Driver Monitoring
How it works

Martin Krantz, CEO Smart Eye
GSA Europe, München, 11 April 2019
Introfilm från MILK
Bridging the gap between man and machine by developing groundbreaking eye tracking technology that understands, assists and predicts human intentions and actions.
Made in Sweden
100 employees
Nasdaq First North (SEYE.ST)
20 years of experience
Global presence
Unique software and hardware products
Market leading in automotive and premium research-based eye tracking
Automotive Solutions
The automotive evolution
Global road accidents

1,200,000 casualties every year.
50,000,000 injuries every year.

Driver monitoring will reduce the numbers and eye tracking will be a key prerequisite for autonomous driving. Enabling safe, sustainable transportation in the future.
Infrared light is used to create a reflection on each eye’s cornea.
2. Image data captured by camera

3. In the SoC (System on Chip), Smart Eye’s algorithms then identify e.g. eye and head position, driver features, iris and pupil behaviour.

4. The data is processed in different applications, deciding whether the driver is sleepy, inattentive or in a bad mood. The application may or may not be developed by Smart Eye.

5. The data sent over to the CAN (Car Area Network) - bus allows the application to interact with other subsystems.

6. Actuators receive commands to e.g. take over steering or send out a warning to the driver to stop.
The safety and convenience features of tomorrow
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- Sleep
- Passenger monitoring
- HMI interaction
- Enhanced warning system
- Alertness
- Speech identification
- Identification
- Full Ai-suite
Driver monitoring vs. automation level

<table>
<thead>
<tr>
<th>SAE automation level</th>
<th>Responsibility</th>
<th>HD map</th>
<th>DMS</th>
<th>Vehicles With DMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 5</td>
<td>Vehicle</td>
<td>Required</td>
<td>Not required</td>
<td></td>
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<tr>
<td>– Fully automated, no driver, certified roads</td>
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<tr>
<td>Level 4</td>
<td>Vehicle/Driver?</td>
<td>Required</td>
<td>FS, NCAP</td>
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<td>– Fully automated on certified roads</td>
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<tr>
<td>Level 3</td>
<td>Vehicle/Driver</td>
<td>Required</td>
<td>FS, NCAP</td>
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<tr>
<td>– Fully automated on certified roads</td>
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<tr>
<td>Level 2+</td>
<td>Driver</td>
<td>Not required</td>
<td>FS, NCAP</td>
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<tr>
<td>– Highly assisted driving</td>
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<tr>
<td>Level 2</td>
<td>Driver</td>
<td>Not required</td>
<td>NCAP</td>
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<tr>
<td>– Assisted driving</td>
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<tr>
<td>Level 1</td>
<td>Driver</td>
<td>Not required</td>
<td>NCAP</td>
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<tr>
<td>– Manual drive</td>
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New proposal EU GVSR 2018/0145(COD) mandates drowsiness and inattention warning
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BMW X3, X4, X5 and 8 Coupe launched in 2018-19

**Geely** new platform, launch in 2020

Today Smart Eye software has been awarded for 43 car models with 6 different OEMs
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DMS Facial Expressions

neutral
happy
surprise
angry
sad
fear
disgust
Body pose and action recognition

- Out of position
- Behaviour like Drinking, Smoking, Dialing
- Interaction in between passengers
Object classification
Forgotten items, baby seat occupation, driver state and gender
Feature detection

- Occupied seating positions
- Safety belt status
Automotive Supply chain

OEM
Automotive manufacturers

Tier 1
Supplies OEMs with complete systems

Tier 2
Supplies Tier 1:s with parts for a system

Customer application
Smart Eye embedded software
Two decades of research available

Time to market
Production Program
Evaluation kit
One insight at a time
See further