

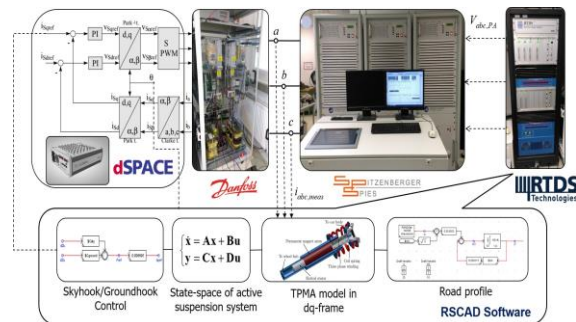
P-HIL for Evaluation of Battery Lifetime in Vehicles Equipped with Active-Controlled Suspension System

Master's Thesis

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Abstract— Ride safety and the handling capabilities of a car are contrasting goals when designing its suspension system. Mechatronic suspensions can ease this conflict by employing controlled force actuators between the wheels and the chassis. The actuators must be supplied, so harvesting and storing the dissipated energy by the mechanical system becomes essential to achieve high efficiency. Road profile and suspension control tuning can have an impact on the storage system lifetime. Optimization of the actuator control parameters which take in account for both ride safety/handling and battery lifetime is essential in future e-vehicles.



Background— The goal of this work is to investigate the impact of active suspension systems on the lifetime of the e-vehicle battery when driving in different road conditions. The hardware validation would need the realization of a laboratory quarter-car test rig, which is wasteful if the focus is on power electronics. Power hardware in the loop (P-HIL) simulation offers the possibility to connect a real-time simulation of the road profile, of mechanical and electrical components of a car with the hardware under test (HUT) through a power interface. Implementation of a P-HIL test bench with dSPACE real-time simulator is essential requirement for achieving the main goal.

Objectives:

- Analysis on the impact of the road profile and suspension tuning on the battery lifetime;
- Implementation of a mechatronic suspension and its control in dSPACE real-time simulator;
- Implementation of a P-HIL test bench for testing the DC/AC power converter and for characterization of the battery lifetime.

Type of the Work:

- Theoretical analysis
- Real-Time Simulations\Laboratory

Language of the Thesis:

- English

Connected Project:

dSPACE collaboration

