



Driven for Life.

Autoliv Active Safety

Vision Systems

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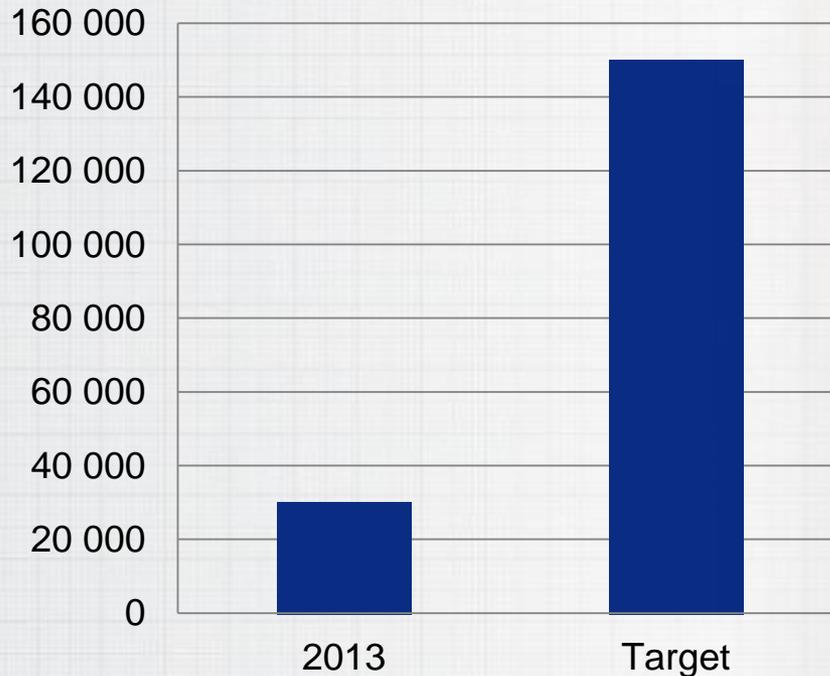
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Our Mission

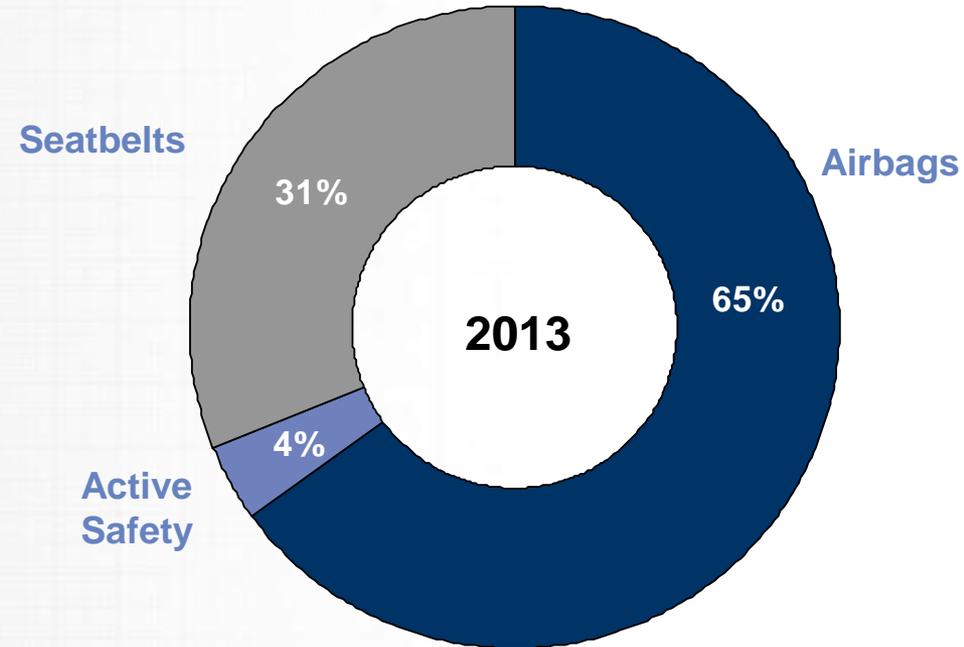
Human lives saved by our products



...additionally our products prevent ten times as many severe injuries

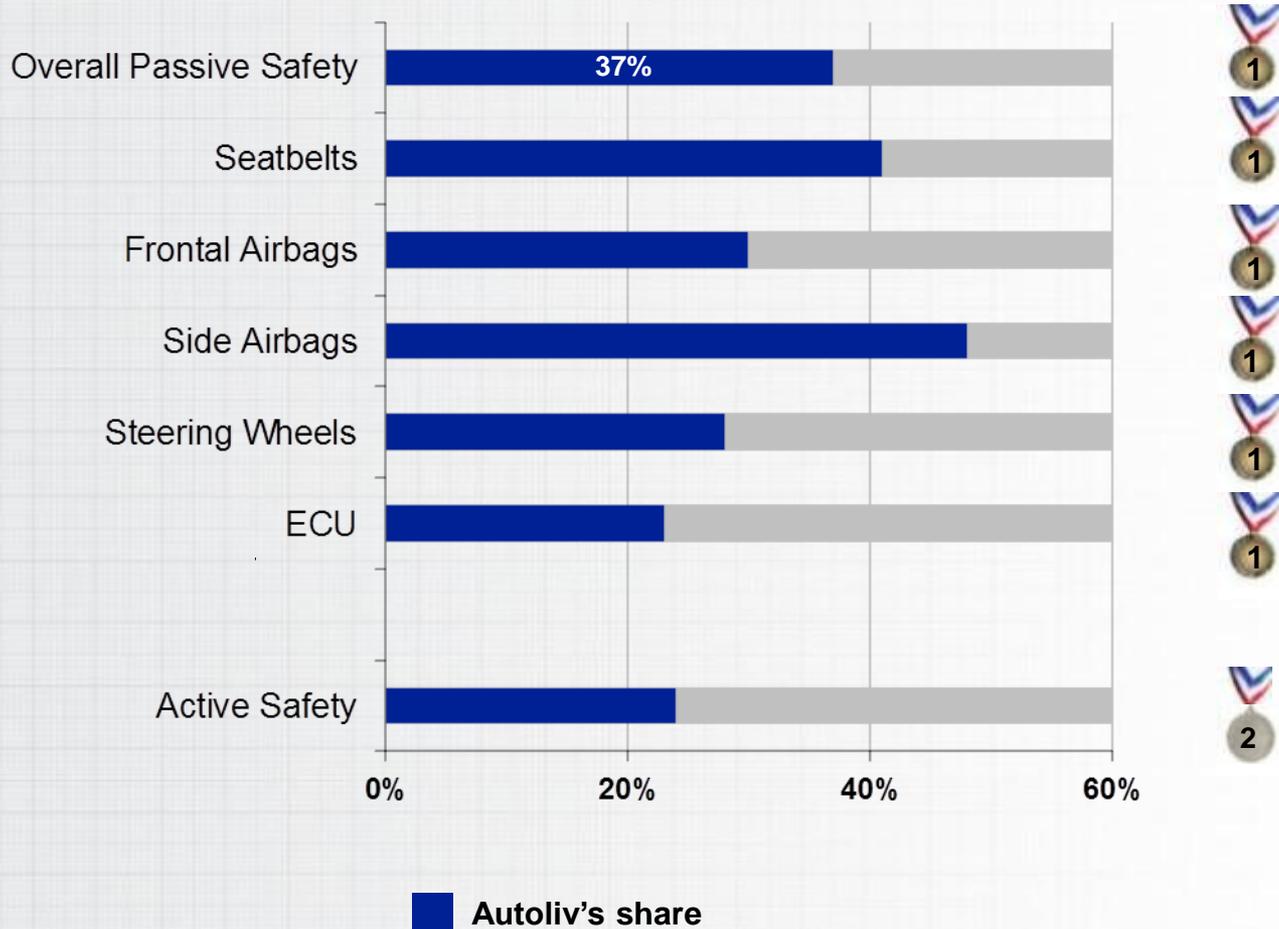
Autoliv in Brief

- Sales and technology leader
- Sales US\$8.8 billion
- Sales to all major vehicle manufacturers
- Fortune 500 company with an A- credit rating (S&P)
- ~ 80 facilities in 29 countries
- 18 technical centers and 20 crash test tracks
- ~ 56,000 associates of which ~ 5,000 in R,D&E

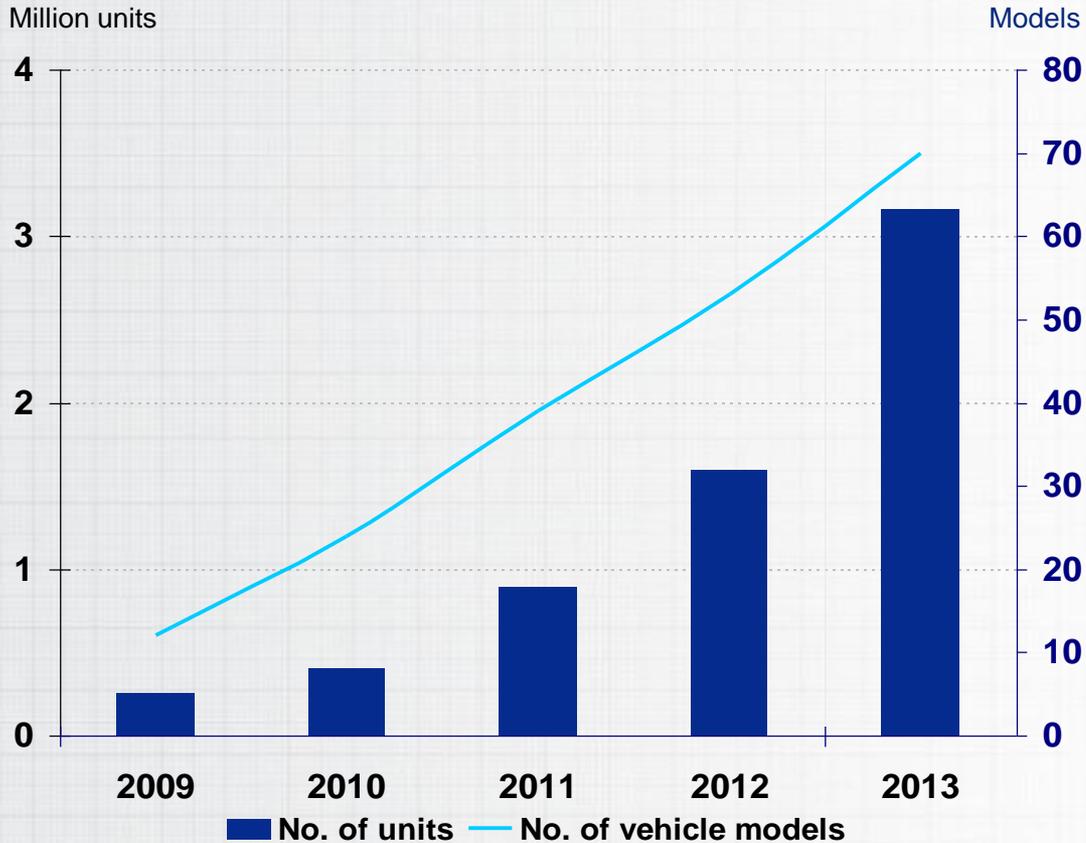


Market Shares 2013

- Global Safety Market Share by Product



Active Safety Adoption



- The rapid **adoption of Active Safety** continued. In 2013, we shipped almost twice as many Active Safety units as in 2012. Organic sales grew by 57%, and we delivered Active Safety products to almost 70 different vehicle models.

The needs now and in the
future ...



Cause of Traffic Accidents

Global Traffic Deaths: 1.3 million



🚗 Automated Driving Can Save Millions of lives

*Source NHTSA

Market Direction For The Future

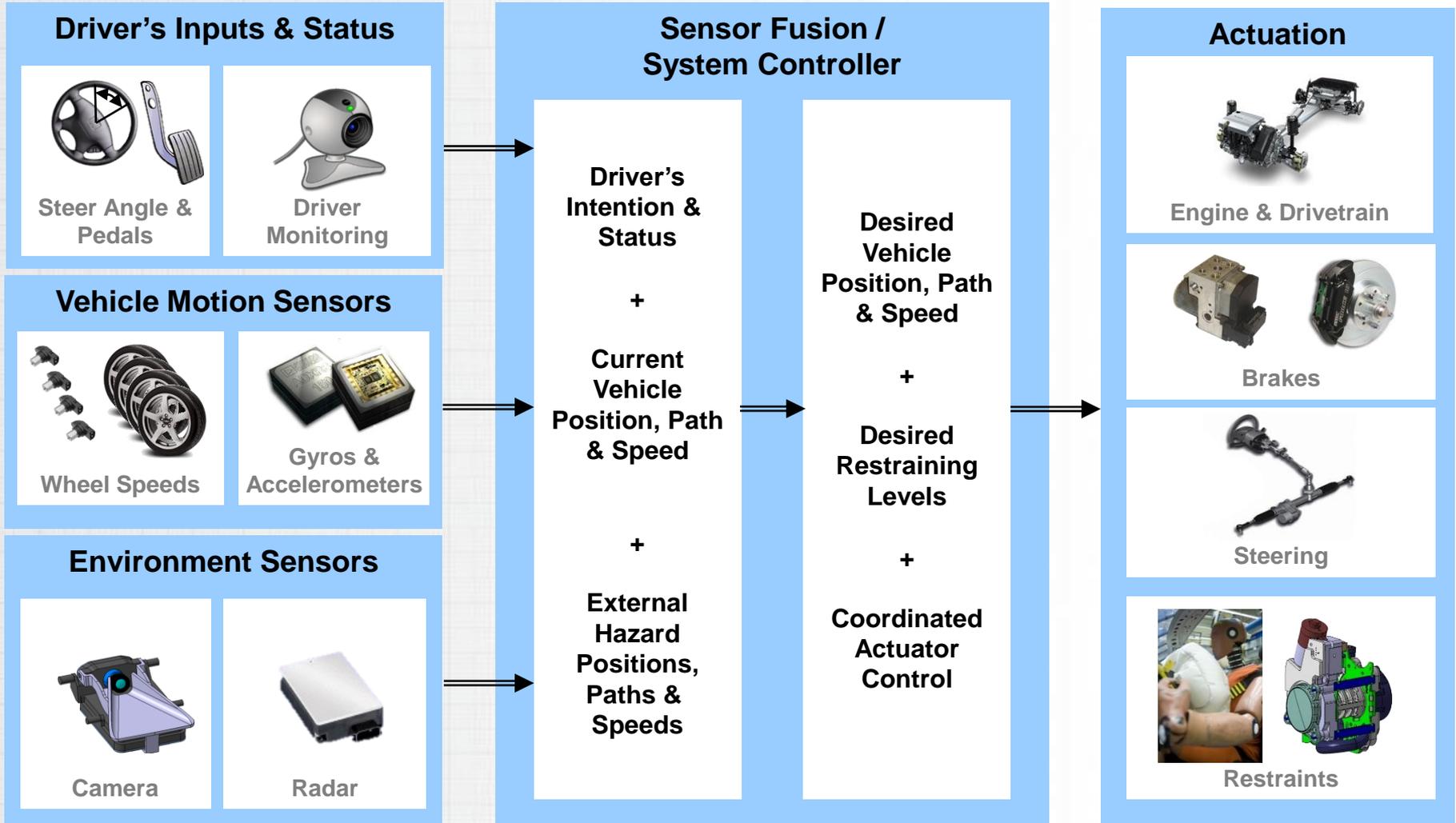


A blue humanoid robot is shown in profile, facing left. It has a smooth, featureless face and a neck with visible mechanical joints. The robot is surrounded by a complex network of black cables and wires. In the background, there are bright, circular lights and some blurred mechanical structures. A semi-transparent grey rectangular box is overlaid on the right side of the image, containing the text "Technology Enablers and Challenges".

Technology Enablers and Challenges

ALV Has Many Components

- However full system needs cooperation



Key Enablers

- Environment Sensing Technologies

Are important to Understanding Surroundings, State of Driver and Vehicle

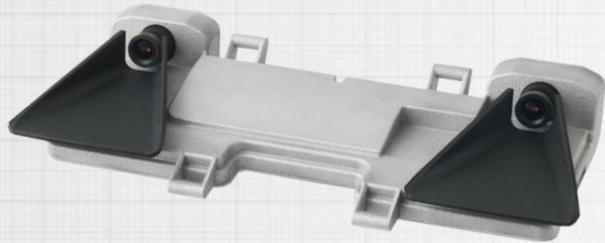
- **Camera based** – Visual features like lane, traffic signs, light, vehicles and pedestrians
- **Radar based** – Accurate & robust measurement of distance and velocity to various objects
- **Far Infrared based** – sensing living objects like animals and pedestrians using the object thermal signature
- **Other Technologies** – Lidar, Laser etc



Active Safety Vision Systems

- Product Development

Stereo Vision System



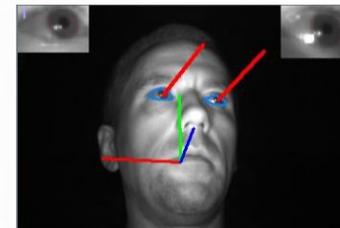
Night Vision System



Mono Vision System



Driver Monitoring System



Autoliv Active Safety Products

- Vision Systems

In production
since 2011



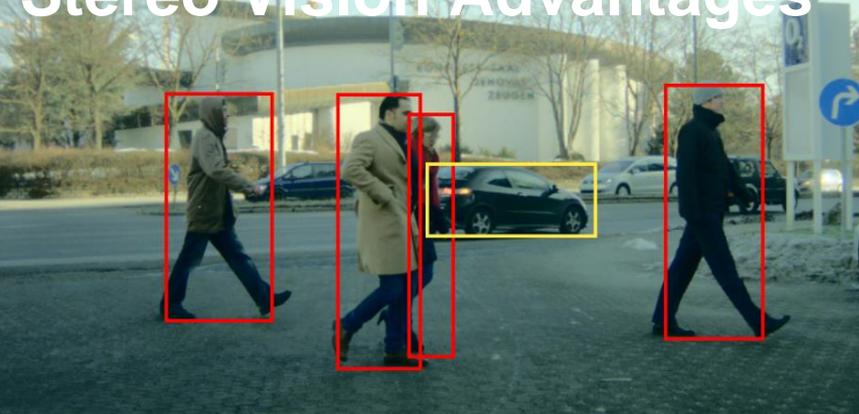
Traffic Sign
Recognition



Lane Departure
Warning

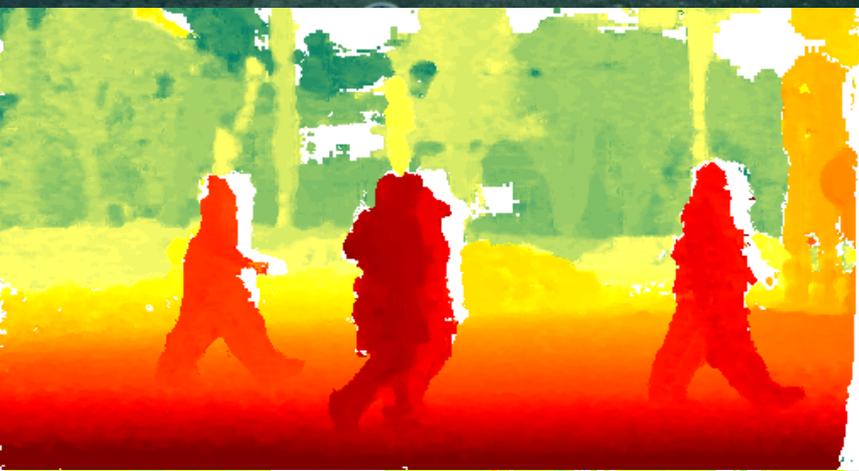
- Autoliv has launched Vision System since 2011 with BMW and is rolled out on all BMW vehicles.
- New customer with next generation Mono- and Stereo-Vision System with launch in 2015 (using Autoliv algorithms)

Stereo Vision Advantages

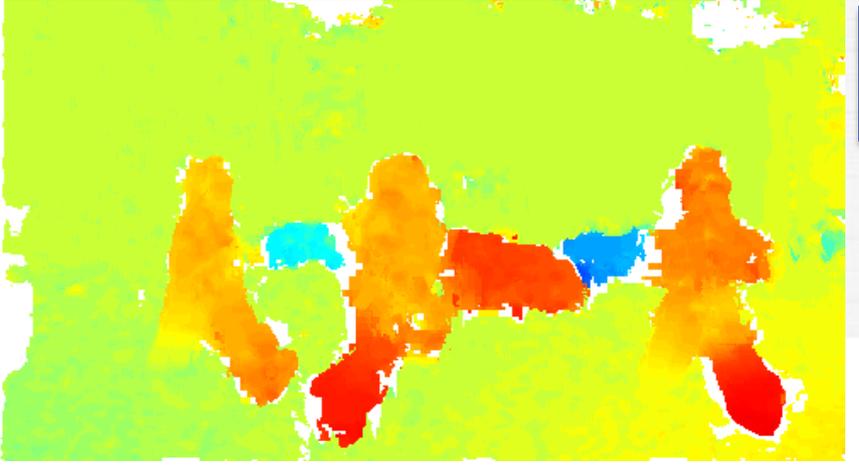
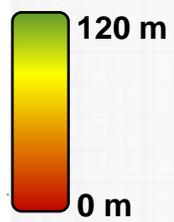


Mega Pixel Color Image (2D)

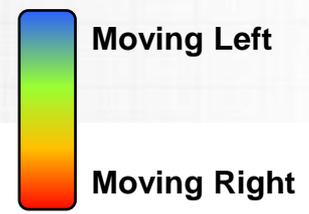
Image processing based on 3D information
The very nature of SVS technology allows you to not only detect objects in a 2D image but also predict range and predict in what direction objects are moving.



Mega Pixel Range Image (3D)



Mega Pixel Motion Image (Optical Flow)

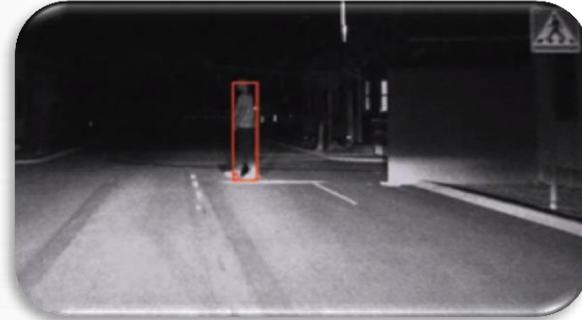


Autoliv Vision Systems

- Next Generation Advantages

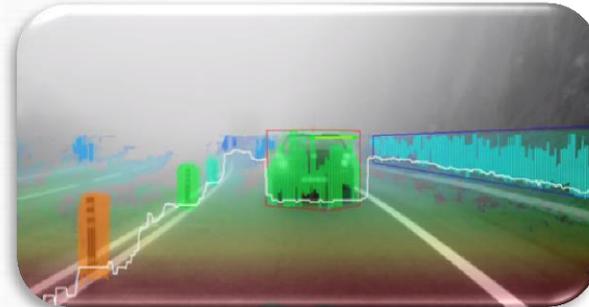
■ Night Time Performance with Pedestrian Detection

- To meet new EuroNCAP upcoming changes



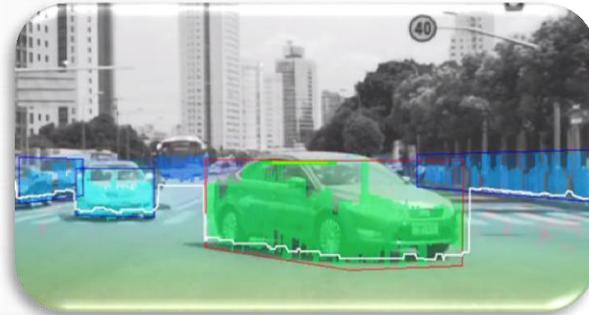
■ Adverse weather robustness

- To Increase system availability



■ Intersection assist

- To meet new EuroNCAP upcoming changes
- To extend system operation range of scenarios



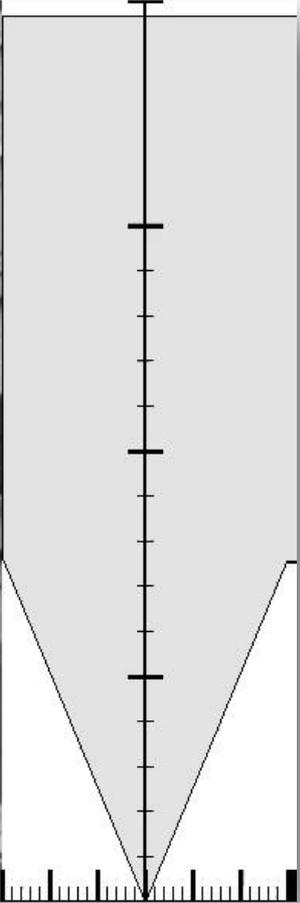
Autoliv Vision Systems - Free Space Detection



Autoliv Vision Systems - Road Surface Detection



Autoliv Vision Systems - Advanced Object Detection



Autoliv Vision Systems

- Pedestrian Detection, Night time



Spotlight Function using Night Vision

System Available on Audi, BMW and Mercedes.



Pedestrians and Cyclists on Street

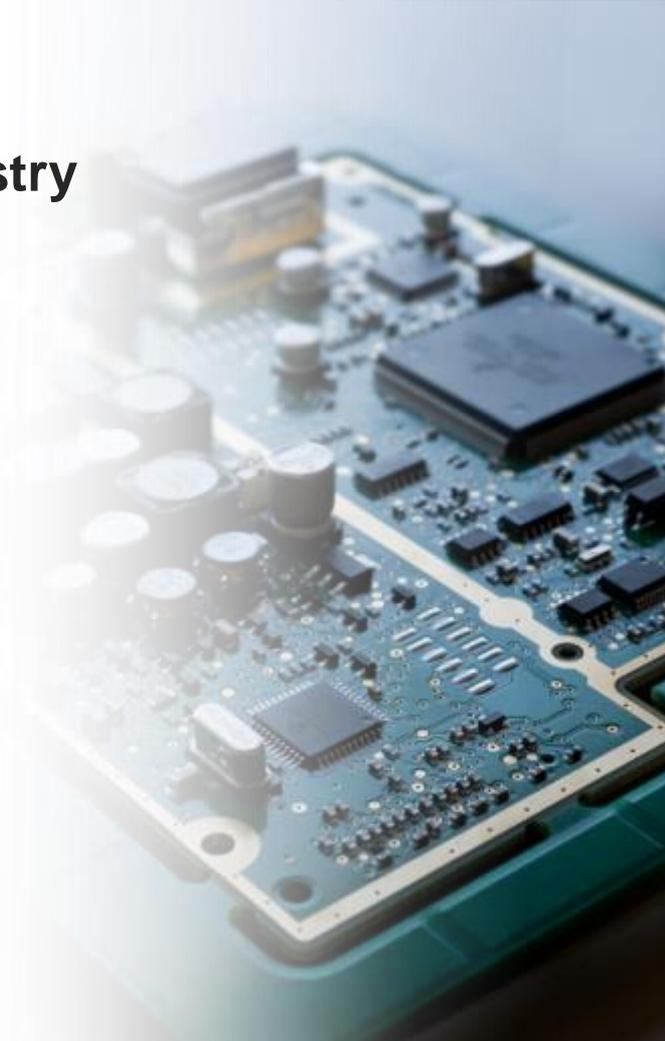


Animal Detection with Spotlight



Autoliv's Competitive Advantages

- Technology and System knowledge
- Taking advantage of Swedish High Tech Industry Cluster (SAAB, FOI, Universities, etc.)
- Speed to market and flexibility
- Global presence & market position
- A true automotive company
- Safety First





Every year our products
save over 30,000 lives

and prevent ten times as
many severe injuries