Fraunhofer

FRAUNHOFER INSTITUTE FOR INTEGRATED CIRCUITS IIS
FRAUNHOFER INSTITUTE FOR PHOTONIC MICROSYSTEMS IPMS

PRESS RELEASE

"Energy-efficient AI system": Fraunhofer participates in Germany's *Sprunginnovationen* competition with the ADELIA project

Erlangen/Dresden: Germany's Federal Ministry of Education and Research (BMBF) has launched its first-ever competition dedicated to the development of an innovative, energy-efficient AI system. The Fraunhofer Institutes IIS and IPMS have entered their joint ADELIA (Analog Deep Learning Inference Accelerator) project into the BMBF's *Sprunginnovationen* competition, where their focus is on the design of an analog inference accelerator ASIC. Fraunhofer IIS leads the project.

Whether for voice, health or parking assistance, artificial intelligence forms the backbone of the smart assistants we use every day. However, such computer systems consume large quantities of energy, which is why new, more efficient energy concepts are becoming essential.

To help address the energy problem, the BMBF is running the AI *Sprunginnovationen* competition – aimed at driving innovation through creative, disruptive ideas – to support projects of particular interest to technology and society. A total of eleven participants from universities and research institutions are taking part and working on solutions for energy-efficient AI processing. The participants are given access to a database containing real training data and their task is to develop an AI solution that reliably detects signs of medical conditions, such as atrial fibrillation, from this ECG data.

"Our team combines interdisciplinary experience from the fields of low-power integrated circuit (IC) development, medical engineering, machine learning and signal processing, all of which are key to developing an energy-efficient ASIC for AI applications," explains Dr. Loreto Mateu, ADELIA project manager and group leader at Fraunhofer IIS.

"The ADELIA project aims to come up with an energy-efficient solution for evaluating ECG data to reliably identify ventricular fibrillation," explains Dr. Thomas Kämpfe, group leader at Fraunhofer IPMS. "The issue with many applications, especially battery-powered mobile devices, is that current AI systems consume way too much power."

The project is part of a new approach to research funding in Germany, whereby for the first time funding goes to participating teams who then compete to develop a solution to a particular problem. Eleven teams in total are competing in three categories (FPGA, ASIC-130 and ASIC-22FDX) to come up with solutions for different technological appli-

Editorial notes
Thoralf Dietz | Phone +49 9131 776-1630 | thoralf.dietz@iis.fraunhofer.de | Fraunhofer Institute for Integrated Circuits IIS |
Am Wolfsmantel 33 | 91058 Erlangen, Germany | www.iis.fraunhofer.de

cations. The winners of the three categories each have the chance to work with industry and users to put their innovative ideas into practice.

Fraunhofer IIS and Fraunhofer IPMS have teamed up to compete in the category to design a solution for the 22FDX® FD-SOI technology developed by GLOBALFOUNDRIES Dresden Module One LLC & Co KG. Both institutes are focusing their development work on an energy-efficient analog crossbar-based accelerator. Potential applications range from energy-efficient ASICs for human-machine communication to dedicated wearables for the diagnosis of medical conditions.

Background:

Demand is growing for more complex AI applications that perform multi-channel sensor evaluations in edge devices that are not connected to a cloud server – including smart home devices, portable voice assistants, autonomous systems and wearables. In addressing this demand, key criteria for developers are how compact such mobile devices are, the costs they generate and their battery life. For sensitive data, such as readings from medical devices, trustworthy electronics are also required, which is why European solutions and technologies (such as 22FDX®) are sought that ensure AI sovereignty.

Fraunhofer IPMS researches and develops solutions in the fields of microsystems technology, nanoelectronics, sensor systems and wireless microsystems. In addition to developing technology components, Fraunhofer IPMS also works to develop and optimize NVM storage solutions.

Fraunhofer IIS, one of Europe's leading IC design institutes, works in the field of integrated circuits and systems to research and develop tailored solutions for increasingly sophisticated and complex electronic systems. Its main areas of activity include mixed-signal ASIC design for industrial and automotive applications and ultra-low-power solutions for IoT applications. A key focus in the field of digital health is on recording medical-grade textile-integrated multi-channel ECGs and reliably detecting health-relevant parameters in the ECG signal.

The Fraunhofer-Gesellschaft is the leading organization for applied research in Europe. Its research activities are conducted by 72 institutes and research units at locations throughout Germany. The Fraunhofer-Gesellschaft employs a staff of more than 26,600, who work with an annual research budget totaling 2.6 billion euros. Of this sum, 2.2 billion euros is generated through contract research. Around 70 percent of the Fraunhofer-Gesellschaft's contract research revenue is derived from contracts with industry and from publicly financed research projects. International collaborations with excellent research partners and innovative companies around the world ensure direct access to regions of the greatest importance to present and future scientific progress and economic development.