

5G and Beyond Wireless Communication System Utilizing Leaky Coaxial Antenna for Hyperloop

Description of the research topic:

18/01/2024

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Context

Can 5G be used for wireless communication of ultra-high-speed vehicles like Hyperloop? In this thesis, we are going to investigate the potential usage of leaky coaxial antennas for ultra-high speed trains, specifically Hyperloop. Hyperloop is a maglev train concept, operating inside a vacuum tunnel that can reach up to 1000kph. And Leaky Coaxial Antennas are used inside the tunnels to reduce the doppler effect caused by the moving vehicles. Therefore, we will investigate the potential benefits of such antennas for a 5G and beyond wireless communication systems in Hyperloop scenario.

Tasks

1. Understanding how Leaky Wave Antennas work
2. Familiarize yourself with Vienna Simulator:
 1. Matlab based 5G simulator.
3. Implement Hyperloop scenario
 - Traditional Antennas
 - Leaky Coaxial Antennas (different architecture scenarios)
4. Evaluation and Comparison of the different architectures
5. Documentation of results

Requirements

- Matlab / git
- Good knowledge on 5G, MIMO, Doppler effect, Channel Modeling, Antenna, and Electromagnetic Theory

Contact

If you are interested in this project, please send your full application (CV, transcript of records, research interests, possible start dates) to Mustafa Selman Akinci(selman.akinci@tum.de).

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