

FRAUNHOFER INSTITUTE FOR INTEGRATED CIRCUITS IIS  
DESIGN AUTOMATION DIVISION EAS

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## OPTICAL ACTIVITY DETECTION WITH PROTECTION OF PRIVACY

**Challenging localization tasks, such as in automation, electronic control and safety systems, demand especially powerful and energy-efficient sensor solutions. Image sensors offer more potential than simple, passive sensing elements. Against this backdrop, Fraunhofer IIS/EAS has developed an energy-efficient system for activity detection using image sensor systems-on-chip.**

Various measurement approaches exist for detecting the positions and movements of persons. However, if robust detection and localization of movements and gestures is required for a presence detection application, typical sensors such as infrared motion detectors are not suitable. An optical system represents an effective alternative. Researchers at Fraunhofer IIS/EAS have therefore developed such a system for activity detection. It is based on the principle of multimodal, texture-based image sequence processing and can be flexibly adapted to the respective conditions. This allows existing cameras to be equipped with corresponding software, but it is also possible to develop individual systems based on image sensor systems-on-chip.

The Fraunhofer approach offers the decisive advantage that no real image data is output. Algorithms prevent this, thereby ensuring that the privacy of the detected persons is not violated. Nevertheless, motion tracking and scene analysis are still easily possible. The optical system detects the location and the intensity of the activity of persons within a defined area. Events are assigned to specific attention zones with a region editor for this

purpose. On this basis, various software modules can output the number of independent objects, their position and direction of motion as well as register when regions are entered or left. A self-learning function enables the system to independently differentiate between persons and moved objects. The energy-efficient system can also be reliably used even in high-contrast situations or low illumination. The power consumption of the image sensor system-on-chip is less than 100 mW.



ACTIVITY SENSOR IN A CAMERA MODULE

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## ON THE PATH TO SELF-DIAGNOSTIC MICRO-ELECTRONICS

**For numerous components used in aviation, automotive or medical technology, it is essential that the associated electronics function flawlessly for decades. At the same time, they must be inexpensive and offer high performance in order to carry out increasingly complex tasks. These requirements can only be met if the micro-electronics systems of tomorrow are developed differently from today. In the RELY project, researchers at Fraunhofer IIS/EAS worked with other partners to create software for the development of electronics with maximum reliability. This is the foundation for future systems offering previously unachieved functionality while also being capable of independently detecting and correcting functional defects over their lifespan.**

Safety-critical applications cannot be allowed to malfunction. It must therefore be ensured that their electronic components have particularly good longevity and also operate reliably even under extreme conditions. At the same time, the components should be increasingly powerful, faster and more energy-efficient in order to optimally make use of the limited energy resources of the system and enable additional functionality. These requirements are met only by the newest semiconductor technologies. However, since these technologies originate in consumer electronics, they are not inherently optimized for especially high demands on longevity and stress. They react sensitively to environmental influences such as cold, heat, moisture or heavy vibrations. In order to use these advanced technologies despite these aspects, it is necessary to take into account the required quality, reliability and resilience already during development of the parts. Nine German research partners have now developed software tools and test procedures for this purpose. These tools allow the demands on reliability to be integrated into the entire design process for electronic systems.

Fraunhofer IIS/EAS worked on an important component for achieving this goal: the simulation of aging processes in modern, highly integrated semiconductors. Important physical effects are

accounted for and simulated with precise models. Special interfaces permit electronics designers to utilize these methods in their design process. Practically at the push of a button, they can generate aging models based on measurement data from individual components and integrate these into their design environment. This makes it possible to investigate in advance the reliability of entire systems over the course of years, something that is impossible with measurements in general. Another software component predicts the quality of the microchips to be manufactured. With the help of these procedures, new technologies can be employed without difficulty while avoiding failures in safety-critical systems.



The individual approaches were tested on demonstrators, which also contain self-diagnostic functions to an extent. For example, they independently detect malfunctions as they arise and switch over to replacement components. The German sub-project RELY was part of a European project of the same name. The partners from research and industry were coordinated by Infineon Technologies. The Federal Ministry of Education and Research supported the German research work with 7.4 million euros.

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## News

### **SEMI European 3D TSV Summit 2015 from January 19th to 21st, 2015, in Grenoble**

A conference, exhibition and networking event on the topic of 3D system integration under the motto of "Enabling Smarter Systems".  
<http://www.semi.org/eu/node/8566>

### **WiCkeD training course from February 24th/25th in Dresden**

This course offered by Fraunhofer IIS/EAS gives participants a comprehensive overview of the possibilities of the MunEDA software for analysis and optimization of analog, mixed-signal and digital

ICs. The course is geared towards new users of WiCkeD.

<http://www.eas.iis.fraunhofer.de/wickedkurs> (German)

### **Modelica basics course on April 21st, 2015 in Dresden**

Our experts will be teaching the basics of the Modelica modeling language. Applications in modeling, the use of typical simulators and analysis will also be discussed in addition to fundamental concepts. The one-day course is an ideal way to get started with Modelica.

<http://www.eas.iis.fraunhofer.de/modelicakurs> (German)

## GREAT INTEREST IN USER GROUP MEETING

On October 16th, in parallel with DVCon Europe in Munich, roughly 40 users gathered for the first SystemC AMS – COSIDE® user group meeting. Representatives of major European companies from various fields of electronics design attended to present practical application examples. Thanks to the positive reception to the format, the next user group meeting has already been planned for October 2015.

The SystemC AMS – COSIDE® user group meeting offers an effective and practical forum for intensive sharing of information on potential applications and current developments in the language and design environment. The meeting is organized by Fraunhofer IIS/EAS, which actively participates in the development of SystemC as an allied member of the Accellera Systems Initiative. In this role, the division offers SystemC AMS proofs of concept with model libraries for Accellera Standard Extensions 1.0 and 2.0 for free downloading. The division also developed the design environment COSIDE®, which is based on this language.

During the first meeting of this kind, the participants came in particular from industry in order to share their experiences and learn from each other. Over four sessions, they learned more about the broad range of possible application from companies such as NXP



THE PARTICIPANTS OF THE USER GROUP MEETING

Semiconductor, Infineon, Lantiq, STMicroelectronics and Viconnis Test Technologie. Topics came from the industries of automotive manufacturing, telecommunications and automation. The next user group meeting is expected to be held again in Munich. Interested parties can notify us now to sign up for more information.

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## PROJECT AWARDS AT THE EUROPEAN NANO-ELECTRONICS FORUM

On November 26th and 27th, the annual European Nano-electronics Forum was held in Cannes. Under the motto of “Enabling Smart Solutions”, participants gathered to learn more about current industry trends, innovations, European



AWARD PRESENTATION IN CANNES

strategies and research subsidies. Two projects in which Fraunhofer IIS/EAS participates were also recognized at this event.

The 2014 ENIAC Innovation Award went to the project “EnLight – Energy Efficient and Intelligent Lighting Systems”. The European companies and research institutes participating in this project have developed intelligent lighting solutions for fully realizing the potential of LEDs and lowering their energy consumption by as much as 40%. The award was received by the companies of Osram, NXP Semiconductors and Philips on behalf of all project partners. In addition, roughly 50 current research projects were presented in a poster session. The project “THINGS2DO – THIN but Great Silicon 2 Design Objects”, which concerns FD-SOI technology, was selected as the best of these.

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