Safe and Efficient Electrical Vehicle

Joint EC / EPoSS / ERTRAC Expert Workshop 2011
Electric Vehicle System Integration and Architecture
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Agenda

» Objectives

» Partners and work packages

» Architecture definition – Ideas and Challenges

EC funded corporate research project, 2010-2013, framework: Green Cars Initiative
Grant number 258133
Objectives of the project

» **Innovative E/E Architecture**: *how to design a lean and interconnected component set for FEV.*

  » Holistic approach to overcome separate ECUs and account for Domain Controller trend

» **Adaptive driveline**: *how to facilitate safe and efficient driving by an intelligent two motor concept.*

  » Achieve advanced driving stability while maintaining a high level of functional safety

» **Human energy management**: *how to support the driver for intelligent energy use.*

  » Proper choice of driving modes
  » Efficient driving

» **Greening the ADAS**: *how to use driver assistance ecologically.*

  » New functions to support safe and efficient driving
  » Take advantage of extended environment knowledge
Partners

INTEDIS
E/E Architecture, Vehicle Specifications, PM

TATA Motors Engineering Technical Centre
Vehicle Concept, Vehicle & Prototype builds,

HELLA – Electronic Components, Energy & Battery Management

MILJØBIL
Traction Battery – Concept and builds

IFSTTAR
Virtual Co-Pilot, Green ADAS

Würzburg Institute for Traffic Science
Driver Acceptance, HMI functions
Working Packages

- **INRETS – WP 600**
  - Co-Pilot Configuration
  - Passive Prototype

- **HELLA – WP 500**
  - Architecture Components
  - Test Bench

- **TMETC – WP 400**
  - Driveline Integration
  - Driveline on HiL

- **INTEDIS – WP 200**
  - Vehicle Specification

**TMETC – WP 300**

- Prototype 1 GE
- Prototype 2 UK

**Start of project**
- Sept. 2010

**End of project**
- Aug. 2013

**Milestones every 6 months**

**24 deliverables**

**Project coordination by Intedis (WP 100)**
Architecture definition

» Basic ideas

» Reduce number of control units

» Create new functions by using existing functions

» Arbitrate between comfort, efficiency and safety by decision units

» Managing the transfer from assisted to manual driving and v.v.
Architecture definition

» Basic ideas
  » Reduce number of control units
  » Today’s situation vs. the extreme
Architecture definition

» Basic ideas

» Reduce number of control units

» Intermediate solution with Decision Units as central intelligence
Architecture definition

» Basic ideas

» Create new functions by using existing functions

- Smart & Green ACC
- Decision Units
- Driving Evaluation
- Driver Coaching
- Energy Modes
- Decision Units

- Advanced Energy Mgmt.
- Vehicle Observer
- Torque Vectoring
- Stabilizing ADAS
- Guiding ADAS
- Energy Mgmt.
- Sensor Fusion
- Driver
- Perception Layer
- Sensor Mgmt
- Navi/eHor
- HMI
- Command Layer
- Decision Unit 1
- Execution Layer
- Decision Unit 2
- Drivetrain
- Steering
- Smart & Green ACC
- ACC
- Driver Coaching
- Energy Modes
- Decision Units
Architecture definition

- Basic ideas
  - Arbitrate between comfort, efficiency and safety by decision units
Architecture definition

» Basic ideas

» Managing the transfer from assisted to manual driving and v.v.

» Example: Choice and transition of stabilizing ADAS in the DU2
Tools for architecture development

Functional modelling

Vehicle modelling

Function and scenario definition

Definition of hardware concept
Challenges

» Align all functions in a consistent model

» Implement a Functional Safety Concept for an electric drivetrain with two front motors

» Set up prototype (HW&SW) and validate functions and architecture
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Thank you for your attention. Questions?

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