

Optimization of an Energy Management System for Fuel Cell Hybrid Busses and Further Development of the Associated Engine Test Bench

Abstract The Laboratory for Automation Engineering and Electrical Drives of the Cologne University of Applied Sciences is part of a joint research venture of industrial and academic partners from the Netherlands and the state of North-Rhine Westphalia. Financially the research project is supported by the governments of the Netherlands and the state of North-Rhine Westphalia, as well as by the European Union. In the course of the development and evaluation project, four fuel cell hybrid bus prototypes were established and successfully brought into bus line service. As an element of the continuous revision process, this thesis deals with the optimization of the initial vehicle Energy Management System (EMS), mainly in terms of increasing the overall efficiency and component life times. In this context the focus is on four major topics, precise identification of optimization potential, general construction of improving EMS algorithms, adequate transforming of those algorithms into Icon-L software code, as well as the final software implementation in the prototypes. Also in the scope of this thesis, the project-related engine test bench is revised regarding its model ratio and energy management, in order to provide a properly scaled testing environment for EMS algorithms, suited to all possible driving situations and EMS states of the emulated vehicle.