

Tue, 25 April 2023  
Weekly Newsletter

  
Lighting & ADAS

NEWSLETTER #800

## PixCell LED

**Ultimate precision in perfect alignment**

100+ individual cells with just 25 µm spacing, perfectly matrixed onto a single LED chip for intelligent headlamps

SAMSUNG



# Editorial

## Seeing Subjects Are Alive And Well At SAE

The SAE WCX (World Congress and Expo) was held shortly ago in Detroit, and there were some interesting lectures related to lighting and vision. The amount of content like this has fluctuated over time; some years there have been tens of lectures, other years just a few.

Today we bring you detailed summary descriptions and comments on four of the lighting- and vision-related lectures from SAE WCX 2023. It is perhaps a bit easy to think of SAE as relevant only to the North American regulatory island, but the diverse presentations we highlight for you in this week's DVNewsletter show real worldwide perspective and applicability. Too, we're happy to see (and say) that so far, there seems to be no realisation of predictions that lighting is being made redundant by increasingly-autonomous vehicles.

Also: today, 25 April, the DVN-Interior Workshop gets started in Köln. We're excited to see fruit from our constant work to grow and expand the scope of the DVN community, and we're glad you're with us.

Cheers,



Daniel Stern  
DVN Chief Editor

# In Depth Lighting Technology

## Vibrant Vision, Lively Lighting Lectures at SAE WCX '23



Every year we're excited to see a new batch of lighting and vision presentations at the SAE World Congress and Expo. Here we summarise and comment on four presentations from this year's WCX

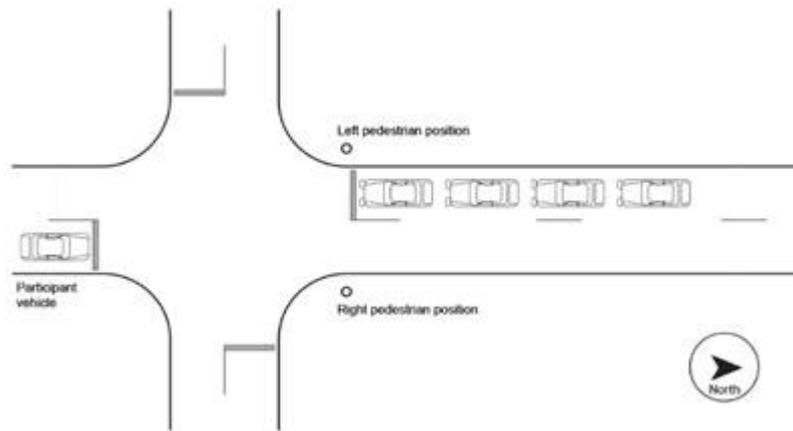
### **Effects of Sequential Turn Signals under Realistic Visual Conditions**

M. Flannagan (UMTRI) • T. Waragaya and Y. Kita (Stanley Electric)

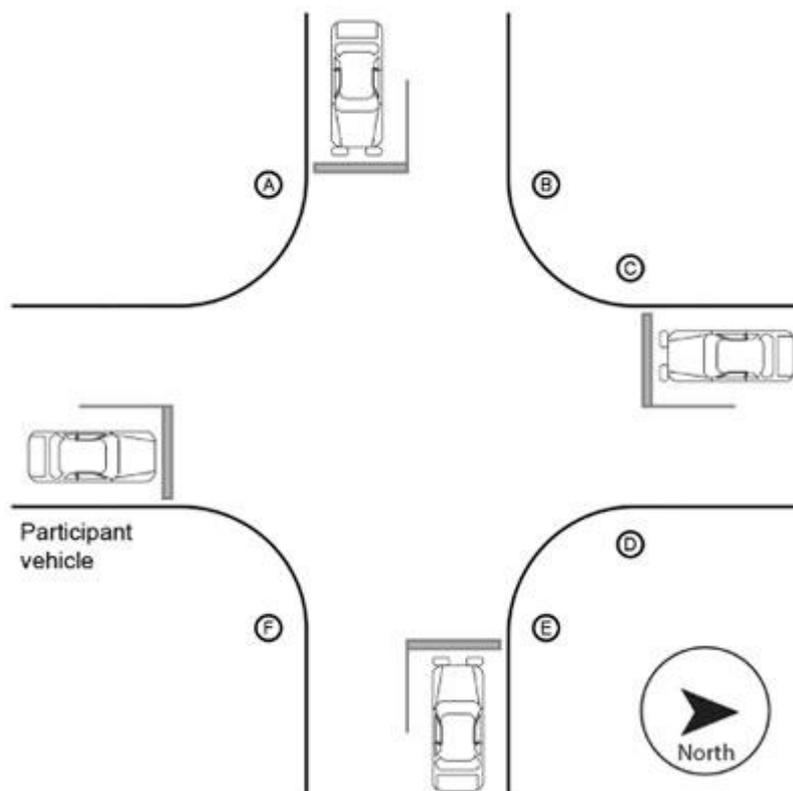
The research investigated the potential real, objective performance benefits of modern types of sequential turn signals by exposing experimental subjects to a variety of turn signals in realistic conditions and giving the subjects tasks representative of encounters at four-way road junctions. These encounters were set up with automobiles statically positioned realistically, and the rest of the conditions were realistic as well (viewing geometry; signal photometry, etc), in both daytime and nighttime environs.

Participants seated in one of the vehicles were asked to make simple but important judgments about the other vehicles' intended turns.

**Experiment 1** involved participants making two responses in quick succession on each trial. First, they had to push one of two buttons to indicate their judgement of which side of an intersection a pedestrian was standing on. Then, immediately after that, they had to indicate whether any of multiple vehicles was signaling an intent to turn left across the participant's path. These two tasks were chosen to test the idea that adding animation—movement—to the turn signals might provide a benefit to participants faced with a decision about two spatial relationships in immediate succession. Basic human-performance studies give reason to predict interference between spatially-based responses, and the researchers wanted to test if such interference could be lessened by the sequential turn signal.



Participants sat in a passenger car, viewing a mock-up of a junction at which four vehicles were stopped across from the participant vehicle—sometimes close together, as shown here, so the participant could only see the whole turn signals on the lead opposing car and could see only an outboard chunk of the following opposing cars; other times with greater spacing between the opposing cars so the participant could see the entire left turn signal of each opposing car—and quickly make pairs of decisions as described above. Each of the four opposing vehicles, all identical, could display a variety of turn signals modes, including a static on/off turn signal and three different sequential signals. Participants' reaction times and error rates were measured for each decision on each trial.



**Experiment 2** looked at effectiveness of the various kinds of turn signal as perceived in peripheral vision. Participants had to fix their gaze on specified locations and respond to stimuli that covered a wider range of angles than in experiment 1. Specifically, they were tasked to report the directions of turn signals that were briefly (333 milliseconds) and simultaneously displayed by three vehicles, each in its own arm of a four-way junction. All three vehicles showed the same kind of turn signal in each iteration. After the turn signals flashed, the participant had to state the side of each of the three cars that had flashed. This experiment, too, was run both in daytime and nighttime ambient light conditions.

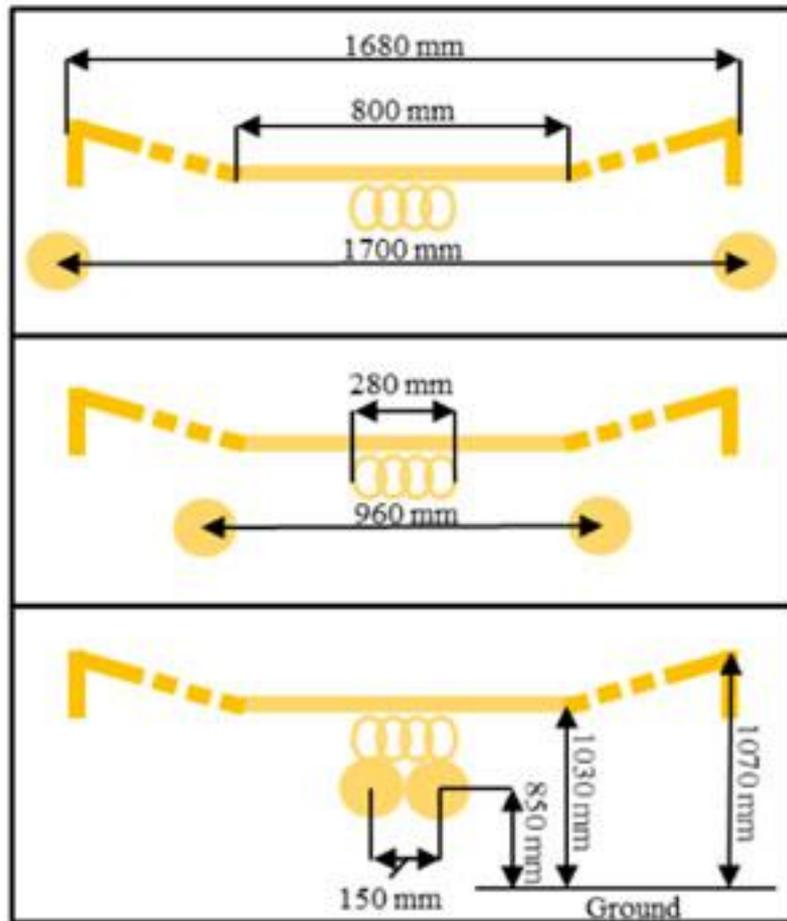
**Experiment 3** was orientated toward unusual, less-common traffic situations, to try to tease out potential benefits of sequential turn signals that might not be readily apparent in more common situations.

In two of the three experiments performed, sequential signals garnered statistically-significant subjective preference over static on/off signals—participants felt they were better—but no objective performance benefit was found in any of the three experiments.

**DVN comment:** Ever since the first enthusiastic but subjective preferences have been reported for sequential (progressive, wiping) turn signals, we have been watching for what might develop by way of objective research. Of course, it must be kept in mind that the absence of evidence (no objective benefit found) is not the same as evidence of absence, and sequential turn signals look so nifty that it is easy to want to believe they surely must be better, so it is perhaps a bit disappointing that no benefit was found in this rigorous study. Nevertheless, the purpose of research is not to validate an idea that we might hope and wish to be true, but to find out what is and what is not so. This study expands and steadies the corpus of knowledge, and it is a fine capstone to the long career of deservedly-renowned, recently-retired researcher Dr. Michael Flannagan.

## Investigation of Horizontal Light Function Positions on the Distance Estimation by Test Persons to Ensure Road Safety

C. Hinterwaelder; J. Kobbert; M. Kruppa; M. Hamm (Audi)



The ability to accurately adjudge the distance to an object on the road, and its width, is crucial for safety, especially with regard to passing. To overtake safely a driver must correctly gauge the distance to oncoming vehicles. This is difficult, especially when ambient darkness hides roadside context clues and reduces the view of a vehicle to its light signature. Therefore, the mounting position of the main lighting functions is important to safety.

A fundamental regulatory difference between the United States and more or less the rest of the world is that in most of the world, there are dimensionally-explicit requirements for the positions of various lighting functions, notably the low beam, which must be within 40 cm of the outer edge of the vehicle. In the U.S., there are no such prescriptions; instead, responsibility for appropriate placement is left to the automaker, who must place (for example) the low beams "as far apart as practicable". While these requirements are quite different in their philosophy and structure, their underlying philosophy is the same: the lights most likely to be visible to another driver in traffic mustn't be positioned so as to convey a false sense of the vehicle's width or distance.



This presentation examined a variety of low beam placements in context of a variety of overall lighting configurations, to scrutinise the effect of lamp position on vehicle distance judgement by observers. There are two main principles of human distance/width perception; one of which is effective up to 10m distance, and the other of which takes over from there—and that's the one most relevant to most traffic situations. Basically, we perceive a faraway object as smaller than a closer object. This means a night-time visual signature with lights closer together might cause its vehicle to be perceived as more distant than if the lights are farther apart.

The researchers used the Audi Light Tunnel to present a variety of vehicle light signatures—low beams with or without position lights and/or full-width light strip with only the low beams' lateral separation being variable. Three low beam separations were used: 15 cm (extremely narrow); 170 cm (extremely wide), and 96 cm (typical value for a US-market vehicle). The scrutiny found that the low beam separation distance doesn't affect an observer's distance estimation if the front position lights (at least) are lit along with the low beam. The test case with only the low beams lit (no position lights; no light strip, nothing else but the low beams) showed that with the low beams separated by 15 cm, participants thought the vehicle was considerably farther away and narrower than with the low beams separated by 96 or 170 cm. This underestimation of width and overestimation of distance was not found in test cases with the front position lights lit, with or without a light band and central lit logo.

**DVN comment:** Well...now we know why 'position lights' is a better, more accurate name for the function than 'parking lights'! Clearly, the regulatory decision taken decades ago in the 1960s to require front position lights to remain lit with headlamps was a wise one, for exactly the stated reasons: they are the elements of the vehicle's night-time visual signature that primarily control the accuracy of other drivers' perception of the vehicle's distance and width (i.e., its position on the road).

Interesting to see that the strong effect of the position lights' signal countervails even extreme placement of the low beams.

## **An Evaluation of External Human-Machine Interfaces and Compliance with Federal Motor Vehicle Safety Standard 108**

S. Marulanda (Ford) · N. Britten (Virginia Polytechnic) · C-C Chang (Amazon) · J. Shutko (Westat)



One of the challenges of integrating autonomous vehicles into traffic and society is how to inspire broad public confidence in them. Key to that is for AVs to communicate effectively with all traffic participants—motorists, cyclists, and pedestrians alike. One proposed method for doing this is with an external human-machine interface ('eHMI'). These necessarily being lighting devices, their compliance with apposite regulations—Motor Vehicle Safety Standard 108, in the United States and Canada—is an important factor to consider.

This study assessed comprehension; trust, and acceptance of an eHMI embodied as a light bar to advertise AV intent. Interestingly, the research was done in a virtual-reality realm. Participants were exposed to three conditions: no light bar; a light bar compliant with FMVSS 108, and a noncompliant light bar on an AV, which advertised its intent when navigating a busy intersection. On average, it required two exposures for participants to correctly describe the light bar's purpose. Overall, participants subjectively considered the light bar useful and satisfying, and most said they would expect and prefer that AVs be so equipped. The FMVSS-compliant bar inspired trust in self-driving vehicles, with participants reporting it provided clearer, more predictable advertisement of what the AV would do than the noncompliant light bar did.

As far as compliance goes, MVSS 108 stipulates that supplemental lighting equipment (beyond that required by the standard) may not interfere with the effectiveness of required equipment. NHTSA, in serving their habit of regulating by interpretation, have declared that a front eHMIs meets that requirement so long as it provides only white-to-amber light, isn't so bright as to drown out or distract from the turn signals, and do not provide animated light.

The particular aims of the research were to check if (and after how many exposures) participants would notice the light bar and understand the meanings of its displays in terms of AV intent; whether they would consider such a light bar a good way of advertising vehicle intent, and whether they would feel more trusting and accepting of AVs as a result of the light bar.

The light bar (simulated; this was a virtual-reality scene created in Unreal Engine and presented via an HTC Vive Pro high-resolution headset) was positioned at the top of the windshield. Active autonomous driving was advertised by steady white light. Deceleration (autonomous stopping) was advertised by a white light 'swiping' side-to-side for the noncompliant condition, or by a steady amber light for the compliant condition. The third displayed condition was that of no light bar.

After a familiarisation exercise, participants experienced a variety of scenarios wherein they were standing still on a street corner, watching as an AV approached. They were tasked with describing the vehicle and its behaviours. Sometimes the light bar was mentioned, and participants were asked to describe its meaning. Based on what they saw, participants were asked to rate their trust in self-driving vehicles by rating, on a 5-point scale (strong disagreement to strong agreement), statements including 'the self-driving car's actions are always clear to me' and 'I know what the self-driving car will do'. A great deal of statistical analysis was done on their answers.

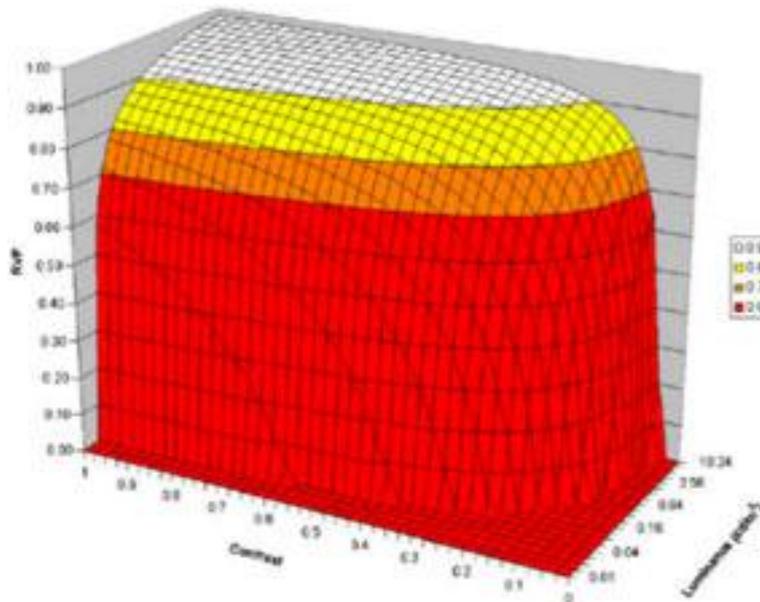
A key finding was that there was no advantage to the noncompliant light bar over the compliant one—in this study, changing the colour of the light from white to amber (compliant) to change the message was as effective in all relevant scrutinised ways as animating the white light (noncompliant) to change the message. Another: It took very few exposures before participants correctly understood the eHMI meaning, which the researchers say suggests advertising deceleration/stopping may be more effective than advertising "I am giving way", which in another study took participants many exposures before they understood it.

The researchers consider this study a demonstration that "an FMVSS-compliant light bar is an effective and scalable solution to the issue of AV-pedestrian communication.

**DVN comment:** It is increasingly obvious that one of the hard yet very necessary things to replace about a human driver is their ability to readily communicate with other traffic participants. Taking away the human driver deprives all other road users of that driver's eye contact, hand waves, head nods, and so on. It is interesting to see the general idea of an autonomous-driving light taking more detailed shape, and it is nice that this study shows an effective one can be implemented without fouling out on NHTSA's interpretations of what the regulations might mean. However, the steady-white and steady-amber lighting constraint would seem to clash directly with daytime running lights, which in America are steady white or steady amber front-facing lights. How is a pedestrian to immediately distinguish a steady amber daytime running light on a human-driven vehicle ("I am probably moving toward you") from a steady amber eHMI light on an AV ("I am stopping")? Perhaps there will have to be some movement—or constructive reinterpretation—by NHTSA vis-à-vis light colours.

## **Using Visual Performance Modelling to Assess the Safety Consequences of Headlight Evaluation Systems**

J. D. Bullough (Icahn School of Medicine at Mt Sinai)



This paper starts out with a statement of context: recent research has demonstrated a direct link between better driver vision and reduced night-time collisions. Good, and an important next link in the evidentiary chain that could power a push (regulatory or otherwise) for better lighting would be to demonstrate that visual-performance modelling, together with headlight evaluations, can dependably predict the degrees of safety improvement and economic benefit to society, flowing from better lighting.

The author, after noting that even though ADB is now nominally legal in the United States, the apposite regulation is problematic enough that low beam lighting will likely carry on being the primary means by which U.S. drivers try to see where they're going at night. He then describes the large number of headlight performance rating systems which have been developed in recent years, as it has grown increasingly apparent that, compared to sluggishly-upgraded regulations, non-governmental ratings can exert more influence, faster, over the provision of effective headlighting systems. In the United States, a system used by the Insurance Institute for Highway Safety (IIHS) has come to be highly influential. One unique aspect of the IIHS test is that it measures the aim of headlamps on test cars, but does not adjust the aim; if the car doesn't arrive with the lamps aimed correctly, it gets tested with the incorrect aim.

Another worthy aspect of the IIHS testing system is the amount and granularity of data made available. The author uses that data, together with the RVP (relative visual performance) model, which predicts the speed and accuracy of visual processing. RVP ratings are known to correlate with night-time crash reductions at road junctions; for example, lighting which improves an RVP score by 0.1 units is associated with a night-time crash reduction of 7.2%. The author describes this linkage, as well as age effects (younger drivers see better than older drivers; older drivers need better lighting for any given level of visual performance).

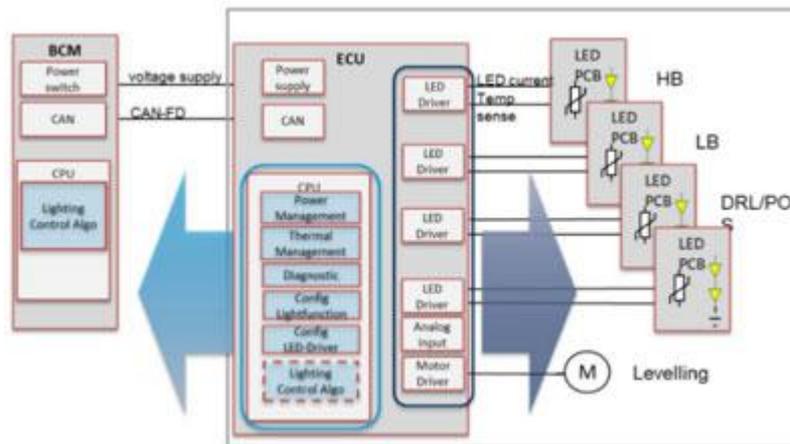
The author performs and illustrates a great deal of rigorous data analysis and comes to some highly salient conclusions—not least of which is that a 3.8% reduction in fatal single-vehicle night-time crashes can be sturdily predicted to bring an economic benefit of USD \$4.2bn/year.

**DVN comment:** Obvious as it may seem to state that better lighting reduces crashes, being able to stand on a sturdy platform of data while saying this, and from there being able to dependably predict—in real terms—the safety and economic benefits of better headlighting, is a critical key link in the American context where crash-avoidance systems such as lighting have long been difficult to improve from the regulatory side because of a perceived lack of proof that doing so is cost-effective.

Another keen finding in this highly technical paper: the vertical aim on the headlamps of 2022-model vehicles ranged from 0.24° up to 0.31° down (relative to correct aim), while the 2015-'16 models evaluated for a previous study ranged from 0.25° up to 0.65° down. That is a 40% improvement in the accuracy of new-car headlamp aim, which might suggest that the IIHS as-aimed rating system might be spurring automakers to pay closer attention to lamp aim before releasing new cars for sale.

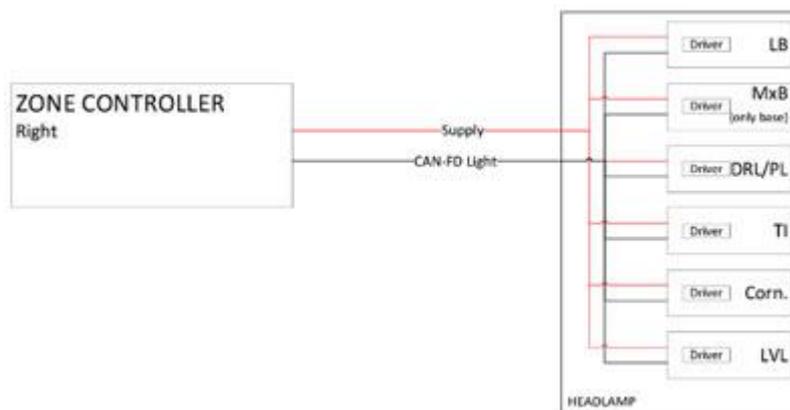
## ECU-Less: State of the Art

Cadenas, and P-H. Matha (Volvo Car)



Present practice: BCM talks with ECU in lamp, which talks to drivers in lamp

The authors start out by noting the enormous strides being made recently in electronic technology and technique, which are paving the way new enabling technologies, particularly in exterior lighting; in other words, the time is ripe for re-imagining techniques and strategies for the electronic control of vehicle exterior lighting. Volvo Car are pursuing an approach they call "ECU-Less", which they believe could pave the way for computing power presently located in lamps to migrate to more centralised, automaker-controlled ECUs and software. This, from Volvo's perspective, goes beyond just pursuit of internal corporate strategy; rather, it is a worthy, widely-beneficial line of pursuit for the whole of the automotive world. Particularly, they point out, in light of the cost-plateau together with skyrocketing R&D efforts.



NEW APPROACH: ZONE CONTROLLER CONTAINS THE COMPUTING POWER

Presently, automotive front lighting uses a CAN or CAN FD communication bus between a dedicated ECU and the vehicle's BCU, and in rear lighting there are diverse strategies ranging from hardwired connections to LIN or CAN connections. All computational power of the lamps is located within the lamps' ECUs themselves, which spurs a need for internal microcontrollers and associated software. The light-makers themselves require dedicated drivers, which also are inside the lamp-located ECU.

	Discrete Approach	Modular Approach
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Control electronics replaceability</li> <li>• Good thermal behavior</li> <li>• No need for integrated motor</li> </ul>	<ul style="list-style-type: none"> <li>• No specific tooling</li> <li>• No fixations</li> <li>• Bulb change approach possible</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• Increased wiring</li> <li>• Specific tooling</li> <li>• Need for fixations</li> <li>• Inside vs outside Housing strategy</li> </ul>	<ul style="list-style-type: none"> <li>• Levelling PCB vs integrated motor</li> <li>• Wire splicing = ↑ cost</li> <li>• Tier 1 redesign of existing modules</li> <li>• No control electronics replaceability</li> </ul>

Much of that is staged to change, for reasons including an emigration of suppliers getting out of the ECU business; new technologies which might facilitate the deletion of lighting-specific ECUs, and future zonal architectures which, by design, centralise computational power in zone controllers. The authors go on to describe, in detail, the constellation of technologies fuelling the feasibility of new exterior-lighting control strategies. They discuss new ICs, such as drivers which can be directly driven by CAN communications without need of an intermediary microcontroller. They detail the applicability to static and dynamic loads, the new CAN-FD comms protocol which allows high bitrates and efficiencies at reasonable cost. They compare the efficiencies of LED drive techniques including classical boost-buck; SEPIC, and H-bridge. And they discuss, in great detail, the benefits; challenges, and potential drawbacks of a wide array of new ways of doing the job.

Finally, the authors zoom out and take a broad view, noting a rare and unique opportunity, created by a confluence of developments across a big collection of mutually-relevant technologies, to revolutionise the way car lights are engineered from a categorical, system-architecture standpoint.

**DVN comment:** Usually in the vehicle-lighting world, evolutions are piecewise: for many years the optics stayed pretty much the same, but light sources gradually evolved. Then optics began evolving, but with no particular speed-up of light source evolution. Then came the LED revolution, which changed everything all at once—optics, light sources, design, drive strategy. This paper presents a well-illustrated, sturdy case that we're on the verge of another major revolution in car lighting. It is one that could not have been imagined much earlier in the ongoing migration of cars toward software-defined smart computers on wheel.

# Lighting News

## Stunning DA Projection Innovation by Qisda, TI

LIGHTING NEWS

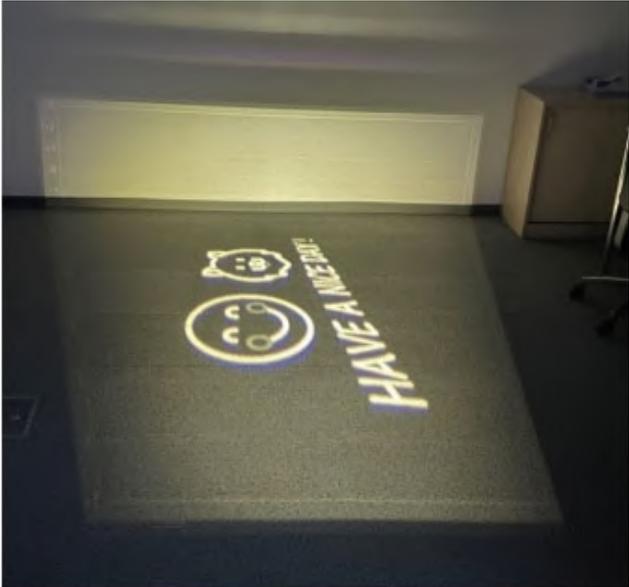


L-R: Peter Lohs·Tony Lin·Wolfgang Huhn·Lee LJ Tsao·Edward HY Lin

DVN's Wolfgang Huhn recently had the honour of a great show-and-tell by Qisda, a huge Taiwanese group founded in 1984, employing about 30,000 people and with revenue over USD \$8bn, with business in IT; healthcare; communication, and more. They're expert suppliers of LCD monitors and DLP projectors, and now they have developed an automotive driver assistant projector module with the latest Texas Instruments chip, the DLP4621-Q1. That's the new 0.46" automotive-qualified DMD with 921 kilopixels, which supports an aspect ratio of 2:1.



The DMD chip is newly illuminated by a laser source—any of several automotive laser sources, actually, and the result is a compact projector that puts a super-quality image on the road. Its very high contrast makes the projected symbol visible not only to the driver (which all of today's systems can do) but to an observer anywhere in a full 360° ring around the projection. The DVN team have never seen a projector produce such a high-quality image! It does a fantastic job of realising the often-used example of a projected pedestrian crossing (zebra stripes); the only projector we've seen do a credible job of it. It really demonstrates that the image quality of a DMD is far better than that from microLED systems. Still, each technology has strong advantages and disadvantages, which is a very nice situation for the car makers to choose their preferences.



PICTURE TAKEN PARALLEL TO PROJECTION LINE



PICTURE TAKEN 90° TO PROJECTION DIRECTION

# GM Patent: Dynamic Glare-Blocking Windshield

LIGHTING NEWS

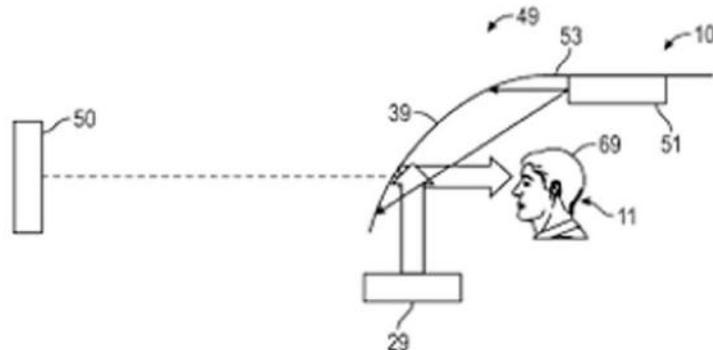


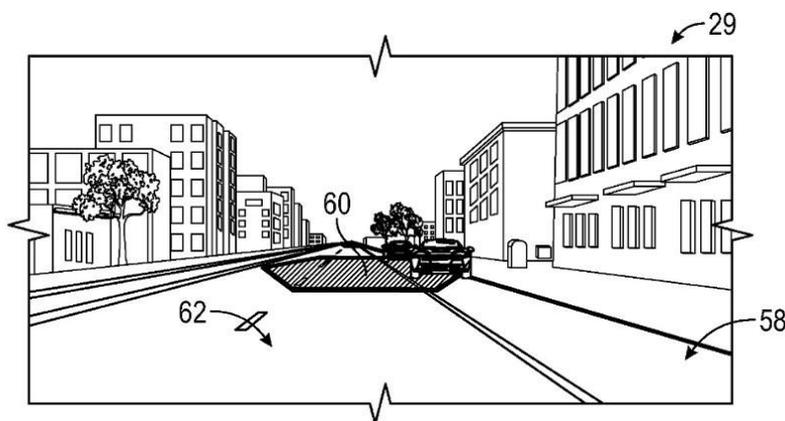
FIG. 5



Windshield visors have been helping block sun glare for most of a century. Some of them, such as ones we've previously reported on from [Bosch](#) and [Apple](#), are even getting smart about it. Now, General Motors has what they think might be a better idea: an auto-dimming windshield to control glare both day and night.

As described in U.S. patent № [11557234B1](#), entitled Windshield Zone Dimming and Augmented Reality Head Up Display, the system keeps track of the brightness of the scene ahead, at a granular level, with respect to the driver's viewpoint. When and where the brightness exceeds a certain threshold, that region of the windshield would be dynamically dimmed.

According to the patent application, the system includes forward-looking sensors and an augmented-reality head-up display and windshield made of glass with electrically-tuneable transmittance. It's sort of like a vehicle-mounted opposite-of-ADB system: instead of the glare car tracking where other drivers' eyes are and shadowing them out of the beam from the source end, the GM windshield tracks where the glare is coming from and shadows the equipped driver's eyes out of the beam at the receiving end.



There's been no announcement as to when this technology might be available in GM vehicles.

# Plastic Omnium at Shanghai Autoshow

LIGHTING NEWS



Smart Tailgate 2.0



PO's newest light projections

The new PO lighting division develops lighting solutions with advanced hardware and software to enable greater design freedom, quality services, and driver assistance.



PO offers a wide range of solutions for increased safety and new possibilities for the design of the front and rear of a vehicle. In their Slim Line ADB, a 15mm lens makes an extra-slim profile for a modern design. A microLED Module with more than 20 kilopixels combines intelligent front lighting with semi-HD projections for the display of information onto the road in front of the vehicle.



In signal lighting, PO's patented surface-LED technology combines an ultra-homogenous OLED look with all the advantages of LED light guides: they have a particularly thin design, and support multiple colours and 3D lighting.



With 171 individually controllable LEDs, PO's Pixelated Rear Light allows for various safety and warning signals as well as personalised multicolour animations with impressive homogeneity from wide viewing angles.



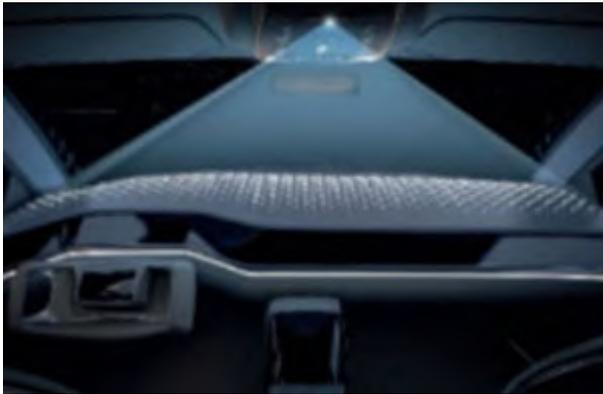
Completely dark when off and very homogeneous when on, PO's Dark Lamp enables elegant design and significantly reduces power consumption. Made possible by a high-quality optical system.



Exterior projection systems enhance traditional lighting functions in relevant situations. PO's Dynamic Turn Signal Projection, for example, projects the turn signal onto the road next to the vehicle to improve visibility and thus provide additional safety for other road users.



PO's dynamic welcome light projection module won a CES award this year. It's compact enough to be installed in numerous locations around the vehicle. It's based on a microlens array—a lens system which projects four different graphics independently out of a single unit, thus enabling partial or full surround projection of images or patterns, including warning symbols.



PO's interior lighting technology facilitates the enhancement of comfort and wellbeing and creates a feeling of safety. On a functional level, well-designed illumination makes it easier for drivers to locate and use vehicle functions after dark.



PO think a bumper gives a car its final visual appeal—it's a strategic part to express a vehicle's 'personality'. Plastic Omnium's core business involves translating the automaker's creative brief into a bodywork part that meets extremely strict specifications and stringent regulations. This photo shows PO's "trend wall", including a car with a sparkly, well-lit grilleboard and front bumper.



DVN's Tylon Zhu on the left with PO representatives on PO booth

# Valeo at Auto Shanghai 2023: Lighting Everywhere

## LIGHTING NEWS



At Auto Shanghai 2023, Valeo presented their Valeo Lighting Experience and Digital Twin technology, as well as developments in AI systems to define and visualise designs in real time by combining style, function, and technique. These cutting-edge systems will accelerate the virtual development of lighting solutions, with prototypes built at the latest possible stage, thus reducing development costs.

Valeo are also hard at work reinventing interior lighting and extending it across surfaces to create a more immersive experience for passengers. It can be used for a variety of purposes such as delivering navigation information; visualising music; creating personalised and relaxing atmospheres, and more. Immersion is made possible by engaging multiple senses such as sight; sound, and touch.

With vehicles becoming more and more electric and autonomous, lighting will be even more important to assist driving; transmit signals, and promote personalisation.



China is a dynamic market with permissive regulations, and Valeo partner with Chinese automakers to facilitate the development of visibility solutions incorporating high-performance dynamic OLED lamps, which allow design freedom; high-end finishing; personalisation, and a first level of communication.

# PO CEO to Hold Conference on 15 May

## LIGHTING NEWS



Plastic Omnium CEO Laurent Favre will put on a conference on 15 May 2023, at 7pm, at the Club Auto-Cercle La Rochefoucauld, 9bis Avenue d'Iéna, Paris, France. Registration is [open online](#).

Favre will tell attendees about his career; the challenges faced by the main automotive suppliers, and his vision for the future of a rapidly changing sector.

The conference will be followed by a joint cocktail, then a dinner for those who wish to attend.



# Driver Assistance News

## Innoviz & Ascendtek: Agreement to Increase Lidar Sales

DRIVER ASSISTANCE NEWS



Innoviz Technologies announced that it has signed a distribution agreement with Ascendtek Electronics, an integrated provider of advanced electronic systems, to drive sales of the company's lidar solutions throughout the Greater China region.

Pursuant to this agreement, Ascendtek intends to promote Innoviz's lidar to its customers, aiming to accelerate the adoption of the lidar's solutions globally, by strengthening Innoviz's market presence across the Asia-Pacific region. Innoviz's high-performance lidar solutions offer mature, reliable and ready-to-ship products for the automotive and non-automotive industries.

The Asia-Pacific LiDAR market is expected to grow at a compounded annual growth rate of approximately 32% over the next 3 years.

# General News

## Pietzonka : “Western world, We Need to Speed up. NOW!”

### GENERAL NEWS



NETA GT



XPENG G6



NIO ES6



HIPHI Y

Extract of the feedback of Forvia's Steffen Pietzonka who would like to share his very individual key learnings from the recent trip to China, being at AutoShanghai.

«Everything in China is digital from public to private services. Having Chinese colleagues who did not even have 10RMB in their pocket but experiencing all services one can imagine. Shopping with instant delivery for nearly everything, pickup service at the doorstep for returning purchases, digital keys if not at home, ride hailing for other people, digital micropayments, bill splittings, digital identification and so much more. Nothing goes without WeChat and similar Apps.

«The vehicle landscape on the road has changed massively. So many vehicles with very progressive car designs. Very modern, stylish and individual with own design language. So many vehicle badges where I could not even identify the brand. And this I'm saying working in Automotive for more than 25 years. Most western people never heard about vehicle brands like Zeekr, Arcfox, Xpeng, Hiper, Aion, Li Auto, Avatar, Build your dreams, Nio and so many others. And they could not even imagine what kind of cool cars they meanwhile offer. Not in the future. On sale now. Also technology-wise really advanced with big screens, new HMI concepts, race-car steering wheels, lounge seats like in Airplane business class, integrated Lidar, Radar, Cameras for Level 3 automated driving use cases etc. And all this at very attractive price levels and high perceived quality level.

«User experience is key. Not only regarding all the digital services, delivery robots etc. but also related to cars. A cocoon of services. Inside and outside of the vehicle. Just to mention Nio with e.g. Nio Life and Nio Power. Or their small robot avatar. Like a buddy sitting on the dashboard giving advice, intelligent interacting with the driver like a person, turn its head and showing emotions, pampering the driver saying e.g. "...I feel it's warm outside - should I activate cooling...?" Isn't that great?

«So my take away and message when returning to Germany is "western world, you need to speed up. NOW!" With regards to China speed - When looking over the Shanghai Bund towards the Pudong skyscraper skyline I'm always fascinated, that 40 years ago Pudong was just a village of fishermen...

# Sino-Euro Rivalry at Shanghai Auto Show

GENERAL NEWS



This year's Shanghai Auto Show is the world's most diverse, based on automaker participation, after the decline of other globally significant shows.



BYD YangWang U9

**BYD** showed the YangWang U9 all-electric supercar and the U8 electric SUV. The automaker also unveiled their Seagull electric city hatchback, and a new model in their Denza premium brand. The Dynasty B-Class electric SUV also made its global debut.



HiPhi Y

The **HiPhi** brand, from Human Horizon, revealed their third model—the HiPhi Y. It is designed and engineered with global markets in mind. Currently, HiPhi sell their X SUV and Z sedan in China, with the X now ready for European sales.



**Lincoln** unveiled a new version of their Nautilus premium midsize SUV, with styling that will closely follow that of their China-only Zephyr sedan.

**Mercedes** unveiled the newest addition and first fully-electric model in their ultraluxury Maybach range, the EQS—a rework of the U.S.-built EQS large SUV. China accounted for about half of Maybach's 23,000 sales last year.

**Mini** now have a digital personal assistant that takes the form of a British bulldog character called Spike. The character appears on the Aceman's circular OLED touchscreen to guide users through the digital features. China-sold Mini models will use a platform developed jointly with Great Wall.



Chinese premium EV brand **Nio** showed the new version of their entry-level ES6. It's a small SUV that will be renamed the EC6 in Europe, following a legal challenge from Audi because of potential confusion with Audi's sporty S line (which includes an S6 model).

**Porsche**'s Cayenne large SUV has been given a massive rework, inside and out, including a brand-new digital display inside.

**Volkswagen**'s big reveal was their ID.7 full-electric midsize sedan, at the top of the brand's ID range of MEB-based electric cars. The ID.7 will be aimed mainly at U.S. and Chinese buyers, but will also be sold in Europe.



Chinese premium brand **Xpeng** brought their new G6 coupe-styled midsize SUV to the show. The car will compete against the Tesla Model Y and Nio ES6/EC6. It is expected to launch in European markets with high EV sales.



**Zeekr**, Geely's premium electric brand, showed their X EV compact crossover. The new model will be positioned in Europe against German premium electric SUVs such as the Audi Q4 e-tron; BMW iX1, and Mercedes EQA.

**And others:**

**Neta GT:**



**Hycan Atelier concept:**



**BMW iX1:**



# Jaguar Land Rover Rename as JLR With 4 Brands

## GENERAL NEWS



Jaguar Land Rover will be now called JLR, in a move intended to highlight four sub-brands: Range Rover; Discovery; Defender, and Jaguar.

JLR will thus become a 'house of brands' in hopes of "amplify[ing] the uniqueness of our characterful British marques", according to Chief Creative Officer Gerry McGovern.

JLR have been trying to separate their SUV product line and put more air and light between vehicles with distinct personalities.

The strategy within Land Rover since 2021 has been to separate vehicles into three 'pillars', with Range Rover taking the lead on luxury; Discovery focusing on families, and Defender drawing on its off-road durability roots.

With the updated strategy, each Land Rover pillar is elevated from a model name into a vehicle marque, joining Jaguar as such.