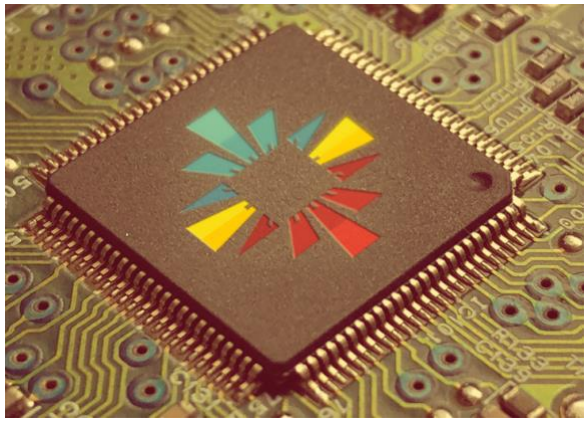
Intelligence at the edge (i-EDGE): €4.5M project to build hardware platform for edge computing using nanomechanical relays

A consortium from industry and academia has been awarded €4.5M by the EU, UK and Switzerland to build a next-generation hardware platform for edge computing using nanomechanical relays.

Computing at the edge of the network instead of transferring data to the cloud for processing can greatly improve efficiency, improve data security and reduce energy consumption. This is especially true for industrial Internet-of-Things (IoT) applications where embedding some processing capability, i.e. "intelligence", is very beneficial, but impossible with conventional transistor technology due to high temperatures or radiation levels, or both, at the sensing sites.



In the i-EDGE project a research team consisting of Microchip Technology Inc. (UK and France), a leading provider of smart, connected and secure embedded control solutions, the University of Bristol (UK), KTH Royal Institute of Technology (KTH, Sweden), Technical University of Vienna (TUWIEN, Austria), Gesellschaft für Angewandte Mikro und Optoelektronik mbH (AMO, Germany), the Swiss Centre for Electronics and Microtechnology SA (CSEM, Switzerland) and SCIPROM Sàrl (SCIPROM, Switzerland) will build processors from tiny mechanical relays with moving parts to withstand these harsh environmental conditions. Because these switches operate fundamentally differently from transistors, they can withstand much higher temperatures and radiation levels without failing, while an open air gap in the off state means no standby power is consumed.

Building on a technology platform developed in the ZeroAMP project https://www.zeroamp.eu/ funded by the European Horizon 2020 programme, the consortium in the i-EDGE project will exploit the unique properties of nanomechanical switches to build "systems-on-chip" where sensors, the interface to the sensors, the processor, and electronic memory for data storage are densely integrated on the same chip.

"I look forward to working with our project team. Based on the results achieved so far in ZeroAMP, we will further develop this technology in i-EDGE so that we can serve a number of highly relevant applications with it. I hope that at the end of i-EDGE we will be able to commercialize our concepts and solve real problems for real customers."
Dr. Jens Bolten, AMO GmbH, the project's coordinator

"Not only are NEM switches robust in harsh environmental conditions, in our approach logic and non-volatile memory, a type of electronic memory that retains information when power is switched off, can be built using the same manufacturing process. This allows for extremely efficient system architectures that avoid bottlenecks in communication, allowing us to build single-chip systems with integrated sending and processing that consume very little energy, up to an order of magnitude less than possible with conventional techniques."
Dr. Dinesh Pamunuwa, University of Bristol, Principal Investigator

The consortium expects the i-EDGE project to provide electronic solutions that unlock the full power of the IoT for industrial processing and manufacturing, electric vehicles, asset tracking, and smart environmental monitoring applications, strengthening EU technological leadership on chip design and manufacturing capabilities, supporting the EU Chips Act.

» For more info visit the i-EDGE website at https://www.i-edge-project.eu.

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