The frontier of Automated Driving

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State of practice- supported driving

• Integrated Adaptive Cruise Control, Lane Keeping and Driver Monitoring commercially available
• High-end segment, low penetration rate

State of art – automated driving

• Hands-off, feet-off and brain-off driving
• Research prototypes (numerous)
• Special permits, special drivers, dedicated tracks
Automated driving in 1976....

What is automated driving?

- Partial automation
- High automation
- Full automation
High automation

Potential impacts

- Better travel experience
- No accidents
- Less congestion delay
- Better energy efficiency
- Solve traffic jams by increased outflow
- Prevent traffic jams by better stability
- Better distribution of traffic over network
- Less congestion delay
The platooning dilemma

Who goes first?

Cooperative Eco ACC

Each follower minimizes own cost

Followers jointly minimize total cost

W-LAN IEEE 802.11p
The congestion assistant

Active accelerator pedal
• Start at approach of congestion
• Counter pressure on accelerator pedal
• Smoothly adapting speed to speed of congestion

Stop & Go
• Takes over keeping speed and headway
• Switches on below 50 km/h, switches off above 70 km/h

Modelling experiments 4-> 3 lane transition

10% penetration rate, 30% delay reduction

Challenges in Automated Driving

• Human factors
  • The remaining role of the driver (if any)
  • Safe transition of control
  • Acceptance
  • Perceived safety
• Technology
  • Reliable Environment Perception - Sensing
  • Robust / fail safe control - Algorithms
  • System safety
    ➢ Integration with traffic management
• Legal
  ➢ Type approval
  • Liability
• Public awareness & acceptance
  • Demonstrations
Approach DAVI

- Study human behaviour with automation
- Assess & improve the technology of automated driving
  - Start sensor based, add communication later
- Quantify benefits at individual & network level
- Create public awareness and study acceptance of automated driving
- Pursue first steps in legalisation of automated driving
- Public roads (DITCM) and proving ground (RDW)
Frontiers that were no frontiers....

- Electronic braking
- Adaptive Cruise Control (including braking)
- Lane Keeping
- Adaptive Cruise Control and Lane Keeping
- Automatic Emergency braking

Geneva Convention on Road Traffic, European Member States Article 8.5

“Drivers shall at all times be able to control their vehicles or guide their animals. When approaching other road users, they shall take such precautions as may be required for the safety of the latter.”
The frontier of Automated Driving

- Technology?
- Standards?
- Human factors?
- Regulations and laws?

The road to automated driving...

- Collect, analyse and publish large scale real-world experience
- Case studies for regional transport networks
- Regulations, type approval
- Awareness, ambitions, expectations, reality checks