

XenomatiX
True solid state lidar



Impact of contamination on integrated LiDAR

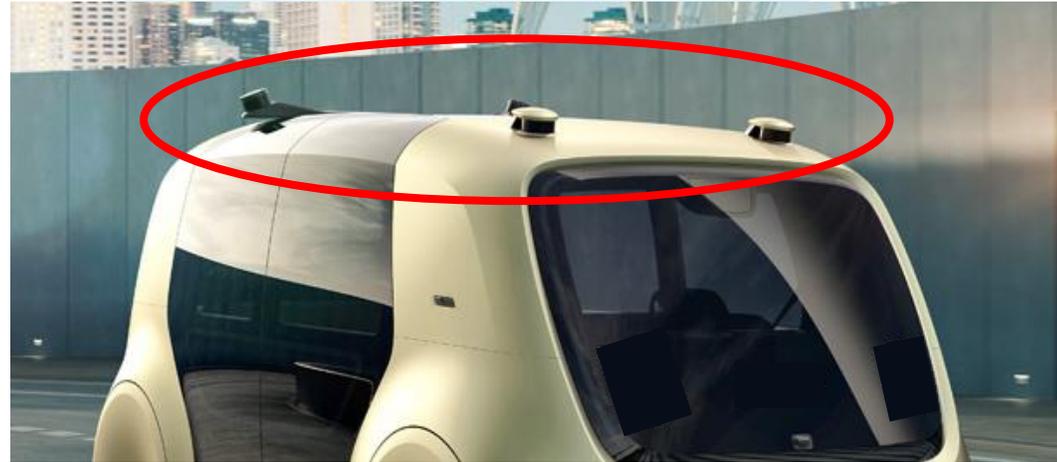
ir. Filip Geuens
CEO of XenomatiX



Current and future integration of LiDARs in the press



Source: www.autoevolution.com April 2019



Source: www.sabergastar.tv March 2017

The reason of this conference is to make sure Lidar technology gets properly integrated. This requires the selection of a Lidar solution that can deal with all aspects of integration.

Challenges related to Lidar integration

x Environmental factors

- Dirt
- Fog, frost
- Rain droplets
- Damage (gravel impact / scratches...)
- Vibration
- Temperature
- External light source (sun, headlight,...)

x Cover design & maintenance

- Transparency
- Curvature
- Tilt
- Distortion
- Emitter/Receiver – cover distance
- Heating wires (passive, active)
- Haze (ageing)
- Cover replacement

Windshield mounted XenoLidar

- ✘ High point of view
- ✘ Well protected
- ✘ Use existing cleaning & defrosting installation
- ✘ Excellent esthetics



XenoLidar Highway for Highway Pilot



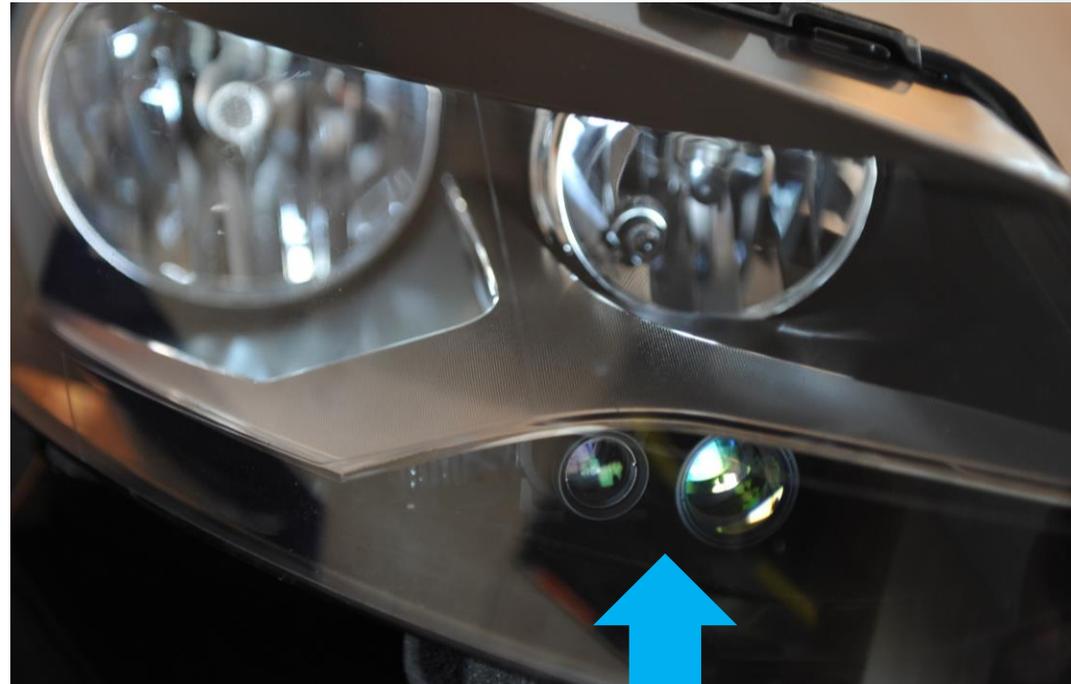
Bumper integrated XenoLidar



Partial blockage of XenoLidar does NOT result in blind zones in the FOV.

Headlight integrated solid state Lidar

- ✘ Same DNA
- ✘ Joint components
- ✘ No obstructed areas in front of the car
- ✘ Use existing cleaning & defrosting installation
- ✘ Excellent esthetics



What makes Lidar integration difficult

LiDAR technology designed for integration in mass production cars should have following characteristics:

- ✘ No moving beams, so diffraction in covers does not vary with incident angle
- ✘ Ability to detect contamination
- ✘ Compact
- ✘ Configurable
- ✘ Thermal robustness



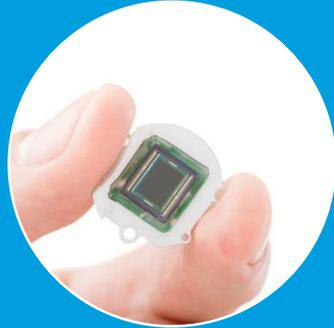
Our unique solution

True solid state lidar



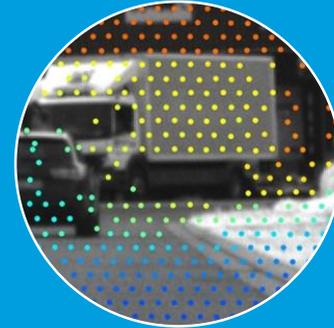
MULTI BEAM

- High resolution
- High data rate
- Outlier check



CHIP-BASED*

- Scalable
- Compact
- Mature technology



3D + 2D

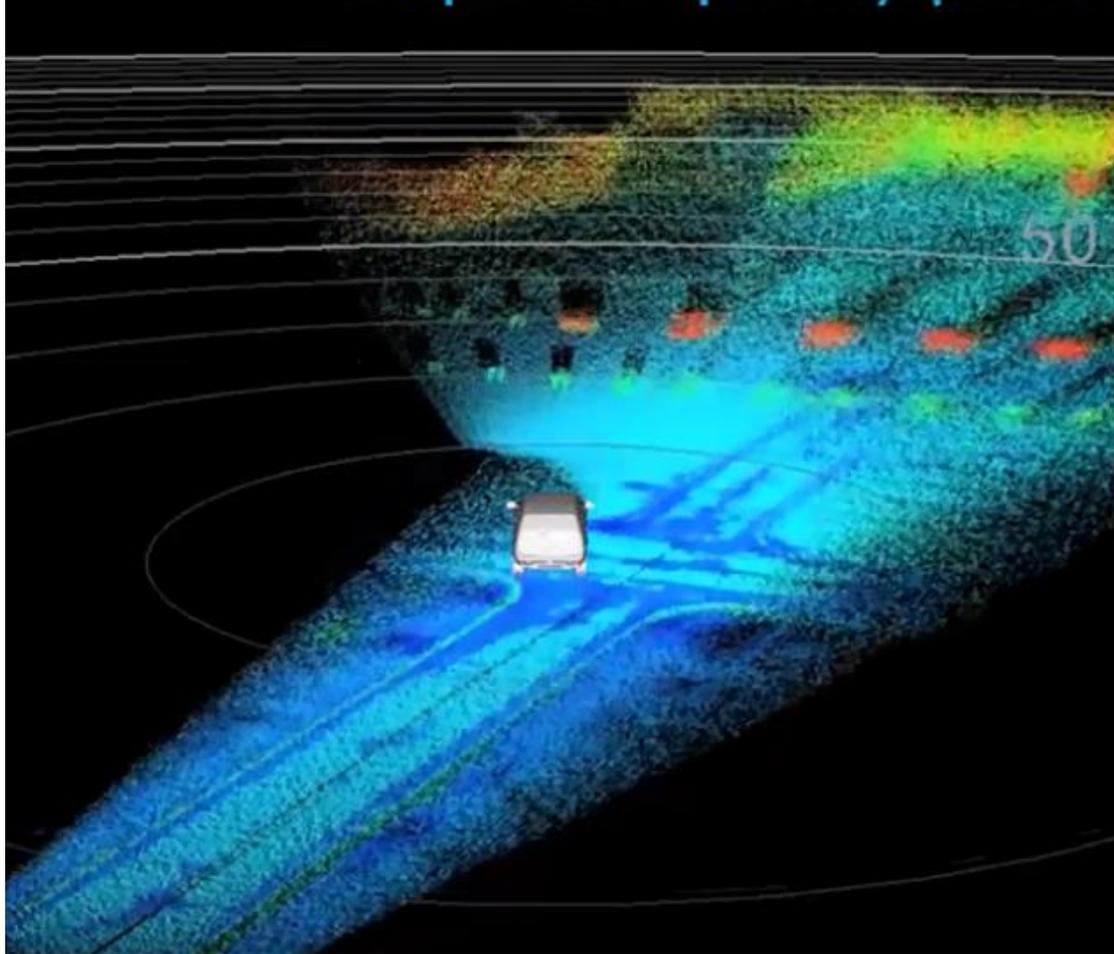
- Camera + lidar
- No parallax error
- Inherent sensor fusion



* Both projector and detector are semiconductor components

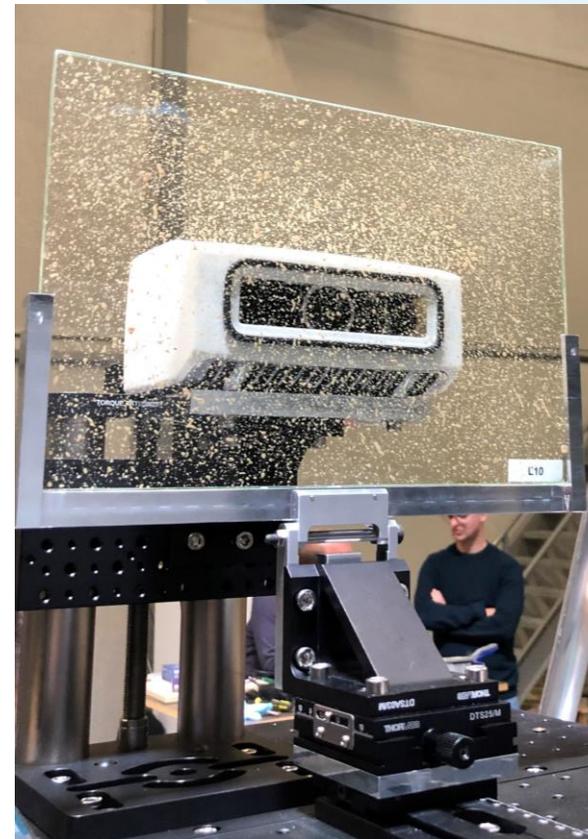
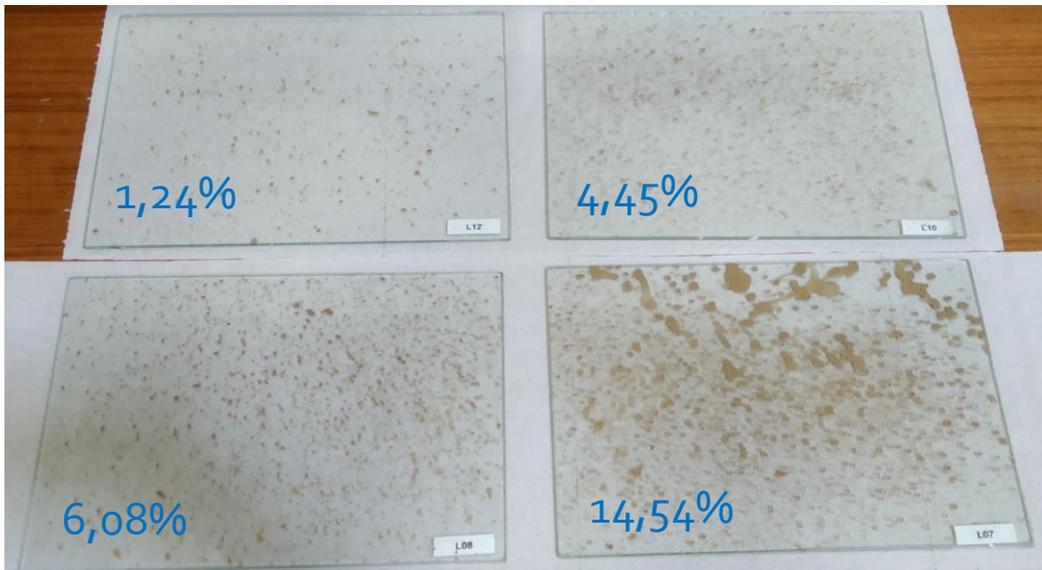
Raw data output from XenoLidar

Superior quality point cloud from XenoLidar

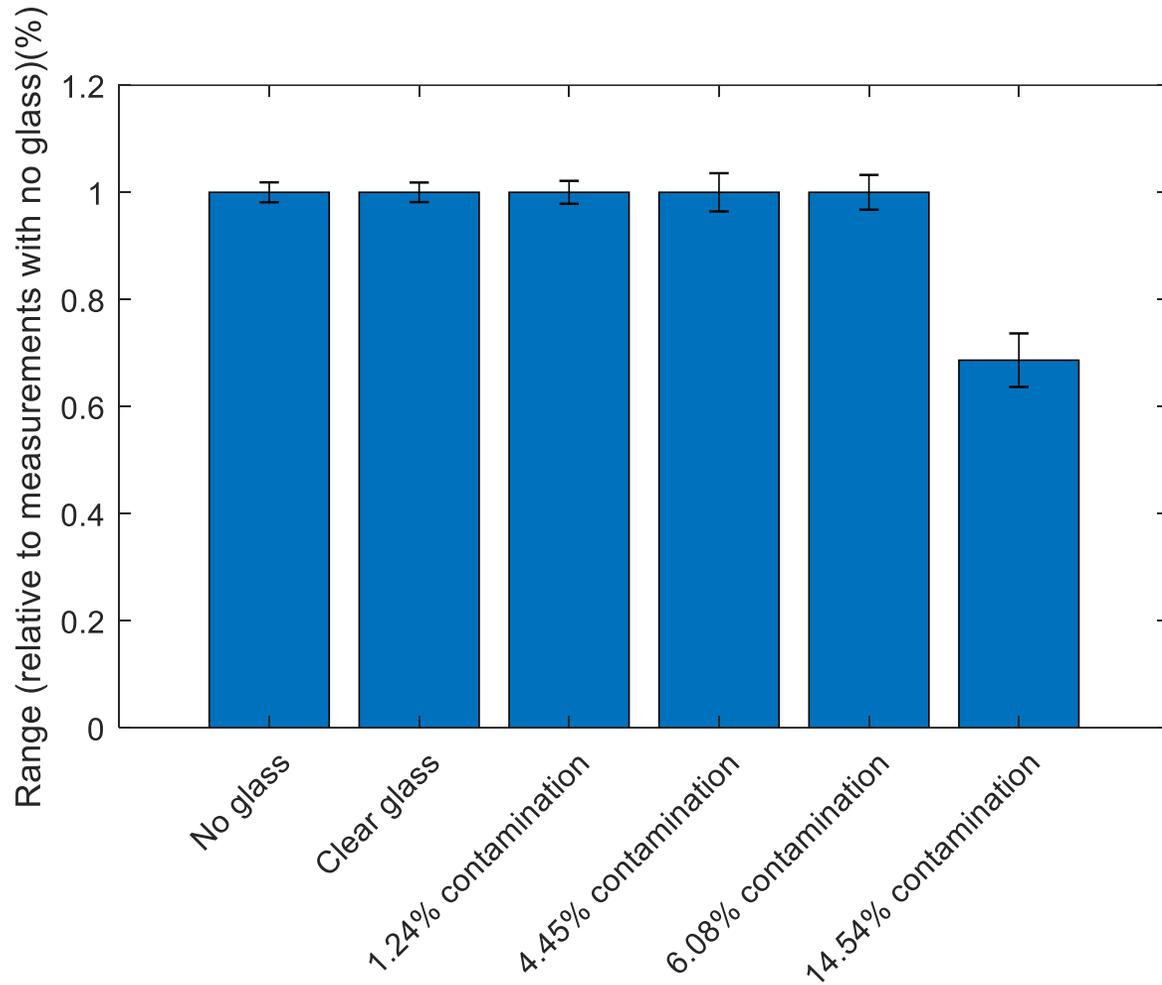


Analysis of influence of contamination

Experimental validation of contamination robustness and contamination detection.
Covers with different types and different levels of contamination are placed in front of XenoLidar with different angles



Impact of contamination on measurement range



- X The measurement range of XenoLidar was not affected by low and medium level contamination.
- X Contamination does not create blind zones.
- X XenoLidar can determine need to activate cleaning system in case of too much contamination

Gravel impact on glass vs polycarbonate

x Glass cover:



Gravel test - low



Gravel test - medium

- x Glass is more sensitive to gravel impact.
- x Lower position in the car requires glass types with suitable gravel impact performance.

x Polycarbonate cover:



Gravel test - low



Gravel test - medium

Haze (ageing)

Object behind covers with increasing haze level



Transparent cover



Haze 1.7%

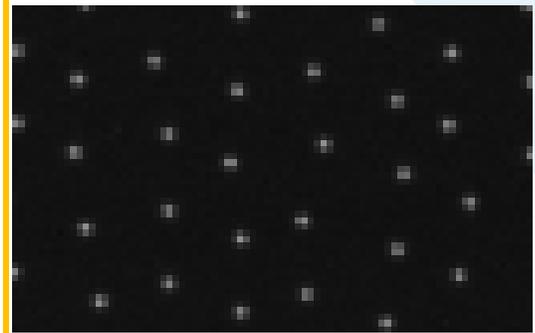
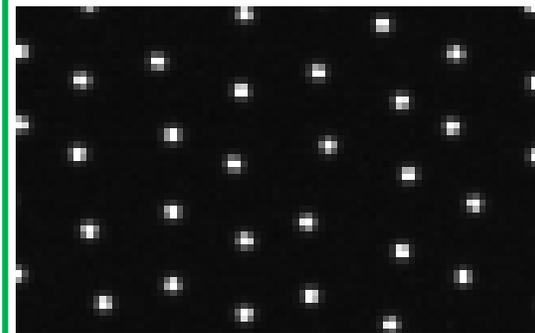
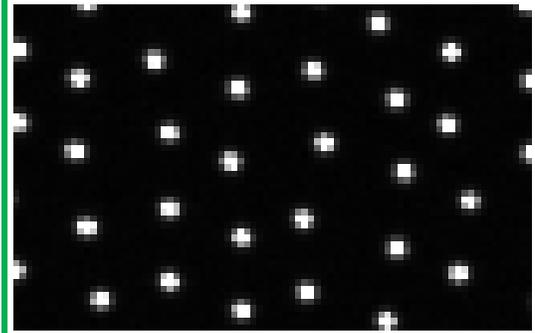


Haze 3.6%

Automotive standard limit

2%

Laser spots with increasing haze level



Laser spots are still correctly detected even with increasing haze

Haze level can be detected based on increasing background level signal



What you should remember from this presentation

- ✘ You should not buy a car with sensors sticking out
- ✘ Multibeam solid-state XenoLidar is designed for integration in cars
- ✘ Lidar has to be able to understand severity of contamination to trigger cleaning

Auto Drive

fail-aware, fail-safe, and fail-operational electronics for **highly and fully automated driving** to make future mobility safer, more efficient, affordable, and end-user acceptable through a synergistic European R&D approach

Funding

From ECSEL JU, Horizon2020 and National Authorities for strategic European semiconductor R&D



AGENTSCHAP
INNOVEREN &
ONDERNEMEN

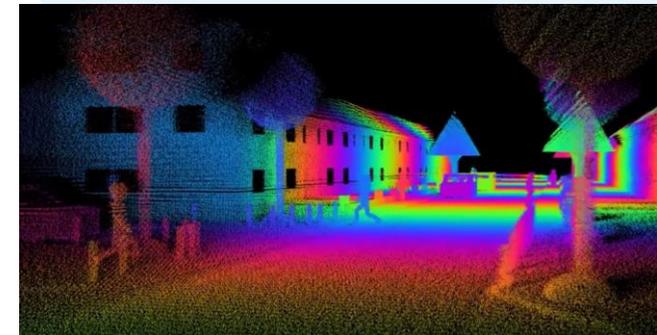
Consortium

Formed by European automotive & semiconductor companies covering the full supply chain

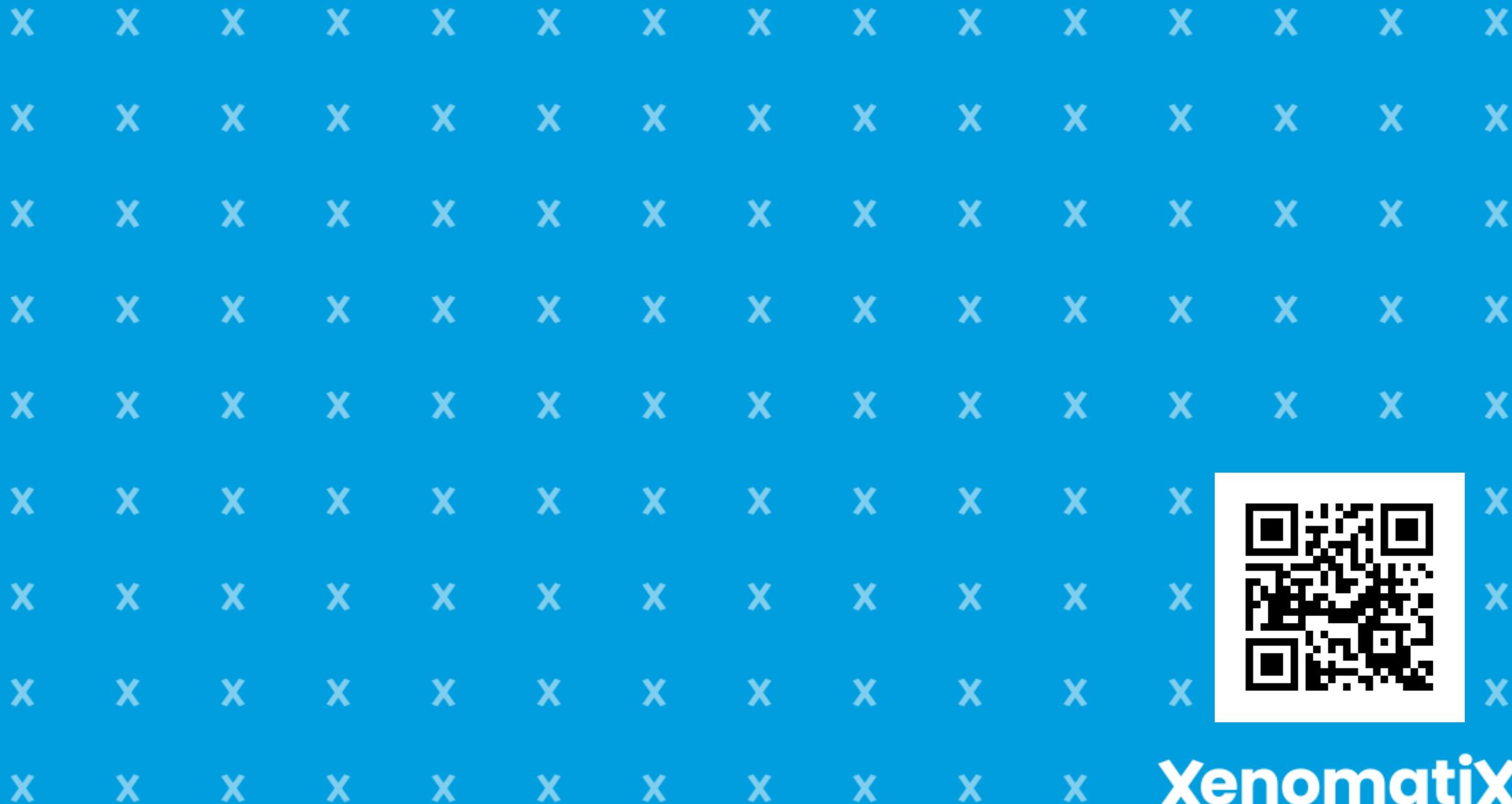


XenomatiX

Contributes to the 3Fs with XenoLidar its solid state lidar enhancing the perception layer



XenomatiX
True solid state lidar



XenomatiX