KU LEUVEN

Trusted IoT

IIoTSBOM – November 16th, 2023

Multi-Core RISC-V platforms

VUB VRIJE UNIVERSITEIT BRUSSEL

KU LEUVEN

TECHNISCHE UNIVERSITÄT DRESDEN

Universität Rostock Traditio et Innovatio

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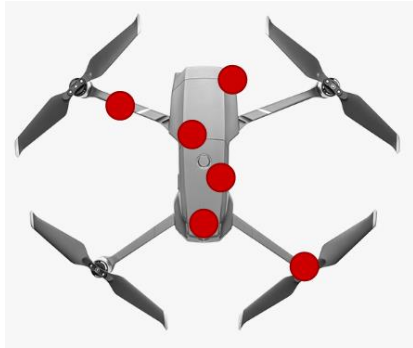
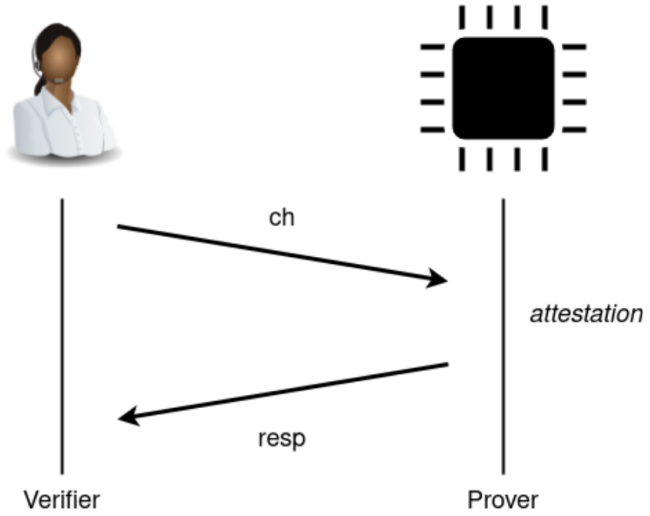
Trusted IoT – Multi-Core RISC-V platforms

- Many devices today consist of multiple processors
- To make sure the device is in a safe / good / known state:

  Attestation:





- You should run the attestation protocol on **every** processor

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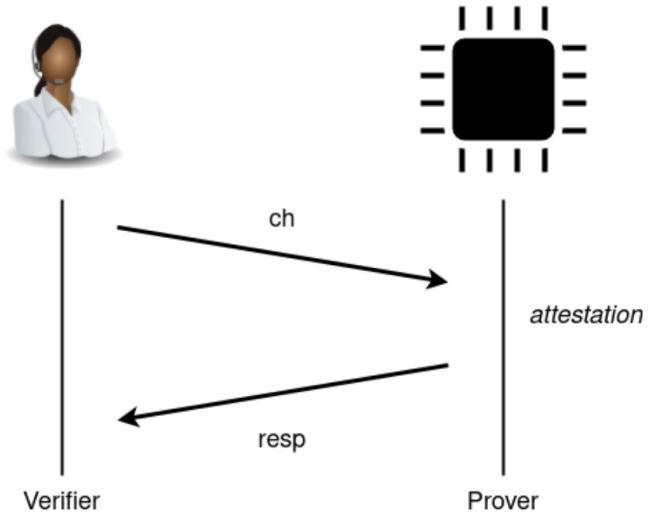
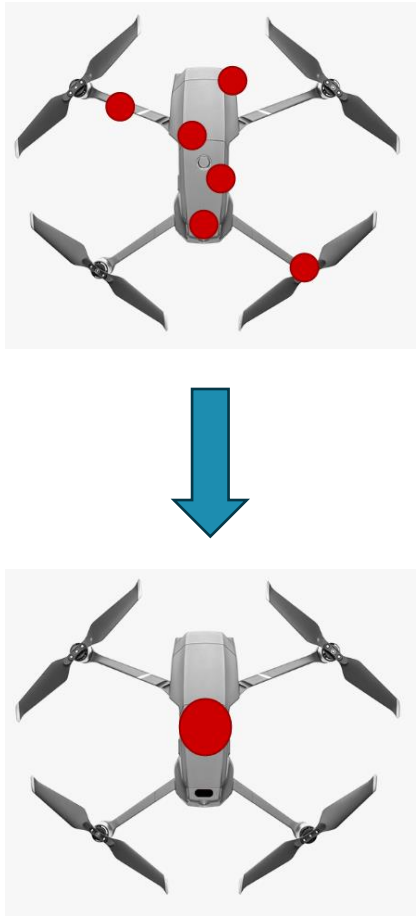
- Substituting the processors with a **single chip** reduces the complexity





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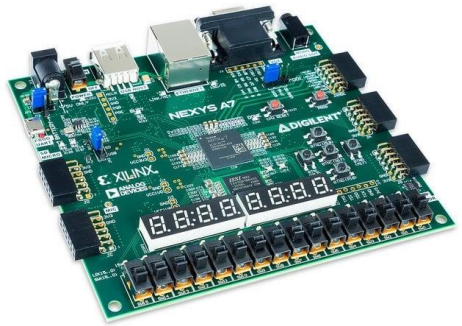
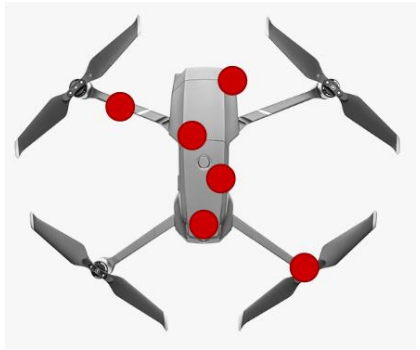
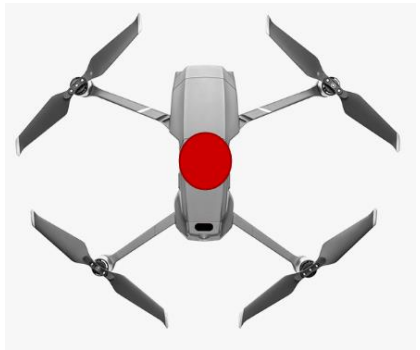
- Substituting the processors with a **single chip** reduces the complexity

- How to merge different chips ?

Configure all of them in an FPGA







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- Depending on the processor that the RISC-V is substituting a different implementation might be better suitable
- Three different RISC-V implementations will be used
  - Ibex (SystemVerilog)
    - MCU / Flight computer
  - NEORV32 (Verilog)
    - Communication
  - PicoRV32 (VHDL)
    - Electronic speed controllers

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- All RISC-V implementations are subjected to different licenses

		ibex Apache License 2.0	NEORV32 BSD 3-clause	PicoRV32 ISC
cannot	Hold Liable	x	x	x
	Use Trademark	x	x	
must	Include copyright	x	x	x
	Include license	x	x	x
	State changes	x		
	Include notice	x		
can	Commercial use	x	x	x
	Modify	x	x	x
	Distribute	x	x	x
	Place warranty	x	x	
	Private use	x		
	Use patent claims	x		
	Sublicense	x		

- A website that might come in handy: https://tldrlegal.com/

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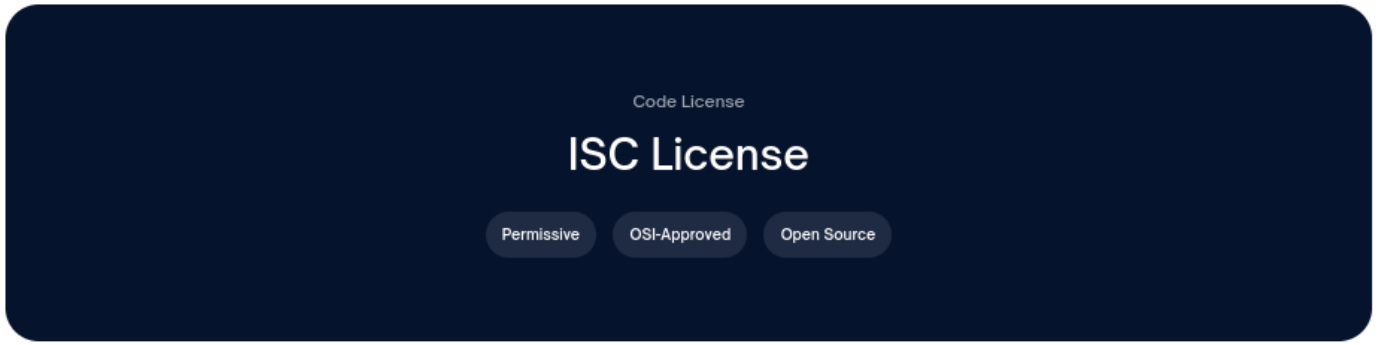
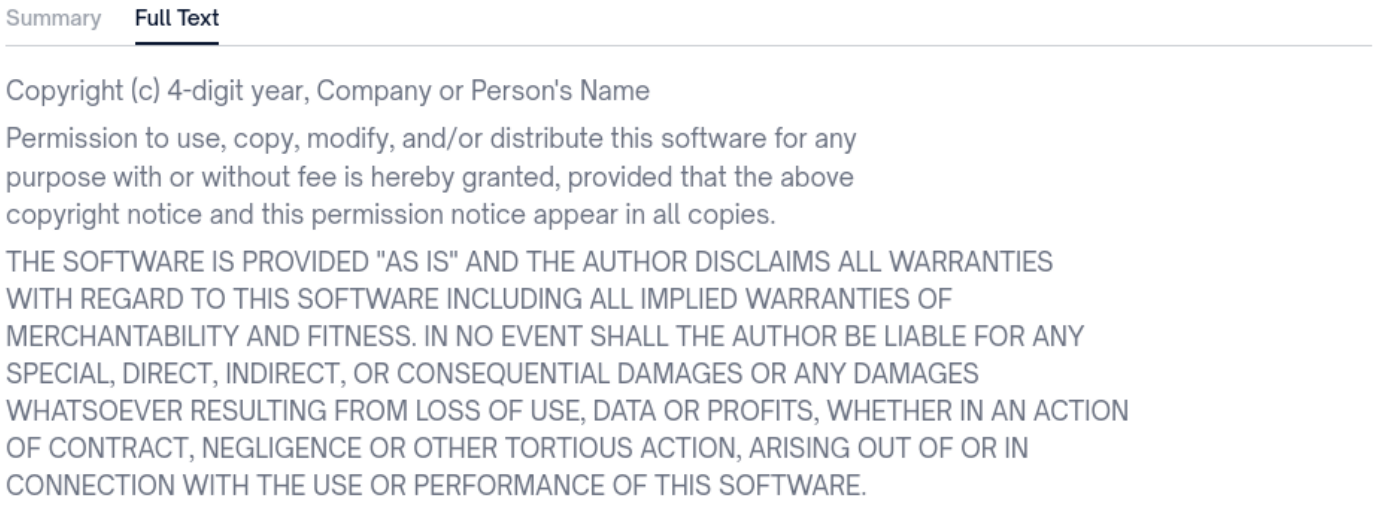
- All RISC-V im





- A website that

Use-case in Trusted IoT

Drones

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Take the device

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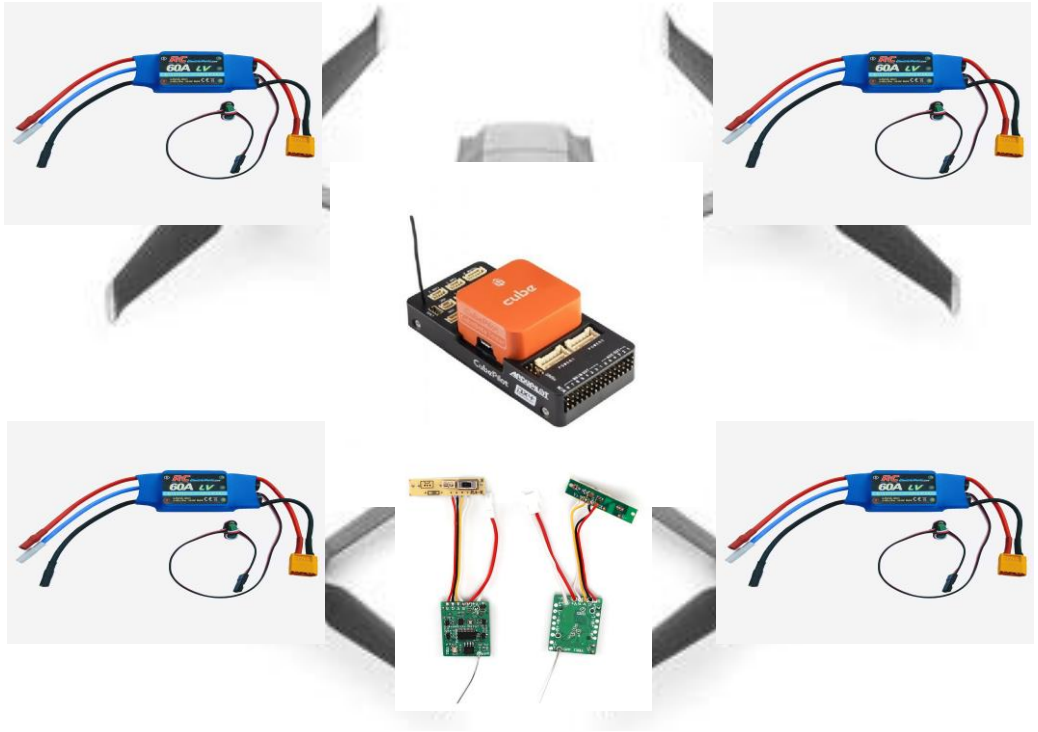

Identify the processors

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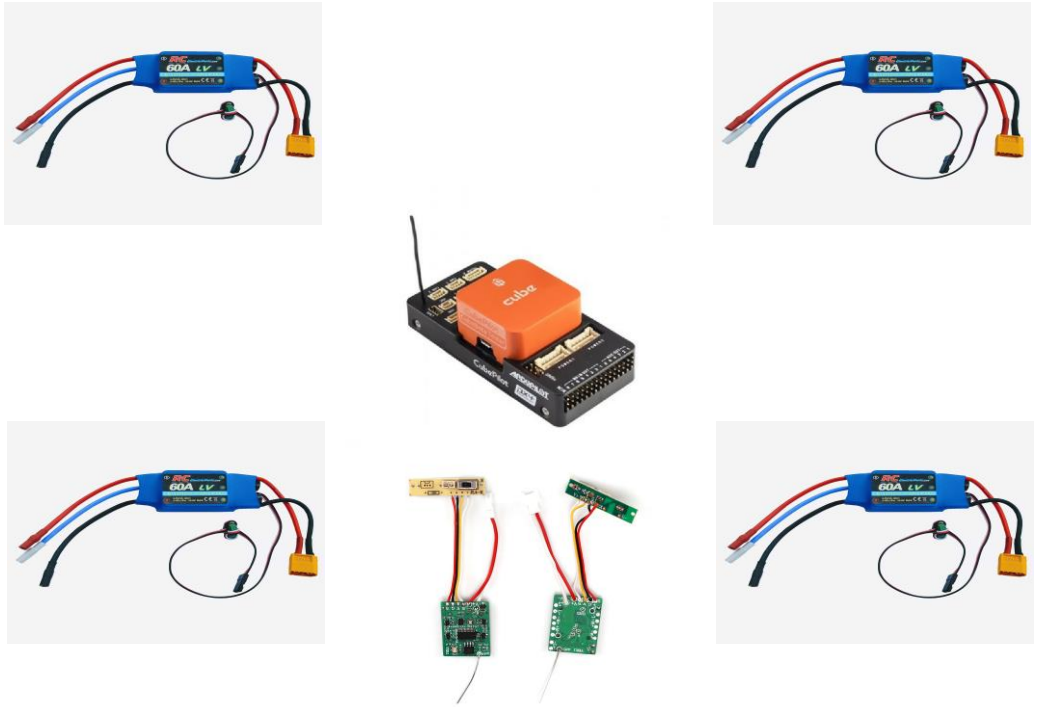
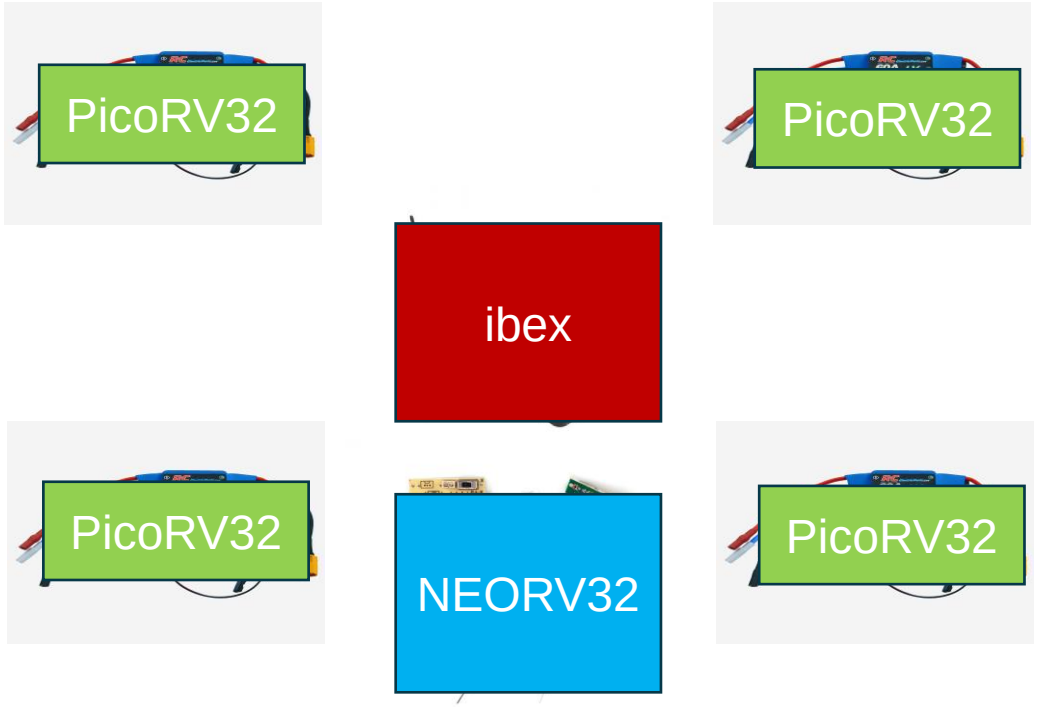


Identify the processors

Trusted IoT – Multi-Core RISC-V platforms



Replace every processor with a suitable RISC-V implementation

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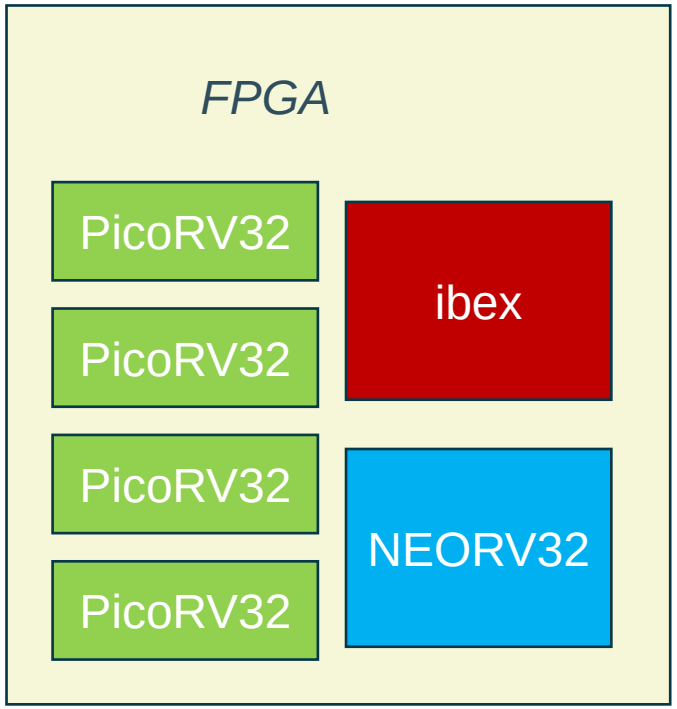

Merge all RISC-V implementations on a single FPGA

- Single device with multiple processors
- Maintain maximal backward compatibility
- Choose best-fitting RISC-V as platform

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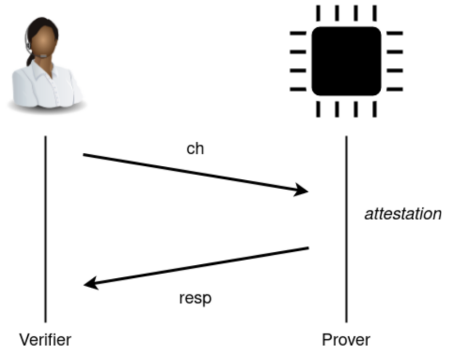
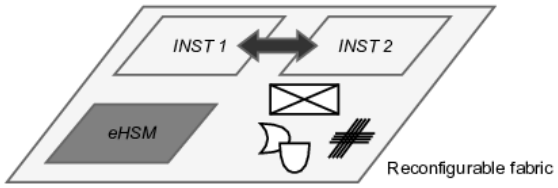
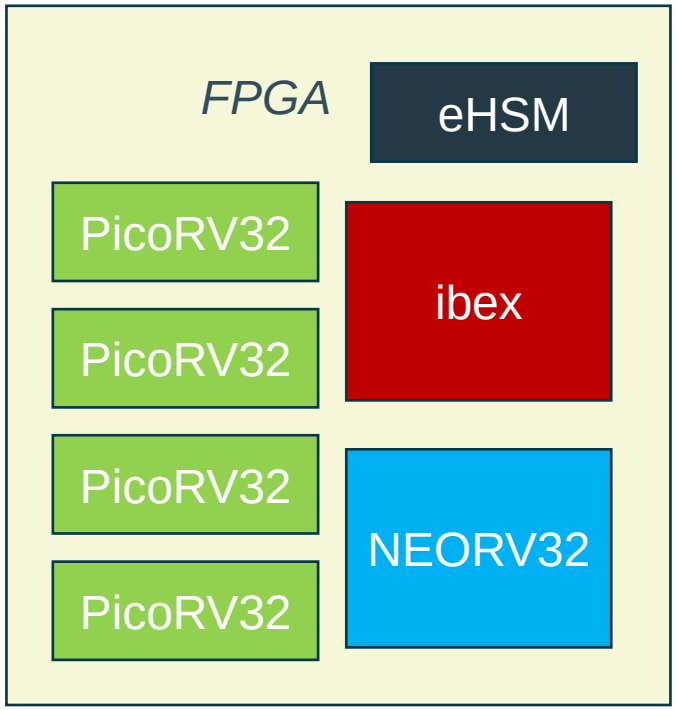
- An embedded Hardware Security Module takes care of crypto and attestation



- FPGA can do readback of configuration





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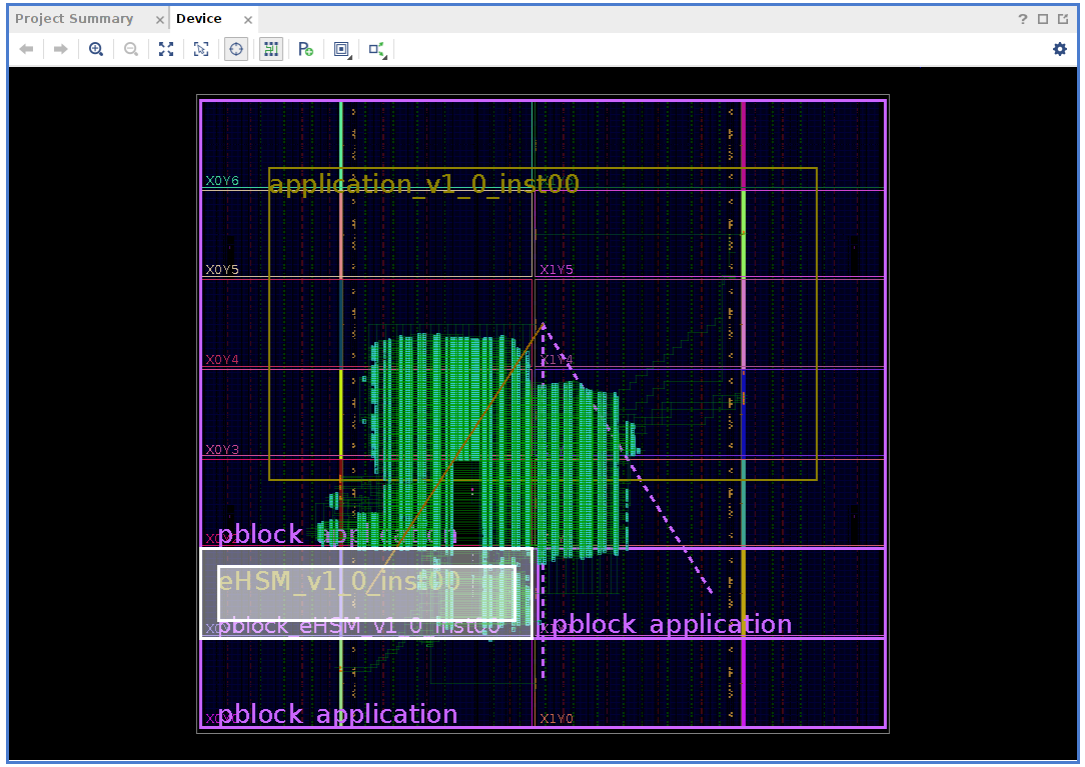
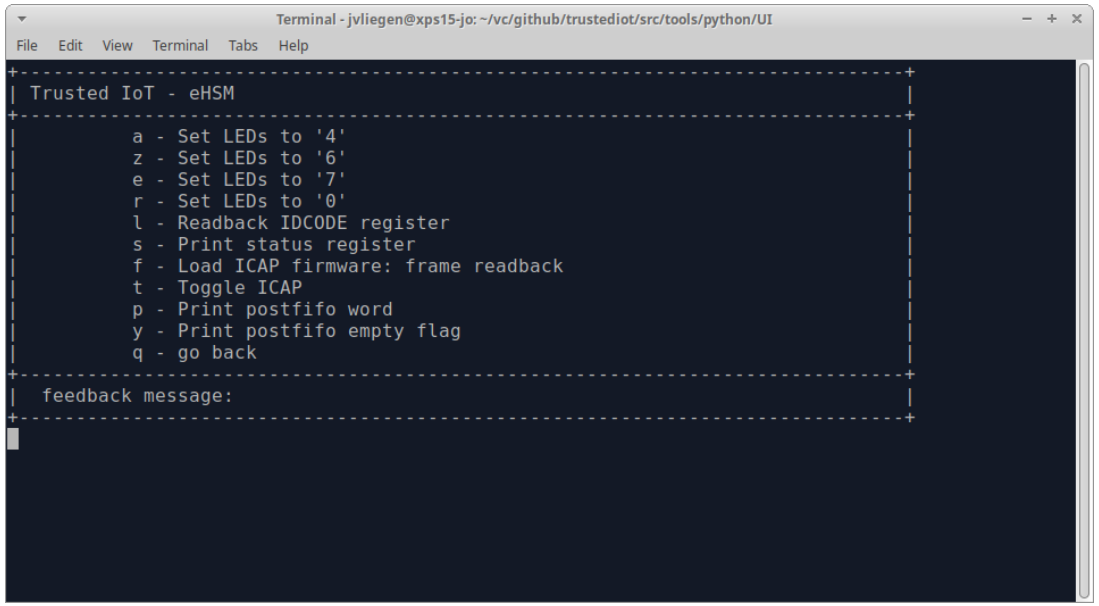
- First results towards implementation





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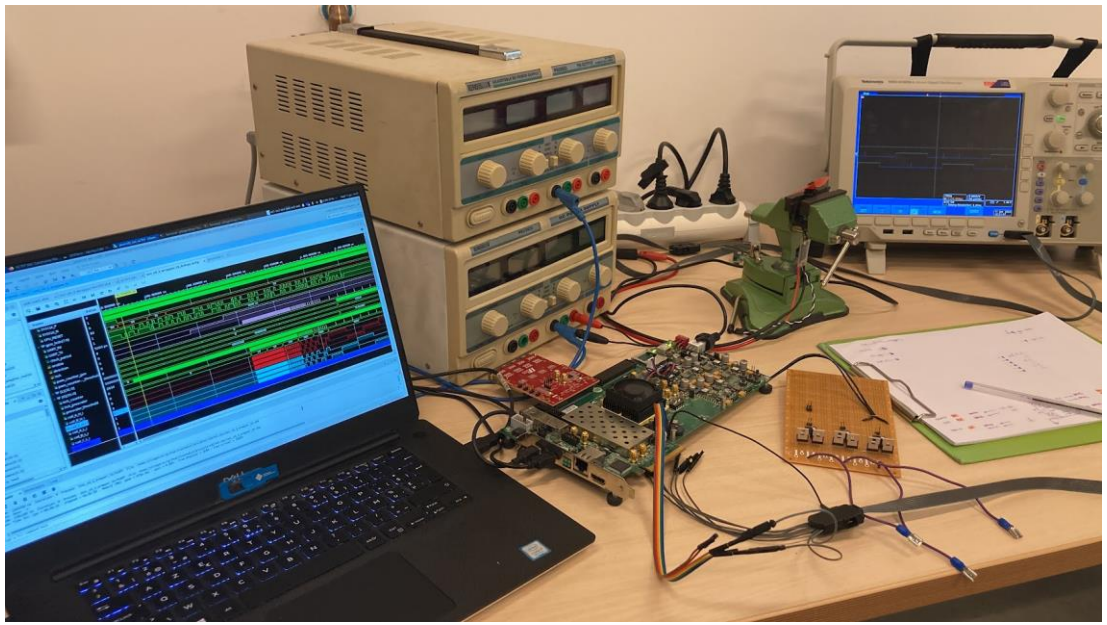
- First results towards demonstrator



Trusted IoT – Multi-Core RISC-V platforms

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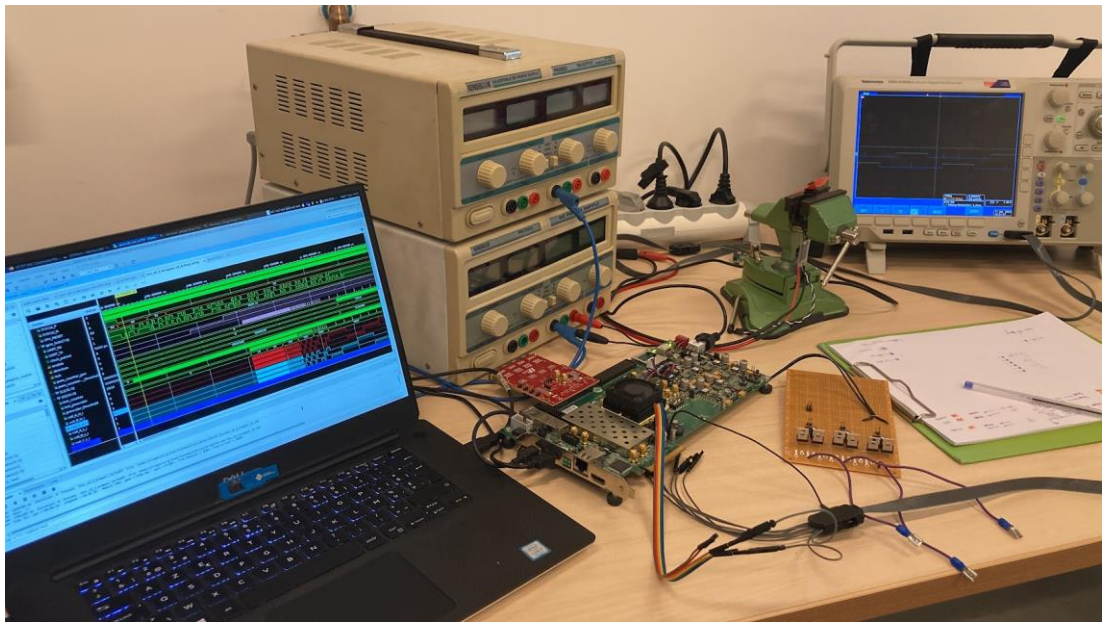

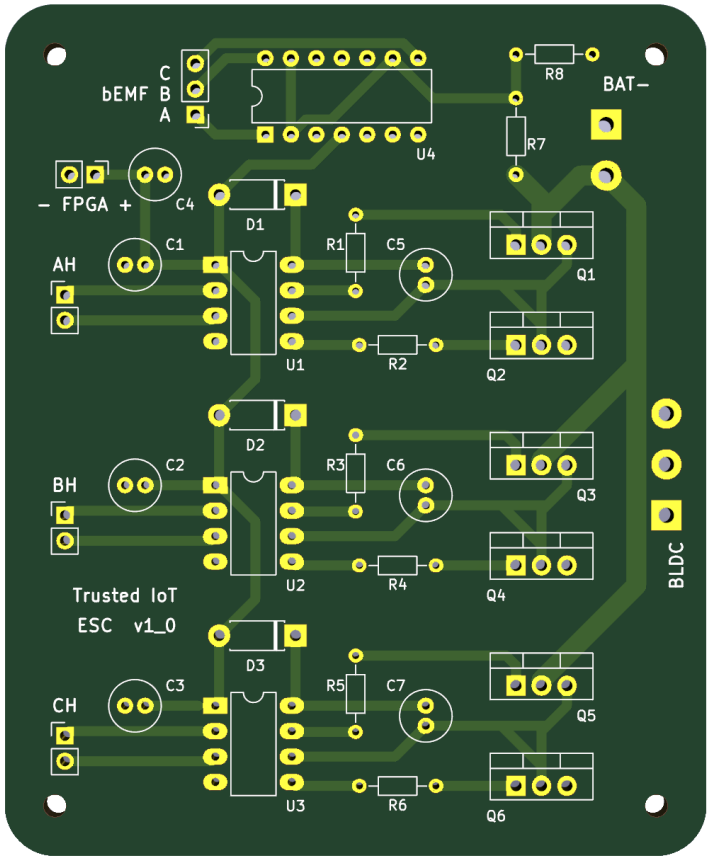

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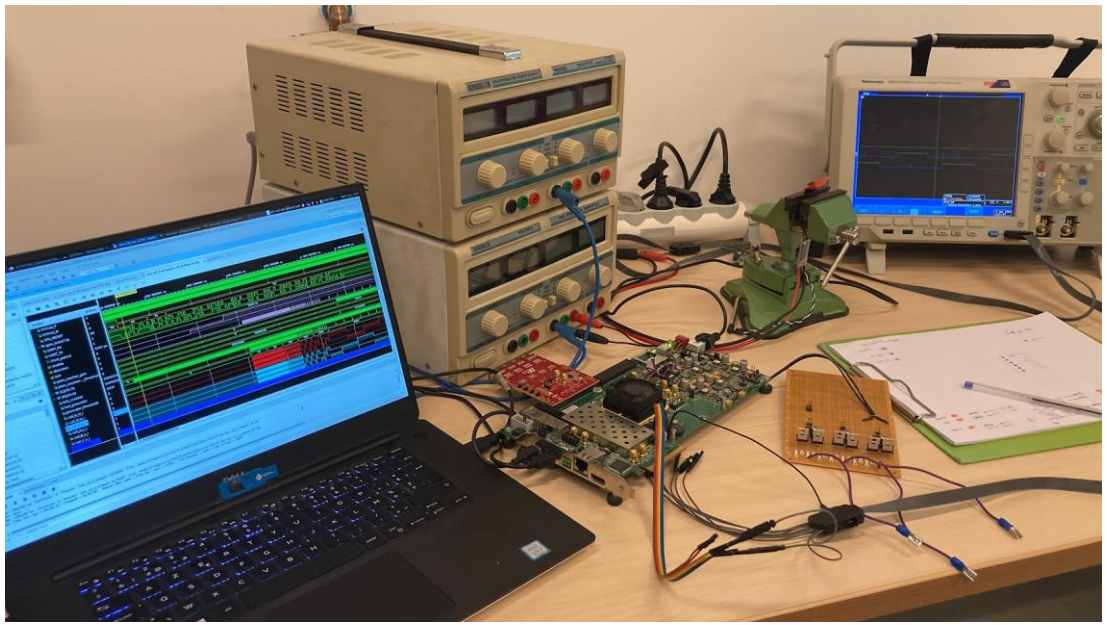

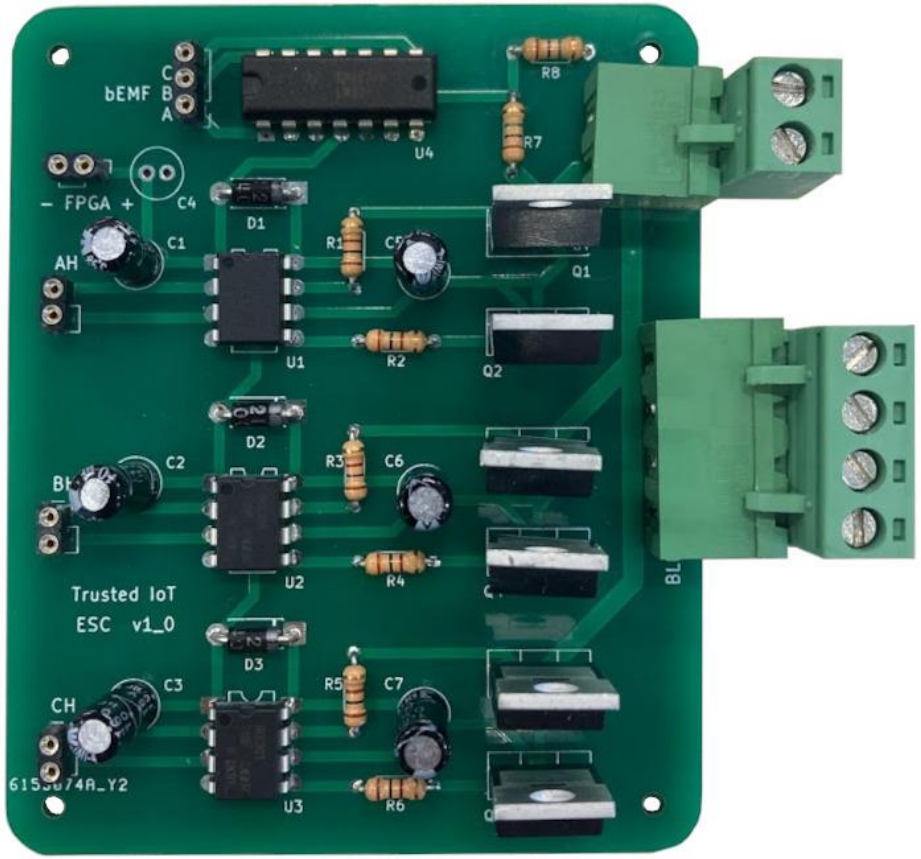

Trusted IoT – Multi-Core RISC-V platforms

- First results towards demonstrator

Everything is on track

Multi-Core RISC-V platforms

Questions ?