Optical Sensors - LiDAR

elmos

EXPERTS FOR AUTOMOTIVE ICs

We have a broad expertise in analog mixed-signal integrated circuit design.

We deeply understand our customers application needs to create real system innovation.

We are a global player for automotive ASSPs and ASICs. We offer worldwide sales and application support.

CORPORATE KEY FACTS

~7 Elmos ICs

on average in every new car

6 product segments

Motor Control, Lighting, Safety/Power/Custom ICs, Ranging, Optical, Sensor ICs

15 locations worldwide

incl. 6 R&D centers, HQ located in Dortmund, Germany

~40 years of experience

in analog mixed signal IC solutions

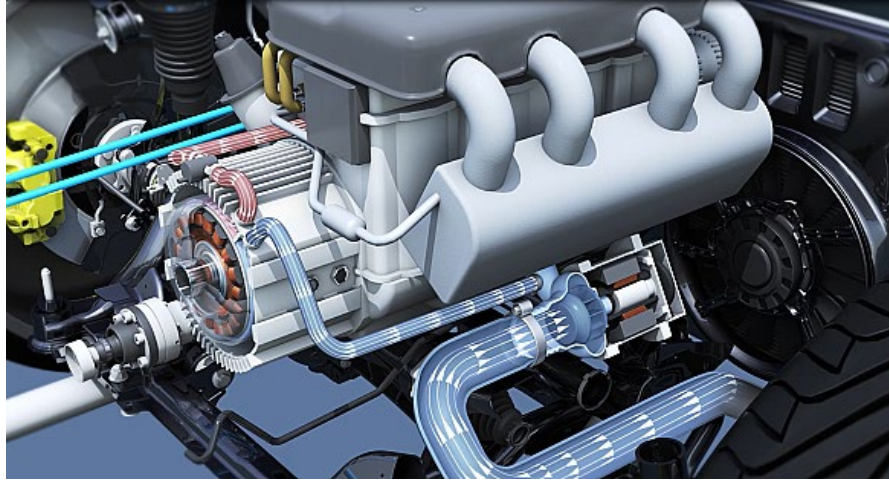
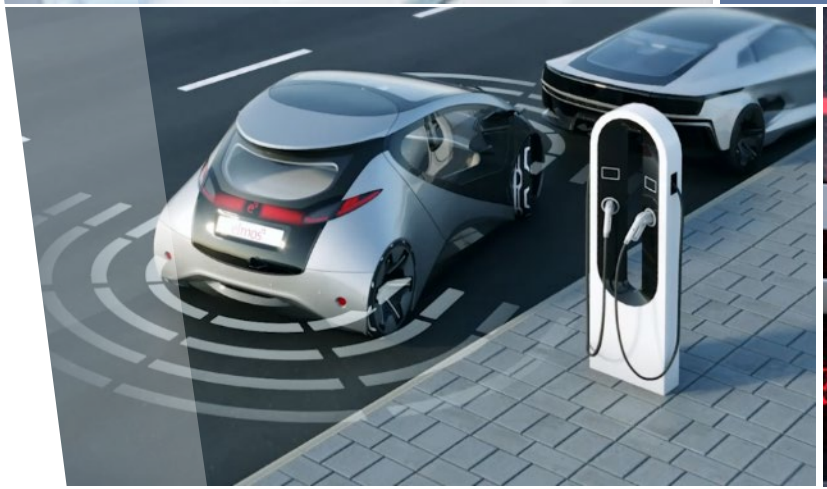
1,200 employees

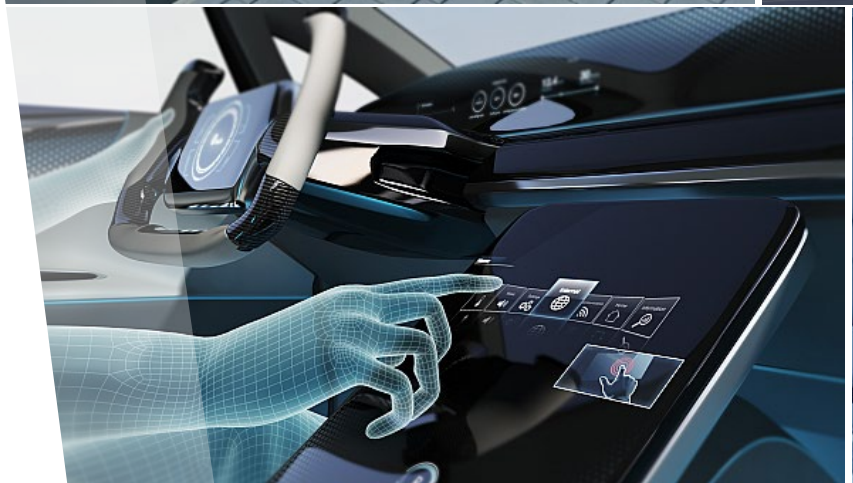
thereof 350+ product developers & engineers

WE ARE LOCATED ALL OVER THE WORLD

PRODUCT SEGMENTS

- RANGING
- OPTICAL
- SENSOR ICs
- MOTOR CONTROL
- LIGHTING
- SAFETY, POWER & CUSTOM ICs




PRODUCT SEGMENT » OPTICAL

TRANSFORMING USER EXPERIENCE

- Intuitive and robust: Pioneering in automotive gesture control with >50 million ICs in the field
  - Proximity and swipes
  - Object detection
  - Touchless door / trunk access
- Reliable and eco-friendly
  - Presence and motion detection
  - Rain and light sensing
  - Smoke detection
- Development of LiDAR key components
  - Highly efficient iToF and dToF imagers
  - LiDAR read-out ICs
  - Best in class laser diode driver

OPTICAL PRODUCT SEGMENTS

HALIOS® IC

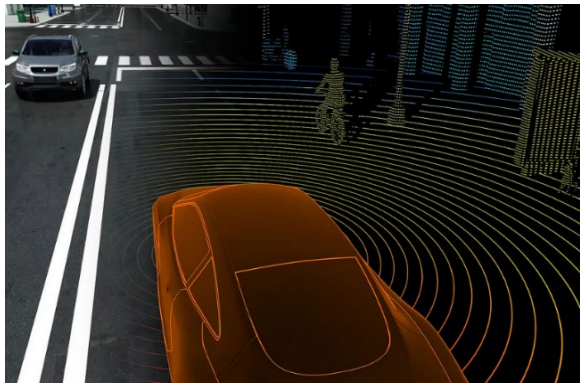
PROXIMITY & BLOCKAGE

- Rain/Dirt Sensing
- Obstacle Detection
- Touchless Control

ToF 3D IMAGER

LIDAR & OBJECT SENSING

- Touchless Gesture Control
- Short Range Lidar Ext.
- Trunk Opener



LASER DRIVER

LIDAR & OBJECT SENSING

- Lidar Systems
- EEL & VCSEL (arrays)
- Pulsed Applications

THERMAL IR IC

MOTION/ PRESENCE/ TEMP

- Smart Home
- Energy Saving
- Security

ELMOS LIDAR FOCUS

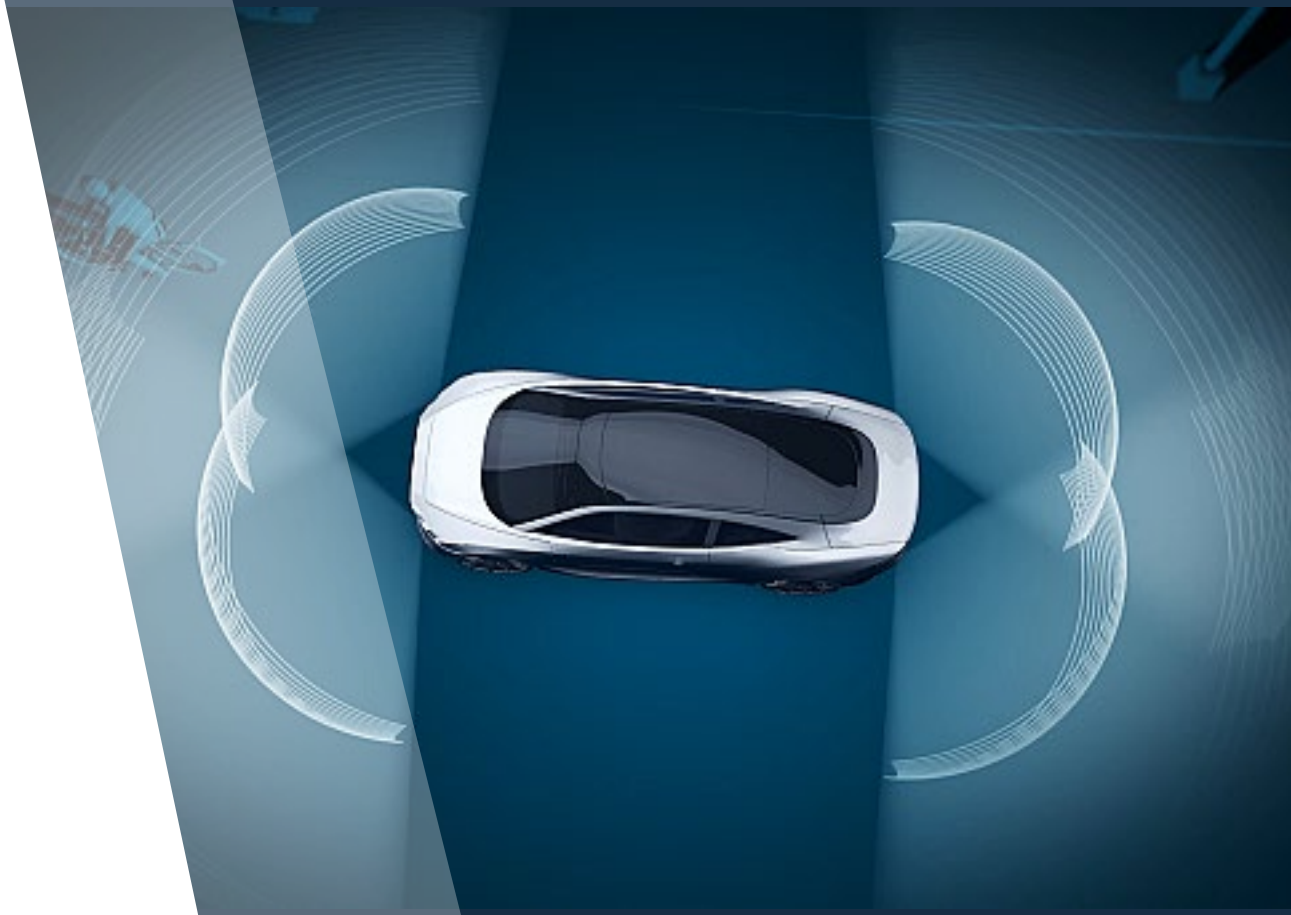
Key components for short range LiDAR (<50m)

Elmos Concept

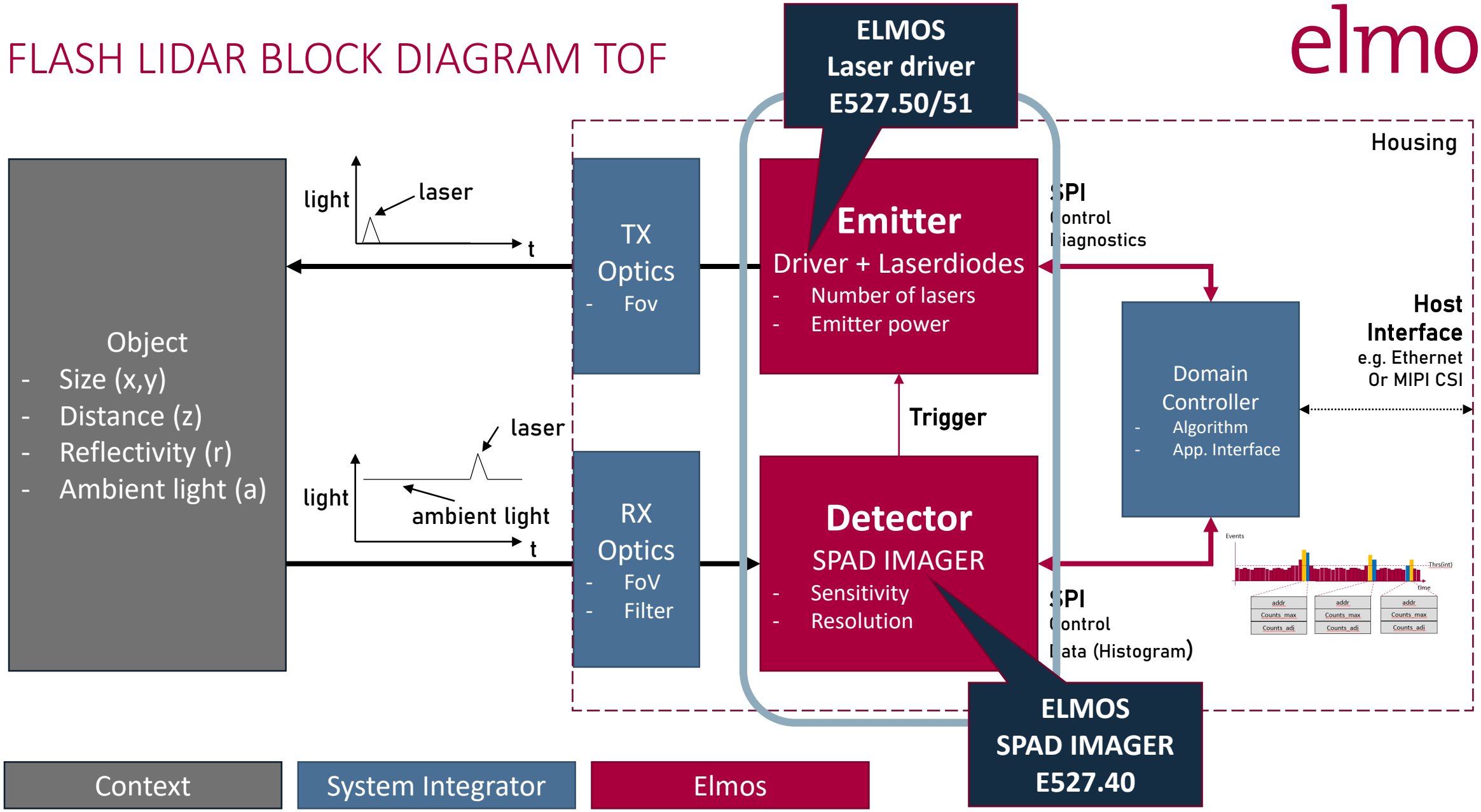
- **Solid state** solution
- **Small sized** and **cost efficient** solution
- **Flexible configuration** for every performance target
- **Low power consumption**

Use Cases

- City pilot, Low Speed Maneuvering
- Collision avoidance
- Automated Valet parking
- Obstacle Detection



FLASH LIDAR BLOCK DIAGRAM TOF



ELMOS FULL FLASH LIDAR DEMONSTRATOR

Lidar demonstrator system features

- Distance resolution of **1cm**
- **60 x 30°** Field of View (scalable with multiple sensor heads)
- 0.25° x 0.4° angular resolution
- Flash Illumination: **3W/ line** (receiver) with multi channel VCSEL

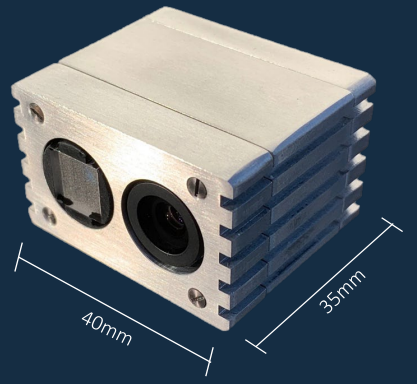
Elmos SPAD Imager Test IC

- **256 x 80** spatial resolution
- Solid State **rolling shutter** architecture
- Ambient light robust with **on-chip histogram**

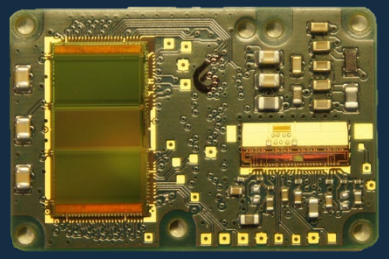
Elmos 4chn Laser Driver for VCSEL and EEL

- **1ns/50A** pulses for best distance resolution and efficiency
- Power-Driver, Gate-Driver and FUSA-monitoring on single chip

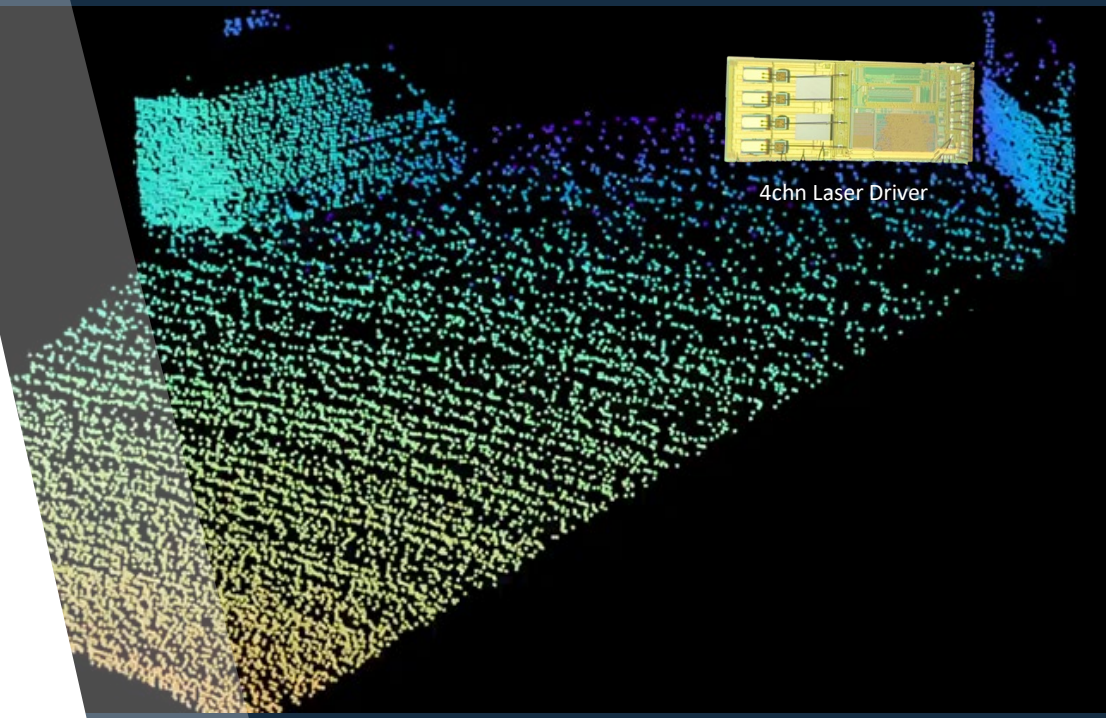
LiDAR Camera 3.0



LiDAR Sensor Board



SPAD Detector Laser Driver



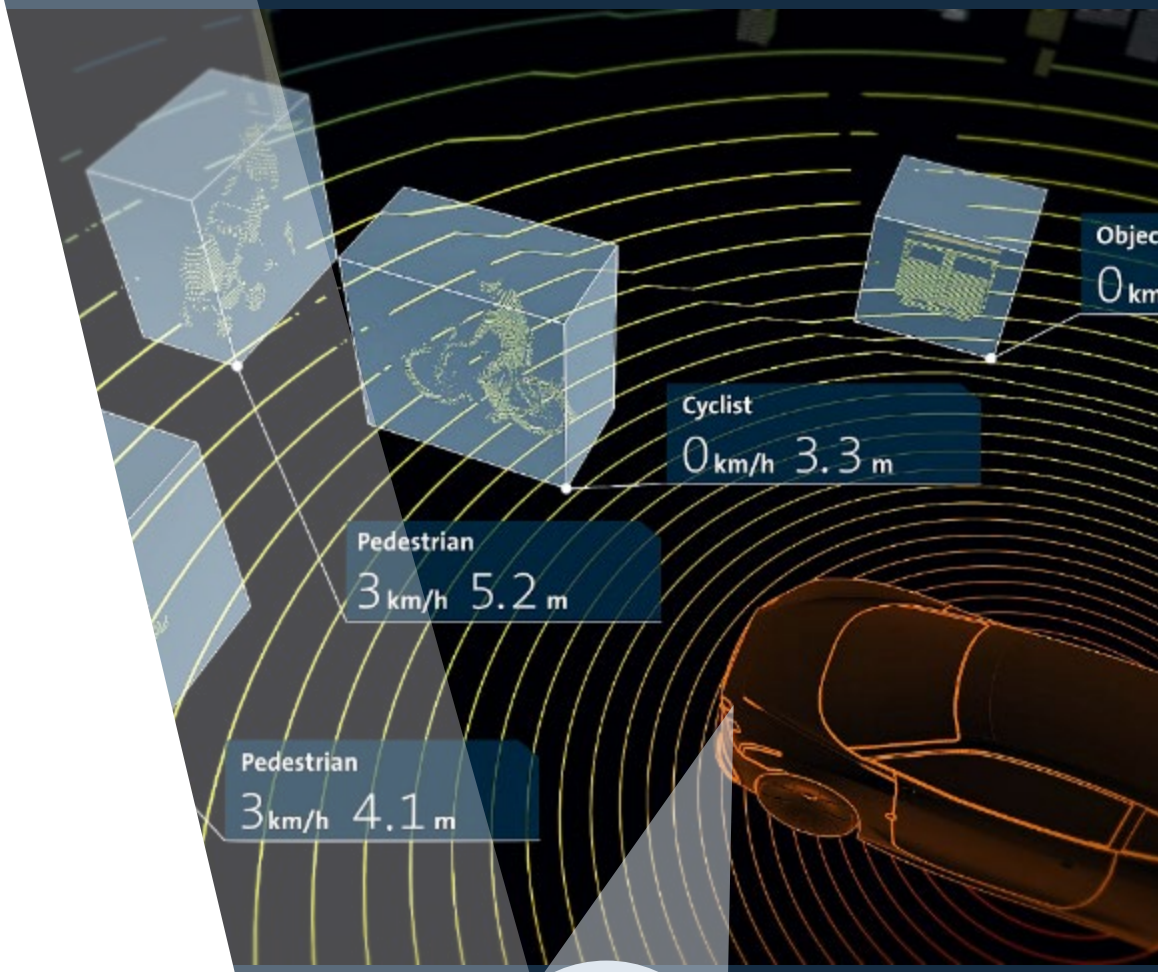
ROADMAP: NEXT GEN ELMOS SPAD IMAGER

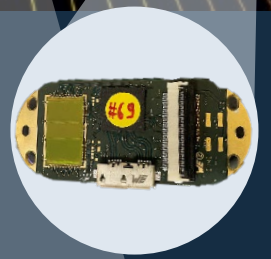
IN DEVELOPMENT

Full digital optical sensor for short range LIDAR

Key features

- Target-range: **50m** (@10% reflectivity, 100kLux ambient, 60° vertical FoV)
- **256 x 128 pxl** resolution
- **On-Chip histogramming**
  - 2MBit high bandwidth memory
- Supports **various addressing modes**
  - Row-by-row rolling shutter
  - Line-sensor-mode
  - Digital alignment options
- Integrated **measurement controller**
- On chip programmable data-processing
- **ISO 26262** (ASIL B)





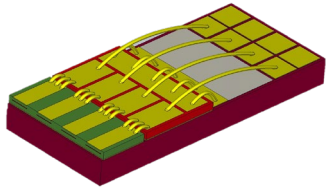
SPAD EVAL BOARD
WITH 256X80 PIXEL
SPAD ARRAY
CURRENT SILICON

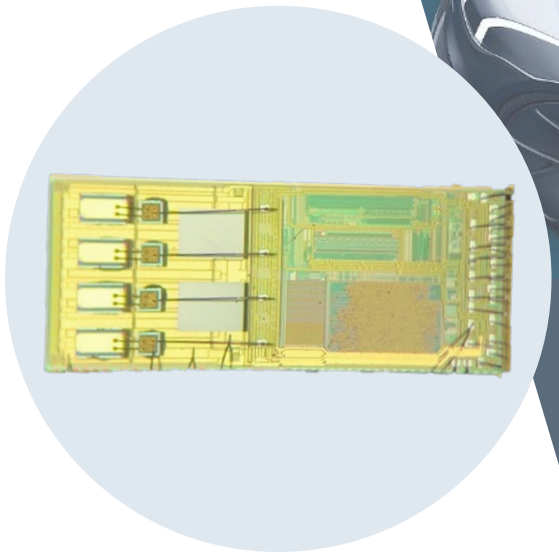
ROADMAP: E527.50 4CHN LASER DRIVER FOR EEL AND VCSEL

Fully integrated laser driver solution for LIDAR systems

Key features

- **1ns** pulse width**, 50A peak** current at 40V
- Fully **integrated** pulse shaper and gate driver
- **4-chn** laser driver IC, **individually addressable**
- **Build-in** self diagnostics
  - IC self-monitoring
  - Monitoring of laser and capacitor
  - Integrated photodiodes
- Multichip die-stack for **low parasitics** and **smallest size**
- **Supports** edge-emitting diodes **(EELs)** and vertical-cavity surface-emitting diodes **(VCSELs)**





Laser Module

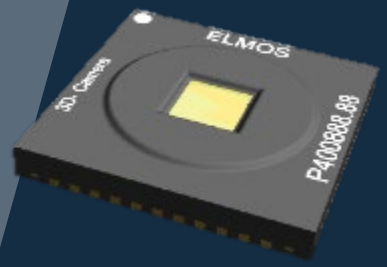
WITH 4 CHANNELS
EDGE-EMITTING DIODES
CURRENT SILICON

ELMOS E527.31 – TOF IMAGER

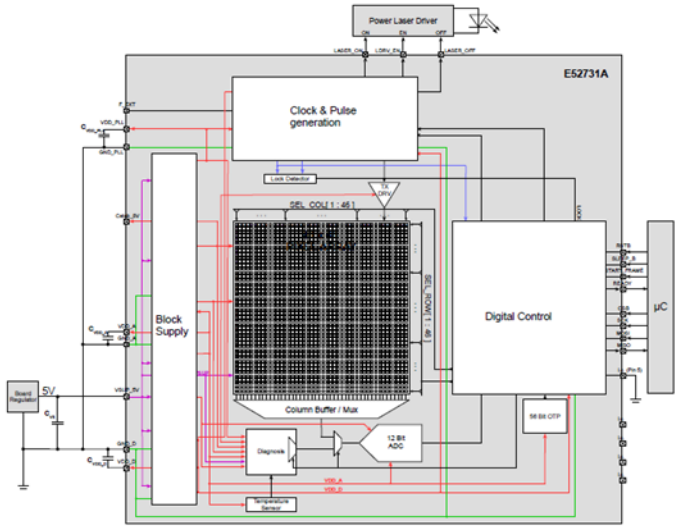
Simple IC design - highly versatile

- **3D object recognition** for simplified and intuitive operation of interior and exterior applications
- Allows to generate a **3d map** of the environment
- Reliable **detection of objects**, such as hand and foot
- Distinction between persons and objects possible

TOF IMAGER – OBJECT AND GESTURE RECOGNITION



- ToF Imager – E527.31
- 3D information enables object **classification in real time**
- Good cost/perfomance ratio (**32 x 32 pixel**)
- **High sensitivity** due to large pixel size
- **Low power consumption**
    - Sleep Current: 14 µA
    - Full Operation Mode Current: 2.6 mA
- On board **temperature sensor** for temperature compensation
- **Programmable lightsource** and shutter delay
- **Programmable Q shutter times**
- Wavelength: 850nm to 940nm possible for LEDs, VCSEL and EEL
- **Demo codes** for foot detection and gesture recognition available



E527.31 ELMOS TOF IMAGER

Hand gesture recognition

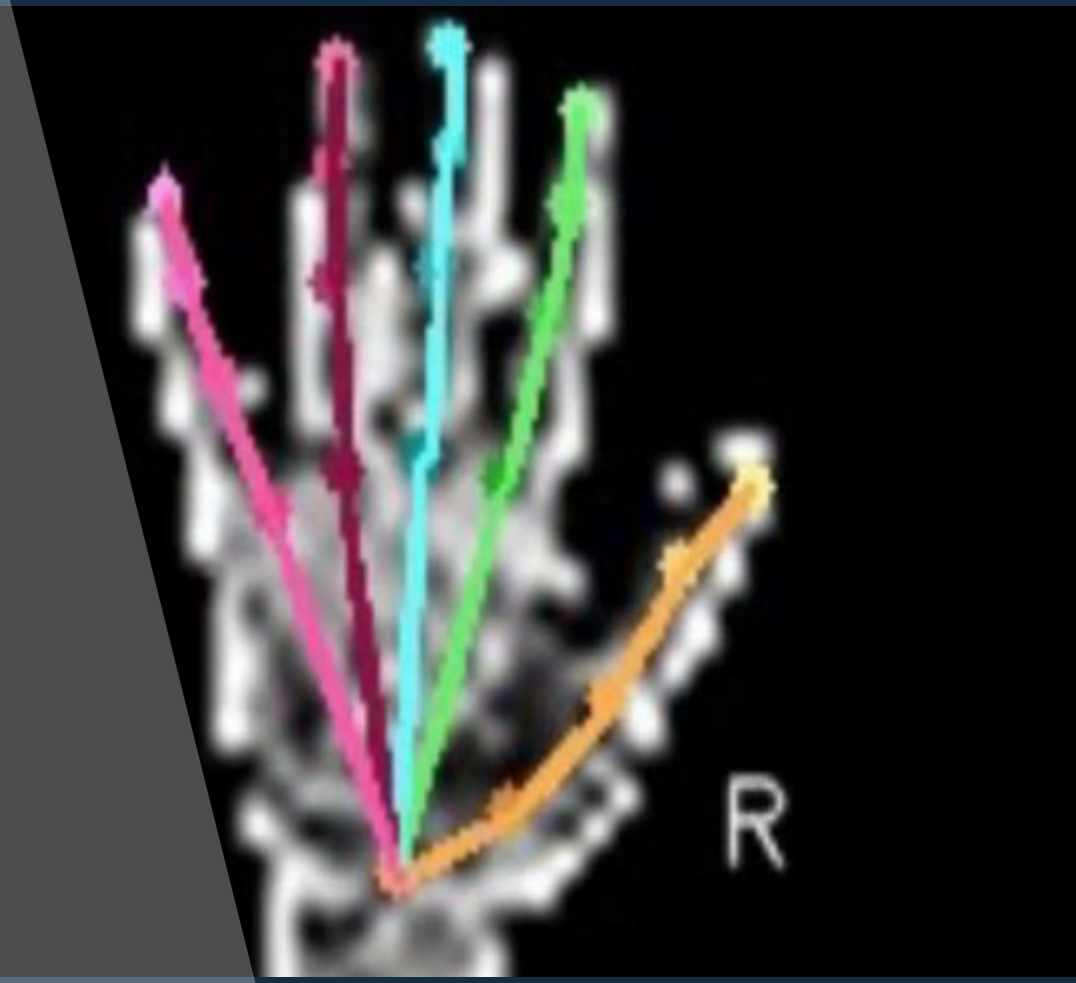
Key Features

- Static and dynamic gestures and 3D object recognition
- Low power consumption
- Cost efficient
- Support different light sources (EEL, VCSEL, LED)

Application

- Intuitive gestures for controlling of infotainment system
- Skeleton-based detection by Motion Gestures

E527.31 Evaluation Kit



MOTION GESTURES
the next wave of interaction


elmos
Innovation Matters

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