FKFS THE COMPANY

The Research Institute for Automotive Engineering and Vehicle Engines Stuttgart (FKFS) was founded in 1930.

Its highly qualified staff conducts research and development projects in the fields of powertrains, vehicles and automotive mechatronics. Highly specialized test benches as well as measurement, testing and simulation procedures developed internally at FKFS provide engineers with the means to solve complex and demanding problems.

TEST AND EVALUATION

Effectiveness, proper operation and driver acceptance of automated driving controls must be evaluated in realistic driving experiments in early development stages.

FKFS developed statistical and representative test person experiment layouts for test and evaluation of driver assistance systems:

- Statistical representative test routes on public roads for different purpose investigations are available.
- A large test person data base is employed for composing specific test person collectives for various research objectives.
- FKFS runs a fleet of experimental electric vehicles with comprehensive measurement equipment for evaluating energetic and vehicle dynamics variables.

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Functions and systems taking over various driving tasks are increasingly introduced to market. The automation of driving is a big trend as it increases comfort by relieving the driver, improves safety, and can support in economical driving.

However, advanced driver assistance systems for automated driving are complex, depend on reliable surrounding sensors information, and have to work absolutely safe over the whole range of driving situations.

The FKFS carries out research in the fields of

» design and implementation of real-time algorithms for energy-saving automated longitudinal dynamics controls in electric vehicles,

» test and evaluation of automated driving controls in statistical test person experiments under real-life operating conditions.

A broad range of commercial and internally developed tools and methods are employed for investigating the aspects of automated driving:

» ADAS RP or compatible self-programmed digital map frameworks.

» Radar based environment sensing and modeling, object classification, and preceding vehicles behavior prediction.

» A comprehensive simulation framework including vehicle, sensor and environment models for model based software design.

» Optimization based model predictive control algorithms for energy-saving automated driving.

» Practically applied and real-time capable optimization algorithms.

» An experimental battery electric vehicle with integrated rapid control prototyping units for testing and evaluating automated driving controls in real-life operating conditions.

» Statistical consumption reduction evaluation of advanced driver assistance systems based on simulation and real-life test drives.

Experimental Battery Electric Vehicle

<table>
<thead>
<tr>
<th>Model</th>
<th>Smart ForTwo</th>
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</thead>
<tbody>
<tr>
<td>Power train</td>
<td>Electric</td>
</tr>
<tr>
<td>Motor power</td>
<td>30/40 kW (nominal/max.)</td>
</tr>
<tr>
<td>Max. range</td>
<td>120 km</td>
</tr>
<tr>
<td>Surrounding sensors</td>
<td>200 m long range radar</td>
</tr>
<tr>
<td>Digital map system</td>
<td>ADAS RP</td>
</tr>
<tr>
<td>RCP on-board:</td>
<td>1x dSPACE MAB I 1501</td>
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<tr>
<td></td>
<td>1x dSPACE MAB II 1505/1507</td>
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<tr>
<td></td>
<td>2x Windows PC</td>
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<tr>
<td>Vehicle control interface</td>
<td>Open motor torque interface</td>
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