UNIVERSITÄT DUISBURG ESSEN

Fachgebiet Hochfrequenztechnik

H F T

Fachbereich Ingenieurwissenschaften
Abteilung Elektrotechnik und Informationstechnik

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Aufgabe der Diplomarbeit im Hauptstudium II

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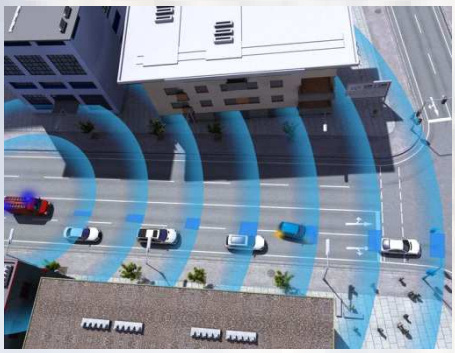
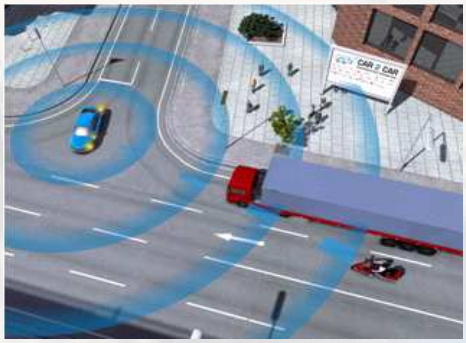
Thema: **Investigation of Antennas for Car-to-Car Communications**

Beschreibung:

Car-to-Car communication is seen as a promising technology to reduce actively the danger of accidents and traffic congestion. Cars use a new WLAN standard to exchange data concerning traffic density, road state and potential danger sources.





Presently, automobile manufacturers develop concepts and standards for a Car-to-Car Communication system and perform technology demonstrations and field testing experiments. Some of the open questions concern the performance requirements of the WLAN antennas mounted on the cars and the pattern degradation effects, depending on the chosen mounting position on a car. In particular, degradations are expected due to blocking and scattering by other antennas on the car and shading and diffraction due to the car's metallic skin shape.

Task:
The Master thesis task concerns investigations of radiation characteristics of antennas that are mounted on cars. In particular, different types of antennas, like single monopole and two- and four-element arrays with beam diversity are of interest and investigations should focus on pattern degradation effects due the antenna mounting at different positions on a typical passenger car. The task requires simulations using a field theoretical simulation tool (EMPIRE) to model specific WLAN antennas which are placed on suitably shaped conducting surfaces in order to represent realistic placement scenarios on a car.

The task can be performed in steps:

1. Select a number of typical antenna types and pattern shapes.
2. Select a number of typical scenarios for the placement of the antennas on the car skin, in particular various positions on the roof and using typical roof shapes.
3. Simulate field distributions and radiation patterns for the chosen antenna types on an infinite conducting plane with no obstacles (as a reference).
4. Simulate field distributions and radiation patterns for the chosen antenna types on a plane conducting ground of the size of a typical passenger car roof (second reference).
5. Simulate field distributions and radiation patterns for the chosen antenna types in the realistic scenarios defined earlier.
6. Compare results of realistic scenario simulations and reference cases and identify typical degradations.

At the end of the work, a public presentation of results is to be given.