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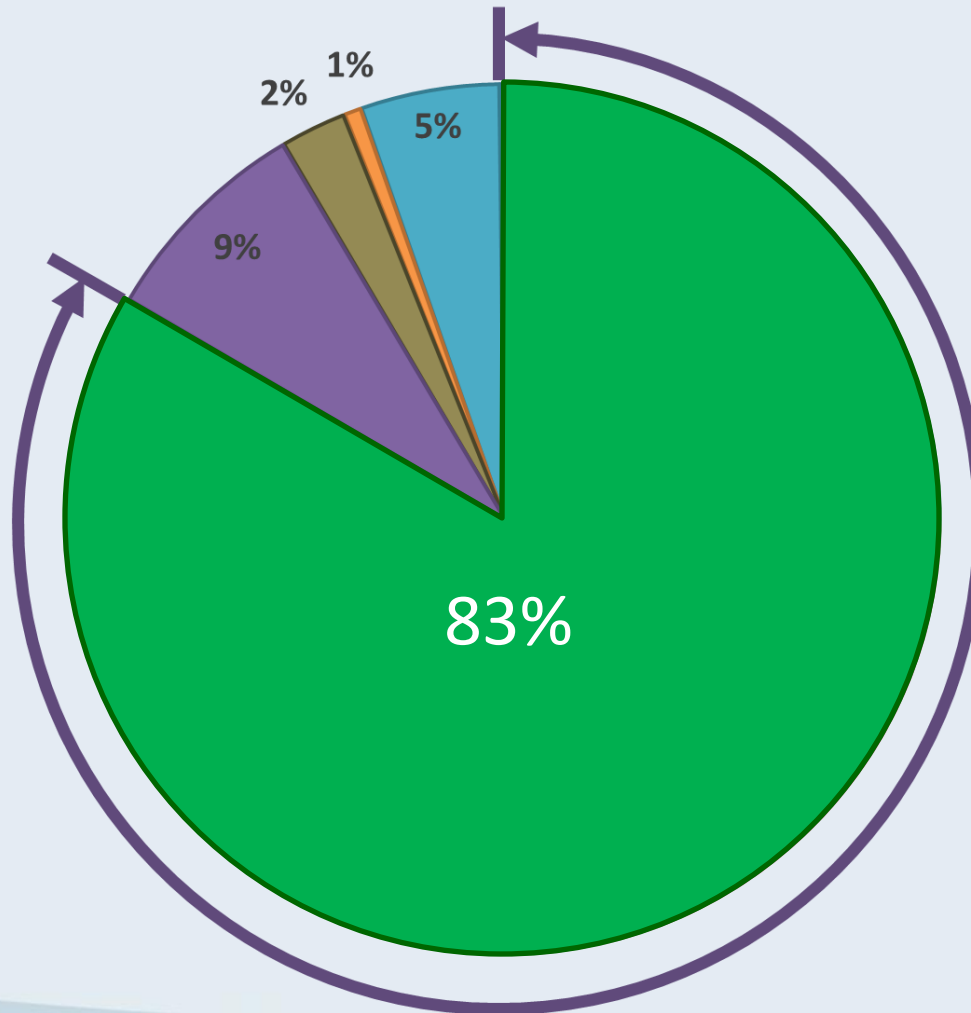
Project Overview

Roland Krzikalla, SICK AG



Accident review results

Accidents distributed by car segments



- Subcompact (VW Polo)
- Compact (VW Golf)
- Mid size (VW Passat, Audi A4)
- Full size (Mercedes E-Class, Audi A6)
- Full size luxury (Mercedes S-Class, Audi A8)
- Sportcars (Porsche 911)
- Trucks and vans

Low-cost miniature Laserscanner for environment perception

- Focused Research Project: ICT – 2009.6.1, # 248123
- Duration: 36 Months (Jan 2010 – Dec 2012)
- Coordinator: Kay Fuerstenberg (SICK AG)
- Budget: 4.8 M€ (3.2 M€ EC funding)
- Consortium:



Vision & mission

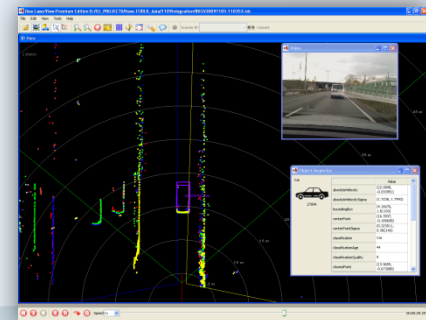


Vision:

- Accident free traffic realised by means of effective environment perception systems

Mission:

- Generic, affordable, durable, compact sensor with reliable data
- Speed up market penetration by facilitating ADAS integration to all vehicle segments



Develop and demonstrate a prototype low cost miniature automotive Laserscanner for environment perception

- Novel Laserscanner for low production cost (40 €)
- Target size: 4cm x 6cm x 6cm (mass production)
- Large field of view (250 deg)
- Micro-Electro-Mechanical System (MEMS) scanning
- Omni directional lens to obtain large field of view
- Integration of TDC and receiver to reduce size and costs
- Integration of optical and mechanical components
- Enhanced object detection and tracking algorithms
- Serve various in-vehicle applications

Sensor requirements

Assistance systems	Range [m]		Range accuracy [m]	Field of view [deg]	Angular Accuracy [deg]	Update frequency [Hz]	Sensor technology today	MiniFaros laser scanner potential
	Tracking	Classification						
FCW, AEB	50-80	25-50	0,5	30	Up to 0,25	25	Radar, camera, laser	Yes
Pedestrian protection	40	30	0,1	60	0,25	12,5	Camera, laser	Yes
LCW, LCA	30	(15)	0,2	100	1	12,5	Radar, camera	Yes
LDW, LKA	100	-	0,2	50	0,1	25	Camera	No
Start inhibit	5	(5)	0,2	Up to 180	2	<12,5	Camera	Yes
Intersection assistance - rural	Up to 190	Up to 50	0,3	250	Up to 0,25	12,5	Laser, Camera, radar	No
Intersection assistance - urban	20 - 80	Up to 20	0,3	250	Up to 0,25	12,5	Laser, Camera, radar	Yes
Pre-crash	20	-	0,1	60 (vehicle width)	1	>25	Radar	Yes
ACC	Up to 200	Up to 20	0,3	10-20	Up to 0,3	<12,5	Radar	No
S&G	50	Up to 20	0,1	Up to 180	1	<12,5	Camera, laser, camera	Yes
Parking assistant	5	-	0,1	Up to 180	2	<12,5	Ultrasonic, camera	Yes

Requirements Summary



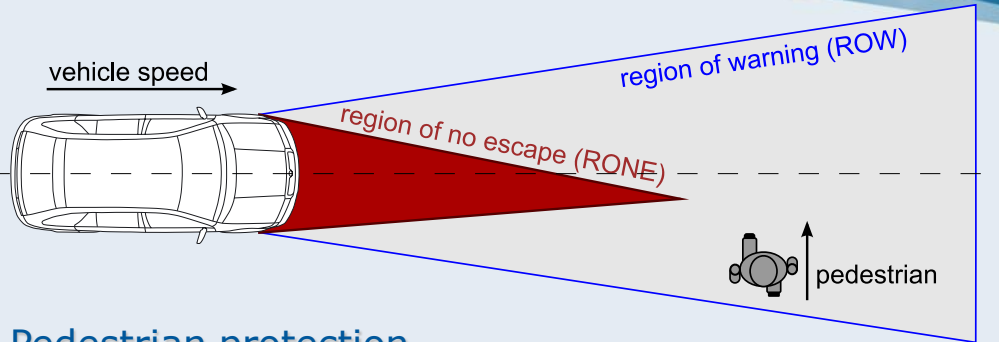
Definition of requirements and user needs of the MiniFaros laser scanner from vehicle advanced driver assistance system, ADAS, point of view.

Accident review and state-of-the-art ADAS surveys shows that there is a big potential for the MiniFaros laser scanner to be used as environment perception sensor for such applications.

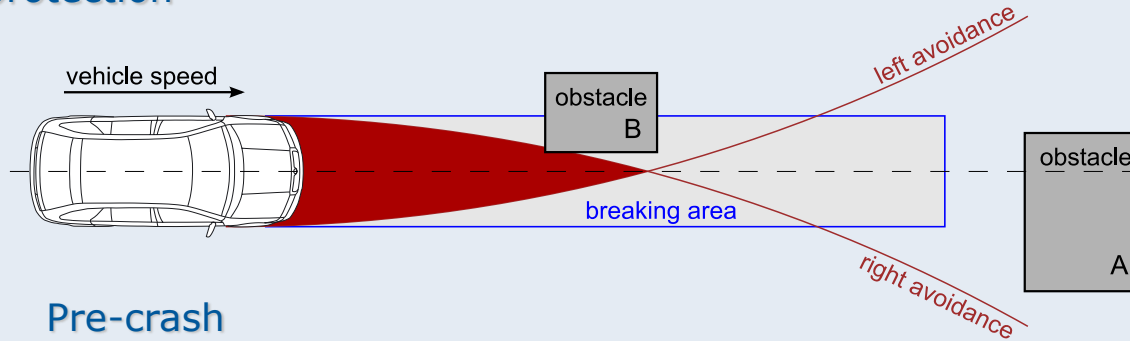
About two third of serious accidents (54-74%, 64-82%) can be addressed by a laser scanner with the following requirements

- Range 0.5 - 80 m
- Field of view 250 deg
- Update frequency 25 Hz
- Range accuracy 0.1 m
- Angular accuracy 0.25 deg

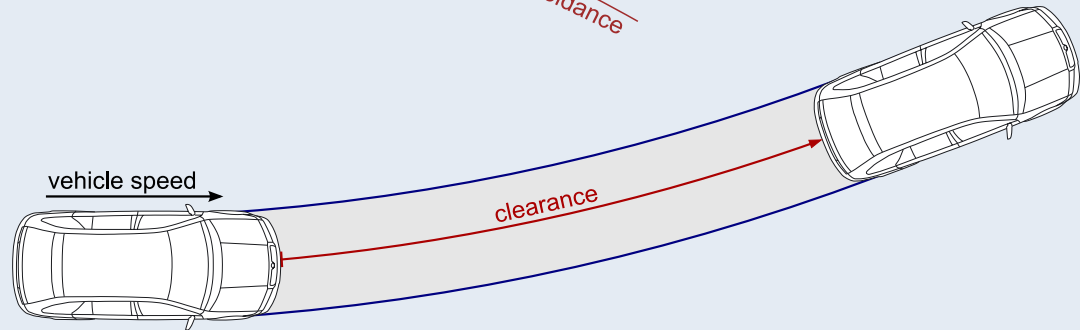
Car applications



Pedestrian protection

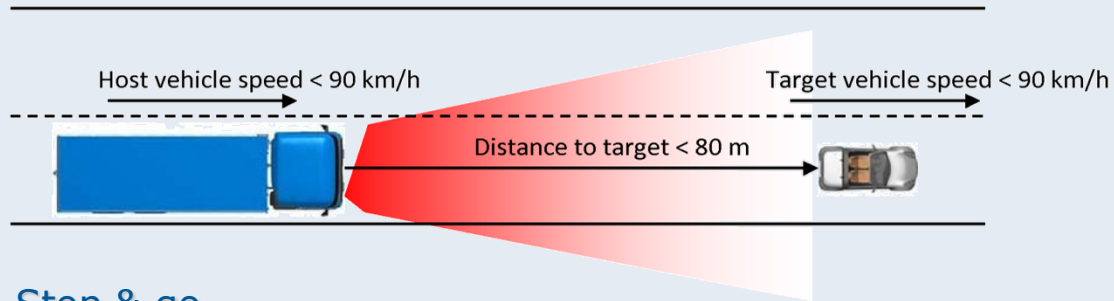


Pre-crash

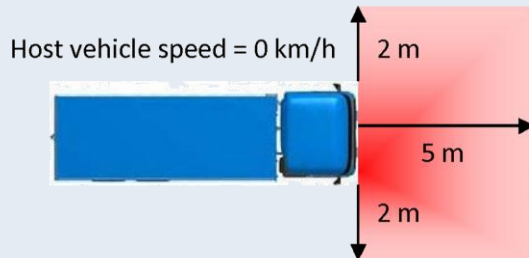


Safe distance

Truck applications

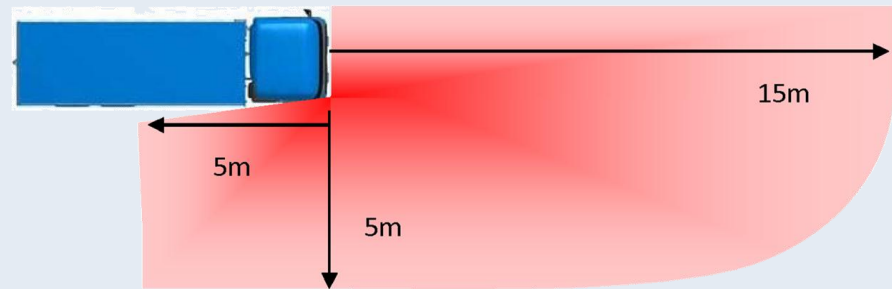


Stop & go



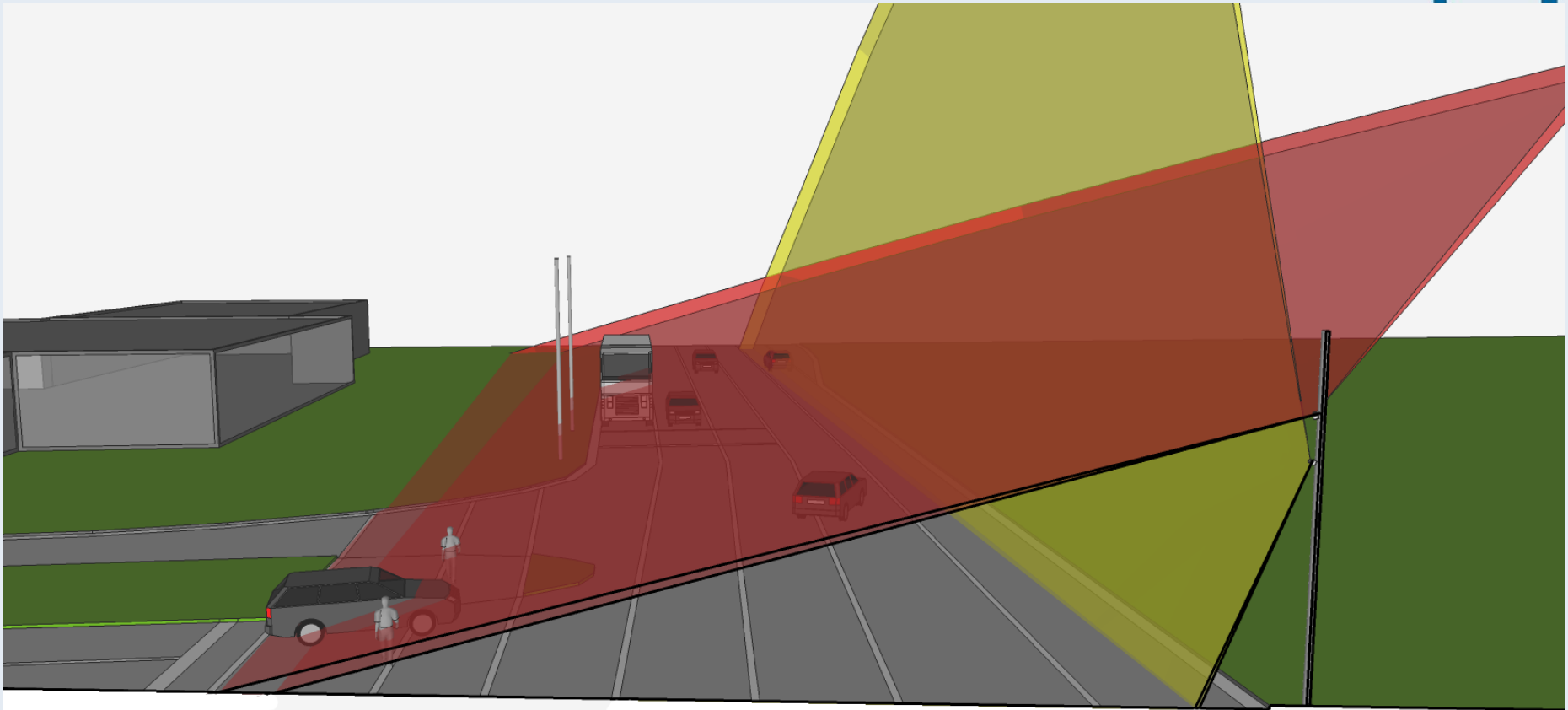
Start inhibit

Host vehicle speed <math>< 30 \text{ km/h}</math>

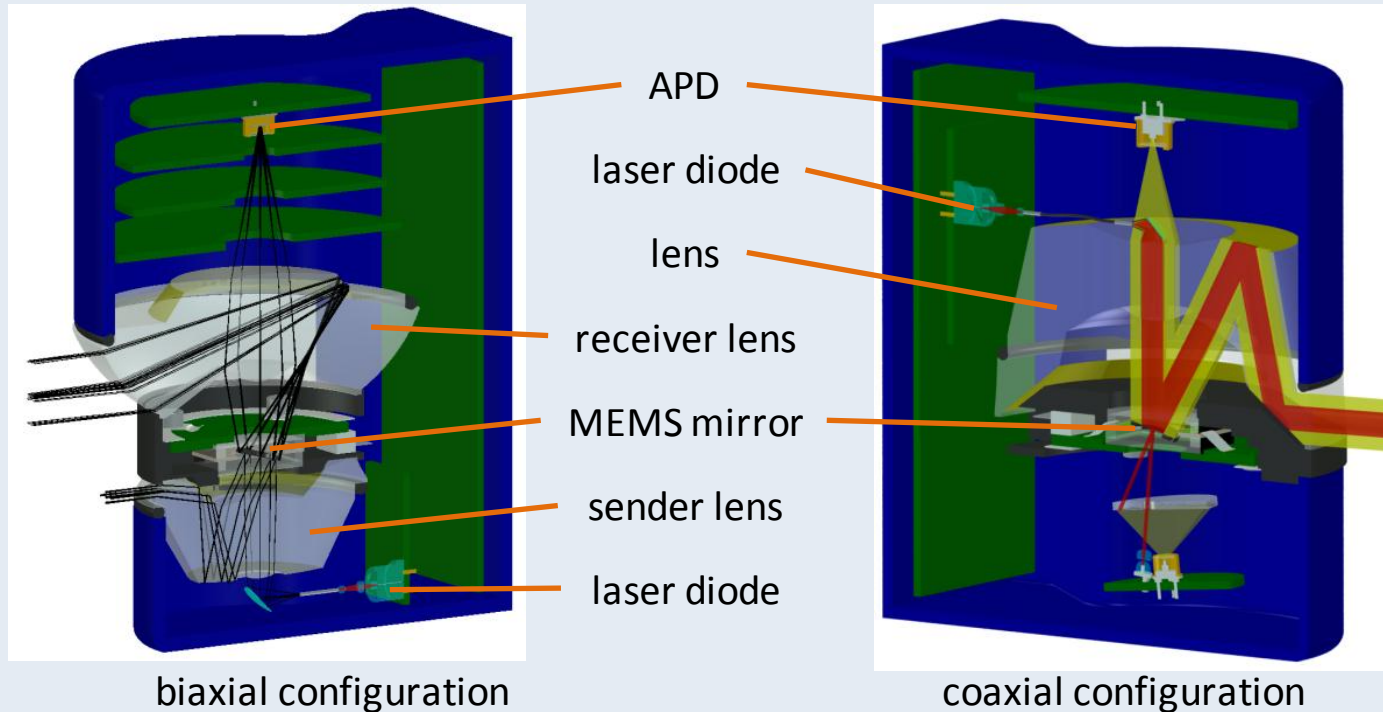


Right turn

Object Tracking and Classification

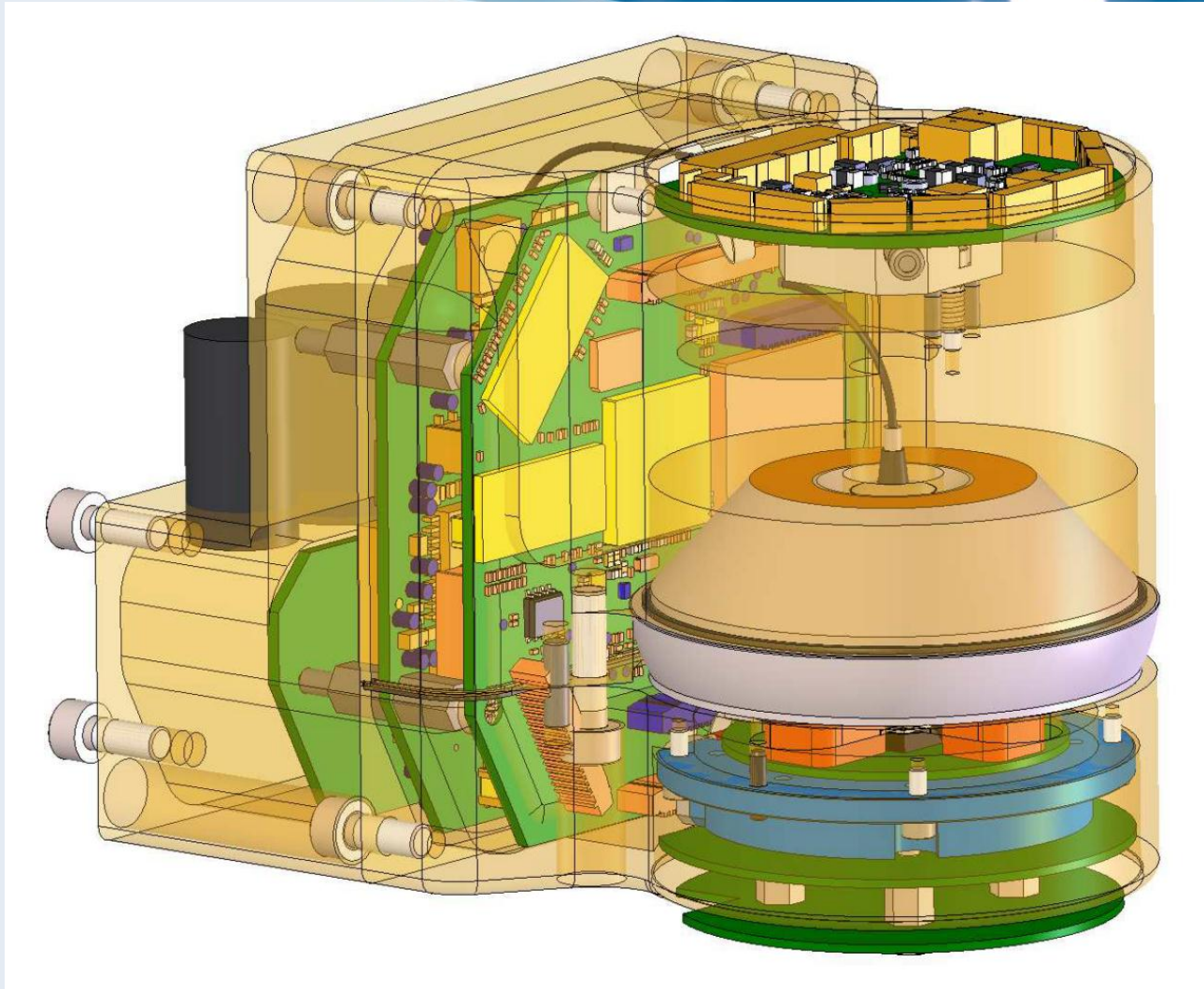


Proposed design concepts



a biaxial system with separate receiver and sender lens and a coaxial system based on one single lens

MiniFaros Laserscanner





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Thank you for your attention

**Roland Krzikalla
Kay Fürstenberg (Coordinator)**

