

## Performance Improvement of Electric Vehicle Using K - Map Constructed Rule Based Energy Management Strategy for Battery/Ultracapacitor Hybrid Energy Storage System

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**Abstract :** The performance improvement of Hybrid Energy Storage System (HESS) in Electric Vehicle (EV) has been in discussion over the last decade. The important issues in terms of performance parameters addressed are, range of vehicle and battery (BA) peak current. Published literature has either addressed battery peak current reduction or range improvement in EV. Both the issues have not been specifically discussed and analyzed. This paper deals with both range improvement in EV and battery peak current reduction by applying a new Karnaugh Map (K-Map) constructed rule based energy management strategy to proposed HESS. The strategy allows Ultracapacitor (UC) to assist battery when the vehicle accelerates there by reducing the burden on battery. Simulation is carried out for various operating modes of EV considering both urban and highway driving conditions. Simulation is done for different values of UC by keeping battery rating constant for each driving cycle and results are presented. Feasible value of UC is selected based on simulation results. The results of proposed HESS show an improvement in performance parameters compared to Battery only Energy Storage System (BESS). Battery life is improved to considerable extent and there is an overall development in the performance of electric vehicle.

**Keywords :** electric vehicle, PID controller, energy management strategy, range, battery current, ultracapacitor

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