XENOMATIX

AUTOMOTIVE VISION SOLUTIONS

Adapt/:/Ve

Automated Driving Applications and Technologies for Intelligent Vehicles

# *Laser based vision*

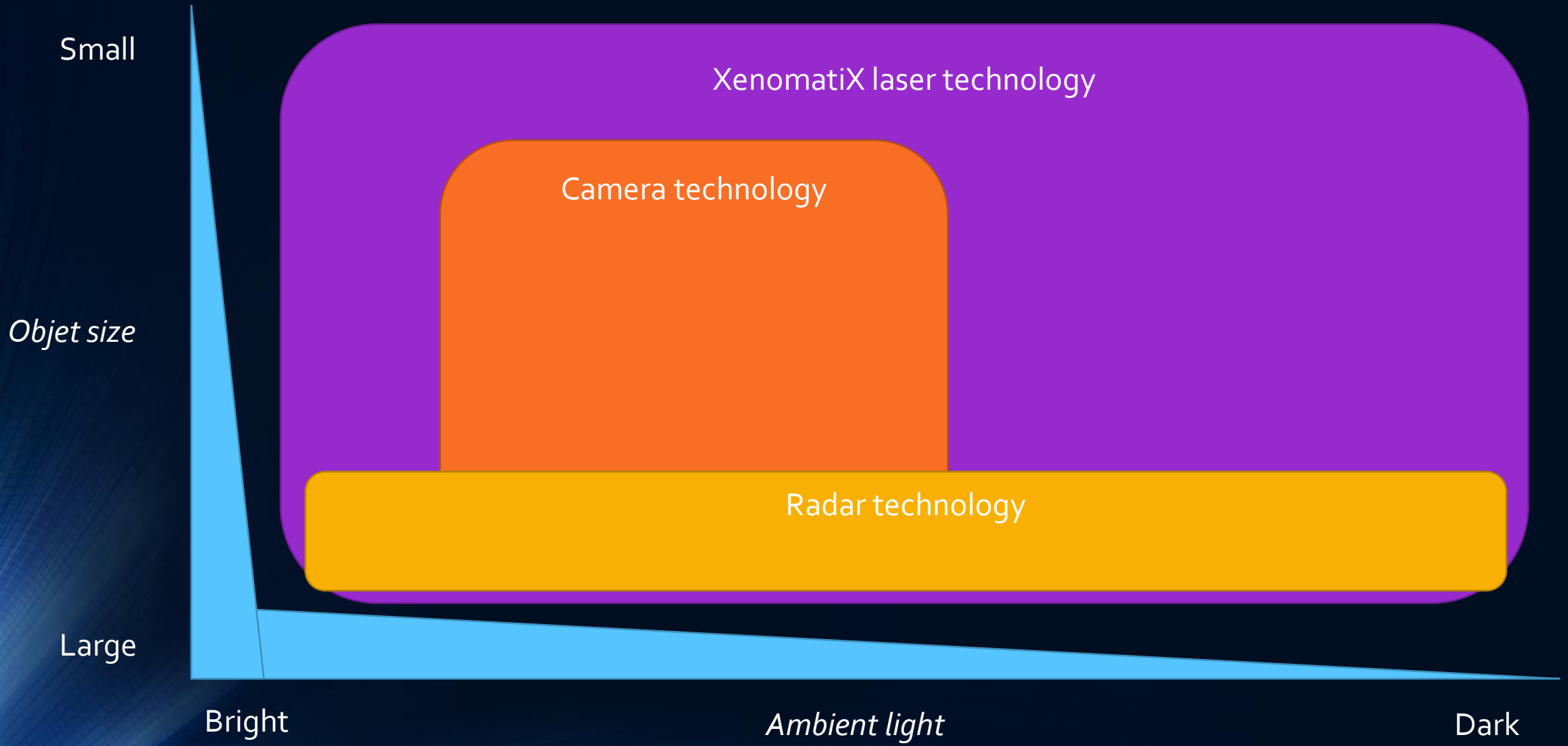
## *for ADAS and Autonomous Driving*

ir. Filip Geuens
CEO of XenomatiX

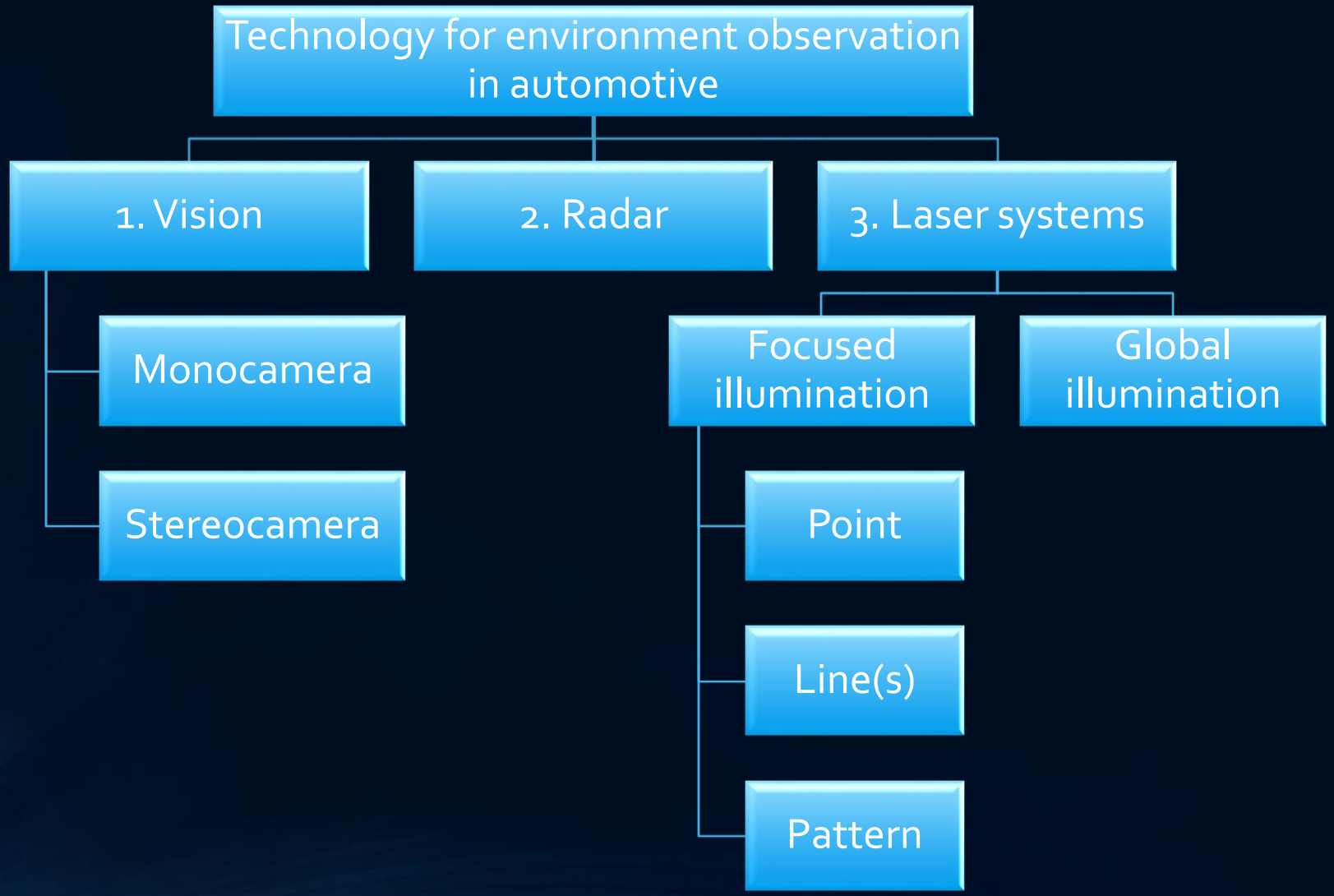
*Technical Workshop*

Athens, Greece
21-22 APRIL 2016

# Detection capabilities



# TECHNOLOGY OVERVIEW



# Working principle of XenoTrack

Solid-state, multi-beam laser projector

CMOS camera

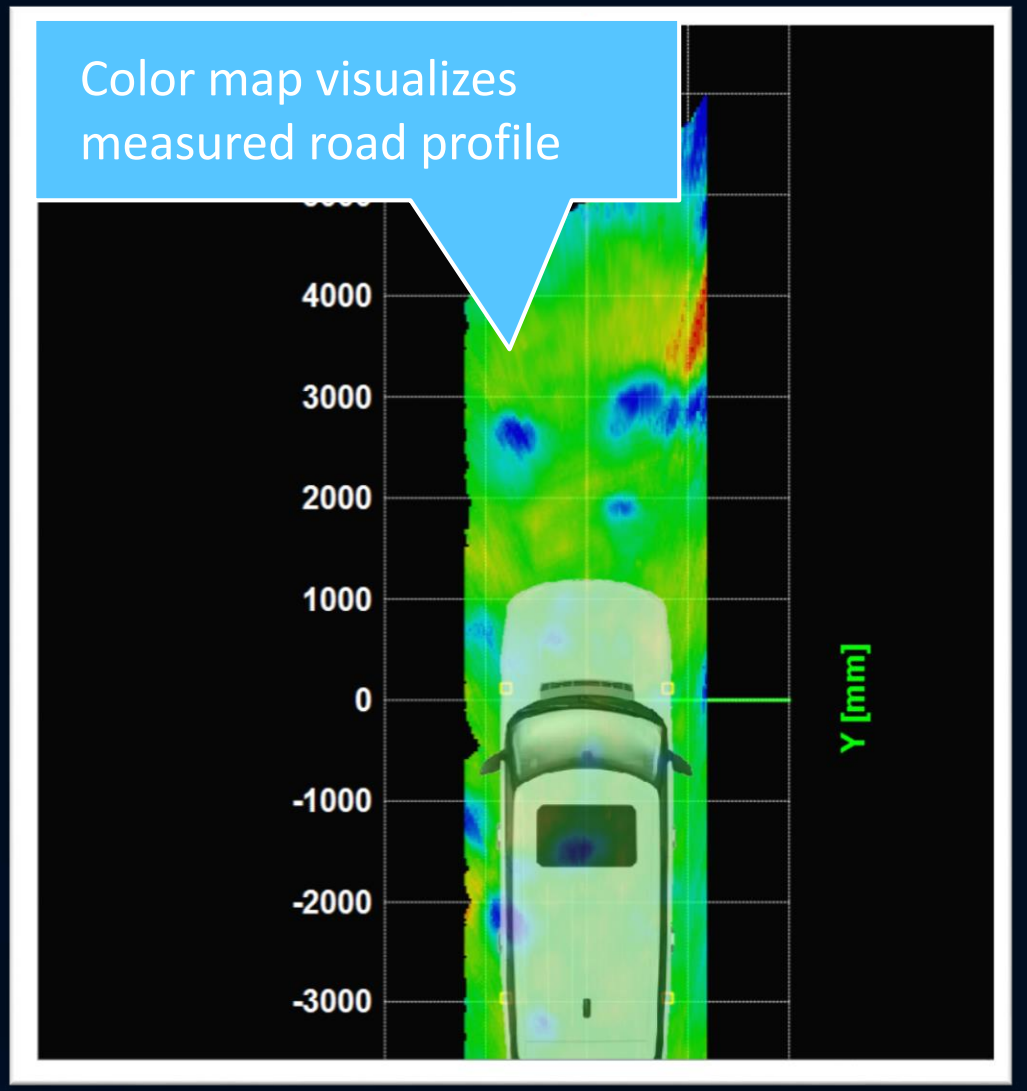
Lens & Filters

Image processing

- Calculation of 3D position of projected laser spots
- Up to 180.000 points per second

**Multiple Patents pending**

# Automotive surround sensing under all circumstances



# Automotive focus

**XenomatiX develops & commercializes optical sensing solutions to observe road & surroundings for automotive applications**

**Application I :**

## Predictive Suspension

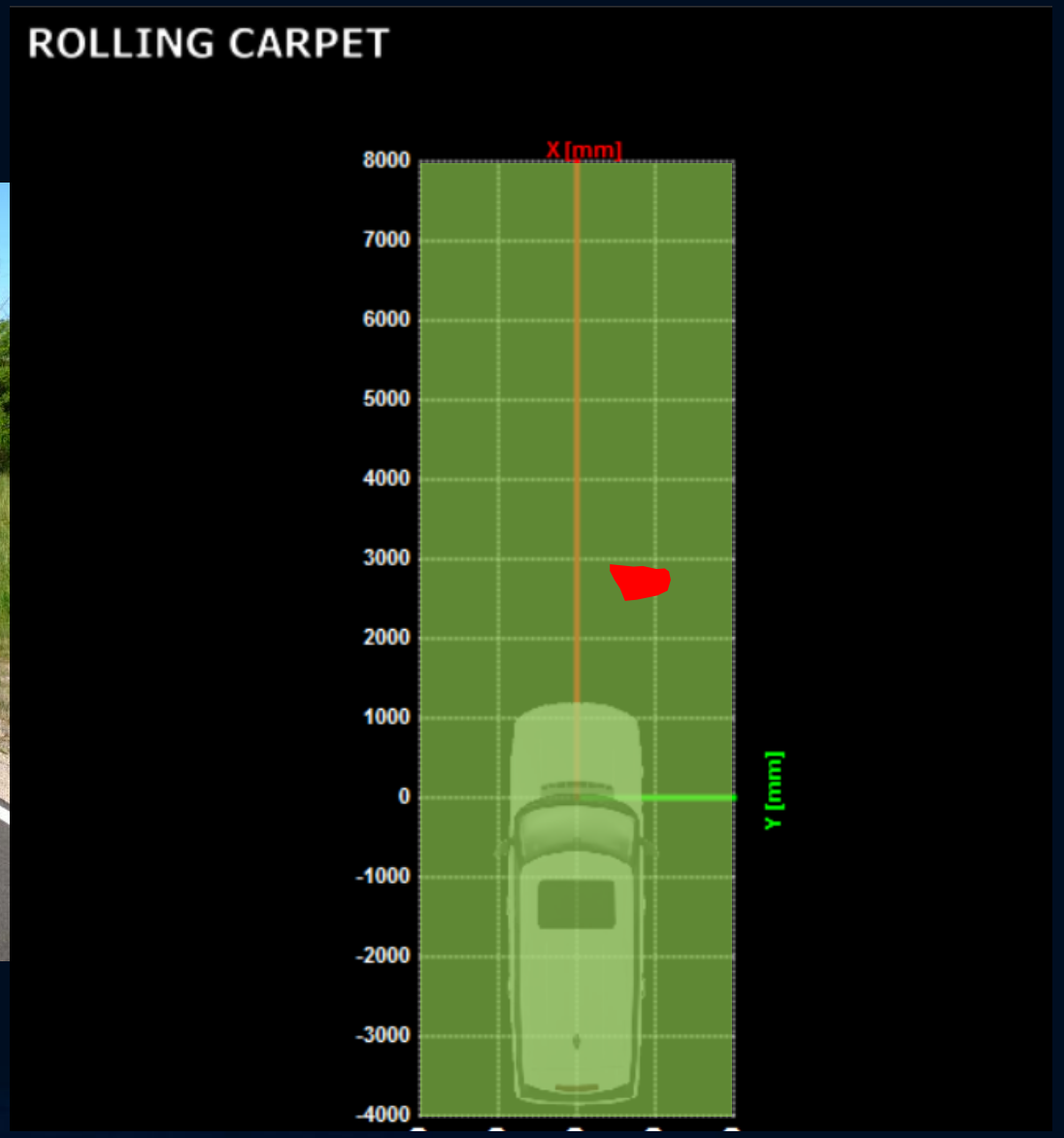
**Application II :**

## Advanced Driver Assistance

**Application III :**

## Autonomous Driving

# 1. (Dangerous) object detection



# 1. (Dangerous) object detection

*What is it:*

Localization of (small) potentially dangerous objects ahead of the vehicle

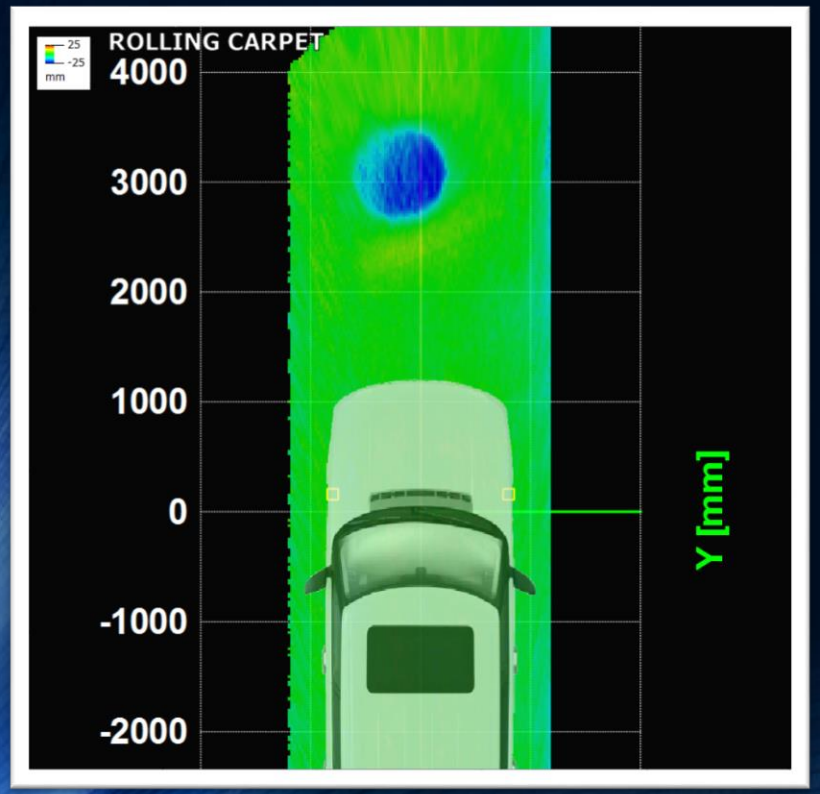
*Benefit*:

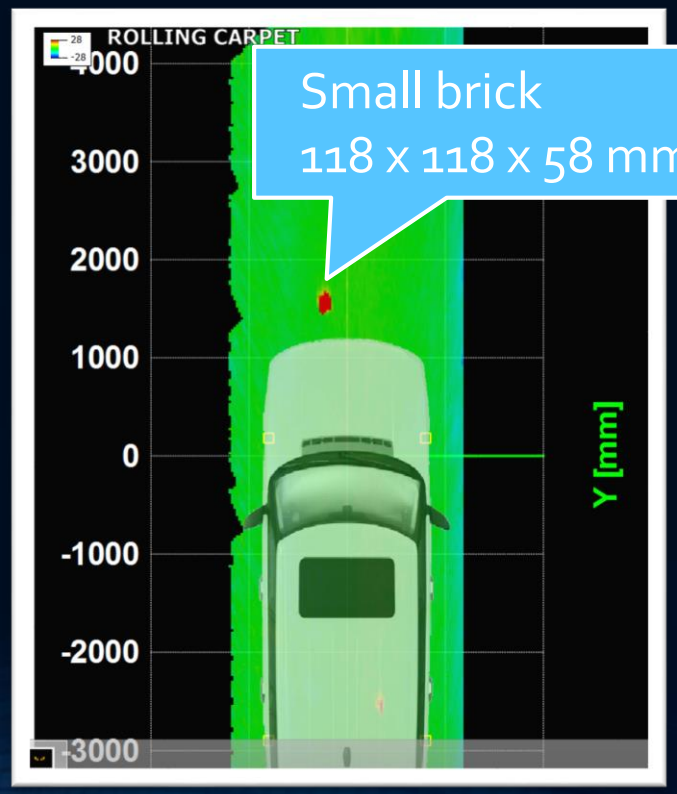
Driver alert and collision avoidance in case of objects on the road

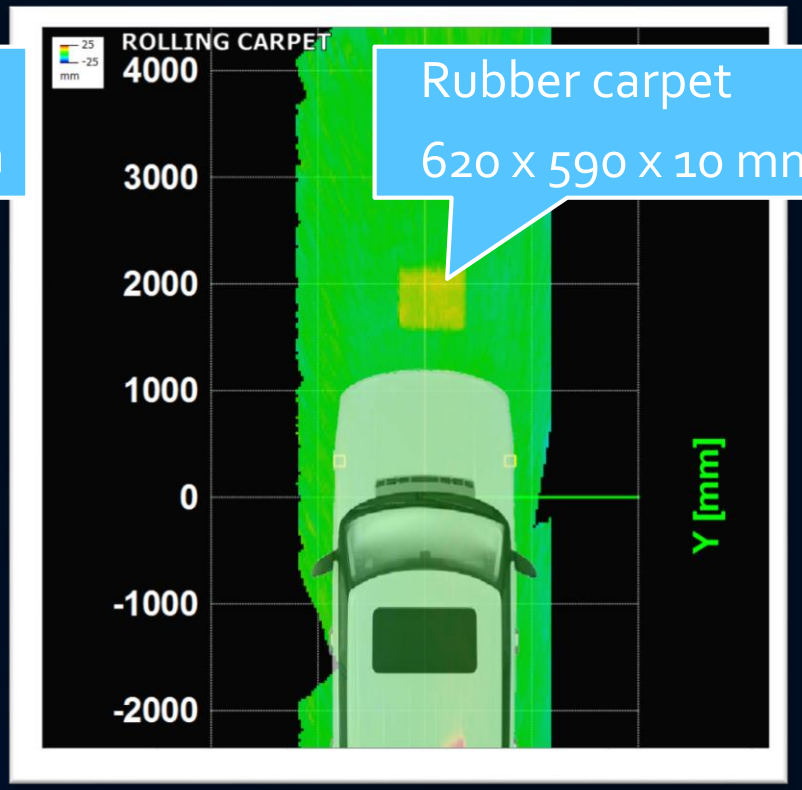
*Characteristics*:

- Risk assessment based on the exact size and position of the object
- Objects are detected under any light condition (in full sunshine and during the night)
- Detection based on size and shape, not just on contrast with the road
- Works at any driving speed

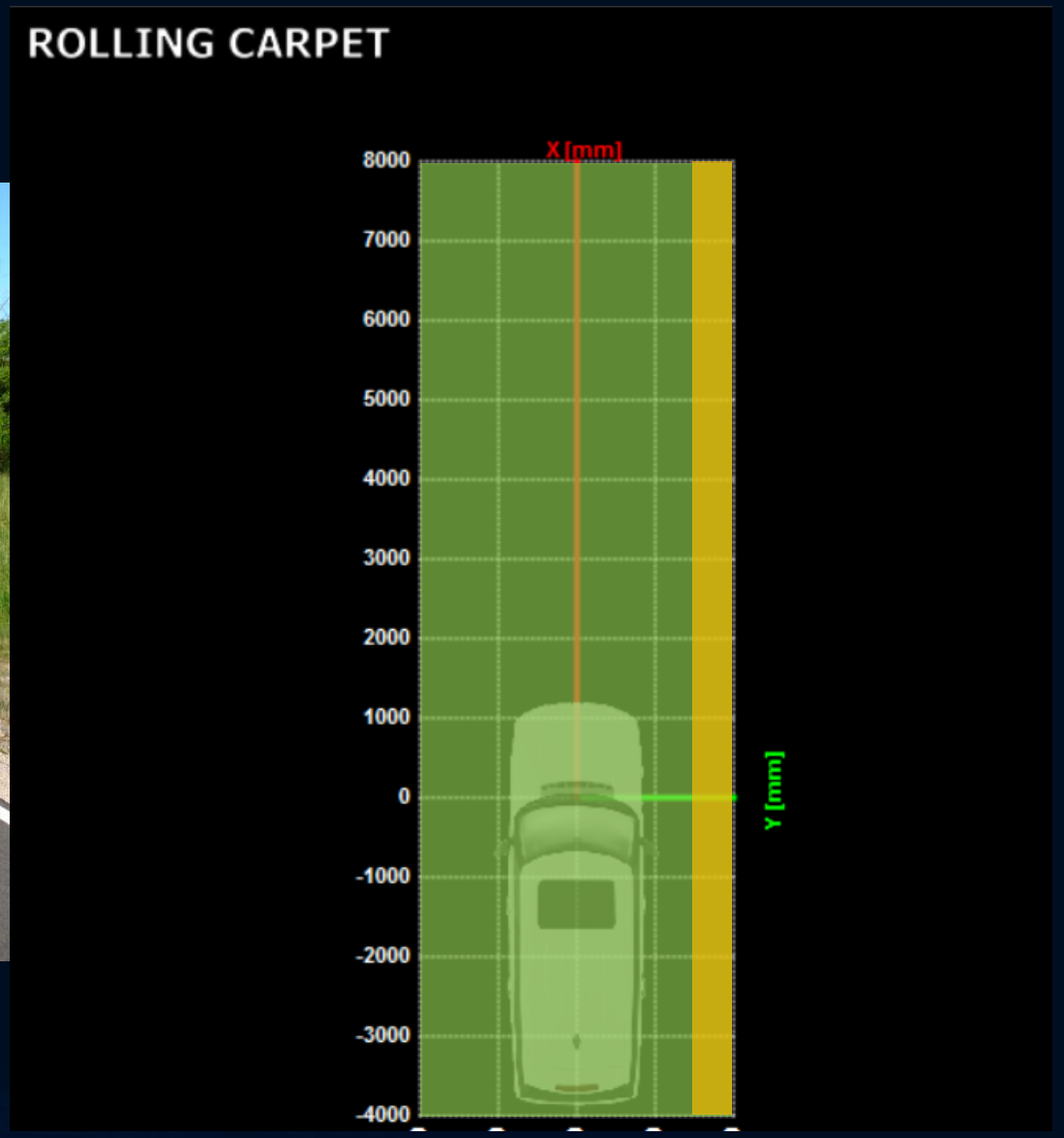
# 1. (Dangerous) object detection



# 2. Driveable area recognition



## 2. Driveable area recognition

*What is it:*

Indication on where the separation is between the normal road and non-driveable section alongside the road

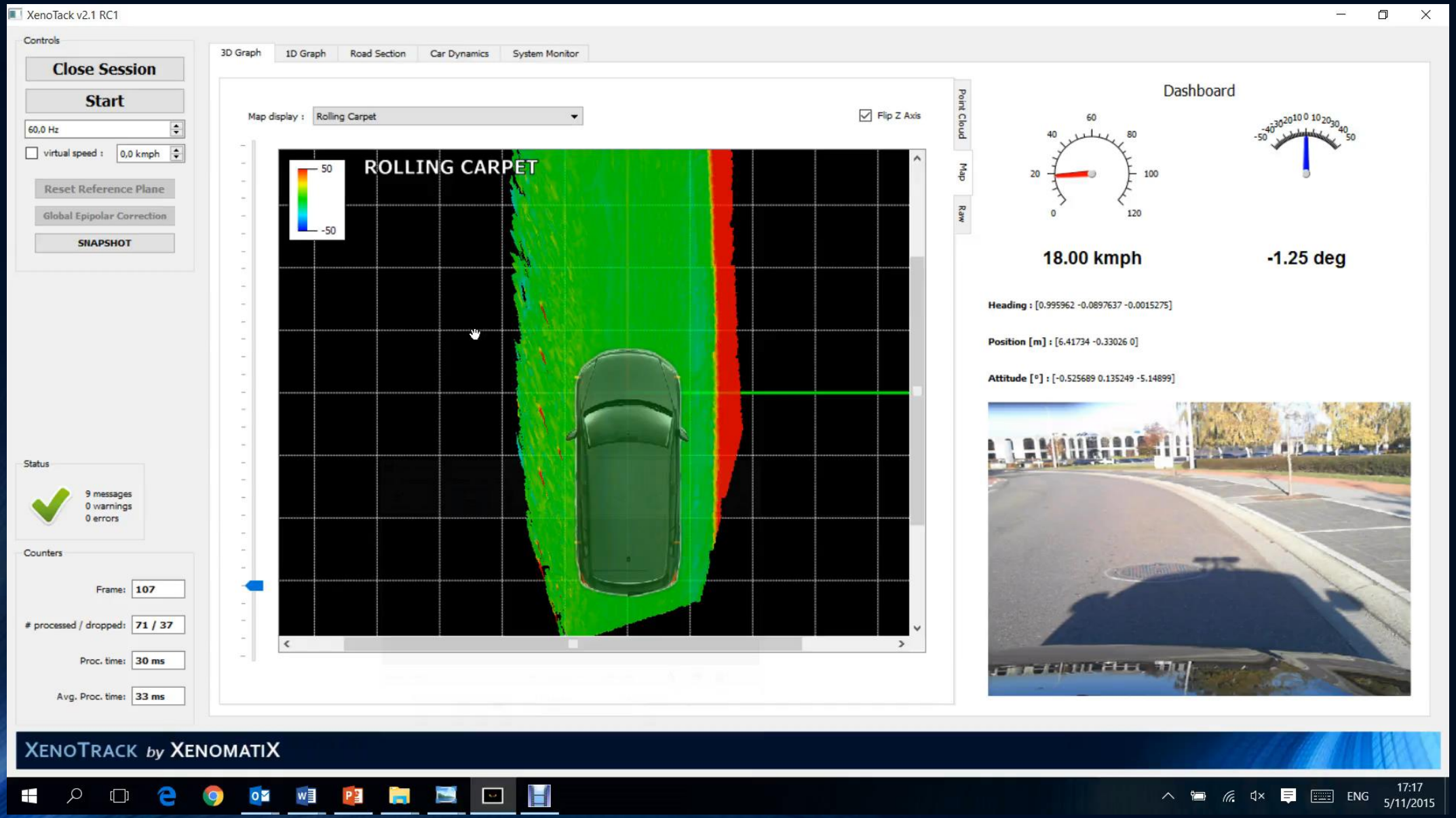
*Benefit*:

Keeps your car on the road
Prevents damage to the tires
Prevents collision with road-border objects

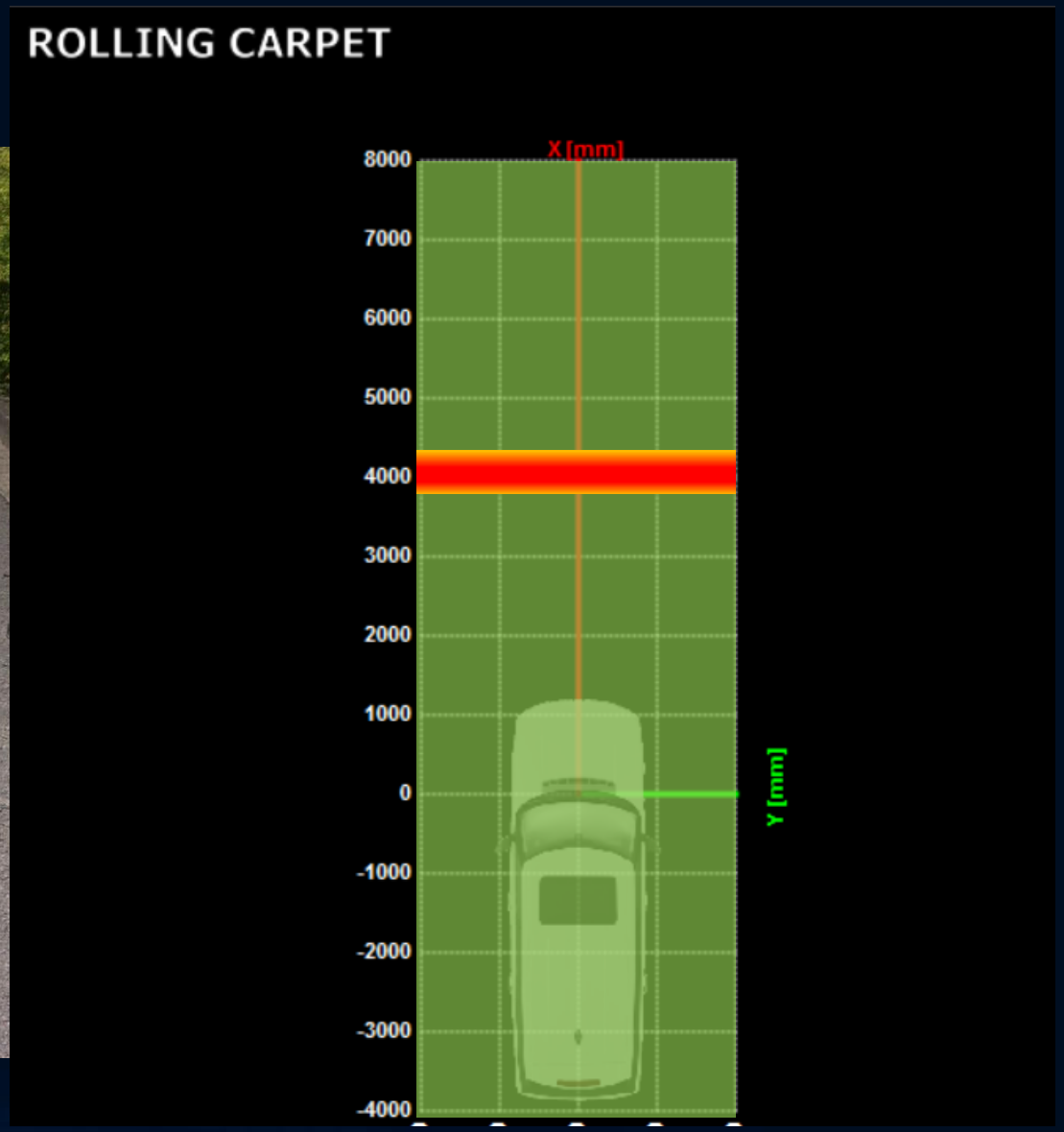
*Characteristics*:

- Precise localization of border between road and shoulder
- Precise height measurement of curbstones
- Based on geometry and structure of observed area ahead of the car

# 2. Driveable area recognition



# 3. Active Suspension



## 3. Active Suspension

*What is it:*

Measurement of the height profile of the road before it hits the wheels, to allow an active suspension keeping the car straight and stable.

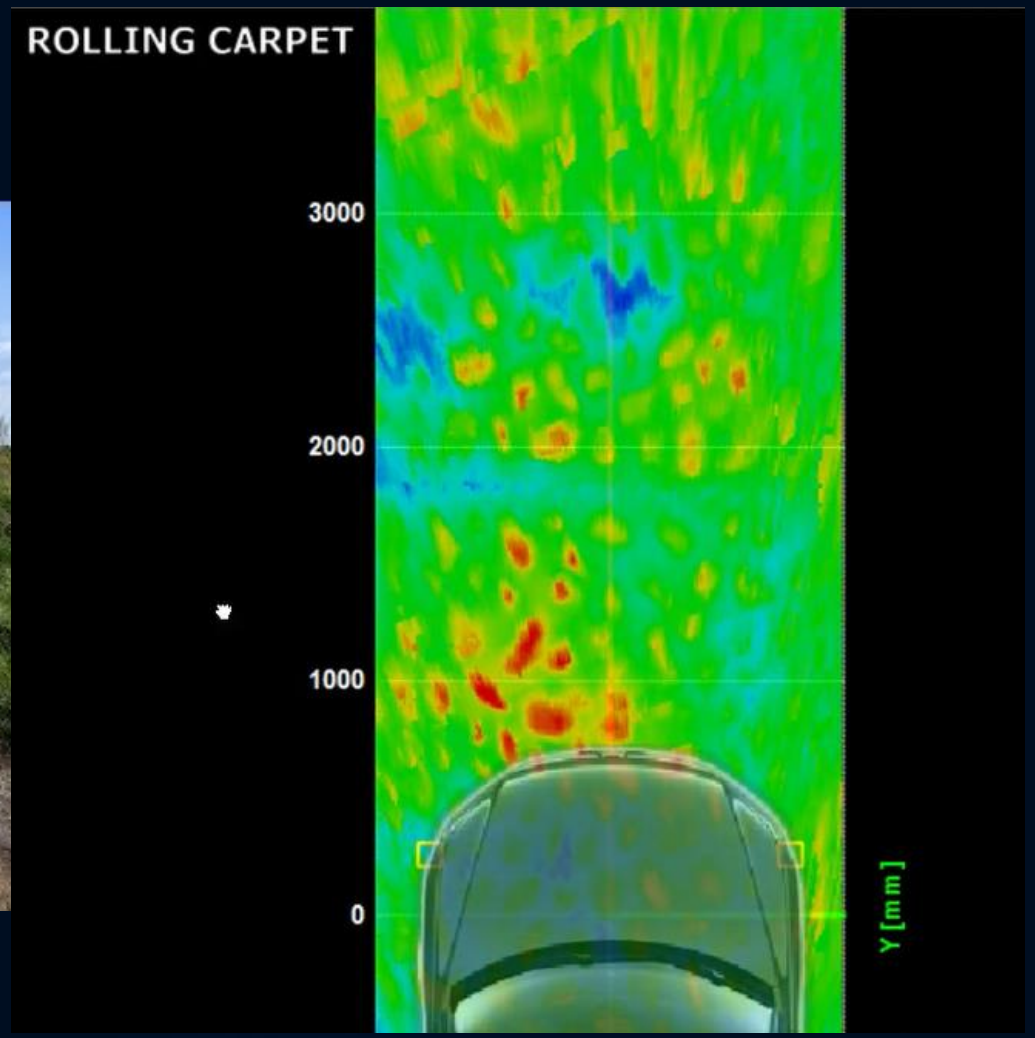
*Benefit*:

Reduced body motion and more passenger comfort

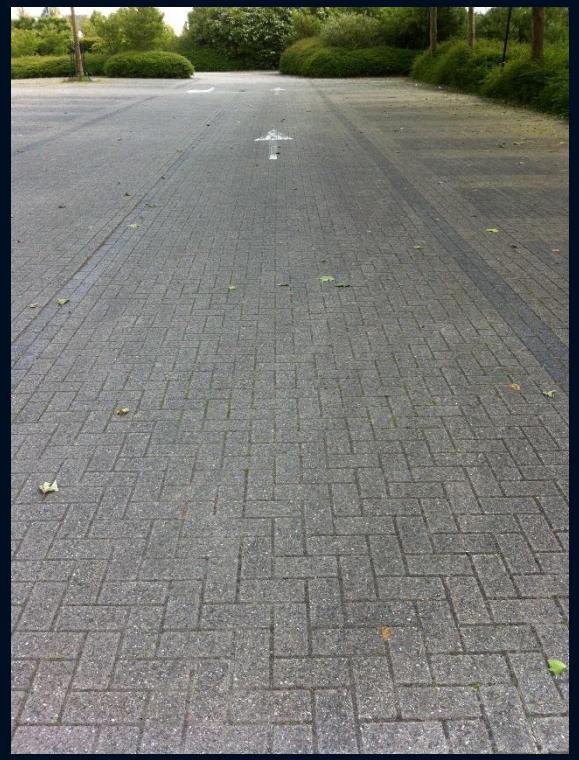
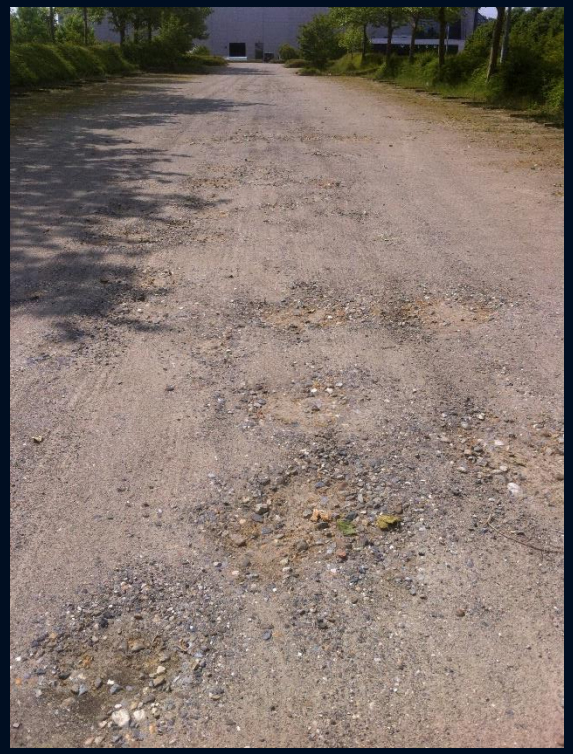
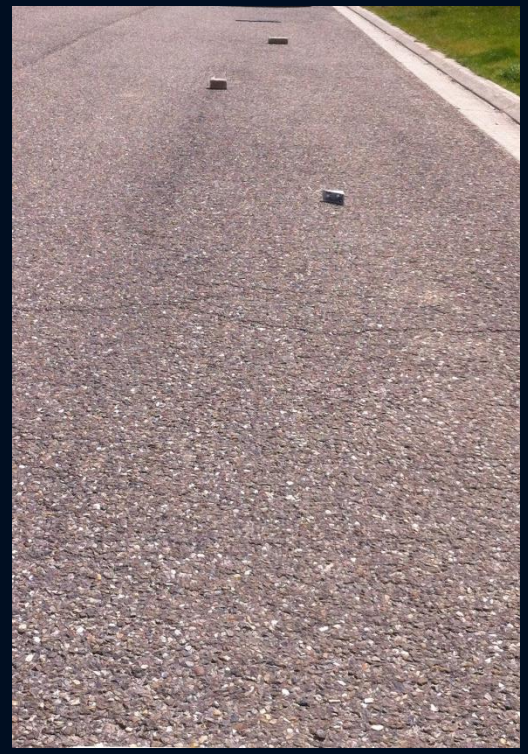
*Characteristics*:

- Real-time output of road profile at 540Hz for each of the 4 wheels
- Works on any road type
- High accuracy
- High resolution
- Automatic roll & pitch calculation
- Configurable feedforward delay

# 4. Road type identification



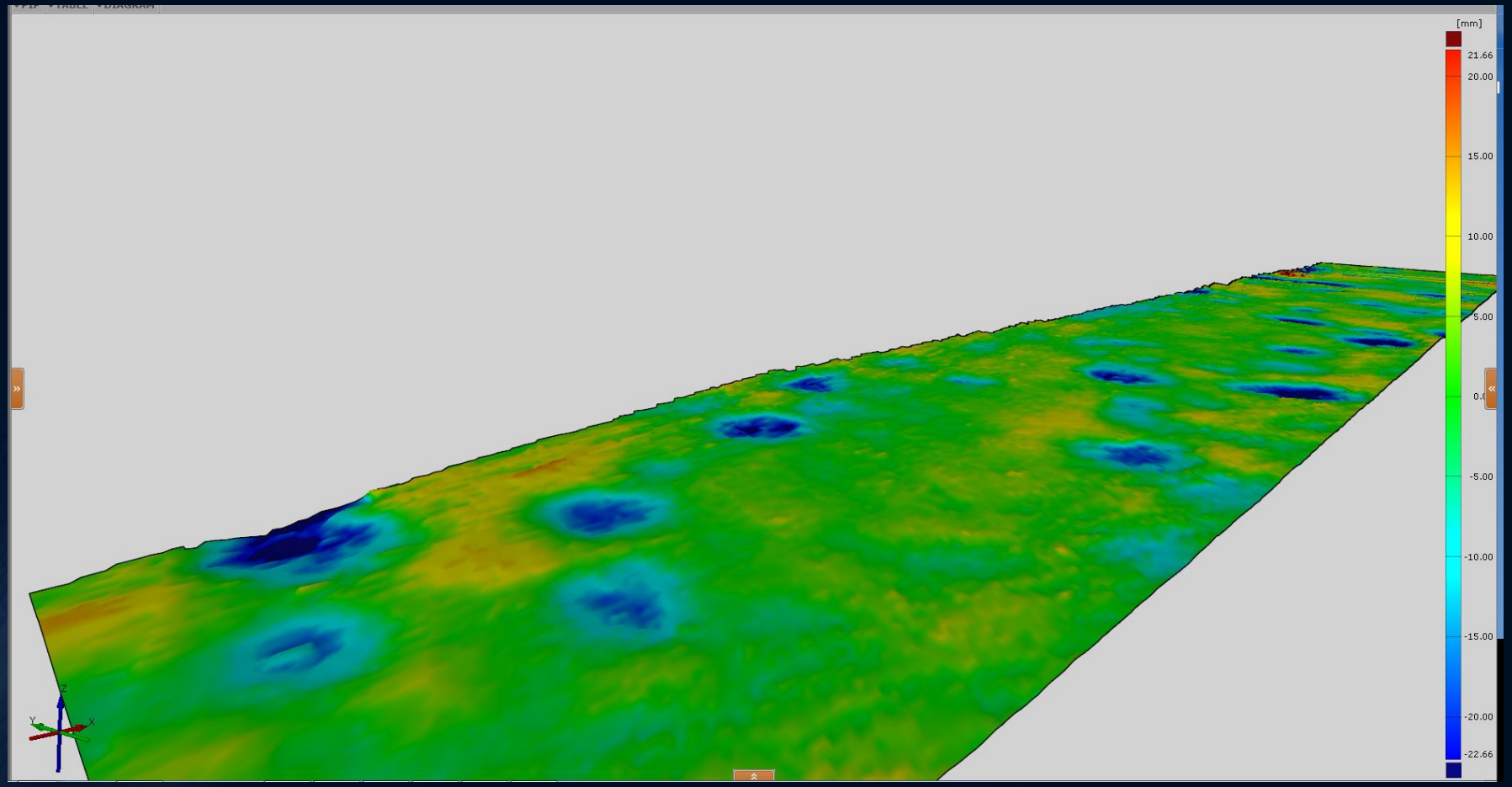
# ROAD TYPE IDENTIFICATION

Road type identification can be used for driver warnings, suspension control, …

# 5. Off-road trajectory guidance

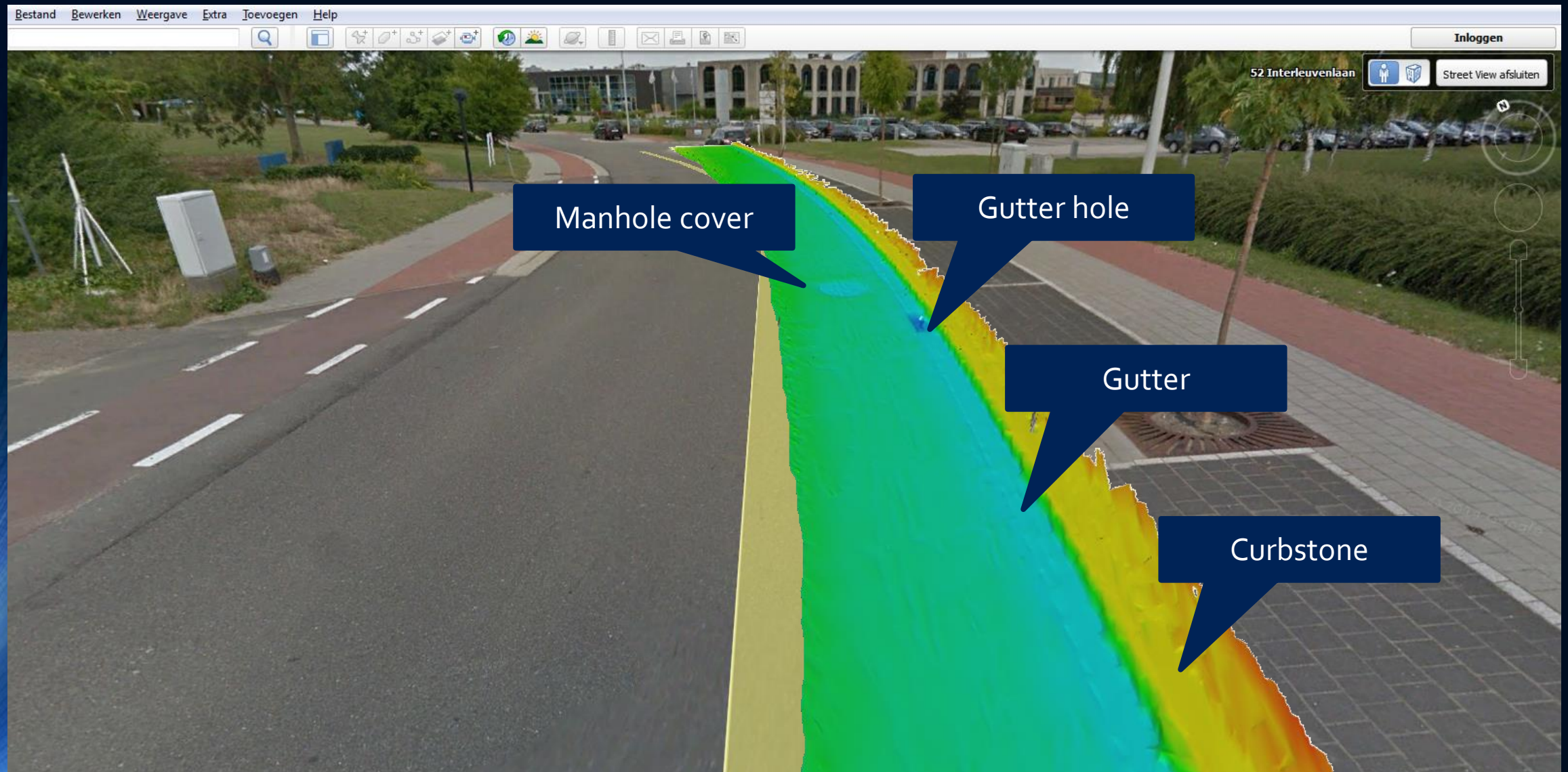
# 6. Track Digitization




*STL export of high resolution 3D map of dirt road measured with XenoTrack RT3000*

# 7. Detailed maps with road characteristics

*XenoTrack data can be used to identify road features and to add these to maps*



# UNIQUE CHARACTERISTICS

| | |
|---|---|
| SPEED | • Pattern recognition is much faster than interpretation of visual (stereovision) images |
| SUNLIGHT | • Use of very narrow band pass filters eliminates influence of ambient light |
| NIGHTVISION | • Camera only looks at IR light of laser point pattern. No need for ambient light |
| DURABILITY | • System consists of solid state elements only |

# UNIQUE CHARACTERISTICS

| | |
|---|---|
| ROBUSTNESS | • Self-alignment (between camera and projector) makes the system insensitive to (small) deformations of the car body |
| WET ROADS | • Road profile can also be seen in wet conditions (Laser beam hits bottom of a puddle of water) |
| RESOLUTION | • Reliable object detections and recognition thanks to high density of measurement points |
| EXTENDABILITY | • New applications are still arising from different image processing of XenomatiX system |

# TECHNOLOGY ROOTS

Company founders have strong background and track record in precision metrology

Based on Excellence in vision technology of Flemish Universities and spin-off companies

Technology validation by reference customers

Co-funded by
the European Union

Adapt:/Ve

Automated Driving Applications and
Technologies for Intelligent Vehicles

*Thank you.*

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*Technical Workshop*

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