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KIT Team Identifies Lithium-Ion Batteries in Household Waste and Wins at COSIMA 2026

Nine teams competed in the 2026 COSIMA (Competition of Students in Microsystems Applications) contest. In the finals held during electronica (Munich), the team from the Karlsruhe Institute of Technology (KIT) emerged victorious with Cellscan. The sensor system detects lithium-ion batteries in household waste. COSIMA is implemented by the Association for Electrical, Electronic, and Information Technologies (VDE) as a project funded by the Federal Ministry of Research, Technology, and Space.

(Frankfurt am Main, November 17, 2026) Every year, COSIMA demonstrates anew just how close microelectronics can be to people's lives and how much it helps in everyday life. Dr. Ronald Schnabel, Managing Director of VDE/VDI-Society Microelectronics, Microsystems and Precision Engineering (VDE VDI GMM), notes: "We expect a working prototype and are consistently impressed by the ideas the teams bring to us. This also shows how strongly the younger generation is interested in shaping the future with technology and making a difference."

The student competition sets no specific thematic requirements and simply calls for a combination of technology and practical applicability. In addition to the technical implementation, a marketing concept is required, and the students must secure sponsors to finance their project. Sponsors of the competition include Bosch, Faulhaber, Infineon, and electronica.

In 2026, the first place went to the team from the Karlsruhe Institute of Technology (KIT) with CellScan. Second place went to VivaPatch, a wearable ECG developed by students at the Technical University of Munich, and third place went to the team from Schmalkalden University of Applied Sciences, which developed EvacEye, a sensor system for detecting people in the event of a fire.

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1st Place: Detecting Lithium-Ion Batteries in Household Waste to Prevent Fire Hazards

Lithium-ion batteries are found in a wide variety of products today and often end up in household trash by accident. In the compactors of garbage trucks, they can trigger a fire—a major problem for waste management, for which KIT students have developed a solution with their CellScan sensor system. Team spokesperson Philipp Casapu explains: “We use an inductive impedance sensor to detect the metallic casings of the batteries via the coil’s magnetic field. For the system to work, we had to take many parameters into account, since the batteries come in a wide variety of sizes.” To analyze the sensor data, the team collected measurement data and used it to train an AI-based classification model. “We’re very pleased to have taken first place at COSIMA. Now we’ll invest the 2,000-euro prize money in further development and continue working on the solution with our industry partner.”

2nd Place: Developing a Wearable ECG to Improve Cardiac Diagnostics

In regions with poor medical care, heart disease is often detected very late. The team from the Technical University of Munich has developed VivaPatch, a wearable ECG that can be used by multiple people. Team spokesperson David Smith explains: “We wanted to create something that helps many people. Additionally, one of our advisors has heart problems, which motivated us personally.” The team deliberately opted for a solution that is viewed as a lifestyle product—like a smartwatch—rather than a medical device. VivaPatch is robust, easy to repair, and designed electronically in a way that allows for cost-effective production. “The biggest challenge was designing the component layout for the first prototype run so that we could produce a working prototype in a single attempt.” It worked: The prototype not only won second place at COSIMA—which came with a prize of 1,500 euros—but also convinced several interested companies of the idea’s potential.

3rd Place: Detecting People in a Fire, Saving Lives

In the event of a fire, every second counts when it comes to getting people to safety. The sensor-based assistance system EvacEye is designed to help emergency responders prioritize evacuation efforts. Leonard Maletzke, spokesperson for the team from Schmalkalden University of Applied Sciences, says: “During a test alarm, we wondered how the fire department determines where people are still located inside the building. That’s when we realized there’s a gap in safety systems in this area.” EvacEye consists of a radar sensor and a thermal sensor that enable robust presence detection. Following the development of the prototype—which won third place at COSIMA, along with a 1,000-euro prize—further steps are already planned: “After consulting with our partner, we want to optimize the cost factor and increase the reliability of the results to turn EvacEye into a product.” In addition to occupant detection, sensors for measuring air quality and other parameters are being considered to meaningfully expand the functionality of fire alarm systems.

About the VDE/VDI-Society Microelectronics, Microsystems and Precision Engineering (VDE VDI GMM):

The VDE/VDI Society Microelectronics, Microsystems and Precision Engineering (VDE VDI GMM) is the comprehensive platform in microelectronic application areas. It is jointly supported by the VDE and VDI, and promotes the valuable transfer of interdisciplinary knowledge. Its spectrum ranges from basic technologies in the production of microelectronics and microsystem technology right through to mechatronics and fields of electromagnetic compatibility. The GMM stands for cooperation and international networking to foster innovation. It works with interdisciplinary research institutes, companies and universities at every stage, from basic research to applications, and offers its members all the advantages of being part of a progressive expert community. Thanks to its expertise, the GMM has an influence on technical standards and is involved in national and European research programs. Other important goals for the GMM include promoting young scientists as well as training and further education. The COSIMA competition (Competition of Students in Microsystems Applications), which is funded by the Federal Ministry of Research, Technology and Space, is essential in achieving this.

For more information, visit www.vde.com/gmm

About VDE:

VDE, one of the largest technology organizations in Europe, has been regarded as a synonym for innovation and technological progress for more than 130 years. VDE is the only organization in the world that combines science, standardization, testing, certification, and application consulting under one umbrella. The VDE mark has been synonymous with the highest safety standards and consumer protection for more than 100 years.

Our passion is the advancement of technology, the next generation of engineers and technologists, and lifelong learning and career development “on the job”. Within the VDE network more than 2,000 employees at over 60 locations worldwide, more than 100,000 honorary experts, and around 1,500 companies are dedicated to ensuring a future worth living: networked, digital, electrical. Shaping the e-dialistic future.

The VDE (VDE Association for Electrical, Electronic & Information Technologies) is headquartered in Frankfurt am Main. For more information, visit www.vde.com

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