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## Studienarbeit / Bachelorarbeit

### Aufgabe der Bachelorarbeit im Studienprogramm

#### International Studies in Engineering (ISE)

**für:** Herrn Acheampong **Kodua Watson**  
**gestellt von:** Prof. Dr.-Ing. K. Solbach  
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**Thema:** Planar Multi-Beam Antenna for W-LAN

#### Description of Problem:

Wireless Local Area Networks in dense traffic situations may use base station antennas with directional selectivity in order to divide the traffic in angular sectors. While in mobile communications this concept is implemented using individual sector antennas placed around a base station mast, in W-LAN applications we need smaller, more simple and inexpensive solutions. If we require beams only in a limited angular sector (non omni-directional), e.g. in a hemisphere, one way is to employ a planar array of radiators which are fed by a network in order to create a number of beams in the azimuth plane.

The task in this project is to design and evaluate such an antenna for a 2.4 GHz system. The antenna array employs four radiators and is fed by a network made of four directional coupler (90° phase shift) - power dividers, called a *Butler Matrix*. A special requirement of the antenna system is a coverage of a full 180° angular range in azimuth (hemisphere) which we may realize by reducing the element spacing and by suitable bending of the planar substrate carrying the radiator elements.

In particular the task incorporates

- Search for applicable publications and patents
- Simulation of beam patterns and optimization of element spacing
- Design and test of planar radiator element (patch element or planar monopole)
- Design of the matrix circuit topology based on commercially available surface mount power dividers and production of layout file
- Assembly and pattern test of the antenna in an anechoic chamber
- Extension of pattern coverage by bending the planar substrate

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