Ultra-low-power, secure processors for edge computing

Panagiotis Tsarchopoulos
CONNECT A3
Expected Outcomes:

• Develop European secure specialised microprocessor designs (including accelerators and controllers) that deliver high-performance computing at ultra-low power operation.

• Improve by at least two orders of magnitude the performance per watt for the targeted edge applications.
### Examples of targeted applications (non-exhaustive list)

<table>
<thead>
<tr>
<th>Automated driving</th>
<th>Machine translation</th>
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<tbody>
<tr>
<td>Artificial intelligence</td>
<td>Speech recognition</td>
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<tr>
<td>Machine learning</td>
<td>Sensor fusion</td>
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<tr>
<td>Computer vision</td>
<td>Signal processing</td>
</tr>
</tbody>
</table>

### Examples of approaches (non-exhaustive list)

<table>
<thead>
<tr>
<th>Neuromorphic</th>
<th>Programmable logic</th>
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</thead>
<tbody>
<tr>
<td>In-memory computing</td>
<td>Hardware-software co-design</td>
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<tr>
<td>Probabilistic computing</td>
<td>Open-source hardware and processor IP</td>
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<td>Neural networks</td>
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</table>
Proposals should have a longer-term perspective taking into account the reduced performance improvements of general-purpose computing, the slow-down of Moore’s law and the changing economics of semiconductor manufacturing.

Proposals should include research on advanced hardware-based security at silicon-level.

Proposals should take into account certification guidelines for secure and safety-critical applications where relevant.

Proposals should include a preliminary analysis of bringing successfully to the market the proposed research either as IP blocks or as standalone chips.

Proposals may include early chip prototyping in well-justified cases.
HORIZON-CL4-2021-DIGITAL-EMERGING-01-01: Ultra-low-power, secure processors for edge computing

BUDGET

- 26 million Euro

PROJECTS

- RIA
- EU contribution/project: 8-10 M€

TRL (TECHNOLOGY READINESS LEVEL)

- From 2-3 to 4-5 by the end of the project
Open Source Hardware for ultra-low-power, secure processors (CSA)

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Expected Outcomes:

- Structure European involvement in open source hardware efforts (including open Instruction Set Architectures) related to the design of ultra-low-power, secure microprocessors, microcontrollers and accelerators.

- Develop a roadmap for open source hardware in Europe covering both R&D as well as funding & business aspects for edge applications in all power and performance ranges from deeply embedded to high-end computing.
### Issues to address (non-exhaustive list)

- availability of a sustainable and reliable open hardware IP supply
- maturity of the IP components
- open source design tools

- compilation
- simulation
- verification
- real-time and mixed criticality

Bring together all relevant European stakeholders and further develop and grow the European open source hardware ecosystem

Align with related regional or national initiatives covering both academia and industry

Interface with international efforts in the area including certification guidelines for design of IP to be used in safe/secure applications

Participate and lead in the development of open source hardware standards and specifications.
HORIZON-CL4-2021-DIGITAL-EMERGING-01-05
Open Source Hardware for ultra-low-power, secure processors (CSA)

BUDGET
- 2 million Euro

PROJECTS
- CSA
- EU contribution: 2 M€
Thank you!

# HorizonEU

http://ec.europa.eu/horizon-europe