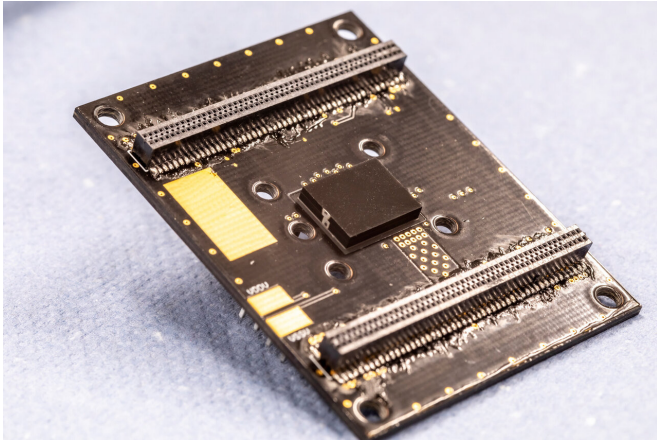


Researchers develop smallest particle sensor in the world

24 September 2020, by Christoph Pelzl



The prototype of the particle sensor developed at TU Graz. Credit: Lunghammer - TU Graz

TU Graz, AMSm, and Silicon Austria Labs have developed a compact, energy-efficient sensor for mobile devices that informs users in real time about the fine dust content in the air and warns them of elevated values.

It is slightly smaller than two stacked one-cent coins and is thus particularly energy-efficient. It requires no maintenance and can be integrated in mobile devices. It is the smallest particle sensor in the world. With this 12 x 9 x 3 millimeter innovation, smartphones, smart watches or fitness wristbands can for the first time measure the quality of the ambient air in real time and sound the alarm in the event of increased fine dust values.

Innovative implementation

The sensor was developed by Paul Maierhofer as part of his dissertation at the Institute of Electrical Measurement and Sensor Systems at Graz University of Technology, together with experts from the semiconductor manufacturer AMS AG

and with researchers from Silicon Austria Labs (SAL). The development was based on well-known methods of conventional measuring instruments as well as modern manufacturing and integration methods, which brought the project team together in an innovation process. The innovation is the miniaturization itself, as Maierhofer explains: "The sensor is right at the limit of what is physically and technically feasible and involves a lot of tricks to function at this size."



Paul Maierhofer with the result of his dissertation at the Institute for Electrical Measurement and Sensor Technology at Graz University of Technology: the 12 x 9 x 3 millimetre small particle sensor. Credit: Lunghammer - TU Graz

Adapting behavior to ambient air

The immense social benefit of this new innovative particle sensor is obvious. According to a study by the European Environment Agency (EEA), over 400,000 people die prematurely every year in Europe alone as a result of particulate matter pollution. With the help of wearables equipped with the new particle sensor, each and every individual can monitor the ambient air and react immediately

in the case of health-endangering fine dust values. "For example, by avoiding particularly polluted routes when jogging or on the daily commute to work," says Alexander Bergmann, head of the Institute of Electrical Measurement and Sensor Systems at TU Graz and doctoral supervisor of Paul Maierhofer.

Improving air quality

Beyond wearables, the sensor can also be integrated in local applications—both in the home and outdoors—and thus provides an unprecedented variety of measured values. Bergmann is convinced that this represents a break from the past in air-quality monitoring: "Close-meshed and comprehensive monitoring of air quality has so far failed due to the size, complexity and cost of currently available measuring [sensors](#). Our particle sensor fills a gap here." The data obtained can serve as a basis for further regulatory measures and raise public awareness of the particulate matter problem.

The series production aimed at by semiconductor manufacturer AMS is intended to achieve a price that is significantly lower than the currently available sensors.

Provided by Graz University of Technology

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