

Predictive Battery Management for Commercial Hybrid Vehicles

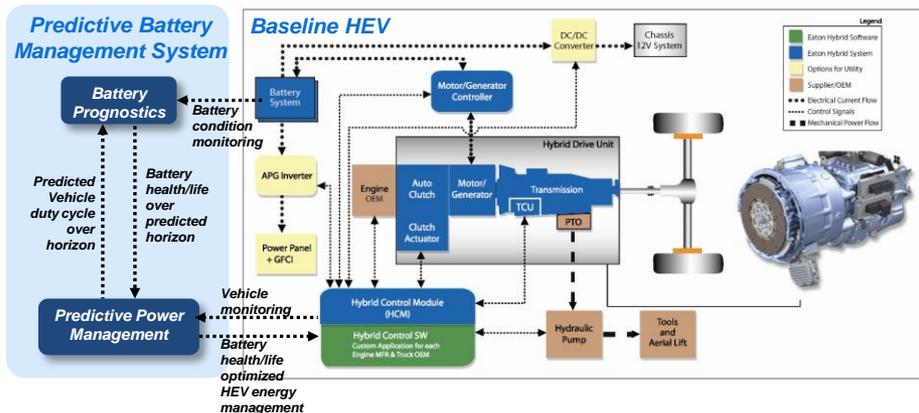
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Technology

- Battery life prognostics model based on electrochemical dynamics, capable of fast and accurate estimation of battery health and residual battery life
- Predictive Powertrain Controls with Intelligent Electric Power Management System, capable of vehicle duty cycle prediction and real-time optimization of fuel economy and battery life



Advantage and Differentiation

- Battery packs in current state-of-the-art HEVs are underutilized by the energy management system to ensure safe and reliable operation over life leading to oversized system
- By combining model-based battery prognostics with vehicle duty cycle prediction, the proposed predictive battery management system enables dynamically expanding the battery utilization to extract the required HEV system performance from a significantly downsized battery pack with minimum impact on the pack life, yielding the following advantages:
 - Significant battery downsizing resulting in lower cost and higher ROI for HEVs
 - Accurate residual battery life estimation for improved estimation of secondary market value of used battery packs

Performance Targets

Metric	State of the Art	Proposed
Battery pack cost, weight and capacity	Oversized by factor of 4	Battery downsizing by 50% while maintaining life and performance
Battery residual life prediction	Prediction uncertainty of nearly 30%	Electrochemical model capable of error of less than 10%



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