Tue, 31 January 2023
Weekly Newsletter

DVN
Lighting & ADAS

NEWSLETTER #788

Editorial

Darmstadt Lighting Deep Dive In Print And Online

Parallel to the 2023 DVN Workshop in Paris, a new **DVN Report** will be published, the 177th monthly report in the big library we've been building for 15 years now. Hector Fratty asked me to make a report about one of the world's leading spots in lighting research—the Technical University of Darmstadt, home and host of ISAL, and their Laboratory of Adaptive Lighting Systems and Visual Processing, known as the Darmstadt Lighting Institute (DLI).

Collecting information and building the report was, for me, a dive in my own history—I was one of the 51 persons to finish their diploma and studies in Darmstadt with a dissertation. And I am happy to present TUD to you in the documents; pictures, and interviews you'll find in this newest DVN Report.

Since 2006, Professor Khanh is the head of the DLI, with an enormous record of more than 1,400 lectures and more than 600 students with lighting lectures in their curriculum. His research team counts 16 doctoral researchers and 6 external researchers. No wonder the DVN community includes members with such roots!

The most important event visible from outside is the biennial International Symposium on Automotive Lighting (ISAL). 14 of these internationally-attended conferences have taken place since the event was founded by Professor Khan's predecessor, Dr. Schmidt-Clausen, in 1995 as PAL (Progress in Automotive Lighting).

I have tried to give readers an overview about all the relevant topics and history. As you will see, the research topics in Darmstadt today cover vehicle lighting with many subfields like front and rear lighting; interior lighting; autonomous vehicles, and VR simulation for all kinds of traffic situations. And it covers much more major lighting issues with research: smart lighting; human-centric lighting; integrative lighting quality; LED technology, and—a recent addition—plant photobiology. DVN Workshop attendees will find a printed version of the report in their goody-bag; everyone can access it online.

I hope you will enjoy reading my report band enjoy the workshop as well!

Sincerely yours,

Michael Hamm
DVN Senior Advisor
Former Audi lighting manager

In Depth Lighting Technology

Starting Now: The Greatest DVN Workshop!

After months of effort and planning, today the DVN team are welcoming some 300 attendees and starting this very special DVN Workshop.
Never before have we offered a program quite so rich as this: four keynotes; 10 lectures from car makers; 25 lectures from suppliers. Sessions on regulations…on the future of front end design…on startups.

- **Keynotes**
  Valeo (president) · Audi (lighting manager) · Bentley (designer) · TU-Darmstadt (Prof. Khanh)
- **Lectures**
  Audi · Bentley · Jaguar Land Rover · Mercedes-Benz · Porsche · Renault · Rivian · SEAT · Stellantis · Volvo • tier-1 and -2 lighting suppliers · regulators
- **Regulatory session**
  Chaired by Bart Terburg (GTB, SAE) with participation of Timo Kärkkäinen and Davide Puglisi (GTB); Whilk Gonçalves (Valeo); Ao Jinlong (Hasco Vision); Michael Larsen (GM), and Jatin Thaker (Elmos).

- **Panel discussion**
  Chaired by Michael Hamm: "What is the new front end?"
- **Startup session**
  To help new companies be better known
- **Award ceremony for DVN's 15th anniversary**
  To congratulate those who have helped the lighting community field so many innovations, including DVN's Personality of the Decade · Best Lecture 2022 · Best New Hope · Lifetime Achievement Awards.
- **20 Exhibition booths**
  Showing the latest innovations in lighting

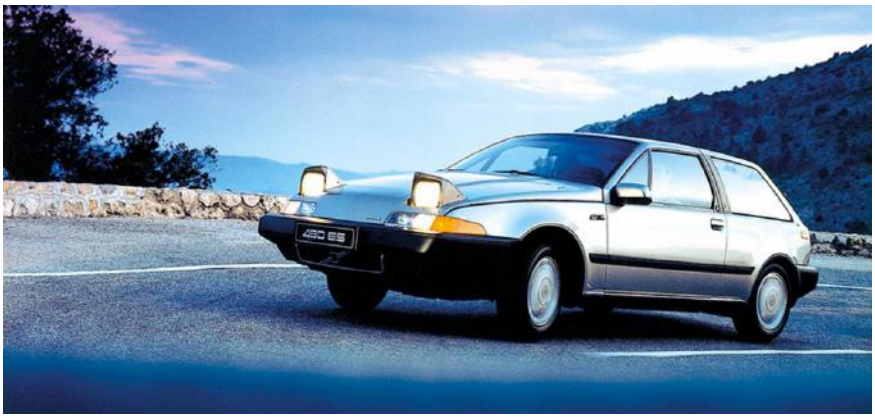
SPEAKER KEYNOTE CHRISTOPHE PÉRILLAT, VALEO CEO

Lighting News

Volvo EX90: from Pop-Up to Thor´s Hammer
from Paul-Henri Matha

LIGHTING NEWS

The pop-up lamps are not new.
Volvo did these sorts of lamps 40 years ago on the famous Volvo 480!



VOLVO 480

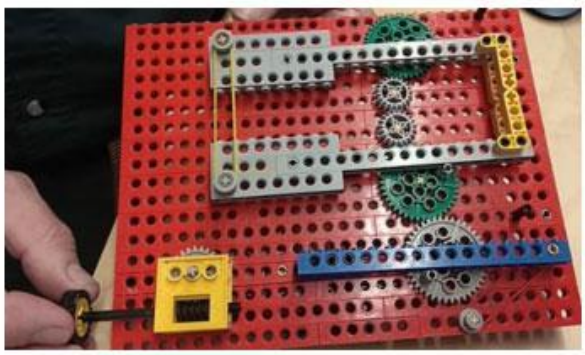
Even before the 1980´s, during the 1960´s, many OEMs, especially in USA, were developing these sorts of cool lamps. Who still remembers? It seems like everybody has lost this memory. Another time, another generation. This style of design is so well known that they even have a “definition” in legal requirement. They are called “concealable lamp” and there are still some specific paragraphs in legislation in Europe,

USA and China (UNECE R48, FVMVSS108, GB4785). When designers came with this idea, we cannot say that we were enthusiastic.

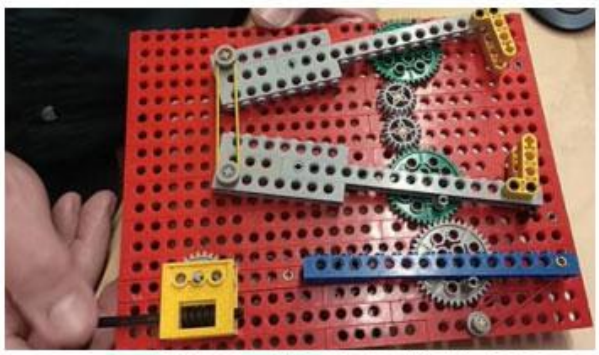
Volvo was used to develop headlamp with the first generation of Thor´s Hammer signature, with lower and upper beam above and below the signature Volvo XC60

This concept was totally new and represented a new adventure for our team Engineers were used to see first technical complexity and were very quick to say that it will probably not work. But we still set up a small team to work on this advanced engineering study. Motivation was at a very high level to be able to tackle this innovative concept.

Styling sketches from Volvo styling department After some weeks of investigation, we built a first concept in only 2 dimensions, it was our Lego concept below

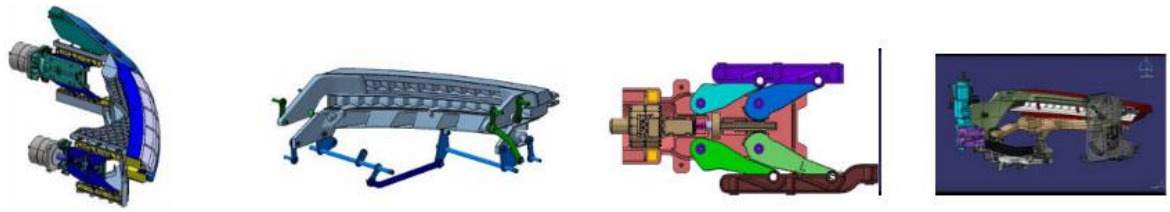


THOR´S HAMMER, DAY MODE



THOR´S HAMMER, NIGHT MODE

The next step was the launch of a concept in 3 dimensions, with computer aided design software, done internally by our mechanical engineers, but also with support from Tier1 supplier and Tier2 supplier. We had the chance to have Mate and Gjert in our team, 2 skilled mechanical engineers with Volvo and lamp supplier background to help in developing the mechanical concept, in addition to our brilliant creative senior engineer Jüri. These ideas came true and some of the concepts are shown below.



a *b* *c* *d*

MECHANICAL CONCEPTS

After concept selection, we realized some POCs (Proof of concept sample). These POCs confirmed us that we were on a good track and that we can go to development. Concept was promising!

PROOF OF CONCEPT SAMPLE

VOLVO EX90 NEW THOR´S HAMMER CONCEPT

SOME R&D CONTRIBUTORS

Recall Puts Stop to Headlamp-Aimability Safety Threat

Daniel Stern, DVN

LIGHTING NEWS

It's happened again: an automaker failed to block off their headlamps' horizontal aim screws, exposing American drivers to the resultant menace of headlamps that can be adjusted not
only up-down, but also left-right. This time it's Porsche, who are recalling nearly 200,000 Cayenne; Macan; Cayman S, and Panamera vehicles, from model years 2003 through 2020.

We've reported previously on similar fumbles by **Ford** and **Volkswagen**; as in those cases, the danger posed by Porsche's having left the H-aim screws uncapped is mitigated only by the **scarcity** of people on the North American continent who know or care that there is a thing such as headlamp aim adjustment. That's a help; it's better than nothing in a case like this, but hardly a sturdy enough countervail to the abject safety hazard of being able—even just theoretically—to point the headlamps where they're meant to be pointed; as we've also **previously reported**, US-spec headlamps' immovable H-aim is often not correct.

Apple Patents Self-Aiming Headlight System

LIGHTING NEWS

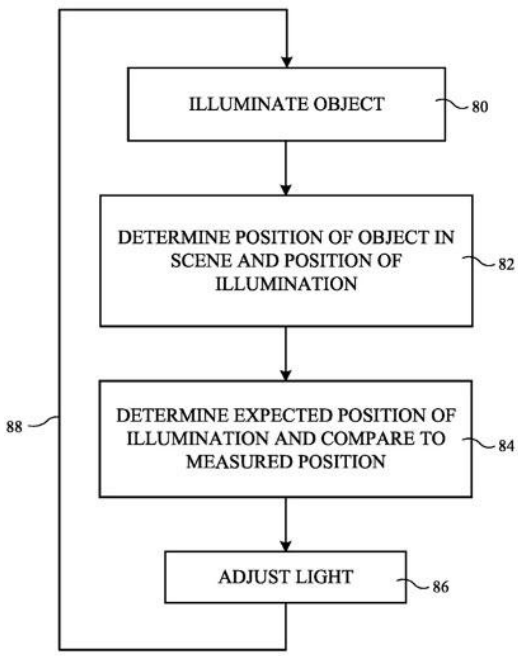


FIG. 8

Headlamp levelling systems have been known for decades, but they can only maintain the initial aim setting dialled in by fallible human beings wielding screwdrivers. But a new U.S. patent just granted to Apple describes a self-adjusting headlighting system with advanced capabilities. The central idea: to make certain the headlamps are properly aligned to provide light beams in the desired directions, a vehicle-based sensor can gather information on an object within range of the headlight beams. For instance, a lidar sensor may be used to map the three-dimensional shape of a roadway and an object on the roadway in front of a vehicle. An image sensor in the vehicle can measure the pattern of illumination from the headlights that falls on the roadway and object.

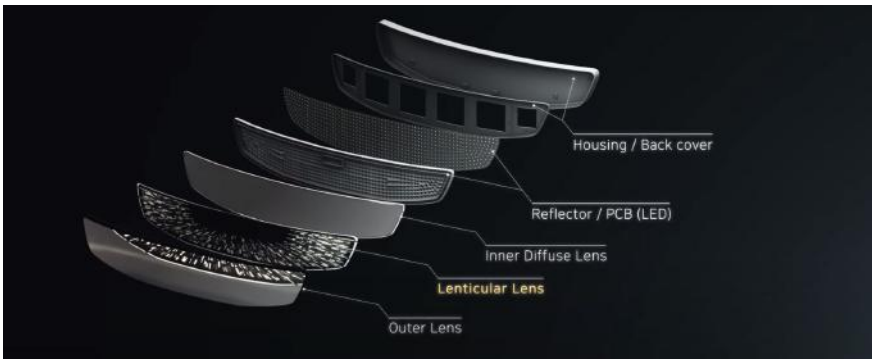
Measurements of headlight illumination reveal the direction in which a headlight is pointing. By comparing the expected illumination with the measured illumination, variations in headlamp performance can be detected and corrective action can be taken. For example, if it is determined that the headlamps are pointed 5° too high, a positioner coupled to the headlights could be activated to tilt the lamps downward by 5°. The headlights may also be adjusted based on measured and predicated changes in vehicle orientation relative to a roadway and other measured and predicated conditions.

The image shown here is a system logic flow chart; more images and further description can be found in the **patent itself**.

Mobis Lenticular Grilleboard Light at DVN Workshop

LIGHTING NEWS

Today at the DVN Paris Workshop, Mobis are describing the future direction of their lighting product development, and unveiling six new future-mobility lighting products. The event will be an opportunity to examine the future direction for Mobis' lighting product range. Here's an example: a technology to form the face of EVs: Mobis' lenticular lighting for grilleboards.



It's a terrific example of the ongoing vehicle design revolution, and indicates the direction of Mobis' future mobility lighting development. This product incorporates lenticular technology into the grilleboard, with advanced films to produce a wide variety of patterns. These lenticular films can even display different images depending on the viewing angle. The lens is only 2 mm thick in reality, but it provides the appearance of 40 mm depth for wow-factor dimensionality. Mobis already have experience with mass production of lenticular technology in the Hyundai Venue taillights, and in the process of validating reliability of lenticular technology, and their lenticular lamps are keenly anticipated by a number of automakers.

Slimline Front, Rear Lights on Changan CS75

LIGHTING NEWS

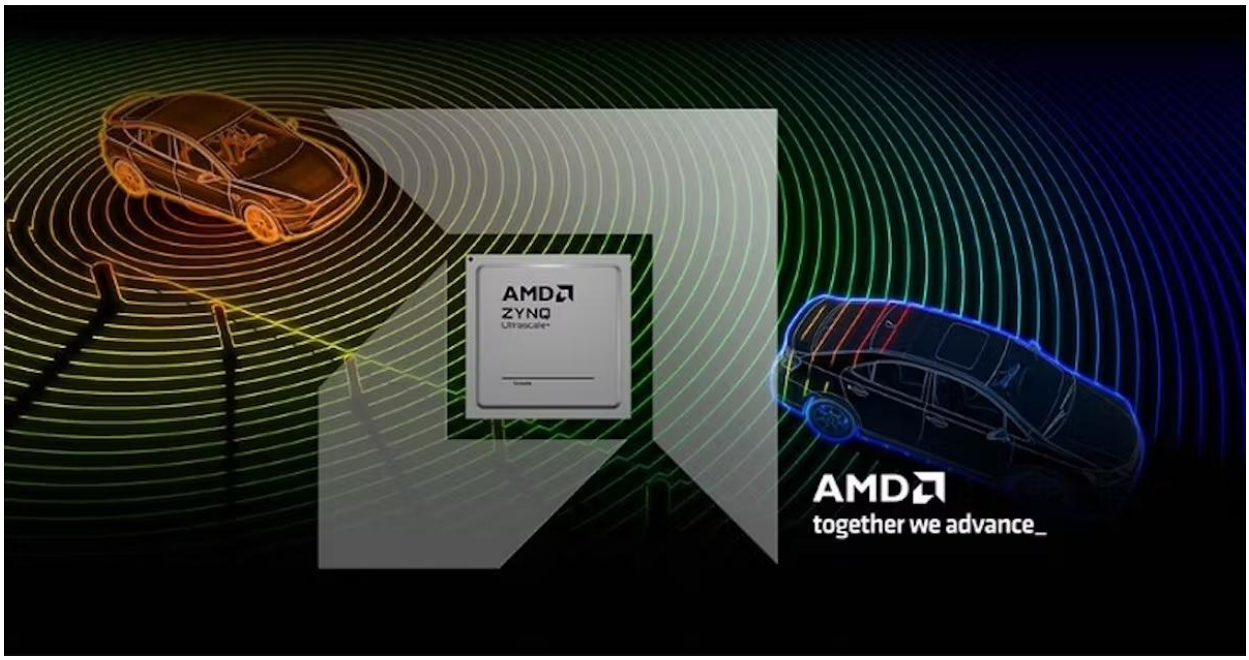
The new Changan CS75 Plus has a complex grate shape to the front position light, echoing the shapes in the grille; when illuminated, it presents a high degree of recognition. The geometric light strip surrounds the perimeter of the headlamp to provide the daytime running; position, and direction-indicator light functions. The low and high beam modules are low-profile oblongs using the dual-function crystal matrix technology newly developed by Marelli. They perfectly integrate into the design of the whole vehicle, and provide high-performance lighting.

The rear lamp bears a split design with a dot matrix on the top and a light strip at the bottom. It creates a visual effect of thousands of lights. The logo lights on both sides have light-transmitting text and graphic textures, which—by dint of laser engraving—are exquisite and beautiful. The taillight shows individuality and conveys the aesthetic design of the car.

Driver Assistance News

Denso' New Lidar Uses AMD Technology

DRIVER ASSISTANCE NEWS



In their newest lidar platforms, Denso are using AMD's adaptive computing technology to increase resolution more than twentyfold at low latency—providing greater accuracy in detecting pedestrians; vehicles; free space, and other elements.

Denso's new lidar platform, scheduled for launch in 2025, will use the AMD Xilinx Automotive (XA) Zynq UltraScale+ adaptive SoC and its suite of functional safety development tools to achieve ISO 26262 ASIL-B certification. The XA Zynq UltraScale+ family comprises a range of differently optimised processing units as a multiprocessor system-on-chip platform. Denso use these in their SPAD (single-photon avalanche diode) lidar system, which they say produces the highest point cloud density of any lidar system currently on the market.

Automakers like SPAD-based lidars because they're generally quite compact. The highly adaptable XA Zynq UltraScale+ will let Denso size-reduce their lidar systems and put multiple such sensors to work together for both the forward and side views of a vehicle. One device can be used for multiple Denso lidar systems. The adaptability of the Zynq UltraScale+ also enables its use for future generations of Denso lidar, which lowers system costs and helps to future-proof designs.

General News

China sales: Slow increase in 2022

GENERAL NEWS

Full year sales increased 2 per cent to 26.86 million units. Passenger vehicle sales rose 9 per cent to 23,563,000 units—driven mainly by surging demand for new-energy vehicles (NEVs), while sales of commercial vehicles plunged 31 per cent to 3,301,000 units. Sales of NEVs almost doubled to 6,887,000 units last year, to account for 25 per cent of total vehicle sales. Deliveries of battery powered electric vehicles (BEVs) rose by 84 per cent to 5,364,000 units, or 20 per cent of total sales. Vehicle exports rose 54 per cent to 3,111,000 units last year, with NEV shipments up 120 per cent at 679,000 units.

	Volume x 1,000	Change
SAIC Motor Group	5,300	-3%
SAIC-VW	1,320	+6%
SAIC-GM	1,170	-12%
SAIC-GM-Wuling	1,600	-3,6%
SAIC Motor	839	+5%
GAC Group	2,533	+13%
GAC-Toyota	1,005	+21%
GAC-Honda	742	-5%
GAC-Alon	271	+126%
GAC Motor	362	12%
BYD	1,857	+213%
Geely Auto	1,433	+8%
Great Wall	1,067	-17%
Tesla	710	+50%
TOTAL	26,864	+2%

Europe's Car Market Still Sputtering, But Picking Up Speed

GENERAL NEWS

In Western Europe, December 2022 was up 16.5 per cent year-on-year (YoY), with one million units registered. However, the overall 2022 sales volume was 4.1 per cent lower than 2021, showing the size of the market performance dent wrought by which supply constraints.

Car sales in Western Europe are estimated by LMC/GlobalData at 10.15 million units in 2022, down 4.1 per cent versus the previous year. The big markets all saw broadly flat or decreased sales of new cars in 2022; German sales were up 1.1 per cent at 2.65 million; the UK was down 2 per cent at 1.61 million; the French market was down 7.8 per cent at 1.53 million; Italy fell 9.7 per cent to 1.32 million, and the Spanish market declined by 5.4 per cent to 813,000 units.

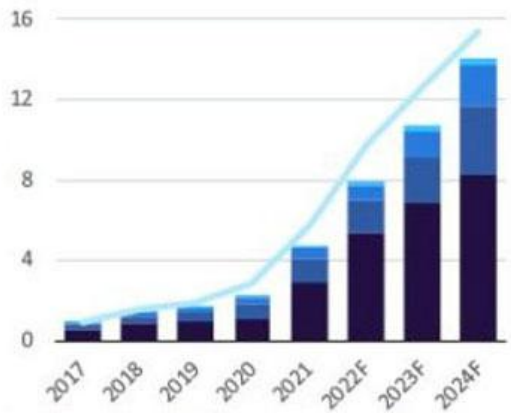
Year	2019	2020	2021	2022	2023
Sales (million)	14.29	10.79	10.59	10.15	10.95

FROM LMC/GLOBALDATA

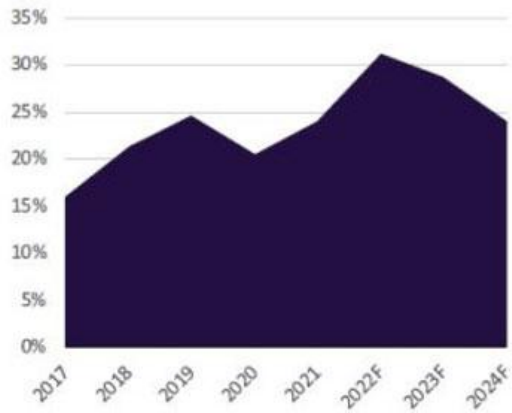
Global BEV Demand to Near 11 Million This Year

GENERAL NEWS

12.5 per cent of light vehicle sales globally in 2023 will be battery-electric vehicles. Europe's sluggish BEV growth, expected to be just 20 per cent YoY in 2022, will accelerate to 50 per cent this year. Meanwhile China's battery electric growth will level off this year, after a meteoric rise in 2022 of more than 100 per cent YoY. And North American BEV sales will break through the million-unit mark this year, with 1.3 million pure electric cars and light trucks delivered.



EV VOLUME - SOURCE GLOBALDAT



ESLA + BYD

Tesla and BYD will continue to set the pace in the BEV market this year—unless one or more of the numerous regulatory and legal investigations into Tesla brings that company down. Their main rival, BYD, saw sales jumping to 1,857,000 in 2022. BYD offer a broad range of BEVs, with prices starting at around USD $15,000 for their compact Dolphin hatchback (after subsidies). That's well below any Tesla, Nio, or Xpeng model's price.