DVN WORKSHOP Assisting Nighttime Driving with Driver & Occupant Monitoring Systems

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Drivers receive more than 90% of the information from the road through the eyes

United States National Highway Safety Bureau, Traffic safety, 1969



About 46% of deathly incidents occur during nighttime, despite of having 60% less traffic

NHTSA, Traffic safety facts, 2020



Drivers **average age increases day by day**, and so their visual problems The 65+ age group has the largest crash fatalities compared to other age groups

NHTSA, Traffic safety facts, 2020



More than 10% of road kills are caused by driver distraction

NHTSA, Distracted driving, 2020

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Safety assistance features for driving experience enhancement

For most of the causality factors, there are technological solutions



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Safety assistance features for driving experience enhancement

WHY MONITORING THE DRIVER? How to Save Lives in Nighttime Driving



Strategic partnership with CIPIA in 2019

to offer complete solutions integrating Driving & Occupant monitoring systems.

- A sophisticated algorithm allows to monitor physiological and cognitive states of the driver via a camera system.
- The DMS is based on a camera system which allows:
 - The detection of the physical driver conditions (Anxiety, drowsiness...)
 - Recognition, even with partial occlusions (Mask, sunglasses...)
 - Perform in any driving conditions (Day or Nighttime)
- Camera positioning & system integration





Grupo Antolin, as a global supplier of solutions for the interior of the car, is the **ideal partner for monitoring solutions**



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DVN WORKSHOP: Assisting Nighttime Driving with DMS & OMS

Safety assistance features for driving experience enhancement

WHY MONITORING THE DRIVER How to Save Lives in Nighttime Driving

- Works constantly during the driving experience.
- Monitoring system performing by nighttime condition thanks to infrared lighting
- Driver monitoring technology offers different use cases and benefits:

Safety control: detection of the physical driver conditions
Onboard comfort management via ID face recognition and AOI
Sensor substitution possibilities (occupancy, hands on wheel, seat belt)

• The EU Safety Regulation is a strategic trigger for the implementation of the DMS

EuroNCAP: Adoption of monitoring camera or radar system to comply with the highest safety rating for the EuroNCAP.

European parliament:

Driver Availability Monitoring mandatory from 2024 onwards in Europe



With proper camera selection and algorithms, the DMS can become an all-condition pupil monitoring system



Current portfolio includes lighting systems to control infrared LEDs for automotive camera systems and proper cabin illumination







Numerous Years of experience in lighting simulations

ANDIVS - Adaptive Night Driving Improved Vision System

Proactively actuating on visual condition: driver monitoring & ANDIVS

Driver monitoring camera + control unit + algorithms for interior light control ANDIVS is able to improve drivers' night vision by tackling the **main challenges** of night driving lighting conditions.



Loss of visual acuity



Traffic signs misinterpretation



Lack of perception of shapes



Increased response times







Visual aberrations

ANDIVS - Adaptive Night Driving Improved Vision System

ANDIVS TECHNOLOGY DESCRIPTION

Enhance vision in scotopic / mesopic conditions through the promotion of an adequate pupil response to each driving scenario and driver profile, in real time.

- Diffuse light source (Wavelength / Wave form / Light intensity)
- Pupil monitoring system (through DMS camera)
- Proprietary algorithm-based control system



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ANDIVS - Adaptive Night Driving Improved Vision System

ANDIVS PROGRAM KEYPOINTS

Developed with the Institute of Applied Ophthalmo-biologics at Valladolid University (Spain)

- Large statistical population covering main groups of interest (age, gender, laser surgery, intraocular lenses...)
- Physical simulator design and construction
- Real visual scenarios selection and reproduction
- Objective / subjective proprietary tests
- Proprietary measurement and control algorithms
- Real time adaptation through continuous pupil monitoring







ANDIVS - Adaptive Night Driving Improved Vision System

ANDIVS PROGRAM CONCLUSIONS

- Overall average improvement in every group of interest
- Significant decrease in **pupil diameter** sustained over time achieved
- Distortions: very significant improvement in 47% of the population
- Shape appreciation: very significant improvement in 32% of the population
- Confirmation of conclusions in **real environment** on going
- Additional research program: Non Visual light effect





Contrast sensitivity



Significant improvements obtained in every group of interest.





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