Bachelorarbeit, Masterarbeit, Diplomarbeit

(1-EN) Software-radio-based demonstrator for wireless intra-battery communication

Project and Motivation
The IntLilon project aims to develop smart data transmission techniques for the battery management system, which monitors and controls the sensor network inside lithium-ion batteries of electric and hybrid vehicles.

Wireless transmission by means of proper antennas is one of the alternatives under study, in order to reduce the amount of wiring and to increase the system data rate. The channel has been measured in 2 different battery emulators for several antennas. For the ones which showed the best performance, different modulation techniques must be evaluated. Currently, this evaluation is being carried out with computational simulations (e.g. with Simulink), in order to determine the system parameters for each modulation scheme and compare their performance.

Task
The next step is the task of this BA/MA: the implementation of a system demonstrator by means of Rapid Prototyping Platforms. The software defined radio platforms USRP N210 (or even USRP X310 if necessary) will be employed, using GNU Radio as framework. For lower frequencies, the channel presents a relatively flat transfer function and therefore simple single carrier modulation techniques (e.g. FSK, DBPSK, etc.) may be implemented. For higher frequencies, the channel characteristics are more complicated (e.g. it is much more frequency selective), thus sophisticated alternatives as multi carrier (e.g. OFDM, frequency hopping) or adaptive single carrier modulation techniques must be employed.

Pre-knowledge
- Communications systems, digital signal processing and Linux basics
- Programming skills