EU DIGITAL FUTURE FORUM

HiCONNECTS – An Introduction by NXP

A. Sanfilippo
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Abstract
The challenges and major HiCONNECTS objectives are to transform the centralized cloud platform to decentralized platforms which include edge cloud computing in a sustainable, energy-efficient way. This will bring cloud services including Artificial Intelligence (AI) closer to the IOT end-users, which enables them to really use the COT and IOT efficiently.
The technologies underpinning this revolutionary step include the development of high-performance computing, storage infrastructure, network interfaces and connecting media, and the analysis of IOT sensors and big data in real-time. This major step forward will enable, for example, the mobile clients (during the 5G deployment phase and 6G exploration) to move among different places with minimum cost, short response time and with stable connection between cloud nodes and mobile devices.
The main underlying technology to be developed by the HiCONNECTS consortium, comprising large industrial players, universities and RTO's, and many SMEs, can be summarized under the title: 'heterogenous integration' (HI) which is needed to meet the computing power, bandwidth, latency and sensing requirements for the next generation cloud and edge computing and applications. The HI revolution brings the electronic components and systems (ECS) into a new domain, which combines traditional silicon wafers integrated circuit (IC), InP based high speed electronics , and Si and InP photonics devices and interconnect.
The HiCONNECTS ambition is to demonstrate, through HI development, a leap in computing and networking reliability and performances across the full vertical and horizontal ECS value chain (i.e. essential capabilities

and key applications) in a sustainable way. In addition, HiCONNECTS will focus on the development of next generation design, algorithms, equipment (HW/SW), systems and Systems of Systems (SOS).

Biography

Dr. Andrea Sanfilippo is currently working as Senior Manager – Public Funding at NXP Semiconductors, Munich (Germany). Previously, he worked for many years as technology planning and cooperation manager and head of the cooperation dept. for the German speaking area at Huawei Technologies in Munich (Germany) and as innovation manager in the R&D incentives domain at Deloitte and PNO, in Milan (Italy). Andrea also obtained a PhD in Physics at the Fritz Haber Inst. of the Max-Planck Society in Berlin (Germany).

HiCONNECTS - Photonics Heterogeneous Integration Pilot Line

D. Velenis
R&D Manager 3D and Silicon Photonics Devices and Components group
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Abstract
Enabling bandwidth scaling of optical interconnects while reducing the energy per transmitted bit, requires the heterogeneous integration of different devices and components in a photonics transceiver system. Challenges related to the integration compatibility of new materials, accurate component assembly, and heat dissipation while maintaining a high-yield process are addressed with the development of a photonics pilot line within the HICONNECTS consortium. The primary activities of the pilot line focusing on co-packaged optics, efficient integration of light sources, and heterogeneous integration of non-silicon components are discussed in this presentation.

Biography
Dimitrios Velenis is the leader of the 3D and silicon photonics device and components group at imec. He has been with imec for more than 15 years, with expertise on the benchmarking of advanced integration flows for 3D and Silicon Photonics interconnects. He has obtained M.Sc. and Ph.D. degrees from the University of Rochester. Previously, Dimitrios worked as Assistant Professor at the ECE Department at Illinois Institute of Technology, and as a Research Associate at the University of Rochester. He is author and coauthor of more than 70 papers in journals and conference proceedings.

HiCONNECTS - Enhanced Chip manufacturing developments

D. Pagano
Project Manager
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Abstract
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Biography
Daniele Pagano is Funding Project Manager at STMicroelectronics s.r.l.
He has covered various positions and responsibility in Catania Wafer Fab Operations (Litography, Dry Etching, APC & SPC, Epitaxy, Quality & Process Control), past experiences in collaborative projects like IMPROVE (2012), INTEGRATE (2015), MADEin4 (2022), SATURN (2023) and nowadays HiCONNECTS

and IPCEI. He is author and co-author of several publications on journals and international conferences.

Dr. Giuseppe Fazio, graduated in physics at University of Milano. He has significant experience in industrial electronic devices and since 2000 he works in Semiconductor industries.
In semiconductor field Giuseppe has significant experiences in advanced process and equipment control. He was APC/AEC group leader in STMicroelectronics, and holding the same position in Numonyx and in Micron from 2009 to 2013.
From 2016 to 2022 as Industrial Engineering project manager, in this position in charge of development and deployment Central Functions IE methodology and systems.
Today in Front End Manufacturing as project manager he coordinates programs aimed at maintaining and improving the performance of production equipment.
Past experiences in collaborative project, he is author and co-author of several publications and some patents.

Digital Twin Software for Finite Element Analysis.

R. Tomar
Managing Director
DigitalTwin Technology GmbH, Cologne, Germany

Abstract
Finite Element Analysis (FEA) has long been a pivotal tool in engineering and design, enabling the simulation of complex physical systems. However, as industries evolve towards greater complexity and integration, there is an increasing need for advanced software solutions that can enhance the capabilities of FEA. This presentation introduces the concept of Digital Twin Software for Finite Element Analysis (DT-FEA), a transformative approach that harnesses the power of digital twins to elevate the accuracy, efficiency, and comprehensiveness of FEA simulations.

DT-FEA bridges the gap between physical and digital realms by creating a virtual replica of a physical system. This digital twin faithfully captures not only the geometry but also the material properties, boundary conditions, and dynamic behavior of the real-world counterpart. It leverages real-time data integration, AI-driven analytics, and multidisciplinary modeling to continuously update and refine the digital twin's representation, ensuring its fidelity to the evolving physical system.

Key advantages of DT-FEA include:
1. Real-time Monitoring and Predictive Analysis: DT-FEA allows engineers and analysts to monitor the performance of physical systems in real time. By continuously comparing the digital twin's behavior to the actual system, deviations and anomalies can be detected early, facilitating predictive maintenance and reducing downtime.

2. Multidisciplinary Integration: DT-FEA enables the integration of multiple simulation domains, such as structural, thermal, fluid, and electromagnetic analysis, within a single platform. This holistic approach provides a comprehensive view of system behavior and interactions.

3. Optimization and Design Exploration: With DT-FEA, designers can explore a vast design space efficiently. Parametric studies and optimization algorithms can be applied to the digital twin, accelerating the development of innovative and efficient solutions.

4. Collaborative Decision-Making: DT-FEA supports collaborative decision-making by providing a common platform for engineers, designers, and stakeholders to interact with and analyze the digital twin. This fosters cross-functional collaboration and informed decision-making.

5. Reduced Cost and Risk: By enabling a deeper understanding of system behavior and performance, DT-FEA reduces the need for costly physical prototypes and mitigates the risk of unexpected failures or performance issues in real-world applications.

Biography
Rahul Tomar is a distinguished mechanical, civil, and software engineer with over 23 years of extensive experience in the field of engineering and technology. He is most notably recognized as the Co-Founder of *DigitalTwin Technology GmbH*, a groundbreaking company at the forefront of the digital twin revolution in the

engineering and construction sectors.

Rahul's profound understanding of mechanical and civil engineering principles, coupled with his expertise in software development, has played a pivotal role in the success of DigitalTwin Technology GmbH. He has spearheaded the development of innovative software solutions that bridge the gap between the physical and digital worlds, revolutionizing how engineers and designers approach their work.

Through his leadership, DigitalTwin Technology GmbH has enabled organizations across the globe to harness the power of digital twins for real-time monitoring, predictive analysis, and collaborative decision-making. These advancements have not only improved efficiency in engineering and construction projects but have also significantly reduced costs and risks associated with complex ventures.

Rahul Tomar's relentless pursuit of excellence and his unwavering dedication to pushing the boundaries of technology have left an indelible mark on the engineering and software development industries. His vision for the future of digital twin technology continues to drive innovation and transformation, making him a respected figure in the global engineering community.