.355

0 800

Air Pressure

102.087

0 150

Humidity

30.16

0 100

Save To SD

 OFF

Temperature

UV Index



### New Dashboards

Are you looking for the dashboards you have created with the new dashboard tool?

[GO TO DASHBOARDS](#)

Legal ...



**Legal ... stuff**

# Legal aspects to consider

- **Certification:** you want your design to be compliant with whatever regulations exist for that specific category of product and to pass the tests established by the authorities for it not to hurt living beings, not interfere with other devices, etc.
- **Protection:** even open designs require protection, since there is a certain degree of brand dilution through counterfeit actions
- Too simple not to be copied

# Certification

- New devices need to pass a certification process, software changes might
- This can be carried by specific labs, a government, etc. depending on the country
- The main markets that many other countries accept for being among the most restrictive are the one in the US (FCC) and the one in the EU (CE)
- Japan has its own special law just to regulate any radio communicating device. This is the reason why some products are sold with deactivated WiFi and leaving up for the end user to activate it
- E.g. Mexico has recently changed its own regulatory frameworks and currently demands passing their own certification

## Outline

[Abstract](#)[Keywords](#)[Resumen](#)[Palabras clave](#)[Introduction](#)

...

## ARTICLE

DOI: 10.1016/j.sjme.2016.12.003

 Open Access

## Trademark dilution and its practical effect on purchase decision

Dilución de marcas registradas y su efecto práctico sobre la decisión de compra

W. Macías<sup>a</sup>, J. Cerviño<sup>b</sup><sup>a</sup> Escuela Superior Politécnica del Litoral, ESPOL, Facultad de Ciencias Sociales y Humanísticas, Campus Gustavo Galindo Km 30.5 Vía Perimetral, P.O. Box 09-01-5863, Guayaquil, Ecuador<sup>b</sup> University Carlos III of Madrid and University ESAN, Lima, Peru ABSTRACT

This work aims to analyze the effect of unauthorized use of trademarks on its consumer-based brand equity and on the consumer purchase decision, through a mediation model with structural equations. An experiment was carried out with 618 participants, who were exposed to advertising of famous brand products or senior brands, and fictitious products with the same brands or junior brands. Participants were then asked to make some purchases with a real budget of US\$5. The results show that exposure to junior brands reduces senior brand equity, i.e. results in trademark dilution, mediating a reduction in the purchase of senior brand products. In addition, similarity between junior and senior brands alleviates brand equity dilution, while consumer involvement with the product category of the famous brand has no moderating effect. The study aims to contribute to our understanding of trademark dilution, including the effect on purchase decision – a subject so far unexplored in the empirical literature. Moreover, the study pursues to highlight the importance of protecting well-known trademarks in order to avoid damage occurring not only in consumer perceptions, but also in firm's sales and brand financial value.

## Keywords:

Trademark dilution

Blurring

Brand equity

Purchase decision

Well-known trademarks



f.LASHES

# Community management and platforms

- Community management should not be based just on expecting people's good will for things to just work
- Currently there are professionals dedicated to handle these activities
- There is a plethora of platforms that responds to the needs of different types of communities, you have to choose wisely how to get people engaged
- Remember that some people will need to be trained in the use of platforms and that you might be interested in hiring some members of your community because of their skills



# Wrapping up

**Yo people ...  
it's Q&A time!**

<https://bit.ly/arduino-hardwarex>



**MALMÖ**  
**UNIVERSITY**