

MANY ROADS



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LEAD TO NEXT DOOR

Researchers and Technicians are Building Bridges Across Institute Borders to Ensure that the World Stays in Motion

By Prof. Dr.-Ing. Uwe Clausen

Increased traffic, negative traffic impacts, traffic jams, traffic infarct – these are the buzzwords which form talking points in the media just as much as in current academic discussions. The reasons for the increase in traffic are manifold. Freight haulage has increased due to the continuing positive economic development, which has increased the volume of goods that require transportation. Heavy goods vehicles, which are still the most important cargo carriers, have increased traffic but even more so have rail traffic, aviation, and marine cargo. For passenger transport, the need for mobility is on the increase. As a result, the traffic load per transport user continually rises. All of these trends are, of course, accompanied by challenges. Researchers are tackling these challenges and are overcoming institutional frontiers, as demonstrated by the cooperation partnership between the Fraunhofer Institute and the German Aerospace Center (DLR).

Researchers and engineers have found a number of topics in the area of traffic research on which DLR institutes and Fraunhofer institutes are now collaborating. This cooperation is being conducted in diverse ways and forms, ranging from joint activities in European scientific organizations, such as ECTRI (European Conference of Transport Research Institutes), through to joint cooperation projects covering topics such as traffic control and monitoring as well as aviation cargo, and planning cooperation in applications of the European satellite navigation system Galileo.

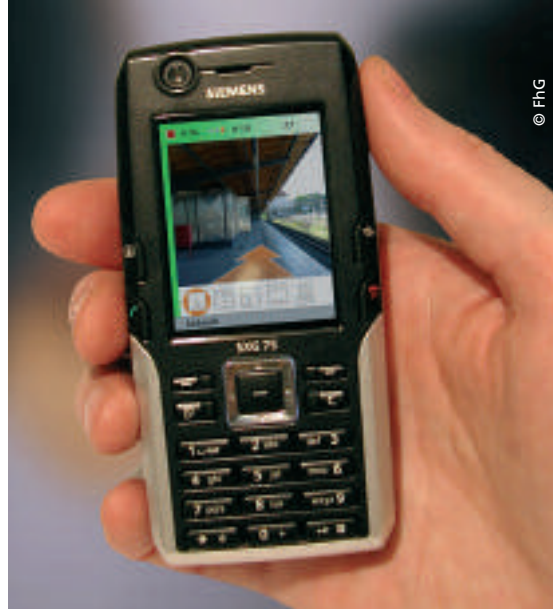
Tests for Galileo system applications

Galileo applications are especially predestined for joint projects. With its 20 associated institutes for traffic research alone, the Fraunhofer Gesellschaft, which has committed itself to application-oriented research, offers ideal conditions for developing new traffic applications for the satellite navigation system Galileo.

A demonstration of these applications in freight and passenger transport and in the area of safety within the Galileo test and development environment (GATE) enables the presentation of Galileo's usefulness for transport before reaching full operational status. This has led many Fraunhofer institutes, especially the Fraunhofer Institute for Production Systems and Design Technology (IPK) in Berlin, to cooperate with DLR. Their common goal: to develop satellite applications with demonstrations in GATE.

The right traffic perspective

Transport management is another common research interest: Practical and financeable solutions for comprehensive monitoring of the



Pedestrian navigation with mobile devices can take into account all available means of transport.

traffic situation city-wide and traffic light control optimization are being developed in the research project ORINOKO (Operative Regional Integrated and Optimized Corridor control). The goal of this project is to prove that adding relatively affordable but effective traffic technologies such as video detection (for the monitoring of the traffic situation with cameras) increases the benefits of transport management with the simplest possible operational conditions.

An integrated database and a concept for data management are being created as part of the cooperation between the Fraunhofer Institute for Transportation and Infrastructure Systems (IVI) and the DLR Institute of Transport Research. The scientists have already cooperated closely during the conceptual design stage and the concepts are currently being put into practice.

Image and video detection is also a joint research topic. Existing expertise in this area will be aggregated in order to develop a high-performance and robust algorithm for traffic situation monitoring on camera-monitored stretches of road. Both institutes have a wide experience in developing video detection algorithms.

Passing a serious test: Balls and buses were rolling

The cooperation in the research project TRANSIT, which is funded by the Federal Ministry of Economics and Technology, was of direct use for traffic participants during the FIFA Worldcup 2006. The TRANSIT system provides traffic-related services for visitors, participants, and organizers of large-scale events in real time on mobile devices.

The difference over conventional systems is that TRANSIT evaluates information about transport means available at a particular location. Apart from up-to-date schedules for local public transport, the driving times of taxis or private cars, regional rail networks, and bicycles were also taken into account in the analysis.

For this purpose, the transport specialists at DLR developed a special aggregation of transport data. The Fraunhofer Institute for Software and System Engineering (ISST) and the Fraunhofer Institute for Material Flow and Logistics (IML) created software modules which build on the DLR system and enable this data to be further used in the TRANSIT system and be provided to the visitors.

Safe aviation thanks to new detectors

Aviation is also included in the research cooperation. The joint efforts here are concentrating on increasing air traffic safety. The Fraunhofer IML project center "Airport" is working together with the DLR Air Transport and Airport Research as well as the Institute of Planetary Research to improve safety in airfreight transport. Lufthansa Cargo AG was won as a project partner for a new venture with the German title "Sichere Fracht" (SiFra – literally "safe freight").

The factors which led to this joint project are the rising safety concerns in aviation which, so far, only concentrated on passengers and their luggage. The technologies and processes employed in passenger aviation cannot be transferred to airfreight because of the different dimensions and strongly differing particularities of air cargo. The x-ray technology employed in luggage monitoring cannot be used for freight due to its low resolution.

The aim of the research project is to create a new detector concept for identifying illegal objects. The technological development is supported by a comprehensive analysis of the processes for the optimal positioning of security controls in the airfreight transport chain as well as for deter-

mining supporting safety measures. National and international legislation requirements also have to be considered.

The project team is planning to develop a detector based on Terahertz technology. This detector will then prove its practicality at a German airport in the form of a demonstrator. The prognosis and the concept will then be integrated into a simulation model in order to assess the requirements for implementation at German airports. The results gathered by the demonstrator will also be incorporated into the simulation.

Lightweight construction vehicles to decrease emissions

The car of the future is another topic where Fraunhofer and DLR scientists are combining their innovative powers. In their many cooperation projects, they are working towards reducing the weight of vehicle components and, thus, vehicles overall by developing new types of materials and structures. The goals are high stability, safety, and reliability while maintaining optimal costs and consumption rates of the vehicles in both production and operation.

These research efforts are represented by the Fraunhofer initiative "Intelligent Lightweight Construction Systems" and the competence center

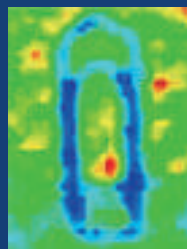
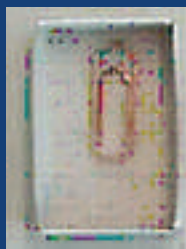
"Lightweight Vehicle Construction," which was jointly founded by DLR, the University of Karlsruhe, and the Fraunhofer Institute for Chemical Technology (ICT). Their research activities range from developing fundamentally new ideas to material and process development and prototype construction.

The partners have set themselves the goal of reducing a vehicle's energy consumption and, thus, the resulting CO₂ emissions by reducing driving resistances.

All these activities and cooperation partnerships as well as the results they have produced demonstrate that combining competences and bundling abilities makes tremendous sense in the area of traffic research. – A reliable way of ensuring that, even in the light of growing knowledge and new issues, in the future, the perspective for a holistic consideration of the world in motion is not lost.

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High-resolution images produced by a detector based on Terahertz technology for identifying illegal objects in airfreight

Test facility for the checking of airfreight units

