



BOSCH

Media Release

19th April, 2005

Combined Active and Passive Safety (CAPS) – right on track to the sensitive car

- New concept by Bosch: CAPS combines active and passive safety systems
- Fewer serious traffic accidents with new assistance systems
- Electronic surround vision with the “sensitive car“

In a critical situation, only fractions of a second often determines whether an accident will occur or not. Studies have shown that about 60 percent of rear end and almost one third of front end collisions would not happen at all, if the driver reacted just half a second sooner. More than one third of all accidents are caused by lane changes or unintentional lane departure. Another third of all accidents are caused by rear end or front end collisions. More than two thirds of all rear end collisions are due to inattention, in another eleven percent, add tailgating to inattention, tailgating being the sole reason in nine percent of all rear end collisions. According to a Bosch estimate, driver assistance systems could generally prevent rear end crashes in almost 90 percent of cases, or at least drastically reduce their severity.

Bosch is working intensively on the “sensitive car”. It will be fitted with sensors and electronic systems that detect and interpret the vehicle environment, identify dangerous situations at an early stage and assist the driver in his driving movements.

Numerous new driver assistance systems can be realised through the electronic identification of the vehicle environment. They contribute to the driver’s attention and give an alarm in dangerous situations – or even override driving movements independently in emergencies. Bosch plans for a step-by-step approach in the launching of these systems to the market. The basis for Bosch driver assistance systems are two assistance systems already in existence: the park pilot with ultrasonic sensors to identify the immediate environment of the car and the increasing employment of the automatic distance regulation ACC (Adaptive Cruise Control) with a long-range radar sensor, which identifies the greater area in front of the car. In combination with other systems, e.g. the passenger protection system (airbag control unit and sensors) or Electronic Stability Program ESP, but optionally also with an innovative video system, Bosch is first upgrading these assistance systems with the intention of giving extended support to the driver. In a second step – based on the same systems components – additional functions will be implemented to reduce the severity of accidents. With the experience gathered over time, these functions will be consistently further developed in the distant future to become accident preventing systems.

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Video and radar sensors assist the driver

Video sensors are of vital importance in driver assistance systems, since they support the interpretation of visual information (object classification) in a specific way. Bosch will be offering them for use in vehicles in the near future and thus opening up the potential for a number of new functions. Rear end video sensors in the most simple version will be able to assist the ultrasonic parking aid in parking and positioning the car. A front end camera is useful for other assistance systems as well. To give one example based on the principle of a front end camera, Bosch is currently developing a system for "lane recognition", which identifies the boundaries and track of the lane. If the vehicle should unintentionally start to depart from the lane, the system alerts the driver. Bosch plans to upgrade the lane recognition system into a lane keeping assistant, which keeps the car on track in the lane by automatic steering. In combination with ACC, this would be an ideal system to support the driver during stop-and-go traffic.

For assistance functions to be completely reliable against interferences and be capable of detecting and classifying several objects simultaneously, signals of different sensors – e.g. of the ACC and video system, have to be combined and evaluated. Sensor data fusion allows the systems to get a realistic and comprehensive image of the vehicle environment, thus receiving much more reliable information on the surroundings of the car than would be possible with just a single sensor.

Combination of active and passive safety systems – CAPS

Future assistance functions require a close network of active and passive safety systems with predictive driver assistance systems, as is being developed by Bosch with the CAPS program (Combined Active and Passive Safety).

Functions for safety improvement can now be achieved on the basis of cross linking ESP, hydraulic brake assist and the airbag control unit. In many cases, accident prone situations are indicated early on by either excessive oversteering or understeering or by the onset of panic braking. ESP or hydraulic brake assist detect the dynamically critical driving situation and initialise passive safety systems. For example, seat belts will be tightened to position driver and passengers optimally in their seats and minimise the risk of injury.

Preventing accidents and reducing injuries with CAPS

In combination with the sensors detecting the vehicle environment, CAPS opens up further potential for the prevention of accidents and reducing injuries.

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Bosch upgrades Adaptive Cruise Control (ACC) as a part of CAPS to become a "Predictive Safety System". Once ACC identifies a critical traffic situation, it applies the brake pads imperceptibly to the brake discs and prepares the hydraulic brake assist for possible panic braking. When the driver hits the brakes, valuable fractions of a second may be gained until the full deceleration effect takes place. Further upgrading stages of the Predictive Safety Systems will include alerting the driver to an impending collision or even automatically braking the car in case of emergency.

For example in longitudinal traffic: collisions with cars moving ahead or overtaking vehicles account for a significant proportion of traffic accidents in Australia. They might be detected early on by scanning the vehicle environment with a radar sensor. The time to potential crash could be used by the Predictive Safety System to alert the driver and to assist him in preventing the accident. Additionally, during this stage, reversible safety systems for the protection of the passengers are already initialised. This includes protection of the passengers by reversible seat belt tensioning and automatic seat adjustment for passengers in the front and back seats, during this phase of accident prevention.

Once an accident has become inevitable or unavoidable, the system activates measures to minimise the severity of the impact and to protect all people involved in the accident. For example, one such measure during the accident preparation stage is to initialise situation-specific non-reversible protection systems by adjusted airbag parameters, including for instance improved angle detection, offset crashes, or the staged triggering of smart airbags. In the future, it is expected to initiate the activation of emergency braking by the Predictive Safety Systems in order to reduce the impact energy and thus the severity of the accident.

In the near future, however, CAPS will not only prevent or attenuate front end collisions, the driver will also be actively assisted in dangerous situations that might potentially lead to side, rear end, multiple crashes or roll over accidents. With its assistance and warning functions, driver assistance systems will generally reduce accident risks in the future. Furthermore, the sensors of the mentioned systems will contribute to improve the passive safety and protection of pedestrians. Surround sensors calculate the time and place of impact as well as the relative speed of the accident obstacle. From this information, protective systems may be initialised with perfect timing based on the situation.

CAPS is a modular, functional concept which can be utilised in different electronics architectures of OEMs. A complete network of sensors and control units makes it possible to distribute CAPS functions to several control units and get multiple usage out of the sensor signals.

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The basic aim is to integrate the CAPS functions into existing control units such as for ESP, ACC and airbags to keep the costs down. The CAPS architecture in regard to interfaces will be designed in such a way that the principle systems and ECUs of different suppliers can be integrated into a comprehensive system.

Accident free road traffic – a vision?

Road traffic without accidents will remain a vision, however, it is a goal well worth pursuing. Bosch foresees numerous measures for the step-by-step introduction of assistance and safety systems, which will lead to more relaxed and comfortable driving and less accidents. With the driver assistance systems and the integrated safety system CAPS presented here, Bosch makes a decisive contribution towards this goal.

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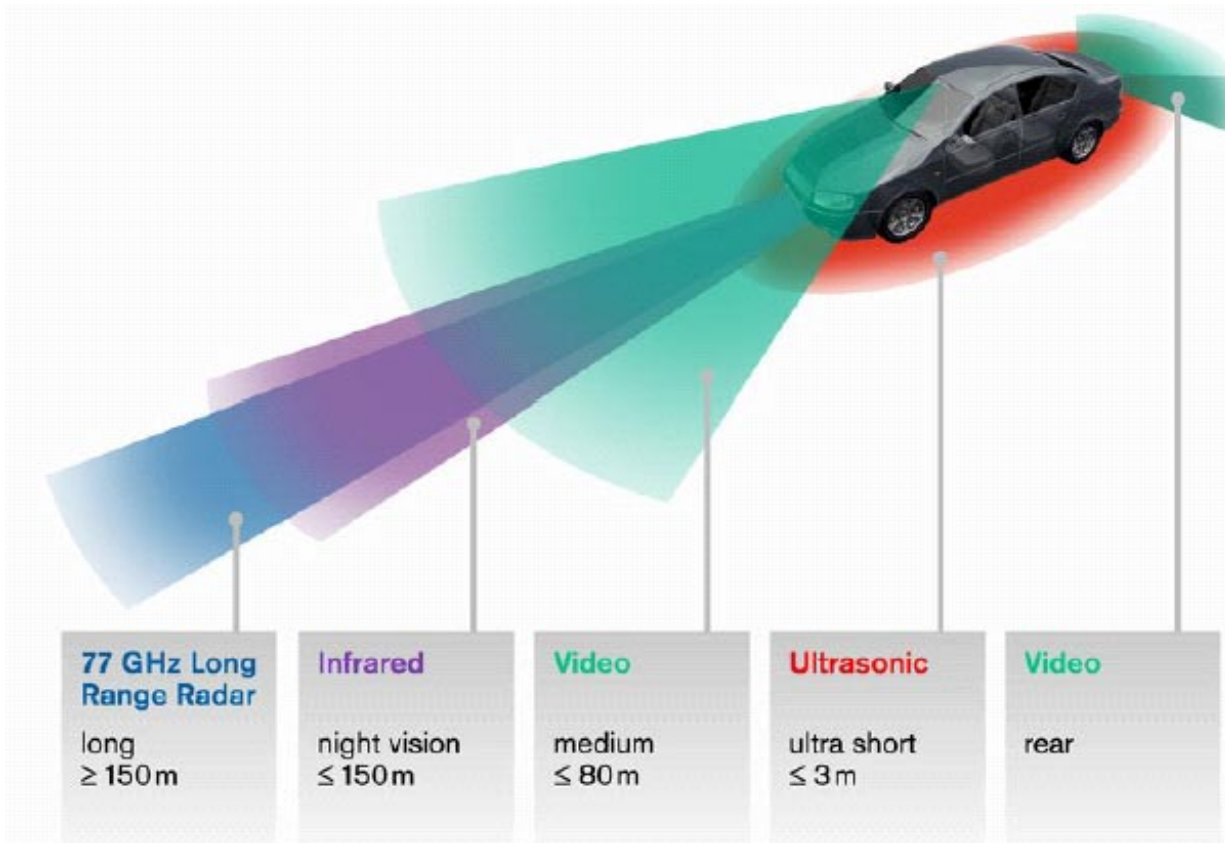
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Robert Bosch (Australia) Pty. Ltd. is a regional subsidiary of the Global Bosch Group. From its head office in Melbourne, Victoria, Bosch Australia is active in the development and manufacturing of automotive technology products for the local Australian and export markets. Bosch Australia's portfolio also includes the marketing and distribution of power tools, gas hot water systems and Blaupunkt car multimedia equipment. In addition, the Bosch Group operates the subsidiaries Bosch Rexroth and Bosch Security Systems in Sydney, New South Wales.

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