Smart Mobility

Challenges in the land of Automotive High-Performance Computing: Chiplets to the Rescue

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Abstract
The automotive industry is going through a monumental evolution – embracing software-defined vehicles, a zonal-based approach with centralized compute, and rapid electrification. This radical shift in vehicle architectures is further fueled by a relentless pursuit for unparalleled (semi-)autonomous driving experiences and the entry of disruptive innovators into the market.

One of the results of this evolution is an exponential surge in computational demands that we can no longer meet solely by implementing semiconductor technology advancements from other sectors, with performance doubling every 18 months (known as Moore's law). It requires us to reimagine how we build automotive compute systems. A promising route is to move away from constructing large, singular monolithic systems-on-chips (SoCs) but, instead, construct system functionalities at a granular level, integrating diverse building blocks or chiplets in a package. This shift will enable the creation of semi-custom solutions tailored to the OEM's choices regarding performance, automotive I/O, AI and other accelerators. It also presents an opportunity to assemble these building blocks like customizable LEGO sets, significantly reducing costs. Our presentation will delve into the valuable lessons learned from high-performance compute markets that have already embraced chiplet-based architectures. We aim to dissect the benefits of this transition in terms of scalability, cost efficiency, and performance enhancements.

Moreover, we'll examine the automotive industry's journey towards adopting chiplets and identify the remaining areas that need attention to fully exploit their potential to revolutionize automotive computing, driving innovation and efficiency across the industry.

Biography
Bart Placklé holds a Master of Science degree and a postgraduate degree in telecommunications from the University of Hasselt (Belgium), and imec (Leuven, Belgium), respectively. He also obtained a postgraduate degree in executive business economics from KU Leuven (Belgium).
Bart started his career at Acunia, an imec spinoff, where he initially served as a lead silicon designer and later advanced to become the general manager of the hardware business unit.
In 2004, Bart joined Intel to create the company's in-vehicle infotainment business. As chief architect and later automotive CTO, he led the development of five generations of high-performance automotive solutions, driving Intel's automotive segment to become a multibillion-dollar business. In recognition of this contribution, Bart received the Intel Achievement Award in 2016. In 2021, Bart was appointed as the CTO of AXG

Mobility-as-a-Service at Intel.
In 2023, Bart Placklé returned to imec, assuming the role of vice president of automotive technologies. In this capacity, he is leading the development of cutting-edge solutions that will shape the future of mobility.

References

Advanced Imaging and Sensing Technologies in ADAS Systems

J. Landgraf
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Abstract
Advanced Driver Assistance Systems (ADAS) are increasingly using more sensing technologies to improve vehicle safety. Current ADAS solutions primarily rely on CMOS image sensors (CIS) for object detection, but future systems will integrate more advanced sensors, such as depth sensing, to enhance accuracy. By 2030, multi-sensor fusion is expected to provide higher levels of perception.

This session will explore key characteristics of image sensors that ensure robust ADAS performance, focusing on High Dynamic Range (HDR), LED flicker mitigation (LFM), and motion artifact reduction for 2D CIS cameras. It will also highlight the role of LiDAR technology in complementing camera systems, particularly in poor weather conditions, and demonstrate how Single-Photon Avalanche Diode (SPAD) technology is driving the widespread adoption of LiDAR for next-generation ADAS and autonomous vehicles.

Biography
Jens Landgraf is a Sr. Technical Program Manager at Sony Semiconductor Solution's Europe Design Center in Oslo, Norway – a location specializing in automotive CMOS image sensor design. Until recently, he spent almost a decade in the United States in California and Michigan, working on automotive imaging and sensing solutions at Sony Semiconductor Solutions America, Ambarella Inc and OmniVision Technologies. He led cross-functional teams in successful strategies for high-performance imaging technologies adopted in ADAS and AD applications. Before his tenure in the semiconductor industry, he served several years as a consultant to the BMW Group as subject matter expert for camera technology in Munich, Germany.

References

From Good to Great: How X-Ray Technology is driving yield in Advanced Packaging

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Abstract
The semiconductor industry faces numerous challenges in the development and manufacturing of advanced packages. From a technical standpoint, these challenges include miniaturization, thermal management, and interconnect technologies. From a market perspective, challenges arise from higher production mixes due to application-specific integrated circuits (ASICs) and customers' intolerance for failures, particularly in critical automotive applications. These challenges have resulted in constantly increasing costs for designing and manufacturing ICs.
Consequently, the industry is adopting two key approaches. Firstly, it is embracing lights-out manufacturing, which involves fully automated factory operations that offer increased productivity, improved repeatability, and consequently, enhanced quality. Secondly, new testing strategies are being implemented to provide data for advanced process analytics, enabling a shift from reactive to predictive actions. These strategies aim to improve traceability, yield, and overall operational efficiency.
In the monitoring of interconnect characteristics such as diameter, height, co-planarity, and bump quality, inspection tools play a crucial role. Advanced X-ray technology, in particular, holds significant potential in driving the development of defect-free advanced packaging solutions through identifying root causes of failures.

Biography
Since 2020 Christian Driller has been VP of R&D at Comet Yxlon, developing high-end x-ray and CT inspection solutions. He formed an agile R&D organization, focusing on customer problems, while forming a passionate and target driven team. In 2017 he joined Comet Yxlon as VP of Business Excellence, driving the professionalization across all functions of the company. His career began 2012 in automotive as Business Consultant at Porsche Consulting focusing on optimizing and restructuring R&D departments within the automotive industry and suppliers. Driller holds a master’s in finance from ESB Reutlingen University and a Bachelor of Engineering from Baden-Wuerttemberg Cooperative State University with Dr. Ing. h.c.F. Porsche AG as his cooperating company.

References