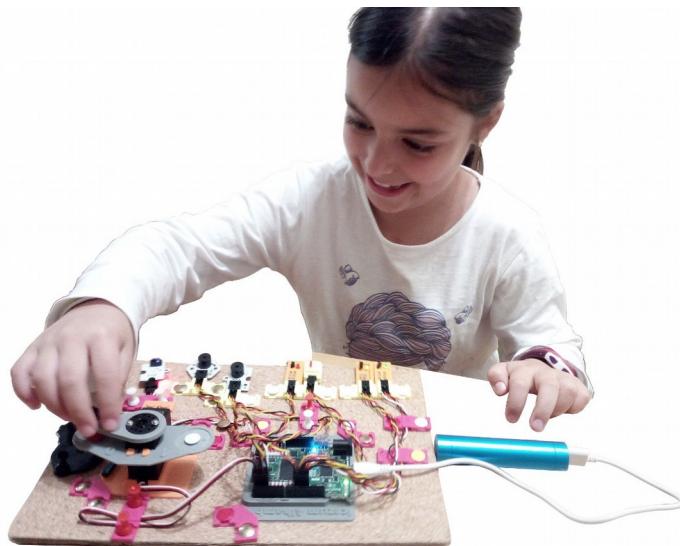


Electrónica Digital Divertida con FPGAs libres



Juan González Gómez

@Obijuan_cube

<https://github.com/Obijuan>



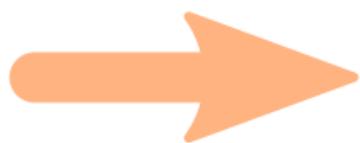
12 de Junio de 2018
ETSI URJC, Campus Fuenlabrada
Madrid



Productos electrónicos y circuitos

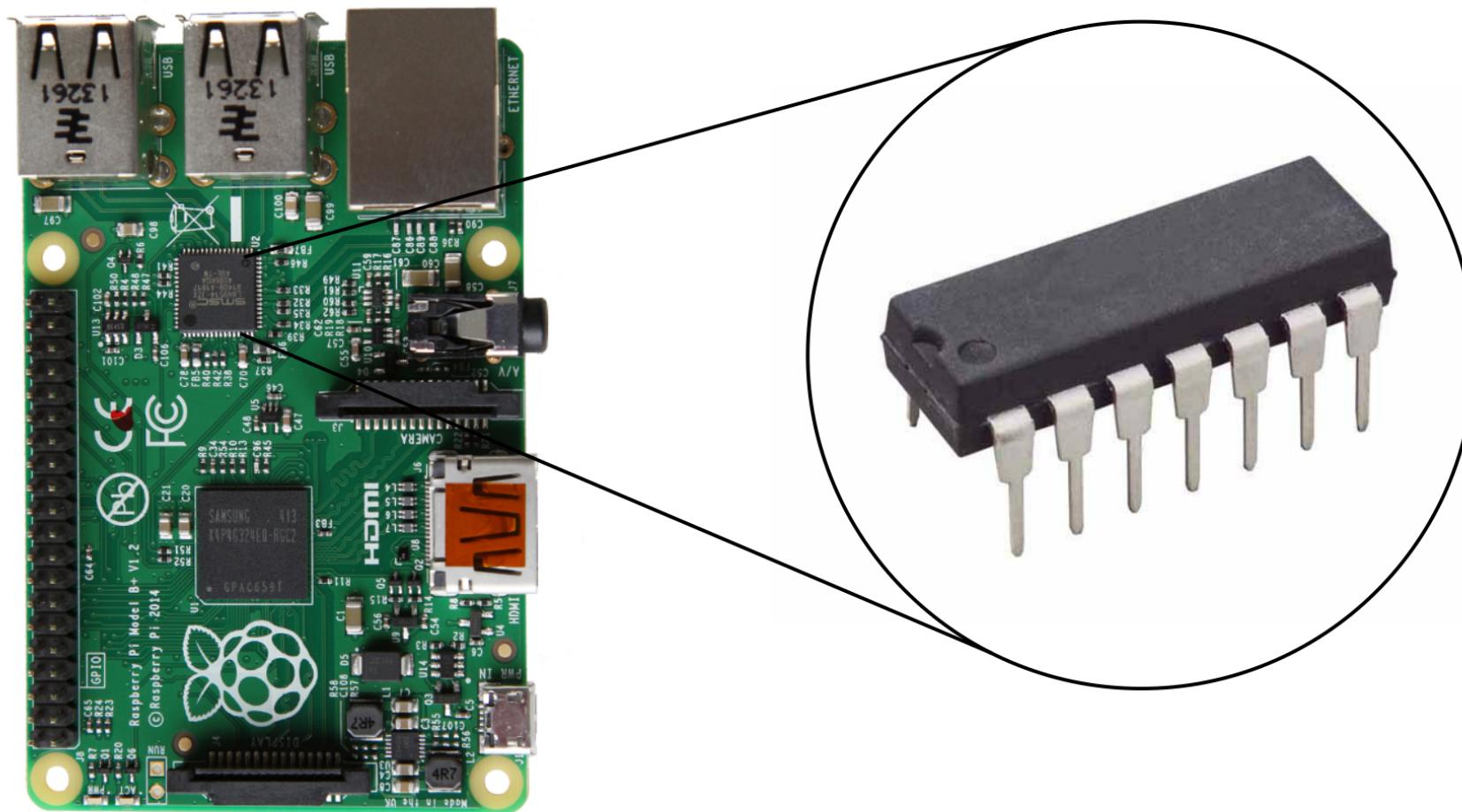


Producto Electrónico

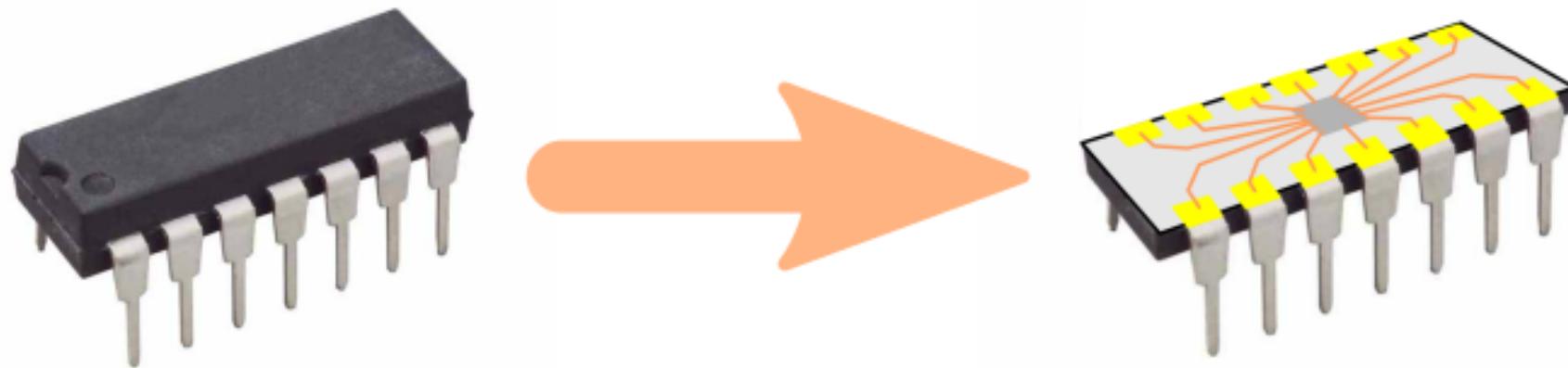


Circuito electrónico

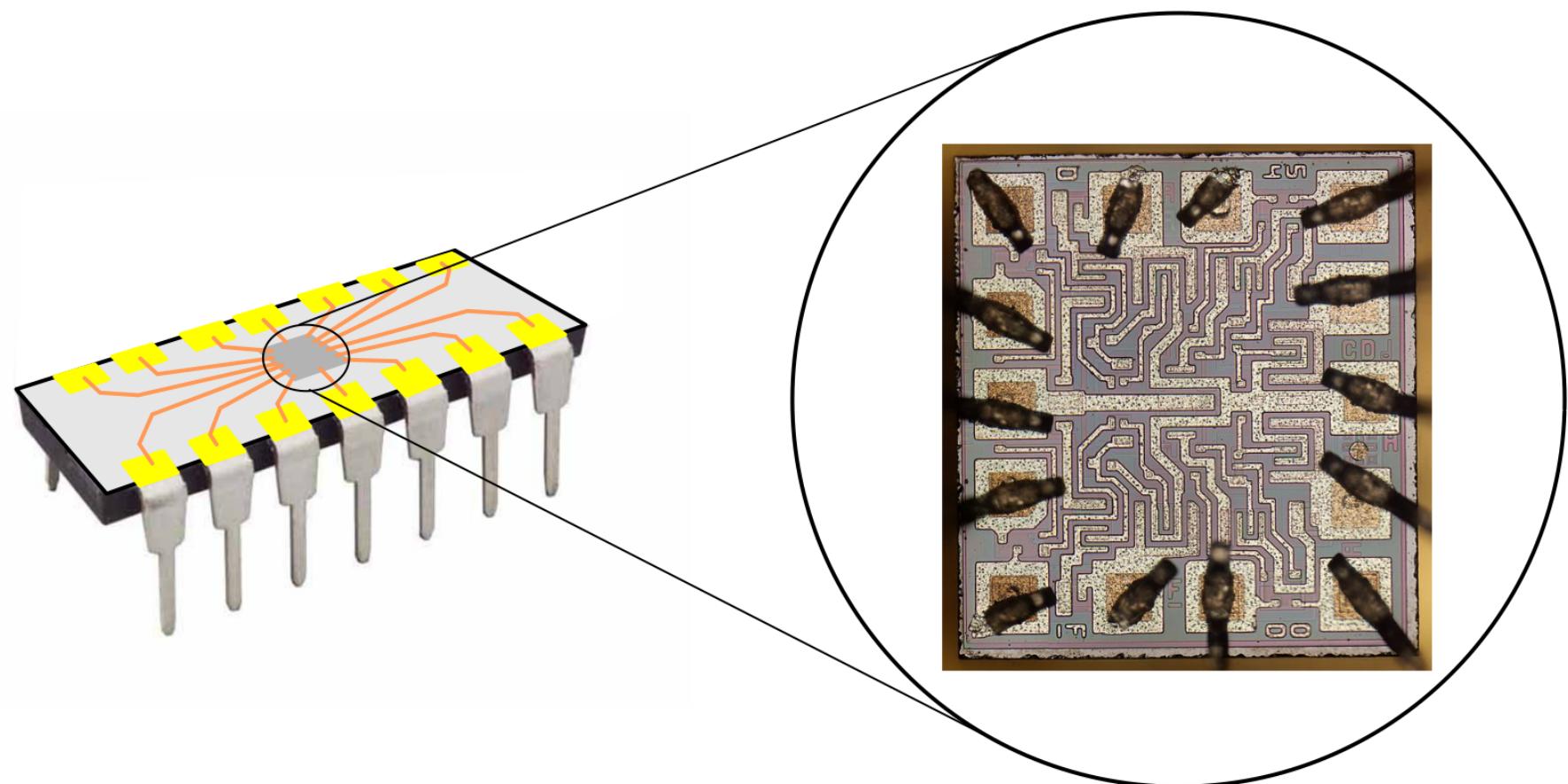
PCBs y Circuitos integrados



Encapsulado y dado

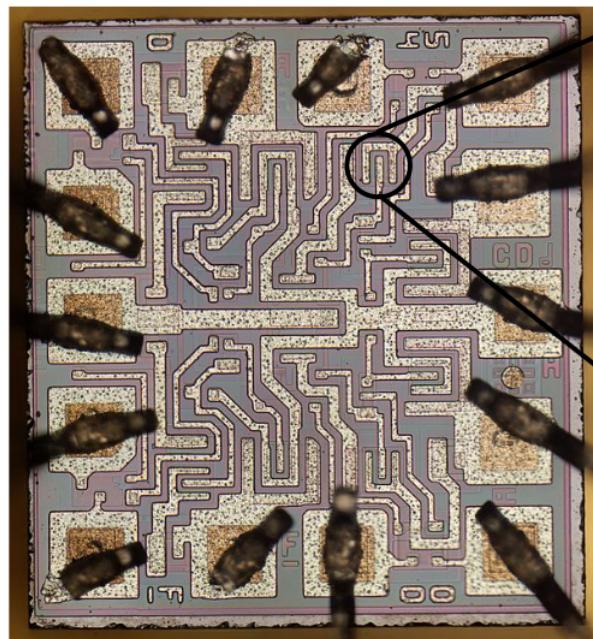


Dado de silicio

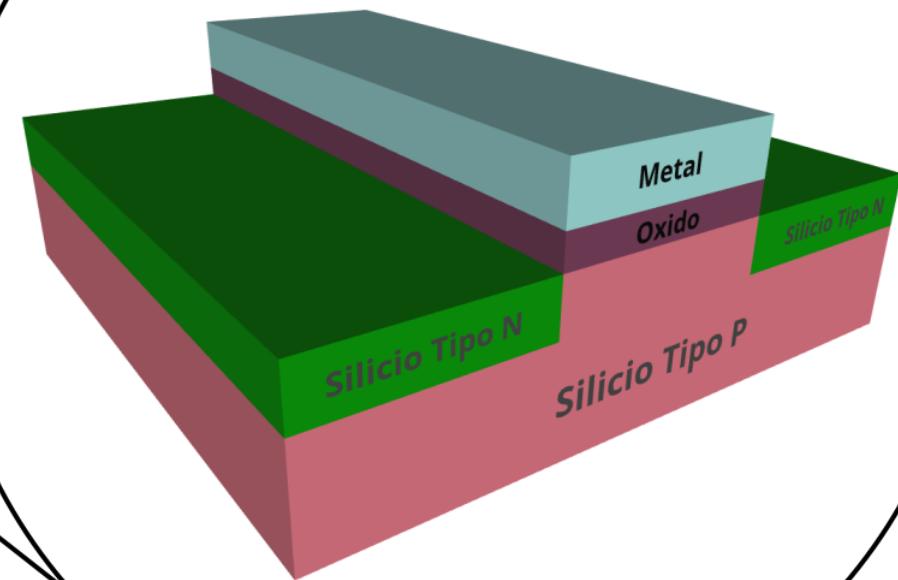


Semiconductores

Dado

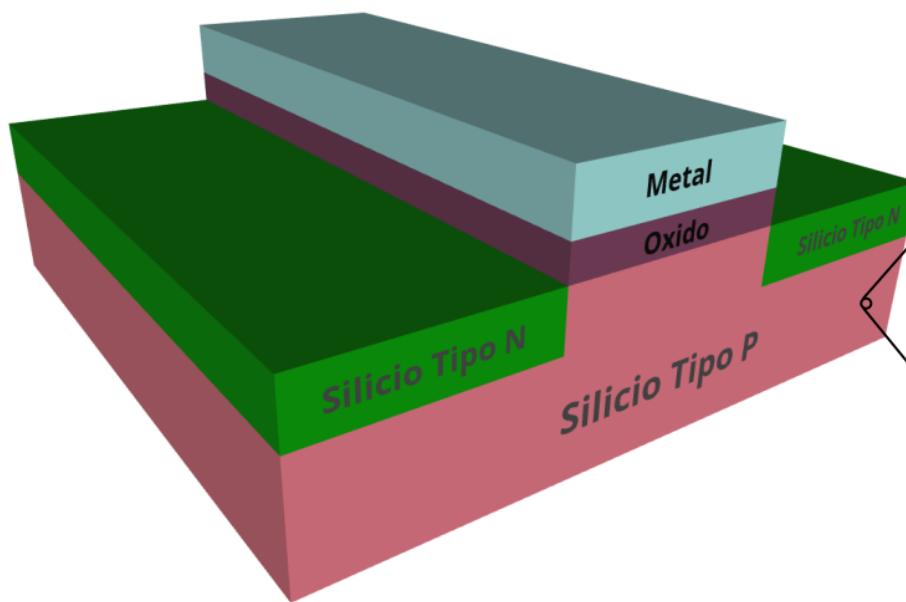


Transistor CMOS

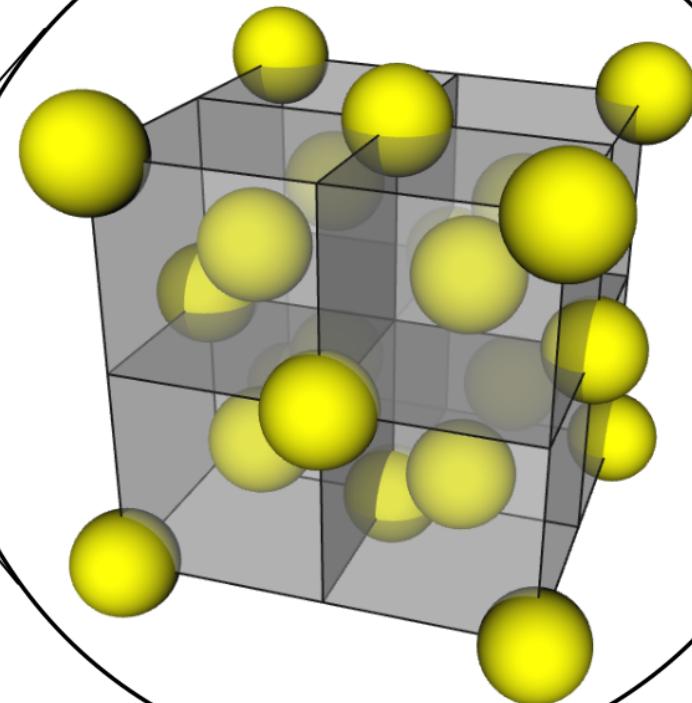


Cristal de silicio

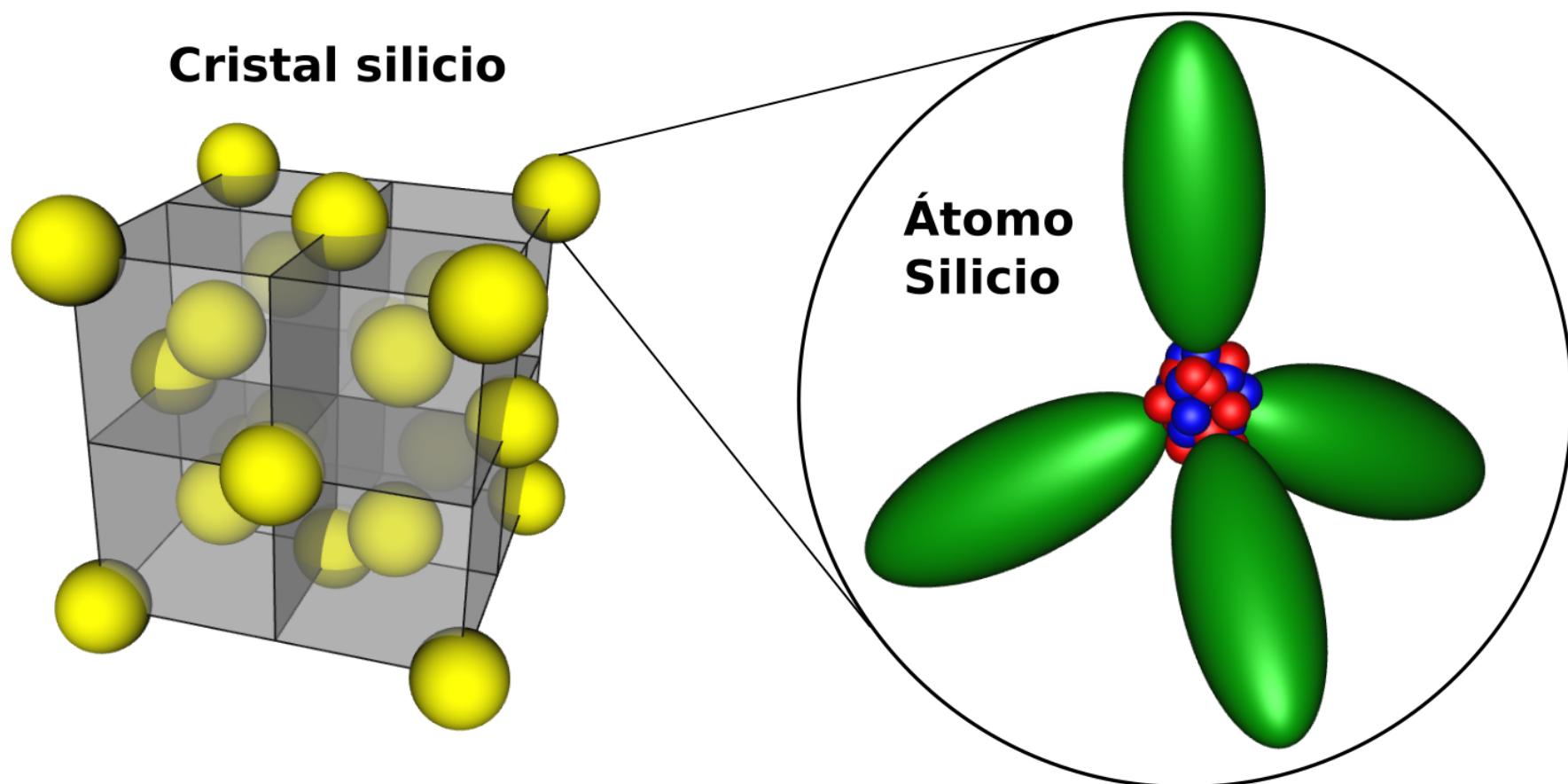
Transistor CMOS



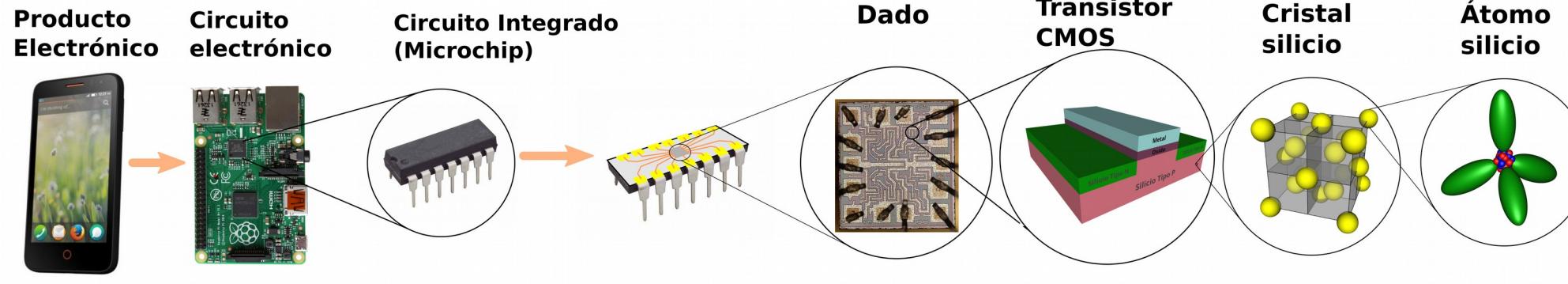
Cristal silicio



Átomos :-)



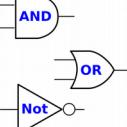
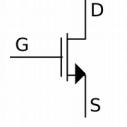
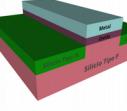
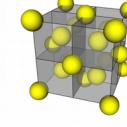
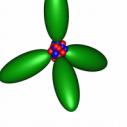
Del producto al átomo



Niveles

	Nivel 7: Software
	Nivel 6: Microprocesador
	Nivel 5: Puertas lógicas
	Nivel 4: Transistor
	Nivel 3: Semiconductores
	Nivel 2: Materiales
	Nivel 1: Átomos

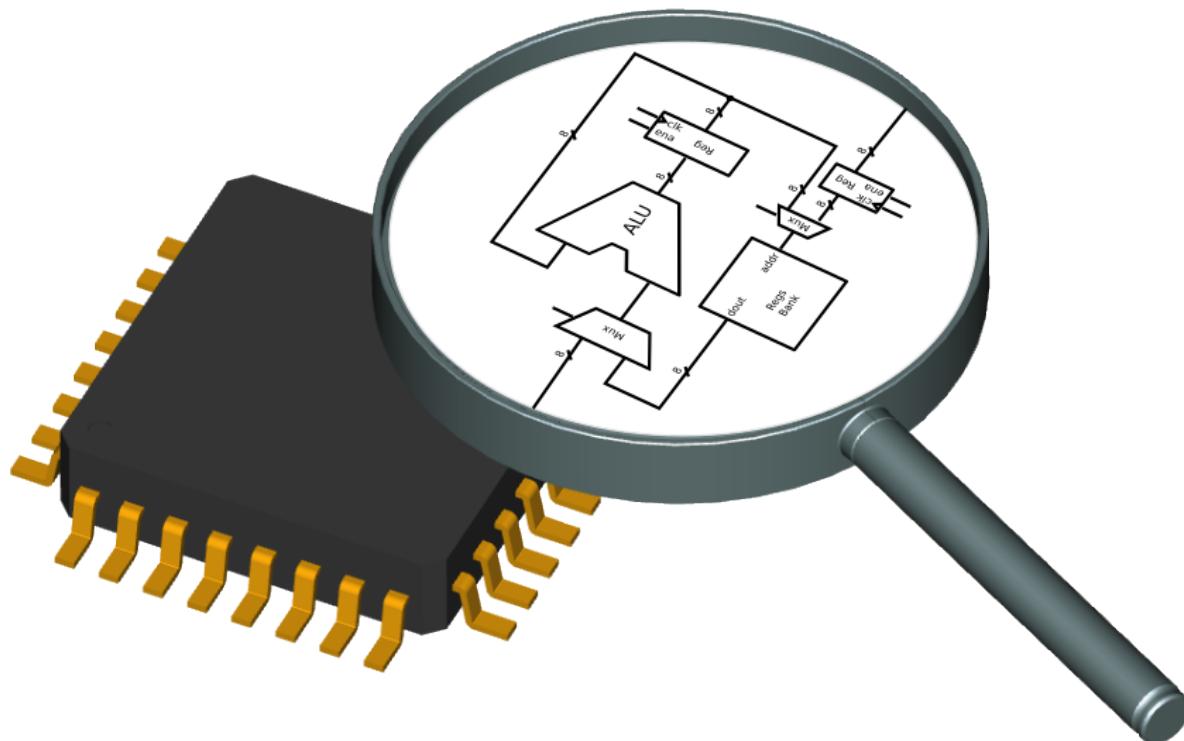
Niveles

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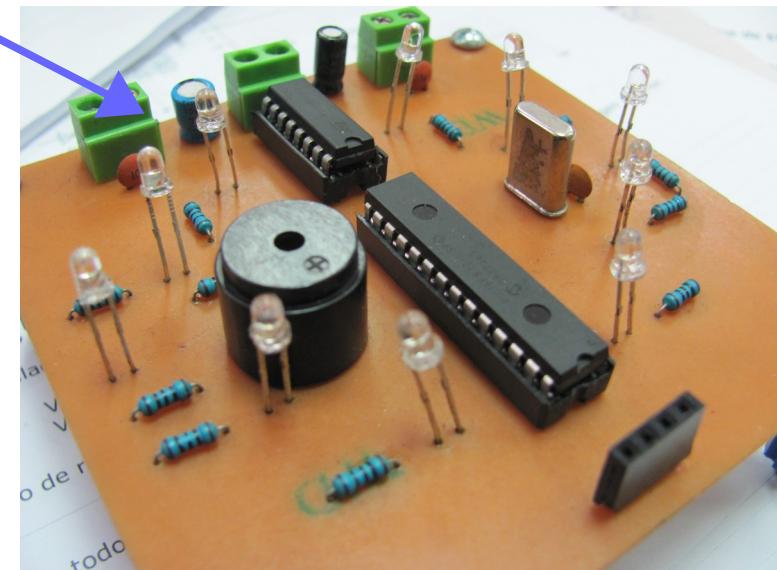
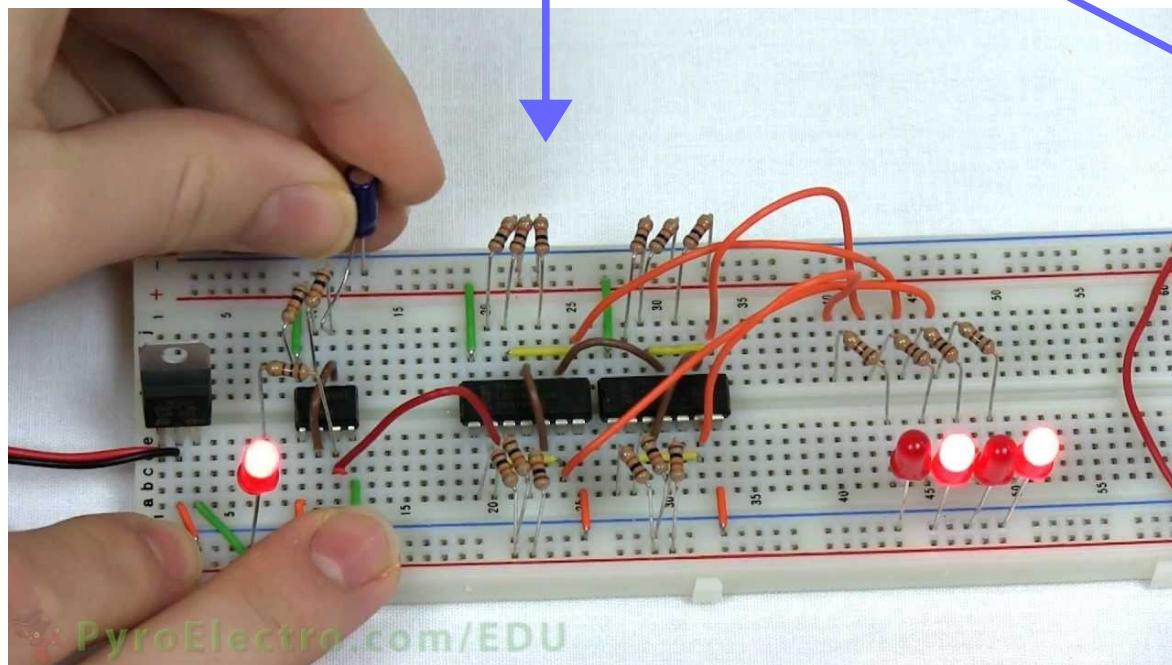
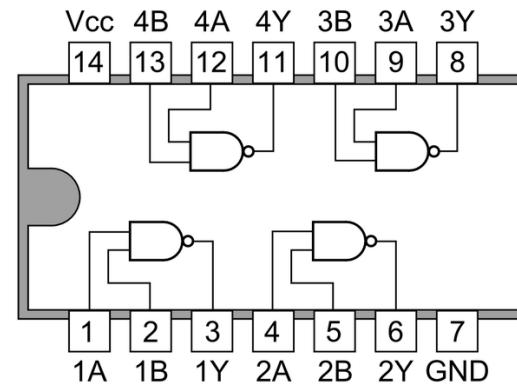
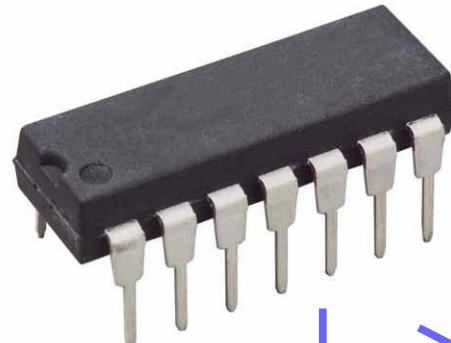
**Electrónica
digital**

Electrónica digital

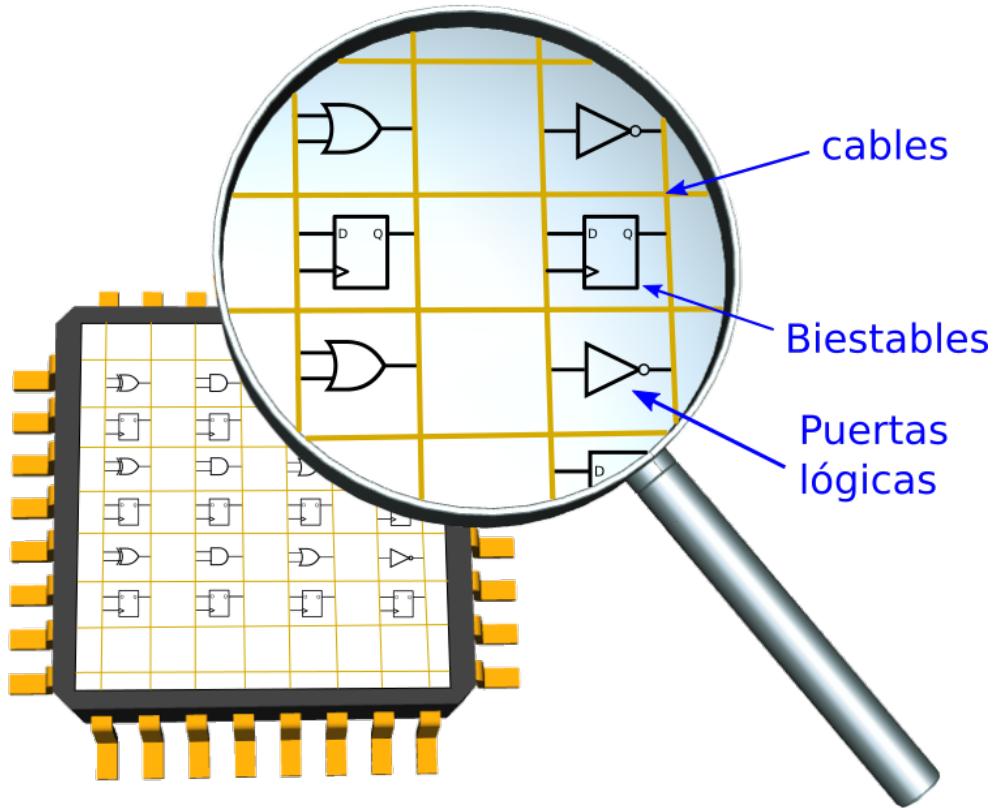


- Nivel de electrónica digital
- Información: Sólo 1s y 0s (Bits)
- Función: **Manipular, almacenar y transportar** bits
- Tres elementos: Cables, biestables y puertas lógicas

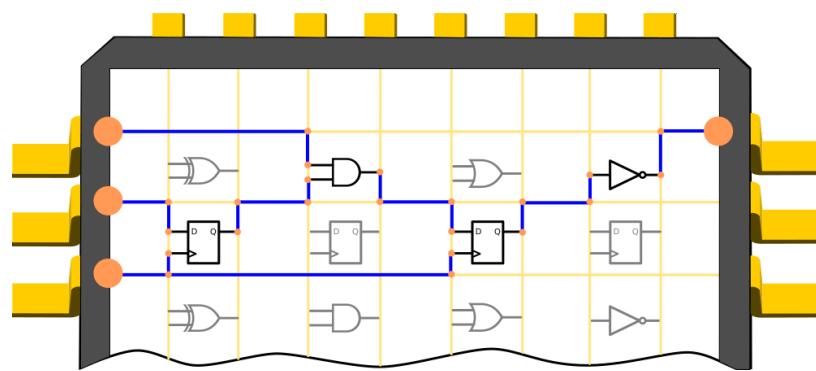
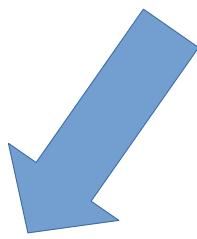
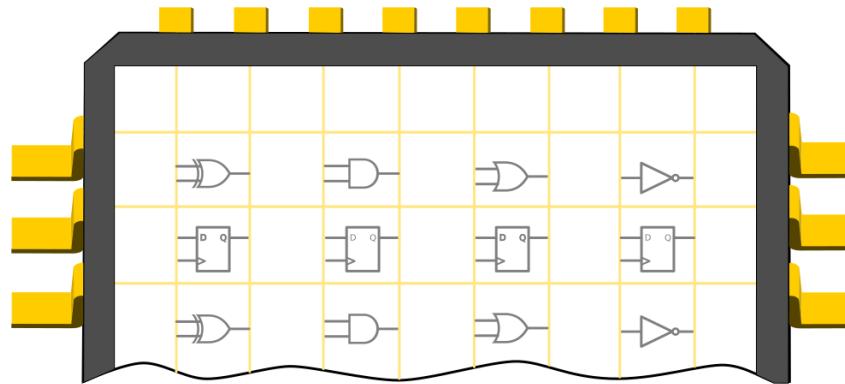
¿Cómo se hacen los circuitos digitales?



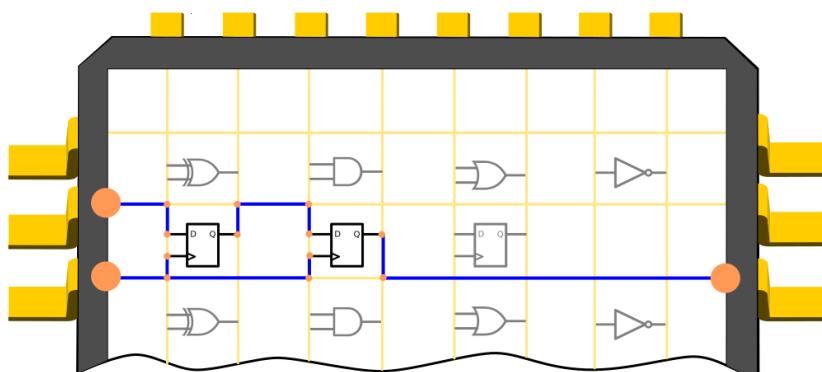
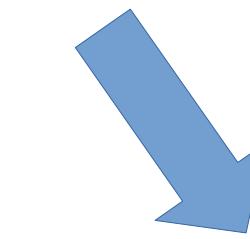
Tecnología FPGA



FPGA: Chip “en blanco” que contiene una matriz con los 3 componentes básicos: puertas lógicas, biestables y cables

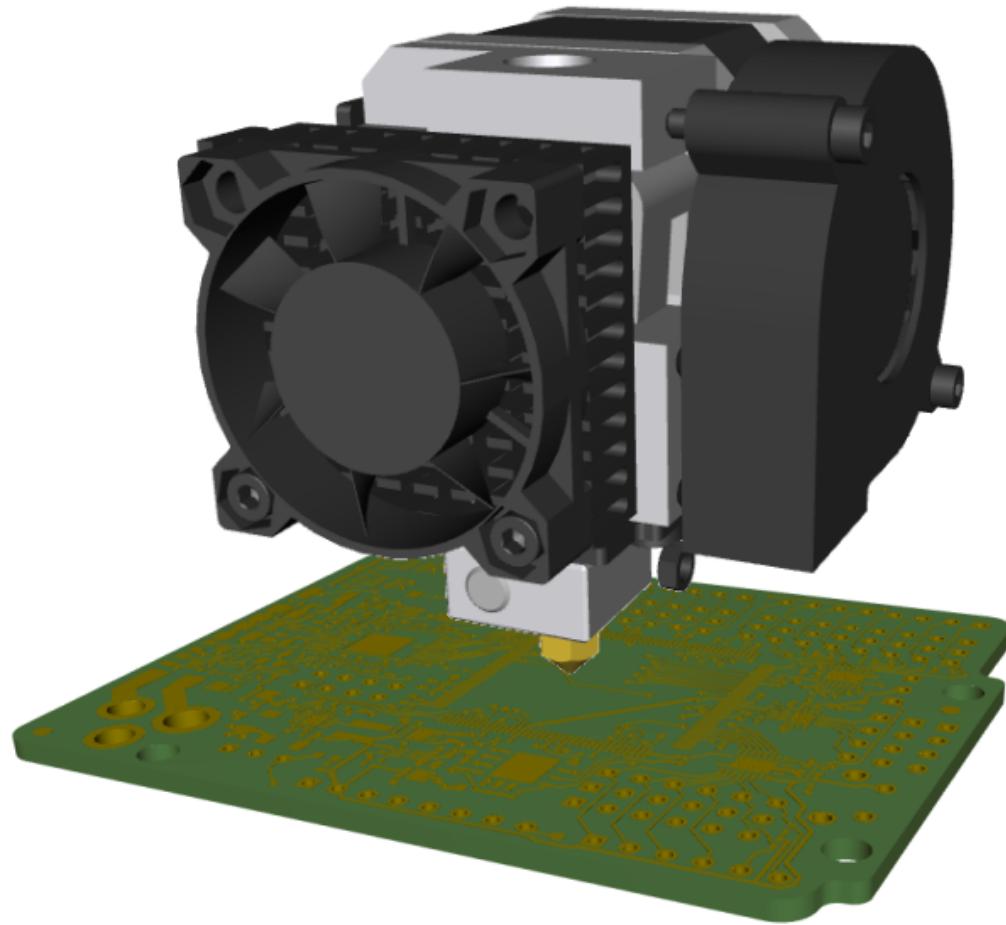


Circuito 1

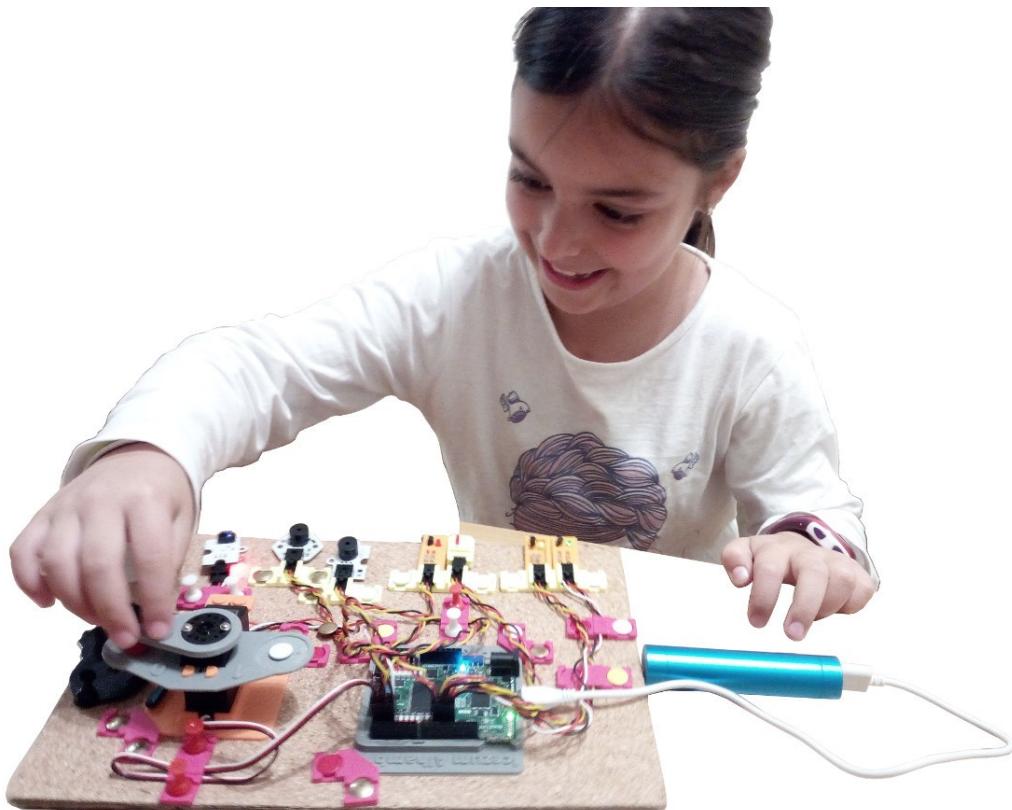


Circuito 2

¡FPGAs = Impresoras 3D de circuitos digitales!



Electrónica digital divertida

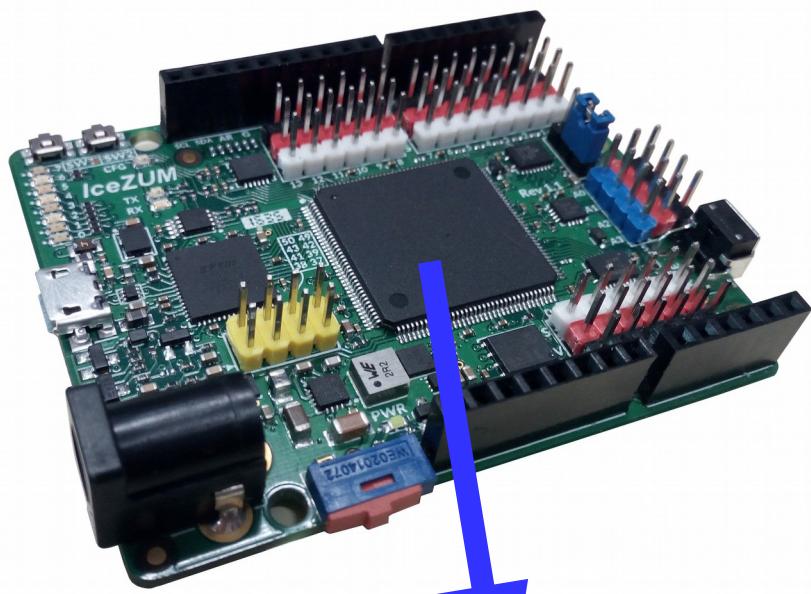


Motivación

¿Cómo podrían los niños y los no electrónicos diseñar circuitos digitales?

Icezum Alhambra v1.1

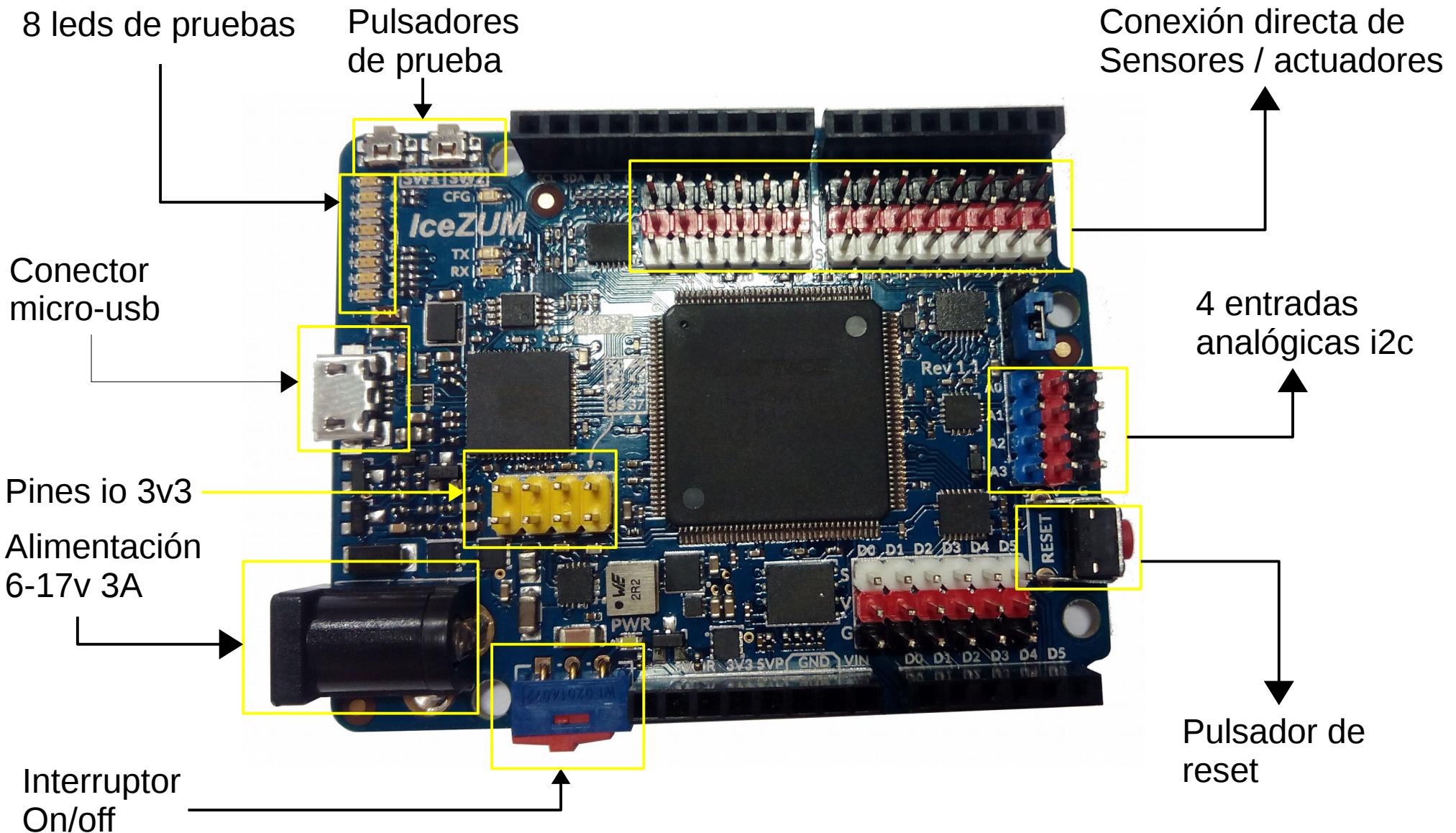
<https://github.com/FPGAwars/icezum/wiki>

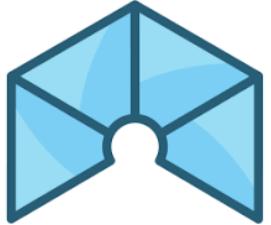


FPGA Libre

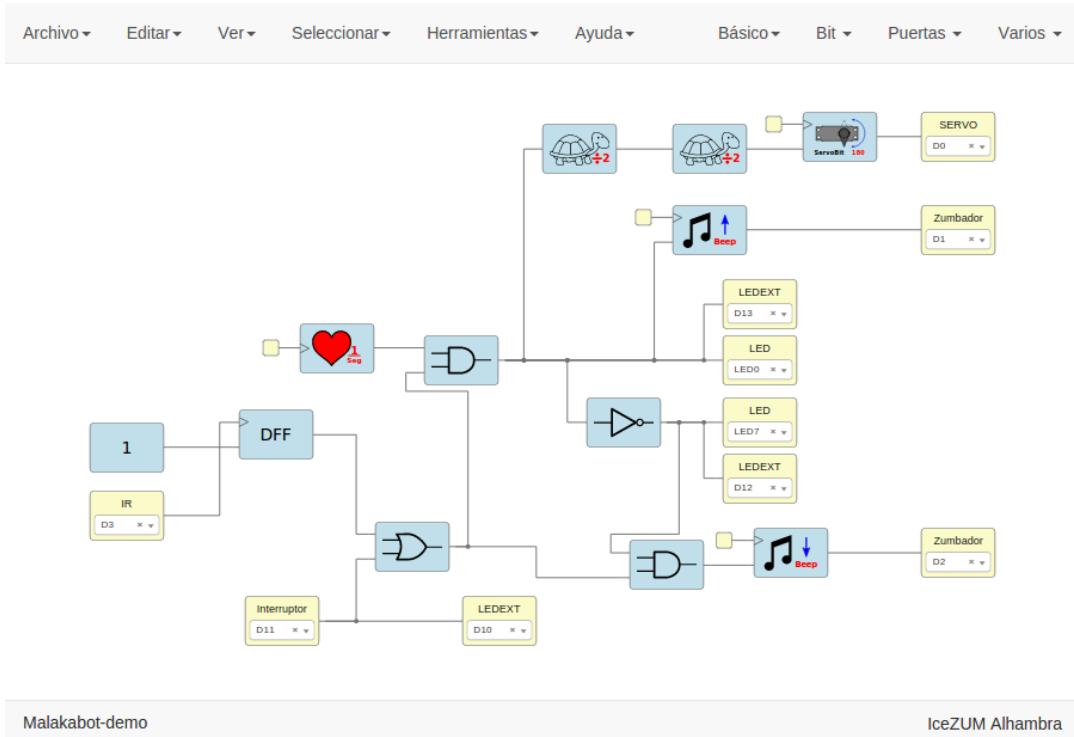
- Autor: **Eladio Delgado**
- Diseñada en Pinos del Valle (Granada)
- Arduino de las **FPGAs**
- Compatible Arduino
- Fácil conexión de circuitos externos/sensores/servos
- Reutilización de los shields de arduino
- 20 entradas/salidas de 5v
- 3A corriente de entrada
- Perfecta para hacer robots

Icezum Alhambra v1.1





Icestudio



Malakabot-demo

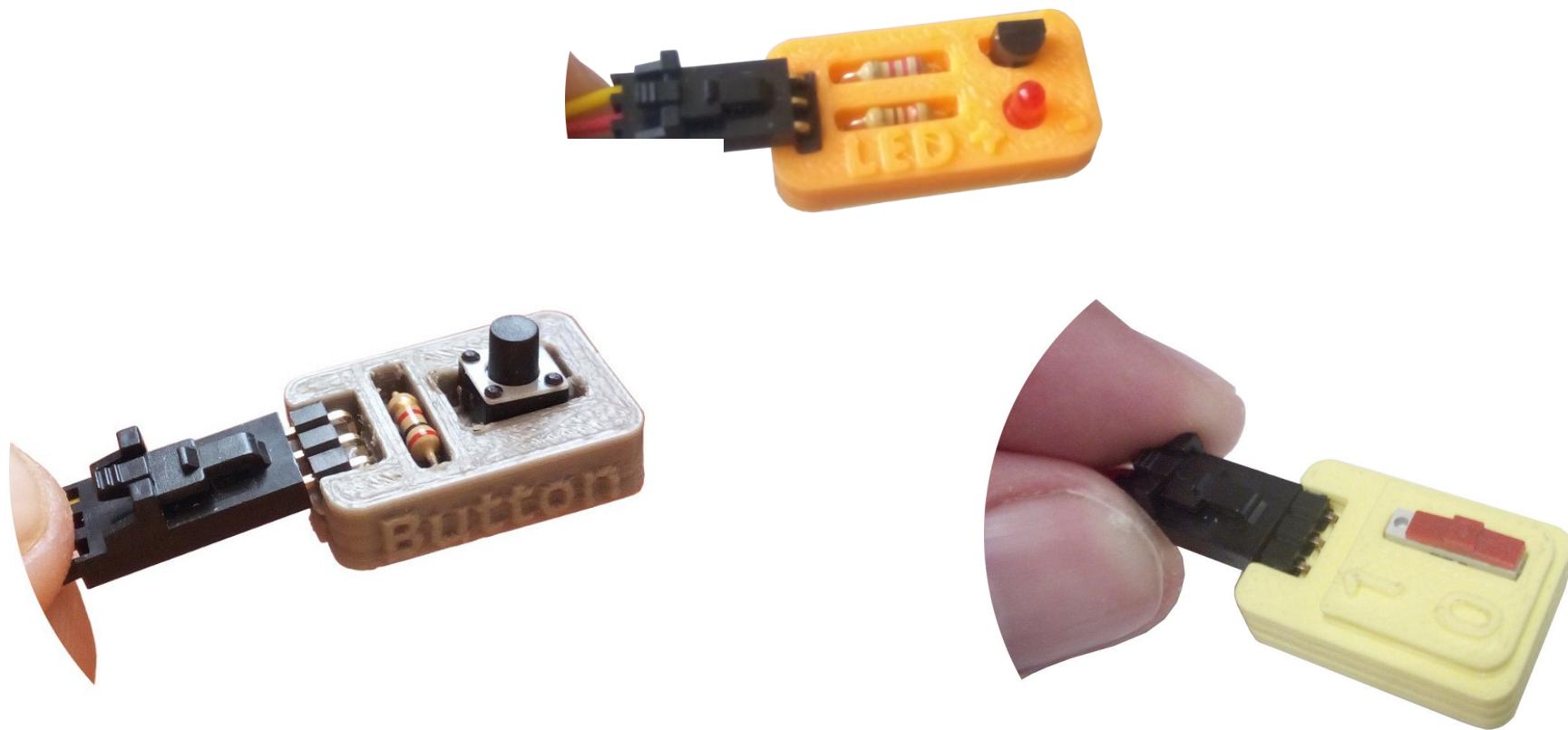
IceZUM Alhambra

<https://github.com/FPGAwars/icestudio>

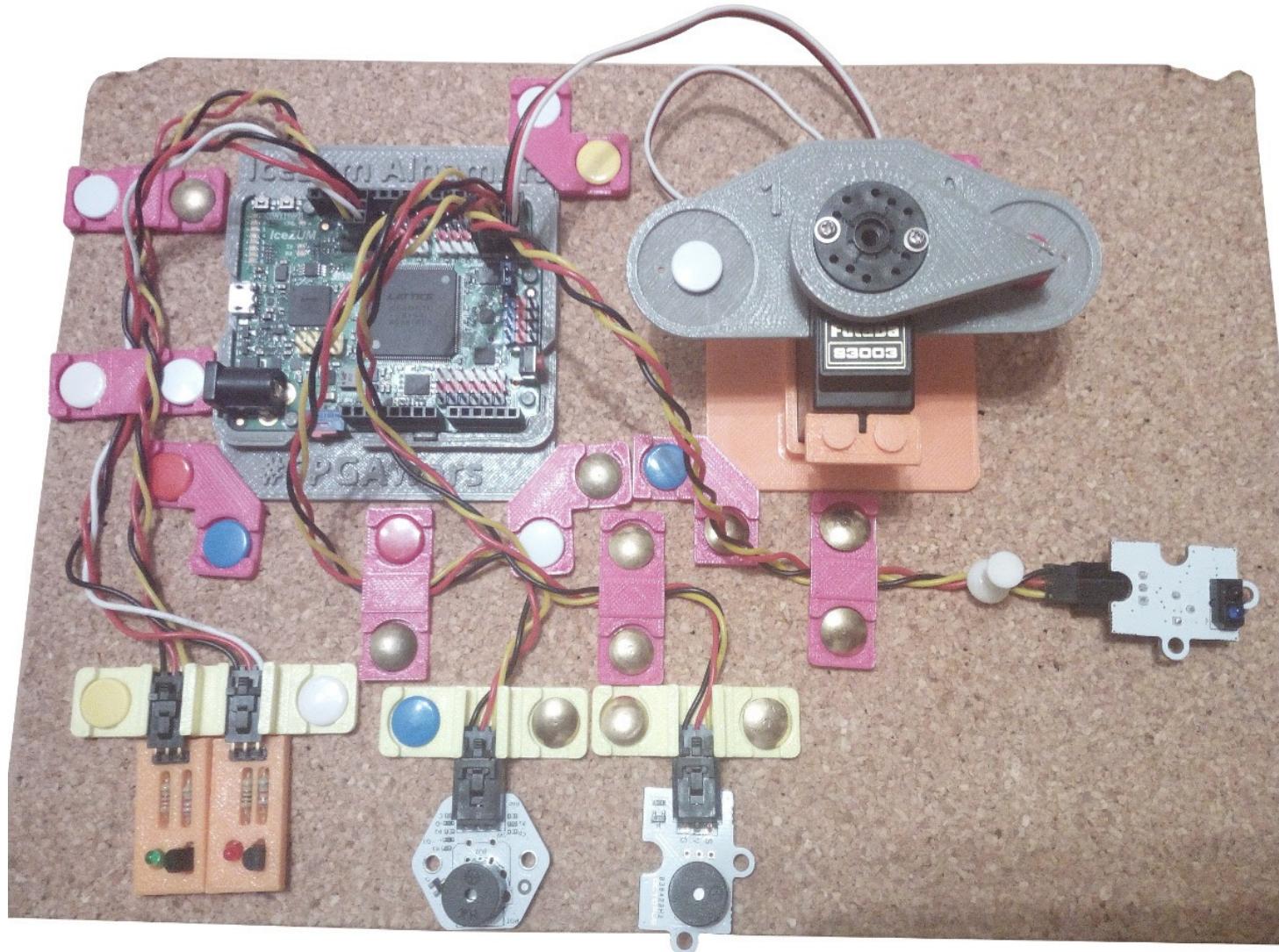
- Autor: **Jesús Arroyo**
- Electrónica digital para todos
- Herramienta visual
- Traduce a verilog

Periféricos

PCBprints: Mini-circuitos impresos en 3D



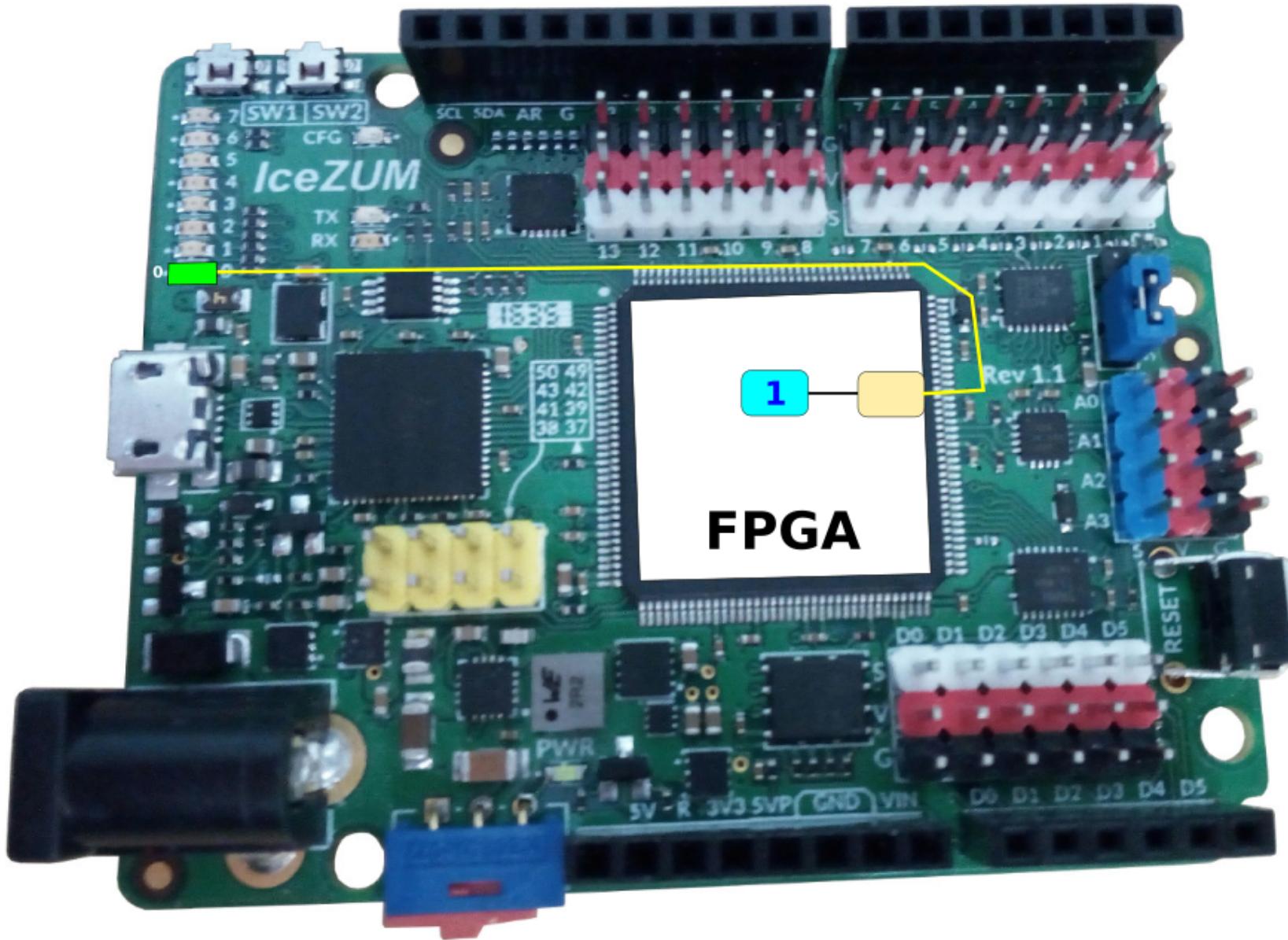
¡Empezamos!



Ejemplo 1: Hola Mundo



Hola mundo: Implementación física

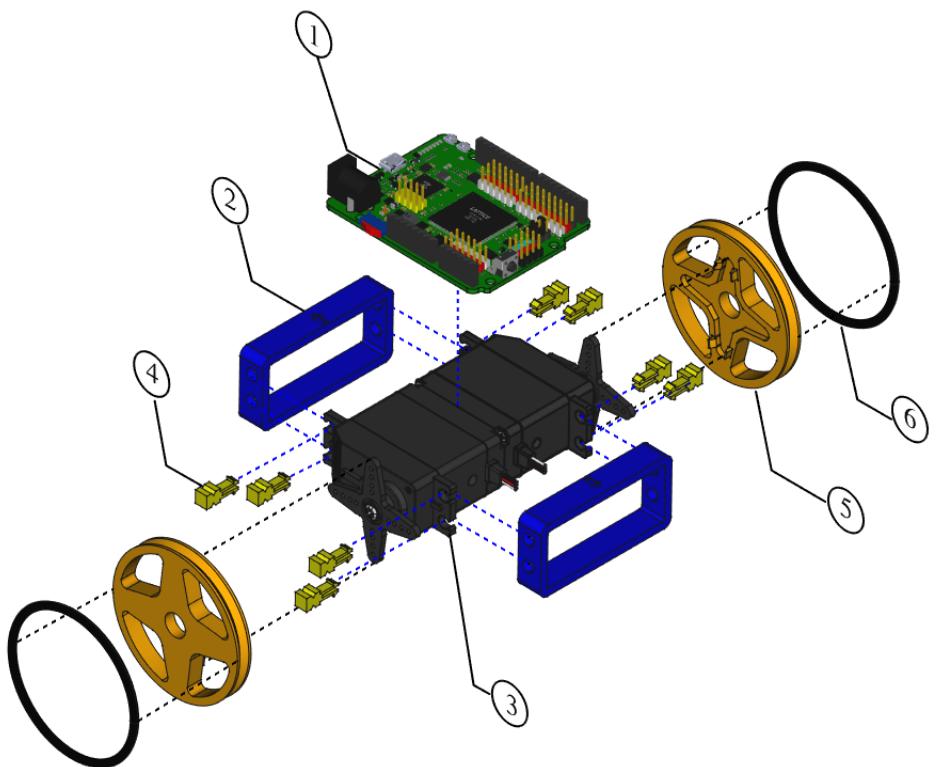
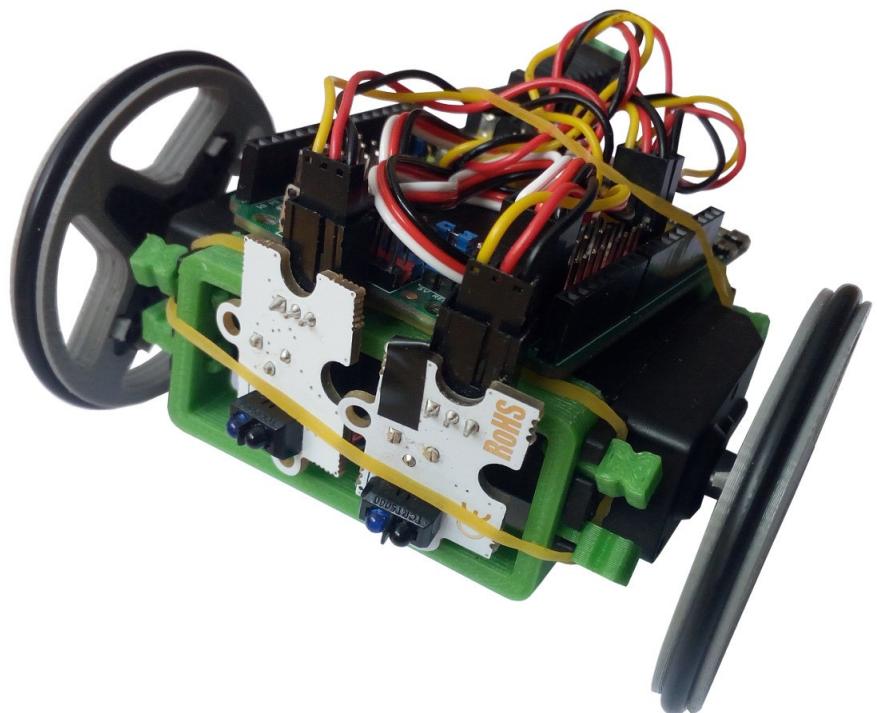


Larby: Robot modular

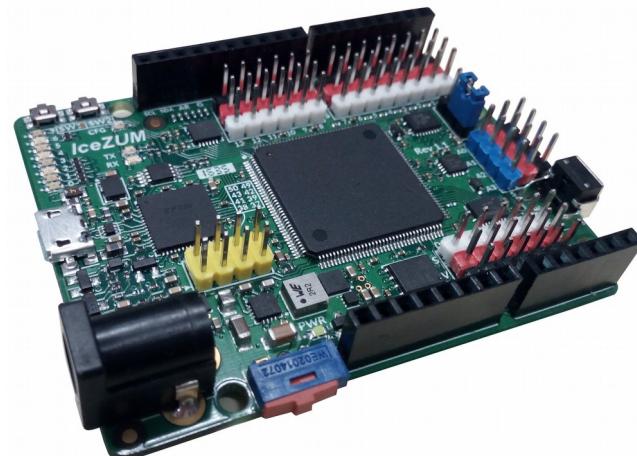
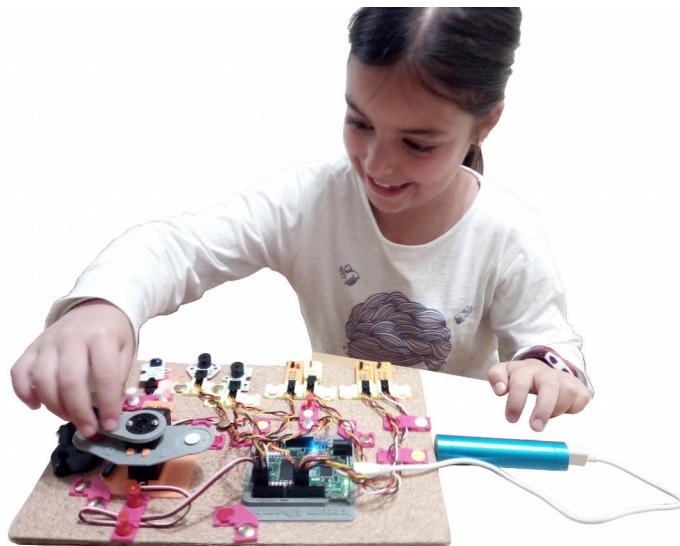


- Servos conectados directamente a Icezum Alhambra
- Configuración mínima pitch-pitch
- Módulo impresos en 3D

Icebot



Electrónica Digital Divertida con FPGAs libres



Juan González Gómez

@Obijuan_cube

<https://github.com/Obijuan>



GSyC



12 de Junio de 2018
ETSI URJC, Campus Fuenlabrada
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