

who used up my battery?



Research on Energy Aware Computing at the **University of Bristol** aims to make energy consumption of computing visible. This enables new ways to predict energy use, guaranteeing battery life and optimizing energy efficiency of both software and hardware.

<http://www.cs.bris.ac.uk/Research/EACO/>

Coordinating research efforts towards

LOW ENERGY ICT

The goal of the ICT-Energy project is to create a coordination activity among researchers working on energy reduction in ICT from Nanoscale Devices to Exascale Computing. By bringing together the **Toward Zero-Power ICT** community with the **MINECC** community this project enables a concerted effort to lower the energy consumption across the ICT sector.

The aim is to assess the impact of existing research efforts and propose measures to increase the visibility of ICT-Energy related initiatives to the scientific community, targeted industries and to the public at large through the exchange of information, dedicated networking events, education and media campaigns.



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how do we make better thermoelectric energy harvesters?



By inserting thin materials of only a few atomic layers thickness, the speed of sound which controls the heat flow in a material can be engineered to slow down the speed of heat transfer and improve the efficiency of turning the heat into electricity to power autonomous sensors.

<http://www.greensilicon.eu/>

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exactly how much work can a device do with the energy it can harvest?



The SENSATION project seeks to balance the energy obtained through energy harvesting with the energy consumption of the device. A self energy-supporting system can adapt its behaviour depending on available energy, continuing to operate in a changing environment.

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can we operate a computer without using any energy at all?



At NiPS Laboratory, University of Perugia, we believe that the answer is yes. We are building micro scale computer device that can function with an amount of energy that is million times smaller than the present computers: towards zero-power ICT.

<http://www.landauer-project.eu/>

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can software engineering be energy-aware?



At Roskilde University we are working on bridging the large conceptual gap from hardware, where energy is consumed, to high-level programming languages and abstractions that are essential for modern software engineering.

<http://entraproject.eu/>

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how do we tackle the power wall in high performance computing?



The research on Energy-Aware Numerics in the **Exa2Green project** embraces all stages of numerical simulations from tools to analyse the power consumption, to elementary algebraic kernels and numerical building blocks on the application level. We developed a new type of power meter to measure the energy consumption of computers, designed energy-efficient numerical algorithms, and optimized the power consumption of a weather forecast model with aerosol chemistry. All of these efforts aim to reduce the energy consumption of numerical simulations in view of the next generation of exascale supercomputers.

<http://exa2green-project.eu/>

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www.ict-energy.eu



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National Institute

EPFL
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FÉDÉRALE DE LAUSANNE

can we bridge the gap between practical and theoretical power limits?



Future innovation in ICT products require us to break through existing power limits. The “Towards Low Power ICT” project researches new and disruptive approaches to push significantly beyond existing limits, paving the way for radically new ICT devices.

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10% of the world's energy consumption is burnt in data centres. How can we reduce this?



Researchers from ParaDIME at BSC are working towards reducing this consumption by proposing several energy minimization methodologies. One of the solutions is to replace traditional processors with modern low-power high performance processors and guaranteeing the same performance.

<http://www.paradime-project.eu/>

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can we build smart sensors that take up no space, cost nothing and last forever?



Researchers at Tyndall National Institute design and fabricate next generation smart sensors that harvest energy from the environment, consume ultra low power, and are made using low-cost materials and processes. These miniaturised integrated systems enable the Internet of Things revolution.

<https://www.tyndall.ie>

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how low can the energy consumption of a wearable medical sensor be?



Research on Ultra-Low Power Computing Architectures at the EPFL targets to reach a minimal energy consumption for multi-modal biomedical sensor nodes. This enables the development of smart wearable sensors that can operate as long as 7-8 weeks with current standard Li-battery. The final goal is to reach eternal operation for wearable sensors using only energy scavenging mechanisms.

<http://www.phidiasproject.eu/>

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