

Embedded Systems and Machine Learning

2018-2022 Microsystems Technology Roadmap, June 2018
Canada's National Design Network



	2018	2019	2020	2021	2022
Drivers: IoT (Node, Edge, Cloud) Artificial/ambient intelligence, machine vision Big Data, Cloud Computing Autonomous vehicles Sensor Fusion, Security		Large-scale Deep learning 11 billion connected devices	>500 zettabytes of data generated 86% of decision data processed at the edge 10M self-driving vehicles on highways Natural Language Processing 20 billion connected devices		44B camera-enabled devices Artificial General Intel.
Technologies: Sensor/Actuator Node	•1 CPU/device •255MHz clock •.608μW/bit Tx/Rx	☆Energy harvesting source	•2 CPU/device •300MHz clock •.228μW/bit Tx/Rx		•2 CPU/device •310MHz clock •.086μW/bin Tx/Rx
Edge Computing	•8CPU/16GPU cores •2.5GHz clock •850Mb/s Wifi	✓Form-factor optimized, programmable IoT node ☆Known Good Die embedded processing library ✓Power-efficient embedded machine learning ✓Neural network co-processor ✓OpenCL for embedded FPGA/GPU ☆ASIP for machine learning	☆Multi-die-based heterogeneous processing •10CPU/32GPU cores •3GHz clock ☆Neuromorphic co-processor •5G	•7Gb/s Wifi	•12CPU/32GPU cores •3.66GHz clock
Cloud Computing	•16/14nm FPGA •32 cores/socket •2.5GHz clock •1800GT/s	☆Application-oriented training dataset •PCIe 5	☆Configurable hardware/software AI platform •11/10nm FPGA •42 cores/socket •3.1GHz clock •2300GT/s ☆Heterogeneous operating system	☆Memristor FPGA ☆Real-time het. OS	•8/7nm FPGA •50 cores/socket •3.3GHz clock •5600GT/s ☆Quantum co-processor
	✓ Heterogeneous cloud computing		☆ Secure edge/cloud demonstrator	☆Optical interconnect processing node	
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The Microsystems Technology Roadmap has 5 segments:

Microelectronics/MEMS/NEMS, Photonics, Embedded Systems, Packaging and Multi-scale Integration, and Nanofabrication Labs.

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✓	Key technology feature of a planned Product or Service; Development activities are underway and/or supply chain is available.
☆	CMC is seeking collaborators, suppliers to deliver capability.
•	Anticipated technology feature based on roadmap sources.