

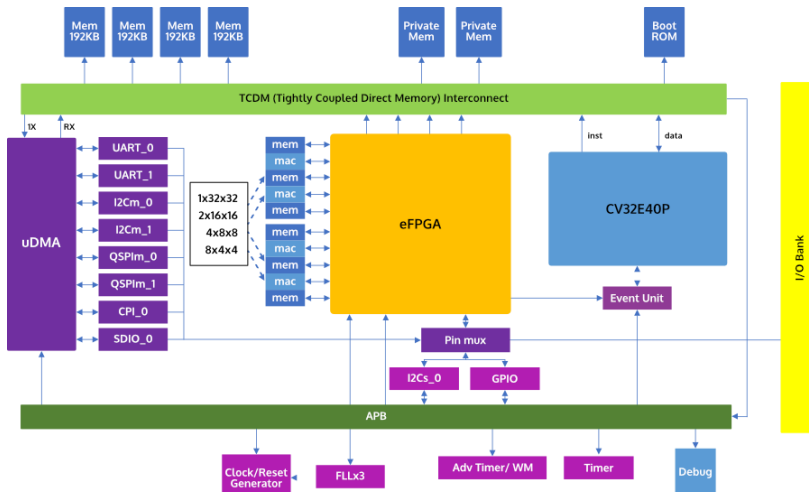


# CORE-V-MCU: An Open-Source Edge Acceleration Platform

CORE-V-MCU is an open-source microcontroller architecture designed for low-power edge processing applications such as machine learning. It is based on the CV32E40P RISC-V core from OpenHW Group and features a standard set of system peripherals. An FPGA implementation targeting low-cost boards is available now. An SoC in Global Foundries 22nm FDx is in development featuring a QuickLogic embedded FPGA macro for adding custom hardware accelerators without the time, cost, and complexity of re-spinning the chip.

## CORE-V-MCU features

- ✓ CV32E40P RISC-V: small, efficient, 32-bit, in-order core with 4-stage pipeline
- ✓ Standard peripherals: UART, I2C, QSPI, Camera, SDIO
- ✓ 512KB SRAM (SoC), BRAM (FPGA)
- ✓ Open-source System Verilog RTL for RISC-V core, peripherals, debug
- ✓ Build and verification scripts compatible with commercial and open-source EDA tool flows
- ✓ Software development kit (FreeRTOS, Eclipse CDT) and demo application
- ✓ FPGA implementation running on Digilent NexysA7-100T and Genesys2 boards; pre-built bitstream files for quick bring-up
- ✓ Coming 2022: Evaluation Kit with SoC manufactured in Global Foundries 22nm FD-SOI technology, featuring QuickLogic eFPGA macro for custom hardware accelerators or custom interfaces



Source: <https://github.com/openhwgroup/core-v-mcu/blob/master/docs/doc-src/overview.md>

## About CMC

### Enabling innovation across Canada's National Design Network

CMC Microsystems delivers a nationwide, shared platform of tools and services to Canada's micro-nano innovators, helping to create the economy of the future.

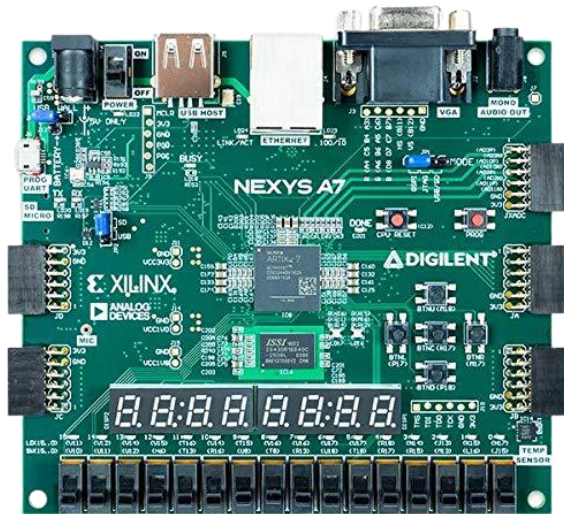
-  **25** multi-project wafer services available through nine foundries worldwide, offering industrial-scale manufacturing
-  **40** university-based micro-nanotechnology (MNT) fabrication labs across Canada, helping researchers customize their designs
-  **80** pieces of test equipment for loan in lab
-  **560** CAD tools and modules
-  **450** design flows, user guides and application notes



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## Key Platform Benefits

- Open-source platform enabling both research and commercial development
- Fully verified processor IP, actively maintained for ready adoption
- Compatibility with commercial design and verification flows for improved quality of results
- Pre-built bitstreams, documentation and demos for quick board bring-up for system evaluation and rapid adoption
- Active developer community provides complementary software tools, opportunities to collaborate and contribute to the ecosystem
- Embedded FPGA block for platform customization such as ML accelerators or custom I/O
- Full software compatibility between FPGA and SoC platforms for early software development
- FPGA and Evaluation Kit extensibility with off-the-shelf add-on modules (e.g. PMODs) to demonstrate user applications



The Digilent NexysA7-100T is a supported target for FPGA prototyping

## Research Topics and Applications

- Ultra-low-power edge processing
- Machine learning edge inference
- Multi-sensor signal processing and sensor fusion

## Related products from CMC

- Xilinx Vivado FPGA development tools
- ASIC design tools and design kits
- CMC Cloud Design Environments and CAD Compute Cluster
- Fabrication multi-project wafer services in a variety of technologies
- Packaging and assembly services
- Test equipment and FPGA development kits
- Collaborative R&D programs and contract R&D
- Technical support

## About OpenHW Group

OpenHW Group ([www.openhwgroup.org](http://www.openhwgroup.org)) is a not-for-profit, global organization driven by its members and individual contributors where hardware and software designers collaborate in the development of open-source cores, related IP, tools and software. OpenHW provides an infrastructure for hosting high quality open-source HW developments in line with industry best practices.

CMC is a Platinum Member of OpenHW Group; CNDN member institutions can join OpenHW Group at the Supporter level at no cost. Through membership, researchers can directly contribute to projects that develop the ecosystem and access the OpenHW Accelerate funding initiative in partnership with Mitacs.

## Get Started

1. Obtain the open-source project from the OpenHW repo:  
<https://github.com/openhwgroup/core-v-mcu>
2. Evaluate on the FPGA platform
3. Join the OpenHW development community
4. Contact CMC for more information and research opportunities



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## Contact

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