Achieving Production Vehicle Implementation
HOW BLICKFELD IS TACKLING LIDAR MASS PRODUCTION

DVN LiDAR Conference

Dr. sc. Florian Petit

Blickfeld

LiDAR / scan your world

Blickfeld

Founders

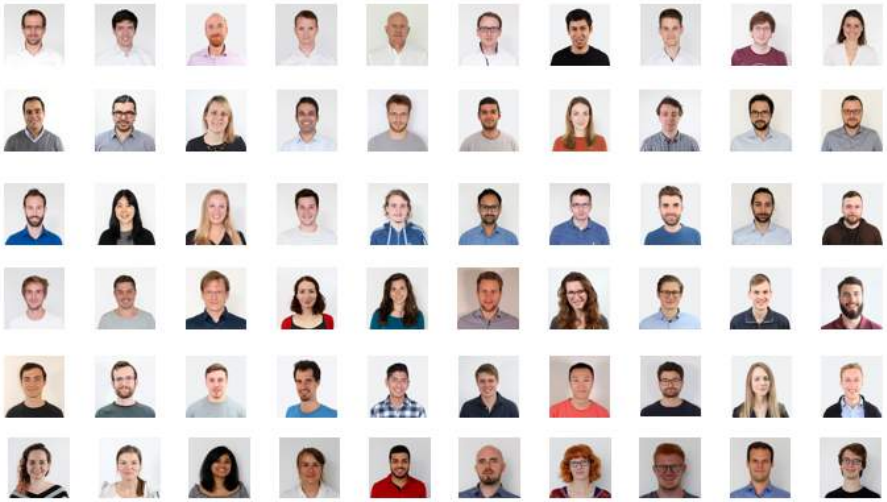
Dr. Mathias Müller
CEO

Dr. Florian Petit
Business Development

Rolf Wojtech
Chief Software Architect

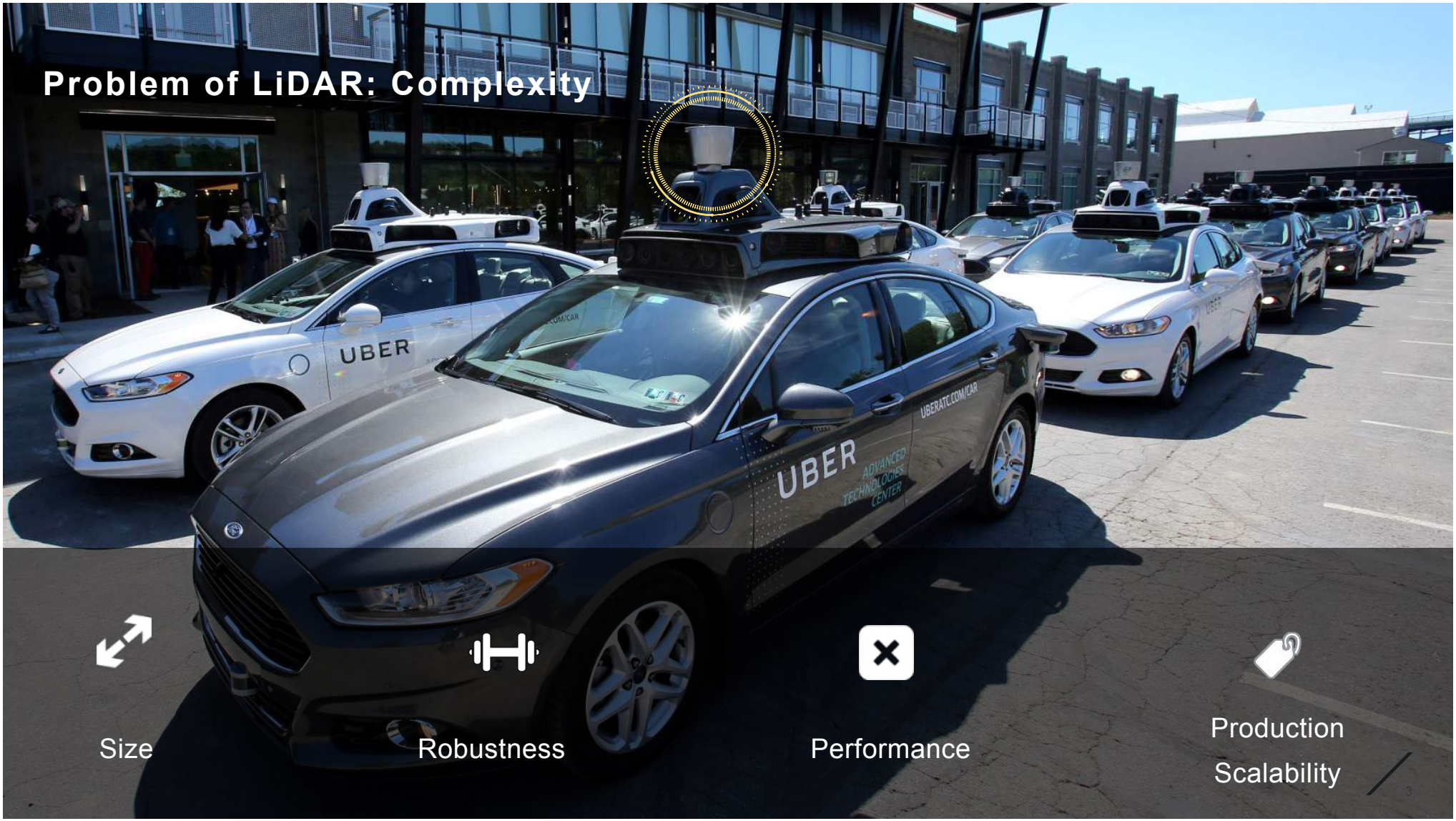
Founded 2017 | Team of 90+ | 30 + patents | Office in Munich

Team



FLUXUNIT OSRAM Ventures · High-Tech Gründerfonds · TENGELMANN ventures · UVC UNTERNEHMERTUM VENTURE CAPITAL

START ME UP! · Der Deutsche Innovationspreis · European Startup Prize for mobility · 3rd BMVI Startup Pitch · carIT STARTUP FACTORY · DAHO.AM · eMove AWARD · NMW Lab 18 Winner · GEWINNER 2018 WECONOMY · traffiX + logistiX autonomous. electric. shared.


Problem of LiDAR: Complexity
UBER
UBER
ADVANCED TECHNOLOGIES CENTER
UBERATC.COM/CAR
Size
Robustness
Performance
Production
Scalability

The LiDAR Gap

HOW DO WE GET FROM 1,000 TO 10,000,000 OF UNITS?

EXISTING LIDAR SOLUTIONS

Units: 100 – 1,000

?

REQUIRED LiDARs

Units: 10,000,000

Blickfeld

LiDAR reinvented – by Blickfeld MEMS mirrors

TODAY, LIDAR IS TOO COMPLEX – BLICKFELD SOLVES THIS PROBLEM BY IT‘S MEMS TECHNOLOGY

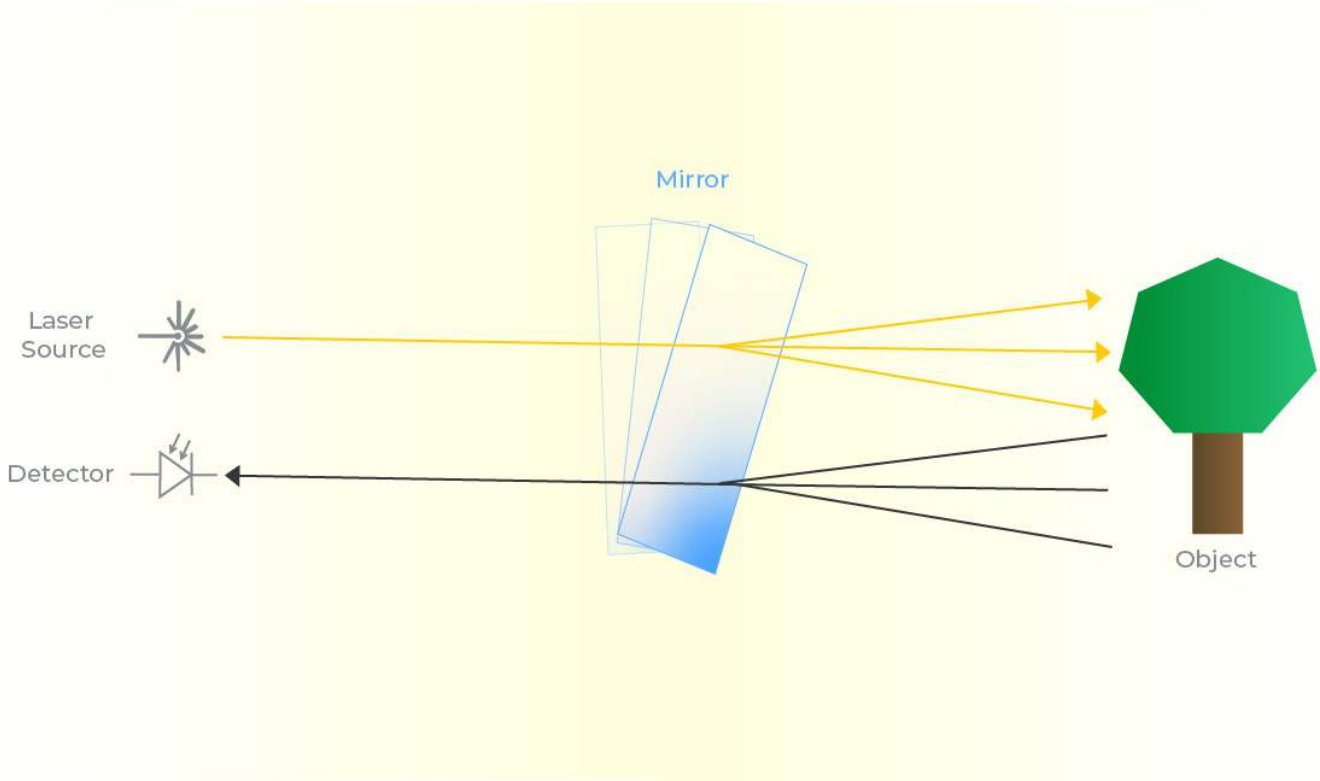
1 instead of 64 lasers

50 x smaller

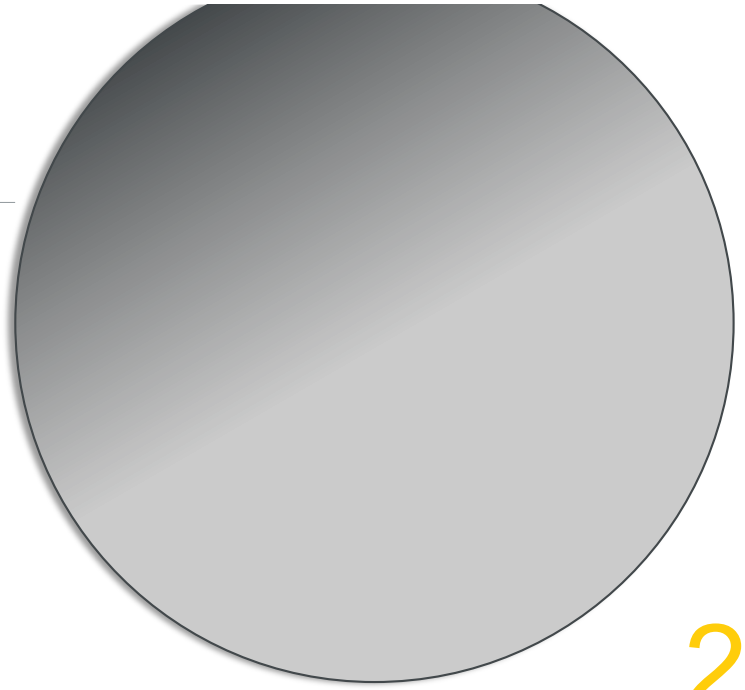
> 100 x cheaper

3D Scanning LiDAR

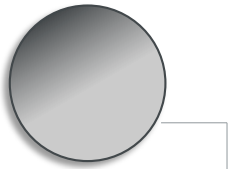
LASER – BEAM DEFLECTION - DETECTOR



Blickfeld LiDAR MEMS



Blickfeld
MEMS mirror
A = 108 mm²
FoV > 80°



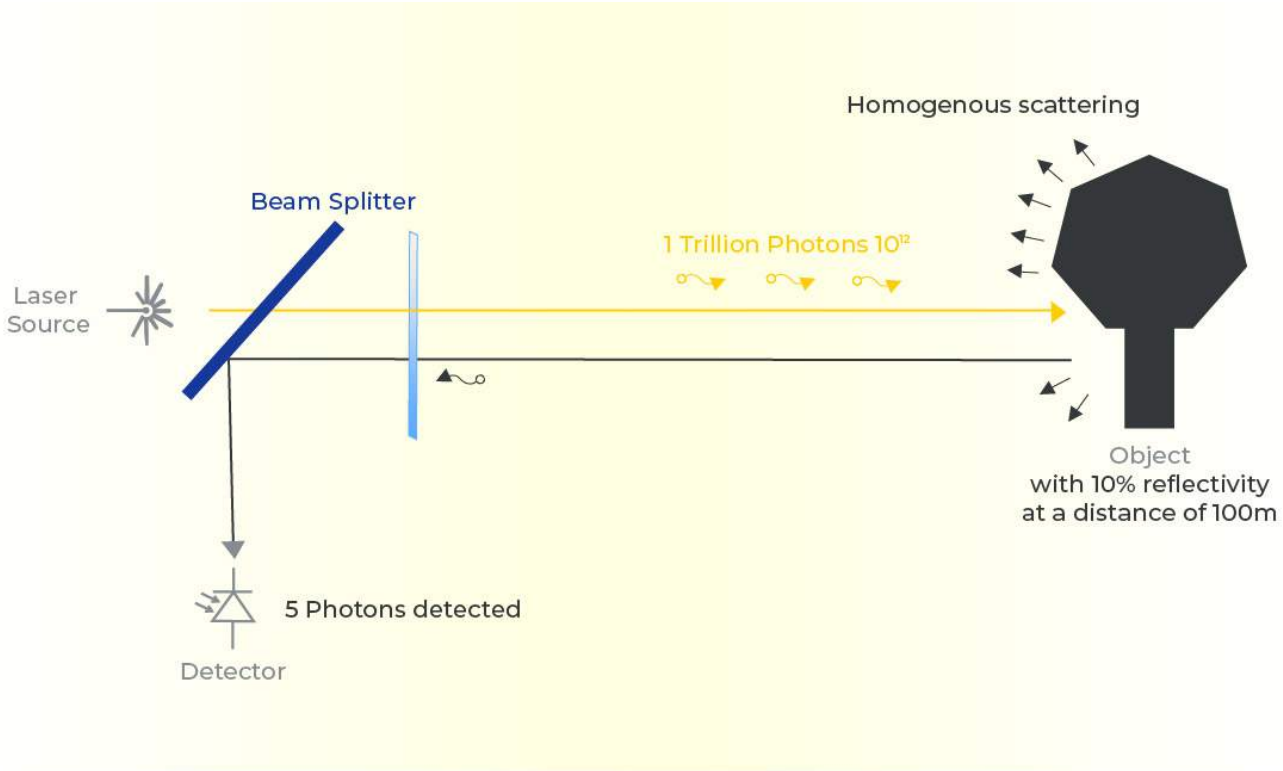
Commercially available
MEMS mirror
A = 5.4 mm²
FoV < 10°

25x Size

8x FoV

Blickfeld

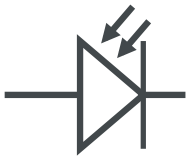
Long Range Link Budget requires Large Apertures



LiDAR simplicity

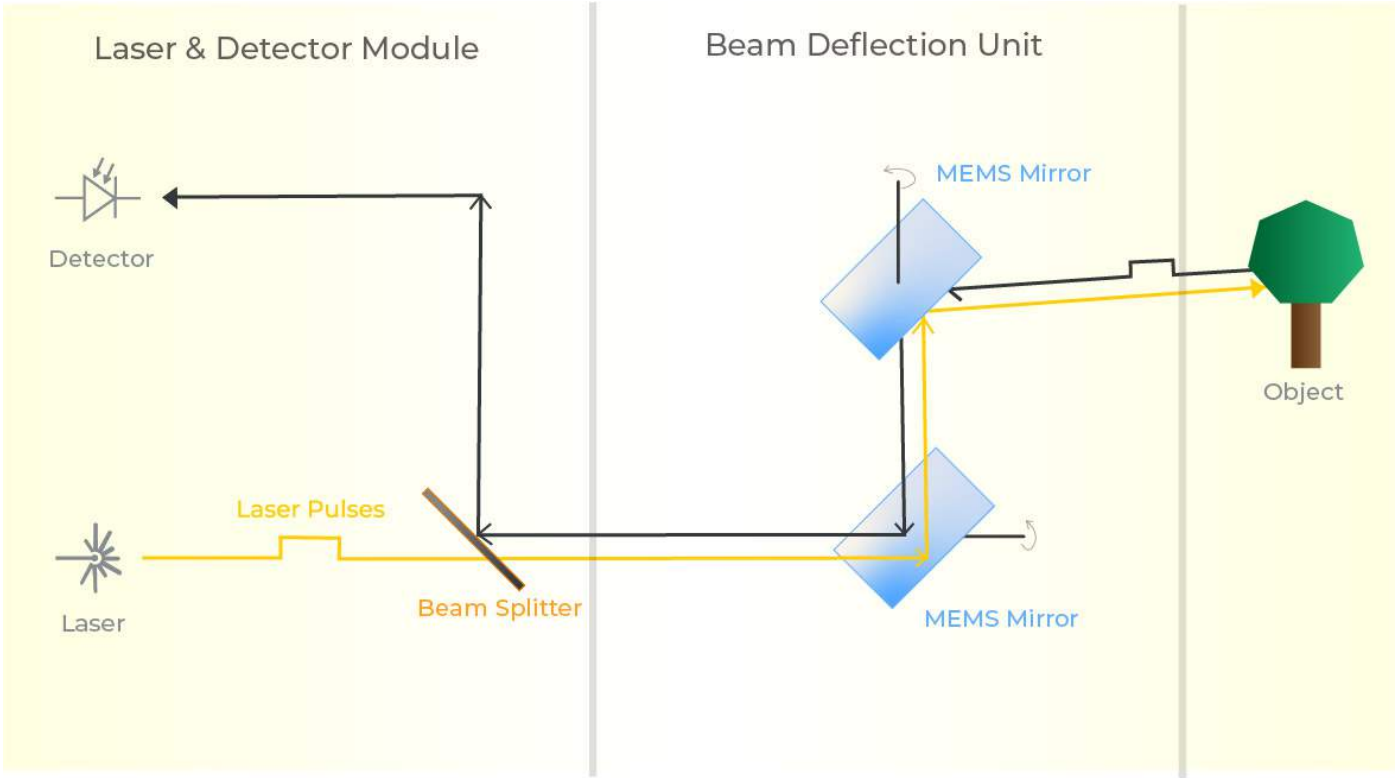
1x  MEMS mirror

1x  905nm

1x  SiPM

Blickfeld LiDAR components

REINVENTING THE BEAM DEFLECTION UNIT SIMPLIFYING LIDAR SYSTEMS

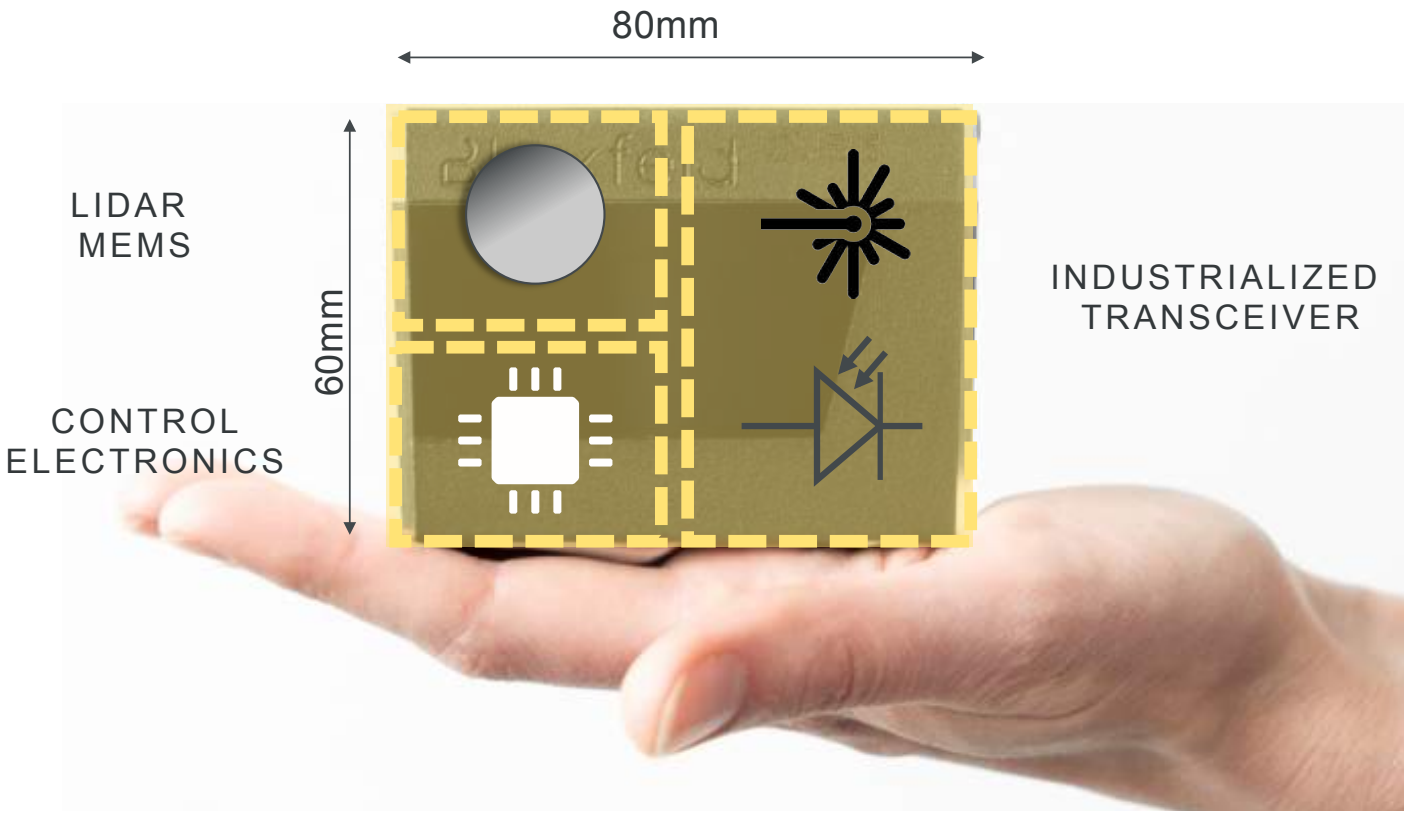


Automated Production

MEMS mirrors produced by renowned foundry with extensive automotive experience

Optical component mass produced on a highly automated production line similar to those used for automotive cameras

What is inside?



Blickfeld

Adjustable Resolution for Different Use Cases

Low resolution &
high framerate

Medium resolution & medium framerate

High resolution & low framerate

Adjustable Regions of Interest

Scan pattern with higher Resolution in the center

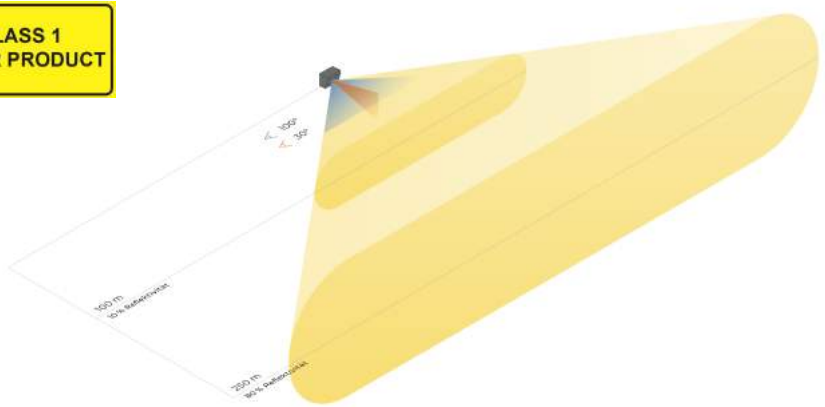
Scan pattern with higher resolution at the edges

Cube

PROVIDING A WIDE FIELD-OF-VIEW FOR APPLICATIONS WHERE AN OVERVIEW IS REQUIRED

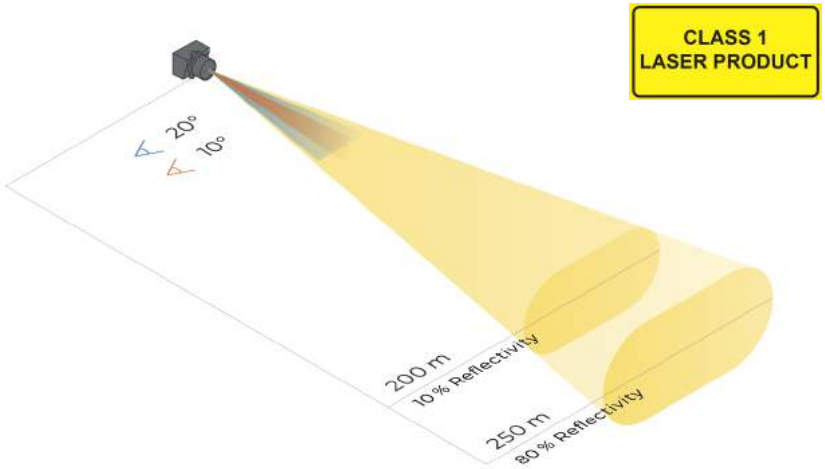
Fiel of view	80° x 30°
Detection range	250 m (80 m at 10% reflectivity)
Scan lines	Variable, max. 200
Dimensions	80 x 60 x 50 mm
Resolution	0.4°
Data points	200,000 / second
Interface	Ethernet
Power	< 15 W

All values are preliminary target specifications



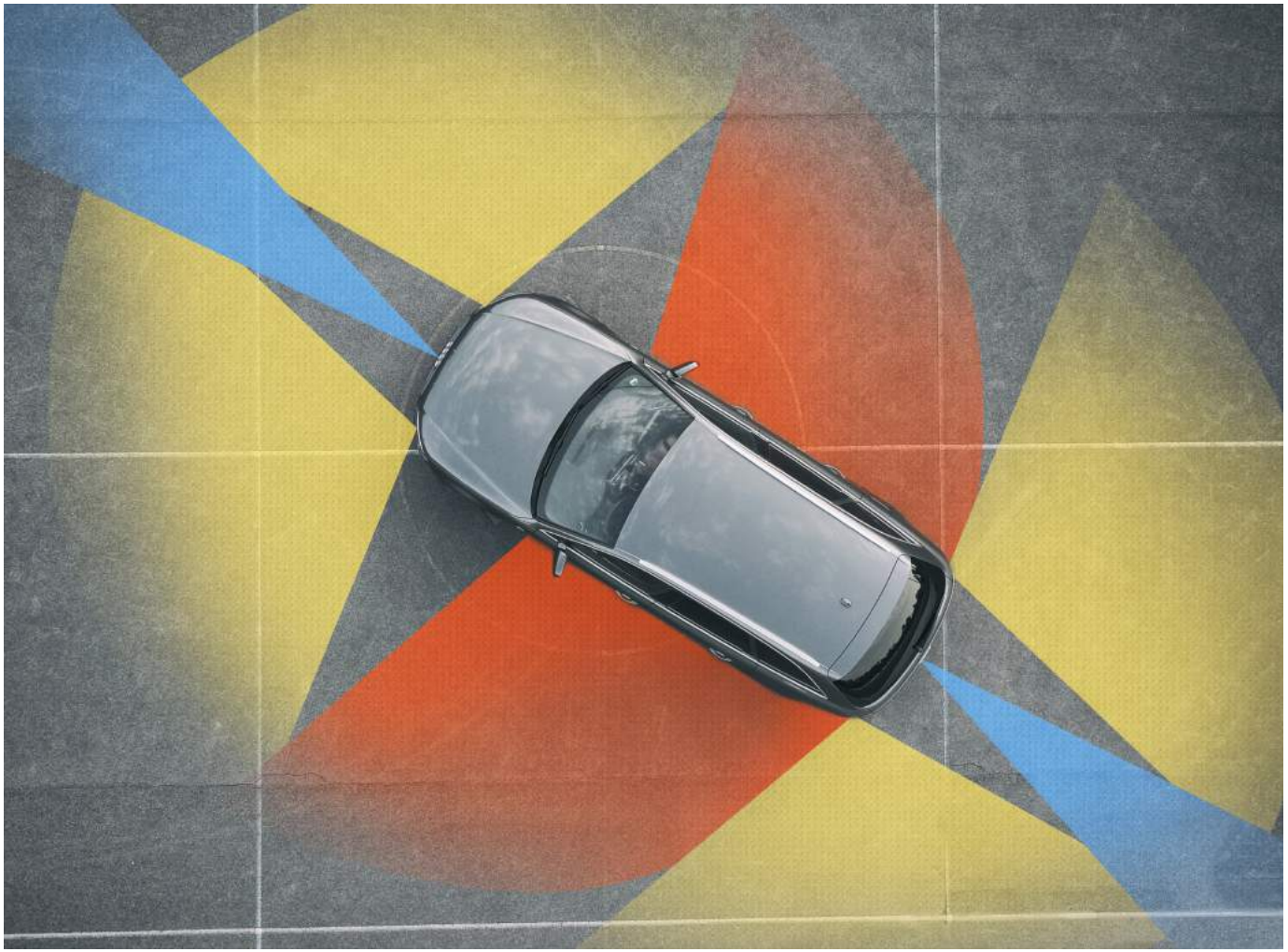
Cube Range

RELIABLE LONG-RANGE DETECTION OF OBJECTS IN UP TO 250 METERS



Fiel of view	20° x 10°
Detection range	250 m (150 m at 10% reflectivity)
Scan lines	Variable, max. 200
Dimensions	80 x 60 x 70 mm
Resolution	0.18°
Data points	200,000 / second
Interface	Ethernet
Power	< 15 W

All values are preliminary target specifications



Environmental testing, technology Proof-of-Concept

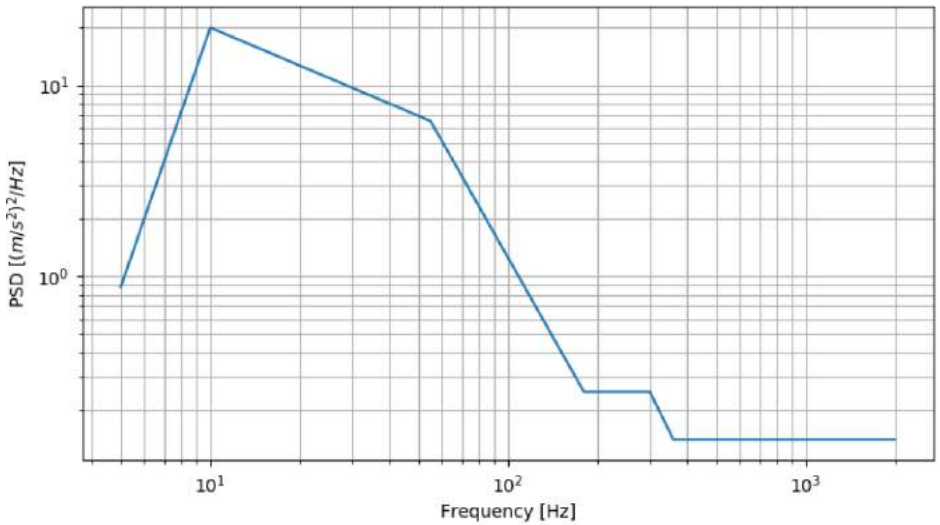
OVERVIEW OF CONDUCTED TESTS AT BLICKFELD

Component Preliminary Test Results		
Test	Demonstrated Sample Tests	Result
Temperature	-30 to +60°C (Peripherals) -40 to +105° (MEMS & LDM)	Pass
Vibration	sinusoidal (10 m/s²), broadband (30 m/s² RMS), driving test on cobblestone street	Pass
Shock	500 m/s², 6 ms	Pass
Endurance	5000h continous operation demo on MEMS	Pass
System Pre Validation		
Rain	30 to 80 mm/h	10 % to 35 % range reduction
Range	Different ranges and targets	Pass
Fog	Yes, controlled environment	Range reduction similar to human vision
Field testing	Multiple scenarios	Pass
Spray water	Yes, on window	Pass: Clear detection of target not impacted
Blinding by direct sunlight	Yes, artificial sunlight (light tunnel)	Pass: Clear detection of target not impacted

Testing

VIBRATION

#	Document Identifier	Document Title
[STD1]	LV124	Electrical and electronic components in motor vehicles - Environmental requirements and testings
[STD2]	DIN EN 60068 2 64	Environmental Testing – Broadband Vibration

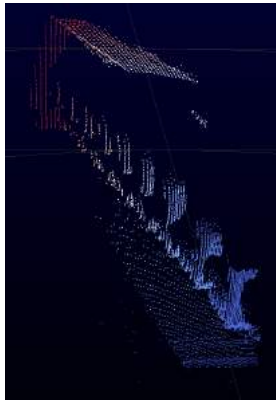


Vibration profile D applied to the DUT

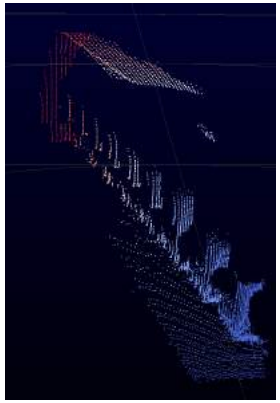
Testing

HEAT

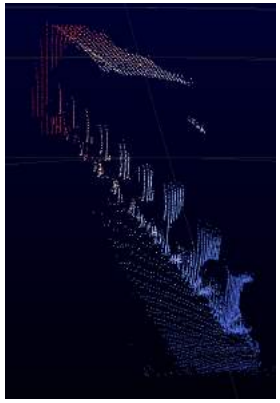
68.7°C



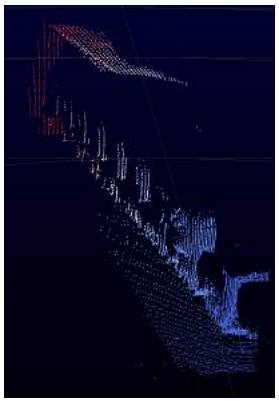
81.4°C



95,6°C



100,9°C

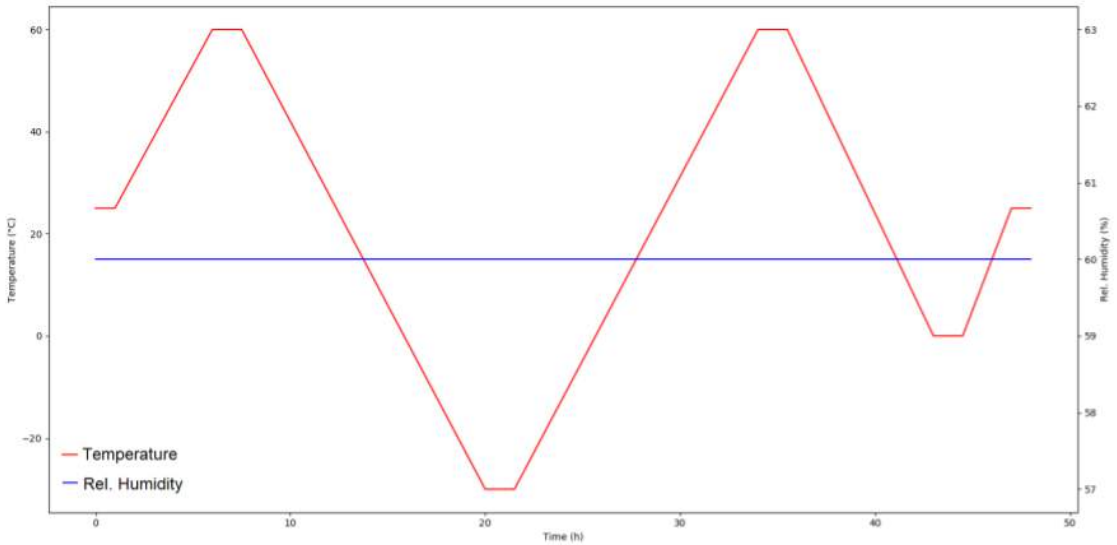


Blickfeld

Damp heat (with frost) testing

MEMS MIRRORS

Temperature Profile:



Seamless Vehicle Integration

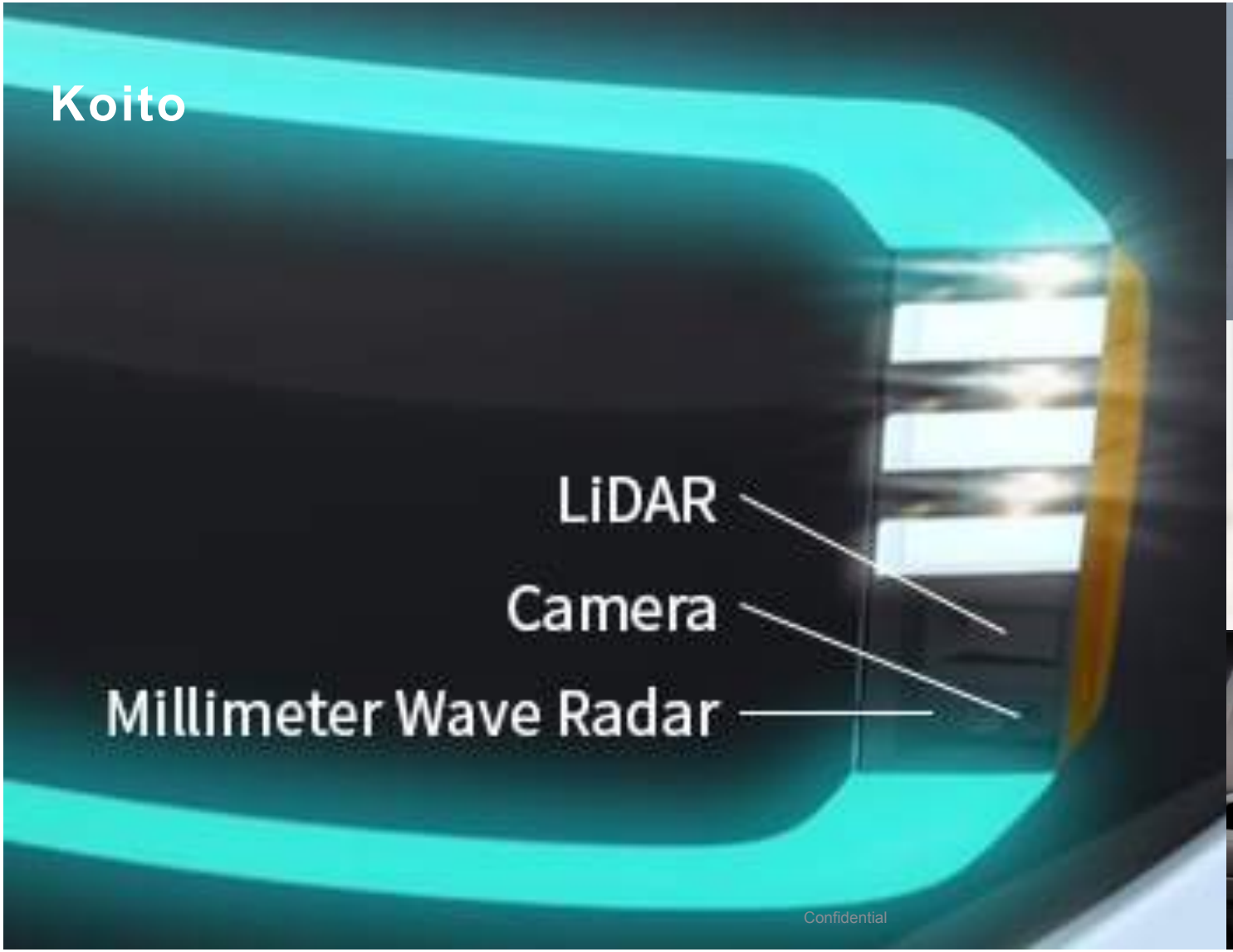
Use Case

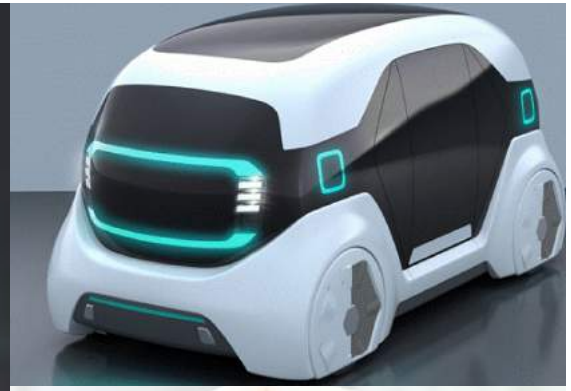
Problem

- In the past, LiDAR sensors were very large and had to be mounted on the roof top of autonomous vehicles.

Solution

- Compact LiDAR sensor that can be fully integrated into a headlight.
- Enabling OEMs to possess breakthrough LiDAR technology without marring with the vehicle's design.






Webasto
Camera
LiDAR
Cleaning solution


Blickfeld

Thank you!

／ Dr. sc. Florian Petit
／ florian.petit@blickfeld.com
／ www.blickfeld.com

Blickfeld

LiDAR ／ scan your world