WAVE-OPT

Analysis and Optimization of Non-Radiating Slotted Waveguides for Data Transmission

Programm / Ausschreibung	, Dissertationsprogramm Tiroler Hochschulen 2024	**Status**	laufend
Projektstart	15.07.2024	**Projektende**	14.07.2027
Zeitraum	2024 - 2027	**Projektlaufzeit**	37 Monate
Keywords	Signal Transmission, Communication Systems, High-Frequency Technology, Waveguides, Ultra-Wide Bandwidth		

Projektbeschreibung

The number of Internet of Things (IoT) connected devices worldwide will increase in the next few years rapidly reaching 29 billion devices in 2030. Especially for industrial applications, a large number of wireless sensors and actuators, such as robotic systems, will be connected in limited spaces. This increases the demand for high connectivity density along with high data rates and low latency.
For this purpose, non-radiating slotted waveguides (NRSW) have been used extensively in the past by industry. Most interestingly, although there are several communication systems employing NRSWs on the market, they were never a topic of scientific research, neither their fundamentals have been described in depth.
In the proposed research project, the Universität Innsbruck and VAHLE Automation aim to change the future of communication systems using NRSWs. By exploring the fundamental principles and applying these insights for optimization, these systems will be prepared to meet upcoming real-world challenges. Through the cooperation with VAHLE Automation it is possible to cross check the derived principles and simulations on their research demonstrators or current system.
The first phase – Research on Fundamental Principles of NRSWs – focuses on establishing equations and simulation models for electromagnetic propagation inside a NRSW in order to gain a deep understanding of the influence of various design parameters on its electromagnetic behavior. In a second step – Feeding Optimization – the scientific findings from the previous WP will be used to optimize the feeding structure of NRSWs including matching network, position and so on. Finally, in a third phase – System Optimization – the optimized feeding structure is implemented in a field-scaled research demonstrator and optimized using the results of complex measurements.

Projektpartner

- Universität Innsbruck