

Project profile

SE2A

Nanoelectronics for safe, fuel-efficient and environment-friendly automotive solutions



The societal need for a transport infrastructure based on the availability of safe, fuel-efficient and environment-friendly vehicles is clearly recognised by both European citizens and the European authorities. The ENIAC SE2A project is targeting a host of nanoelectronics developments for European automotive manufacturers to enable higher fuel efficiency, lower carbon dioxide (CO₂) emissions and enhanced road safety. The objective is to achieve these advances with a minimum impact on costs for the end user. Success will substantially boost the position of European automotive manufacturers in the global market.

Sub Programme

- Nanoelectronics for Transport and Mobility
- Nanoelectronics for Energy and Environment
- Equipment and Materials for Nanoelectronics

Nanoelectronics has a major role to play in improving road safety as well as improving the environmental performance of vehicles. Electronic components already account for 20% of the car's value, with microelectronics making up some 44% of this. And this figure is set to reach 25% – with microelectronics growing even faster towards 55% – in the next five years. In total, automotive components represented 19% of the European electronic components market in 2006, with a stable growth rate of around 3.5% a year.

Cutting energy use

Energy and fuel consumption are pivotal issues for the future of the European automotive sector. Transport accounts for 71% of oil consumption in the EU with the road sector using 60% of all oil. Such significant burning of fossil fuels has major environmental impacts in terms of climate change, pollution and consequences for health; there is an urgent need for change.

Apart from the necessity to provide a clean and sustainable environment through the reduction of harmful emissions such as carbon monoxide and nitrogen-oxygen compounds, the high cost of oil and the need to reduce dependency on it are further factors which simply reaffirm that fossil fuels are moving towards an uncertain future.

To satisfy the vital needs of society in terms of enhanced safety, lower fuel consumption and less pollution, more effort has to be applied to the innovation and exploration of automotive electronics.

The ENIAC SE2A project aims to support European leadership in automotive vehicle manufacturing and use by reducing fuel consumption and CO₂ emissions as well as increasing road safety through a combination of EU innovation expertise and resources applied to the total value chain. SE2A involves industrial, institutional and academic actors in research, development and innovation for automotive applications to

provide substantial improvements at all levels.

Reducing road accidents

Traffic on Europe's roads has tripled since 1970. Around 50 000 people die every year as a result of road traffic accidents, with another 1.7 million people injured. However, road transport still boasts some of the safest means of mobility available to EU citizens and road transport is likely to remain the most practical means of getting goods to market.

Safety and security are therefore major issue for all stakeholders. Apart from being of great emotional concern to individuals, it is also a dilemma for European society as a whole. With the socio-economic cost of road accidents estimated at €200 billion a year, or 2% of the Union's gross domestic product, the burden of traffic-related accidents on Europe's society and economy is unacceptably high.

SE2A aims to develop nanoelectronic solutions which allow the development of advanced systems for driving guidance as a major step towards lowering accidents rates.

It is expected that, in future cars, a network of sensors integrated with dedicated control units will deliver information on vehicle status, increasing safety. Moreover, coupling data from vibration sensors with other vehicle information such as speed and acceleration will provide more detailed description of the overall system. Application of advanced control/data processing algorithms embedded in the control units will allow

for predicting and early elimination of failures. This would reduce operating costs and impact ecology.

Improving reliability

With the steep rise in the use of electronics in the car, the potential for failures that could impact safety is likely to grow at the same rate if no counter measures are taken. To increase safety on the road, fail-safe and fault-tolerant electronic systems are mandatory.

New methods and technologies for improved reliability and increased lifetime are needed to achieve this. The requirement is for the analysis of failure mechanisms of different technologies under harsh conditions, the development of accelerated life tests and screening procedures and the implementation of fail-safe design methodologies.

SE2A aims to enhance reliability and lifetime predictability for nanoelectronic automotive devices to a level of zero parts per million and 95% accuracy by the end of 2011. The new sensors will contribute to greater fuel efficiency, cut the CO₂ footprint and enhance safety.

Meeting EU targets

Overall, this will help reduce fuel consumption – one of the most urgent EU priorities driven by increasing oil costs and the need to reduce pollution. SE2A will contribute to improving fuel efficiency by another 5 to 10% by the end of 2011. It will also help achieve a 30% reduction in average CO₂ emissions for the new vehicle fleet by 2020.

Transport and Mobility

Partners:

- BONN Hungary Electronics
- Boschman Technologies
- Budapest University of Technology & Economics
- Foundation for Research & Technology-Hellas
- INESC Investigação e Desenvolvimento
- INESC Microsistemas e Nanotecnologias
- INOV INESC INOVAÇÃO – Instituto de Novas Tecnologia
- Institute of Electron Technology (ITE)
- Institute of Microelectronics (IMEL)/NCSR 'Demokritos'
- Materials Innovation Institute (M2i)
- National Institute for Research and Development in Microtechnologies (IMT)
- Netherlands Organisation for Applied Scientific Research (TNO)
- NXP Semiconductors Netherlands
- Optronic
- Research Institute for Technical Physics and Materials Science (MFA)
- SP Technical Research Institute
- Volvo Technology
- WESZTA-T Industrial and Trade
- Wroclaw University of Technology

Project co-ordinator:

- Harry Thewissen, NXP Semiconductors

Key project dates:

- Start: January 2009
- Finish: December 2011

Countries involved:

- Greece
- Hungary
- The Netherlands
- Poland
- Portugal
- Romania
- Sweden

Total budget:

- €21.66 million



The ENIAC Joint Undertaking, set up in February 2008, co-ordinates European nanoelectronics research activities through competitive calls for proposals. It takes public-private partnerships to the next level, bringing together the ENIAC member states, the European Commission and AENEAS, the association of R&D actors in this field, to foster growth and reinforce sustainable European competitiveness.