

Retro-uC

An open source microcontroller with retro
instruction sets

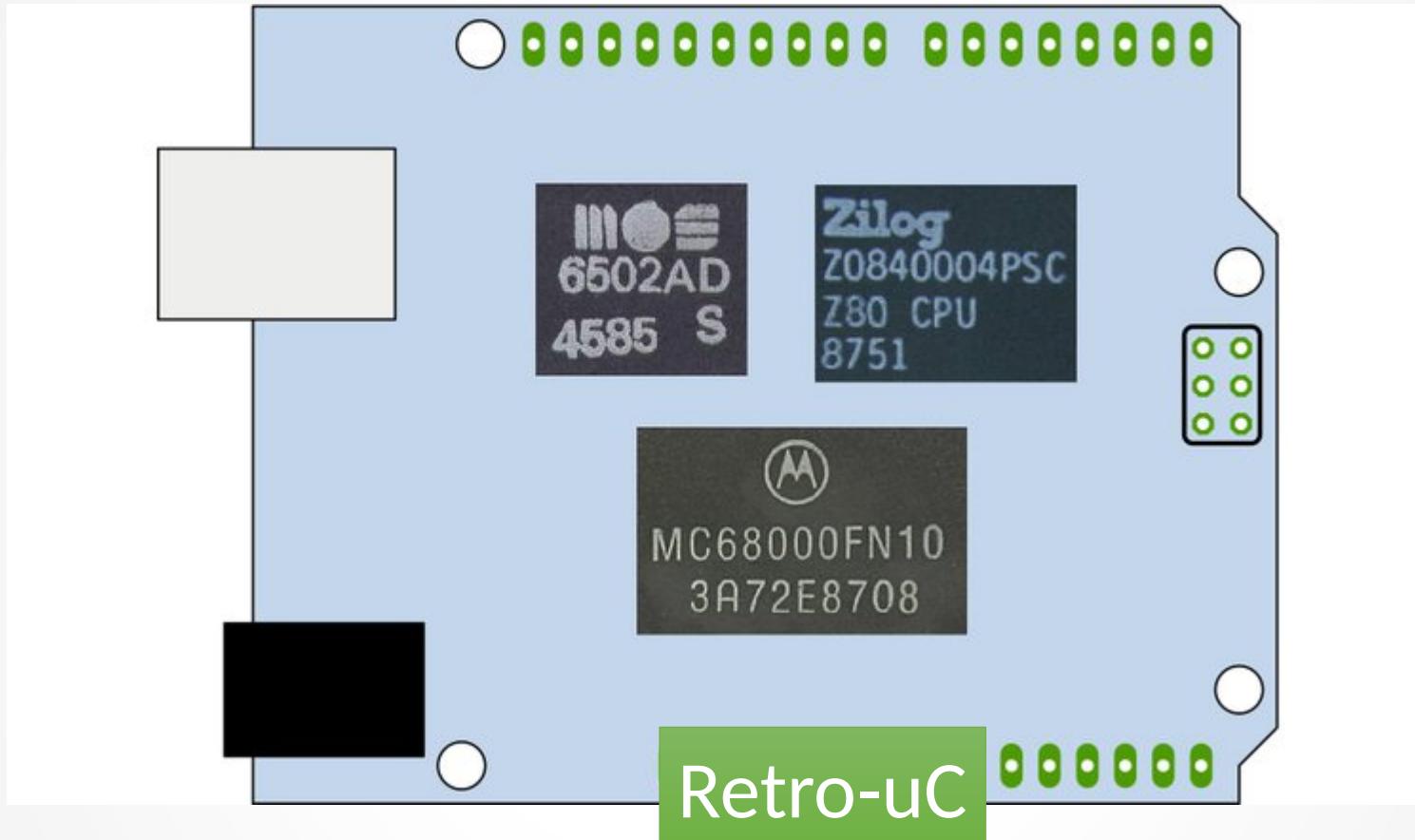
4/2/2018

Staf Verhaegen

Overview

- What?
- Why?
- Status
- RFC: ASICs and retrocomputing

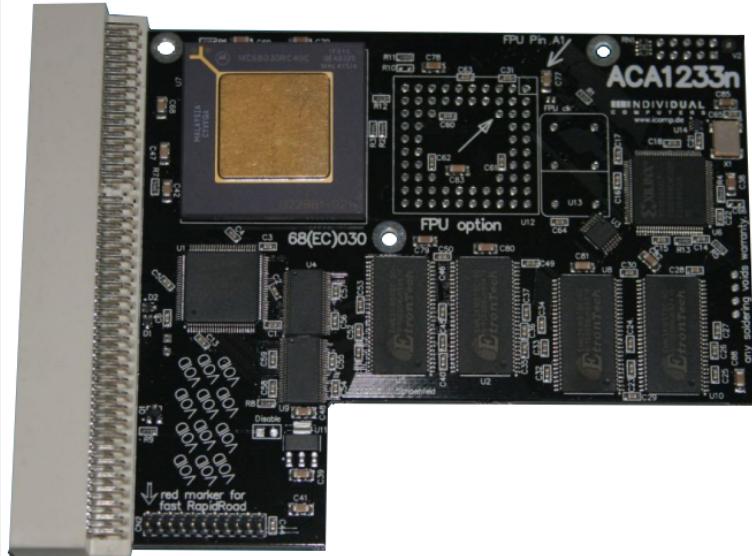
What?



A micro-controller with Z80, MOS6502, Motorola 68000 cores

Why?

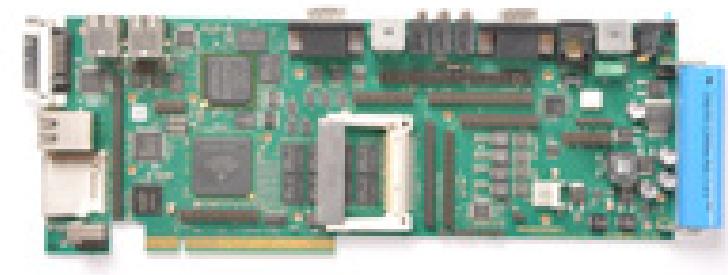
- Retro Computing



**ACA 1233n 40Mhz Accelerator
with 128MB RAM**
€ 240,-



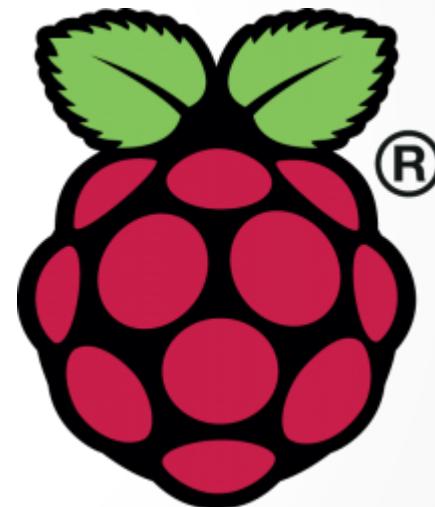
**MIST FPGA computer
simulates old consoles
and computers**
€ 200,-



**Firebee computer
Coldfire based Atari clone**
€ 520,-

Why ?

- Hobbyist/Maker



Why? Chips want to be free

- Linux: hackers (makers) coding at night on their PC



- For custom ASICs high start-up cost but now we have:

Crowdfunding

Distributed Development

KICKSTARTER
CROWD SUPPLY

FOSDEM 2018

Retro-uC - Staf Verhaegen



Why?

- The Dream:
Low-volume Open Source ASIC service
 - ASIC production targets high-volume:
high startup costs, low per unit costs
 - Mask costs
 - EDA tools license
 - Engineering
 - IP blocks
 - The fine print is not maker friendly

Why?

- The Dream:
Low-volume Open Source ASIC service
 - Cost < €100/piece for 100+ devices/boards;
lower prices for higher volume
 - Open source RTL
not reinvent/repay for the wheel
 - Pool different chips to share set-up cost;
use multi-project wafer services
 - Push button open source EDA flow
 - Intermediate in the legal affairs

Why?

- The Dream:
Low-volume Open Source ASIC service
 - Retro-uC is pilot project to test the flow and costs in the manufacturing

Status

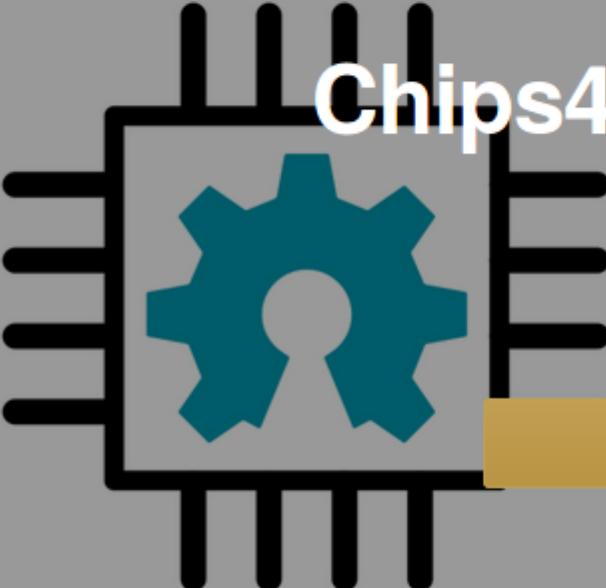
Chips4Makers Pilot: Retro-uC | Hackaday.io - Mozilla Firefox

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https://hackaday.io/project/27091-chips4makers-pilot-retro-uc

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Chips4Makers Pilot: Retro-uC

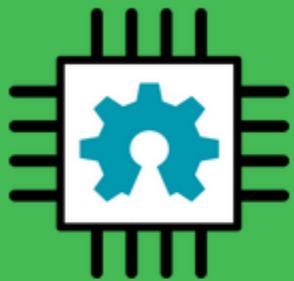
Chips want to be free

Staf Verhaegen

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Description Details Files 0 Components 0 Logs 7 Instructions 0 Discussion 3



Chips4Makers

Chips want to be free

Retro-uC (hackaday.io)

Retro-uC (Crowd Supply)

Contact



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Chips4Makers @ FOSDEM 2018

Posted on vr 02 februari 2018 in [Retro-uC](#)

When writing this I am putting the last efforts in my presentations for [FOSDEM 2018](#). I will have two presentations there:

- [The open source EDA tool chain for the Chips4Makers project](#) in the [CAD and Open Hardware devroom](#)
- [Retro-uC - An open source microcontroller with retro instruction sets](#) in the [Retrocomputing ...](#)

[Continue reading](#)

Retro-uC Campaign Product Options

Posted on wo 31 januari 2018 in [Retro-uC](#)

Finally I see a light at the end of the tunnel and is the launch of the Retro-uC campaign getting closer. In this post the different options for the campaign will be presented in their current state. Changes are still possible until the launch of the campaign. All feedback is ...

Status

Chips4Makers / Retro-uC · GitLab - Mozilla Firefox

Chips4Makers / Retro-uC +

https://gitlab.com/Chips4Makers/Retro-uC



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Chips4Makers > Retro-uC > Details



Retro-uC

The top level of the Retro-uC in the Chips4Makers pilot project.



Star

0

HTTPS



<https://gitlab.com/Chips4Makers/Retro-uC>



Files (2.2 MB) Commits (35) Branches (2) Tags (0)

master



Retro-uC

History

Find file



Added pictures of front and back of the designed PCBs.

Fatsie authored a day ago

554f9d41



Name

Last commit

Last update

Status

master Retro-uC / rtl / submodules History Find file

 **Added ao68000 fork as a submodule.** 28023690 
Fatsie authored 2 months ago

Name	Last commit	Last update
..		
 ao68000 @ f3d77fc7		
 c4m_jtag @ 70709b53		
 t65 @ b268bdaf		
 t80 @ 6c2b16cb		

Status

master Retro-uC / rtl / vhdl History Find file

Synthesis and P&R for WBBus with 73 IOs. Fatsie authored 4 days ago 9aef73c6

Name	Last commit	Last update
..		
Retro_uC_arbiter.vhdl	Moved Wishbone bus arbitration to separate ...	3 months ago
Retro_uC_ram.vhdl	* Removed XLR8 specific stuff from Retro_uC...	3 months ago
Retro_uC_ram_entity.vhdl	Synthesis and P&R for WBBus with 73 IOs.	4 days ago
Retro_uC_t65.vhdl	Implemented WishBone wrapper around T65...	2 months ago
Retro_uC_t80.vhdl	Renamed block Retro_uC to Retro_uC_t80	2 months ago
Retro_uC_top.vhdl	Renamed block Retro_uC to Retro_uC_t80	2 months ago
Retro_uC_wbbus.vhdl	Moved on-chip RAM block inside Retro_uC_W...	3 months ago

Status

master Retro-uC / sim / cocotb History Find file

 Implemented WishBone wrapper around T65 core and added cocotb test.
Fatsie authored 2 months ago 3e7c140b

Name	Last commit	Last update
..		
└ JTAG_RAM	First version of the Retro-uC.	5 months ago
└ RAM_only	First version of the Retro-uC.	5 months ago
└ Retro_uC_t65	Implemented WishBone wrapper around T65 core a...	2 months ago
└ Retro_uC_t80	Renamed block Retro_uC to Retro_uC_t80	2 months ago
└ Retro_uC_top	Renamed block Retro_uC to Retro_uC_t80	2 months ago
└ WBBus	Rename vhdl files from Retro-uC* to Retro_uC to brin...	3 months ago

Status

master Retro-uC / boards / XLR8 History Find file

 Remove altera_dual_conf.sopcinfo from repo and ignore it.
Fatsie authored 3 months ago 16ba77f4

Name	Last commit	Last update
..		
quartus	Remove altera_dual_conf.sopcinfo from repo and ignore it.	3 months ago
rtl/vhdl	* Removed XLR8 specific stuff from Retro_uC_top and cr...	3 months ago

Status

master Retro-uC / KiCad History Find file

 **Added pictures of front and back of the designed PCBs.** Fatsie authored a day ago 554f9d41

Name	Last commit	Last update
..		
Archive	PCB design updates.	4 days ago
Retro_uC-Breadboard	Added pictures of front and back of the design...	a day ago
Retro_uC-ProtoPlus	Added pictures of front and back of the design...	a day ago
Retro_uC-Retrino	Added pictures of front and back of the design...	a day ago
library	For QFN100 footprint scale a QFN64 9x9mm fo...	a day ago

Retro-uC | Crowd Supply +



i



https://www.crowdsupply.com/Chips4Makers/Retro-uC



70%



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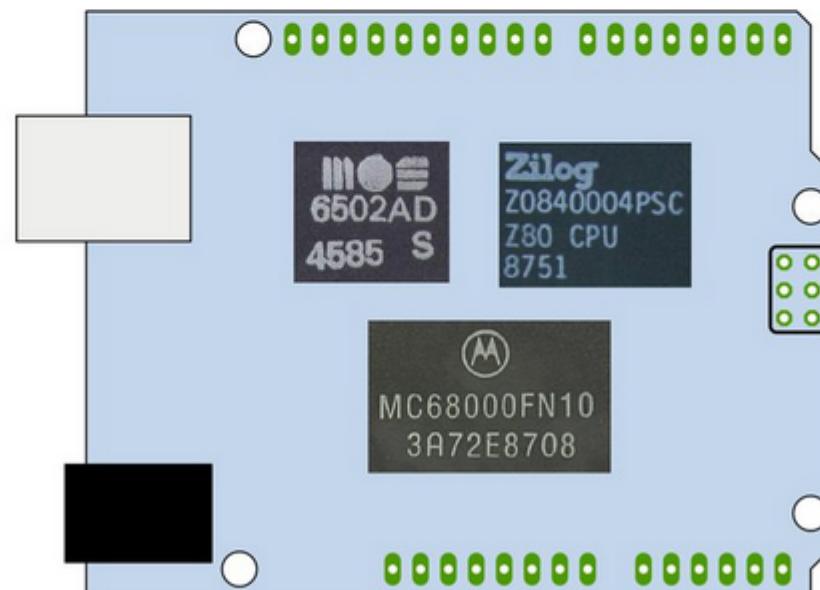
CROWD SUPPLY

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Retro-uC

An open silicon microcontroller with a Z80, MOS6502,
and M68K - start the open silicon revolution

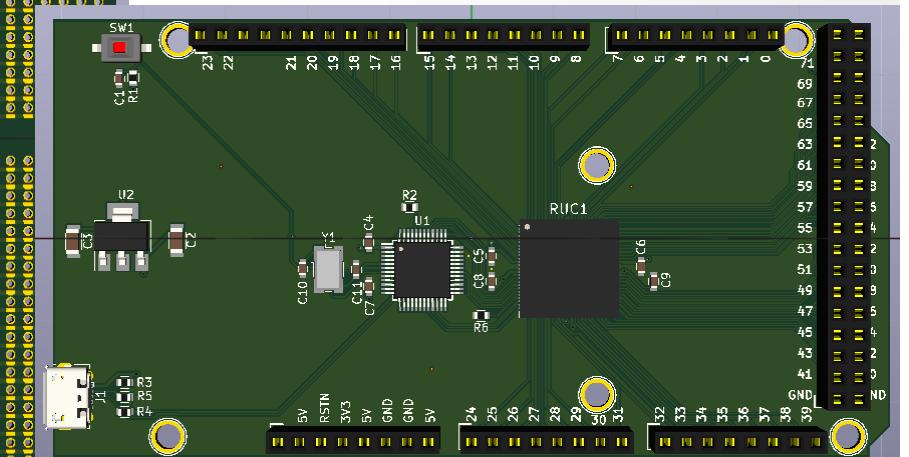
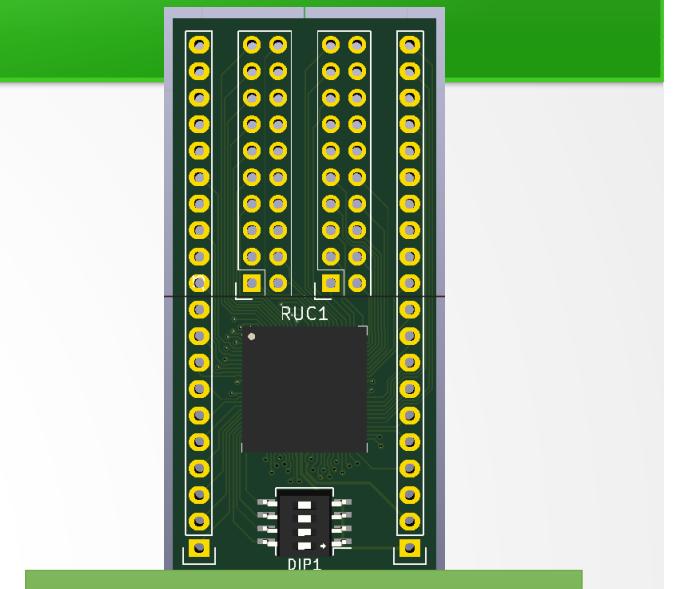
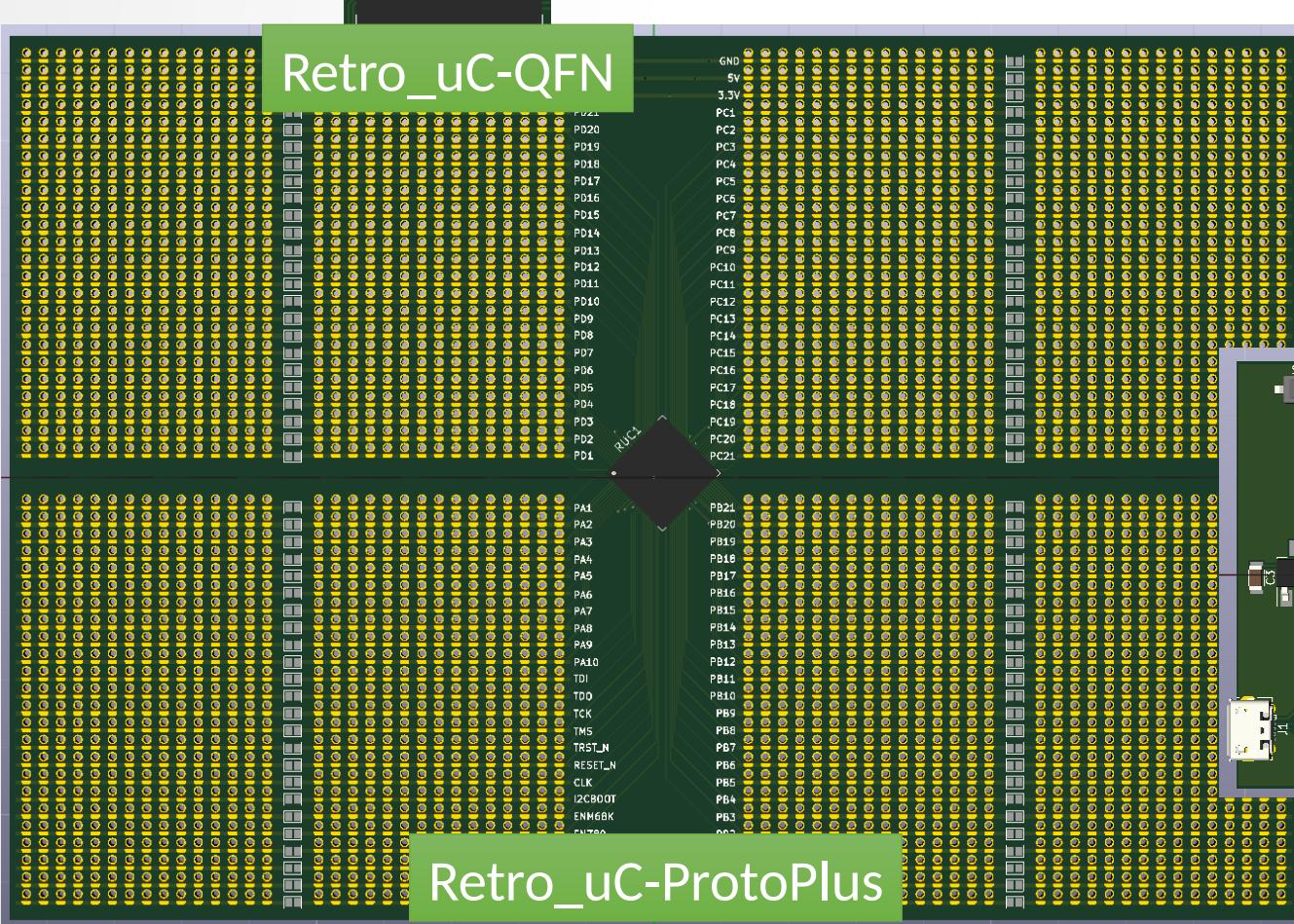
This project is coming soon. Sign up to receive updates and be notified when this project launches.

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The Retro-uC pilot run will produce an open source silicon ASIC that contains the RTL for some retro CPUs
the Zilog Z80, MOS 6502 and Motorola MC68000. The IC will be on a board that has Arduino compatible I/O for

Status

- Planned Product Options



RFC: ASICs and Retrocomputing

- Do you think crowdfunded projects ASIC projects interesting for retrocomputing ?
 - Goal: \$10 000
 - Price/piece < \$100
 - Should be able to provide 5V/12V capability
 - Production will be slower (e.g. months) compared to PCB manufacture with COTS parts
- What are requirements to make it attractive ?