

MASP: Transport and Mobility

Market Relevance

- The automotive industry represents 3% of Europe's GDP and 8% of EU government's total revenues.
- Electronic components have reached 20% (of which Microelectronics is 44 %) of the car value, and the figure is growing to about 25% (Microelectronics even growing faster to 55%) in the next five years
- In total Automotive components represented 19% of European electronic component market in 2006, with a stable growth rate around 3.5%.

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Societal benefits

- In Europe, road transportation alone accounts for 21% of fossil fuel consumption, and 60% of all oil (OECD).
 - There are 5 deadly accidents every hour, and road accidents are the main cause of death in the under-45 age group
 - In an aging society, the number of senior citizens is continuously growing. Assistive systems, driver monitoring and alerting can be leveraged to mitigate cognitive shortcomings due to age-caused disabilities
- Such systems will increase security for all road users, and at the same time extend the mobility and self-determined independence of the elderly

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Technology challenges

- **Efficiency increase and reduction of pollution** in Internal combustion engines will require advanced mechatronics for fuel and air control, coupled with low-cost sensors and highly efficient computing units, based on the most advanced CMOS technology
- **Hybrids and full electric vehicles** will require power electronics and sophisticated and reliable power management systems, able to withstand high voltages and power surges, in order to manage power distribution among engine(s), batteries
- **Increased safety** will require a variety of sensors embedded into the car, together with optical and radar sensors, coupled with high speed, low cost data storage and processing for collision avoidance
- **Distributed sensor networks**, communicating through RF and supplied by energy scavenging, can strongly reduce car weight and costs, and could be applied to a variety of segments including aeronautics and large structures, like building and bridges. It will require, in addition to reliable technology for sensors and energy scavenging sources, high performance low power logic for sensor data acquisition and handling and low cost RF CMOS technology
- All electronic systems for automotive and aerospace applications have to withstand **very harsh environments**, including high temperatures, humidity, vibration, fluid contamination and electro-magnetic compatibility. The safety-critical nature of automotive systems will require extreme reliability and long life time, measured in parts per billion instead of today's parts per million
- **Cost** of high performance logic for assisted driving systems must be reduced for a widespread adoption, while reducing energy consumption and increasing frequency capability through development of advanced CMOS logic technology

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Priorities 2008 (600 person years)

- **Assisted driving:** sensor and processing, increased road awareness: optical, infrared sensors, fast data processors, advanced display systems
- **Fail safe and fault tolerant electronic systems;** new methods and technologies for improved availability and increased
- Technology integration for **hybrid or full electric** management, power electronics
- **Advanced mechatronics for internal combustion engines** and actuators for air and fuel injection, for exhaust and combustion control, high temperature electronics for engine management, high-voltage management for actuators, processors with embedded NVM



Safe Car



E - Car