This project is co-financed by the European Union
and the Republic of Türkiye

PRESENTER FULL NAME: KAYA DEMIR

ORGANIZATION: TUBITAK BILGEM, Integrated Circuits and Training Laboratory (TUTEL)

WORKSHOP NAME: Workshop#3-Digital, Chips and 6G

E-MAIL: kaya.demir@tubitak.gov.tr

ICTürkiye2025
10 April, İstanbul

TÜBİTAK
BİLGEM

Description of the Organisation

REPUBLIC OF TÜRKİYE
MINISTRY OF INDUSTRY
AND TECHNOLOGY

#NATIONAL TECHNOLOGY INITIATIVE

TÜBİTAK
BİLGEM

TÜBİTAK BİLGEM is an institution of the Scientific and Technological Research Council of Türkiye [TÜBİTAK] and TÜBİTAK is affiliated council of the T.R. Ministry of Industry and Technology.
TÜBİTAK BİLGEM is the **largest research center** in Türkiye and focusing fundamentally on ICT and digital transformation.

TÜBİTAK BİLGEM contributes to Türkiye's technological independence and enhances both the Türkiye's and European technology ecosystems by conducting research in advanced technologies such as cybersecurity, artificial intelligence, digital transformation, blockchain, cloud computing technologies, chip technologies, and cryptology.

With 6 institutes, 8 testing laboratories, over 200 products, 230+ ongoing projects, and a portfolio exceeding 1 billion dollars, BİLGEM operates in 15 critical research areas. With over 2,000 employees, 14% of whom hold PhDs and 25% hold Master's degrees, BİLGEM continues to strengthen its capabilities.

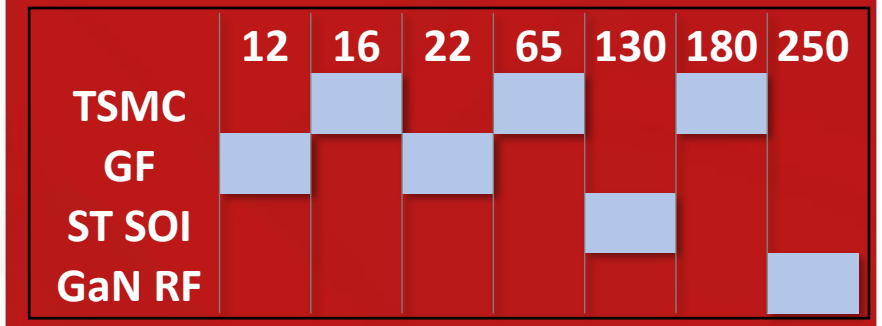
TÜBİTAK BİLGEM actively participates in EU calls with over 19 completed and 14 ongoing projects.

ICTürkiye2025
10 April, İstanbul

TUBITAK BILGEM TUTEL
LAB. Expertise

- End-to-end SoC microprocessor design
- Multi-domain IC design capability
- Analog, mixed-signal IP design
- Cutting edge research & development

TUTEL Process Technology Nodes



We focus on IC design, RISC-V microprocessors, AI&ML accelerators, analog blocks such as PLL,sensors, ADC/DAC, DDR PHY.

In cooperation with other institutes and units within TÜBİTAK, TUTEL participates in multidisciplinary projects on IC design. We can work together on RISC-V processor design and other related topics.

ICTürkiye2025
10 April, İstanbul

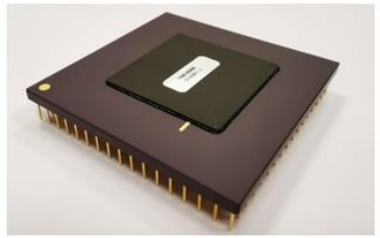
Research Fields & Expertise

- RISC-V Microprocessor Design
- AI&ML Accelerators
- Open-Source FPGA
- Analog design of peripheral components
- Digital IC design flow

ICTürkiye2025
10 April, İstanbul

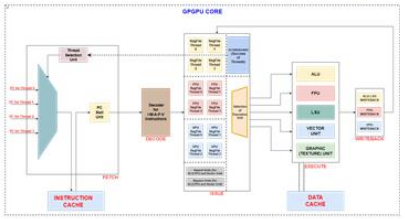
On-going Projects at TUTEL

ÇAKIL
Single-core SoC MPU

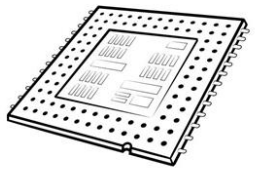


YONCA
Multi-core SoC MPU

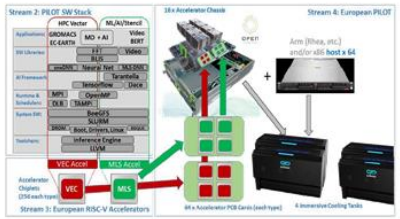
MERCEK
GP-GPU

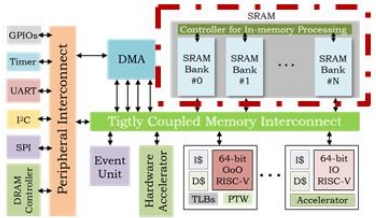


ALP-EREN
FPGA



EU PILOT
AI & ML ACCELERATOR ICs

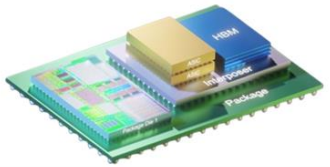


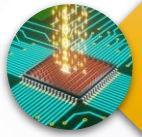


BEYOND5 RF SOI V2X
Vehicle2Everything

MEEP Neural Network
Accelerator Module

HiCONNECTS
5G Secure IoT Processor





RISC-V CPU
- Quad-Core | YONCA

RISC-V GPGPU

FPGA SOC

GaN RF

EU Projects
- MEEP
- BEYOND5
- EUPILOT
- HICONNECTS
- TruBrain

ICTürkiye2025
10 April, İstanbul

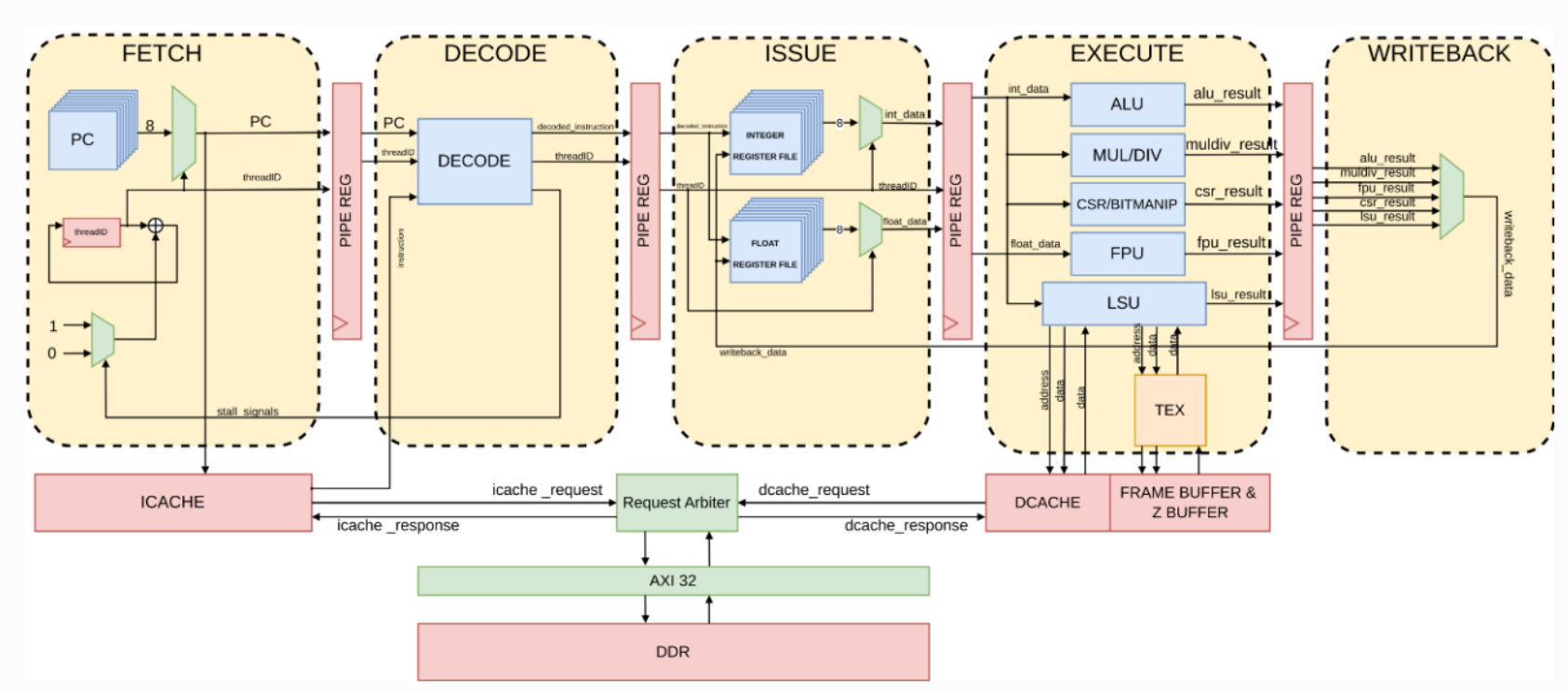
Project Idea: RISC-V based GP-GPU

Call Topic:HORIZON-Chips-2025-1-IA-LEAI: Low power Edge AI Chips

- Objectives:To design a RISC-V GPGPU that supports general-purpose TensorFlow Lite towards AI&ML applications
- Expected Results: A low-power and cost-effective RISC-V GPGPU demonstrator as an FPGA prototype and IC.

ICTürkiye2025
10 April, İstanbul

Project Idea: RISC-V based GP-GPU

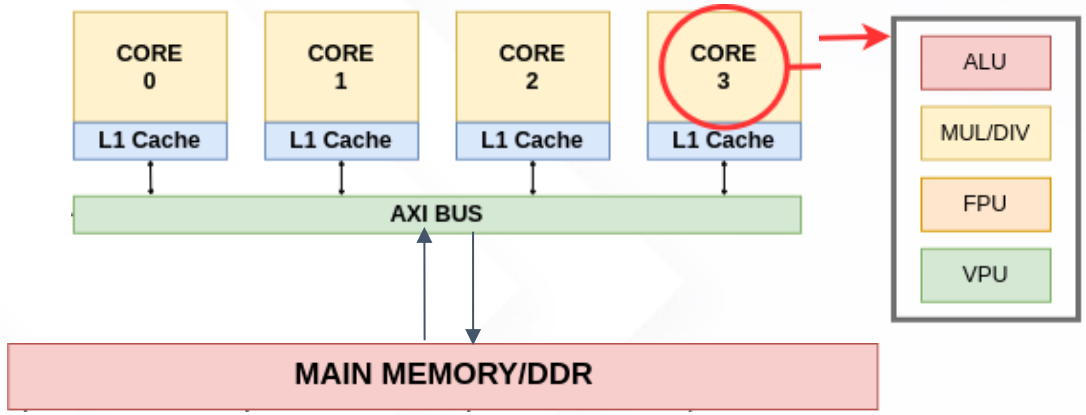


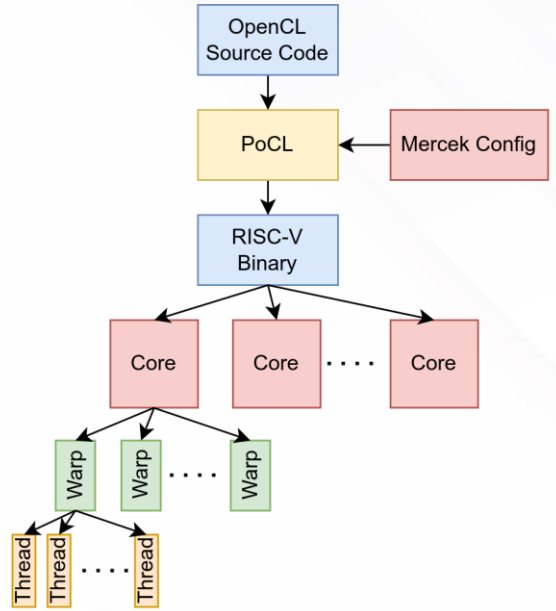
A new architectural approach

- Software applications and use-case demonstrations will be run on the RISC-V GP-GPU platform.
- The Project will help reduce dependency on external GPU vendors.

ICTürkiye2025
10 April, İstanbul

Project Idea: RISC-V based GP-GPU





- ❑ 4 Cores 1024 Threads
- ❑ Complete support for Vector extension
- ❑ Chip level place and route with 16nm or below technologies.
- ❑ Can be expanded to 16 Cores

- ❑ Dividing the work into sections, and drive them with different cores
- ❑ Develop a complete set of instructions for all of the OpenCL applications.

ICTürkiye2025
10 April, İstanbul

Consortium

Partners

- ❑ Partner for developing the software stack (OpenCL and OpenGL)
- ❑ Partner for the IC tapeout
- ❑ Partner for developing the PCB and cards

EDA Tools

cadence Mentor SYNOPSYS

intel FPGA XILINX

Fabrication

EUROPRACTICE imec Fraunhofer IIS

cmp
MPW Service and Business Development
Circuits Multi-Projects, Grenoble, France

UKRI Science and Technology Facilities Council
Design Tools and Training Courses
Science and Technology Facilities Council,
Rutherford Appleton Laboratory, Didcot, UK

ICTürkiye2025
10 April, İstanbul

PRESENTER CONTACT DETAILS:
kaya.demir@tubitak.gov.tr
COUNTRY: Türkiye