

Honda Demonstrates Life Saving Motorcycle Technology

In its efforts to improve safety for everyone, especially vulnerable road users, Honda's leading motorcycle to car communication system is being demonstrated for the first time in Europe at the CAR 2 CAR Communication Consortium event taking place at the Opel Test Track in Dudenhofen, Germany, from 22-23 October 2008.

The system generates warnings to riders and drivers of other vehicles by continuous exchange of positioning data from satellite GPS sources. This is particularly relevant as road users approach intersections, alerting them to other vehicles that are potentially on a collision course, allowing avoidance manoeuvres.

The demonstration will exhibit the interoperability of the Honda life-saving system which facilitates communication with vehicles from 8 other manufacturers.



European research data shows that the majority of accidents involving a motorcycle are caused by perception failures and this system will reduce these failures.

The development of inter vehicle communication is part of Honda's ongoing approach to safety for powered two-wheelers. This approach tackles Preventive, Active and Passive safety. The resulting technologies in the field of preventive safety include the Motorcycle Riding Simulator and the Riding Trainer, both of which are used for hazard perception training. The

introduction of the world's first motorcycle airbag on a Gold Wing in 2006 was a landmark in safety. This year's release of the first ever electronically controlled Combined ABS for Super Sports motorcycles provides enhanced braking capability in a wide range of road conditions and a step forward in the field of Active Safety.

Vehicle to Vehicle (V2V) Systems Development by Honda

Honda has developed this technology within the ASV (Advanced Safety Vehicle) programme in Japan, and is currently participating in projects in Europe, Japan and the United States. In Japan, Honda is now in phase 4 of its ASV development. This ASV-4 system uses a wireless communication unit to ascertain the position and direction of cars and motorcycles in relation to each other, and provides drivers with information on approaching vehicles and obstacles on the road. This follows the introduction of ASV-3 technologies in 2005, and ASV-4 has built on extensive research, data collection and collaboration in advanced safety technologies.

What is Vehicle-to-Vehicle Communication?

V2V communication rapidly relays information in a simple and concise manner, which supports motorists' and bikers' recognition processes. Information including position, direction and vehicle dynamics coordinates is exchanged between vehicles. Motorcycle riders can safely receive warnings about vehicles near them on a Head-up Indicator Display, and can receive information through an in-helmet audio system, neither requiring them to take their eyes off the road. Drivers can view information on the status of cars and motorcycles in their vicinity and receive warnings on, for example, their navigation system display.



Honda Advanced HMI

The effectiveness of a Vehicle-to-Vehicle and Vehicle-to-Infrastructure communication system largely depends on the HMI concept – the interface between the rider and his machine. Based on extensive research, Honda has developed for the Car 2 Car demonstration a simple, logical and intuitive HMI for faster and easier recognition. Both a visual and an audible warning are provided in safety critical situations. The visual HMI is located on the upper edge of the motorcycle dashboard, as close as possible to the line of vision, enabling the rider to spot the information and warnings easily without actually having to take his eyes off the road. The intensity, colour and the position of the lights provide intuitive information on the seriousness and the location of the danger ahead. To augment the riders' recognition and further specify the hazard ahead, an acoustic warning by means of spoken text is given in the helmet, which is connected by means of Bluetooth® communication link with the on-board system. This advanced HMI contributes to enhanced motorcycle safety.



Figure 1: The Honda HMI

Figure 2: Safety warning

Figure 3: Communication helmet

The Honda HMI for the CAR 2 CAR demonstration



Example of a HMI display used for Honda ASV-3 vehicles

Motorcycle Accident Characteristics.

Motorcycle safety requires special consideration, due to the particular nature of motorcycle accidents. Both the causes and the consequences of these are different to those of accidents involving only cars. The majority of motorcycle accidents are caused by the simple failure of other motorists to detect the presence of a motorcycle on the road until it is too late, or to correctly assess its distance and speed. There are several reasons for this.

Firstly, the front profile of a motorcycle is significantly smaller than that of a car or truck. Not only can it be more easily overlooked, but it can also be obscured by larger vehicles or street furniture. Its smaller size can also be more easily camouflaged by its surroundings. For example, a motorcycle can be completely hidden behind a car's A-pillar for a limited amount of time on the approach to a roundabout.

Secondly, motorcycles are more subject to errors of perception and judgement of distance and speed. This is related to their smaller size and also to certain disadvantageous characteristics of motorcycle lighting systems. Honda is also addressing this through Conspicuity Enhancement Designs, with proven success in helping car drivers to better estimate both distance and speed of motorcycles.

Statistics

In 1999, an EU funded research project (Motorcycle Accident In-Depth Study or MAIDS) investigated the underlying causes of motorcycle accidents. The researchers were a consortium of partners including, among others, ACEM (The Motorcycle Industry in Europe), FIM and FEMA (rider organisations at international and European level).

Data was collected on 921 motorcycle accidents occurring in 5 European countries. It was found that 88% of the accidents were mainly caused by human error, while 8% were due to external environmental factors such as weather conditions or road infrastructure. In 37% of cases the motorcyclist was the cause of the accident, while in 50% of cases the driver of the other vehicle was responsible. A breakdown of this 50% showed that: 72% were so-called 'perception' failures, where the driver failed to see the motorcycle, 3% were 'comprehension' failures (they saw the motorcycle but the brain did not recognize it as such), and 20% were 'decision' failures (they saw the motorcycle but decided to continue with the intended manoeuvre anyway).

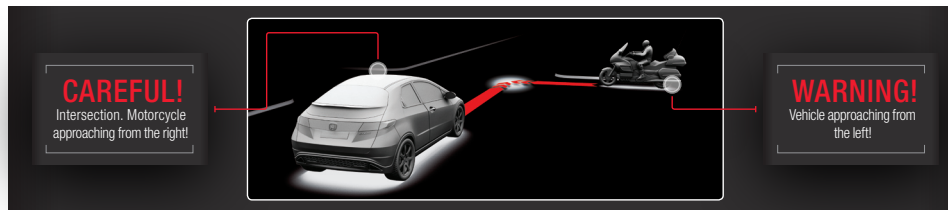
The problem of visibility and awareness of motorcycles on the road clearly needs to be addressed.

How can V2V communication help?

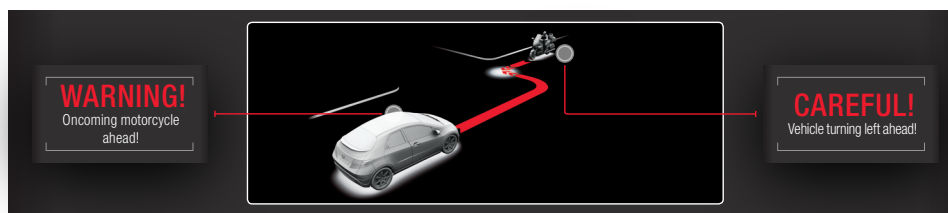
The MAIDS research also looked at the most common motorcycle accident configurations. Almost 35% of these were down to two main configurations:

- Accidents at an intersection, where the colliding vehicles were following perpendicular paths;
- Left-turn accidents (right-turn in the UK and Ireland), where two vehicles approach in opposite directions and where the other vehicle cuts across the path of the oncoming motorcycle.

The diagrams below illustrate how Vehicle-to-Vehicle communication operates in these two typical situations:



Configuration 1



Configuration 2

In the above situations, the V2V communication system may compensate for errors of perception or momentary lacks of concentration. The system is also being tested in situations where human senses do not necessarily register reliable data. One example is in the blind spot that remains invisible in a rear view mirror check. Another is the approach of an emergency services vehicle where a siren can be heard but determination of its position, speed or direction is difficult. An additional case would occur when a driver sees a motorcyclist in the mirror but has difficulty judging closing speed and distance, especially at night or in poor weather conditions.

Honda and the Car 2 Car Communication Consortium

Honda believes that by demonstrating its advanced safety technologies, a common approach to safety can be achieved for all road users.

The CAR 2 CAR Communication Consortium is a non-profit organisation initiated by European vehicle manufacturers, and is open for suppliers, research organisations and other partners. The CAR 2 CAR Communication Consortium is dedicated to the objective of further increasing road traffic safety and efficiency by means of inter-vehicle communications.

Honda has been researching Vehicle-to-Vehicle communication systems for more than a decade, both independently and in joint research projects in Japan and the USA. To improve motorcycle safety in Europe, Honda became a full member of the CAR 2 CAR Communication Consortium in 2005, with the clear objective of integrating the motorcycle within the CAR 2 CAR system. The common objective of the participating bodies is to develop common interoperable standards for all vehicles, including motorcycles, and ultimately to introduce a standard C2C CC system into the European vehicle market.

Honda's own innovations

The research into vehicle-to-vehicle and infrastructure communication systems is yet one more step in the development of new technologies for enhanced comfort and safety. Previous innovations and world-firsts by Honda are, for example, the world's first car navigation system, which can be found nowadays in many vehicles; collision mitigation braking systems which initiate occupant restraints and the brakes in pre-collision situations; lane keeping assist systems in cars in Europe; intelligent night vision systems recognising pedestrians; and the first floating car data system from a car maker in the Honda Internavi navigation system.

Further resources

Honda also fully supports the EU targets for traffic fatality reduction and is well on its way to fulfilling its safety commitments under the European Road Safety Charter. For more information on Honda's safety initiatives, the C2C CC and the Road Safety Charter, visit:

www.world.honda.com
www.world.honda.com/HDTV/ASV/ASV-3
www.car-to-car.org