Tue, 17 September 2024
Weekly Newsletter

DVN Lighting

NEWSLETTER #871

Editorial

Back In The Home Saddle

I'm back from India to Europe for this newsletter! We were invited to test the new Open Grandland, and I consider it a great example for our lighting community. It has a really nice lamp design; great execution with thick front and rear light blades that really look premium. There are front and rear lit logos, demonstrating how to leverage recent regulatory changes. It offers best-in-class lighting performance to increase safety by night. Offering a HD lamp on a car like this is really impressive. And it was all done by a highly-skilled team mixing senior and young engineers with mechanical, optical, hardware, software, and electrical backgrounds.

This is how we should work as a lighting team. Opel's Lighting Technology Director Ingolf Schneider can be proud!

This car will be also showcased at SIA VISION congress next month in Paris. That'll be a great occasion to see the car's great lighting system and talk with the people who made it—from Opel as well as Marelli, who make the front lamp.

In the meantime, have a look at our DVN-exclusive show-and-tell on it, in today's issue of your DVNewsletter!

Sincerely yours,

Paul-Henri Matha
DVN Chief Operating Officer and Lighting General Editor

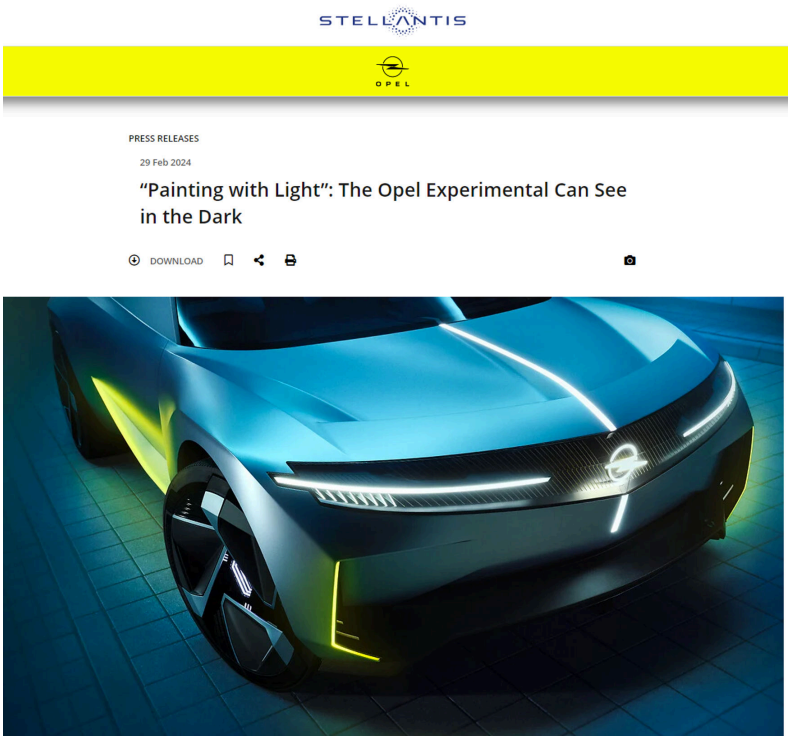
In Depth Lighting Technology

DVN Show & Tell: Grand Lighting on New Opel Grandland

By Paul-Henri Matha, DVN COO and Lighting General Editor

Wolfgang Huhn and I were invited to see and try out the new Grandland by Opel's Global Complex Lighting Lead Philipp Röckl and his team in Russelsheim: Technical Lead Engineers Carsten Neitzke, Thomas Feid, and Dominic Weil.

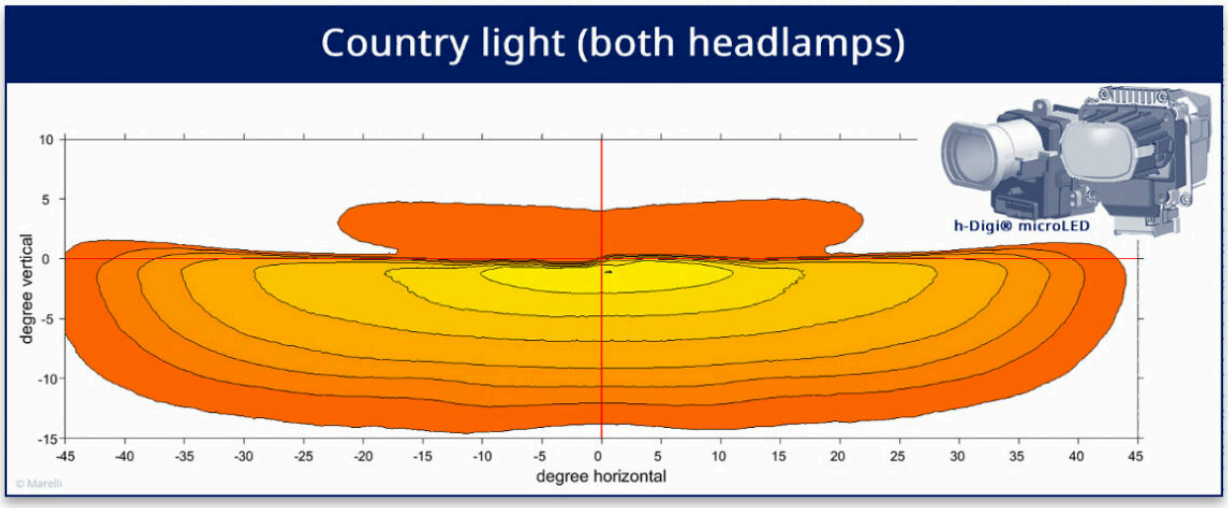
Opel have always put great importance on lighting performance, as described on their official media site.

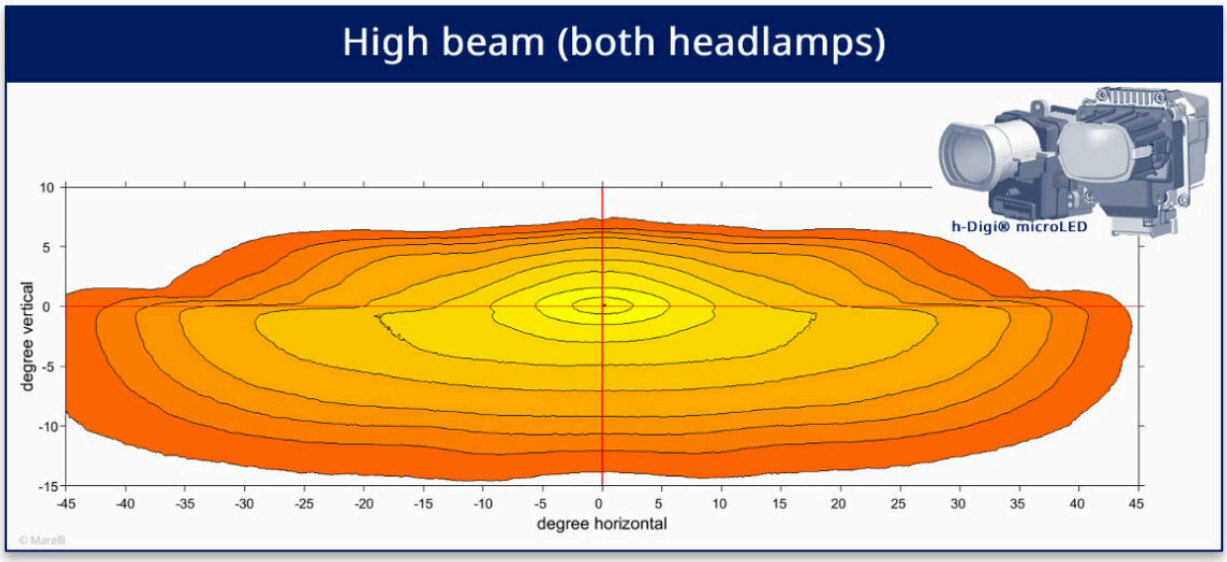


Previous Grandlands were already equipped with a performant 84-pixel ADB system: low beam width ±38°; total high beam flux 3,350 lumens, high beam peak intensity 85,625 cd per headlamp, and ADB width ±20°. That system's take rate was around 50 per cent, demonstrating that Opel customers want and get ADB.

This new Grandland has a new HD module from Marelli, equipped with a 25.6-kilopixel microLED light source from Osram with 1 × 4 field of view lens system covering 6°V × 24°H (the first HD module development done by Marelli for the VW Tiguan and Touareg was a 1 × 3 FoV system). Modules are equipped symmetrically for the left and right headlamp with a HD field of ±12°, and the HD module is supported by a bi-matrix module (Marelli's e-light 9).

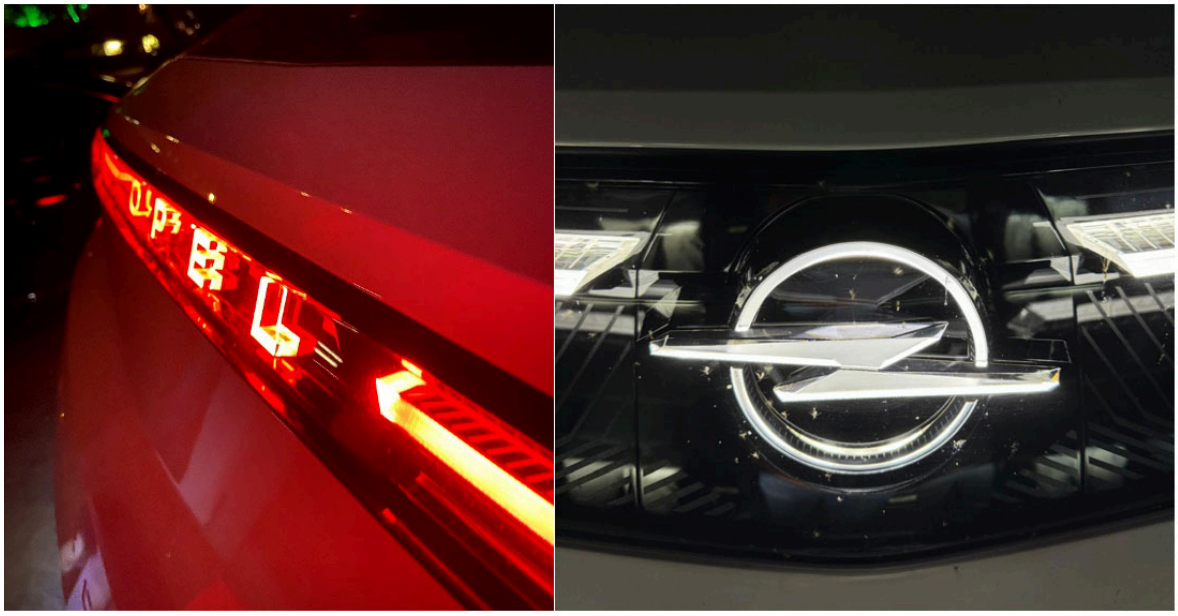
Compared to the previous Grandland's system, the new system's performance has been improved. Low beam width is now ±42° degrees, and high beam overall output is now 3,400 lumens. The most impressive improvement is for ADB width (±35°, including HD + elight module), resolution (1-2° before; now 0.1°) and I_{max} (now 95,625 cd); this great intensity gives a 1-lux seeing range of 430 metres.





The driving experience is very smooth thanks to the HD resolution. Rather than trying to explain with words, I prefer to show you this video:

Better performance isn't the end of the story; this car showcases the new Opel lighting design with lit grille and illuminated front and rear logos. They're allowed in Europe as of January 2023, if the logo's lit area is not more than 100 cm^2 (which is the case on the Grandland). These are impressively homogeneous, with a really nice 3D effect created by the blade design.



And the UX designers have defined an attractive, pleasant welcome/goodbye sequence with HD modules.

The new Grandland will be showcased during the SIA VISION event in Paris next month; you surely won't want to miss it!

Lighting News

Register Now for SIA VISION!

LIGHTING NEWS

VISION 2022 gathered more than 550 participants and showcased the latest innovations with 35 booths and 22 demonstration vehicles, SIA and the VISION organization and scientific committee are excited to welcome you back for the 2024 symposium, on 16-17 October. For the first time this year, there will be a parallel session on ADAS, allowing for in-depth discussions and presentations on the latest developments in this fast-evolving field.

Registration is open, so **sign up** and come participate in high-content sessions covering the latest advancements in lighting and ADAS. Here's a graphic list of companies involved in the organization and scientific committees :

ISDs All Over at Chengdu Auto Show

LIGHTING NEWS

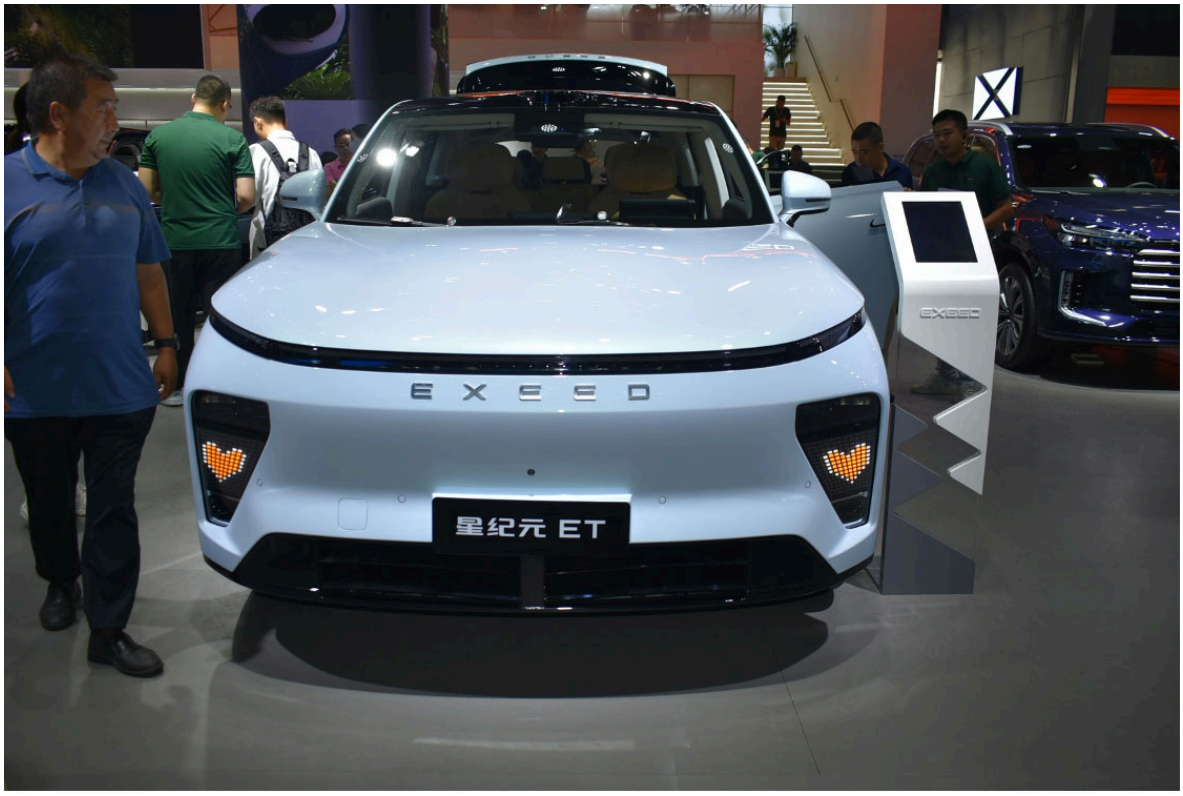
Special to DVN by A2mac1's AutoVision team

Here are pictures from the Chengdu auto show. Take a look at all these vehicles equipped for the hot fad in China: an 'ISD' (interactive social display).

Starting with the Avatr 12:

The Deepal S07:

The Exeed ET:



The IM L6:

…and the Zeekr 7X:

Valeo Innovation Days 2024 (part 1, Lighting)

LIGHTING NEWS

Last week, Valeo held their Innovation Days event in Troy; near Detroit, Michigan. Their latest hardware and software technologies were on display for customers and media, including:

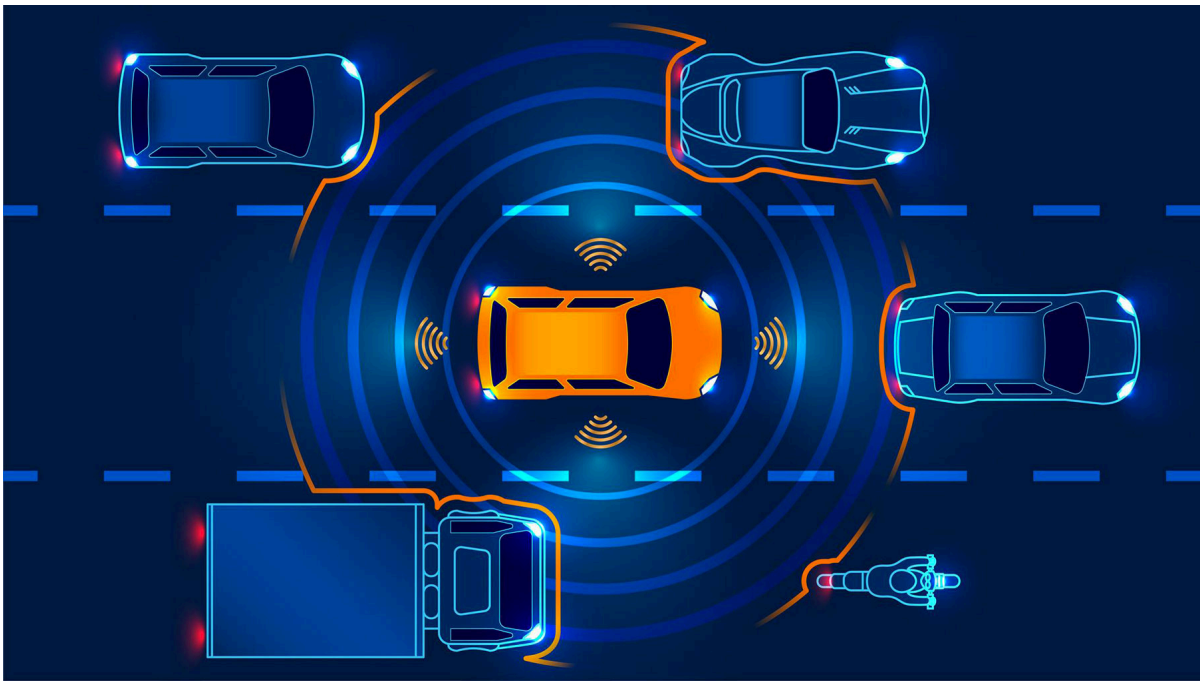
- New exterior lighting with personalization and brand differentiation features
- Optimized advanced propulsion and thermal systems to support combustion, hybrids, and electric powertrains
- Innovative sensor and software applications with Valeo Racer, bringing the outside environment into a video game for passengers

Valeo North America President Jeffrey Shay said, "Innovation and ingenuity are on full display here! I’m so proud of our team for their creativity and innovation as we help drive our industry forward".

Driver Assistance News

AV Hardware and Software: Beyond the Sensors

DRIVER ASSISTANCE NEWS



Special to DVN By Martin Booth, President of Montevena Consulting and DVN Senior Lidar Adviser

Most DVN readers are familiar with the five SAE levels of vehicular autonomy from basic assist—features like adaptive cruise control—to full, hands-off/eyes-off autonomy. Most automakers are currently shipping L^2 to L^{2+} systems, with features like lane keeping and automatic braking. The L^2 systems are mostly camera-based, sometimes with radar for longer range visibility and ultrasonic sensors for short distance measurement.

Mobileye was the most successful hardware vendor for L^2 systems, with a dedicated chip (EyeQx)for running Mobileye's own software for all L^2 functions. Depending on the specific functions offered, between three and seven cameras were used, along with ultrasonic sensors and often radar.

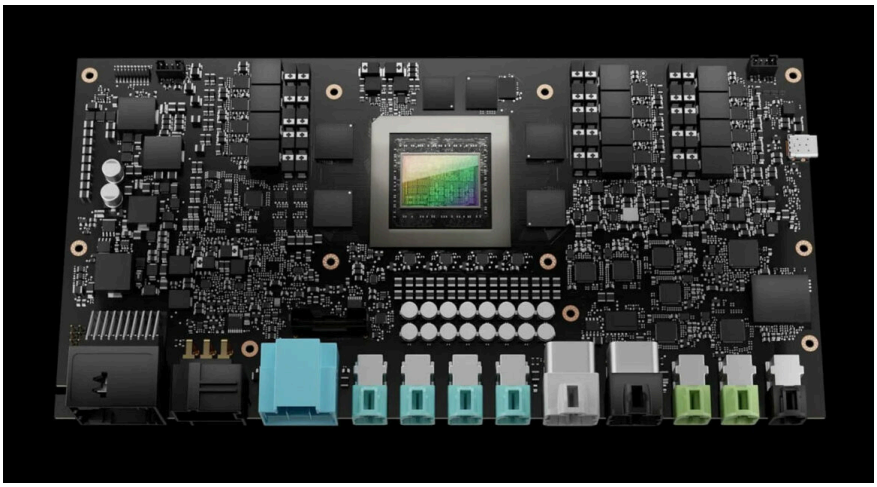
Prior to this sort of central computing architecture, separate ECUs and chips were required for individual functions like surround view, reversing camera, blind spot monitoring, automatic emergency braking, and adaptive cruise control, with automotive silicon suppliers including TI, Renesas, and NXP offering solutions.

The Mobileye EyeQ4 vision processor system-on-chip shipped in 2018 with 1-2 TOPS of performance. TOPS means **t**rillion **o**perations **p**er **s**econd, and it is a basic measure of 'AI' performance, representing the maximum number of 8-bit computing operations per second possible. Real-world performance depends on multiple other factors, but we can use the TOPS measure to describe and compare performance. A typical mobile phone or PC processor at the same time offered $^1/_{100}$ the TOPS performance of the Mobileye EyeQ4.

Mobileye EyeQ4 Chip

More advanced features need more computing power and memory, along with a better sensor suite, to run multiple algorithms in parallel—for example to do lane recognition, object-in-lane detection, street sign recognition, traffic light recognition, path planning, and control all at the same time.

Nvidia started to offer much more powerful chips based on their graphics processing expertise. First came the 10-TOPS Tegra, then the 30-TOPS Xavier, then the 200-TOPS Orin, and soon will come their 2000-TOPS Thor. However, these are costly and take a great deal of power. The entire self-drive computing "Drive" platform could consume 500 W or more and required liquid cooling. Nvidia offer a comprehensive software environment for developing autonomous-drive systems, and many automakers as well as truck and robotaxi companies use it.



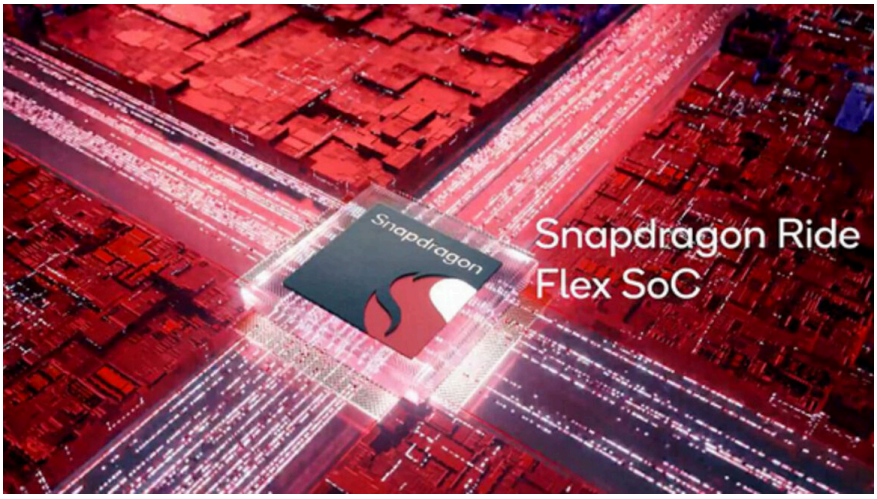
Nvidia Drive Thor Platform

Tesla were the first automaker to develop their own 'AI' chip, which reduced hardware costs and allowed them to create an optimal solution for their specific operational domain, and remove software and other restrictions imposed by Mobileye (and Nvidia, to some extent). This required a large dedicated chip and software engineering team, but arguably gave Tesla a significant lead, at least in theory, with their so-called 'Autopilot' systems starting in 2018 (see **DVN's Report** on Tesla's 'Autopilot' and 'Full Self-Driving' L^2 systems).

Most other American and European automakers did not develop their own silicon solutions, but looked for alternatives to Nvidia. However, there are very few other semiconductor companies with Nvidia's scale and capabilities. Qualcomm were shipping a billion advanced CPUs for the cellphone market per year and were adding 'AI' capability for that market. It was a fairly obvious extension for them to build on that and

develop a competitive solution for the autonomous-driving market. They acquired software capability from Veoneer/Arriver in 2022, to offer customers a full self-driving stack, but also kept their solution open, allowing customers to develop and integrate their own software on the platform, which had been a major criticism of Mobileye.

Qualcomm also established relationships with all of the major automakers for their Snapdragon SoC (System on Chip) infotainment platform, and have displaced NXP, Samsung, and Nvidia in much of that market.



GM were the first automaker to announce their choice of Qualcomm Snapdragon Ride for their Super Cruise driving-automation platform, and it appears BMW, VW, and others will likely follow.

In China, many automakers started using the Nvidia drive platforms, but a growing number of Chinese EV makers are starting to design their own chips.

Most 'AI' chips for autonomous drive systems use a number of ARM cores to run the operating system (Linux), AutoSAR stack, control algorithms, and general housekeeping. Meanwhile, the neural network code used for computer vision runs on a large number of NPUs (neural processing units) in parallel, which are optimized for those sorts of calculations.

A large part of the 'AI' chip is on-chip memory, and large amounts of external memory bandwidth must be provided to hold the data for the neural net and intermediate results. The chips have inputs for cameras and other sensors, and typically take RGB images from the camera over a dedicated interface (like MIPI) or Ethernet. Some level of image processing capability is typically provided; for example, HDR and LED **flicker** mitigation, but the images do not have to be perfect for neural network processing. For automotive safety design (ASIL) there must be some level of redundancy and system monitoring. All of this makes for a fairly expensive computing platform, with special cooling considerations and placement in the vehicle required.

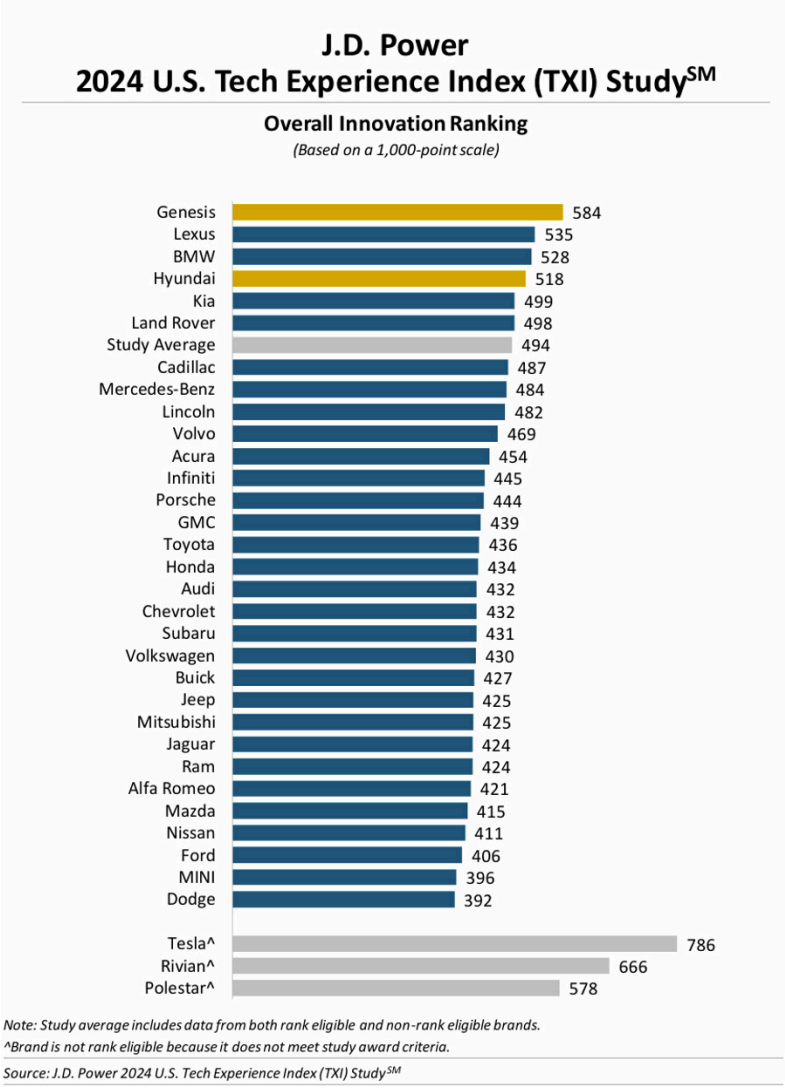
Nvidia remains the go-to solution for the development and training of the autonomous drive software. However, their dominance is under active challenge by the likes of Qualcomm, and increasingly by in-house developed silicon.

Car Owners Fed Up With Fatuous Features: J.D. Power

DRIVER ASSISTANCE NEWS

J.D. POWER

There's been another new release from J.D. Power—their 2024 U.S. Tech Experience Index ("TXI"). The findings suggest vehicle owners are fed up with tech features that don't solve an actual problem, don't work well enough to be worthwhile (or don't work at all), and are user-hostile.



Features such as facial recognition, fingerprint readers, and interior gesture controls are not living up to the hype; owners say they unsuccessfully try to solve problems that don't actually exist. For example, owners say interior gesture controls are problematic (43.4 PP100, problems per 100 vehicles), and 21 per cent of these owners also say this technology lacks functionality. J.D. Power says these poor performance metrics,

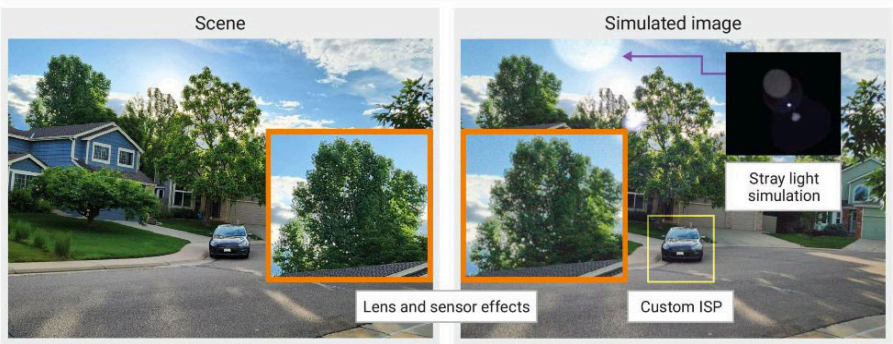
including the lack of perceived utility, represent enormous amounts of lost investment by automakers.

The 2024 TXI looked at 40 automotive technologies, classed as convenience; emerging automation; energy and sustainability; and infotainment and connectivity. The conclusions are based on responses from 81,926 owners surveyed between July 2023 and May 2024 after 90 days of ownership of new 2024-model vehicles registered from April 2023 through February 2024. Here are some key findings:

- Features like 'smart' climate control, said to be based on 'AI', get favourable responses from owners who have used it, but overall drivers still strongly prefer hands-on controls. Despite proliferation of ADAS features, many owners don't see the point. Most owners do appreciate features that directly address specific issues, such as visual blind spots while reversing. But other ADAS features register with owners as unnecessary; drivers feel capable of handling, all by themselves, the tasks those systems purport to assist with. This, says J.D. Power, is particularly evident with active driving assistance. Hands-on-the-wheel features (L2, L2+) are among the lowest-rated ADAS technologies, with low perceived utility. More advanced hands-free versions aren't rated significantly better.
- Automakers are increasingly putting in passenger display screens, but they get negative reviews from owners who consider them unnecessary and difficult to use. J.D. Power think maybe these screens might find better favour if the front passenger seat weren't usually vacant; only one in 10 vehicles in America carries a front passenger daily. Meanwhile, the addition of a second screen adds to the vehicle's cost and complexity right from the start, with additional costs and hassles accruing as soon as the sales contract is signed; it is difficult for dealers to teach new owners how to use the primary infotainment screen, let alone a second one.
- Cracks are appearing in Tesla's carefully-cultivated façade of technological superiority. Historically, Tesla owners have expressed zealous enthusiasm for the brand, and everything associated with it, and rated their vehicles highly despite discussed build quality, seemingly unfixable problems, and important safety recalls all over the world. However, owners who aren't in the hardcore fanbase are answering surveys perhaps more realistically, and Tesla's satisfaction scores are dropping in technology such as direct driver monitoring.
- Genesis ranks highest overall and highest among premium brands for innovation for a fourth consecutive year; in that brand's premium segment, Lexus ranks second and BMW ranks third.
- Hyundai ranks highest among mass-market brands for innovation for a fifth consecutive year; Kia ranks second, and GMC ranks third.

Synopsys Bring World-First Total Virtual Prototyping Platform

DRIVER ASSISTANCE NEWS



Synopsis have launched ImSym—short for Imaging System Simulator, a virtual prototyping platform for imaging systems, encompassing lenses, sensors, and image signal processors (ISPs). By integrating components of the imaging chain into a comprehensive end-to-end simulation platform, ImSym enables tailored optimization of any imaging system, facilitates team collaboration, and reduces the risks of problems in later development stages. By shifting the majority of imaging system development into virtual prototyping, ImSym can dramatically slash development time.

Traditionally, optical system builders have relied on one or more physical prototypes to optimize and confirm system performance. These physical prototypes can provide performance assurances, such as image quality assessment, but require significant build times and expenses. With accuracy powered by Synopsis' Code V and LightTools optical design software, ImSym reduces the need for physical prototypes and delivers simulations that can directly translate into production-ready designs.

Synopsys' Head of Optical Solutions Emilie Viasnoff says, "The ability to comprehensively and accurately prototype imaging systems virtually is a game-changer. ImSym embodies our commitment to innovation by offering a comprehensive, intuitive, and physics-based software solution for imaging system design and validation. After decades at the forefront of software for optical design, we are proud to expand our trusted solutions into the virtual prototyping world".

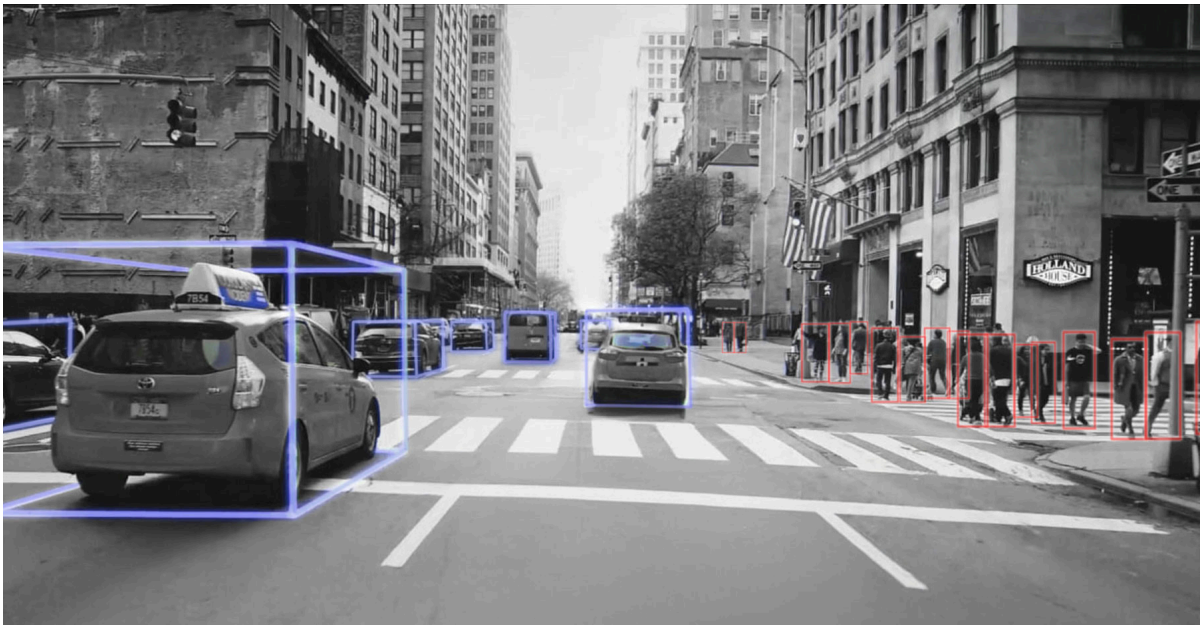
ImSym presents the user with a series of simulated images at each step in the imaging chain, enabling image quality assessment throughout the simulation flow. This enables optical system builders to quickly get the system right the first time. ImSym models geometric, aberration, and diffraction effects. It simulates scene stray light and additive stray light sources; models detector effects on imaging with radiometric accuracy, and processes detected images with custom or built-in image and signal processing.

ImSym provides a unified design environment supporting real-time updates and version control, ensuring all team members stay in sync. By encapsulating the entire imaging chain, domain experts—system engineers, lens designers, stray-light analysts, ISP and detector engineers—can communicate and coordinate effectively, understanding the effects of every system component on overall performance.

The platform features an intuitive interface which guides users through each step of developing an imaging virtual prototype. A Python (programming language) interface enables users to optimize their workflows by automating ImSym processes and customizing ISP capabilities.

Mobileye Stop FMCW Lidar R&D, Pivot to 4D Radar

DRIVER ASSISTANCE NEWS



Mobileye will cease the development of a next-generation FMCW (frequency-modulated continuous wave) lidar. The FMCW R&D unit will be closed by the end of 2024. The company say this will not affect any customer product programs or overall product development, though it will lurch about 100 employees; as of 30 December 2023, Mobileye had a global workforce of 3,700. Operating costs in 2024 for the lidar R&D unit were projected by Mobileye at around $60m.

The company say the decision was influenced by factors including "significant progress on our EyeQ6-based computer vision perception, and increased understanding of the performance of our internally developed imaging radar". At the same time, ongoing cost drops of third-party ToF lidar units have changed the landscape.

Mobileye will advance their imaging radar, set to begin production next year, which offers higher dynamic range and resolution than traditional radars. It can detect a child 150 metres away when a bus is 10 metres in front of the equipped vehicle, and identify objects in unique scenarios like stationary vehicles under a bridge. It can spot pedestrians, motorcyclists, and cyclists at 350 metres, and identify hazards up to 230 metres away.

General News

Valeo's 30th Anniversary in China

GENERAL NEWS

Valeo have been in China for three decades, and they celebrated that milestone in the city of Wenling.

Valeo launched Chinese operations with a wiper factory in Wenling, Zhejiang, in 1994. At that time, just 250,000 passenger cars were produced per year in China. Now the Chinese automotive market is by far the world's largest, with over 30 million vehicles produced annually.

And China has become Valeo's biggest market, as well. The supplier has almost 18,000 employees there, across 35 plants and 14 R&D centres. Over 70 per cent of Valeo's orders in China are from local Chinese carmakers—established ones as well as new startups.