UNIVERSITÄT DUISBURG ESSEN

Fachgebiet Hochfrequenztechnik

H F T

Fachbereich Ingenieurwissenschaften
Abteilung Elektrotechnik und Informationstechnik

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Aufgabe der Abschlussarbeit im ISE Masterstudiengang

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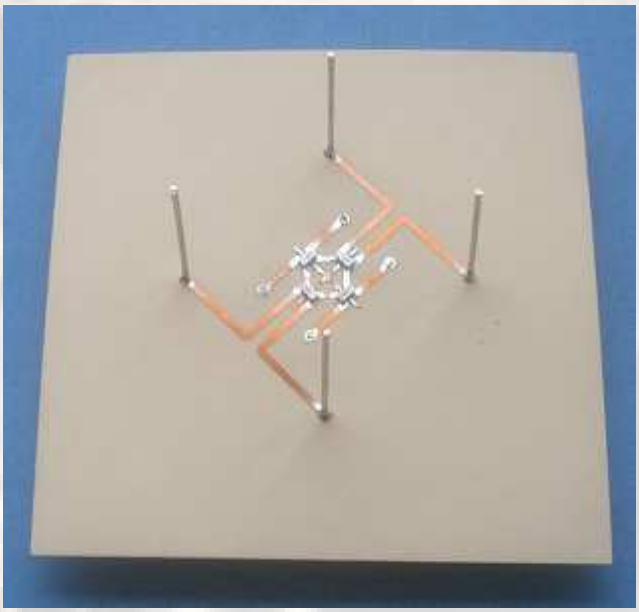
Thema: **Multibeam Antenna Array for WLAN and Car-to-Car Communications**

Beschreibung:

In wireless LAN systems and future Car-to-Car communication systems, antennas of omni-directional radiation characteristic in azimuth are important in achieving 360° coverage by one single antenna. Conventionally, this requirement is satisfied by using, e.g., a monopole antenna on a flat ground plane. In an earlier project at the department, an antenna array system has been developed which utilizes four monopole antenna elements to form an antenna array which are fed by a network which allows four discrete beams in azimuth to be created at the same time, a so-called multi-beam array. The beam width of the four beams is about 90° such that full 360°-coverage is achieved.

Based on this primary antenna, an improved antenna system is to be designed which provides an increased gain and more narrow beam width. A suitable concept for such a design is to add switched parasitic elements around the primary antenna array. Such parasitic elements are monopole antenna elements which are not connected to a feed network but rather are excited by the radiation from the "active" antenna (parasitic feed). At the base of the monopole elements, PIN- or Varactor- diodes are inserted as the termination to ground. The impedance of the diodes and thereby the radiation pattern of the array is modified by suitably varying the bias of the diodes.



Task:
The thesis task is to design and test an antenna array of monopole elements with a four-element multi-beam array at the core and a number of switched elements at the periphery. The operating frequency is to be centred at 2.4 GHz so that the earlier design can be fully exploited. The design goal for adding the parasitic elements is to increase the effective gain by 3 dB and reducing the beam width in the azimuth plane by a factor of 2. The task can be performed in steps:

1. Search of the literature on switched parasitic array antennas
2. Search and selection of suitable Varactor- and PIN- diodes
3. Investigation of the range of diode impedance variation due to biasing (calculation using manufacturer's data and test circuit experiment)
4. Antenna simulations using the EZNEC-wire antenna simulator: Model the core array and vary numbers and positions/configurations of parasitic elements
5. Build the array in microstrip technology and test

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