

6th Annual

AUTOMOTIVE INTELLIGENT LIGHTING TECHNOLOGIES & DESIGNS 2023

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AMBIENT LIGHTING IN VEHICLES AND ITS ROLE IN SAFETY,
PERSONALISATION, AND WELL-BEING

INTERVIEW WITH



Serkan Altintas,
Interior Lighting Specialist, EMEA Product Development,
Tofaş (working under Stellantis)





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In this interview with Automotive IQ and Serkan Altintas, Interior Lighting Specialist, EMEA Product Development at Tofaş (working under Stellantis), Serkan discusses various aspects of ambient lighting in vehicles and its role in enhancing both comfort and safety for drivers. He provides examples and scenarios to illustrate how ambient lighting can effectively warn and indicate drivers about potential collisions and driver fatigue.

Serkan also explores the potential future applications of interior projection lighting in personalising the driving experience for occupants. He shares practical solutions for reducing packaging constraints while maintaining high levels of intelligence in interior lighting features. Furthermore, he delves into how companies leverage machine learning to adapt ambient lighting according to the driver's needs, highlighting the technology's benefits.

Serkan will be part of the following panel discussion at the Automotive Lighting Technologies 2023 conference:

HOW TO DEVELOP HUMAN-CENTRIC LIGHTING FEATURES TO BENEFIT OCCUPANT WELL-BEING

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Q: How can ambient lighting in vehicles be effectively adapted to provide warnings and indications to the driver? Can you provide some examples or scenarios?

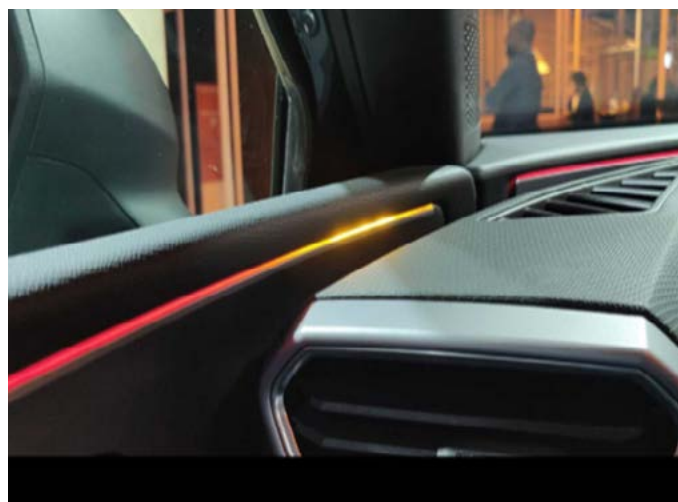
Serkan

Ambient lighting has become not only a comfort tool for the driver, but also a safety tool by warning the driver. With functional ambient lighting, the driver can be warned of any collision or warned with different colours if there is a driver fatigue. For example: In the Mercedes S-Class, you can see 'event lighting' for incoming traffic. If there is a tight traffic, you will see some warnings on the door panel through ambient lighting in the colour red (dynamic lighting).



In the Mercedes S-Class 2021, there is a front collision warning system, which will warn you of a possible collision by projecting a bright red animation throughout the cabin.

There is functional ambient lighting in the Seat Leon 2020 model by using blind spot detection. The yellow part of the light strip can work in conjunction with other vehicle functions, such as the blind spot warning system, lane change assistant and exit assistant.



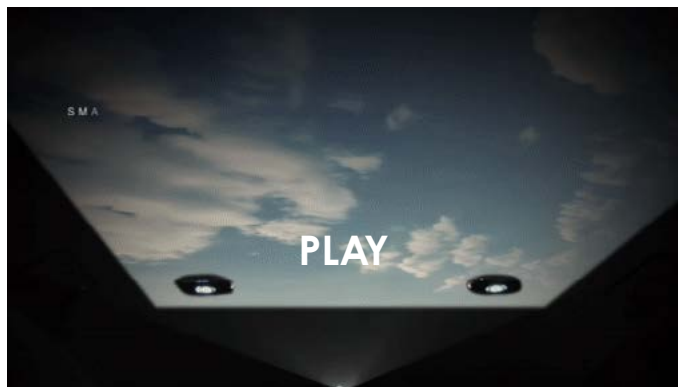
Q: What are the potential future applications of interior projection lighting for personalising the driving experience for occupants?

Serkan

With ambient lighting, a spacious home environment can be created, especially in autonomous vehicles. Interior surfaces can be personalised with dynamic ambient lighting applications like RGB flexible LEDs. Grupo Antolin, a manufacturer in the vehicle interior space, carried out an innovation study and found some solutions on static projection.

You can find more examples about projection of the light of interior lighting components in these links:

- Projection lighting under door panels - https://www.youtube.com/watch?v=ZzAVaDcKLzE&ab_channel=MINI
- Projection on the headliner: this is a plug-play solution for projection lighting on the roof. It is an after-sale solution. Rolls-Royce use roof projection lighting in their specific models. <https://www.youtube.com/shorts/1bpWRINbda0>
- Smart Skin Project from Grupo Antolin, the light projection on headliner, click to see the GIF:



Q: Balancing intelligence with packaging constraints can be challenging. Could you share some practical solutions to reduce packaging of interior lighting features while maintaining high levels of intelligence?

Serkan

Yes of course, we are always faced with packaging problems during product development. I had worked as an Ambient Lighting Specialist on the 965 Alfa Tonale project for 2 years and I can give an example from this. For RGB Backlit Fascia, which

is located on the Tonale dashboard, we used flexible RGB modules to split the connector and RGB module. You can see the flexible band instead of a simple wire harness unit. So, this was a good solution to locate RGB modules at the back of the component. The other solution was creating an all-in-one module by merging all LEDs in a one RGB module. Tonale was in my scope, and it is in serial production. I can give other examples, but the projects are still ongoing; I can't say too much but we are using flexbands or small RGB modules to avoid packaging issues.

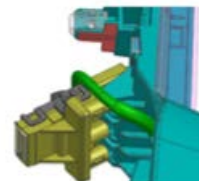
Flexband Module RGB LED



Pre Development Design



Current Design



Q: How are companies leveraging machine learning to adapt the ambient lighting of vehicles according to the driver's needs? Can you elaborate on the technology and its benefits?

Serkan

Ambient lighting components are managed by the BCU of the vehicle and there is a specific control unit to manage lighting. This control unit can be supported by specific software, and we can give some functions to make a collaboration with other units of the vehicle. This software can record the user's behaviour and enable the right decisions to be made for future scenarios. For example, the last selected colour may appear when the vehicle is first unlocked or turned on, or whatever colour you chose while listening to music, you will see this colour when you start listening to music.

Q: What are the key considerations for developing human-centric lighting features that promote occupant well-being? Are there any specific design principles or guidelines that are followed?

Serkan

For ambient lighting, there is not any homologation requirement, but we are waiting on new regulations to control interior lighting with some constraints. As a person who works for a big OEM, we work with condensing suppliers. Both suppliers and OEMs follow design practices, and these procedures are improving with trends and new technologies. For example, if we put a light for air vents like Mercedes does, we should understand the lighting performance and characteristics by considering benchmarks. Because we do not have any design practices for air vents with lighting, it will be developed day by day. Design practises are our specification, and we should respect these specs during the product development phase. What the product will be, performance targets, which tests will be performed, etc. are all determined within these procedures.

Q: Could you share any case studies or examples where human-centric lighting features have had a positive impact on occupant well-being?

Serkan

- Antolin developed: New ID5 / ID.buzz (IP) + BMW IX (Doors) + Lotus Electre
<https://www.youtube.com/watch?v=WNitkuKZssE> (See IP illumination)
- Other DVPTS with various OEM for Dynamic (IP / Doors)
- DAY + Night

In many vehicles, the lighting is ergonomically positioned so that it is easily seen by the driver and passengers. If you can't see the light or feel its presence, it means nothing to put more lights in the passenger compartment. Each colour has a different effect on human psychology, there is a study of BMW engineers related to this. The colours and intensity of the light are chosen with such conditions.

Some colours cause more serotonin hormones to be secreted in humans. Whereas some colours, like red, on the contrary, secrete the hormone melatonin. Thanks to its long wavelength, red is one of the most visible colours in the colour spectrum (second only to yellow). Its ability to instantly grab people's attention is the reason why it's often used to warn people of impending danger. Think of stop signs, sirens, fire engines, and red traffic lights. People tend to associate red with negative, danger-bearing emotions. This could be because it is the colour of fire, blood, and sometimes poisonous or dangerous animals.

If you see the above example, Mercedes uses red colour for front collusion system.

https://www.researchgate.net/publication/230758962_Influence_of_ambient_lighting_in_a_vehicle_interior_on_the_driver%27s_perceptions

[Psychology of the Color Red \(verywellmind.com\)](https://www.verywellmind.com/psychology-of-the-color-red-2786181)

Q: As an Interior Lighting Specialist, what role does Stellantis play in the development of intelligent interior lighting? Can you highlight some of the innovative approaches or technologies that your team is working on?

Serkan

I'm afraid due to confidentiality I can't give away too many examples, but I can say that you will see a new generation of ambient lighting applications in the new Maserati models, my teammates are working on this, and I try to follow their work.

Q: In terms of user experience, can you tell us more on implementing intelligent interior lighting systems?

Serkan

Co-design suppliers should understand machine learning and they should adapt new advanced technologies. For example, ambient lighting can be adapted with hologram technologies. This trend requires advanced optics and software knowledge.

Thanks to the HMI and software, the colours that the driver likes the most while doing a job can be defined and shown to the driver. I intend to discuss machine learning usage in our ambient lighting projects further at Stellantis.

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