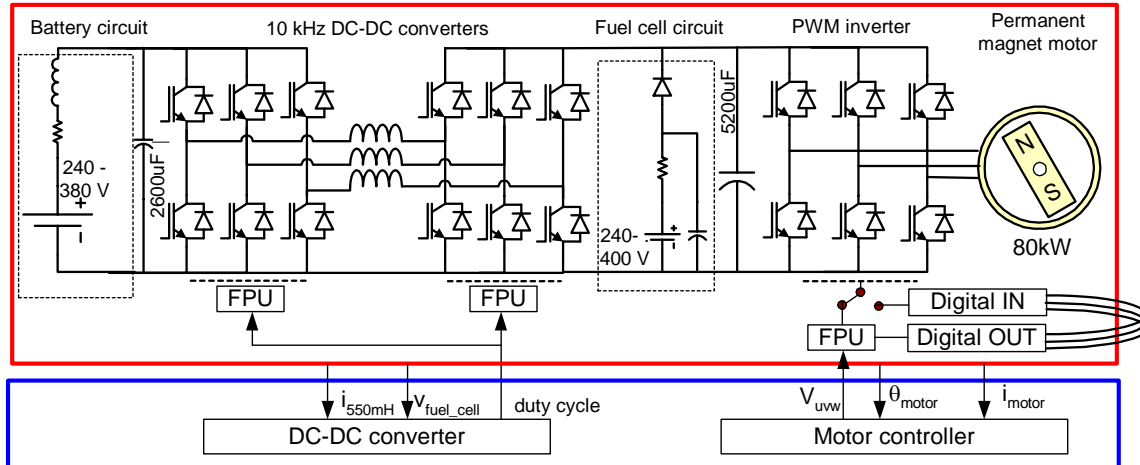


Fuel-cell, hybrid-electrical, vehicle drive

Keywords: Fuel cell, Battery, 10 kHz DC-DC converter, 2-level PMSM 10 kHz drive

The demo for the fuel-cell, hybrid-electrical vehicle drive is composed of a battery, a fuel cell (modeled as a voltage source), a DC-DC converter, and motor drive. In this system, the DC-DC converter controls the power sharing between the battery and the fuel cell. The Opal-RT Time-Stamped Bridge is required to obtain accurate simulation of the DC-DC converter because its chopping frequency (10 kHz) represent only 1/10 the period of the 10 microseconds sample time for the model. Errors on IGBT gate sampling can lead to loss of control in the real-time simulator.

CPU 1: ($T_s = 10 \mu s$)



CPU 2: ($T_s = 20 \mu s$)

Figure 1. Fuel-cell, hybrid-electrical, vehicle drive

System configuration	
Hardware enclosure	MXStation or HILBox
Software modules	RT-Events, ARTEMIS
Additional models	N/A
Package	C

This demo can be run using 2 independent RT-LAB simulators. The first one (Pentium-M-based RT-LAB) implements a DC-DC converter controller with analog inputs and PWM outputs. The second RT-LAB system implements the fuel-cell, hybrid-electric, vehicle models (DC-DC converter, battery, fuel cell and PMSM drive) along with the PMSM controller. This part was implemented with a time step below 25 microseconds using on a dual-Xeon-based, 3.0 GHz, RT-LAB simulator.