

Hybrid Electric Power Train Engineering and Technology: Modeling, Control, and Simulation

By Antoni Szumanowski

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Hybridization is an increasingly popular paradigm in the auto industry, but one that is not fully understood by car manufacturers. In general, hybrid electric vehicles (HEV) are designed without regard to the mechanics of the power train, which is developed similarly to its counterparts in internal combustion engines.

Hybrid Electric Power Train Engineering and Technology: Modeling, Control, and Simulation provides readers with an academic investigation into HEV power train design using mathematical modeling and simulation of various hybrid electric motors and control systems. This book explores the construction of the most energy efficient power trains, which is of importance to designers, manufacturers, and students of mechanical engineering. This book is part of the Research Essentials collection.

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Editorial Review

Review
Author Antoni Szumanowski of Warsaw University of Technology in Poland has conducted research on hybrid electric vehicles for more than 30 years, providing the most up-to-date treatment of hybrid electric vehicle power trains available today. Hybrid vehicles utilize both an internal combustion engine and at least one electric motor, with applications ranging from large buses to consumer autos. The book discusses plug-in hybrids and the planetary power-splitting transmission configuration that has become popular in current automotive applications. The work is rich in simulation examples and includes excellent coverage of important components such as traction batteries, electric motors, ultracapacitors, and transmission configurations. The coverage of internal combustion engines is at a level that will facilitate the discussion of hybrid power train technology. The content will be most accessible to advanced students, researchers, or professionals in electrical or mechanical engineering. Summing Up: Highly recommended. Electrical or mechanical engineering collections supporting graduate students and above. --*G.E. Johnson, Tennessee Technological University, CHOICE Magazine, Vol. 51 (5)*

About the Author

Antoni Szumanowski is a professor at Warsaw University of Technology and the Head of the Department of the Multisource Propulsion System. He has been involved in hybrid electric vehicles (HEVs) research since 1976. He earned both Ph.D. and D.Sc. degrees from Warsaw University of Technology, where he is the leader of the Scientific Division, whose activity is supported by government and university grants. He is a member of the Committee of EVS (Electric Vehicle Symposium in the world), a board member of the European Association for Battery, Hybrid and Fuel Cell Electric Vehicles (AVERE), and President of the Polish Society for Environmentally-friendly Vehicles. He is the reviewer of a few important journals such as 'IEEE Transactions on Vehicular Technology' and the 'Journal of Automobile Engineering'. He has been involved in EU FP6 (HyHEELS) and FP7 (AVTR, WIDE -MOB, ENIAC, INTRASME, SAGE) in the fields of electromobility and green transportation because of his rich experience and knowledge in the field of Hybrid & Electric Vehicles.

He has published five monographs and books in Polish in the field of E&HEVs, alternative energy and energy storage systems. Two monographs have been written in English 'Fundamentals of Hybrid Vehicle Drives' (2000) and 'Hybrid Electric Vehicle Drives Design Edition based on URBAN BUSES' (2006). The two English books were translated into Chinese and published in the Press Department of Beijing Institute of Technology. He has about 30 patents on the solutions of components and propulsion systems for E&HEVs.

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