COOPERATIVE RESEARCH PROJECTS

NXP Semiconductors Romania is engaged in the following cooperative research projects at European and National level.

- IPCEI ME/CT: SENTHICOM
- Chips JU: TRISTAN
- Chips JU: ISOLDE

Details about these projects and collaborations can be found in the next pages. For more details, please contact respective project responsible.

SENTHICOM – SENse, THInk and COMmunicate

IPCEI Microelectronics and Communication Technologies (IPCEI ME/CT)
State aid decision: SA.101192
Project starting date and duration: 1 April 2023, until 31-Dec-2028
NXP Romania project director: Bogdan Costinescu (bogdan.costinescu@nxp.com)
Details: https://competition-cases.ec.europa.eu/cases/SA.101192
Webpage: https://ipcei-me-ct.eu/
National contract: 3/RUE Nr.3/C9/I4 PNRR

Project Description: The scope of the SENTHICOM project is to develop breakthrough NXP products (mainly focused on SoC and associated software) in the area of Radar (aligned with WS Sense), Automotive (aligned with WS Think), and 5G/B5G/6G (aligned with WS Communicate). For each product, NXP Romania team will research, develop and innovate, together with the HW design teams in other NXP sites or with partner R&D teams, the design of the domain-specific HW accelerators and the associated firmware, drivers and middleware such that customers can focus their efforts on creating value based on their own domain expertise. The domain-specific HW accelerators allow to reduce the power consumption of the final SoC while delivering the functionality and performance required in each of the respective domains, thus being an important part of advanced silicon design.

Estimated Results: The innovative contributions expected from Romanian researchers in NXP teams and partners span (1) usage of programmable accelerators based on RISC-V cores, including novel programming approaches for these accelerators, (2) finding the right mix of hardware-supported processing with integration of already in-use middleware and applications, and (3) definition of new algorithms and methods to cope with the increased complexity of next generation radar, 5G/6G wireless communication, evolution of vehicle electronics architecture, embedded AI, safety and security

Dissemination: This section will be updated after the annual report scheduled for Feb-2025.

TRISTAN - Together for RISc-V Technology and ApplicatioNs

Horizon Europe, HORIZON-JU-IA, Project number: 101095947
Call: HORIZON-KDT-JU-2021-1-IA, Topic: HORIZON-KDT-JU-1-IA-Focus-Topic-1
Project starting date and duration: 1 December 2022, 36 months
NXP Romania project director: Bogdan Costinescu (bogdan.costinescu@nxp.com)
Details: https://cordis.europa.eu/project/id/101095947
Webpage: https://tristan-project.eu/
National contract: PN-IV-P8-8.1-PME-2024-0026

Project Description: The TRISTAN consortium aims to expand, mature and industrialize the European RISC-V ecosystem to compete with existing commercial/proprietary alternatives. This will be achieved by leveraging the Open-Source community to gain in productivity and quality. This goal will be achieved by defining a European strategy for RISC-V-based designs, including the creation of a repository of industrial quality building blocks to be used for SoC designs in different application domains (e.g. automotive, industrial, etc.). The TRISTAN approach is holistic, covering electronic design automation tools (EDA) and the full software stack. The broad 46 partner consortium will expose many engineers to RISC-V technology, further strengthening adoption. This ecosystem will ensure a European sovereign alternative to existing commercial/proprietary players. The consortium, which includes the largest EU companies and globally operating semiconductor IDMs, is convinced that once solutions using RISC-V building blocks are well verified, the industry will feel sufficiently confident to make the investments necessary for tape-outs.

Estimated Results: TRISTAN'S overarching aim is to expand, mature and industrialize the European RISC-V ecosystem to compete with existing commercial alternatives. Building blocks developed in TRISTAN will be demonstrated in the business domains of Automotive, Industrial, Aerospace, Mobile, Wearables and Health. The objective is to reach TRL-5 for the TRISTAN building blocks enabling further industrial adaptation into commercial applications.

Dissemination:

1. "*RISC-V Extension Enablement*", Simona Costinescu, presentation during TRISTAN Technical Conference, 11-Sep-2024 (link).
2. "*ADL Tools to generate LLVM target description files and tests*", ADL-Tools project in GitHub, documentation and codebase available at https://github.com/nxp-auto-tools/tools_adl

ISOLDE - High Performance, Safe, Secure, Open-Source Leveraged RISC-V Domain-Specific Ecosystems

Horizon Europe, HORIZON-JU-IA, Project number: 101112274
Call: HORIZON-KDT-JU-2022-1-IA, Topic: HORIZON-KDT-JU-2022-1-IA-Focus-Topic-3
Project starting date and duration: 1 May 2023, 36 months
NXP Romania project director: Bogdan Costinescu (bogdan.costinescu@nxp.com)
Details: https://cordis.europa.eu/project/id/101112274
Webpage: https://www.isolde-project.eu/
National contract: PN-IV-P8-8.1-PME-2024-0025

Project Description: The ISOLDE project aims to significantly support the digital transformation of all economic and societal sectors, to speed up the transition towards a green, climate neutral and digital Europe, to strengthen the design capacity and to achieving digital autonomy EU wide. By the end of our project, we will have high performance RISC-V processing systems and platforms at least at TRL 7 for the vast majority of building blocks, demonstrated for key European application domains such as automotive, space and IoT with the expectation that two years after completion ISOLDE's high performance components will be used in industrial quality products. To achieve such an ambitious goal, an industrial-grade open-source support for development, verification, and maintenance will be provided. The customizable IPs will be hosted on physically located European servers to address the European digital sovereignty requirement that the ISOLDE project will support. This way, ISOLDE will have delivered a major contribution to the unification and focus of the full-fledged – industry-supported – eco-system for RISC-V open-source architecture, especially in the area of embedded high-performance computing, and thus to the creation of a breakthrough design capacity across the EU microelectronics industry.

Estimated Results: ISOLDE'S overarching aim is to expand, mature, industrialize and make available the European high-performance RISC-V ecosystem so that it is able to compete with existing commercial/ proprietary alternatives.
This will be achieved by exploring and implementing advanced architectures and in addition by providing novel accelerators as well as IPs to complete the high-performance compute infrastructure based on inputs of partners that cover the entire value chain.
Further, this goal will be supported by following and contributing to specifications from suitable industrial bodies and to Europe's long term strategy for RISC-V based ecosystem including the creation of a repository of industrial quality building blocks to be used for SoC designs in different application domains (e.g. automotive, industrial, etc.).
The ISOLDE approach is holistic, includes all players along the value chain covering also electronic design automation tools (EDA) and the full software stack. The broad industrial guided consortium will expose a large number of engineers to RISC-V technology, which will further strengthen adoption. This ecosystem will ensure a European sovereign alternative to existing commercial/proprietary players.

Dissemination:

1. "*RISC-V Accelerators, Enablement and Applications for Automotive and Smart Home in the ISOLDE Project*", Cătălin Bogdan Ciobanu, Honorius Gâlmeanu, Alexandru Puscas, Mihai Gologanu, Octavian Buiu, Mihai Antonescu, Vlad-Gabriel Serbu, et al., presented during International Conference on Embedded Computer Systems: Architectures, Modeling and Simulation (SAMOS) 2024 conference, 3-Jul-2024 (link).
2. ISOLDE Project Meeting in Bucharest, Simona Costinescu, 17-18-Jul-2024 (link).
3. "*Contributions of Romanian ISOLDE Cluster: RISC-V Accelerators, Enablement and Applications for Automotive and Smart Home*", Bogdan Costinescu, Cătălin Ciobanu, presented during workshop organized by the STMS Commission of the Academy in collaboration with the Romanian Section of IEEE on 1-Oct-2024.
4. "*Efficient OpenMP Target Offloading for Bare-Metal Embedded System*", article abstract submitted to Embedded World 2025.