

## Making the Right Turn

**New, Assisted Steering System with Optimum Energy Efficiency for Electric Vehicles Is Subject of a Joint Project by KIT and Schaeffler**



*New drive and steering concepts for electric cars are tested with the scale model demonstrator at KIT. (Photo: KIT/M. Breig)*

The project "Intelligent Assisted Steering System with Optimum Energy Efficiency for Electric Vehicles (e<sup>2</sup>-Lenk)" subsidized by the Federal Ministry for Education and Research (BMBF) focuses on a new assisted steering concept. In conventional vehicles, the internal combustion engine not only accelerates the car but also supplies on-board assist systems with energy; such as the assisted steering system, which reduces the strain on the driver at the wheel. In electric vehicles, this energy comes from the battery and also reduces the range as a result. In this research project by the collaborating partners, Karlsruhe Institute for Technology (KIT) and Schaeffler, the steering system is assisted in an energy-efficient manner by intelligent control of the drive torques transmitted to the individual wheels. The project is being sponsored by BMBF with a sum of around 0.6 million euros over 3 years and was started in January 2015.

"The new assisted steering system would require less system components in an electric vehicle, this would mean savings in terms of



*KIT Mobility Systems Center:  
Solutions for tomorrow's mobility*

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weight and energy in an electric vehicle", explain project managers Dr. Marcel Mayer, Schaeffler, and Dr. Michael Frey, KIT. "This would mean that an electric car would be cheaper and have a greater range." Materials and production steps can be saved due to the potential optimization of the design and weight.

The basic idea of the e<sup>2</sup>-Lenk project is simple: The wheels in an electric car will be driven individually by electric motors in contrast to a car with an internal combustion engine where all the wheels are provided with equal force. If the wheels on the left side transmit more drive torque to the road than those on the right side, this will result in acceleration of the vehicle to the right without the need to turn the front wheels or consume additional energy for steering. Tracked vehicles or quadrocopters steer using the same principle. "Steering assistance can be provided while driving by means of an intelligent control system and suitable wheel suspension", says Schaeffler engineer Mayer, Manager of the Automatic Driving Working Group, which is carrying out research as part of the collaborative research project SHARE (Schaeffler Hub for Automotive Research in E-Mobility) at KIT. "Only steering when stationary remains a challenge with conventional designs."

"The assisted steering system is part of the drive train with our approach", explains Frey who is researching at KIT's Institute of Vehicle Systems Technology. Steering the front wheels is carried out without using additional energy. "We also want to significantly increase the quality of driving. Customer benefit, comfort, safety and reliability go hand in hand here."

As part of the project, functional demonstrators are being built, with which the concepts can be validated and optimized in experiments. It is also planned to implement the system in last year's Formula Student racing car KIT built by the university group KA-RaceIng with the participation of the students.

e<sup>2</sup>-Lenk is the first publicly subsidized joint project as part of the collaborative re-search project SHARE at KIT between Schaeffler Technologies AG & Co. KG and KIT. This joint project is being managed at KIT's East Campus in a joint project management office run by SHARE at KIT and the Institute of Vehicle Systems Technology (FAST).

### **Leading Edge Cluster Electric Mobility South-West**

Schaeffler and KIT are partners in the Leading Edge Cluster Electric Mobility South-West (ESW), which connects over 80 stakeholders



*Electric cars can be provided with steering assistance by means of an intelligent control system and suitable wheel suspension (Photo: M. Frey, KIT)*

from science and economics in the region Karlsruhe – Mannheim – Stuttgart – Ulm. The cluster strategy of the ESW cluster aims to achieve intensive regional collaboration in the field of electric mobility by means of new approaches and forms of cooperation. As a result, knowledge is developed, consolidated and ultimately advantages are achieved in international competition.

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**The Mobility Systems Center pools KIT activities relating to vehicle technology. Presently, 40 KIT institutes with about 800 employees are working on methodological and technical fundamentals for tomorrow's vehicles. It is their objective to develop concepts, technologies, methods, and processes for future mobility considering the complex interactions of vehicle, driver, traffic, and society.**

**Karlsruhe Institute of Technology (KIT) is a public corporation pursuing the tasks of a Baden-Wuerttemberg state university and of a national research center of the Helmholtz Association. The KIT mission combines the three core tasks of research, higher education, and innovation. With about 9,400 employees and 24,500 students, KIT is one of the big institutions of research and higher education in natural sciences and engineering in Europe.**

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