

Next Generation LiDAR for Industrial and Automotive Use Cases

BY HYBRID LIDAR SYSTEMS AG

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What We Do

Selling *precise*, *flexible* and *affordable* LiDAR* systems to automotive and industrial high tech OEMs.

*LiDAR systems are the eyes of autonomous cars and next generation automation systems; they are indispensable for autonomous driving and real-time situational awareness.

We are the only LiDAR company that has invented a new method to measure distance with light.

This *hybrid method* is always up to *50% cheaper* and allows a *10 times higher resolution* than the standard measuring methods.



Why – Challenges lidar systems are facing: Resolution

lidar should not only **detetct objects**, but also **classify** them **object** of 10cm height should be detected by 200m range





current lidar solutions have the problem of resolution!

The greater the distance at which small objects are detected, the faster and safer can be driven.



Initial Research and Development Phase Completed





Development Phase Completed and Roadmap



State of the art

Competitors

Imager Chip of Time of Flight Solid State Lidar



Problem:

In total, the counters take 60-95% of the imager area, hence reducing the number of possible pixels and resolution. This technology is almost at its limit.



Imager Chip of Hybrid Method Solid State Lidar

120.000 (far field) or 240.000 pixel (near field)



 Light receptor (no separate counters required)



Benefit:

- Highest resolution in class
- No moving parts
- Low Costs

Product – Pure Solid State Flash Lidar Sensors

The Proprietary Distance Measurement Method Is Our Core Technology

Market Ready

In Development

Concept Phase

Our Product

Our know-how is the proprietary distance measurement method. This is a unique measurement approach that allows for high resolution.

This method allows us to use market-available parts, which make our product inexpensive.

Competition has to develop own hardware, thus increasing cost.

Version 1: Industry grade LiSSA Industry



- Industry grade system with 20.800 pixels (this is more than currently available systems)
- Small series production starts in Q1/2023
- 20 customers have ordered a sample
- Price 2,900€ current price; competition 6,000€ with lower performance

Version 2: Automotive grade LiSSA Industry & Automotive



- Automotive grade system with 600.000 pixels (2x 240.000 and 1x 120.000 sensors)
- Series production for automotive SOPs in 2025
- Meets all automotive specifications
- Will replace LiSSA Industry and serve both automotive and industry use cases

Version 3: Consumer grade



- Concept phase with AR glasses manufacturer for industrial use
- Combination of camera and Lidar to detect gestures.
- Further applications smartphones, tablets, cameras

Our Products

Delivery from Q1 2023. Available for order now.



OPTICAL PERFORMANCE		
TECHNOLOGY	SEQUENTIAL SOLID STATE LIDAR (NO MOVING	
	PARTS), 3D DATA OUTPUT VIA ETHERNET	
WAVE LENGTH	905 nm	
LASER CLASS	CLASS 1, EYE-SAFETY	
RANGE (10% OBJECT REFLECTIVITY)	20 m (50 m long range version)	_
RESOLUTION (H x V)	256 x 80 px (20,480px)	\Box
RESOLUTION ANGULAR	0,33° x 0,42° (customizable)	
FIELD OF VIEW (H x V, CUSTOMIZABLE)	80° x 33° (customizable)	
NUMBER OF ECHOS	1 (up to 32 possible)**	
FRAME RATE	10 – 30 fps (customizable)*	
MECHANICS/ ENVIRONMENT/ CONSUMPTION		
DIMENSIONS (W x H x D, CUSTOMIZABLE)	70 x 35 x 70 mm	
WEIGHT	350 g	
OPERATING TEMPERATURE RANGE	-20° to +55°C	
PROTECTION CLASS (DUST, WATER)	IP44 (customizable)	
SUPPLY VOLTAGE (CUSTOMIZABLE)	USB 3.0 (customizable)	
POWER CONSUMPTION	< 15 W	
INTERFACE		
POWER SUPPLY	USB 3.0 (ACC. CUSTOMER)	
DATA	USB 3.0 (ACC. CUSTOMER)	

LiSSA Universal Industrial

Up to 2.662.400.000 measured points per second (10fps)

*can be changed via software on the device. **via software upgrade

Standard version. The Field of View can be adjusted via different optics.





Our Products - Application example



LiSSA Universal Industrie

- Current applications in logistics Anwendungen in der Logistik
 - \rightarrow Safety solution for the crane area on the Subsea7 fleet
 - \rightarrow Safety solution for portal crane application



HOW IT WORKS Deceptively simple, quick to install yet LIDAR on tip of game changing on the ground. crane arm scans deck and lift item below. LIDAR projects exculsion zone beneath lift item Staff alerted when crossing safe Supervisor plans and perimeter. monitors lift from web application.

Delivery from Q1 2023.

Available for order now.

Safety solution for the crane area

How it works:

Deceptively simple, quick to install yet game changing on the ground.

LiDAR on tip of crane arm scans deck and lift them below.

LiDAR projects exclusion zone beneath lift item. Staff alerted when crossing safe perimeter.

Supervisor plans and monitors lift from web application.





DLR GmbH* - Smart City Solution



Autonomous driving Testfield lower saxony Autobahn A39

*german aerospace center



Railroad Solution 1 – 3D map of railroad and stations

 Scanning the invironment and creating high resolution 3D map of railroad network across Germany and Europe





Railroad Solution 2 - Scanning the environment

- detection of tree branches that are blocking the railway
- sending direct data of exact position, as the point cloud and the GPS data for railway service







Blade Tip protection for Wind turbine

In strong wind, the blade tip is deformed so much that it can hit the pole.

We measure the distance between the blade tip and the mast. The challenge is that the blade tip is 400 km/h fast.





Customized Concepts Minebea Mitsumi Smartcity and Traffic monitoring

Parking lot monitoring:

- One sensor covers many parking lots
- No additional hardware for each parking lot
- Easy to install
- Easy to expand monitoring area
- Low wear due to the position
- Classification of vehicle
- Car mapping in sensor possible





Cargo Bike

Digital map based on LiDAR Data













Cargo Bike

Application 1: safety feature for real time detection of obstacles

Application 2: Mapping of the environment and creation of a 3D map





Autonomous Transportation Vehicles

Autonomously Moving Transportation Vehicles



Automated Guided Indoor Vehicles and Carts

Last Mile Delivery





Automated Access Control and Security

Access Identification and Alarm

on People Counter

Optimized Door Closing Speed









Indoor Navigation, Monitoring and Safety

Navigation for Automated Vehicles and VR

Anonymous Site Monitoring Ranging Assistance and Crane Payload Monitoring







120.000 Pixel Far-Field

480.000 Pixel Near-Field

Up to 30.000.000.000 measurement points per second (25fps)

LiSSA Automotive	Long Range (LR)	Short Range (SR)
	Lf	R SR
		OPTICAL PERFORMANCE
TECHNOLOGY	SEQUENTIAL SOLID-STATE I 3D DATA OUTPL	LIDAR (NO MOVING PARTS), IT VIA ETHERNET
WAVE LENGTH	850, 9	05 nm
LASER CLASS	CLASS 1, E	YE-SAFETY
RANGE (10% OBJECT REFLECTIVITY)	Up to 220 m	65 m
RESOLUTION (H x V)	400 x 300 px	1600 x 300 px
RESOLUTION ANGULAR	0,1° x 0,033°	0,1° x 0,1°
FIELD OF VIEW (H x V, CUSTOMIZABLE)	40° x 10°	160° x 30°
NUMBER OF ECHOS	4-	16
FRAME RATE	2	.5
	MECHANICS/ EN\	/IRONMENT/ CONSUMPTION
DIMENSIONS (W x H x D, CUSTOMIZABLE)	126 x 79	x 98 mm
WEIGHT	129	90 g
OPERATING TEMPERATURE RANGE	-40° to) +85°C
PROTECTION CLASS (DUST, WATER)	IP6	К9К
SUPPLY VOLTAGE (CUSTOMIZABLE)	12V (FROM C	ONTROL UNIT)
POWER CONSUMPTION	< 4	0 W
		INTERFACE
POWER SUPPLY	ACC. CU	STOMER
DATA	ETHERNET AC	C. CUSTOMER

This data sheet shows the Automotive series product, which is currently under development.





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Automotive Triple Sensor.





Our Products – LiSSA Automotive short Range

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OPTICAL PERFORMANCE	
SEQUENTIAL SOLID STATE LIDAR (NO MOVING	TECHNOLOGY
PARTS), 3D DATA OUTPUT VIA ETHERNET	
905 nm	WAVE LENGTH
CLASS 1, EYE-SAFETY	LASER CLASS
65 m	RANGE (10% OBJECT REFLECTIVITY)
800 x 300 px	RESOLUTION (H x V)
0,1° x 0,1°	RESOLUTION ANGULAR
80° x 30°	FIELD OF VIEW (H x V, CUSTOMIZABLE)
5	NUMBER OF ECHOS
25	FRAME RATE
MECHANICS/ ENVIRONMENT/ CONSUMPTION	
116 x 79 x 98 mm	DIMENSIONS (W x H x D, CUSTOMIZABLE)
890 g	WEIGHT
-40° to +85°C	OPERATING TEMPERATURE RANGE
ІР6К9К	PROTECTION CLASS (DUST, WATER)
12V (FROM CONTROL UNIT)	SUPPLY VOLTAGE (CUSTOMIZABLE)
< 20 W	POWER CONSUMPTION
INTERFACE	
ACC. CUSTOMER	POWER SUPPLY
ETHERNET ACC. CUSTOMER	DATA

> 240.000 Pixel Near-Field

Standard version. The Field of View can be adjusted via different optics.



Our Products – LiSSA Automotive long Range

	OPTICAL PERFORMANCE	
	SEQUENTIAL SOLID STATE LIDAR (NO MOVING	TECHNOLOGY
	PARTS), 3D DATA OUTPUT VIA ETHERNET	
	905 nm	WAVE LENGTH
	CLASS 1, EYE-SAFETY	LASER CLASS
N	Up to 220 m	RANGE (10% OBJECT REFLECTIVITY)
120.00	400 x 300 px	RESOLUTION (H x V)
	0,1° x 0,03°	RESOLUTION ANGULAR
	40° x 10°	FIELD OF VIEW (H x V, CUSTOMIZABLE)
	5	NUMBER OF ECHOS
	25	FRAME RATE
	MECHANICS/ ENVIRONMENT/ CONSUMPTION	
	116 x 79 x 98 mm	DIMENSIONS (W x H x D, CUSTOMIZABLE)
	890 g	WEIGHT
	-40° to +85°C	OPERATING TEMPERATURE RANGE
	ІР6К9К	PROTECTION CLASS (DUST, WATER)
	12V (FROM CONTROL UNIT)	SUPPLY VOLTAGE (CUSTOMIZABLE)
	< 20 W	POWER CONSUMPTION
	INTERFACE	
	ACC. CUSTOMER	POWER SUPPLY
	ETHERNET ACC. CUSTOMER	DATA

Standard version. The Field of View can be adjusted via different optics.

120.000 Pixel Far-Field



Examples for positions of LiSSA Automotive in the car. long range Sensor

Far-Field Area



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Examples: All-Round-Scan (horizontal) with front triple sensor, rear sensor and 2 site sensors





Examples: Scan (vertical, cut) in combination with front triple sensor, rear sensor and site sensors



2023 / Q1

2023 / Q4

2024 / Q2

2025 / Q3

Example: Timetable Automotive Lidar Sensor

Milestones LiSSA Automotive:

- 2022 / Q3 Project launch
 - Start development of "customized imager"
 - B pattern
 - C-sample, start validation
 - SOP customer available

3 years from commissioning to Integration into the finished customer vehicle Hybrid lidar systems aG

Why – Data is the new oil

We have the oil source !

Searching and exploration

Recording Truck Geophones and Acquisition Units Layer 1 Layer 3 Layer 4

Source: Bundesverband Geothermie





ource: Shotshop.com





Gasoline Diesel Cerosin Plastic Pharmacies



Source: weltkugel-globus.de



LiSSA universal industrial LiDAR

- Highest-In-Class Resolution
- No Moving Parts
- Low Costs
- DSGVO conform





We capture the world in high-resolution 3D.

Among other things also source data for Metaverse.

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Where is this needed ?

More than you think, here is a small selection

Automotive industry

Automotive OEMs need landmarks or highly accurate up-to-date maps for autonomous driving. Realtime detection of obstacles

Logistic industry

highly accurate maps for autonomous driving in and outdoor. Realtime detection of obstacles. Object classification

Service providers offering services

If you know your customers, you can offer them targeted services.

Construction industry

The construction industry digitizes facades and buildings for documentation and to plan installations in the 3D CAD model.

windturbine

Realtime detection of blade tip distance to pole. Bird detection

Advertisers

We know the exact current position and can offer advertising targeted to the location. In future virtual worlds you can advertise.

Cities and municipalities

Where do roads need to be repaired ? Where to build new ones ? Where are there dangerous places ? Who uses which road and when ?

Traffic monitoring

How much traffic is on the road and when ? Which parking spaces are occupied? Where is traffic jam at the moment ?

Google 🙂

If you already have a static 2D map, you will want a 3D map that is always up to date.

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Further application areas of our Hybrid LiDAR LiSSA



LIDAR (Light Detection and Ranging) is used to determine distance by measuring how long it takes light to reach an object and reflect back. It is so advanced, it's being used by NASA for the next Mars landing mission. And it's now been engineered to fit in the thin and light #hone 12 Pro

The custom-designed LIDAR Scanner uses direct time of flight to measure reflected light from up to five meters away, both indoers and out. It works at the photon level, operates at nanosecond speeds, and opens up tremendous possibilities for augmented reality

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Smartphones & Tablets



augmented reality



Smartcity solutions



Drones



Servicerobotik



Autonomes Trains



Logistic



Wind turbines



Healthcare & Sports



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··AZO • Space of Innovation

1/40 HIGHTECH VENTURE DAYS 2019

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PLUGANDPLAY

Winter 2020

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TOP 5 LiDAR Startups in the world

Spotlight: 5 Top Lidar-Start-ups

5 der 200 vielversprechendsten Lidar-Start-ups

06.05.2020 | Redakteur: Sven Prawitz

Wo gibt es die meisten Start-ups, die Lidar-Technologie entwickeln – und welche sind am relevantesten? Die Ergebnisse einer exklusiven Datenanalyse von 200 Unternehmen in einer Heatmap.



Das sind laut Startus Insights momentan die fünf interessantesten Lidar-Start-ups (Bild: Startus Insights