***Emerging applications in aerospace, automotive and IoT among others, require electronics efficient enough to use ultra-low power sources even in harsh environmental conditions. Despite the ubiquitous use of transistors in every modern electronic device, they cannot perform in extreme environments. Thus, there is a critical need for computation solutions with very high energy efficiency that survive extreme environments. The EU project ZeroAMP tackles this challenge by developing novel nanoelectromechanical (NEM) switches.***

**Ultra low-power computing for everywhere**

ZeroAMP aims to develop nanoelectromechanical (NEM) relay-based field-programmable gate arrays (FPGA) with integrated non-volatile memory (NVM) that can work at near cryogenic temperature and up to 300°C, with zero current leakage and standby power. The technology solution will incorporate novel materials, switch designs and circuit techniques along with advanced 3D stacking for large-scale integration of the NEM switching elements.

By leveraging recent breakthroughs of the ZeroAMP partners on novel 4-terminal (4-T) relay, bistable relay, 3D integration and wafer-level packaging, ZeroAMP will build demonstrators validated in a laboratory environment, targeting improved energy efficiency and harsh-environment capability for two product families, namely FPGA and NVM.

**The future exploitation and applications**

Autonomous nodes in the IoT require extremely energy-efficient processors with zero standby power, while all-electric vehicles and more-electric aircraft need electronics controllers that work at very high temperatures. At the other end of the spectrum, readout circuitry for superconducting quantum circuits need to operate close to cryogenic temperatures.

Thus, the ZeroAMP technology will be potential game-changers in the IoT, automotive, energy, aerospace and industrial automation industries, as well as an enabling technology for cryogenic quantum computing.

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| ZeroAMP is an industry-led project with partners covering the entire research and commercial supply chain across four European countries, including a large enterprise from UK (MICROCHIP), a semiconductor and MEMS manufacturing partner from Germany (XFAB), two specialised SMEs from Germany (AMO) and from Switzerland (SCIPROM), a research institute from Switzerland (CSEM) and two world-class university groups from Sweden (KTH) and UK (UNIVBRIS).  The industry partners are crucial for ensuring the industrial relevance of the technology development and for the commercial exploitation of the project results, while the research and academic partners will target breakthrough innovations and demonstrate the viability of the ZeroAMP technology. This well-balanced cluster of enterprises and institutions works together to achieve the project objectives, i.e. to bring the new NEM switch technology to Technology Readiness Level 4 (TRL4). |