Newsletter

Volume 2, Issue 1
September 2023

European Nanoelectronics Applications, Design & Technology Conference - ADTC 2023, 26-27 June 2023, Grenoble, France

The 24th **European Nanoelectronics Applications, Design & Technology Conference - ADTC 2023**, was held on 26-27 June 2023, in Grenoble, France and co-located with the LETI Innovation Days.

The ADTC Conference focused on electronic components, electronic system design, design automation, and manufacturing topics related to micro- and nanoelectronics, which are critical to the success of many European companies. EUREKA, Horizon Europe, and local governments have supported exhaustive research and development in this area in recent years. The conference highlighted the exciting and promising results primarily from the PENTA/XECS, ECSEL/KDT & H2020/Horizon Europe projects.

The attendees included leading experts and project managers in R&D projects in nanoelectronics and design technologies and their applications, semiconductor-industry R&D managers, microelectronics experts in applications industries like automotive and industrial, and the major research organizations in the European scientific community.

The technical sessions focused on several important topics, such as Green Electronics, RISC-V, connectivity, edge AI and applications in the automotive sector. The conference included invited keynote talks and presentations with audience opportunities to interact with the speakers, discuss novel and exciting research, and establish new and fruitful collaborations in the edge AI field.

The EdgeAI project supported the organization of the conference, with several EdgeAI beneficiaries like CEA, STMicroelectronics, and SINTEF contributing and presenting during the conference sessions. The conference co-chairs, Marcello Coppola, STMicroelectronics and Gilles Sicard, CEA-Leti, France, emphasised the importance of edge AI in the new developments in advanced integrated circuits, sensors, and microcontrollers. Ovidiu Vermesan, SINTEF, Norway and Mario Diaz Nava, STMicroelectronics, France, held a presentation on "*Edge AI Technology Trends*", highlighting the major technological trends in the field based on their work in EdgeAI and ANDANTE projects.

The Key Digital Technologies Joint Undertaking (KDT JU) was represented by Programme Officer Huascar Espinoza, who gave a keynote speech on "*Pathways to Human-centred AI-driven Modular Innovation in Electronic System Design*" covering the AI-driven key innovation in electronic system design and the overview of KDT/Chips JU activities related to edge AI for 2023/2024.

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Requirements Engineering for Edge AI Systems

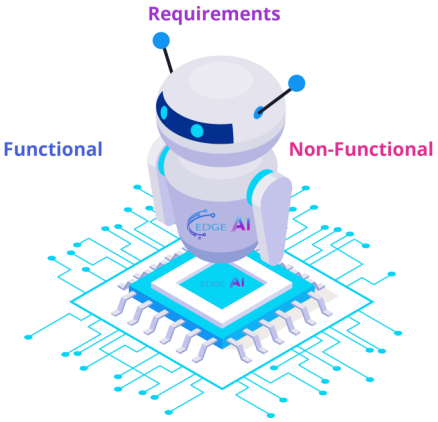
The EdgeAI project activities during this period focus on defining the requirements and specifications of twenty edge AI-based demonstrators developed by the project beneficiaries.

The functional requirements (FRs) define the edge AI system's specific features, functions and behaviour and are typically detailed in the system design stage. The edge AI system non-functional requirements (NFRs) define operation capabilities and quality system attributes rather than specific behaviour and are usually described in the system architecture stage. The approaches for addressing the FRs and the NFRs help to enhance EdgeAI project cohesion and support the consortium beneficiaries to track the individual demonstrators and results in the five value chains (VCs) covered by the project: digital industry, energy, agri-food and beverages, mobility, and digital society.

The FRs and NFRs are based on the demonstrator's high-level architecture and intended applications. They are defined with the key performance indicators (KPIs) and measures used to monitor their performance over the project lifetime.

The NFRs can also be called quality requirements, imposing constraints on the design or implementation (such as functional suitability, reliability, performance efficiency, usability, security, compatibility, maintainability, and portability). NFRs are represented in the form of what the edge AI system should be. The plan for implementing NFRs is detailed in the system architecture description.

Edge AI functional requirements define a function of an



edge AI system or its parts, where a function is defined as a specification of behaviour between inputs and outputs.

The FRs can involve technical details, processing, data manipulation and other required functionality that defines what a system is supposed to achieve. Behavioural requirements describe cases where the edge AI system uses the FRs captured in use cases.

FRs are represented in the form of what edge AI systems must do. The plan for implementing FRs is detailed in the system design.

Defining the FRs and NFRs of edge AI systems includes new processes such as managing data, training the models, and changing the system design process. In edge AI systems, the work focuses on the edge hardware platforms, software edge AI technology stack, including edge AI frameworks, managing data, feature extraction, analysing, configuring, and optimising the AI-based models, etc. It includes gathering requirements, collecting, cleaning, and labelling data, feature engineering, training, and evaluating the model, and deploying and monitoring it over time. The FRs and NFRs are decided based on how feasible it is to implement features and find appropriate models for the existing use cases. The edge AI systems development process differs from the traditional embedded systems developments, and unexplored challenges are emerging when managing the requirements for edge AI, including new elements such as ethics, explainability, interpretability, and trust. Some existing requirements have changed.

The EdgeAI project beneficiaries are now working to address these new challenges and issues when building performant edge AI systems into the planned demonstrators.

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https://edge-ai-tech.eu/

EdgeAI

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EdgeAI Key Facts

Start: 01 December 2022

Duration: 37 months

Budget: 35,43 M€

Coordinator: SINTEF AS

Consortium: 49 partners

Consortium

SINTEF, Infineon, ams OSRAM, SoftwareCUBE, TU/e, imec, NXP, GNT, NEURO Controls, COGNITION FACTORY, IMST, Universität zu Lübeck, netcompany intrasoft, ST life.augmented, Vranken Pommery, TECHNEXT, cea, Grenoble INP UGA, Université de Reims Champagne-Ardenne, cnrs, Université Polytechnique Hauts-de-France, Χαροκοπειο Πανεπιστημιο Harokopio University, scm group, HTS High Technology Systems, Intelligent Machines IoT & Cyber Physical Systems DeepSensing S.R.L., Xtremion, Università degli Studi di Cagliari, Alma Mater Studiorum Università di Bologna, Università degli Studi di Milano, Elektronikas un datorzinātņu institūts Institute of Electronics and Computer Science, Signify, Technolution, almende, TU/e, Fredrikstad energi, NxtEnergy, PROLUX, nxtech, ITML, CONVERGENCE

Disclaimer

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