Electromobile, together

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Not buying cars but sharing them -- car-sharing is practiced in many major cities. And in the electromobile future, city dwellers will use lots of vehicles and infrastructure together -- that is the idea of Fraunhofer researchers. In the project "eMobility Together: Vehicles, Data and Infrastructure" or "GeMo" for short, researchers are working to make this vision a reality.

Lower emissions, less noise, more quality of life – all good reasons to turn to electricity where mobility is concerned. If the EU has its way, we will all be driving only electric cars in the major cities of Europe by the year 2050. A beautiful goal, but experts are going even further than that: citizens can forego a car of their own and share electric vehicles.

A project goal is to develop technological solutions that make electromobility possible to begin with. The main prerequisite is a well-developed network of publicly accessible recharging infrastructure. An inductive recharging system is even more convenient and quicker than charging through a cable connection. "Cordless charging is the key technology for across-the-board shared mobility. That's why we're focusing on this development," notes project coordinator Florian Rothfuss of the Fraunhofer Institute for Industrial Engineering IAO. He and his team are working on a bidirectional inductive charging system that can draw energy if needed but also feed it back into the shared grid as well. This makes each individual car a tiny storage battery that relieves the grid from high fluctuations. The biggest problems facing electric cars to date have been excessive charge times and a small driving range. To charge vehicles quickly and make them available with the

largest possible driving range for the next user, the system will be designed with 22 kW. With this level of output, it takes only about an hour before a car is ready to return to the road. Another benefit of the inductive approach to charging is that it can be integrated into the road surface itself. This way, there are no pillars or boxes to impede traffic.

Networked through the cloud

If all of the citizens in a city want to share in the use of electric cars, then the users and the vehicles must be able to communicate with one another. The mobility-data cloud, a public, Internet-based platform, will unite all of the data important to a city's transportation system. "The cloud is an area of focus of this project, and it combines all of our subsystems," Rothfuss explains. "It is the central compilation point for of all of the relevant data. This information is then available through defined interfaces and provides the basis for various mobility services." Via smartphone, the user has access to available vehicles and charging stations, carpooling databases and information about local public transportation. In a protected personal interface the user can then select, reserve and pay for a car. The nexus between cloud, car, charging stations and personal mobile device is a newly developed on-board unit (OBU) installed in every vehicle. This central communications unit can determine a car's charge level and location; it also performs tasks such as access and code management.

Shared eMobility is not reserved to drivers, however. The same technology can be applied to other means of transportation – to Segways, for instance, the electric one-person scooter. To field-test the OBU and the built-in inductive charging system, the project will equip two demonstration vehicles with the technology – one passenger vehicle and one Segway.

Participants in the GeMo project include the Fraunhofer Research

Institution for Communication Systems ESK in Munich, as well as the Fraunhofer Institutes for Open Communication Systems FOKUS in Berlin; for Industrial Engineering IAO in Stuttgart; for Integrated Circuits IIS in Erlangen; for Solar Energy Systems ISE in Freiburg; and for Transportation and Infrastructure Systems IVI in Dresden.

GeMo is one of seven "Markets Beyond Tomorrow" projects. In these projects, researchers are working to find solutions to the pressing problems of the future.

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