



UNIVERSITÀ
DEGLI STUDI
DE L'AQUILA



disim



ATES@AQ Research Group

Assistive Technologies and Embedded Systems

University of L'Aquila

DISIM Department

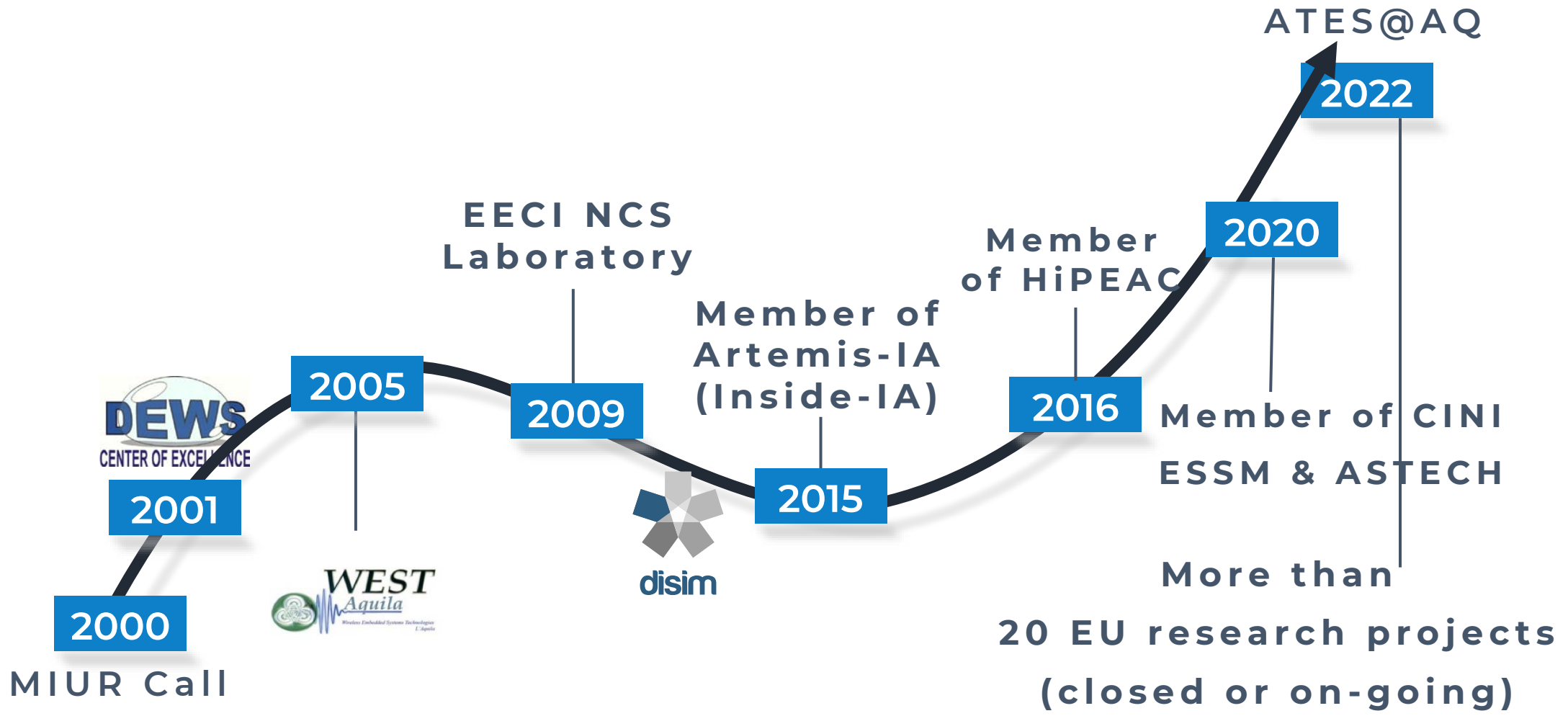
Information Engineering, Computer Science and Mathematics

Center of Excellence DEWS

Design methodologies for Embedded controllers,
Wireless interconnect and System-on-chip



ATES@AQ - History



ATES@AQ - People



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Ph.D. Student

ATES@AQ - Research Topics

- **1. Embedded ICT (eICT)**
- **2. On-Chip Monitoring**
- **3. Support on HW reconfiguration**
- **4. AI @ Edge layer**
- **5. Electronic System-Level HW/SW Co-Design**
- **6. Assistive Technologies**

1. embedded ICT (eICT)

- Experimentation, analysis, and characterization of all the ICT typically involved in the embedded systems domain (both traditional and high-performance)

HW

- **uC:** Microchip/Atmel, ST, etc.
- **DSP:** Texas Instruments, etc.
- **FPGA/SoPC:** Xilinx/AMD

SW

- **Bare-metal C/C++**
- **EOS/RTOS/HPV:** Linux, FreeRTOS, VxWorks, RTEMS, PikeOS, Xtratum

COMMUNICATION PROTOCOLS

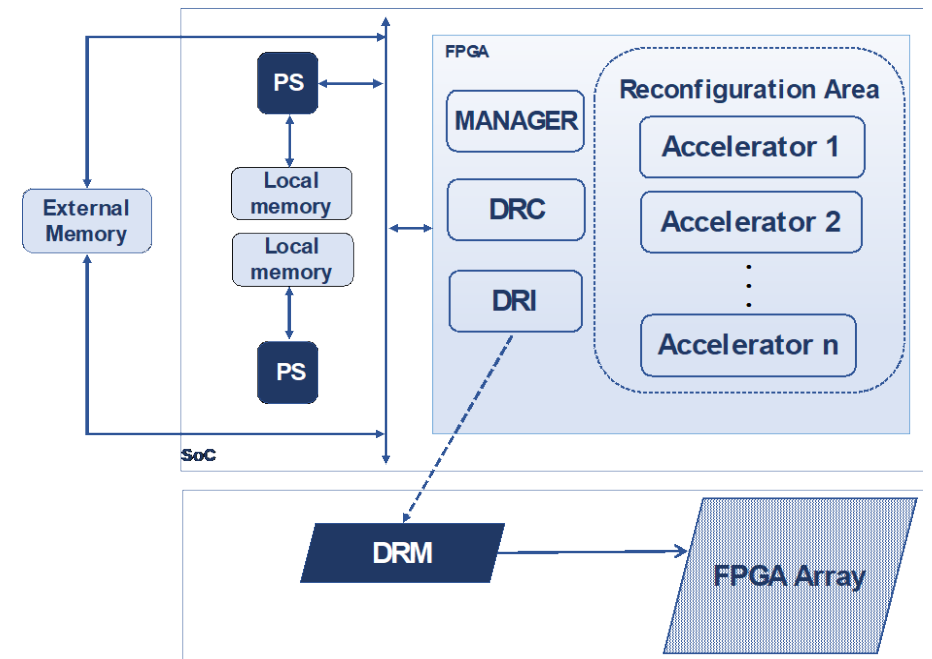
- **Wired:** USB, SPI, I2C, UART, RS485, CAN, etc.
- **Wireless:** IEEE 802.15.11, IEEE 802.15.4, BT, LORA, etc.

2. On-Chip Monitoring

- **Automatically finding on-chip monitors from requirements**
 - MONICA Tool (<https://monicatool.cloud/>)
- **Support on custom generation of on-chip hardware monitors**
 - Library: JOINTER
 - Unobtrusive tracing
 - Runtime characterization of system behavior
 - Tightly coupled bandwidth regulation

3. Support on HW reconfiguration

- **Dynamic Partial Reconfiguration Profitability & Off-Loading**
 - Accurate evaluation of DPR time
 - Reconfiguration Time
 - Multiple DPR requests
 - Support on HW-tasks context-switch



4. AI @ Edge layer

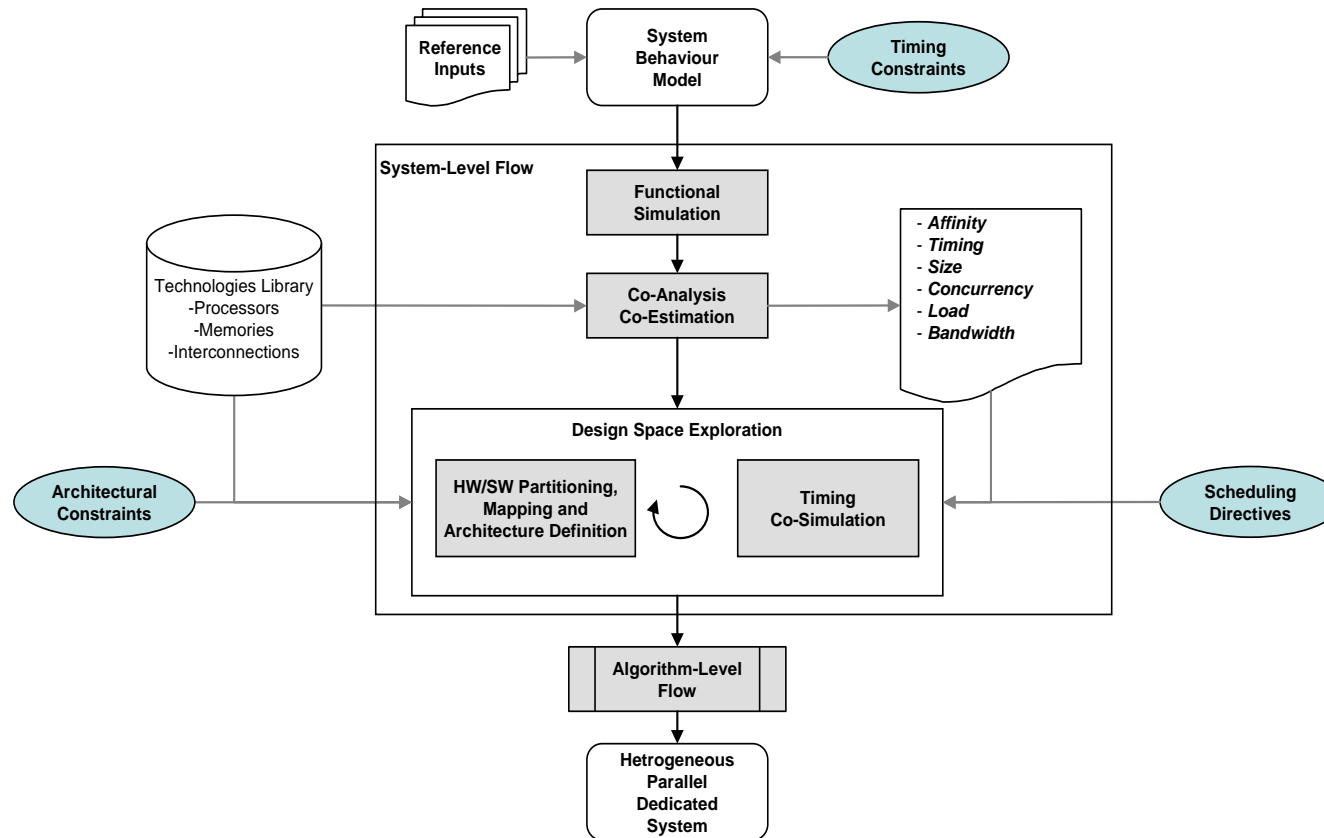
- **AI inference at the Edge**
 - Support to the designers in the analysis of the trade-offs provided by acceleration alternatives of CNNs on embedded/edge platforms
 - Acceleration on FPGAs, GPUs and dedicated cores
 - Optimization for constrained devices



5. ESL HW/SW Co-Design



HW/SW Co-Design of
Heterogeneous Parallel
Dedicated/Embedded
Systems



<http://www.hepsycode.com>

6. Assistive Technologies

- **The CrazySquare Project**
 - ICT-Game based system for music education learning
- **IVR-based Serious Game for ASD People**
 - Serious games for the treatment of autistic people using immersive virtual reality technologies

ATES@AQ - Figures

- **2010/2022**
 - More than 15 funded EU/National research projects
 - More than 10 industrial research contracts
 - Thales Alenia Space Italy, Thales Italy and several SMEs
 - Member of several international/national associations
 - INSIDE-IA, HiPEAC, ESSM & AT CINI National Laboratories

ATES@AQ - Contacts

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