

Low Power and Customized Embedded and Cyber-Physical Systems

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The Microelectronics and Bioengineering group in University of Cagliari is active in several national and european research projects in the field of embedded and cyber-physical systems (CPS), concerning different levels of abstractions in the design flow of such devices.

Activities involve sensor development, processing platform integration and refinement, and algorithm optimization. In the different projects several application domains have been tackled, such as multimedia processing, automotive, space. However a special emphasis has been often dedicated to embedded system support for bioengineering. The main effort has been dedicated to techniques aimed at reducing power consumption in special purpose embedded platforms and at reducing the design effort required for their development and application driven optimization. Here follows a general list of the main objectives that have been targeted in the group's recent activity:

- Development of novel technique for adaptive/fault tolerant design and management of multi-core embedded systems (Madness Project, at www.madnessproject.org)
- Development of an automated toolflow for the application-driven design of ASIP-based MPSoCs (ASAM Project, at www.asam-project.org)
- Development of an automated toolflow for the model-based design of re-configurable CPS (Cerbero Project, at <http://www.cerbero-h2020.eu/>)
- Development of an integrated CPS for sensing, processing and stimulation of neural signals in prosthetic devices, at <http://www.nebias-project.eu/>)
- Exploiting FPGAs and all-programmable SoCs to accelerate processing of biological signals (acquired by high-density microelectrode arrays) and bio-inspired artificial intelligence (Convolutional Neural Networks).

A prospective presentation at the workshop would describe main techniques and most important research results obtained in the above-mentioned research activities.