

Title: The Evolution of the EV Powertrain from 1990 to Today

In this keynote, the speaker reviews the evolution of the electric car from the late 1980s to 2025. He discusses the powertrain developments of the battery chemistries, semiconductors, machines and drives, all technologies of interest to the power electronics engineer.

John G. Hayes, PhD, MSEE, MBA, has lectured at University College Cork since 2000, and specialises in research collaborations with industry to develop electromobility and renewable energy systems and related power electronics, machines and electromagnetism. He previously worked in Southern California for ten years at General Motors developing propulsion and charging systems for the GM EV1, the first modern production electric vehicle (EV).

He is the lead author of the widely adopted textbook *Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles* (in Chinese 电驱动系统——混动、纯电动与燃料电池汽车的能量系统、功率电子和传动). John is currently developing the second edition.