

## FUNDING

The Ministry for Science and Culture of Lower Saxony, Germany, provides funding for the research group totalling 1.3 million euro over five years. Volkswagen AG is also investing more than 3 million euro of its own into the joint project. In April 2007, when the research group started its work, the Minister for Science and Culture Mr. Stratmann declared: 'This is an industry-oriented flagship project with a great innovative potential and immense economic and scientific power.'



**Lower Saxony**

## PARTNERS

Under the name »Connected Cars in a Connected World (C3World)« the research group created by Volkswagen and three research institutes in Lower Saxony has positioned itself to conduct research into information and communications technology for the vehicles of tomorrow. Research partners are: Institut fuer Nachrichtentechnik of Technische Universitaet Braunschweig, the Institute of Communications Technology of the Leibniz Universitaet Hannover and the OFFIS Institute for Information Technology in Oldenburg. In C3World, researchers from these three institutes work together in close collaboration with the Volkswagen Group Research Electronics and Vehicle Technology Division.

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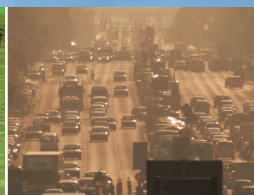
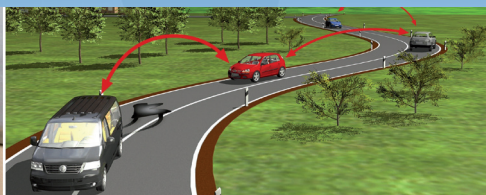
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# C3World

Connected Cars in a Connected World



## VISION

In the future, cars will become smarter and more connected to the flows of data that surround us. Vehicles will communicate with each other to provide drivers and passengers with information that enhances safety as well as comfort and convenience. This could be e.g. a hazard warning about a broken-down vehicle on the route ahead, but also navigation instructions to the nearest vacant car park, the current calendar of events in the city you are driving to, or a list of music tracks copied onto the portable MP3 player the day before. The basis for this is the robust and secure wireless transmission of information within the vehicle and between the vehicle and its environment.

The C3World Research Group  
C3World - Connected Cars in a Connected World is a research group created by Volkswagen and three research institutes in Lower Saxony, Germany. It is a joint project that is working on the technological preconditions that will make this vision possible.

## RESEARCH TOPICS

Car-to-Car- and Car-to-Infrastructure Communications enable vehicles to communicate with each other and with the surrounding local infrastructure. Using this technology, vehicles are able to exchange information with each other and to receive relevant information from other vehicles, for example about regional traffic obstructions on the route ahead. The exchange of information with the infrastructure allows new services, for example reserving a space in a car park and paying for it. This function will become even more important when electric vehicles require reserved parking space while recharging. Communications between vehicles and their surroundings can provide a vehicle with information such as news about forthcoming events in the area. This will make the vehicle part of a networked communications infrastructure. Here, communications technology needs to be developed with a general framework that satisfies quality factors such as robustness, security and fast transmission rates.

Interactive, networked and location-based services will take aspects of the World Wide Web into the car and help to develop future navigation equipment towards a comprehensive information terminal for both driver and passengers.

Depending on the driver's preferences, or the route of the current journey, relevant information will be taken from the World Wide Web – for example about places of interest along the way, convenient filling/charging stations (depending on the fuel/battery level), and about forthcoming events at the destination – and then be dynamically selected and processed for intuitive presentation and use in a future driver information system.

Another field of research deals with the data link between components in the vehicle. The options for seamless integration of mobile equipment into the infotainment system of a car are being examined and a middleware developed, which will, for example, keep the graphic user interface in the vehicle constant while the system is automatically reconfiguring for a new mobile device. Furthermore, prototype investigations are being conducted to evaluate how the latest broadband radio communications technologies (like UWB) can be used to link infotainment components. For example, a retrofit display for the rear seat entertainment system could be made considerably more straightforward. Even with the initial equipment it would be possible to save resources by eliminating cables.