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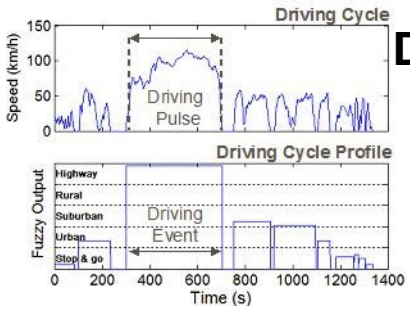
Driving Cycle Analysis



Driving Cycle Analysis

Focused Areas Main List [1]

Other Areas: Understanding Real Life Data [2] **-** Commercial Cell Evaluation:Understanding Degradation Mechanisms [3] **-**
Cell Modeling [4] **-** Battery Pack Simulation [5]

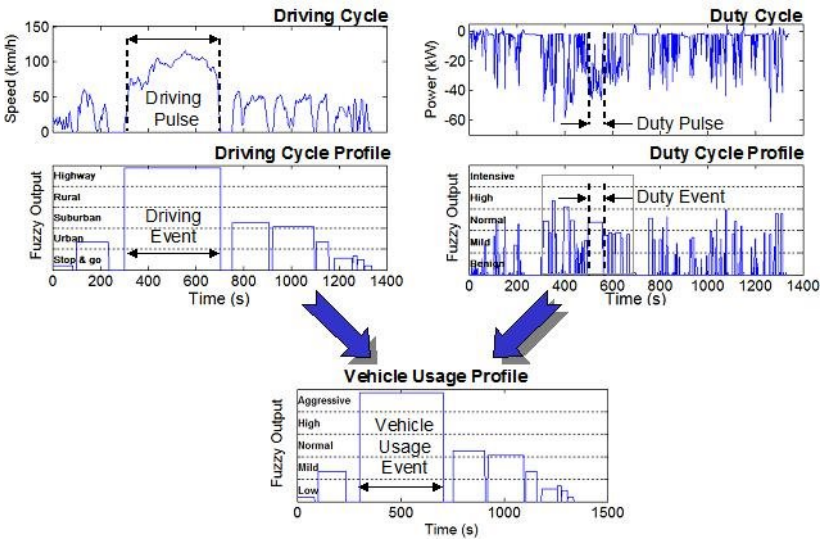
This work proposes a methodology and approach to understand battery performance and life through driving cycle and duty cycle analyses from electric and hybrid vehicle (EHV) operation in real-world situations.

Conducting driving cycle analysis with trip data collected from EHV operation in real life is very difficult and challenging. In fact, no comprehensive approach has been accepted to date, except those using standard driving cycles on a dynamometer or a track. Similarly, analyzing duty cycle performance of a battery under real-life operation faces the same challenge. A successful driving cycle analysis, however, can significantly enhance our understanding of EHV performance in real-life driving. Likewise, we also expect similar results through duty cycle analysis for batteries.

Since 1995, we have been developing tools to analyze EHV and power source performance. In particular, we were able to collect data from a fleet of 15 Hyundai Santa Fe electric sports utility vehicles (e-SUVs) operated on Oahu, Hawaii from July 2001 to June 2003. Using this data we conducted driving and duty cycle analyses in order to understand battery pack performance from a variety of EHV operating conditions.We thus developed a comprehensive approach that comprises fuzzy logic pattern recognition (FL-PR) techniques to perform driving and duty cycle analyses.

This approach has been successfully applied to EHV performance analysis via the creation of a compositional driving profile called ?driving cycle profile? (DrCP) for each trip. The same approach was used to analyze battery performance via the construction of ?duty cycle profile? (DuCP) to express battery usage under various operating conditions. The combination of these two analyses enables us to

understand both the usage profile of EHV and battery performance in synergetic details and in a systematic manner using a pattern recognition technique.



More details? 2 publications:

From Driving Cycle Analysis to Understanding Battery Performance in Real-Life Electric Hybrid Vehicle Operation. [6]
B.Y Liaw and M. Dubarry, J. Power Sources, invited, Special Issue on Hybrid Electric Vehicles, 174(1), p. 76 (2007).

Analysis of Electric Vehicle Usage of a Hyundai Santa Fe Fleet In Hawaii.[7] M. Dailliez, A. Teeters and B. Y. Liaw, Journal of Asian Electric Vehicles, 3 , p. 657 (2005).

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