



**Safer Roads:**  
***Thanks to High Definition Lighting  
Experience***

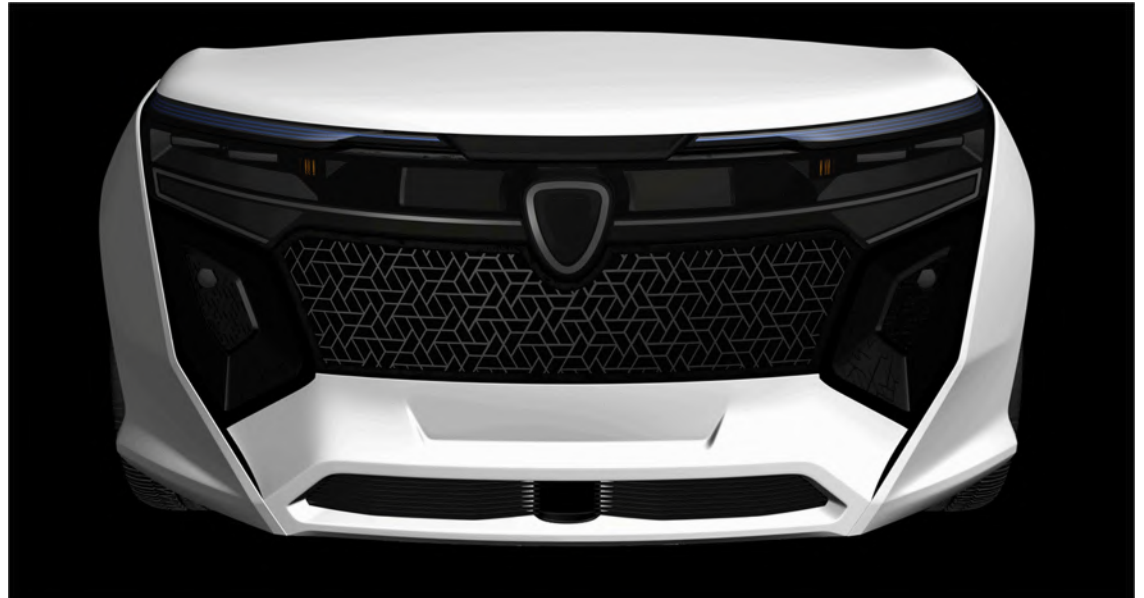
John S. Orisich

SMART TECHNOLOGY FOR SMARTER MOBILITY

**We have come along way....**



Caveman using fire torch to see at night



State-of-the-art lighting for 3 distinct lighting scenarios

# We are contributing to the visibility of...



## THE DRIVER

**Reducing by 59% the driver stress by night** with HD Lighting solutions and under adverse weathers



## THE SYSTEM

**100% of ADAS efficiency** @night and in All Weather /All Seasons



## THE ENVIRONMENT

**By communicating about the intention towards other road users**



**SAFETY**

# Visibility for the Driver



**Let's take look at some interesting statistics....**

## BRING VISIBILITY TO THE DRIVER AT NIGHT

**5x**

Higher **risk of pedestrian fatality** when driving at night

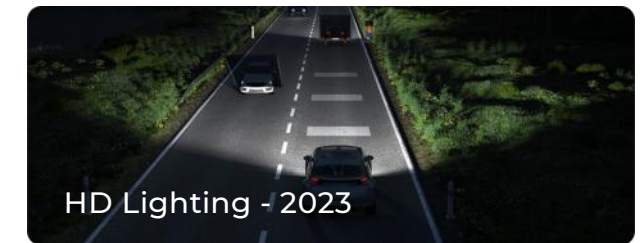
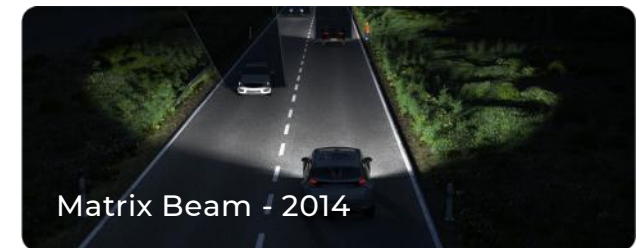
**Driver stress** is higher when driving at night

**Pedestrian fatalities** occur in winter at twilight and at night when **ROAD TRAFFIC** combines with **DARKNESS**

### HD Lighting

illuminates the scene ahead while precision shades oncoming cars, highlighting the presence of vulnerable users and dimming the light on road signs

### Visibility solutions



# DRIVER AND FRONT CAMERA VIEW WITH LOW BEAM ONLY

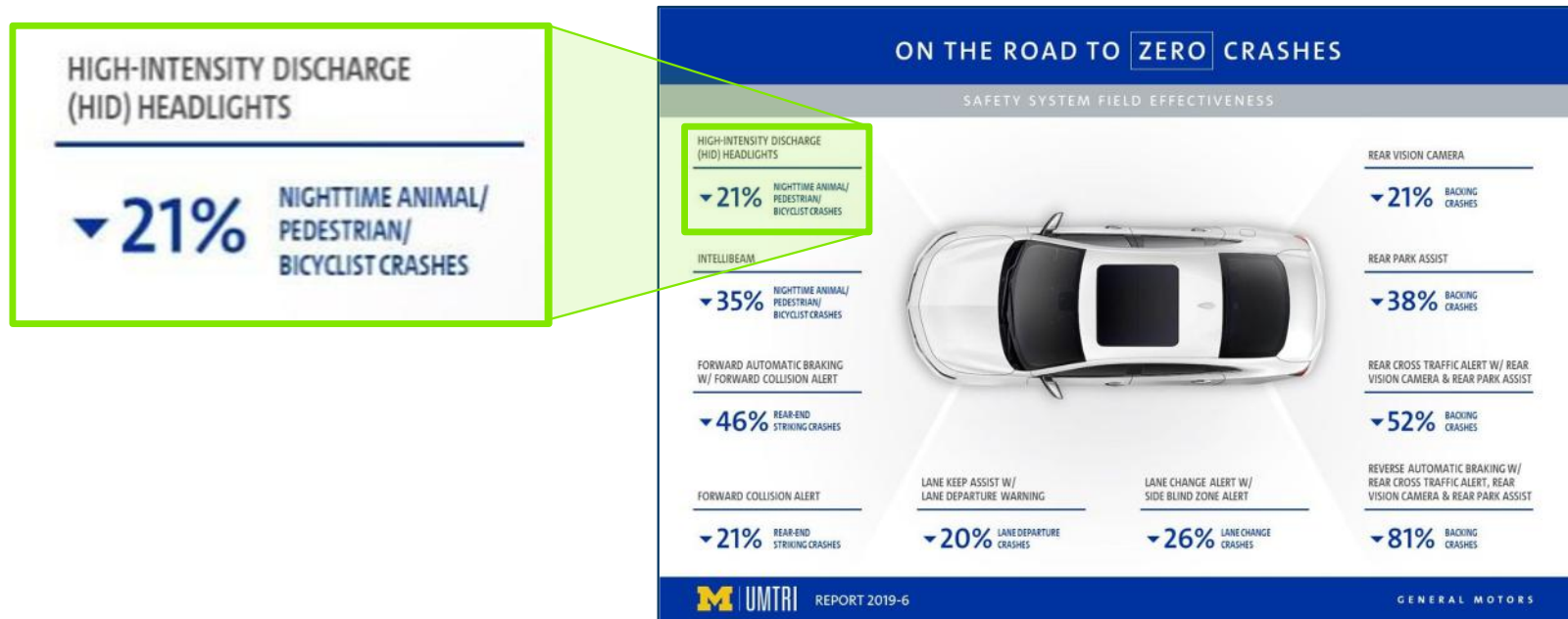


**5 X** higher risk  
of a pedestrian fatality  
when driving at night\*



\*DVN Report Study 2020

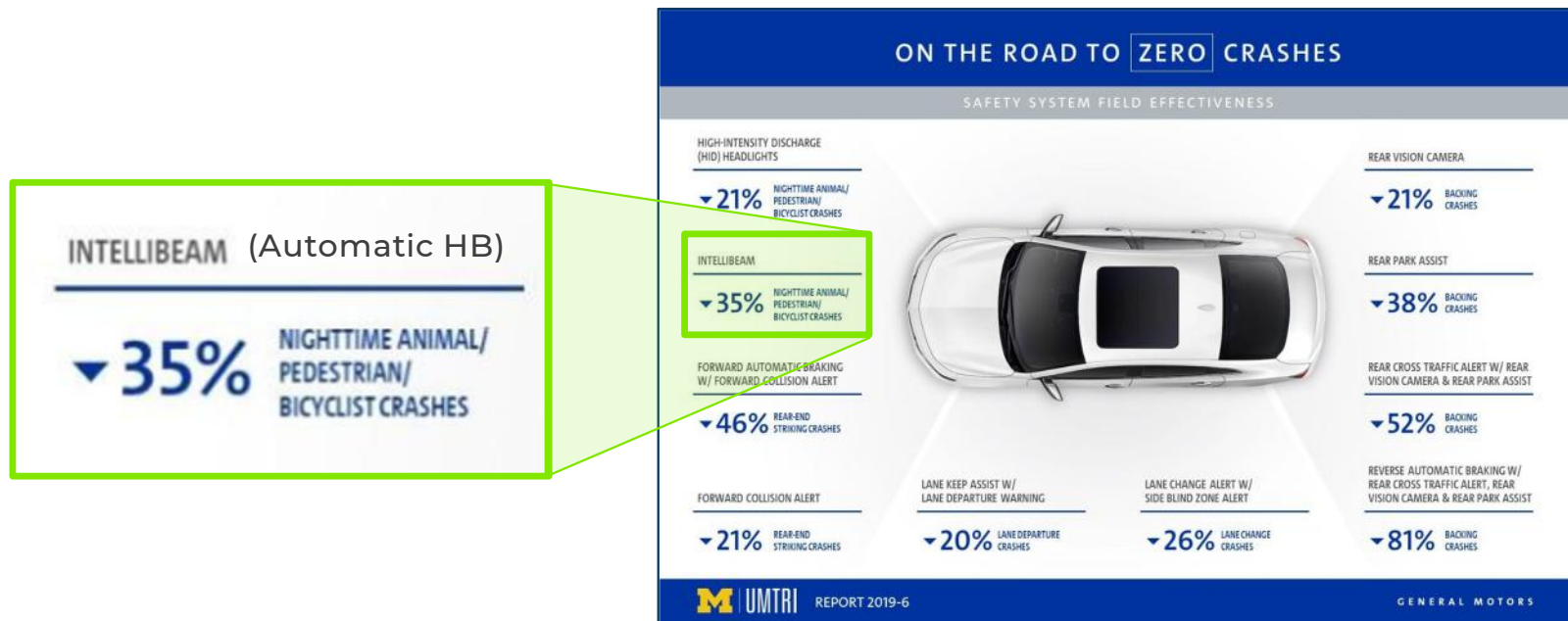
# SAFETY SYSTEMS FIELD EFFECTIVENESS | GM/UMTRI | JUNE 2019 REPORT



**HIGH PERFORMANCE HEADLIGHTS SAVE LIVES ! -21% REDUCTION IN NIGHTTIME CRASHES WITH VULNERABLE USERS**



# SAFETY SYSTEMS FIELD EFFECTIVENESS | GM/UMTRI | JUNE 2019 REPORT



**HIGH BEAM AUTOMATIC ACTIVATION SAVES LIVES ! ▼ 35% REDUCTION IN NIGHTTIME CRASHES WITH VULNERABLES**

# EVOLUTION OF FRONT LIGHTING TOWARDS HIGH DEFINITION & AUTONOMOUS DRIVING



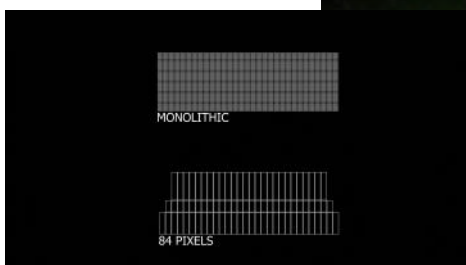
# BEST-IN-CLASS LIGHTING SOLUTION THROUGH FULL 2D PIXELATION - PRECEDING VEHICLE



HD  
Lighting



Pixel 84



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Optimized visibility in all driving conditions

# BEST-IN-CLASS LIGHTING SOLUTION THROUGH FULL 2D PIXELATION - ONCOMING VEHICLE + PRECEDING



HD  
Lighting

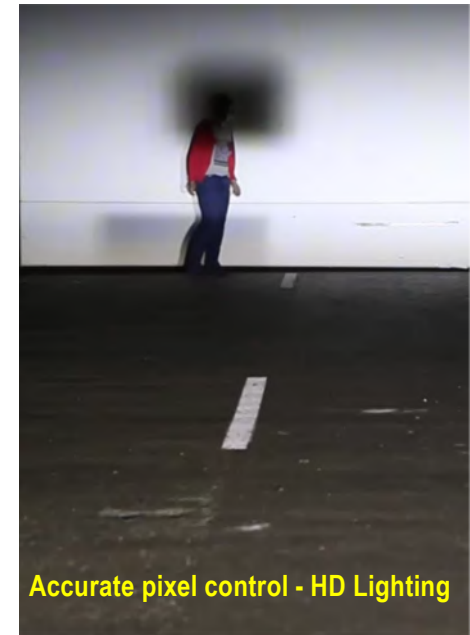


Pixel 84





# DEMOCAR VALEO HD LIGHTING BEST-IN-CLASS LIGHTING SOLUTION



# DIGITAL LIGHT FOR ROAD MARKING

## FUNCTIONS & USE CASES

### DRIVER ASSISTANCE FUNCTIONS



Lanes Guidance / Construction zones



Navigation & other environment information



Turn Signal repetition

### SAFETY FEATURES



Obstacle alerts / No Go zone



Safety distance information



Pedestrian illumination & alert

## Monolithic Video

# Visibility of the System



## Visibility of the system

In some areas, it's raining,  
snowing or freezing

**24%** of the time

In spring, considering 4 cameras  
and 1 lidar, **56%** chances per  
hour of an insect-splatch

The detection rate of some  
camera based systems falls  
to **<10%** at night

...without sensor  
cleaning in all  
conditions and  
lighting @night

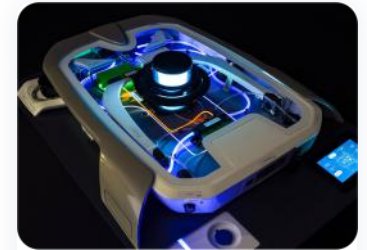
**100%**

of **autonomous  
vehicles**  
would be facing  
visibility shut-down

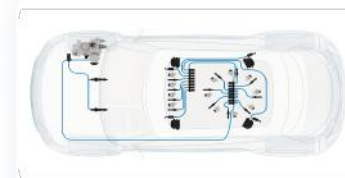
## Visibility solutions



**SENSOR  
CLEANING**



**SENSORS /  
CLEANING  
MODULES**



**CLEANING  
SYSTEM  
APPROACH**



**LIGHTING  
FOR SENSORS**



# VULNERABLE ROAD USER SAFETY ENHANCEMENT



Low Beam **W/O** Lighting for Camera

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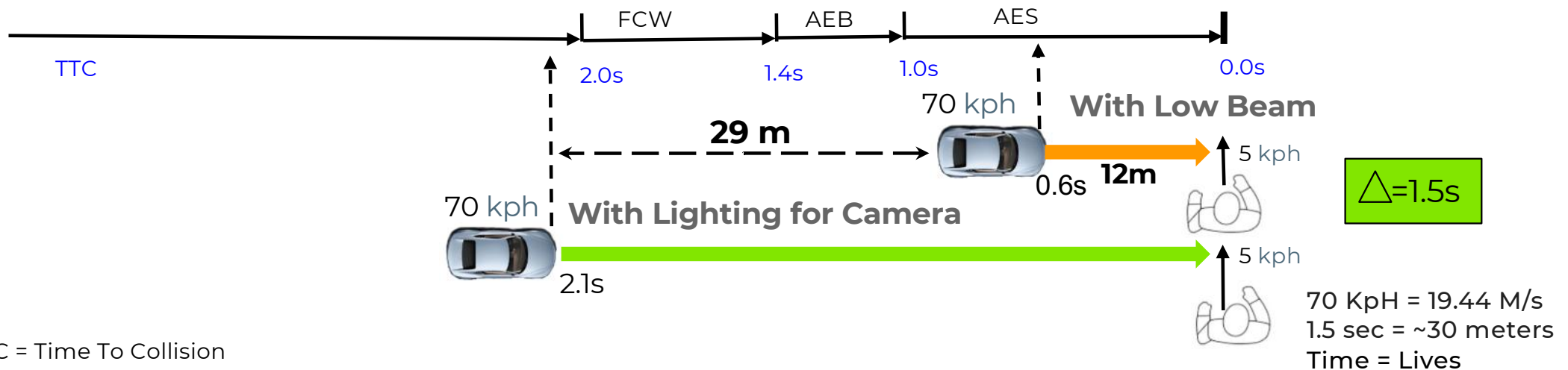
Low Beam **W/** lighting for Camera



# VALEO SOLUTION FOR PEDESTRIAN RECOGNITION IMPROVEMENT

Time To Collision Front Camera (FC) Classification - Values below based on system latency assumptions that needs to be confirmed for each systems considered

## Crossing Pedestrian Case Study



TTC = Time To Collision  
FCW = Forward Collision Warning  
AEB = Automatic Emergency Braking  
AES = Automatic Emergency Steering

*This case study is indicative of one type of vehicle installation. The performance of the system is based on many hardware and software variables such as camera, bus speed, and ADAS behavior*

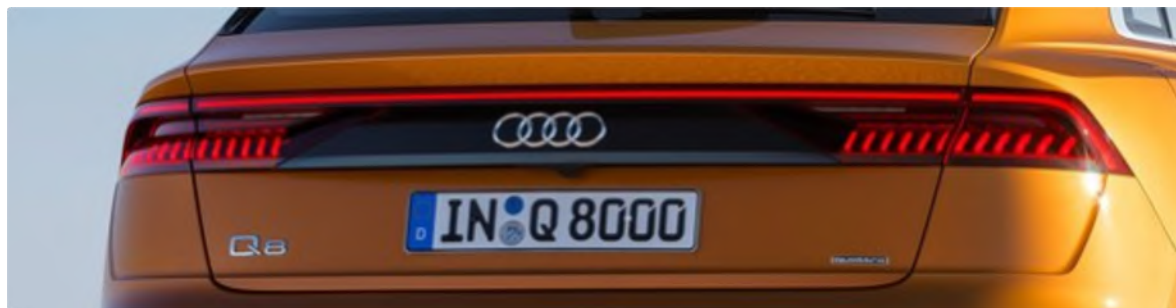


# Visibility of the Environment



# REAR SIGNALING EVOLUTION - TODAY

## ADVANCED COMMUNICATION

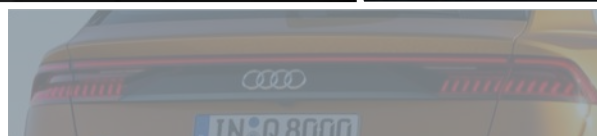
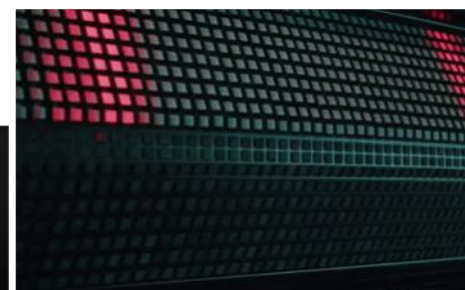
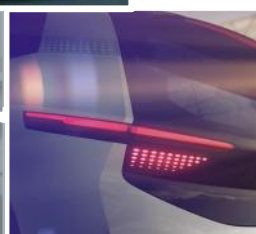


COMPACT

EXTENDED

# REAR SIGNALING EVOLUTION - TOMORROW

ADVANCED  
COMMUNICATION



COMPACT

EXTENDED

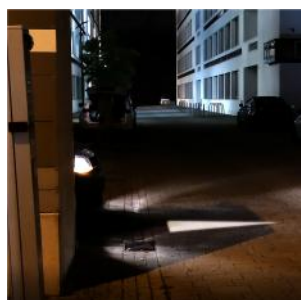
# Communication By Projection





# FUNCTIONALITIES TO INCREASE SAFETY & COMFORT

## NEAR FIELD PROJECTION



FRONT CAR PARK EXIT

**INCREASED  
AWARENESS OF  
THE CAR  
MANOEUVRE**



TURN INDICATOR  
EXTENSION

**INCREASED  
AWARENESS OF  
THE CAR  
INTENTION**



WELCOME

**INCREASED THE  
COMFORT  
EXPERIENCE**



UNLOADED AREA

**SECURE CAR  
ENVIRONMENT**



DOOR OPENING

**SECURE WAY OUT  
OF THE CAR**



SURROUND CAMERA

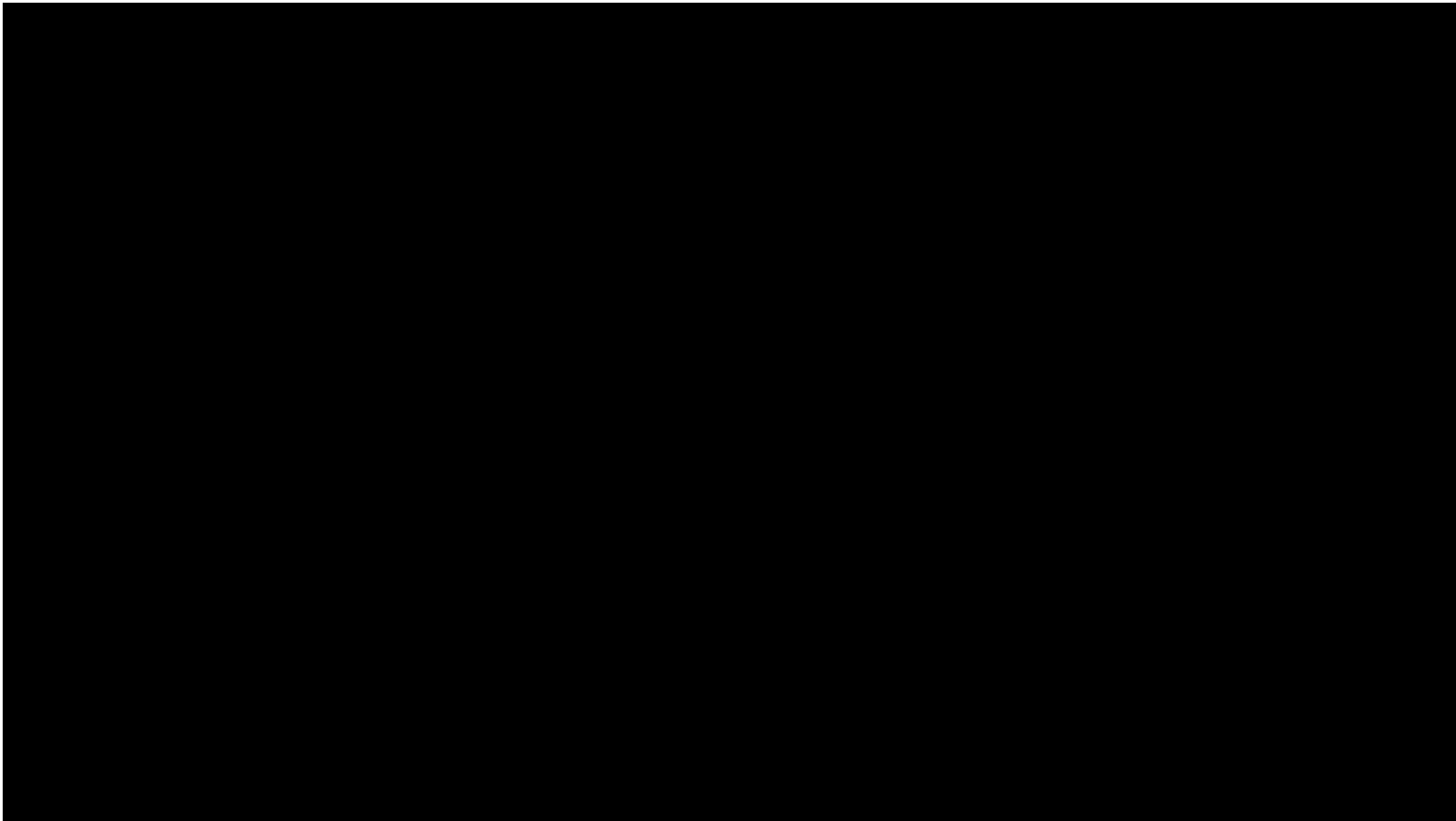
**INCREASED  
CONFIDENCE IN  
MANOEUVRING  
DISPLAY**



REVERSE EXTENSION

**INCREASED  
AWARENESS OF  
THE CAR  
MANOEUVRE**

## EXAMPLE OF TURN INDICATOR 360° NEAR FIELD PROJECTION






## NEAR FIELD PROJECTION REGULATORY STATUS FOR NA

- NFP not currently covered in FMVSS-108
- However SAE is targeting meetings at the end of September to determine if task force will be formed. This task force will likely embody road projection for driver assistance as well as near field projection for VRUs'

### Thursday – 30 September 2021



8:30 AM – 9:30 AM	University Michigan Transportation Research Institute Review	M. Flannagan/J. Jaklic
9:30 AM – 9:50 AM [TEVLCS4]	Road Illumination Devices Committee	M. Larsen/G. McCarter
9:50 AM – 10:50 AM [TEVLCS4x]	Road Projection Lighting Task Force	M. Larsen
10:50 AM – 11:30 AM [TEVLCS4W]	J3069 Adaptive Driving Beam Task Force	M. Larsen
11:30 AM	Closing Remarks	J. Jaklic

## IN SUMMARY

### 4 Key points:

- **HD Lighting + ADAS Collision Mgmt can save lives**
- **A HD system that can adjust in real time to the optimum lighting needed can have a profound impact on safety**
- **Lighting for Illumination, Camera and Sensors and Communication all offer unique attributes that directly improve safety**
- **Front, Rear and 360 Surround lighting all working together can move us closer to ZERO lives lost.**

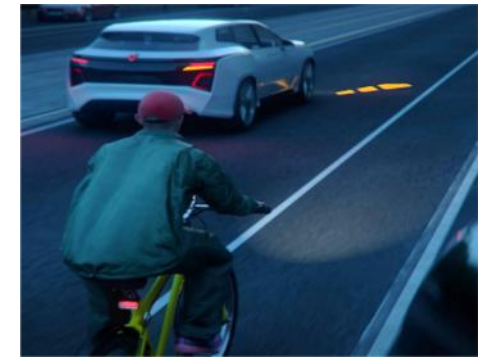
## CONCLUSION



Caveman using fire torch to see at night



State-of-the-art lighting for 3 distinct lighting scenarios



Safer roads for everyone



SMART TECHNOLOGY  
FOR SMARTER MOBILITY