VEHICLE electronics

The monthly magazine for automotive electronics engineers

Renesas moves to GaN with Transphorm buy

Renesas is to acquire US firm Transphorm for $339m to expand its power portfolio with GaN technology.

The acquisition will provide Renesas with in-house GaN technology for power semiconductors, expanding its reach into fast-growing markets such as electric vehicles.

Renesas has already announced the establishment of an in-house SiC production line, supported by a ten-year SiC wafer supply agreement.

Renesas now aims to further expand its wide-bandgap portfolio with Transphorm's expertise in GaN, a material that enables higher switching frequency, lower power losses and smaller form factors.

Demand for GaN is predicted to grow by more than 50 per cent annually.

Renesas will implement Transphorm's automotive-qualified GaN technology to develop enhanced power offerings, such as x-in-1 powertrains for EVs, along with computing, energy, industrial and consumer applications.



Primit Parikh (left) and Hidetoshi Shibata

"Transphorm is a company uniquely led by a seasoned team rooted in GaN power and with origins from the University of California at Santa Barbara," said Hidetoshi Shibata, CEO of Renesas. "The addition of Transphorm's GaN technology builds on our momentum in IGBT and SiC. It will fuel and expand our power portfolio as a key pillar of growth."

The board of directors of Transphorm has unanimously approved the agreement. The transaction is expected to close in the second half of 2024.

"Combined with Renesas' world-wide footprint, breadth of offerings and customer relationships, we are excited to pave the way for industry-wide adoption of wide-bandgap materials and set the stage for significant growth," said Primit Parikh, CEO of Transphorm. "This transaction will also allow us to offer further expanded services to our customers and deliver significant immediate cash value to our stockholders. Additionally, it will provide a strong platform for our exceptional team to further Transphorm's leading GaN technology and products."

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MulticoreWare uses Imagination on TI processor

MulticoreWare and Imagination have enabled GPU compute on the Texas Instruments TDA4VM processor, unleashing around 50GFlops of extra compute for common workloads used for autonomous driving and adas.

The collaboration has achieved over 100 times performance gains when running a stereo block matching (BM) algorithm on the GPU rather than on the CPU on a 3200 x 2000 resolution image.

This enables automotive engineers to use IMG BXS GPUs with OpenCL to achieve increased performance per watt on TDA4 SoCs for sensor processing workloads for camera, radar and lidar, augmenting other compute accelerators existing in the platform.

"The automotive software revolution is driving the need for seamless intelligent features on low-power SoCs," said Vish Rajalingam, vice president at MulticoreWare. "Our experience with OpenCL and edge AI across all major AI accelerators, GPUs and SoCs unlocks incredible possibilities for the future of mobility."

MulticoreWare optimised the stereo BM algorithm to leverage GPU cores efficiently. The IMG BXS-4-64 GPU intrinsics and adaptive memory handling helped achieve improved performance on higher resolution camera data.

"The graphics processor can do so much more in a car than its traditional job of rendering pixels on the displays," said Jake Kochnowicz, vice president at Imagination. "It is also a flexible, programmable and high-performance option for supporting a vehicle's adas workloads. In a world where hardware is agreed very early in the lifecycle of a software-defined vehicle, GPUs are becoming a key differentiator that can unlock new functionality with a user-friendly software environment, just as this partnership with MulticoreWare has demonstrated."

Hyundai and Samsung link car to home



Hyundai Motor and Kia will link Samsung's SmartThings IoT platform to their connected car services.

The agreement covers car-to-home and home-to-car service connectivity between residential and mobility spaces.

Under this agreement, Hyundai and Kia customers will be able to control digital appliances remotely via touch and voice commands through their in-car infotainment systems. Conversely, they will have remote vehicle control via AI speakers, TVs and smartphone apps to control various vehicle functions.

This is made possible through the organic integration of Hyundai and Kia's connected car services and SmartThings.

Users can also experience seamless connectivity with over-the-air (OTA) and USB-based updates.

• Samsung and Tesla partner at CES, see page 21.

Kodiak picks Ambarella to drive lorries

Autonomous vehicle company Kodiak Robotics has selected Ambarella's CV3-AD685 AI domain control system-on-chip (SoC) as a complete embedded compute option for its latest autonomous trucks.

This SoC provides a complete embedded option for Kodiak's multi-sensor perception, fusion and path planning, running neural networks while processing multiple cameras, lidars and radars.

Kodiak has already logged over 480,000km on Ambarella's CV2 AI perception SoC while delivering over 875 loads, demonstrating that Kodiak Driver with help from the Ambarella hardware can withstand the rigorous environment of highway trucking.

The CV2 has enabled image quality through rain, fog and darkness, ensuring Kodiak delivers freight for its customers safely and on time.

Kodiak's next self-driving truck platform will use the CV3-AD685 SoC to optimise hardware cost, reliability, size and robustness, while improving safety and performance.

Designed with Ambarella's algorithm-first philosophy, this 5nm SoC is purpose-built to provide compute in a small form factor, which enables Kodiak's modular autonomous vehicle platform hardware across many environmental conditions.

"The CV3-AD685 enables the Kodiak Driver, Kodiak's autonomous system, to turn sensor data into actionable insight with lower latency, lower power consumption and higher reliability," said Don Burnette, Kodiak CEO.



Kodiak has selected Ambarella's CV3-AD685

The CV3-AD685 AI domain controller combines AI processing, image signal processing and low power consumption. Its CVflow AI engine includes a neural vector processor engine that is twenty times faster than the CV2 SoCs, along with a general vector processor to provide the overall performance needed for full autonomous driving stacks.

"We are thrilled to continue our partnership with Kodiak as we pave the way together for the future of autonomous trucking," said Fermi Wang, CEO at Ambarella. "Our CV3-AD685 SoC provides the autonomous vehicle industry with the processing performance needed to set new benchmarks in AI-based autonomous safety, efficiency and innovation."

C2A provides security for ThunderSoft vehicle OS

ThunderSoft has selected C2A Security along with Amazon Web Services, Arm, Blackberry Ivy, Microchip and others to create a new vehicle OS.

C2A Security was chosen by ThunderSoft for its Dishui OS, the result of a joint effort between ThunderSoft and 18 companies, including AWS, Arm, Blackberry Ivy, Microchip and Cerence.

ThunderSoft is a partner of C2A Security in China.

"We're excited to join this trailblazing effort alongside industry leaders AWS, Blackberry, Arm and others to create a mobility specific operating system that brings together all the elements for secure, scalable and innovative vehicle operating systems," said Roy Fridman, CEO of C2A Security. "Security by design should be the bedrock of automotive software development and this collaboration with ThunderSoft's vehicle OS will bring our patented and proven technology to millions of cars globally, enabling the software-defined vehicle era."

This has been a collaborative effort with companies including HiPhi, GAC Aion, Dongfeng, Neta Auto, Bytedance Volcengine, Horizon Robotics, TomTom, Arkamys, Cercence, Etas, KPit, Tier IV and ABUP.

Intel to fabricate Valens Mipi A-Phy chipsets

Intel Foundry Services (IFS) will fabricate Valens Semiconductor's Mipi A-Phy chipsets using its automotive process nodes.

Mipi A-Phy was developed for in-vehicle high-speed sensor connectivity. Since its release in 2020, it has attracted a growing ecosystem of companies using the technology.

Valens, a contributor to the standard, was the first on the market to offer A-Phy-compliant chipsets with its VA7000 products.

"Best-in-class products, like our A-Phy chipsets, require best-in-class processes, and that's exactly what we're getting through this collaboration with Intel Foundry Services," said Gideon Ben Zvi, CEO of Valens Semiconductor. "With the full suite of resources Intel offers, including advanced process and packaging technologies, and a broad IP portfolio, we're confident that we can further advance our A-Phy products."

As part of this collaboration, Valens will use Intel's process technology to produce its second generation of A-Phy chipsets. Intel's ecosystem and processes should enable cost and power reductions for this chipset family while achieving electromagnetic compatibility.

With the increase in bandwidth and other architecture requirements, its capabilities ensure link performance and passenger safety at all times.

"One of the goals of Intel Foundry Services is to identify transformative technologies, and harness Intel's breakthrough process technology and global ecosystem to accelerate innovation and unlock new opportunities for our customers," said Stuart Pann, senior vice president at Intel. "The Mipi A-Phy chipset is an obvious fit."

This collaboration could boost the vision for a chiplet architecture in the automotive industry. With its reliance on package integration and the use of standard interfaces such as UCIe, the chiplet architecture will be complimented by Mipi A-Phy as the standard connectivity interface.



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Magna sensors check for alcohol on breath

Magna has developed breath and camera-based technology designed to combat impaired driving.

The safety technology determines if drivers are fit to drive in a fast, reliable and affordable way. It combines elements of the interior sensing system, which uses camera technology to detect driver distraction, drowsiness and intoxication through pupillary signals, with infra-red sensor technology developed by Senseair.

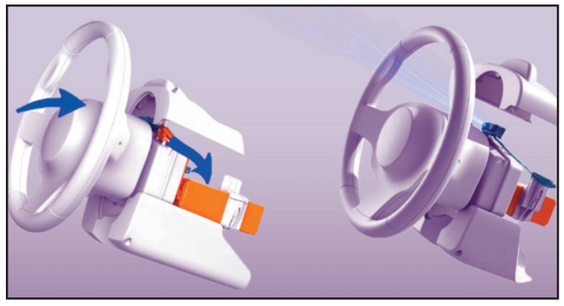
Cockpit-embedded sensors placed close to the driver measure and quantify the alcohol and carbon dioxide levels in diluted exhalations from the driver. The technology is intended to detect passively an intoxicated driver with a blood alcohol concentration at or above the legal limit of 0.08 per cent in all states in the USA except Utah, where the legal limit is 0.05 per cent.

"As we continue to support the company's vision of advancing mobility for everyone, our team is focused on delivering active safety innovations that help reduce accidents and fatalities," said Bill Snider, president of electronics at Magna. "We are working with our customers and the industry to take a significant step forward in making the roads safer for all who share them."

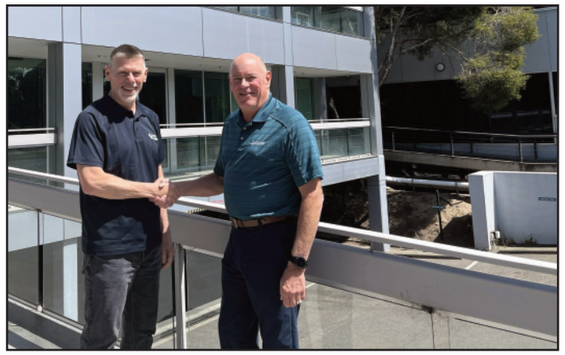
Drunk driving claimed more than 13,000 lives in 2021 or about one-third of all traffic-related deaths in the USA, according to the National Highway Traffic Safety Administration.

Magna's development focuses on alcohol detection, the most common substance associated with impaired driving crashes.

During CES in Las Vegas in January, the company provided outdoor demonstrations of this technology.



Infra-red (left) and vision based alcohol detection



Paul Gray (left) and Tom Rzeznik

Danlaw acquires Cohda in V2X safety merger

Danlaw has acquired fellow V2X firm Australia-based Cohda Wireless to advance connected vehicle safety.

The synergies between Danlaw and Cohda should yield results in the V2X technology. By aligning the strengths of both firms, this acquisition could lead to the development and delivery of products for connected vehicle safety and smart city applications.

The integration of Cohda's V2X-Locate technology along with its Etsi, North American and China based V2X communication stacks should offer better positioning accuracy and connectivity for vehicles, enabling real-time communication between vehicles and infrastructure, pedestrians and other road users.

Danlaw will gain access to Cohda's talent pool and V2X intellectual property, fostering the creation of V2X technology for automotive OEMs, smart city initiatives and underground mining.

The deal combines Danlaw's presence in North America and India with Cohda's reach in Europe and Apac.

"This acquisition is a testament to Danlaw's dedication to creating a safer and smarter future for transportation and urban environments," said Danlaw CEO Tom Rzeznik. "With Cohda's expertise on board, we are confident that our combined efforts will accelerate advancements in V2X technology."

Cohda CEO Paul Gray added: "We are thrilled to join forces with Danlaw, a company that shares our global commitment and passion for innovation and safety. Together, we are poised to lead the way in V2X technology and make a lasting impact on the industry."

Continental and Synopsys digital twins aid software development

Continental is collaborating with Synopsys to accelerate the development and validation of software features and applications for software-defined vehicles (SDVs).

This collaboration integrates Synopsys' virtual prototyping for virtual electronic control units (vECUs) within Continental's CAEdge automotive edge cloud-based development framework.

The results are digital-twin capabilities that help automakers accelerate software development and speed time to market.

"The SDV requires working on hardware, software, applications and validation in parallel, all while maintaining the highest level of quality and safety," said Gilles Mabire, CTO at Continental Automotive. "Synopsys' virtual ECUs and vehicle digital-twin capabilities enable us to develop and test software earlier, so it can be deployed to vehicles faster."

The modern SDV promises continuously improved software features, so car manufacturers and suppliers rely on tools to simulate the performance of digital features and confirm their compatibility with existing and new car models.

CAEdge provides a cloud-based development environment for software-intensive vehicle architectures. Its modular hardware and software connect the vehicle to the cloud and feature a virtual workbench to develop, supply and maintain software-intensive system functions.

Within this framework, digital representations of the real-world physical devices, such as vECUs and the vehicle digital twin, facilitate the development and validation of software prior to general hardware availability.

"The SDV focuses automotive development and innovation on the software that offers customers real added value," said Mabire. "By combining our CAEdge framework with Synopsys' vECUs, we are directly addressing the vehicle manufacturers' needs to accelerate software development and automate software validation in a modern cloud-based environment."

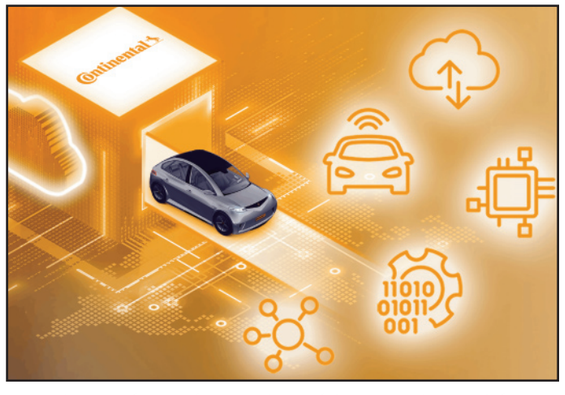
The Synopsys virtual prototyping tools simplify the deployment of individual vECU and vehicle digital twins by combining multiple vECUs with dynamics, sensor and environment simulations.

They support the full range of vECUs abstraction (L1 to L4) and mixed abstraction vehicle simulation, and come with a large library of models developed within an automotive semiconductor and software ecosystem.

Together with CAEdge, developers can benefit from the full power of a digital twin in the development pipeline for the SDV, automating the software validation and delivery process during development and through the vehicle's lifecycle.

"The combination of CAEdge and Synopsys virtual prototyping tools marks a significant step in accelerating the deployment of the SDV," said Tom De Schutter, vice president at Synopsys. "Bringing together Continental's proven track record in design, software and manufacturing of complex automotive systems at scale with Synopsys' proven vECU technologies, we are expanding and speeding the automotive design process from physical to virtual."

• Continental and Aurora Innovation have finalised the design and architecture of the future fallback system and hardware of the Aurora Driver, an SAE level-four autonomous driving system that Continental plans to start production of in 2027. The finalised hardware comes less than a year after the companies entered a partnership aimed at high-volume manufacturing of autonomous trucking.



Continental conducts virtual integration with Synopsys software tools

Foxconn picks Blackberry to power future projects

Foxconn's Mobility in Harmony (MIH) initiative has selected Blackberry Ivy to power its next Project X, and future passenger and commercial vehicle reference platforms.

This collaboration builds on the earlier partnership established between MIH and Blackberry in July 2023.



Blackberry Ivy will power MIH's future electric production vehicles

Deploying Ivy in its vehicle digital cockpit should help MIH's vehicles with applications for real-time monitoring of the vehicle's health and performance. This will offer fleet operators and drivers insights for managing operations, improving driver safety, lowering business risk and optimising asset use.

"We are extremely excited by this collaboration with Blackberry Ivy as it will provide our electric vehicle platform with scale and the ability to accelerate development and innovation for EV and mobility marketplaces," said Jack Cheng, CEO at MIH. "Ivy gives us the middleware foundation to realise our vision of an open ecosystem where we can continuously provide new experiences and services over the lifecycle of the vehicle."

He said Ivy allowed it to offer out-of-the-box fleet management capabilities, powered by AI-generated fleet insights. These extend beyond traditional telematics data, eliminate the need for unreliable and costly companion devices, and increase vehicles' operational efficiency in a cost-effective manner.

"We are very pleased that MIH has selected the Blackberry Ivy platform to power its electric vehicle platform," said Vito Giallorenzo, general manager for Blackberry Ivy. "This announcement is the continuation of a valued collaboration with MIH that started with our core QNX for their foundational software and is now extending to leveraging Ivy to enable their connected services ecosystem. We look forward to working with the MIH consortium and ecosystem to add rich services to the MIH platform and the broader EV and mobility marketplace."

The MIH platform powered by Ivy helps ensure each vehicle operates at its best condition, with diagnostics that predict, detect and notify any maintenance needs.

Drivers and fleet operators get accurate battery and range information, enabling routing optimisation, energy management and longer life.

It evaluates driving behaviour and patterns to encourage safer driving habits and reduce the fleet operator's risk and costs. And it uses cyber security to protect against threats, and ensure the integrity of vehicle operations.

Autocrypt and Hitachi offer V2X consulting

Cyber-security and mobility company Autocrypt is working with Hitachi to provide offerings and consulting services covering V2X and in-vehicle systems security to Japanese automotive OEMs and tier suppliers.

The two companies have a history of collaboration; Autocrypt has been offering its V2X security with the option of integrating its security library with Hitachi's V2X middleware platform.

The partnership seeks to expand the scope of collaboration beyond V2X to embedded vehicle system.

Autocrypt's in-vehicle security helps OEMs exceed cyber-security needs with open-source licence management, fuzzing, penetration testing and threat mitigation, while Hitachi offers compliance consulting that covers vehicle production.

• Autocrypt has released a project management tool for conducting threat analysis and risk assessment, a process crucial to the development and maintenance of automotive software. The cyber-security tool is available as an extension on Siemens' Polarion ALM application lifecycle management platform.

Green Hills receives SDV cyber-security certification

Green Hills Software has received compliance certification against the ISO/SAE 21434 automotive cyber-security standard.

As a supplier of safe and secure real-time operating systems, Green Hills is the first to receive the certificate, issued by certification company Exida.

Green Hills supports vehicle manufacturer efforts to meet the UNECE WP.29 R155 regulation and incorporate security measures across development, production and post-production processes.

This certification builds on Green Hills's existing OEM relationships for designing and securing connected software-defined vehicles (SDVs), including automated driving, integrated cockpits, zonal and domain controllers, vehicle gateways, telematics, keyless entry, diagnostic systems, and electric-vehicle charging systems.

The importance of this automotive cyber-security standard is set to grow as EU countries, Japan and South Korea mandate automotive cyber-security regulation for vehicle launches in 2024; other countries are expected to follow.

"Green Hills has demonstrated that they have a process in place that addresses security throughout the development lifecycle to deliver products that are secure by design," said Mike Medoff, director of certification at Exida.

• Smart Eye, a provider of human insight AI, and Green Hills have expanded their collaboration focused on delivering an integrated driver monitoring system (DMS) platforms for rapid tier-one and OEM adoption.

This DMS is road-ready and already in production with several OEMs.

Hexagon and JSol accelerate virtual powertrain prototyping

Hexagon's and JSol are working together to accelerate the virtual prototyping of electrified powertrains through multi-physics simulation.

This builds on a long-term technical alliance offering users accurate and high-productivity virtual prototyping of complex electro-mechanical systems.

The rapid electrification of many industries, including automotive and aerospace, requires simulation technologies that enable cross-functional teams to understand the implications of component-level design choices on system-level integrity.

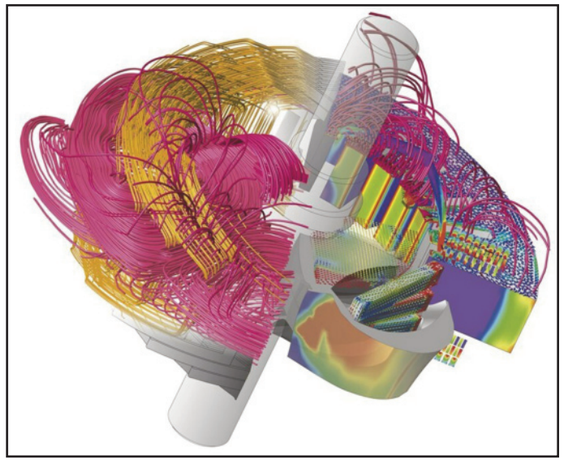
Reliable prediction of their durability, efficiency, thermal management or noise and vibration requires comprehensive simulation that can capture multi-physics effects at the component, subsystem and system levels.

The partnership will let users combine Hexagon's engineering simulation software suite with JSol's JMag electromagnetic field analysis software to solve system design problems in the virtual world more quickly than physical prototyping allows.

"As the move towards electrification accelerates, new challenges need to be addressed to improve vehicle performance characteristics, from the component to system level," said Mahesh Kailasam, general manager at Hexagon. "For example, improvements to noise, vibration and harshness performance now require simulation to provide answers at much higher frequency ranges."

Takashi Yamada, chief technology officer for JMag, added: "We are excited to work with Hexagon in this electrification journey."

A primary focus is to help engineers improve product comfort and reduce noise through simulation-based design adjustments. Another focus is tackling the complexities of electro-mechanical machines, controls and gearboxes with integrations that foster collaboration between engineers from different disciplines.



Combining simulation software with electromagnetic field analysis

Mercedes turns to gen AI to improve relationship with car

Mercedes-Benz's integrated MBUX Virtual Assistant uses software and generative AI to create a more natural and intuitive relationship with the car.

This development takes the 'Hey Mercedes' voice assistant into a visual dimension made with Unity's high-resolution game-engine graphics.

Running on the Mercedes-Benz Operating System (MB Os) developed in-house, its rollout starts with vehicles on the forthcoming Mercedes-Benz Modular Architecture (MMA) platform.

"Through advances in artificial intelligence, tomorrow's Mercedes-Benz will know its driver like never before," said Markus Schäfer, chief technology officer at Mercedes-Benz.

The virtual assistant is a development of the system first shown in the Vision EQXX. It uses generative AI and proactive intelligence to make life as easy, convenient and comfortable as possible. For instance, it can offer helpful suggestions based on learned behaviour and situational context.

Examples include playing the latest news in the morning or initiating a preferred massage programme at the end of the day. And if the driver is running late for a meeting entered in the calendar, the system can offer to dial in directly from the car.

If the driver wishes, these processes can be automated.

The experience can be augmented through incorporation of the vehicle's ambient lighting and sound system. For example, warm light and soft music can accompany a relaxing massage.



Virtual assistant uses generative AI

The holistic approach pairs more natural dialogue with visual feedback through 3D graphics made with Unity's game engine. An avatar uses animations to express different moods and states of being. Emotions range from calm to excited and even sensitive.

Further animations indicate whether the assistant is speaking, listening, thinking, making a suggestion or providing a warning. Movement, brightness, intensity and colour interact to communicate intuitively with the driver.

Facilitated by the domain integration of MB Os, MBUX surround navigation pairs a real-world view of the car's surroundings with its reactions to it in real time.

The driver benefits from enhanced situational awareness by being able to see what the car sees.

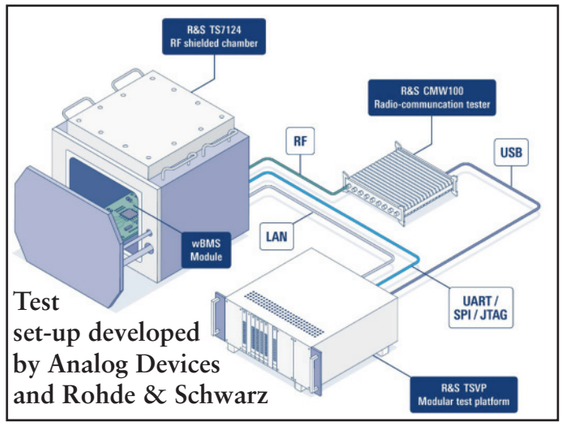
The incorporation of information into the driver display using 3D graphics made with Unity's game engine provides a intuitive overview. It offers everything the driver needs to know in a single glance.

For instance, it shows the type of traffic, be it another car, van, lorry or cyclist. It shows pedestrians close to the roadside as well as potential hazards. And it superimposes route guidance into a realistic representation of the surroundings, particularly helpful in busy urban environments.

Over-the-air (OTA) updates ensure usrs have access to the latest content and features tailored to their wishes and regional preferences. The E-Class, for example, is already delivering this with its infotainment domain, a precursor of MB Os technology.

The video streaming offering will be enhanced by an integration of Sony's RideVu service, providing access to an array of video entertainment directly within the vehicles.

The CLA Class concept at the recent CES in Las Vegas offered a close-to-production insight into the technology. The complex multi-faceted architecture was represented by one of its hardware components, the water-cooled chip from collaboration partner Nvidia.



Test set-up developed by Analog Devices and Rohde & Schwarz

R&S and ADI develop wireless BMS tester

Rohde & Schwarz is using technology from Analog Devices (ADI) to develop a wireless battery management system (wBMS) production tester.

The two companies are helping the automotive industry adopt wBMS technology, which brings technical, environmental and cost advantages compared with wired BMS.

The automated tester is tailored for verification and mass production tests of wireless device tests. This builds on existing efforts for wBMS RF robustness testing.

Analog Devices has developed a complete wBMS that is in production across multiple EV platforms. It is ISO 21434 Cal4 compliant and adheres to strict cyber-security standards. It also meets requirements in RF performance and robustness to increase battery capacity and lifetime value.

Rohde & Schwarz and Analog Devices have developed the compact automated test equipment (ATE) system for wBMS. With this setup, the necessary wBMS module calibration, receiver, transmitter and DC tests can be conducted fast and executed reliably for verification in the lab as well as for production tests for high yield.

It consists of the CMW100 radio communication tester, WMT wireless automated testing software framework and the Express TSVP universal test and measurement platform. Due to radiated test, the device under test (DUT) is placed in an interference-free environment such as the TS7124 RF shielded box.

For RF robustness testing, the companies worked together to get an off-the-air recording option to capture real-world RF spectrum. They then played it back in the lab to confirm the correct operation of wBMS in demanding RF environments.

This allows realistic, repeatable and efficient verification of wireless devices.

During several test drives in various complex RF environments, an FSW signal and spectrum analyser monitored the RF spectrum and sent it to an IQW wideband I/Q data recorder.

For playing back the recorded spectrum profiles in a lab, the IQW is connected with an SMW200A vector signal generator.

"We apply our market-leading technical expertise to develop innovations through the entire lifecycle from pre-development to production," said Juergen Meyer, vice president at Rohde & Schwarz.

Hyundai and Wind River build SDV digital twin

Hyundai Mobis and Wind River are creating a way to develop and validate key vehicle technologies in an unrestricted digital virtual environment.

This initiative aims to reduce technology development time, allowing related research teams and collaborative partners early-stage access to the system's innovative collaboration platform.

It is for software-defined vehicles (SDVs).

Called M.Dev Studio, it enables simulation and remote monitoring of core technologies in a real-vehicle environment, shifted to digital space.

Core technologies and vehicle products can be quickly evaluated, from the early-development to research and development stages, in a digital environment simulating real-world applications.

For example, it allows for simulation of various sensors and controllers under different conditions and testing of autonomous driving functionality through virtual signals in diverse scenarios. Hyundai plans to implement this next year, using it for component design, validation and assessment.

In the online environment, developers can participate in development and conduct joint tests using a standard system, anytime, anywhere. This enhances the completion of future mobility core components and improves reliability of validation and assessment.

Eatron funds

Eatron Technologies, a developer of AI-powered battery management software for the automotive industry, has completed a funding round so it can accelerate the development and deployment of embedded and cloud-based features.

Eatron's portfolio encompasses AI-powered battery management systems spanning from the edge to the cloud, which helps electric vehicle and battery manufacturers optimise performance, efficiency and safety.

It will also fuel a programme of growth for the business' teams in the UK and Turkey as Eatron extends its partnerships with global companies.

The company's technology enables smarter battery management by implementing an intelligent software layer on top of existing battery controls. Rapid deployment is possible through the easy-to-integrate edge-to-cloud offer making use of abstraction and an articulated software architecture that considers intricacies of connected vehicle systems.

SK provides SiC wafers to Infineon

SK Siltron CSS will provide Infineon with 150mm SiC wafers, supporting the production of SiC semiconductors.

SK will also help Infineon's transition to a 200mm wafer diameter.

"For Infineon, supply-chain resiliency is about implementing a multi-supplier strategy and thriving in times of adversity to create new growth opportunities and drive decarbonisation," said Angelique van der Burg from Infineon.

SK supplies global semiconductor manufacturers with compound semiconductor wafers. A subsidiary of South Korea-based SK Siltron, it can leverage the global resources available within the SK group to supply sustainable compound semiconductors.

"With decades of experience in silicon carbide materials and manufacturing, we bring unparalleled knowledge to our sustainably manufactured compound semiconductors," said Jianwei Dong, CEO of SK Siltron CSS.

Valeo uses digital twins to speed adas development

Valeo and vehicle software supplier Applied Intuition are partnering to provide a digital-twin platform for adas sensor simulation.

The joint offering should help automotive OEMs bring safe and reliable adas features to market faster.

The platform will provide OEMs with a digital-twin database representing locations all around the world, offering an extensive and diverse set of scenarios and environments for adas perception testing and validation.

Using the digital twins in Applied Intuition's Spectral sensor simulation product, OEMs can create more accurate simulations than using traditional simulation methods. This helps OEMs ensure the safety, performance and reliability of critical algorithms and to develop production-ready adas perception systems more rapidly.



Digital twin depicting camera output and lidar overlay

The digital-twin platform focuses on simulating Valeo's Scala 3 lidar and expands to other Valeo sensors for software-in-the-loop (SIL) and hardware-in-the-loop (HIL) testing.

"Valeo has always been at the forefront of automotive innovation," said Clement Nouvel, CTO of Valeo. "Our partnership with Applied Intuition exemplifies our commitment to pushing the boundaries of what is possible and how fast autonomous driving features can be brought to end-customers while improving safety. Together, we aim to redefine the future of lidar perception through digital-twin technology."

Peter Ludwig, CTO of Applied Intuition, added: "Digital twins create huge advantages for adas simulation. Digital-twin-based simulations achieve more breadth and accuracy than any other simulation technology. Paired with Applied Intuition's deterministic Spectral simulator and accurate sensor models of the Valeo Scala 3 lidar, our digital twins are paving the way for safer, more rapid deployment of adas worldwide."



Bosch and Here bring adas to Daimler lorries

Location data company Here Technologies is collaborating with Bosch and Daimler Truck on adas technology for commercial vehicles that automatically determines the most efficient driving style, helping reduce driver stress, energy consumption and CO_2 emissions.

Daimler Truck's PPC predictive powertrain control is a cruise control and transmission control system for commercial vehicles.

Powered by the Here Adas Map and Bosch's Horizon software, the system takes into account roadway topography, curvature, slope, intersections, traffic signs, speed limits (including lorry-specific regulations) and driving rules.

By seamlessly integrating this information, the vehicle system reduces unnecessary braking, accelerating and gear shifting to optimise driver comfort, and fuel and battery consumption.

The Here Adas Map links the precise position of a truck on the road to define an electronic horizon to which the driving style is then automatically adapted.

It delivers vehicle information to plan and time gear shifts in advance as well as to adjust vehicle speed predictively.

The system works on motorways and on inter-urban roads as well. For commercial vehicles with combustion engines, it leads to an overall fuel reduction of up to 5%, which in turn lowers CO_2 emissions.

For electric commercial vehicles, it improves the energy efficiency, resulting in a longer range.

The PPC can also be directly connected to the on-board navigation system as shown in the newly introduced eActros 600. In this case, it takes into account the planned route calculated by the navigation system to facilitate a better recognition of the situation on the road ahead.

This is enabled by UniMap, Here's latest map-making capability. UniMap aligns all standard definition, high-definition and adas map data into one semantically consistent digital representation of the world.

Through this, the PPC can match waypoints from the navigation to the adas map it uses.

Leveraging artificial intelligence (AI), UniMap automates the processing of vast amounts of data from multiple sources, including car sensors, connected devices, satellites and lidar. Changes detected in the physical reality thus become part of the map within 24 hours, ensuring map freshness and quality.

"Together with our partners Daimler Truck and Here, Bosch attaches a great importance on the quality and the reliability of the electronic horizon," said Dirk Paetzold, head of cockpit technologies at Bosch. "The system was intensively tested before its market launch, and will always be kept up to date in the future. In the future, the function will check whether the information stored on the map corresponds to the actual conditions on the road."

Leen Balcaen, vice president at Here, added: "Collaboration is essential when it comes to achieving societal sustainability goals. Our work with Bosch and Daimler on PPC is a great example of that. PPC not only helps to reduce fuel consumption and lower CO_2 emissions, but also create a safer and stress-free driving experience."

CES Consumer Technology Association

SHOW TIME

A look at some of the technology on show at January's Consumer Electronics Show (CES) in Las Vegas

Intel drives AI everywhere strategy into automotive

Intel announced plans to drive the company's AI everywhere strategy into the automotive market, including a deal to acquire Silicon Mobility, a fabless silicon and software company that specialises in SoCs for intelligent electric vehicle energy management.

Intel also announced: a family of AI-enhanced software-defined vehicle SoCs, with Zeekr as the first OEM to adopt them to deliver its generative AI-driven living room experiences to vehicles.

"Driving innovative AI across the vehicle platform will help the industry navigate the transformation to EVs," said Jack Weast, vice president at Intel. "The acquisition of Silicon Mobility aligns with our sustainability goals while addressing a critical energy management need for the industry."

Intel also announced a commitment to deliver the industry's first open UCIe-based chiplet platform for SDVs. Intel will work with Imec to ensure the packaging technologies meet the quality and reliability requirements of the automotive industry.

And the company is to chair an industry-defining international standard for EV power management.

Silicon Mobility is a fabless automotive silicon and software company that designs, develops and deploys EV energy management SoCs that have accelerators purpose-built for energy delivery and co-designed with software algorithms for gains in vehicle energy efficiency.

The technology should extend Intel's reach in the vehicle beyond high-performance compute into intelligent, programmable power devices.

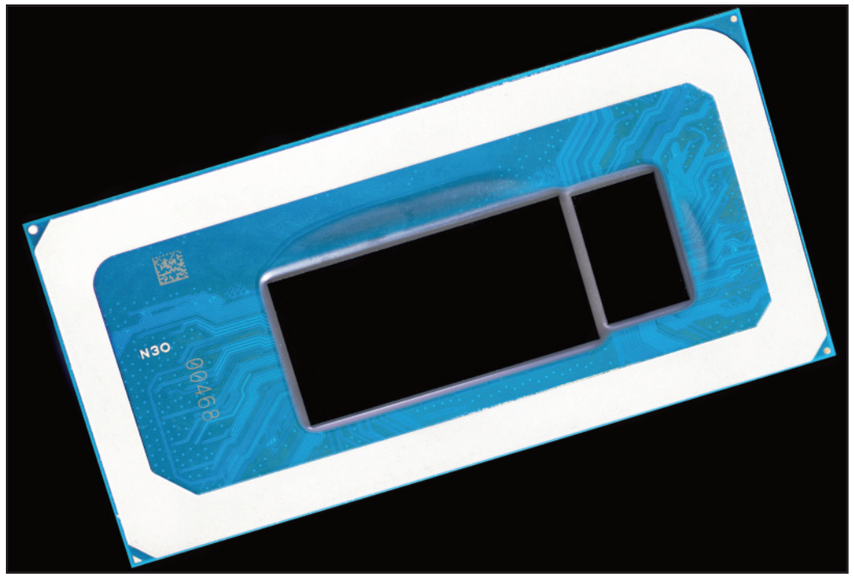
The AI-enhanced SDV SoCs address a need for power and performance scalability. They feature AI acceleration capabilities from Intel's AI PC roadmap to enable in-vehicle AI use cases such as driver and passenger monitoring.

A demo showed 12 workloads – including generative AI, e-mirrors, high-definition video conferencing and PC games – running concurrently across multiple operating systems, including mixed critical use cases. The demo shows how automakers can consolidate legacy ECU architecture to improve efficiency, manageability and scalability, while integrating their own custom options and AI apps.

"Intel's AI-enhanced SDV SoCs combine the best of AI PC and Intel data centre technologies to support a true software-defined vehicle architecture," Weast said.

Geely's Zeekr brand will be the first OEM to use the SDV SoCs. Andy An, CEO of Zeekr, explained how forward-compatibility on Intel systems combined with Intel AI acceleration will allow Zeekr to scale and upgrade services continually to enable experiences customers demand, such as generative AI-based voice assistants.

To fuel a smoother transition to EVs and a sustainable SDV, Intel and SAE announced a committee to deliver a standard for vehicle platform power management (J3311). Intel will chair the committee.



Intel AI-enhanced software-defined vehicle SoC

Continental embeds display in crystal

Continental showed a centre display embedded in a stylish crystal housing, opening up possibilities to integrate minimalist luxury into car interiors with a frameless and semi-transparent look.

The 25.4cm display is based on micro-LED technology that enables better brightness and contrast. The image-generating panel is suspended in an artfully composed crystal body, creating the illusion that the content displayed is floating.

The combination of the automotive display and real crystal was developed in collaboration with Swarovski Mobility.

"With the crystal centre display as a key component, we want to turn the world of interior design on its head and create an innovative focal point for premium vehicles of the future, one that grabs attention and stirs emotions," said Boris Mergell, head of user experience at Continental. "We are moving away from the straightforward display of information and elevating it to a highly personalised user experience."

Continental and Swarovski are pooling their resources and expertise into a product that breaks ground in terms of design and technology. Particular focus was placed on the volumetric crystal panel, which has distinctive faceting created using special grinding techniques.

They succeeded in conceiving a delicate yet durable crystal housing that meets the optical and technical challenges of in-vehicle use. The tinted crystal element allows the driver and passengers to see right through to the centre console behind it.

"The crystal centre display is the result of a combination of production and process technologies which together with Continental we implemented into an innovative new design element, one that is as impressive visually as it is technically," said Peter Widmann, senior vice president at Swarovski Mobility. "In this way, our crystal becomes much more than just an interior design element; users experience it as a key interaction interface in the vehicle."

A particular challenge faced by engineers at Continental was to project the display into the tinted crystal panel and merge everything into a seamless unit. This creates the illusion that the content being displayed is floating freely in the crystal. To do this, the display uses micro-LEDs with self-illuminating pixels, offering more brightness and contrast than comparable technologies.



Display content appears to be floating

Bosch uses Qualcomm SoC for central computer

Qualcomm and Bosch introduced a central vehicle computer that can run infotainment and adas functionalities on one SoC.

The platform is based on the Snapdragon Ride Flex SoC, which is designed to support mixed-criticality workloads, allowing for digital cockpit, adas and automated driving (AD) capabilities to be co-implemented on a single SoC.

This helps automakers realise a unified central compute and software-defined vehicle architecture that scales from entry to premium tiers.

Bosch's vehicle computer can implement rich user experiences through infotainment, vehicle lifecycle management, and digital cluster and adas features such as object, traffic light and lane detection, automated parking, intelligent and personalised navigation, voice assistance, control for multiple displays, and processing for camera radar and ultrasonic data.

"The fusion of infotainment and adas functionalities on a single SoC is a milestone for the industry," said Nakul Duggal, Qualcomm SVP.

Christoph Hartung from Bosch's cross-domain computing division added: "With the cockpit and adas integration platform, we can once again demonstrate our outstanding cross-domain expertise and experience."

Panasonic HPC addresses software-defined mobility

Panasonic announced its Neuron high-performance compute (HPC) system for software-defined vehicles (SDVs).

Neuron allows for not only software updates and upgrades but also hardware upgrades across platform lifecycles.

The HPC can aggregate multiple computing zones to reduce cost, weight and integration complexity of the vehicle by removing redundant components. The design supports up-integration with high-performance and heavy data input processing.

The architecture could reduce the number of distributed ECUs by up to 80%, allowing for faster, lighter, cross-domain computing for real-time, cross-functional communications. The design is suitable for any mobility platform including internal combustion engine, hybrid, fuel cell or electric vehicles.

"In collaboration with OEMs, Panasonic has designed and met some of the largest central compute platform challenges in the industry to make the driving experience evolve with technology," said Andrew Poliak, CTO at Panasonic Automotive. "Neuron maximises performance, safety and innovation over the entire ownership of the consumer's vehicle and enables OEMs with a future-proof SDV platform for ensuing generations of mobility needs."

With a streamlined design, the Neuron incorporates up-integration capability by consolidating multiple ECUs into a centralised nucleus to handle all levels of adas, chassis, body and in-cabin infotainment features.

It can integrate various computing processors such as GPUs for better visuals and neural processors and accelerators for AI into one unit, which can distribute computing across processors for functional use cases spanning all levels of adas, predictive maintenance, safety and security.

A liquid-cooled design can dissipate up to 1kW of heat.

The architecture also enables upgrading to newer technologies and standards when they are available for automotive.

A software framework supports standards-based device virtualisation, distributed computing and inter-domain communication. It also offers core microservices that can be used in multiple domains.

Flying car makes international debut



XPeng Aeroht's second breakthrough vehicle, the eVTOL flying car, made its international debut at the show with a demonstration of its transition between land and flight modes.

The vehicle has a two-part design, seamlessly switching between terrestrial and aerial modes. The air module facilitates vertical takeoff for low-altitude flights, while the ground module envelops the air module, allowing for ground transportation.

Beyond personal use, the modular flying car holds potential for public services such as emergency rescue.

The car will become available to pre-order towards the end of this year, with delivery to individual users starting late in 2025.

This was the first time the company has given an eVTOL demonstration outside of China.



TI chips can create smarter and safer vehicles

TI chips up safety and intelligence

Texas Instruments (TI) introduced semiconductors designed to improve automotive safety and intelligence.

The AWR2544 77GHz mm-wave radar chip is for satellite radar architectures, enabling higher levels of autonomy by improving sensor fusion and decision-making.

The software-programmable DRV3946-Q1 integrated contactor driver and DRV3901-Q1 squib driver for pyro fuses offer built-in diagnostics and support functional safety for battery management and powertrain systems.

"Semiconductor innovations like the ones we're showcasing this year at CES are helping automotive systems continue to evolve and contribute to a safer driver experience," said Fern Yoon, TI's director of automotive systems. "From more advanced driver assistance systems to smarter electric vehicle powertrain systems, TI is working alongside automakers to reimagine how reliable and intelligent technology can enable safer vehicles."

The AWR2544 uses launch-on-package (LoP) technology to reduce the size of the sensor by as much as 30% by mounting a 3D waveguide antenna on the opposite side of the PCB. LoP technology also enables sensor ranges to extend beyond 200m with a single chip.

In satellite architectures, this lets automakers increase adas intelligence for higher vehicle autonomy levels to make smarter decisions from further away.

Supporting the trend towards software-defined vehicles means designers must develop smarter, more advanced battery management systems (BMSs). The two software-programmable driver chips address requirements for safer and more efficient control of high-voltage disconnect circuits in a BMS or other powertrain system.

Both drivers are ISO 26262 compliant and offer built-in diagnostics and protection to reduce development time.

For BMS and other powertrain systems, the DRV3946-Q1 includes a peak-and-hold current controller that helps increase power efficiency. The device also implements safety diagnostics to monitor the condition of the contactor.

The DRV3901-Q1 squib driver enables an intelligent pyro fuse disconnect system by using built-in circuitry to monitor the pyro fuse and provide diagnostic information to the system microcontroller.

This gives HEV and EV BMS designers flexibility to use a pyro fuse instead of traditional melting fuse systems while reducing design complexity.

Marelli features software-defined interior

Marelli featured its software-defined interior built on a centralised architecture.

This evolution of the company's digital cockpit comprises a central computing unit powered by the Qualcomm Snapdragon cockpit platform and supports up to four zone control units.

The interior incorporates digital displays in place of analogue interfaces, with content that can be personalised by the vehicle owner, leveraging artificial intelligence.

The interior supports several display technologies, including the HorizonView, Marelli's pillar-to-pillar display with improved brightness and contrast, and a 30.5cm hidden display that seamlessly blends into the cabin.

LG displays set for SDVs

Under the theme of shaping the future of mobility, LG Display presented automotive displays optimised for software-defined vehicles (SDVs).

SDVs are associated with screenification, a concept that refers to the increase in the number of automotive displays in a vehicle as various vehicle control and infotainment features advance.

LG showed various large-sized automotive displays that completely cover the vehicle's dashboard, leveraging differentiated technologies such as P-OLED, advanced thin OLED (ATO) and LTPS (low-temperature polycrystalline silicon) LCDs.

The high-resolution P-OLED has a plastic substrate for a lightweight and flexible panel. ATO uses glass substrates to offer the core strength of automotive OLED at a more competitive price.

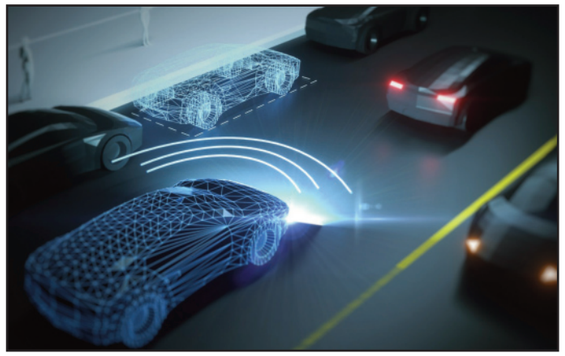
LTPS LCD is a high-performance panel that enables larger and higher-resolution displays than existing LCDs.

LG also introduced its SPM switchable privacy mode safety enhancement that automatically adjusts the display's viewing angle away from the driver's line of sight to keep their eyes focused on the road. When active, content such as movies or games being displayed on the front passenger's side is diverted away from the driver's side so only the passenger can watch it.

Furthermore, the company also presented slidable and foldable OLEDs installed in the back of seats that can be hidden away or extended for use on demand.



LG showed large automotive displays



Improving safety for teen and elderly drivers

To help young and elderly drivers, Imagry, a developer of mapless autonomous driving software, announced an autonomous driving function to prevent drivers from exceeding the posted speed limit, and from disobeying traffic signals and signs.

Aimed at teens and other drivers who could use some assistance, whether due to inexperience, longer reaction time in the elderly, fatigue or distraction, the Safe Driver Overwatch operates like a shadow driver, always maintaining a safe envelope around the vehicle.

"Safe Driver Overwatch is not just a feature; it's a guardian angel for drivers, especially those who are new to the road, or whose skills are diminished due to age, fatigue or distraction," said Imagry CEO Eran Ofir. "This advanced capability is designed to enhance safety by ensuring responsible and rule-abiding driving behaviour. It's a game-changer for families with teen or elderly drivers."

Youthful drivers face unique challenges, including limited experience, incomplete formulation of the brain's judgment centre, and inclination to test boundaries.

By adhering to speed limits, responding intelligently to traffic signals and signs, and prioritising pedestrian safety, Safe Driver Overwatch acts as the vigilant co-pilot for drowsy drivers.

It takes proactive measures by automatically responding to traffic signals and signs. The vehicle intelligently slows down and stops for amber and red lights, follows right-of-way protocols at stop signs, slows appropriately at yield signs, and enters traffic circles and roundabouts only when the coast is clear.

Ambarella expands autonomous driving AI domain controller family

Ambarella announced the latest additions to its CV3-AD family of automotive AI domain controllers – the CV3-AD635 and CV3-AD655 SoCs.

The CV3-AD635 supports a sensing suite that includes multiple cameras and radars to enable mainstream L2+ feature sets, such as highway autopilot and automated parking, in addition to meeting GSR2 and NCap standards.

The CV3-AD655 enables advanced L2+ (also called L2++) with urban autopilot, as well as support for additional cameras, radars and other sensors.

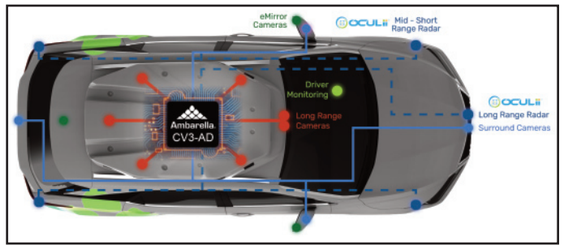
With the previously announced flagship CV3-AD685 SoC, which targets L3 and L4 systems, along with the China-focused CV72AQ SoC, the CV3-AD family now covers the full range of AD and adas, from mainstream to premium passenger vehicles.

All SoCs in the family feature Ambarella's CVflow 3.0 AI accelerator. This AI engine combines neural network acceleration, including support for the latest NN architectures such as transformers and bird's eye-view networks, along with general vector processing capabilities for traditional computer vision and efficient radar processing.

"With the accelerating adoption of AI-based adas and AD, automotive OEMs and tier-ones require more AI performance, lower power consumption and support for advanced algorithms, in all segments of the market," said Fermi Wang, CEO of Ambarella.

Portability across the entire CV3-AD family is achieved by sharing the same architectural approach, SDK and tools. Additionally, Ambarella's full software stack for autonomous and semi-autonomous driving is optimised for all CV3-AD family members.

This allows automotive OEMs and tier-ones to leverage engineering investments across their full vehicle line-ups, while achieving high AI performance that supports the latest NN architectures along with power efficiency.



CV3-AD automotive AI domain controller

The on-chip image signal processor provides imaging in low-light conditions, including high-dynamic-range processing to extract image detail in high-contrast scenes.

All CV3-AD family members provide high-resolution video recording and streaming at low bit rates with H.264 video encoding.

The integrated hardware security module provides isolation of different domains and secure software provisioning, as well as cyber-security features, including asymmetric and symmetric crypto acceleration, secure storage and key provisioning, encrypted CVflow AI acceleration tasks, true random number generator, one-time programmable memory, dram scrambling and dram virtualisation.

Engineering samples are expected to be available early next year.

Point One locates autonomous racing cars

The Indy Autonomous Challenge (IAC) selected Point One Navigation to provide real-time kinematic (RTK) corrections technology.

The RTK network delivers centimetre-accurate location services that make autonomous racing at high speeds possible. IAC race cars often exceed 290kmph and require precise location data for safe high-performance racing.

"These are the fastest autonomous racing cars in the world and they highlight the capabilities of our RTK and demonstrate our commitment to advancing innovation," said Aaron Nathan, CEO of Point One Navigation.

The technology is available for a wide range of autonomous applications, including drones, robots, delivery robots, construction and farm equipment, and autonomous cars and lorries.

Tesla links with Samsung SmartThings

Tesla is allowing the use of the Samsung SmartThings smart-home platform to control charging on its electric vehicles.

SmartThings Energy will be able to control Tesla products such as Powerwall home battery, solar inverter and wall connector, made possible through Tesla's open APIs.

"Tesla Energy's customers can now manage and monitor the power status of their homes through SmartThings Energy and Samsung devices in addition to the Tesla app, ensuring more access and connectivity," said Chanwoo Park, executive vice president at Samsung Electronics.

Additionally, consumers will be able to prepare for power disruptions and outages through SmartThings Energy's ability to sync with the Tesla app's Powerwall Storm Watch function. This means during extreme weather events such as typhoons or heavy snowfall users can be alerted through SmartThings on their connected Samsung TVs and mobiles in addition to the Tesla app.

What's more, they can activate AI Energy Mode before and during power outages to extend the remaining backup energy stored in Tesla Powerwall.

"At Tesla we are excited to add capability to our products to interact with other intelligent devices and software in customers' homes," said Drew Baglino from Tesla.

The service is in development and is targeted for launch in the second quarter of 2024.



SmartThings app shows Tesla Powerwall status

SoC supports single domain controller for driving and parking

Black Sesame Technologies (BST) introduced the Huashan A1000 autonomous driving chip and Wudang C1200 intelligent vehicle cross-domain platform.

The Huashan A1000 is China's first automotive-grade, single-SoC platform capable of supporting a single domain controller for both driving and parking.

Now in mass production, it is in vehicles from Chinese car makers FAW, Dongfeng, Geely and JAC, powering, among others, the Lynk 08 and Hycan V09 models.


BST stand at CES

Features include integrated driving and parking, urban navigation, valet parking, 3D surround-view parking assistance, vehicle-road cooperation and driver monitoring.

The SoC's ecosystem includes domain controllers, operating system, middleware, higher-layer application algorithms, and a scenario iteration platform for algorithmic enhancements.

It uses the Blackberry QNX operating system in mass production.

The Skyland series of intelligent driving computing platforms, developed by ECar X using the A1000, were featured in a demo video at CES.

The Wudang C1200 is said to have the industry's highest MCU integrated computational power and built-in 10Gbit network hardware acceleration to let users integrate more intelligent functions into a vehicle.

The multifaceted capabilities of the Wudang C1200 were on display, including an integrated driving and parking platform, a 6V bird's eye view sensor, vehicle data exchange, hard isolation and GPU rendering.

Virtual cockpit transforms software engineering

Stellantis, Blackberry QNX and Amazon Web Services (AWS) launched a virtual cockpit, transforming in-vehicle software engineering.

Part of the Stellantis VEW virtual engineering workbench, it is said to enable the delivery of infotainment technology 100 times faster than previous processes.

The platform uses the QNX Hypervisor in the cloud from Blackberry, which is now on early access release via AWS Marketplace within the QNX Accelerate portfolio of cloud-based tools.

Stellantis can create realistic virtual versions of car controls and systems, making them behave as they would in a real car, but without needing to change the main software that runs them, taking what used to take months to be achieved down to 24 hours in some cases.

Accessing QNX Hypervisor via AWS Marketplace enables Stellantis to include a virtual cockpit high-performance computing (HPC) simulation into a cloud environment. This platform for mixed-criticality and multi-OS embedded application development includes QNX Hypervisor Amazon Machine Images (AMIs) and standard hardware interfaces as defined in the Trout v1.2 VirtIO standard.

With tools such as virtualisation of graphics, audio and touchscreen, mouse and keyboard inputs, it offers little to no difference between running QNX Hypervisor-based systems in the cloud versus on real hardware.

Taking a software-driven approach and deploying the QNX Hypervisor in the cloud, Stellantis can accelerate customer feedback sessions and replicate the cockpit experience of a particular brand and vehicle, making changes in real time to optimise the experience for the driver.

"Software is becoming increasingly crucial in vehicles, leading us to innovate in how we develop and validate it," said Yves Bonnefont, chief software officer at Stellantis. "With our virtual cockpit, we're revolutionising not just our approach, but also that of our suppliers and partners in the industry. Essentially, we're able to get closer to our customer's needs through this technology with faster development cycles, faster feedback loops and quicker delivery of the technology they use and love."



Kyocera antennas meet AEC-Q200

Kyocera AVX released the A-Series low-profile, surface-mount automotive antennas.

They are qualified to AEC-Q200 and are for automotive applications, including wireless battery management, telematics control units and vehicle access key fobs.

Wireless technologies supported include GNSS L1, L2, L5 and L6, ISM, Wifi 6E, Bluetooth, cellular, LTE, 5G and UWB, with frequencies from 617MHz to 8.5GHz.

The are designed to deliver RF field containment for improved performance in reception-critical applications and available in stamped metal, FR-4, ceramic chip and small chip packages, all of which are RoHS compliant.

Lidars cover mid and long range

Robosense unveiled its M2 mid-range and M3 long-range lidar sensors for intelligent driving systems and autonomy in the automotive industry.

"Robosense's deep technical expertise and achievements in mass manufacturing enable us to develop lidar that is higher performance, smaller, more power-efficient and more cost-effective," said Mark Qiu, executive president of Robosense.

The M3 uses 940nm wavelengths to deliver a range of 300m at 10% reflectivity and 0.05 x 0.05° angular resolution within the region of interest (RoI) to detect smaller objects at long distances.

It for safe, intelligent driving systems for OEMs and tier-ones in L3 or higher vehicles. It can meet L3 functionality at up to 120kmph.

The M2 uses proprietary 2D scanning and mems chips developed in house to achieve a range of 200m at 10% reflectivity and angular resolution of 0.1 x 0.1° in its RoI.


M3 long-range lidar

Harman collaborates to entertain occupants

Samsung-subsidiary Harman has expanded its Ready product portfolio by collaborating with other companies.

It wants to help OEMs quickly and efficiently introduce in-cabin features and content, empowering drivers and passengers with enhanced safety and entertainment.

Harman is also introducing SeatSonic, an approach to in-car audio systems designed from the seat out that delivers better audio performance while reducing system complexity and energy consumption.

"As the industry continues to be disrupted by technologies like advanced connectivity, artificial intelligence and electrification, the winners will be those who can harness these forces into heightened in-cabin experiences," said Christian Sobottka, automotive president at Harman.

Harman is focused on partnering with like-minded companies, such as Gentherm and Cisco, to extend the capabilities and connectivity of its products, allowing automakers to deliver more impactful experiences.

Harman is also working with business consulting and services firms that understand the automotive industry's transformation at a deep level. Together, they are helping OEMs deliver modern features and services, while increasing revenue streams.

Additions include the use of Samsung technology in Harman's Ready Connect TCU products, the Ready Vision and Ready Display products powered by Samsung Neo QLED, the Ready Upgrade Advanced with Samsung's Exynos processor that powers consumer experiences, and collaborations to develop vital and stress-sensing technology for Ready Care in-cabin monitoring.

Visitors saw integrations with popular consumer apps such as ChargePoint in the Harman Ignite store, and collaborations with automotive suppliers including Gentherm and Adient that enhance the value proposition of Ready Care and SeatSonic.

Harman Ignite Store Payments integrate with OEM wallets and support multiple payment service providers, but also allow automakers to monetise and maintain control of commercial relationships with customers.

The product is powered by Samsung Checkout, which executes millions of transactions a day and has been tested and built to enable secure transactions at a global scale.

It is the same payment system integrated into Samsung's TVs to make online purchases and the Galaxy Store, Samsung's app store.



Harman helps OEMs add in-cabin features

Software stack powers adas

LeddarTech supported accelerated L2 and L2+ adas development by releasing the LVS-2+ LeddarVision surround-view highway assist software stack on an embedded platform.

The LVS-2+ was developed on the Nvidia Orin embedded system, with the flexibility to be ported to other platforms.

It is engineered to power premium L2 and L2+ adas highway assistance and achieve the five-star NCap 2025 and GSR 2022 safety rating.

This AI-based low-level fusion and perception software can adapt to different sensor configurations.

It seamlessly evolves from the foundational 1VxR sensor configuration to the 5V5R configuration, eliminating the need for side cameras typically implemented in the legacy 11V5R configuration.

Surround-view perception is achieved using the 5V5R sensor architecture, which should accelerate mass deployment of premium L2 and L2+ adas by lowering hardware and system implementation costs.

Mitsubishi hardware improves TomTom maps

Mitsubishi Electric and TomTom have integrated technologies to provide precision navigation for vehicles.

TomTom's high-definition (HD) map technology running on Mitsubishi's hardware provides the accurate navigation data required for automated driving.

"We're exhilarated to work with TomTom, widely recognised as the leading provider of precise and reliable mapping data, to further enhance our positioning systems," said Michael Horani, director at Mitsubishi.

Mitsubishi's Locator is a vehicle positioning system with an algorithm that uses GNSS and an inertial measurement unit (IMU). Coupled with high-definition mapping from TomTom, it provides accurate information on the vehicle's position and road data for adas applications.

TomTom uses multi-sourcing for its HD Map technology, including GPS, front-facing cameras, sensors and artificial intelligence, to allow automated driving systems to see and anticipate the road ahead.

Already used in levels one and two autonomous driving, TomTom's HD Maps are consistently updated, provide a detailed representation of the road, and can pin-point the location of road elements, including lane centrelines, traffic signs and other objects to help self-driving vehicles make sense of the surroundings.



Mitsubishi and TomTom provide precise navigation for automated vehicles

"TomTom HD Maps help vehicles plan a path and safely travel along any route, making all necessary adjustments, including changing lanes, taking exits and merging into highway traffic," said Paul Hesen, vice president at TomTom.

During CES, TomTom demonstrated recorded video from a vehicle equipped with Mitsubishi's Locator hardware and TomTom HD Maps as it travelled in Detroit.

• Visitors to the TomTom stand saw in-vehicle infotainment services powered by Access Twine running on a digital cockpit. This demonstration of the infotainment platform and its car-centric app store is the result of a multi-year collaboration between Access and TomTom to provide OEM-branded in-car infotainment.

Intellias partners Rightware on digital cockpit

Intellias unveiled a digital cockpit with Rightware's Kanzi One technology to accelerate development of dynamic, consumer-friendly automotive instrument panels.

The IntelliKit digital cockpit showed how the company's engineers seamlessly integrate hardware and software from partnerships to speed cockpit development.

Rightware's Kanzi One HMI kit and Qualcomm's fourth-generation Snapdragon automotive cockpit platform are among the systems featured in the portable but fully functional digital cockpit.

Intellias technology director Adam Konopa explained that Intellikit with Kanzi One enables faster, easier prototyping of digital screens. It also speeds up user-interface development processes by linking and creating interaction logic between different components.

"Harnessing the power of Rightware's Kanzi One HMI tools not only showcases our proficiency in orchestrating a diverse ecosystem of software and hardware partners, but also allows us to revolutionise the way we develop and integrate software," Konopa said. "With Intellikit empowered by Kanzi One we're able to simplify and accelerate the prototyping of digital screens, forging a path to the development of more intelligent and dynamic digital instrument panels."

Rightware's head of partnerships Derek Sellin said the partnership with Intellias was established in 2022, adding that Rightware's Kanzi One provided a virtually limitless toolchain for creating visually stunning digital automotive cockpits with optimised performance.



Steve Rogerson found alternative powertrains and the use of AI were burning topics at January's Autosport International in Birmingham, UK

AI POWER

Motorsport is battling with the problem of continuing to create a spectacle that draws in the fans while making the sport greener, not easy as the whole point is to get these energy guzzling vehicles around a track in the fastest time possible.

Even in electric vehicle racing, there can be banks of diesel generators providing the power.

"You have to keep it appealing for the fans and for the competitors," said Bill Pearson, senior manager at the International Motor Sports Association (IMSA). "If you don't keep it interesting, they won't come."

Pearson was speaking during the panel discussions at January's Autosports International trade show in Birmingham, UK.

One issue in keeping it appealing is the noise level; fans moaned louder than the cars when Formula One became quieter. But Richard Saxby, motorsports director at McLaren Applied, doesn't believe it is that important.

"I have watched Formula One in silence on my phone and it is still an exciting race," he said. "For older people, the noise is part of the passion. We are moving away from that to technologies where the noise is not that important."

And Bernie Collins, former F1 strategy engineer for Aston Martin and now a Sky Sports analyst, added: "We are in an exciting engineering era and you can do whatever you want."

That is providing it can move away from carbon fuels, something that is challenging not just motor sports but all vehicles.



Bernie Collins: "We are excited about the challenges."

And Pearson believes that even in the USA drivers are realising that.

"The USA does get it," he said. "They know there is a problem with carbon fuels moving forward."

But he said the car manufacturers had an impossible task.

"They have to stop what they are doing and do something different, but what they do might be wrong," he said. "The biggest challenge is time. You go in one direction and it fails and you need to start again with a different plan. There are different challenges going on. Formula E is not the same as Le Mans, or what you do in big endurance races. We need the big OEMs to come and show us what they can do. We have to follow the OEMs, but we can be part of the discussion as a community."

Saxby agreed, saying the individual motorsport series each had to have their own targets, but said they all could follow F1's lead in sorting out the order of the races to reduce the amount of travel.

"We are led by the OEMs in Nascar and F1," he said. "They decide what to do with the powertrains."

Andy Welch from the Extreme E offroad series, which will become Extreme H when it transitions to hydrogen fuel in 2025, said government policies in different countries would drive motorsports down a particular route.

"You need a varying approach," he said.

Saxby though is worried about the perception people have of hydrogen and its safety.

"We have to educate people about hydrogen," he said. "Some think you are driving around in an H-bomb and if you have an accident it will wipe out an entire city. Education is needed before hydrogen can become mainstream."

Pearson though said people wanted it to relate to what they drove down the street, but said changing all the cars in the fleet to versions that didn't burn a carbon fuel was "mind boggling".

But for motor racing, Collins said the fan base was demanding the industry did something more environmentally friendly.

"As engineers, we are excited about the challenges," she said. "If the race is good enough, the powertrain is not that important."



Tom McCarthy: "Motorsport can play a big role in bringing science to people."

Saxby added: "At the end of the day, it is about the show, and it has to be a proper show. We do put on a good show and we also provide valuable R&D."

Car makers are also turning to artificial intelligence (AI) to help them with the R&D and some are looking at AI driving the cars. One such body is the Abu Dhabi Autonomous Racing League (A2RL).

"We want these cars to use AI to drive around the track," said Tom McCarthy from A2RL. "Motorsport can play a big role in bringing science to people."

The capabilities of the average driver, he said, were well below the capabilities of the car.

"We spend a lot of time trying to make it better for drivers," he said. "The question is how can we make autonomous vehicles so they close that gap. That will provide a huge benefit in terms of safety."

Collins added: "I love driving, so I don't want an autonomous vehicle for most cases. But if you ask if I want it when I am stuck in traffic for two hours, the answer is yes."

McCarthy said that even when driving manually there were some incidents where you could not react quick enough and said having AI in the car was like Lewis Hamilton sitting next to you ready to take over in difficult situations to make it safer.

"I am not sure having Lewis Hamilton driving all the cars would reduce accidents," said Collins.

Alan Patterson from AI engineering start-up BeyondMath said machines were better at optimising performance and gave the opportunity to, for example, reduce the complexity of designing the aerodynamics of a car.

"This is something better than you can do manually," he said. "You want enough data to statistically describe what you are trying to do. This can produce speed and accuracy to do jobs better."

However, he warned: "If optimisation becomes so good, all the cars will become the same and it will be just down to the drivers."

Personar is using AI to translate voice conversations in motor racing between teams and drivers over the radio into instant text. Its vice president Paul Clarke said it was important that the technology did not create mistrust.

"You have to trust the data, and that matters whether in motorsport or self-driving cars, or other industries," he said. "This means you need copious amounts of accurate data."

These data are being used to help team strategists in motorsports make the crucial decisions.

"The decision of when to take a pitstop has to be made in seconds," said Collins. "You have a lot of data coming in, and letting machine learning analyse those data quickly and show the repercussions of each decision gives me the freedom to do my job properly."



Paul Clarke: "You have to trust the data."



Bill Pearson: "The biggest challenge is time."

ELECTRIC VEHICLES



A look at smartphone maker Xiaomi's move into electric vehicles

SMARTPHONE ON WHEELS

Chinese smartphone maker Xiaomi has unveiled its first electric vehicle as well as core technologies including Pilot autonomous driving and a smart cabin.

Lei Jun, CEO of Xiaomi, said the firm's entry into the automotive industry marks a significant leap from the smartphone industry and a crucial step towards closing the loop of the human-car-home smart ecosystem.

"Xiaomi has decided to invest tenfold, starting from the development of fundamental core technologies, committing to constructing an outstanding vehicle," he said, adding that the company aimed to become one of the top five global automakers.

He said by integrating industrial manufacturing, smart software and artificial intelligence (AI), the Xiaomi EV would completely redefine the automotive industry, marking a significant leap in its technological landscape.

Xiaomi has invested over CNY10bn in the initial research and development phase. The R&D team comprises more than 3400 engineers and over a thousand technical experts in critical domains. These are in both China and abroad.

The EV is equipped with a self-developed battery management system (BMS) with Asil-D functional safety. This BMS includes three independent thermal runaway monitors and alarms, along with an around-the-clock early warning system.

Xiaomi believes its smartphone heritage makes it well positioned to integrate automotive and consumer electronics.

In terms of autonomous driving, Xiaomi has pioneered three key technologies: adaptive bird's eye view (BEV), road-mapping foundational model and obstacle recognition technology.

Adaptive BEV technology invokes different perception algorithms based on scenario. The perception grid has a minimum granularity of 5cm and a maximum of 20cm, with a recognition range extending from 5 to 250m.

This technology ensures wider visibility in urban areas, extended vision in high-speed situations, and more precision when parking.

The road-mapping foundational model recognises different road conditions in real time and intelligently switches to a more appropriate driving trajectory. It can also navigate smoothly in complex intersections without relying on high-definition maps thanks to it learning from complex intersection scenarios and experienced driver habits.

Xiaomi's occupancy network technology has unlimited categories of recognition for irregular obstacles. Compared with traditional networks that interpret obstacles as blocks, the vector algorithm simulates all visible objects as continuous curved surfaces. This improves recognition accuracy to as low as 0.1m.

Additionally, Xiaomi's self-developed one-click noise reduction feature eliminates the impact of rain and snow on recognition, reducing the probability of misidentification.

As well as the road-mapping foundational model, Xiaomi has also independently developed what it claims is the world's first production-ready end-to-end sensing and decision-making AI model for automated parking. This model allows for real-time observation and dynamic adjustment when parking in difficult scenarios, such as parking facilities that include elevators.

On the hardware front, the system is equipped with two Nvidia Orin processors with a combined computing power of 508Tops.

Perception hardware includes one lidar, eleven high-definition cameras, three mm-wave radars, and twelve ultrasonic radars on the SU7 Max model.

The smart cabin adopts a human-centric interaction architecture and has a 41cm 3K central console, 142cm head-up display (HUD), 18cm rotating dashboard, and two seat-back extension mounts that allow for the mounting of two tablet devices.

It is equipped with the Qualcomm Snapdragon 8295 in-car processor with AI computing power of up to 30Tops, enabling an interactive experience with the linking of five different screens.

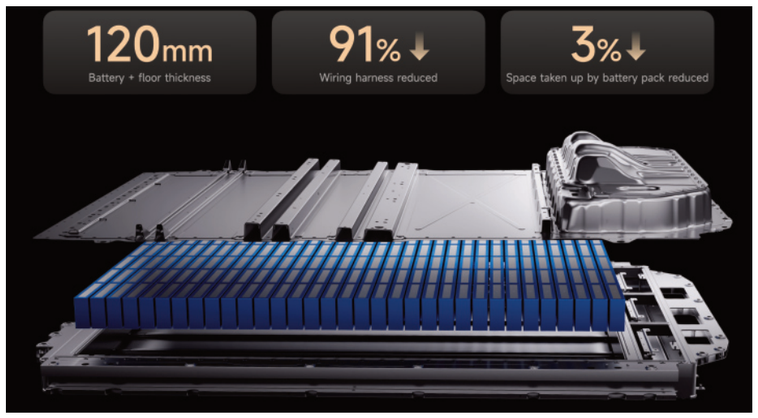
The interactive experience of the smart cabin is similar to tablets, allowing users to adapt quickly without the need for a learning curve. The system operates smoothly, with the vehicle OS launching in 1.49s after the door is unlocked.

Additionally, it offers seamless cross-device connection between smartphones and the EV. For example, when a phone is brought into the cabin, the console automatically displays an icon, enabling easy access to the phone's interface with one touch.

The in-car OS seamlessly integrates mainstream applications, including the whole Xiaomi tablet application ecosystem, with gradual adaptation to over 5000 applications. Smartphone applications can be pinned to the car console, instantly transforming them into in-car applications.

In terms of hardware integration, the SU7 supports over 1000 Xiaomi smart-home devices for integration with the vehicle, enabling automatic discovery, password-free access and the ability to set up automation scenarios, creating a robust car IoT ecosystem.

The car interior also has dedicated pin-point expansion connections, supporting plug-and-play functionality for a wide range of devices. To meet the needs of users, it supports Apple CarPlay, the mounting of iPads and iPad accessories, and applications on the rear extension mount.



CTB integrated battery technology

Conclusion

The Xiaomi SU7 has an e-motor, cell-to-body (CTB) integrated battery technology, a body structure manufactured from the firm's die-casting cluster, a 0 to 100km/hr acceleration in 2.78s, and the capability to reach a top speed of 265km/h.

With a self-developed smart chassis control algorithm, it possesses two major capabilities: smart multidimensional sensing and global synchronised control. This allows for millisecond-level adaptive dynamic chassis control across all scenarios, providing a stable handling experience while delivering an almost bump-free driving experience.

More importantly, the SU7 incorporates three major ecosystem empowerments by integrating applications, hardware and third-party car IoT ecosystems, providing a smart mobile space experience.

The car IoT ecosystem is open to third parties, featuring standardised interfaces, communication protocol standards, and lightweight retrofit options for existing devices.

Lei Jun said the ultimate realm of smart electric vehicles was the fusion of technological breakthroughs and the seamless integration of user needs and their vehicles, where driving became intuitive.

Ecosystem

In October last year, Xiaomi announced an upgrade of its group strategy, transitioning from smartphone plus AIoT to the human-car-home smart ecosystem, with automobiles becoming a crucial component of its focus.

This ecosystem integrates scenarios involving people, cars and homes, facilitating seamless connectivity of hardware devices, real-time coordination and driving collaboration among industry partners.

The ecosystem enables mutual collaboration and evolution among individuals, devices and intelligent services. Leveraging HyperConnect cross-device connectivity, Xiaomi HyperOS seamlessly integrates more than 200 product categories, including the Xiaomi EV. The ecosystem coverage extends to over 95% of users' daily scenarios, allowing intelligence to serve each individual intricately.

Simultaneously, with AI empowerment, Xiaomi HyperMind serves as the centre for intelligent reasoning, and can perceive and learn from usage, providing automated, proactive options.

Additionally, the smart ecosystem achieves mutual empowerment among products, technologies and industries, maintaining an open platform. Xiaomi adheres to the principle of continuous R&D in foundational technology, and continuous and long-term investment.

Xiaomi collaborates with industry partners, including developers, supply chain and manufacturing to harness the potential of the entire industry, making HyperOS a more open platform and ensuring human-car-home becomes more inclusive and human-centred, capable of enabling a multitude of possibilities.

Lei Jun said Xiaomi's entry into the automotive industry marked "a significant leap". This represents a long-term commitment and deep investment in foundational core technologies, a coming-of-age moment for Xiaomi's modern industrial intelligent manufacturing capabilities and, most importantly, a crucial step in completing the human-car-home ecosystem.

"Xiaomi's entry into the automotive industry signifies a new beginning for Xiaomi," said Lei Jun. "I believe that one day Xiaomi EVs will be a familiar sight on roads around the world."



Smart cabin adopts human-centric interaction

PRESSURE POINT

Richard Mount explains the role of asics for tyre monitoring



Nils Bohlin invented the three-point seatbelt in 1959

Nils Bohlin, an engineer at Volvo, introduced the three-point seatbelt back in 1959. His invention, combined with legislation to make seatbelt wearing mandatory, is estimated to have saved thousands of lives.

The seatbelt is just one example of a safety aid but, as vehicles get more and more complex, what other technologies are being used?

With more than 30 million cars on the roads, safety continues to be an area of focus for further innovation and development in the automotive industry. As a result, modern vehicles find themselves host to a variety of sensors, monitoring the car and alerting its occupants when anything is amiss. So how do these technologies work, and what makes them so important?

On track

Tyre pressure monitoring systems, or TPMS, have been a legal requirement in passenger vehicles sold in the EU since 2014. These monitor the air pressure inside the tyre to detect if the pressure falls below safe levels. TPMS is a valuable safety tool to reduce the risk of tyre blowouts, but it also helps improve fuel efficiency and tyre lifespan, both of which can be affected by under-inflated tyres.

There are two types of TPMS sensor – indirect and direct. Indirect sensors estimate the tyre pressure based on information from the vehicle's anti-lock braking system. Under-inflated tyres will result in the wheels moving at different speeds, which is something the indirect sensor is able to detect.

But because it cannot accurately determine an absolute pressure value, it can be slow to register multiple tyres losing air at the same time.

For more reliable measurements, direct TPMS sensors are the preferred approach. A direct system is comprised of sensors placed within the valves on each tyre, which record pressure and temperature readings. These readings are then transmitted wirelessly back to the central control system for analysis. Unlike the indirect method, the direct TPMS approach offers higher specificity, allowing the system to identify an underinflated tyre and notify the driver, even when the car is stationary.

ICs

Essential to the success of TPMS is the electronics within. These systems require ICs capable of performing the required signal conditioning and signal conversion, as well as communicating the data to the driver. This all must be achieved within operation constraints of low power consumption, measurement accuracy and reliability, all accommodated within a compact package.

Achieving all these demands to the level required can be difficult to achieve using standard, off-the-shelf ICs. But for a custom IC, the possibilities are very different.

An application-specific IC, or asic, offers multiple benefits over a standard IC. Asics are designed exactly with the user's specification in mind, resulting in a chip optimised for the desired application.

This optimisation leads to a reduced bill of materials (BoM) by removing functionalities and



Systems can identify under-inflated tyres and notify the driver



TPMS reduces the risk of tyre blowouts

components that aren't necessary to each application. This optimised functionality and performance ultimately results in a lower cost per system, by removing performance and circuitry that is not required.

These can incorporate communication protocols such as 2.4GHz Bluetooth LE within the asic. This can be achieved efficiently by using a system-in-package approach, where a number of individual die – asic, mems and BLE – are encapsulated within a single package, reducing development time and therefore time to market.

And for battery powered sensors, such as those within the TPMS, the asic can also offer a much lower power consumption through performance optimisation and the use of power saving techniques. By integrating protocols that switch off the sensor when the car is parked, and only switch back on again when the vehicle is moving, the asic helps guarantee that the TPMS's battery will last for up to ten years or at least as long as the tyre.

Contrary to what might be expected, the custom design process for an asic doesn't need to be slow. An experienced asic design and supply company will have its own IP, and in addition will be able to access third-party IP. This can be used to shorten the design timescales and productionise the asic far more quickly than attempting to design an asic from transistor level upwards.

If reflecting on the history of automotives shows anything, it's that continuous development is key to continue to ensure driver and passenger safety. Striving to improve vehicles through ingenuity and expertise at chip level not only achieves a more comfortable, enjoyable driving experience, but also a safer one.

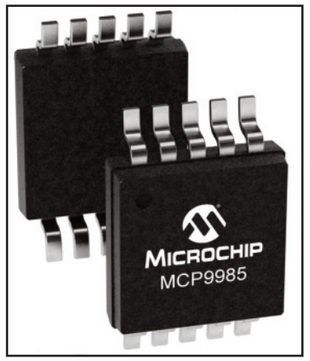


Richard Mount is director of sales at Swindon Silicon Systems

Temperature sensors accurate when hot

Ten multi-channel automotive-qualified remote temperature sensors from Microchip are designed for 1°C accuracy at a wide operational temperature range.

The MCP998x family includes five sensors with shutdown temperature setpoints that are designed not to be overwritten by software or maliciously disabled.



With up to five channels of monitoring and several alert and shutdown options for security, this family can support systems that supervise more than one thermal element. The remote sensors also integrate resistance error correction and beta compensation, eliminating the need for additional configuration for improved accuracy.

Resistor-settable shutdowns options cannot be overwritten by software. Resistor error correction eliminates long PCB trace resistance.

Monitoring temperatures at multiple locations with a single, integrated temperature sensor reduces board complexity and size and simplifies design for a lowered bill of material.

Designed for 2.5°C accuracy up to +125°C, they can be used at the high end of the traditional temperature range. This high temperature tolerance makes them suitable for automotive applications where operating temperatures for electronics is a major factor.

The sensors are designed to support vehicle functions including HID lamps, adas, automotive servers, video processing, infotainment, engine control, telematics and body electronics such as seat control, lighting systems, mirror control and power windows.

Supply volatage range is 1.7 to 3.6V. They are AEC-Q100 grade-one qualified.

To enable easier design and development, the MCP998x family is supported by the EV23P16A evaluation board.

Making noise for electric vehicles

Designed for acoustic vehicle alerting systems (avas) in electric vehicles, the ML22120xx series of speech synthesis ICs have been introduced by Rohm subsidiary Lapis Technology.

The number of hybrid and electric vehicles that silently operate on motor power is increasing, prompting avas regulations that require a warning sound to alert pedestrians of their approach.

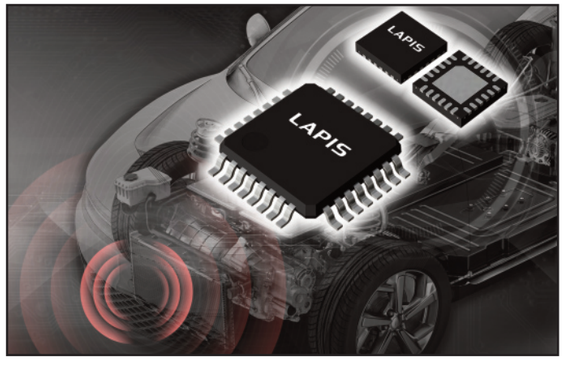
However, when generating a warning sound using an MCU, the pitch and volume must be smoothly controlled and characteristics adjusted to match the vehicle geometry. This increases MCU software development load requiring verification with other software processes inside the MCU.

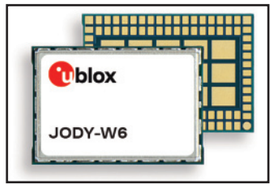
In response, the speech synthesis ICs aim to achieve a high-fidelity sound using a novel hardware-based configuration.

The ML22120-TB and -GP integrate hardware functions that include a warning sound generator, fader and equaliser. Unlike MCU-based designs, the hardware configuration eliminates the need for software validation, reducing development time.

At the same time, dedicated gui software makes it easier to comply with regulations for volume and frequency characteristics required for avas.

The ICs can be controlled by simple commands, allowing warning sound to be started in less than one-tenth the time of conventional MCU-generated systems.





Wifi module

A concurrent dual-band Wifi 6E module from U-Blox has Bluetooth 5.3 and LE Audio for automotive infotainment, navigation, telematics and OEM telematics.

The Jody-W6 measures 13.8 by 19.8 by 2.5mm and delivers the benefits of Wifi 6E plus dual-mode Bluetooth with LE Audio. It can withstand operating temperatures from -40 to +105°C.

The module comes with either two or three antennas. It can also integrate an LTE filter.

An EVK and an M.2 card will be available for the series.

Furthermore, it is compatible with previous Jody modules to ensure seamless scalability.

Use cases include support for Apple CarPlay and Android Auto, personalised entertainment, data off-loading, and smart roof-integrated antennas.

It has an embedded NXP AW693 chipset, which includes mu-mimo, OFDMA and target wake time.

Samples are available, with volume production set for early next year.

Image sensors offer LED flicker mitigation

Two image sensors from Omnivision are for automotive surround- and rear-view cameras. Both offer LED flicker mitigation (LFM) and 140db high dynamic range (HDR).

The OX01J is a raw image sensor only, with no ISP, 1.3MP image sensor, and the OX03J10 is a fully integrated 3MP image sensor.

The OX01J provides OEMs with the flexibility to purchase just the image sensor if they already have their own backend image signal processor (ISP) architecture.

For surround view, rear-view camera and camera monitoring across a range of lighting conditions, it has a 3μm pixel in a 1/3.55in optical format with low-light performance and low power.

It comes in an a CSP package and is built on the firm's PureCel Plus architecture.

By integrating the image sensor with a dedicated ISP into one cmos SoC, the OX03J10's HDR and LFM performance are optimised and the size and cost of the device reduced.

With its high sensitivity, it can capture objects and road condition changes quickly and accurately during high-speed operations.

Resolution is 1920 x 1536 in a 1/2.4in optical format. It uses PureCel technology and a 3μm Deep Well split pixel. It outputs YUV and RAW simultaneously, and is Asil-C compliant.



Spring contacts ruggedise card-edge connectors

Double-ended linear card-edge connectors from Kyocera AVX have spring contacts.

The 9159-7X0 devices use a beryllium copper spring contact system, which is proven to deliver high electrical and mechanical reliability, high signal integrity, and high durability in harsh environments.

Combined with the convenience of a double-ended, single-piece and solder-free-mating card-edge design and the versatility enabled by its various configurations and plating makes them suitable for linear PCB mating in harsh industrial, LED lighting, automotive lighting and transportation lighting applications.

They are available in open- and closed-side configurations with high-temperature white or black UL94 V-0 insulators, five contact variations (four, six, eight, ten and twelve positions), gold or tin over nickel contact plating, and current ratings up to 2A per contact.



They can mate with 1.5mm-thick (±0.15mm) PCBs with gold- or tin-plated pads and rated for 150V AC RMS or the DC equivalent, up to 1000 cycles with gold-plated contacts or up to 20 with tin, and operating temperatures from -40 to +130°C.

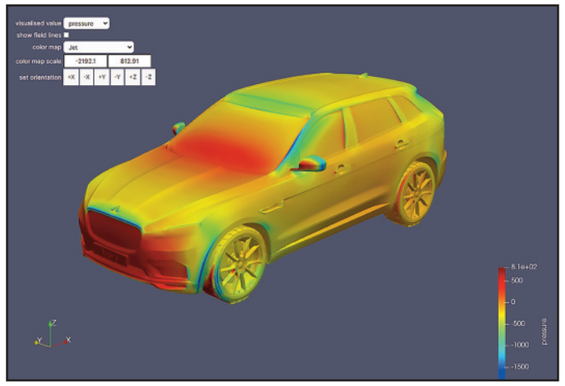
They are UL and RoHS compliant and can be customised.

SaaS app combines simulation with gen AI

A physics-agnostic, software-as-a-service (SaaS) app from Ansys combines the predictive accuracy of simulation with the speed of generative AI.

The SimAI supports an open ecosystem and predicts performance within minutes, democratising simulation through intuitive interfaces and processes.

Demand for engineering software that improves productivity without sacrificing accuracy has grown significantly, driven by more sophisticated products and shorter time-to-market imperatives.



By infusing generative AI into the design process alongside simulation, users can redefine and gain more value out of existing processes to meet the needs of a dynamic market.

It is intuitive and easy to use, designed for those without coding experience or deep learning expertise.

Instead of relying on geometric parameters to define a design, it uses the shape of a design itself as the input, facilitating broader design exploration even if the structure of the shape is inconsistent across the training data.

The application can boost prediction of model performance across all design phases for computation-heavy projects.

Users can train the AI using previously generated Ansys or non-Ansys data.

AD software stack based on deep-learning AI

Ambarella's autonomous driving (AD) software stack is primarily based on deep-learning AI processing for all its modular components, including environmental perception, sensor fusion and vehicle path planning.

This AD stack and Ambarella's CV3-AD AI domain controller system-on-chip (SoC) family were designed so the stack runs optimally on the SoC's CVflow AI engines, reducing power consumption and the processing load for its on-chip Arm cores.

Likewise, these SoCs provide processing for vision and radar sensing and fusion.

The stack provides a flexible implementation model, so OEMs can leverage any or all its modules combined with their own software.

The dynamic vehicle path planning module enables a natural driving experience. It was trained with data from many real-world scenarios.

A sensing suite consists of mono and stereo cameras, as well as Ambarella's Oculii 4D imaging radar. All the processing is being done by the CV3-AD. It is flexible to support OEMs' specific sensing suites, including the option for adding lidar.

It only requires readily available, standard-definition (SD) maps, eliminating the need for pre-generated high-definition (HD) maps. Instead, the stack generates HD maps in real time using live environmental data from the vehicle's sensing suite.

This is suitable for handling difficult AD scenarios, such as downtown areas in large cities with roundabouts, narrow roads with parked vehicles, heavy traffic, construction, and a high density of pedestrians, cyclists and other vulnerable road users.

Modular AD software and hardware provide OEMs with a scalable platform that enables them to select the CV3-AD SoC with the right mix of performance and features for each model in their fleets, opening the door for autonomous features in mass-market vehicles.

This includes a broad range of autonomous and semi-autonomous vehicle implementations, from fully featured L2+ systems through to higher levels of autonomy.

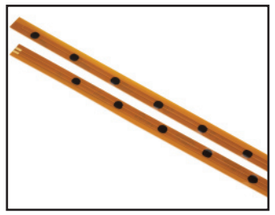
The tool chain includes tailored tools for data collection with the SoC's on-chip encoder, simulation and annotation.

Development is streamlined via accelerated software-in-the-loop (SIL) simulations using PCIe server cards, while a fully automated 3D annotation pipeline supports AI training.

Detecting when Li-ion cells get too hot

An overtemperature detection platform from Littelfuse is designed to transform the management of Li-ion battery systems.

Called TTape, it helps vehicle systems manage premature cell aging while reducing the risks associated with thermal runaway incidents.



Applications include EVs, HEVs, commercial vehicles and energy storage systems.

Distributed temperature monitoring enables detection of localised cell overheating, thereby improving battery life and enhancing the safety of battery installations.

It ensures the battery pack remains serviceable for an extended period by initiating temperature management at an earlier stage.

With a single device, multiple cells can be monitored, thus alerting the BMS sooner in case of overtemperature scenarios.

With a response time of less than one second, it guarantees quicker alerts, signalling the potential onset of thermal runaway conditions.

Calibration isn't necessary as it can integrate with an existing BMS.

The thin design makes it suitable for conformal installations.

With a single MCU input, its distributed temperature monitoring capability improves the detection of localised cell overheating. This approach enables efficient cooling measures to prolong battery life and heighten the safety standards of battery installations.

It is available in tape and reel or box packaging, depending on the length required.

Root of trust

A hardware-based root of trust (RoT) for semiconductors in the automotive market that must meet stringent functional safety standards is available from Intrinsic ID.

QuiddiKey 400 has been developed following an ISO 26262 functional-safety-compliant flow and meets the Asil-B fault metric and Asil D for systematics failures.

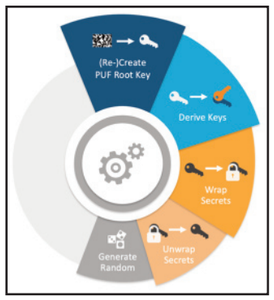
It leverages sram physical unclonable function (PUF) technology to create a hardware-based RoT that secures and protects electronic systems and components.

RoT technology has become essential for protecting connected automotive components from tampering or from being cloned or counterfeited.

Supply chain integrity is crucial for automotive safety.

It provides a reliable RoT for asic, SoC, MCU and FPGA-based devices, which prevents attacks that can compromise functional safety and provides components with an unclonable identity to protect against counterfeiting.

The product is based on the firm's core PUF technology that has already been proven in the field for a decade with no known breach or failure.



Mosfet relays

Mosfet relays from Omron extend capacity and work at higher temperatures in a high-current six-pin dip format.



The G3VM-63BR and G3VM-63ER extend the company's 60V six-pin dip mosfet relay range up to 0.7A continuous load current, while providing operating temperatures from -40 to +110°C.

The optical semiconductor technology has high-speed operation and compact size, thereby overcoming the drawbacks common with mechanical relays.

Power consumption on the input is low compared with all electromechanical relays, but especially reed relays.

Maximum resistance with output on is typically 0.3Ω, or 0.1Ω. with connection C, while typical capacitance between output terminals is 520pF.

Maximum trigger LED forward current is 2mA, while turn on and off times are 2 and 3ms, respectively.

They have NC contacts allowing status output to linked devices including power off status. They can also be used alongside the NO contact type, enabling switching control of multiple loads with one input control.

Applications include test, safety, automotive and medical equipment.

GaN fet boards aid evaluation of lidar

Three evaluation boards – EPC9179, EPC9181 and EPC9180 – from EPC use pulse current laser drivers of 75, 125 and 231A, showcasing the firm's AEC-Q101 GaN fets.

These FETs – EPC2252, EPC2204A and EPC2218A – are 30% smaller and more cost-effective than their predecessors. Designed for long and short-range automotive lidar systems, these boards expedite evaluation with varied input and output options.

All boards share identical functionality, differing only in peak current and pulse width.

Using a resonant discharge power stage, they employ a ground-referenced GaN fet driven by the LMG1020 gate driver.

The fet's fast switching enables rapid discharge of a charged capacitor through the load's stray inductance, enabling peak discharge currents of tens to hundreds of amps within nanoseconds.

The PCB is designed to reduce power loops and common source inductance while offering mounting flexibility for laser diodes or alternative loads.

To enhance user-friendliness, all boards ship with EPC9989 interposer PCBs, featuring various footprints to accommodate different laser diodes or other loads. Users can choose one that meets their needs for evaluation.

The boards are designed to be triggered from 3.3V logic or differential logic signals such as LVDS. For single-ended inputs, the boards can operate with input voltages down to 2.5V, or 1.8V with a simple modification.



The purpose of these boards is to simplify the evaluation of GaN-based lidar drivers that switch faster and deliver higher pulse current than with other semiconductor options.

Accelerometer suits non-safety use

A high-temperature monolithic three-axis motion-tracking accelerometer from TDK is for non-safety automotive applications, such as navigation, infotainment systems and telematics.

The InvenSense SmartAutomotive IAM-20381HT operates at up to +105˚C.

It is part of a compatible, multi-axis, multi-grade portfolio of smart automotive products.

The stand-alone three-axis mems accelerometer comes in a 3 by 3 by 0.75mm 16-pin LGA package and is automotive-qualified based on AEC-Q100 grade two.

There are two programmable independent interrupt lines, wake-on-motion functionality, and a fifo up to 4096byte, which can lower the traffic on the serial bus interface and reduce power consumption by allowing the system processor to burst-read sensor data and then go into a low-power mode.

Such features enable a variety of motion-activated functions such as anti-theft, vehicle security and driving style data recording.

It has a 16bit digital-output accelerometer, and x-, y- and z-axes acceleration sensors with a user-programmable full-scale range up to ±16g.

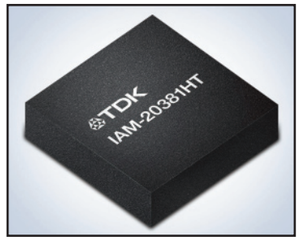
User-programmable digital filters are for accelerometer and temperature sensors.

Features include embedded self-test and final test over temperature.

It is pin-to-pin and register-compatible across the IAM-20680HT, IAM-20680HP, IAM-20380HT and IAM-20381.

Applications include lift gate motion detection, tilt measurement, infotainment, navigation systems, car alarms, telematics, insurance vehicle tracking and drive style recording.

The product will be available to distrtibutors from February.



Mems sensor measures gases and liquids

For electric vehicles (EVs) thermal management systems, Melexis has launched the MLX90830 pressure sensor, its first product to feature its patented Triphibian technology.

This miniaturised mems pressure sensor handles gas and liquid media measurement from 2 to 70bar. The factory-calibrated device measures the absolute pressure and delivers a proportional analogue output signal.

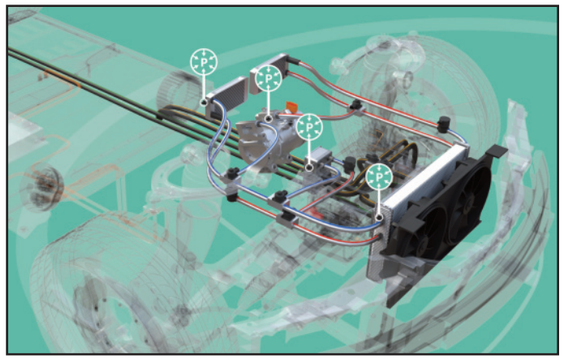
Triphibian technology not only allows the mems sensor to provide accurate measurements considerably above 5bar but also while in contact with liquid.

This combination of high-pressure sensing while compatible with gas and liquid is achieved by the construction of the device. The sensing mechanism contains a suspended cantilever inside an SO16 package with the diaphragm at its tip.

The suspended cantilever design of the sensor provides pressure spike immunity up to 2000bar/ms and static burst level up to 210bar.

The two available calibrated ranges (10 or 35bar) are each tailored to fulfil the demands of a distinct EV thermal management system, including low and high-pressure refrigeration loops.

The design is inherently more robust than rear-side exposed options, which still experience a pressure differential between the glass pedestal side and the wire bonding side. The pressure equalisation principle is also



valid for frozen media, allowing the device to survive in such conditions.

Compared with existing non-mems-based designs, the device provides elevated accuracy and robust design, helping optimise the efficiency of the vehicle's thermal management systems, allowing for a longer range. Furthermore, its compact embedded packaging shrinks the sensor volume compared with standalone sensor modules.

It includes a sensor readout circuit, digital hardware, voltage regulators and analogue output drivers. Piezo-resistive elements implanted into the membrane create a Wheatstone bridge to generate an output signal.

This signal is amplified and converted into a digital format, allowing the 16bit digital signal processing to apply temperature compensation before providing the result as an analogue output.

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