Elektrotechnisches Kolloquium

der Bergischen Universität Wuppertal

Die Fakultät für Elektrotechnik, Informationstechnik und Medientechnik lädt zur Teilnahme an folgender Vortragsveranstaltung mit anschließender Diskussion ein:

Es spricht

Nooshin Feiz

Lehrstuhl für **Theoretische Elektrotechnik**
Prof. Dr. Clemens

über das Thema
Simulation, Design and Development of 76-81GHz Waveguide Components for Azimuth Configurable Automotive Radar Antenna Systems

Inhalt:

This thesis focuses on the simulation, design, and development of waveguide-based antenna systems for automotive radar applications in the 76–81 GHz frequency range. Modern radar sensors play a critical role in advanced driver-assistance systems (ADAS) by providing reliable environmental awareness in diverse and dynamic driving conditions. However, conventional fixed-pattern antennas are no longer sufficient to meet these complex demands. This work addresses the need for reconfigurable, dual-band radar antennas with optimized radiation performance and reduced system complexity. The thesis explores two major waveguide technologies—substrate integrated waveguides (SIW) and air-filled waveguides. In the SIW-based designs, two compact antenna systems are proposed: one combines medium- and long-range radar functionalities within a single dual-band antenna; the other provides azimuthally configurable corner radar coverage using a single structure. Both designs achieve high gain and directional control without requiring active switches. For the air-filled waveguide approach, several feeding networks are investigated for slot array antennas, aiming to identify optimal configurations based on passive distribution of amplitude and phase. Additionally, an analytical and numerical study of an asymmetric E-plane horn antenna is presented, offering deeper insight into how horn geometry influences beam shaping. To further enhance radar system integration, a novel dual-band slot antenna with configurable azimuth beam directions is introduced. Finally, the thesis presents the design and simulation of a compact self-biased circulator with spherical geometry and corrugated surfaces. This circulator enhances transmit–receive isolation, enabling efficient integration of both channels within a single antenna. The results contribute to the development of more compact, efficient, and versatile radar systems suitable for next-generation automotive platforms.

T e r m i n: **16.07.2025, 17:05 Uhr**

O r t: Bergische Universität Wuppertal
Campus Freudenberg, Seminarraum FG 1.01