



Intelligent Safety Systems

Advanced side impact system for crash mitigation

FUNCTIONALITY

Sensing system has to

- determine distance and relative speed of potential bullet objects
- decide on an imminent collision in the next 200 ms

The actuator system has to

- be deployed within 200 ms
- reduce intrusion and intrusion velocity into the passenger compartment
- give conventional devices (airbags) more time and space to protect the occupant

EXPLOITATION

- offer the developed near distance pre-crash radar sensors to car manufacturers
- offer the stereo video system
- market the SMA actuator
- use the knowledge in other pre-crash applications and engineering consulting activities
- offer pre-crash tests and engineering services
- evaluate pre-crash systems
- University partners profit from the industry cooperation in their scientific programs
- other funded projects will build on the gained knowledge

SOCIO-ECONOMIC IMPACT

- modern vehicles implement an increasing number of active and passive safety features
- growing demand for an intelligent integration of both.
- market of intelligent safety systems is in an early phase, but rapidly growing
- Intelligent safety systems will soon contribute substantially to traffic safety.

TECHNICAL DESCRIPTION

Objective

Development, realisation and verification of new technologies for automotive safety

- Integrated safety: Combine active [sensors] and passive [mitigates injuries] safety

Approach

- Build as technology showcase an integrated safety system for side impact protection
- Keep the system adaptive, generic and reversible

Innovative technologies

Problem: Compared to frontal impacts

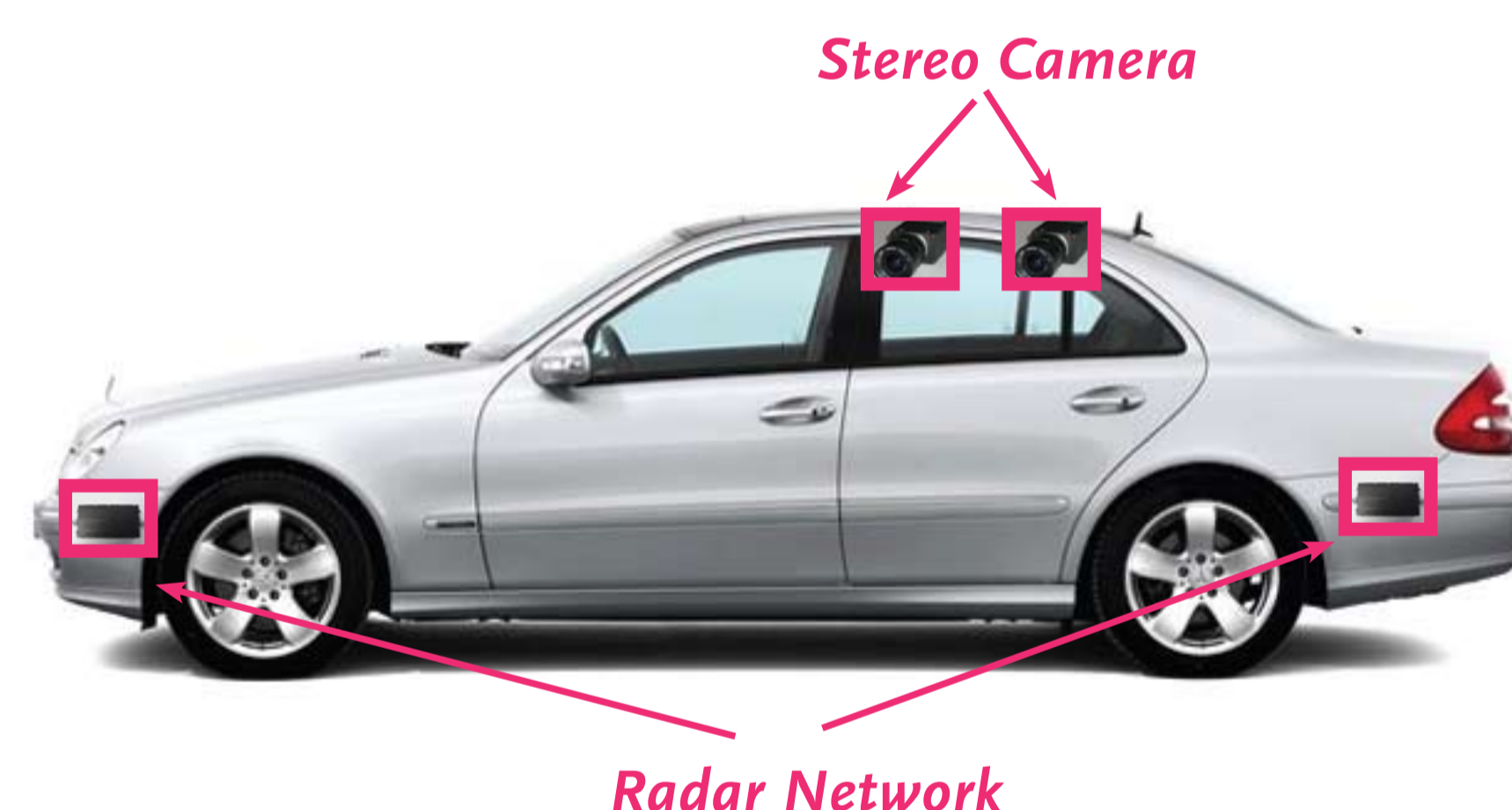
- Almost same frequency
- Almost no crush zone
 - less time
 - less energy absorption.
 - more severe injuries

Solution: Two innovative answers to these problems:

- Time problem
 - pre-crash sensing
- Energy absorption problem
 - new actuator

Sensor Development: A fusion system was developed consisting of

- a stereo video rig in the rear window.
- a radar sensor network (two sensors, 24 GHz)



System Integration: Sensor and/or actuator system are integrated into several test vehicles



Testing: Generic test methods for design and validation are developed:

- Pre-Crash performance tests to study efficiency and false alarms
- Final crash test for actuator validation (compared to reference crash test)

Conclusions

- Environmental sensors combined with fast actuators offer new protection strategies (adaptivity).
- Side pre-crash is feasible.
- Shape Memory Alloys can be applied in reversible actuators in time critical safety applications
- Active and reversible structural components, such as the developed door-seat coupling, could be a promising solution for future integrated safety applications.

Benefit for car occupants:

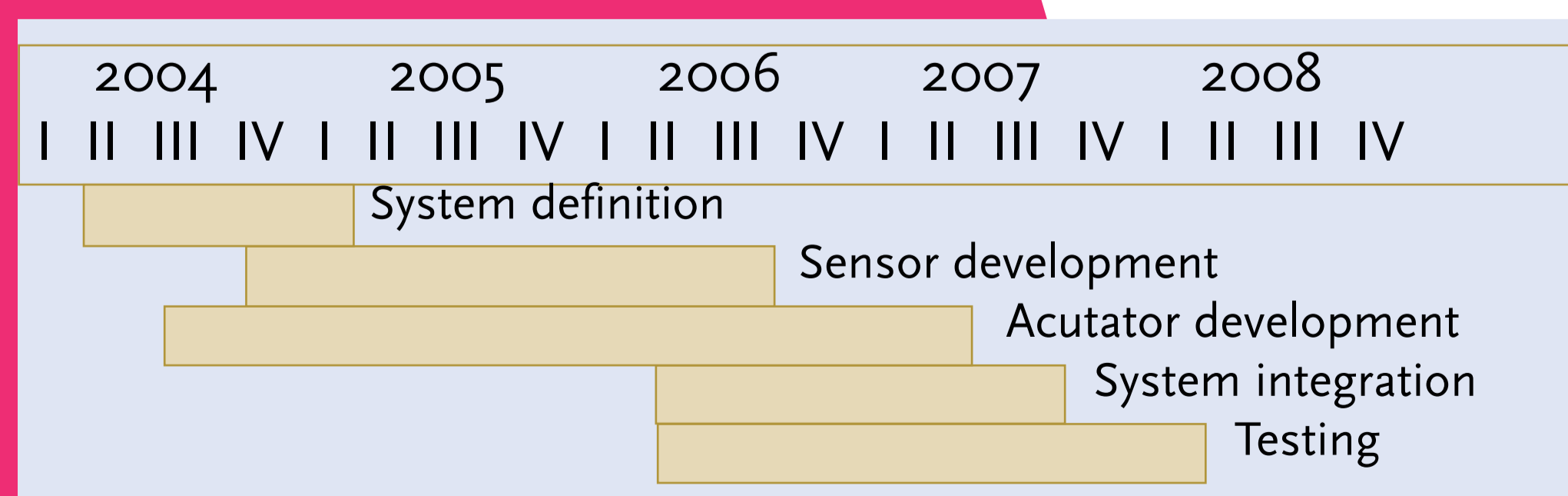
- Intrusion into the passenger compartment is significantly reduced
- Restraint systems (e.g. airbags) have more space and time to deploy more efficiently
- Contact time is delayed
- Survival space and time are gained

Actuator Development: The Actuator is deployed using Smart Materials: Shape Memory Alloys allow for

- fast deployment
- while being reversible
- Extensive simulation studies are used to identify the most promising concept
- lay-out and dimension the actuator



	Deployment time	Reversibility
Pyrotechnics	~30 ms	No
Electromagnetic	> ~200 ms	Yes
Shape Memory Alloy	~50 ms	Yes



CONTACT

Dr. Joachim Tandler, Continental AG,
Joachim.Tandler@continental-corporation.com
www.aprosys.com

PARTNERS INVOLVED

Continental, Faurecia, Fraunhofer LBF, Fraunhofer IITB, Daimler, TNO, CIDAUT, IST, WUT

