

Application of fuzzy logic in multi-mode driving for a battery electric vehicle energy management

ABSTRACT

Energy management system is an area of emerging interest in a full electric vehicle research. With the increasing moves to a more sustainable vehicle, there is a need to extend the battery range that simultaneously satisfying the conflicting demand between battery capacity and vehicle weight or volume. This paper presents a research conducted in the Universiti Putra Malaysia, focusing on the energy management strategy of a battery-powered electric vehicle. Three vehicle driving modes; sport, comfort, and eco have been individually modelled. Each mode is capable to dominate different driving environments; highway, suburban, and urban. In European driving cycle simulation test, comfort and eco modes have shown large extension in driving range with the maximum of 7.33% and 19.70% respectively. However the speeds have been confined by certain specific limits. The proposed of integrated multi-mode driving using fuzzy logic has enabled an adaptive driving by automatically select the driving parameters based on the speed conditions. The results have proven its ability in reducing the energy consumption as much as 32.25%, and increasing the driving range of 4.21% without downgrading the speed performance.

Keyword: Battery electric vehicle; Energy management; Fuzzy logic controller; Multi-mode driving