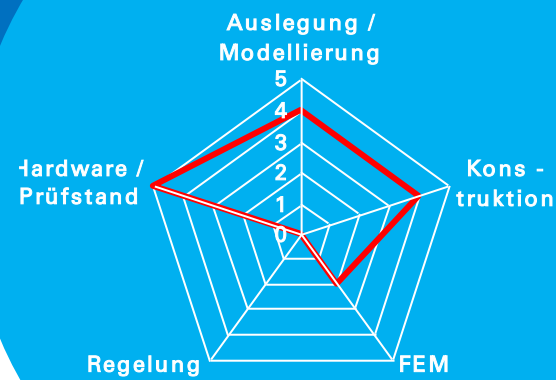


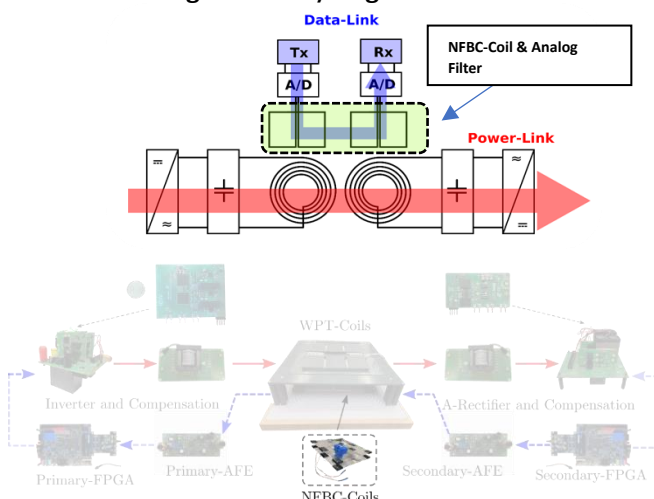


Design of a Coil and an Analog Filter for Near-Field-Based Communication in Wireless Power Transfer Systems

Wireless Power Transfer (WPT) System requires communication between primary and secondary sides to send control commands to start and stop the system, as well as to exchange information in terms of control parameters, identification and more.

The peer-to-peer nature of Near-Field-Based Communication (**NFBC**) makes the paring process of WPT primary and secondary sides easy, which is difficult with far-field-based communication (e.g., WLAN and Bluetooth). Considering other advantages (e.g., low latency, re-use of the channel estimation for positioning etc.), the near-field-based, **combined wireless power and information transfer**, could be therefore one of the most important breakthroughs in this research area, especially for wireless charging of Electric Vehicles (EVs).

However, crosstalk decoupling between WPT and NFBC is still challenging since WPT also utilizes the near-field principle, and power density of WPT in the charging zone is significantly higher than the NFBC.



In this work, an NFBC-Coil and an analog filter should be designed to ensure that the signal of NFBC is not affected by the WPT, or in other words, to improve the Signal-Noise-Ratio in the communication frequency band.

System requirements:

- NFBC-Power $< 5 \text{ W}$
- WPT-Power 20 kW
- High Data-Gain @ $1\text{-}20 \text{ MHz}$
- Low Crosstalk-Gain @ $85 - 300 \text{ kHz}$
- Receiver Impedance $< 200 \text{ Ohm}$
- Component robust

ToDo - List (my suggestion):

- Electrical simulation → Get target values of the coil and analog filter components.
- Feasibility verification → Components available / manufacturable?
- Prototyping, error & try → get BOM, fix the geometry of the coil, adjust this process until match conditions
- Online test (with 20 kW WPT) → Data acquisition and post-processing

Your profile:

- self-motivated
- experience in Simulink, Altium
- knowledge in analog filter design
- pursue perfection (pretty prototype)