Challenges in Automated Driving

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- Automated Assistance in Road Works and Congestions
- Highly automated to fully automated what's next?
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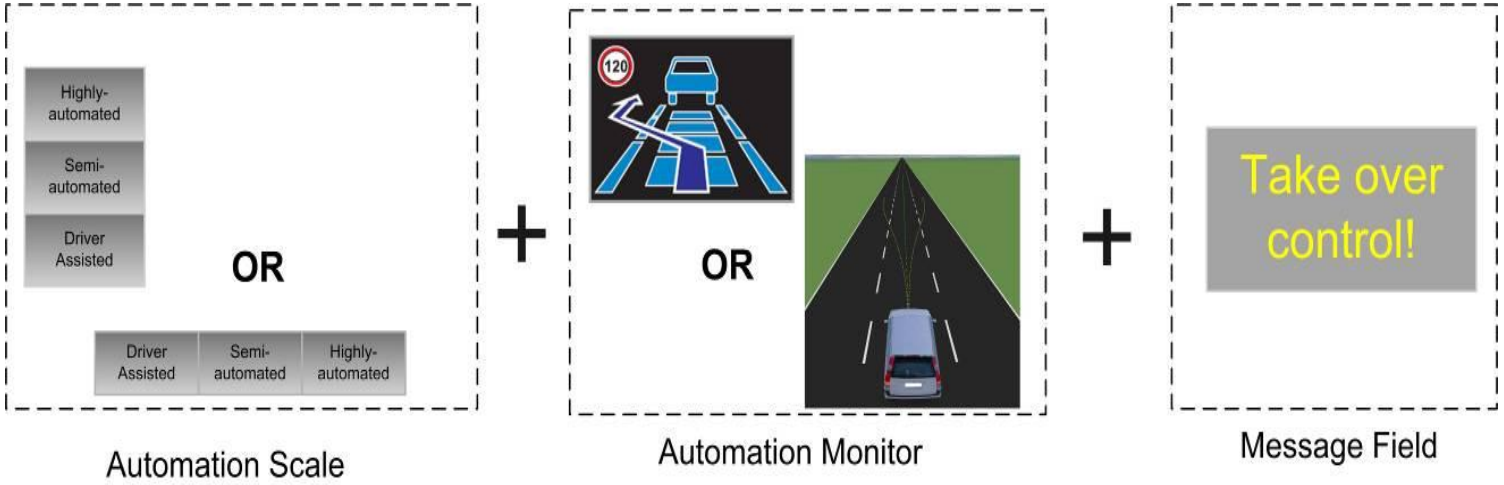
What makes automated driving attractive?

- Technological trends
- Safety and efficiency
- Comfort

Challenges

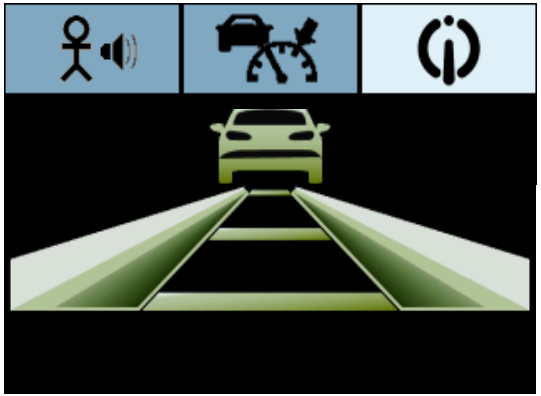
- Reliability of the system
- Driver’s trust
- Affordability

Drivers‘s Trust:
HAVEit Interaction & Display Schemes



Drivers‘s Trust:
HAVEit Interaction & Display Schemes

Joint System Demonstrator



Continental Assistant in Road Works and Congestion

VTEC Automated Queue Assistant

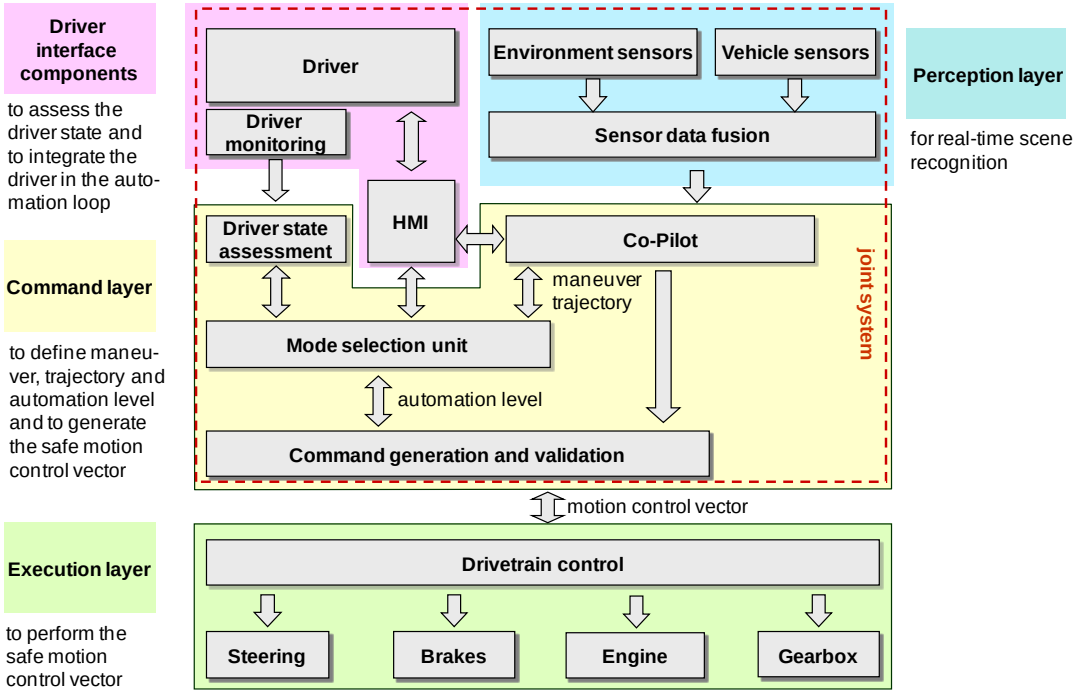
VW Temporary Auto Pilot

Driver‘s Trust:
HAVEit Interaction & Evaluation of Principles

Driver’s State

Driver – System – Interaction

Affordability
Close to series technology and appropriate architecture



HAVEit Demonstrators

Demonstrators according to use case

Highly automated driving

Safety enhancement

Energy optimization, emission reduction

Driver overload (demanding driving tasks)

Driver underload (monotonous driving tasks)

VOLVO Bus — *Active Green Driving (Energy Optimizing Copilot)*

Automated Assistance in Roadworks (and Congestion)

Continental Car

VOLKSWAGEN Car — *Temporary Autopilot*

VOLVO Truck — *Automated Queue Assistance*

Automated Assistance in Road Works and Congestion

Sensor system to observe environment

Long & Mid Range Radar

Short Range Radar

Front Camera

Driver Monitoring Camera

Highly automated to fully automated what's next?
Legal Aspects

Assisted

Automated but supervised

Longer periods of hands free

Fully automated

What's Next?
Technology

Results of HAVEit

- Definitions on automated driving
- 3 commonly understood modes
- Scalable Architecture
- Function algorithms
- Function clusters

Further work toward highly automated driving

- Functional Safety, validation
- Driver monitoring, driver analyzer
- Architecture, higher bandwidth
- Completeness and reliability of environment model
- Investigations on correlation effects of automated vehicles
- Platforms, building blocks of models, classifiers, functions, etc.
- Standard models, standard designs
- Integration of third party information, real-time and asynchronous (cooperative driving)
- Legal questions
- Investigations on necessary time span for re-involvement of driver who is out of the loop (hands on/off)

Summary and Outlook
We are close but some challenges remain

- Increasing the time span for driver's mental diversification
- Completeness of environmental model
- Merging autonomous (vehicle based sensors) with cooperative data acquisition and validation
- Mixed mode traffic
  - Anticipate behavior of driver only vehicles and derive robust drive strategy
- Market challenge: Bring value to the very first buyers of automated systems
    - Congestions
    - Virtual valet parking
    - Road works zones

Acknowledgements