

Research Progress on Electric and Intelligent Vehicles

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Abstract: This editorial summarizes the content of the Special Issue entitled “The International Symposium on Electric Vehicles (ISEV2017)”, which was published in MDPI’s *Energies* journal. The Special Issue was compiled in 2017 and accepted a total of 26 papers. Lithium-ion battery, energy management of electric vehicles, and motor control in electric vehicles were the most discussed topics, introducing brand new methods with very sound results.

Keywords: lithium-ion battery; energy management; motor control; vehicles

Electric vehicles (EVs) have gained heavy investment in many countries to reduce petroleum usage and ease air pollution. However, the usage of EVs is still limited to the current techniques of lithium-ion batteries and energy management [1,2].

This Special Issue has focused on electric vehicles and their applications, which are related to all kinds of energy storage and management fields, including lithium-ion batteries, motor control, wireless charging, and so on.

Authors were invited to submit their original research and review articles exploring the issues and applications of electric vehicles.

The topics of primary interest included, but were not limited to:

- (1) Power Electronics and Electric Motor Drives
- (2) Electric Machines and Actuators
- (3) Thermal Management, Packing, and Optimization for Traction Drive Systems
- (4) Battery, Battery Management, Charging Systems and Infrastructures
- (5) Electric, Hybrid Electric, and Plug-in Hybrid Electric Vehicle System Architectures
- (6) Connected and Automated Vehicles, Smart Mobility, and Vehicle Security
- (7) Smart Grid, Electrical Infrastructure, and V2G
- (8) Wireless power transfer for electric vehicles
- (9) Electrification of Heavy-Duty and Off-Road Vehicles
- (10) Modeling, Simulation, and Control
- (11) Design optimization for vehicle structures
- (12) Codes, Standards, Policies, and Regulations for Transportation Electrification.

Of all the submissions received, only those with very high-quality scientific content and innovativeness were accepted, after a rigorous peer review. A total of 26 papers were accepted.

The lithium-ion battery has been investigated broadly, including battery fault diagnosis [3], parameter identification, and state of charge estimation [4–6]. Recently, the battery thermal

management has been a research focus. Zhang et al. [7] developed an enhanced battery thermal management system including a modified cooling structure and a control unit to improve battery temperature-based performance. Wu et al. [8] investigated the heat problems that occur during the operation of power batteries, especially thermal runaway, which usually takes place in high-temperature environments. The study was conducted on a ternary polymer lithium-ion battery.

Many researchers have investigated advanced motor control methods in electric vehicles. Song et al. [9] proposed a novel direct torque control method based on a sliding mode control strategy for permanent magnet synchronous motors used in EVs. Su et al. [10] proposed an improved continuous-time model predictive control of permanent magnetic synchronous motors for a wide speed range. Cao et al. [11] dealt with the speed synchronization control of integrated motor–transmission powertrain systems in pure EVs. In their paper [12], Huang et al. focused on the problem of insufficient propulsion motor power during high-speed steering. Zhao et al. [13] proposed a practical dual motor equipped with a four-speed Automated Manual Transmission (AMT) propulsion system to eliminate the traction interruption in conventional AMT.

Two papers focused on wireless charging of EVs, including Yang et al. [14], who designed a 6.6 KW wireless charging system for EVs, and Zhang et al. [15], who proposed a dead time soft switching optimization method for metal–oxide–semiconductor field-effect transistors. Hybrid EVs have also been a research focus in this Special Issue. Hong et al. [16] conducted an investigation to assess the influence of the high-efficiency engine on the transmission gear numbers. Xu et al. [17] investigated an electric variable transmission for hybrid electric vehicles (HEVs). He et al. [18] presented a freeway driving cycle construction method based on traffic information for plug-in HEVs. Zhao et al. [19] presented a hydraulic–electric synergy powertrain with multiple working modes to reduce fossil fuel consumption in alternative hybrid powertrains.

Other research studies include improving vehicle ride comfort by controlling an in-wheel vibration absorber [20] and suppressing the in-wheel vibration [21], the accurate control of EV height adjustment [22], a load control method for fast charging [23], and the development of an auxiliary power-integrated system for a range-extended EV [24]. Li et al. [25] introduced a new dynamical trajectory-planning method based on the Adaptive Control of Thought-Rational cognitive model to realize an active obstacle avoidance system that can drive a vehicle smoothly and without collision in complex road situations. Zhang et al. [26] focused on the performance of centrifugal compressors for vehicle turbochargers operating at high altitude. Nie et al. [27] proposed a hierarchical control method to actively control vehicle deceleration with active-brake actuators, while Wu et al. [28] proposed a human–machine-cooperative-driving controller with a hierarchical structure for vehicle dynamic stability.

Besides, the importance of the multi-states estimation of lithium-ion batteries and energy management of EVs [29,30] to further improve the usage of EVs was also discussed.

Editorial Record

Recommended by Editor	Manuscript Title
Suleiman M Sharkh	Design Optimization of an Electric Variable Transmission for Hybrid Electric Vehicles
Tomonobu Senjyu	A Power Coupling System for Electric Tracked Vehicles during High-Speed Steering with Optimization-Based Torque Distribution Control
Giovanni Esposito	Control strategy for vehicle inductive wireless charging based on load adaptive and frequency adjustment
Suleiman M Sharkh	Long-Term Battery Voltage, Power and Surface Temperature Prediction Using Model Based Extreme Learning Machine
Suleiman M Sharkh	Research on a Novel Hydraulic/Electric Synergy Bus
Michael Gerard Pecht	Effect on vehicle turbocharger exhaust gas energy utilization for plateau centrifugal compressor performance
Suleiman M Sharkh	Unified brake service by a hierarchical controller for active deceleration control in an electric and automated vehicle

Recommended by Editor	Manuscript Title
Suleiman M Sharkh	An Improved Continuous-time Model Predictive Control of Permanent Magnetic Synchronous Motors for a Wide-speed Range
Rui Xiong	Design of optimum heat transfer coefficient and model of temperature rise for Harbin bus cycles
Michael Gerard Pecht	Architecture optimization of hybrid electric vehicles with future high-efficiency engine
Xi Zhang	Height Adjustment of Electric Vehicle Based on Static Equilibrium Position State Observation Algorithm
Tomonobu Senjyu	A Novel Direct Torque Control Method Based on Asymmetric Boundary Layer Sliding Mode Control for PMSM
Suleiman M Sharkh	Wavelet Based Denoising for the Estimation of the State of Charge for Lithium-ion Batteries
Izumi Taniguchi	Study on Battery Thermal Management System Based on Thermoelectric Effect
Chunhua Liu	Application-oriented Optimal Shift Schedule Extraction for a Dual-Motor Electric Bus with Automated Manual Transmission
Rui Xiong	A Bi-Level Optimization Approach to Charging Load Regulation of Electric Vehicle Fast Charging Stations Based on a Battery Energy Storage System
Michael Gerard Pecht	Study on auxiliary power unit integrated system design and test application
Rui Xiong	Integration Design and Optimization Control of a Dynamic Vibration Absorber for Electric Wheels with In-wheel Motor
Rui Xiong	Using SOC operation interval online correction method to improve the cycle life of electric boat powered by NI-MH battery
Rui Xiong	Entropy-Based Voltage Fault Diagnosis of Battery System for Electric Vehicles
K.T. Chau	Act-R Cognitive Model Based Trajectory Planning Method Study for Electric Vehicle's Active Obstacle Avoidance System
Suleiman M Sharkh	Freeway Driving Cycle Construction Based on Real-time Traffic Information and Global Optimal Energy Management for Plug-in Hybrid Electric Vehicle
Michael Gerard Pecht	Speed synchronization control of the integrated motor-transmission powertrain over CAN through active period-scheduling approach
Rui Xiong	Ride Comfort Optimization of In-Wheel-Motor Electric Vehicle with In-Wheel Vibration Absorber
Rui Xiong	A Human-Machine-Cooperative-Driving Control Scheme based on AFS and DYC for Vehicle Dynamic Stability
Michael Gerard Pecht	Switching Device Dead Time Optimization of Resonant Double-Sided LCC Wireless Charging System for Electric Vehicles

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