Future Automotive Powertrains: Lecture Notes In Electrical Engineering 191

Chapter 1: to Automotive Powertrains

In this chapter, we provide an overview of the history, evolution, and classification of automotive powertrains. We discuss the fundamental principles of powertrain operation, including energy conversion, power transmission, and control systems. We also explore the challenges and opportunities in designing and developing powertrains for future vehicles.

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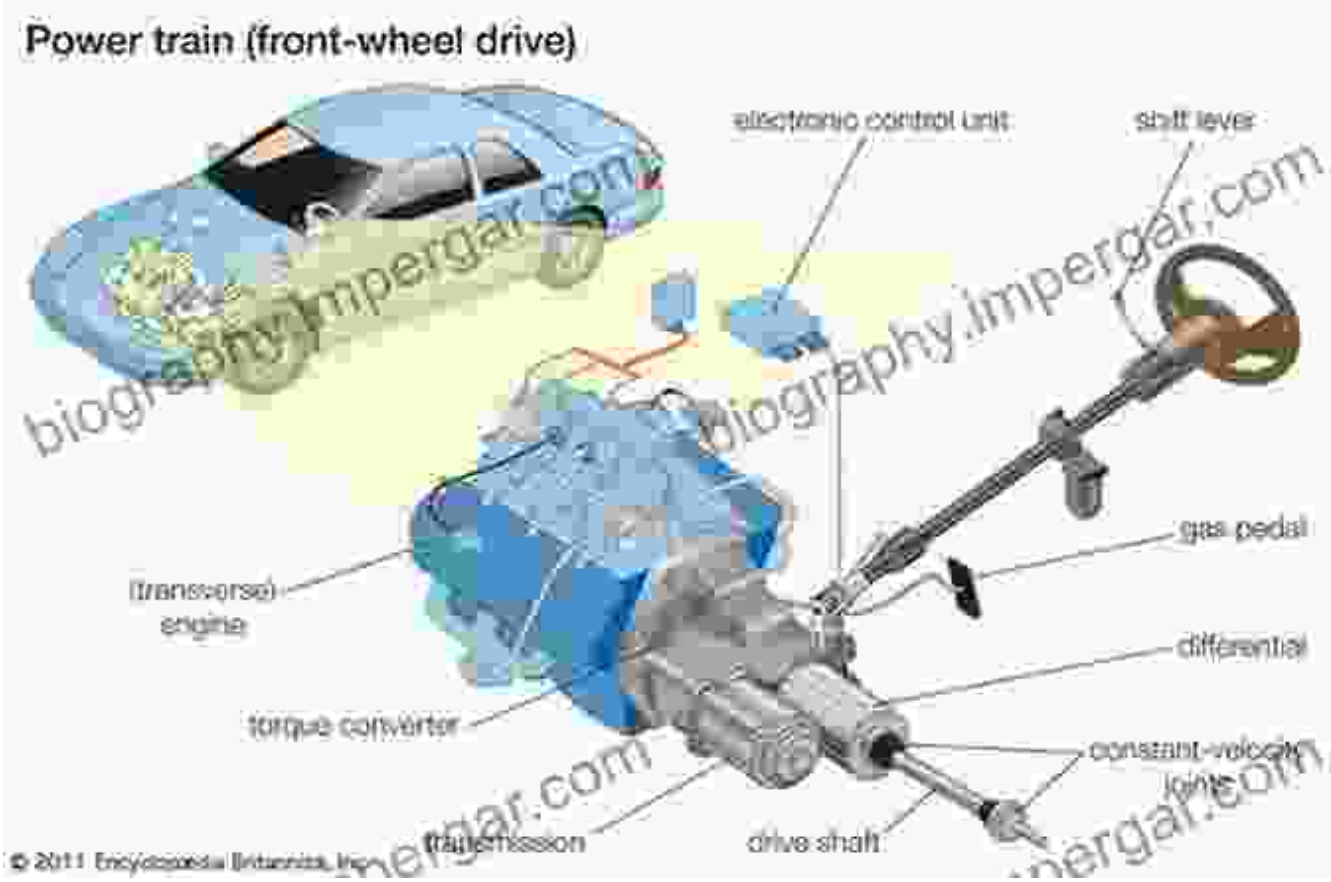
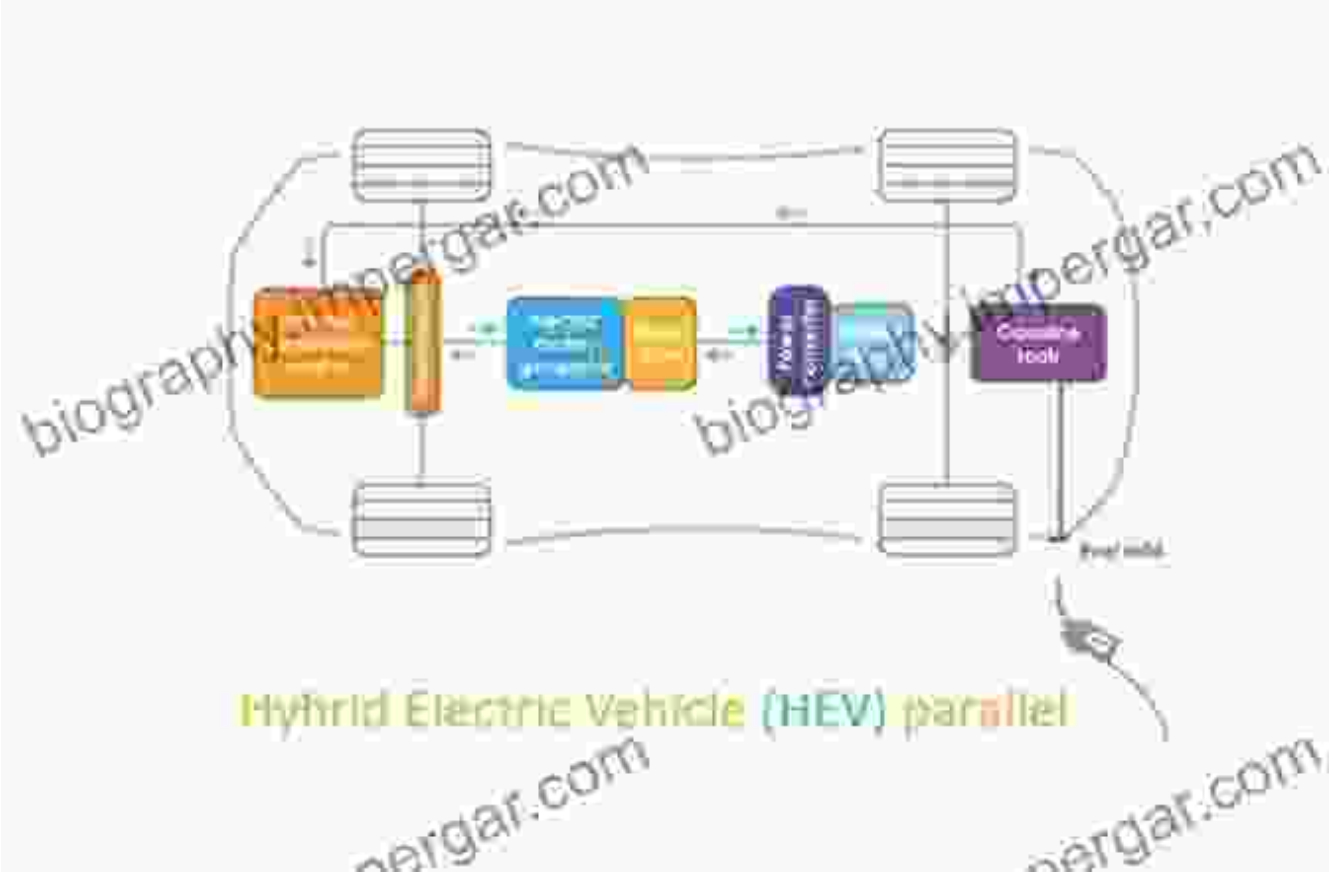


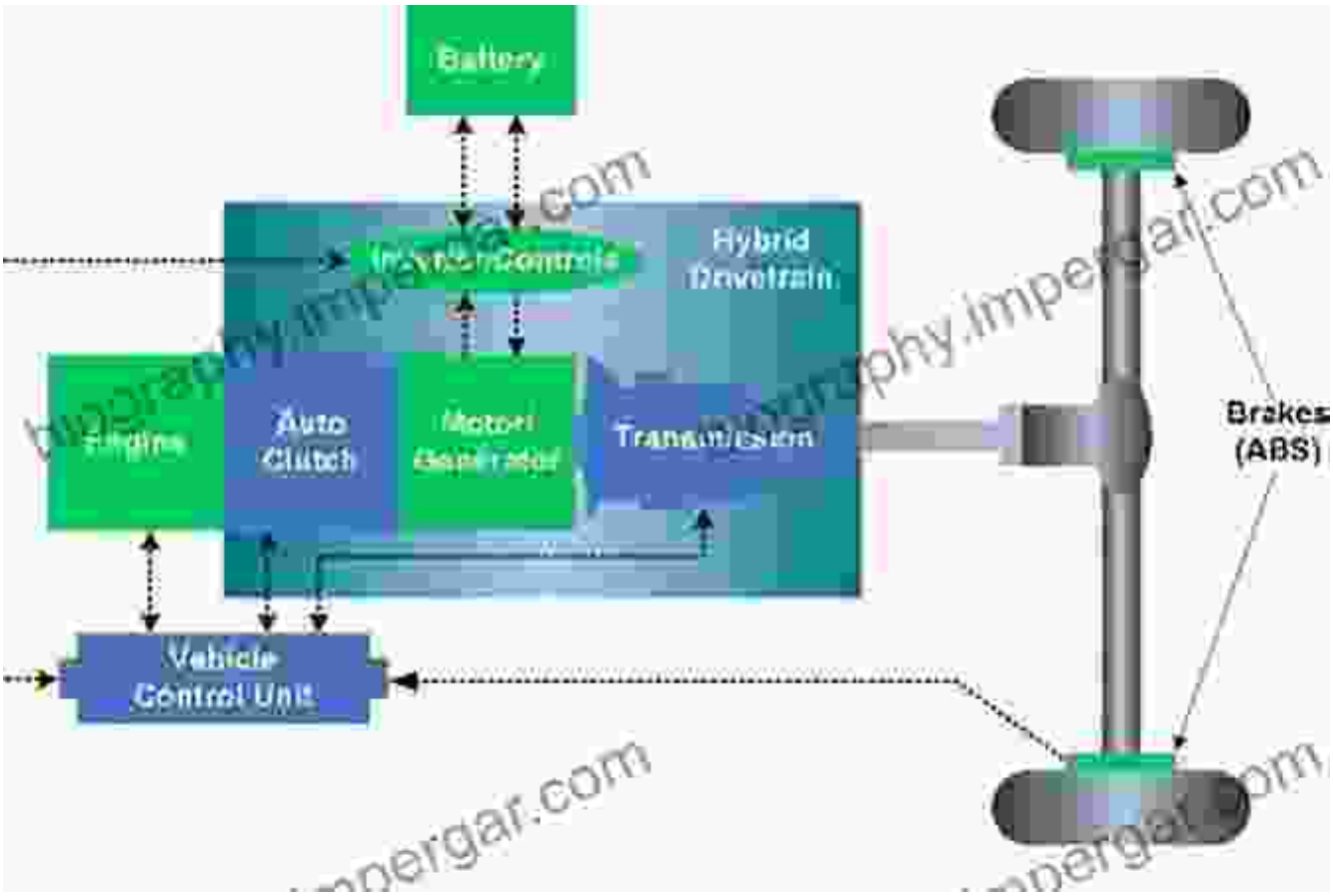
Chapter 2: Electric Vehicles

This chapter delves into the principles and technologies of electric vehicles (EVs). We discuss the different types of EVs, including battery electric vehicles (BEVs),plug-in hybrid electric vehicles (PHEVs),and extended-range electric vehicles (EREVs). We explore the design and optimization of EV powertrains, including electric motors, batteries, and power electronics. We also discuss the challenges and opportunities in the development and adoption of EVs.



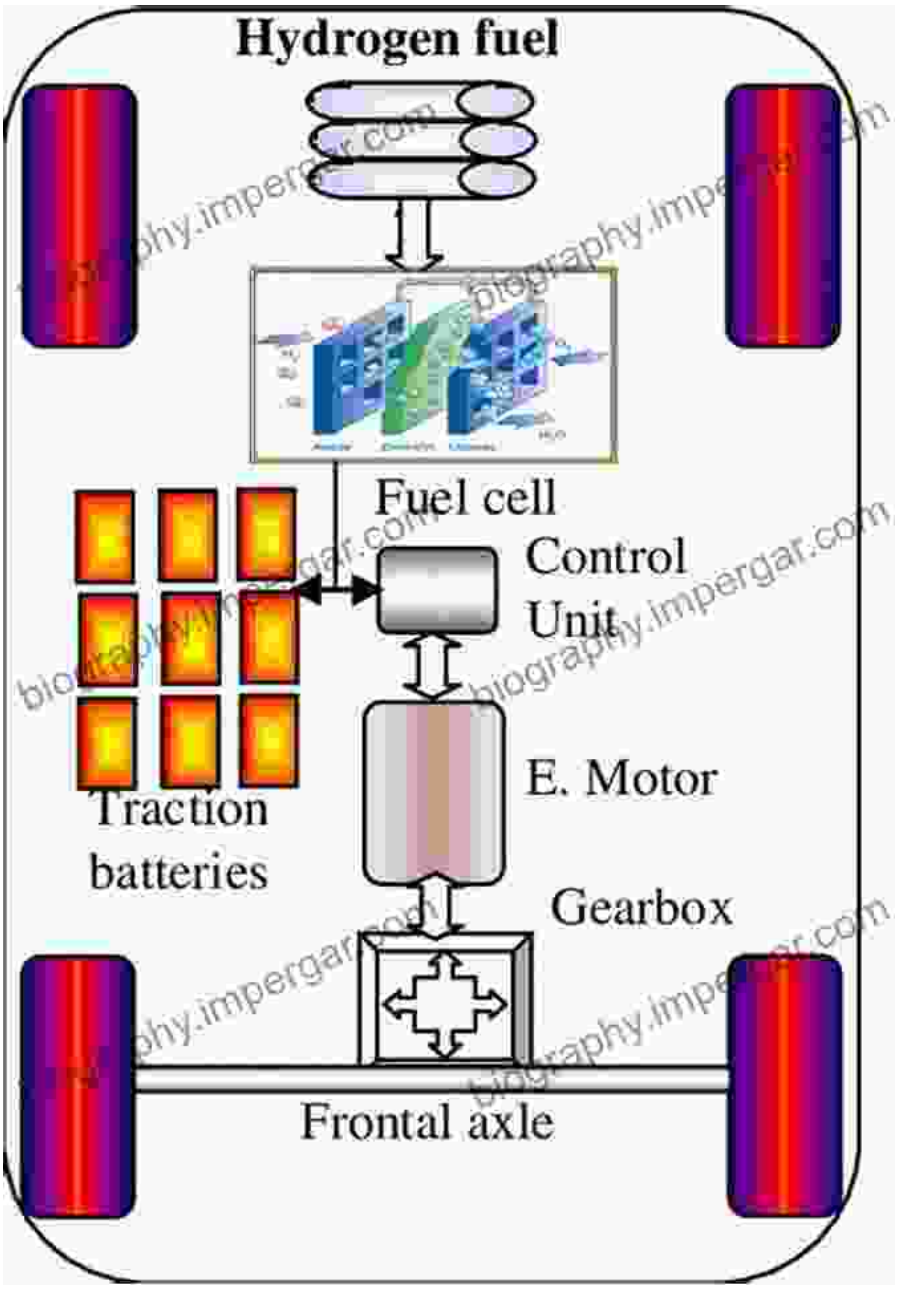
Chapter 3: Hybrid Powertrains

Hybrid powertrains combine the advantages of both internal combustion engines (ICEs) and electric motors. In this chapter, we explore the different types of hybrid powertrains, including parallel hybrids, series hybrids, and power-split hybrids. We discuss the design and optimization of hybrid powertrains, including the selection and sizing of components. We also discuss the challenges and opportunities in the development and adoption of hybrid vehicles.



Chapter 4: Fuel Cell Vehicles

Fuel cell vehicles (FCVs) offer the potential for zero-emission transportation. In this chapter, we explore the principles and technologies of FCVs. We discuss the different types of fuel cells, including proton exchange membrane fuel cells (PEMFCs) and solid oxide fuel cells (SOFCs). We also discuss the design and optimization of FCV powertrains, including fuel cells, fuel storage systems, and power electronics. We conclude with a discussion of the challenges and opportunities in the development and adoption of FCVs.



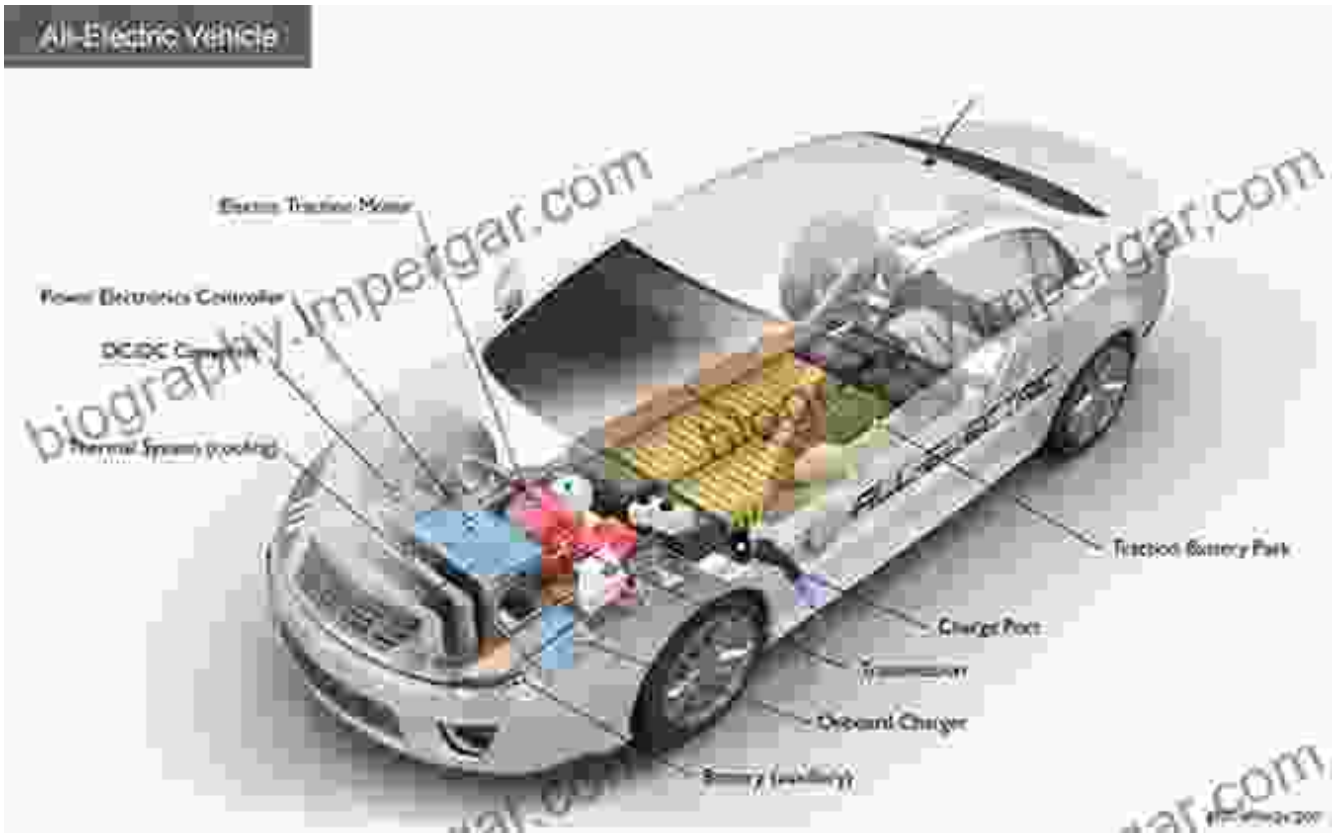
Chapter 5: Powertrain Design and Optimization

In this chapter, we provide a comprehensive overview of powertrain design and optimization techniques. We discuss the different design parameters and constraints, including power, torque, efficiency, emissions, and cost. We explore the use of modeling and simulation tools for powertrain design and optimization. We also discuss the emerging trends in powertrain

design, including the use of artificial intelligence (AI) and machine learning (ML).

Chapter 6: Future Trends in Automotive Powertrains

In this chapter, we explore the future trends in automotive powertrains. We discuss the potential for autonomous vehicles, connected vehicles, and shared mobility services. We also explore the impact of new technologies, such as wireless charging and vehicle-to-grid (V2G) integration. We conclude with a discussion of the challenges and opportunities in the development and adoption of future automotive powertrains.



In this lecture notes volume, we have provided a comprehensive overview of automotive powertrains. We have explored the fundamental principles, emerging technologies, and design strategies for sustainable and efficient mobility solutions. We have also discussed the challenges and opportunities in the development and adoption of future automotive powertrains. We hope that this volume will serve as a valuable resource for engineers, researchers, and students working in the field of automotive powertrains.

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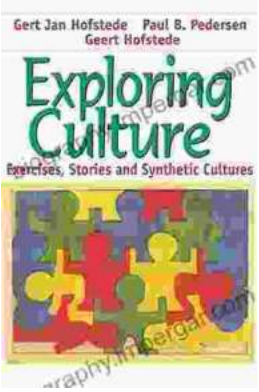

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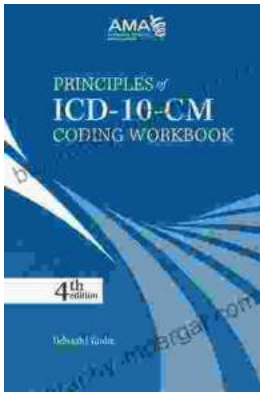

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