

U-SARAH live Will Reduce Congestion and Pollutant Emissions of Road Traffic

Start of the Project Funded by the Federal Ministry of Transport to Optimize Traffic Management Systems on Freeways



Traffic management systems enhance traffic safety on freeways. Here, the morning rush hour at the Frankfurt northwest interchange is shown. (Photo: Hessen Mobil Straßen- und Verkehrsmanagement)

Traffic management systems on freeways dynamically display speed limits, congestion warnings, or overtaking bans for trucks. They increase traffic safety, ensure optimum traffic flow, and indirectly reduce environmental pollution. The “U-SARAH live” project coordinated by Karlsruhe Institute of Technology (KIT) now seeks to integrate transport emission data in traffic management systems to further reduce pollution and noise without unnecessarily slowing down traffic. The Federal Ministry of Transport and Digital Infrastructure (BMVI) funds the project with about EUR 1.1 million.

“The goal of our study is to optimize and integrate environmental monitoring in an already existing traffic management system to reduce environmental impacts along the routes observed,” says Professor Peter Vortisch, Head of KIT’s Institute for Transport Studies. “With the help of a microscopic traffic flow model developed together with Hessen Mobil within the framework of a preliminary study, impacts of the newly developed environmental monitoring system can be simulated

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and control can be optimized with both traffic flow and environmental impacts being considered.”

Hessen Mobil, operator of traffic management systems and partner of “U-SARAH live,” will make available real transport management data. These data and control logics expertise of Hessen Mobil will be incorporated in the system development work and traffic flow model. As a result, it will be possible to simulate the impacts of various control algorithms prior to real implementation. “In a practical test, we will finally test and evaluate the new control system under real conditions,” says Matthias Glatz, Project Head of Hessen Mobil.

Another project partner is EDI GmbH, a spinoff of KIT. It will use the large traffic data volume to model the reaction of traffic participants to the dynamic speed limits with artificial intelligence (AI). “On this basis, we will develop an AI-based acceptance model and a prognosis model that will then be integrated in the control of the traffic management system,” says Dr. Thomas Freudenmann, one of the founders and Managing Director of EDI GmbH. “These modules will be used to extend the existing control system.”

In future, the simulation model developed in “U-SARAH live” will be used for quality management and optimization of traffic management systems. Efficiency of the development process of control systems will be increased. The population, authorities, scientific institutions as well as all manufacturers of traffic management systems will profit from the project results. “With the help of the AI-based approach, the traffic situation can be estimated within a few minutes and controlled much better. Simulation-based development allows for an easy integration of emission data in the control of freeways without high expenses being required for measurement technology,” says Sebastian Buck from KIT’s Institute for Transport Studies, who coordinates the project. “Reduction of emissions and optimization of traffic flow will reduce economic damage due to congestion and high emissions.”

In all steps, an analysis platform developed within the project will help analyze the large data volumes of the traffic management systems under various aspects. This platform will be made available to the public via the mCLOUD of BMVI to ensure not only open supply, but also understandable visualization of the data.

The name “U-SARAH live” refers to the extension of the existing control system SARAH (German acronym for traffic management with an anticipating rule-based approach in the state of Hesse) used so far by an environmental module (U) and its comparison with real transport data (live).

The Federal Ministry of Transport and Digital Infrastructure (BMVI) funds the project within the framework of the mFUND (modernity fund) research initiative. mFUND was launched by BMVI in 2016 to support research and development projects on digital data-based applications for mobility 4.0.

Project Partners

Hessen Mobil is the state authority responsible for planning, building, and operating road transport infrastructure and for transport management and traffic control in the state of Hesse. This transport center is one of the most modern institutions of this type in Europe and pools all state activities in the areas of transport telematics. After it will have been turned into Autobahn GmbH, the future German Transport Center, it will be responsible for transport management on German freeways. Together with partners from industry and science, Hessen Mobil studies and tests future transport systems.

EDI GmbH offers software solutions for Industry 4.0 applications as well as for autonomous and electric driving. The EDI hive framework ensures efficient processing of large data volumes and heterogeneous data. In various projects, EDI gained the know-how to acquire and process such data (type and volume) as well as to integrate expert knowledge and formalize and quantify subjective impressions.

Being “The Research University in the Helmholtz Association,” KIT creates and imparts knowledge for the society and the environment. It is the objective to make significant contributions to the global challenges in the fields of energy, mobility and information. For this, about 9,300 employees cooperate in a broad range of disciplines in natural sciences, engineering sciences, economics, and the humanities and social sciences. KIT prepares its 24,400 students for responsible tasks in society, industry, and science by offering research-based study programs. Innovation efforts at KIT build a bridge between important scientific findings and their application for the benefit of society, economic prosperity, and the preservation of our natural basis of life. KIT is one of the German universities of excellence.

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