(2-EN) Equalization and coding techniques for a robust wireless battery management system

Project and Motivation
IntLiIon is a research and industrial cooperation with the companies Bosch and ProDesign, as well as the University of Applied Sciences Hannover. Under this project, we investigate a radio-based (wireless) data transmission inside the lithium-ion batteries of electric and hybrid vehicles as an alternative to reduce the amount of wiring inside the battery. The Battery Control Unit (BCU) must collect the data measured by the sensors installed in each cell. A reliable and robust communication link between them must be established.

Task
The target of this thesis is to investigate both equalization and coding techniques for this particular application. Different alternatives for the channel estimation (e.g. LS, RLS, etc.) as well as equalization itself (e.g. linear eq. DFE, MMSE, etc) must be taken into account. Regarding the coding, since the retransmission of information is not allowed, the analysis of channel coding must be focused in forward error correction (FEC, such as block codes, convolutional codes, etc.).

The work will consist firstly in a theoretical analysis of different techniques for our wireless approach, and then the corresponding performance evaluation under our specific communication channel by means of simulations (in Matlab/Simulink or GNU Radio). The channel information (noise and channel impulse response) and the corresponding simulation models will be provided. It would be also desirable (mandatory for a master thesis) a validation of the performance of the selected equalizer and coding in our channel emulator by means of software defined radio platforms (e.g. the USRPs N210).

Pre-knowledge
- Communications systems and digital signal processing basics
- Matlab/Simulink skills (and/or GNU Radio)

Research topics
- Communications systems
- DSP
- E-Mobility

Course of studies
- Elektro- und Informationstechnik
- Maschinenbau
- Informatik

Start
Immediately

Links
Researcher
Project I (IntLiIon)
Project II

Contact
Dipl.-Ing. Damián Ezequiel Alonso
Westhochschule, Hertzstr. 16
Geb. 06.35
Zimmer 115
damian.alonso@kit.edu
Tel.: (0721) 608-44519