Adaptive Integrated Driver-Vehicle Interfaces:
The AIDE Integrated Project

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Outline

• Adaptive Integrated Driver-vehicle Interfaces
  • The driver-vehicle interface
  • Adaptation
  • Integration
• Current state of the art
• The AIDE Project
The driver-vehicle interface – a holistic approach

- "Interface"=all aspects that govern the driver-vehicle-environment interaction (not just the displays and controls)
- The driver, the vehicle and the environment must function together
  -> holistic ("ecological") approach needed
Adaptation

- We can monitor the **Driver**, the **Vehicle** and the **Environment** (DVE state) and adapt the driver-vehicle interface accordingly

- **Examples:**
  - Lock-out/postpone non-critical information on demanding situations
  - Adapt the timing/intensity of safety warnings (e.g. warn earlier when the driver is inattentive)
Benefits of interface adaptation

• Prevent driver information overload (inattention major cause of road accidents)
• Enhance efficiency and acceptance of active safety systems -> increase safety effects, accelerate deployment

Tricky issues

• Adaptive system more unpredictable -> more difficult for the driver to create mental model of the system
• The driver is a strongly skilled adaptive system. How will the driver adapt back in response to system adaptation -> infinite cycle of adaptations…?
Integration
Today: Rapid functional growth
Traditional approach: Non-Integrated systems

- Sensor → Application 1 → HMI I/O
- Sensor → Application 2 → HMI I/O
Integration

- Shared HMI input and output (as well as sensors)
- Centralised management for allocating resources and resolving HMI conflicts between applications
- Automatic integration of stand-alone systems (e.g. nomad devices)
Integration

Benefits

• Prevents interference between applications (e.g. by prioritisation)
• Enhances efficiency of functions by exploiting synergies
• More efficient use of hardware (reduces cost)

Tricky issues

• More complex development process
• More complex system architecture (key enabler)
• Different behavioural effects of combined systems (?)
• How to evaluate integrated systems?
Adaptation + Integration = The Adaptive Integrated Driver-vehicle Interface (AIDE)
Current state of the art

Strong tradition of EU-funded research on Adaptive integrated driver-vehicle interfaces!
Current state of the art

US: SAVE-IT
- Ongoing major project on adaptive interface technologies
- Sponsored by NHTSA
- Led by Delphi

AMI-C (Automotive Multimedia Interface Collaboration)
- Standardisation for HMI integration

Systems in production:
- Saab Dialogue Manager
- Volvo Cars Intelligent Driver Information System (IDIS – standard in new S40 and V50)

Other in-house work
- Most OEMs and suppliers are working on it…
Future prospects: How to bring this to the market on a larger scale?

Key steps:

- Establish industrial consensus around the general idea of Adaptive Integrated Interfaces
- Develop an enabling system architecture – interact with existing initiatives (e.g. Autosar, EASIS, AMI-C)
- Standardisation (?)
- Focused research and development!
  - Driver behaviour when interacting with adaptive systems
  - Evaluation methods for adaptive integrated interfaces
  - Further development of HMI- and driver monitoring technologies
The AIDE Integrated Project: Basic facts

Integrated project on automotive human-machine interaction (HMI)

Addresses IST strategic objective (10) "eSafety of road and air transport"

4 years duration

Started: March 04

Budget: 12.5 ME (Total), 7.3 ME (EU funding)

28 partners (~50/50 industry-academia division)

Part of the EUCAR Integrated Safety Program – close links to other related FP6 initiatives

AIDE core group: VTEC (coordinator), BMW, Bosch, CRF, ICCS, JRC, PSA and TNO
## The AIDE Consortium

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AIDE IP

AIDE: Overall project structure

Sub-project 1
Behavioural Effects and Driver-Vehicle-Environment Modelling
Leader: JRC
Vice-leader: PSA

Sub-project 2
Evaluation and Assessment Methods
Leader: TNO
Vice-leader: BMW

Sub-project 3
Design and Development of an Adaptive Integrated Driver-vehicle Interface
Leader: ICCS
Vice-leader: CRF

Sub-project 4
Horizontal activities
Leader: VTEC (IP Coordinator)
Interactions with other initiatives: The Integrated Safety Program & HUMANIST

EUCAR Program: Integrated Safety

- AIDE
  - Adaptive Integrated Driver-vehicle Interface
  - Driver Modelling
  - Evaluation
  - HMI Design

- EASIS
  - Electronic Architecture and System Engineering for Integrated Safety Systems

- PREVENT
  - Integrated Preventive Safety Systems:
    - Lane Keeping
    - Collision Warning
    - Intersect. Control
    - ...

- APROSYS
  - Advanced Protective Systems
  - Enhanced restraint and protection systems, Crashworthiness

- GST: On-line Safety Services
  - Traffic Info., Hazard Warning Rescue Service

OEMs:
- BMW, CRF, DC, Ford, Opel, Seat, Renault, PSA, Volvo
- DC, CRF, Ford, Opel, PSA, Renault, Volvo
- BMW, CRF, DC, Ford, Opel, Renault, PSA, VW, Volvo
- AUDI, CRF, DC, PSA, Renault, VW, TNO
- BMW, DC, Opel, ...

Co-ordinator:
- Volvo
- DC
- DC
- TNO
- Ertico
AIDE open forums for dissemination and interaction with key stakeholders

User forum (leader: ICCS)
• Facilitate interaction with target user groups and other key stakeholders (industry, academia, governments, standardisation organisations etc.)

System architecture forum (leader: Bosch)
• Facilitate open discussion on HMI architecture

Nomad forum (leader: ERTICO)
• Facilitate open discussion between automotive and telematics industry (and other interested parties) on methods and techniques for safe integration of nomad devices
## IP Contact

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