

NoAE Innovations-Competition 2011

Download TC1.1.

Topic-Cluster 1: Powertrain & Electrification	
	Optimisation of the drive train – acceleration in developing new and alternative powertrains – Electrification for Mobility – Energy consumption
Powertrain	Applications and Architectures • Applications and architectures for electric, hybrid and fuel cell vehicles • Full hybrid and/or electric car applications (automotive) • Chiptuning • adaptive power control and management Concepts and Design • Heating and Cooling concepts • Modularity --> re-use in Transportation • Inverter design Energy and Voltage • Low voltage hybridization: Cost efficient design for electric motor and energy storage • Energy recovery devices to convert wasted energy in the powertrain and the vehicle into electricity • Energy management systems and energy management systems of the vehicle and infrastructure

	• Energy-saving brake systems • High voltage battery modules • advanced power electronics • regeneration and energy harvesting - heat, vibration Motor and Motor management • Motor management and auxiliary power • Increase in the efficiency of electric and hydraulic engines • Technologies for high torque motors Others • Robust real-time simulation for powertrain • Testing methods for alternative powertrains (e.g. high-voltage technology) • New material for powertrain components • Power electronics • variable frequency power
Battery Electric Vehicles	Applications • New battery technologies • High voltage battery modules • conductors (polymers, superconductors) Cells • High-energy density cells • fuel cells, high power density batteries, ultra-capacitors Concepts and Design • New battery concepts • High voltage battery modules • Re-Activation methods for used/end-of-life modules • Increase of battery power capacity versus weight and space • Wireless power • Storage combinations (battery caps)

	- federated power - fuel cells, high power density batteries, ultra-capacitors Charging - New charging methods - Charging cycles optimisation, intelligent charging, fast charging - Inductive charging - Air-cooled battery charger - Chemical "recharge" (e.g. substitution of electrolytes) - Battery swap vs. fast charging - Storage combinations (battery caps) - Deep discharge for range extension - Charging infrastructure and Billing of charging Maintenance & Recycling - Health status - Predictive maintenance - Recycling
Electrification of Vehicles	Applications and Concepts - Cooperation between hybrid powertrain energy management and "information and telecommunication" systems to maximise customer value - Mobility service packages - Connecting technologies for "electric vehicle fitment" Design - Future tire line developments Heating and Cooling - Intelligent HVAC solutions - Heating and Cooling concepts - HVAC solutions for (EVs)

	Smart Grid – Power Grid • Impact of vehicle electrification on power grid • Development of applications on mobile devices in context with operating electrified vehicles • Smart grid could be connected to Cloud Services; transfer architecture from IT to power distribution
Electric and Electronics	Diagnosis Systems • (remote) Chassis and suspension diagnosis systems (material failure detection) Controller • Complexity of controller architecture • Selection of controller strategy Engineering • Reliability engineering and management • Requirements engineering for electronic systems and components • Increase system effectiveness of electronic systems Sensor • Sensor integration • Sensor components for EVs
Where innovations are found	Universities and Research Institutes • University and research facilities • Research institutes Companies • Electric engineering companies • Entire value chain from level n to OEM (automotive and transportation) • Electric components companies

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Topic-Cluster 2: Communication & Mobility	
	Communication and information technology – new business models and concepts of mobility and E-mobility
Communication and Internet	Communication & Connectivity: • Communication protocols • Security of communication • Relevance of 4G technologies for internet connectivity (e.g. video) • Cloud computing more integrated functions for mobility – needs and solutions Devices • Mobile devices and mobile services during drive/ride • Mobility efficiency via joint telematic and navigation eMobility • Services and Monitoring Information and new Services • Information comforts during driving • Drive safe and drive connected with facebook and twitter as well as cloud computing (automotive)

	Onboard and Remote • Remote diagnosis • Onboard monitoring: Onboard conditions data collection for wear and tear components (sensors) e.g. running gear/suspension • Remote connection: Constant connection with central diagnostic system Standards • Standards and Standardization
Human – Vehicle Interaction	New Applications • New concepts • New use-cases • Interface: virtual/augmented reality, speech synthesis/recognition, 3D audio/visual, tactile cueing/feedback, enhanced/synthetic vision, displays/display controllers, human error/performance prediction Smart Applications • Filtering and reduction of information during drive/ride • Smart guidance • Contact-less payment (NFC) • Payment via mobile phone • decision aid / support: situation awareness, decision visualization, cognitive performance model Testing and Simulation • Testing and simulation with human interfaces • Influencing driving habits with telematics and HMI-solutions (automotive)

Intelligent Transport Systems and Services and Integrated Mobility (Door-to-Door-Mobility)	Joint Applications and Solutions • Joint content applications and locally-based services for aerospace/automotive/transportation • Joint telematic solutions for aerospace/automotive/transportation – telematic for inter-mobility Traffic Management and Infrastructure • Cooperative driving and intelligent traffic systems • Joint Traffic management • Applications for a robust infrastructure network • Integrated on /off road transportation systems • Smart device integration Services • Full-service offerings for Door-to-door-Mobility • Consultancy Payment Systems • Payment systems for Door-to-Door-Mobility • Contact-less payment (NFC) • Payment via mobile phone Automotive • Effects of Car2CarSystems Aerospace • In-flight entertainment • Content – web in the air
Where are innovations found?	Universities and Research Institutes • University and research facilities • Research institutes

	Companies • Electric and Internet services companies • Application provider • Content provider • Full-service consultants • Rail/airline operators • Telecommunications, telematics, navigation • Avionics suppliers / industry
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Topic-Cluster 3: Materials & Manufacturing	
	New/Eco Materials - and an optimal manufacturing process/life cycle in mobility industries
Materials and Light weight construction	Eco-Life cycle for Materials • The entire life span of a product or material from raw materials to disposal • Eco-materials and renewable materials • Eco building materials • Recyclable (e.g. composites) Function and Combination of Materials • Materials for higher reactivity • New materials for new functions • Bio-degradable materials • Carbon-based materials • Material and product innovation for customised seals and polymer components • Improved material efficiency and recycling potentials/concepts • New material combinations for e.g. aluminium-magnesium or plastic/metal • Applications for high-performance thermoset and thermoplastic materials • New surface structures

	• multi-functional materials • conductive composites (thermal, electrical) • printable electronics • long life – corrosion, fatigue Light weight construction • Lightweight materials and lightweight construction • ultra-high strength-to- weight • light weight, moisture-resistant insulation Recycling • Recycling considerations • Recycling of carbon-based materials
Manufacturing	Eco-Life cycle for Production • To look at or design a product or material from the beginning to the end of its life to assess the environmental standards and the impact it made on the environment: raw material, manufacturing, end product, use, reuse, recycling, disposal • Optimisation of the CO2 balance in production Methods for production • Open manufacturing • Energy efficient manufacturing methods • New manufacturing methods without hard tooling (for low-to mid level production volumes) Value Chain Applications • New production processes/methods for the entire value chain • Human robot cooperation/interaction • New production processes for alternative powertrains e.g. in the electric motor, batteries Quality and Testing • Improved methods for zero-failure production to save resources

	• New safeguard processes for an increase in quality • Testing methods for alternative powertrains (e.g. high-voltage technology) Value Chain Applications • New production processes/methods for the entire value chain • Human robot cooperation/interaction • New production processes for alternative powertrains e.g. in the electric motor, batteries
Where are innovations found?	Universities and Research Institutes • University and research facilities • Research institutes Companies • Entire value chain from level n to OEM in automotive, transportation and aerospace industries

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Topic-Cluster 3: Materials & Manufacturing Automotive Specials		
Reduction of brake dust on rims		Situation: - Through the wear-out of brake discs and in particular brake pads, brake dust is produced, which settles on the rims. In the long term, this not only damages the rims but is above all also optically disturbing. Question: - How can brake dust deposits on rims be reduced? Possible solutions could include, for example: - Special coatings - Electric charge - Constructive solutions, which leave room for an even broader scope of design.
Avoiding surface damages		Situation: - During use, exterior and interior surfaces are exposed to stresses, which lead to damages such as scratches, stone-chipping or other damages. Question: - How can damages on interior and exterior surfaces of the vehicle be avoided? Possible solutions can be found, for example, on the basis of: - Special coatings - Treatments - Self-repairing effects

Lightweight glazing construction-		• Situation: • Increasing comfort features as well as new safety regulations are leading to a more rapid escalation in weight of the vehicle. In order to curb this weight spiral of vehicle mass, lightweight construction topics are playing an even greater role and in particular, glazing offers great potential for effectively reducing weight on the basis of the vehicle's centre of gravity. Question: • With regards to glazing, which possibilities can help to save on vehicle weight? Possible solutions could come from the following areas, for example: • Lightweight construction • Use of new materials (scratch-resistant plastics – lightweight glass) •
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Topic-Cluster 4: Design & Interior	
	Society is changing (aging, urbanisation...) as is the framework of conditions (resources, laws, infrastructure).... and technologies are changing new design requirements
Design & Eco-Design	Eco and Environmental Design • A design which considers ecological principles from concept to disposal. Looking at the least amount of damage to humans, the earth, climate and natural environment. • Design of physical environments that are socially and ecologically sustainable. Taking a holistic look at: interior/exterior, urban & natural landscape, noise/sound/acoustics, sight/vision/aesthetics, smell, air quality, natural light, heating, cooling, ventilation, comfort factors/ergonomics, historic preservation/vernacular design, universal design/whole building design/disabled access. • Sustainable design / design for sustainability and design for environment • Carbon-neutral design • Design parameters and specific performances for electric vehicles (automotive) Future Design • Design studies for new mobility • Mobility in megacities eMobility

	• Package design for electrified vehicles (e.g. with respect to battery integration) • Impact of infrastructure interface on design (e.g. vehicle charging) Reverse usage • automotive – aerospace – transportation
Interior & Convenience	Comfort, Function & Handling • New functions for individualisation • Target group specific features – age pyramid • New functionalities inside the vehicle/cabin • Flexibility of usage • Simplified handling • Customer convenience and comfort • Use of wireless charging inside the vehicle on interior design Holistic interior design • A complimentary way of designing interiors based on achieving a balance between design principles, human health and well-being, and our natural environment. Support • Mental relief and support Technology & New Standards • 3D-printing • Impact of new standards for wireless video transmission on entertainment system design
Where are innovations found?	Universities and Research Institutes • University and research facilities • Research institutes • Universities of Design and Applied Sciences

	Designer • Designer for Future • Cross-Innovation between the mobility branches Companies & Others • Fashion industry
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Topic-Cluster 4: Design & Interior “Automotive Special”

Use of space and luggage compartments



Situation:

- Nowadays, customers have higher expectations for flexible solutions regarding the use of space and luggage compartments in the vehicle, even in sports cars. Thereby customers would like to be able to store their things in the vehicle easily, comfortably and flexibly.

Question:

- In connection with this, which possibilities are available that will increase the suitability for everyday use without forgoing the characteristics of a sports car?

Possible solutions take into account, for example, the storage of:

- Handbags
- Mobile telephones and electric devices
- Drinks
- Luggage and bags