Smart Systems for Safe, Clean and Automated Vehicles

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Overview

• **Context**

• *The importance of and for electronics*

• *Work in hand – statistics and examples*

• *Ongoing Initiatives*

• *Issues for the Future*
Context – Europe's transport challenges – targets 2020-2050

- Road safety: -50% by 2020, towards zero fatalities in 2050
- Reducing congestion: estimated -2% GDP
- Energy efficiency and emissions: - 60% by 2050
- Addressing growth in demand and increasing urbanisation, ageing population
- Integration of different transport modes
- Make use of R&D including ICT
- Reducing dependence on oil and impact of increasing oil prices
- Reducing noise and air pollution in cities
Context – Autonomous vehicle

- Human errors in attention and vigilance are the sole cause in 57% of all road accidents and are a contributing factor in over 90% of road accidents and near-crashes
- Main potential benefits
  - Increase comfort
  - Increase safety
  - Increase road capacity
  - Contribute to green mobility
Europe dominates the market for automotive semiconductors (34% share)

Japan & Germany are the top automotive semiconductor countries (together ~45% share)

Essential qualification for the European success (amongst others)
- Close vicinity to the customers
- Highest qualified development engineers
- ASICs in More-than-Moore technologies

Till 2017 (at least): good further growth
- 6.3% - CAGR for total world
- 7.7% - CAGR for Europe
- Share of Europe up to 36%

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### Further Potential of Safety Enhancement

<table>
<thead>
<tr>
<th>Driver Assistance</th>
<th>Active Safety</th>
<th>Passive Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radar based systems</td>
<td>Vehicle stabilizing</td>
<td>Detection &amp; sensing</td>
</tr>
<tr>
<td>Ultrasonic based systems</td>
<td>Brake functions</td>
<td>Occupant protection</td>
</tr>
<tr>
<td>Video based systems</td>
<td>Vehicle dynamics</td>
<td>Pedestrian protection</td>
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</table>

**CAPS** *(Combined Active/Passive Safety)*
- Preventive information
- Coordinated interaction
- Added value functions

**Targets:**
- Accident mitigation and reduced accident severity

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Electronic equipment production trends by sector

Evolution of the production share from 2012 to 2017

Positive

Negative

stable
Regional specialisation of the electronics industry

World Electronic Production in 2012

- Industrial and medical: 17%
- Aerospace, Defence & Security: 8%
- Telecommunication: 24%
- Data Processing: 24%
- Home Appliances: 7%
- Audio Video: 11%
- Automotive: 9%

Total: 1,412 billion euros

European Electronic Production in 2012

- Industrial and medical: 35%
- Aerospace, Defence & Security: 16%
- Telecommunication: 14%
- Data Processing: 8%
- Audio Video Home 5%/Appliances 6%
- Automotive: 16%

Total: 197 billion euros
ICT for clean, safe and autonomous vehicles have been funded by the EU through 6 streams

- European Green Car PPP
- FP7 Components
- ENIAC JU
- FP7 Complex Systems & Advanced Computing
- FP7 Smart Cities
- ARTEMIS JU
EC funding of projects related to safe, clean and automated vehicles

- **Green car PPP**
- **ENIAC**
- **ARTEMIS**
- **FP7 Components**
- **FP7 Embedded systems**
- **FP7 Smart Cities**

- **HES**
- **RES**
- **SME**
- **IND**
Projects related to safe, clean and automated vehicles

- Vehicle energy & power mgmt; 20
- Electric vehicle; 11
- Nanoelectronics for automotive; 4
- Autonomous vehicle; 5
- Heterogeneous integration; 3
- ES validation & certification; 13
### Work in hand – example projects

<table>
<thead>
<tr>
<th>Electric Powertrains</th>
<th>Vehicle Dynamics</th>
<th>Vehicle ICT and energy controls</th>
<th>Battery Management</th>
<th>Vehicle-to-Grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable fully electric cars made in the EU with high volumes</td>
<td>Improving vehicle stability control</td>
<td>New driving strategies and driver assistance systems to increase efficiency, driving range, and safety</td>
<td>Increased performance of building elements at reduced costs for energy storage in FEVs</td>
<td>Intelligent charging system supported with near real-time exchange of charge related data between EVs and the grid</td>
</tr>
</tbody>
</table>
• Context-aware energy efficient e-vehicle with driving assistance
  • Exploring the full ICT and energy controls over a vehicle in synergy with the driver HMI interface in communication with the surrounding infrastructure

• Project aim:
  • New driving strategies and driver assistance systems to significantly increase the efficiency, driving range, and safety of electric vehicles
  • Increase of ICT functionality in future cars

• Results/demonstrators:
  • 20 to 40% energy savings demonstrated in ITS corridor
  • Short term implementation of project results in hybrids
Some ongoing initiatives

- **HORIZON 2020 – Research and Innovation funding**
  - First calls being evaluated
- **Implementation of the ITS Action Plan**
  - Six actions completed
- **European Innovation Partnership on Smart Cities and Communities**
  - Invitation to Commitment
- **The European Green Vehicle Initiative, ...**
Some ongoing initiatives

- **European strategy for the Electronic Components and Systems**
  - Industrial Roadmap covering demand, supply and infrastructure measures delivered on 14 February 2014 –
    - Automotive identified as one of the main markets
  - **Implementation plan expected on 30 June 2014**
    - Concept of trailblazer projects – autonomous mobility a possible example
Some ongoing initiatives

- **ECSEL – Electronic Components and Systems for European Leadership**
  - A 5B€ initiative with the financial contribution of industry, Participating Member States and the EU
  - Coverage micro- and nanoelectronics, embedded/cyber-physical systems and smart systems
  - Strategic plan includes an application trust on smart mobility
Issues for the Future

- Technology development, experimentation and deployment; Interconnection infrastructure and vehicle, ...; Role of ICT (big data, cloud services, location, ...)
- Legal and regulatory framework
  - Including liability, security and privacy concerns
- Standardisation
  - Including certification and verification
- Spectrum
- International co-operation
Conclusion

- Europe is well positioned
- Need for further cooperation and collaboration across the value and the innovation chain
- Essential to establish the right framework conditions
Collaboration
Thank you