Model-Based Design and Virtual Integration of an Intelligent and Safe Electrical Powertrain

Affordable Hardware-in-the-Loop Real-Time Simulation

- Development of the electric powertrain follows the idea of the model based design.
- 9-phase E-motor will be available later during the research project but corresponding motor control must be tested in advance.
- Validation of the motor control is done by different means of testing: Functional simulation in Matlab/Simulink, execution on a virtual prototype as well as Processor- and Hardware-in-the-Loop simulations using available controller hardware.
- Long-term stability tests of the motor control software requires fast simulation of motor behavior. Commercial solutions are expensive.
- Aim of OFFIS: Development of an affordable Hardware-in-the-Loop real-time simulation platform for early validation of the motor control algorithm.

Conceptual setup of the hardware-aided system simulation

Visualization, control and fault injection through a host PC. Link to driving simulation SILAB is planned.

Realization and Results

Demonstrator setup: Motor simulation model executed on Raspberry Pi (bottom right) as environment for the motor control unit (left).

Acknowledgment: The work has been performed in the project MotorBrain, co-funded by grants from the ENIAC member States and the ENIAC Joint Undertaking.