

Automotive Software Engineering Principles Processes Methods And Tools

Since the early seventies, the development of the automobile has been characterized by a steady increase in the deployment of onboard electronics systems and software. This trend continues unabated and is driven by rising end-user demands and increasingly stringent environmental requirements. Today, almost every function onboard the modern vehicle is electronically controlled or monitored. The software-based implementation of vehicle functions provides for unparalleled freedoms of concept and design. However, automobile development calls for the accommodation of contrasting prerequisites - such as higher demands on safety and reliability vs. lower cost ceilings, longer product life cycles vs. shorter development times - along with growing proliferation of model variants. Automotive Software Engineering has established its position at the center of these seemingly conflicting opposites. This book provides background basics as well as numerous suggestions, rare insights, and cases in point concerning those processes, methods, and tools that contribute to the surefooted mastery of the use of electronic systems and software in the contemporary automobile.

This book presents operational and practical issues of automotive mechatronics with special emphasis on the heterogeneous automotive vehicle systems approach, and is intended as a graduate text as well as a reference for scientists and engineers involved in the design of automotive mechatronic control systems. As the complexity of automotive vehicles increases, so does the dearth of high competence, multi-disciplined automotive scientists and engineers. This book provides a discussion into the type of mechatronic control systems found in modern vehicles and the skills required by automotive scientists and engineers working in this environment. Divided into two volumes and five parts, Automotive Mechatronics aims at improving automotive mechatronics education and emphasises the training of students' experimental hands-on abilities, stimulating and promoting experience among high education institutes and produce more automotive mechatronics and automation engineers. The main subject that are treated are: VOLUME I: RBW or XBW unibody or chassis-motion mechatronic control hypersystems; DBW AWD propulsion mechatronic control systems; BBW AWB dispulsion mechatronic control systems; VOLUME II: SBW AWS diversion mechatronic control systems; ABW AWA suspension mechatronic control systems. This volume was developed for undergraduate and postgraduate students as well as for professionals involved in all disciplines related to the design or research and development of automotive vehicle dynamics, powertrains, brakes, steering, and shock absorbers (dampers). Basic knowledge of college mathematics, college physics, and knowledge of the functionality of automotive vehicle basic propulsion, dispulsion, conversion and suspension systems is required.

For the last century, the automotive industry has been dominated by internal combustion engines. Their flexibility of application, driving range, performance and sporty characteristics has resulted in several generations of this technology and has formed generations of engineers. But that is not the end of the story. Stricter legislation and increased environmental awareness have resulted in the development of new powertrain technologies in addition and parallel to the highly optimized internal combustion engine. Hybrid powertrains systems, pure battery electric systems and fuel cell systems, in conjunction with a diverse range of applications, have increased the spectrum of powertrain technologies. Furthermore, automated driving together with intelligent and highly connected systems are changing the way to get from A to B. Not only is the interaction of all these new technologies challenging, but also several different disciplines have to collaborate intensively in order for new powertrain systems to be successfully developed. These new technologies and the resulting challenges lead to an increase in system complexity. Approaches such as systems engineering are necessary to manage this complexity. To show how systems engineering manages the increasing complexity of modern powertrain systems, by providing processes, methods, organizational aspects and tools, this book has been structured into five parts. Starting with Challenges for Powertrain Development, which describes automotive-related challenges at different levels of the system hierarchy and from different point of views. The book then continues with the core part, Systems Engineering, in which all the basics of systems engineering, model-based systems engineering, and their related processes, methods, tools, and organizational matters are described. A special focus is placed on important standards and the human factor. The third part, Automotive Powertrain Systems Engineering Approach, puts the fundamentals of systems engineering into practice by adding the automotive context. This part focuses on system development and also considers the interactions to hardware and software development. Several approaches and methods are presented based on systems engineering philosophy. Part four, Powertrain Development Case Studies, adds the practical point of view by providing a range of case studies on powertrain system level and on powertrain element level and discusses the development of hybrid powertrain, internal combustion engines, e-drives, transmissions, batteries and fuel cell systems. Two case studies on a vehicle level are also presented. The final part, Outlook, considers the development of systems engineering itself with particular focus on information communication technologies. Even though this book covers systems engineering from an automotive perspective, many of the challenges, fundamental principles, conclusions and outlooks can be applied to other domains too. Therefore, this book is not only relevant for automotive engineers and students, but also for specialists in scientific and industrial positions in other domains and anyone who has to cope with the challenge of successfully developing complex systems with a large number of collaborating disciplines.

This Expert Guide gives you the techniques and technologies in software engineering to optimally design and implement your embedded system. Written by experts with a solutions focus, this encyclopedic reference gives you an indispensable aid to tackling the day-to-day problems when using software engineering methods to develop your embedded systems. With this book you will learn: The principles of good architecture for an embedded system Design practices to help make your embedded project successful Details on principles that are often a part of embedded systems, including digital signal processing, safety-critical principles, and development processes Techniques for setting up a performance engineering strategy for your embedded system software How to develop user interfaces for embedded systems Strategies for testing and deploying your embedded system, and ensuring quality development processes Practical techniques for optimizing embedded software for performance, memory, and power Advanced guidelines for developing multicore software for embedded systems How to develop embedded software for networking, storage, and automotive segments How to manage the embedded development process Includes contributions from: Frank Schirrmeister, Shelly Gretlein, Bruce Douglass, Erich Styger, Gary Stringham, Jean Labrosse, Jim Trudeau, Mike Brogioli, Mark Pitchford, Catalin Dan Udma, Markus Levy, Pete Wilson, Whit Waldo, Inga Harris, Xinxin Yang, Srinivasa Addepalli, Andrew McKay, Mark Kraeling and Robert Oshana. Road map of key problems/issues and references to their solution in the text Review of core methods in the context of how to apply them Examples demonstrating timeless implementation details Short and to- the- point case studies show how key ideas can be implemented, the rationale for choices made, and design guidelines and trade-offs

This volume provides an overview of current work in software engineering techniques that can enhance the quality of software. The chapters of this volume, organized by key topic area, create an agenda for the IFIP Working Conference on Software Engineering Techniques, SET 2006. The seven sections of the volume address the following areas: software architectures, modeling, project management, software quality, analysis and verification methods, data management, and software maintenance.

This volume highlights the papers presented at the National Academy of Engineering's 2012 U.S. Frontiers of Engineering Symposium. Every year, the symposium brings together 100 outstanding young leaders in engineering to share their cutting-edge research and technical work. The 2012 symposium was held September 13-15, and hosted by General Motors at the GM Technical Center in Warren, Michigan. Speakers were asked to prepare extended summaries of their presentations, which are reprinted here. The intent of this book is to convey the excitement of this unique meeting and to highlight

cutting-edge developments in engineering research and technical work.

Proceedings of the FISITA 2012 World Automotive Congress are selected from nearly 2,000 papers submitted to the 34th FISITA World Automotive Congress, which is held by Society of Automotive Engineers of China (SAE-China) and the International Federation of Automotive Engineering Societies (FISITA). This proceedings focus on solutions for sustainable mobility in all areas of passenger car, truck and bus transportation. Volume 6: Vehicle Electronics focuses on: •Engine/Chassis/Body Electronic Control •Electrical and Electronic System •Software and Hardware Development •Electromagnetic Compatibility (EMC) •Vehicle Sensor and Actuator •In-Vehicle Network •Multi-Media/Infotainment System Above all researchers, professional engineers and graduates in fields of automotive engineering, mechanical engineering and electronic engineering will benefit from this book. SAE-China is a national academic organization composed of enterprises and professionals who focus on research, design and education in the fields of automotive and related industries. FISITA is the umbrella organization for the national automotive societies in 37 countries around the world. It was founded in Paris in 1948 with the purpose of bringing engineers from around the world together in a spirit of cooperation to share ideas and advance the technological development of the automobile.

This book focuses on software architecture and the value of architecture in the development of long-lived, mission-critical, trustworthy software-systems. The author introduces and demonstrates the powerful strategy of "Managed Evolution," along with the engineering best practice known as "Principle-based Architecting." The book examines in detail architecture principles for e.g., Business Value, Changeability, Resilience, and Dependability. The author argues that the software development community has a strong responsibility to produce and operate useful, dependable, and trustworthy software. Software should at the same time provide business value and guarantee many quality-of-service properties, including security, safety, performance, and integrity. As Dr. Furrer states, "Producing dependable software is a balancing act between investing in the implementation of business functionality and investing in the quality-of-service properties of the software-systems." The book presents extensive coverage of such concepts as: Principle-Based Architecting Managed Evolution Strategy The Future Principles for Business Value Legacy Software Modernization/Migration Architecture Principles for Changeability Architecture Principles for Resilience Architecture Principles for Dependability The text is supplemented with numerous figures, tables, examples and illustrative quotations. Future-Proof Software-Systems provides a set of good engineering practices, devised for integration into most software development processes dedicated to the creation of software-systems that incorporate Managed Evolution.

Covers important concepts, issues, trends, methodologies, and technologies in quality assurance for model-driven software development.

The proceedings approaches the subject matter with problems in technical convergence and convergences of security technology. This approach is new because we look at new issues that arise from techniques converging. The general scope of the proceedings content is convergence security and the latest information technology. The intended readership are societies, enterprises, and research institutes, and intended content level is mid- to highly educated personals. The most important features and benefits of the proceedings are the introduction of the most recent information technology and its related ideas, applications and problems related to technology convergence, and its case studies and finally an introduction of converging existing security techniques through convergence security. Overall, through the proceedings, authors will be able to understand the most state of the art information strategies and technologies of convergence security.

This book introduces the principles and practices in automotive systems, including modern automotive systems that incorporate the latest trends in the automobile industry. The fifteen chapters present new and innovative methods to master the complexities of the vehicle of the future. Topics like vehicle classification, structure and layouts, engines, transmissions, braking, suspension and steering are illustrated with modern concepts, such as battery-electric, hybrid electric and fuel cell vehicles and vehicle maintenance practices. Each chapter is supported with examples, illustrative figures, multiple-choice questions and review questions. Aimed at senior undergraduate and graduate students in automotive/automobile engineering, mechanical engineering, electronics engineering, this book covers the following: Construction and working details of all modern as well as fundamental automotive systems Complexities of operation and assembly of various parts of automotive systems in a simplified manner Handling of automotive systems and integration of various components for smooth functioning of the vehicle Modern topics such as battery-electric, hybrid electric and fuel cell vehicles Illustrative examples, figures, multiple-choice questions and review questions at the end of each chapter

2012 International Conference on Software Engineering, Knowledge Engineering and Information Engineering (SEKEIE 2012) will be held in Macau, April 1-2, 2012 . This conference will bring researchers and experts from the three areas of Software Engineering, Knowledge Engineering and Information Engineering together to share their latest research results and ideas. This volume book covered significant recent developments in the Software Engineering, Knowledge Engineering and Information Engineering field, both theoretical and applied. We are glad this conference attracts your attentions, and thank your support to our conference. We will absorb remarkable suggestion, and make our conference more successful and perfect.

'Introduction to software engineering design' emphasizes design practice at an introductory level using object-oriented analysis and design techniques and UML 2.0. Readers will learn to use best practices in software design and development. Pedagogical features include learning objectives and orientation diagrams, summaries of key concepts, end-of-section quizzes, a large running case study, team projects, over 400 end-of-chapter exercises, and a glossary of key terms. This text covers all aspects of software design in four parts - Part I introduces the discipline of design, generic design processes, and design management; Part II covers software product design, including analysis activities such as needs elicitation and documentation, requirements development activities such as requirements specification and validation, prototyping, and use case modeling; Part III covers engineering design analysis, including conceptual modeling and both architectural and detailed design; Part IV surveys patterns in software design, including architectural styles and common mid-level design patterns.

This book constitutes the refereed proceedings of the 15th International Conference on Product-Focused Software Process Improvement, PROFES 2014, held in Helsinki, Finland, in December 2014. The 18 revised full papers presented together with 14 short papers were carefully reviewed and selected from 45 initial submissions. The papers are

organized in topical sections on agile development, decision-making, development practices and issues, product planning, and project management.

Automotive Software Engineering Principles, Processes, Methods, and Tools

This book reflects the shift in design paradigm in automobile industry. It presents future innovations, often referred as “automotive systems engineering”. These cause fundamental innovations in the field of driver assistance systems and electro-mobility as well as fundamental changes in the architecture of the vehicles. New driving functionalities can only be realized if the software programs of multiple electronic control units work together correctly. This volume presents the new and innovative methods which are mandatory to master the complexity of the vehicle of the future.

Automotive control has developed over the decades from an auxiliary technology to a key element without which the actual performances, emission, safety and consumption targets could not be met. Accordingly, automotive control has been increasing its authority and responsibility – at the price of complexity and difficult tuning. The progressive evolution has been mainly led by specific applications and short-term targets, with the consequence that automotive control is to a very large extent more heuristic than systematic. Product requirements are still increasing and new challenges are coming from potentially huge markets like India and China, and against this background there is wide consensus both in the industry and academia that the current state is not satisfactory. Model-based control could be an approach to improve performance while reducing development and tuning times and possibly costs. Model predictive control is a kind of model-based control design approach which has experienced a growing success since the middle of the 1980s for “slow” complex plants, in particular of the chemical and process industry. In the last decades, several developments have allowed using these methods also for “fast” systems and this has supported a growing interest in its use also for automotive applications, with several promising results reported. Still there is no consensus on whether model predictive control with its high requirements on model quality and on computational power is a sensible choice for automotive control.

Computer Aided Innovation (CAI) is a young domain, the goal of which is to support enterprises throughout the complete innovation process. This comprehensive book presents the most up-to-date research on CAI. It addresses the main motivations of the industrial sector regarding the engineering innovation activity with computer tools and methods. The book also discusses organizational, technological and cognitive aspects of the application of CAI methods and tools.

This open access book constitutes the proceedings of the 20th International Conference on Agile Software Development, XP 2019, held in Montreal, QC, Canada, in May 2019. XP is the premier agile software development conference combining research and practice. It is a hybrid forum where agile researchers, academics, practitioners, thought leaders, coaches, and trainers get together to present and discuss their most recent innovations, research results, experiences, concerns, challenges, and trends. Following this history, for both researchers and seasoned practitioners XP 2019 provided an informal environment to network, share, and discover trends in Agile for the next 20 years. The 15 full papers presented in this volume were carefully reviewed and selected from 45 submissions. They were organized in topical sections named: agile adoption, agile practices; large-scale agile; agility beyond IT, and the future of agile.

The automotive industry faces constant pressure to reduce development costs and time while still increasing vehicle quality. To meet this challenge, engineers and researchers in both science and industry are developing effective strategies and flexible tools by enhancing and further integrating powerful, computer-aided design technology. This book provides a valuable overview of the development tools and methods of today and tomorrow. It is targeted not only towards professional project and design engineers, but also to students and to anyone who is interested in state-of-the-art computer-aided development. The book begins with an overview of automotive development processes and the principles of virtual product development. Focusing on computer-aided design, a comprehensive outline of the fundamentals of geometry representation provides a deeper insight into the mathematical techniques used to describe and model geometrical elements. The book then explores the link between the demands of integrated design processes and efficient data management. Within automotive development, the management of knowledge and engineering data plays a crucial role. Some selected representative applications provide insight into the complex interactions between computer-aided design, knowledge-based engineering and data management and highlight some of the important methods currently emerging in the field.

Teaches readers how to test and analyze software to achieve an acceptable level of quality at an acceptable cost Readers will be able to minimize software failures, increase quality, and effectively manage costs Covers techniques that are suitable for near-term application, with sufficient technical background to indicate how and when to apply them Provides balanced coverage of software testing & analysis approaches By incorporating modern topics and strategies, this book will be the standard software-testing textbook

Software Engineering for Embedded Systems: Methods, Practical Techniques, and Applications, Second Edition provides the techniques and technologies in software engineering to optimally design and implement an embedded system. Written by experts with a solution focus, this encyclopedic reference gives an indispensable aid on how to tackle the day-to-day problems encountered when using software engineering methods to develop embedded systems. New sections cover peripheral programming, Internet of things, security and cryptography, networking and packet processing, and hands on labs. Users will learn about the principles of good architecture for an embedded system, design practices, details on principles, and much more. Provides a roadmap of key problems/issues and references to their solution in the text Reviews core methods and how to apply them Contains examples that demonstrate timeless implementation details Users case studies to show how key ideas can be implemented, the rationale for choices made, and design guidelines and trade-offs

This comprehensive text/reference presents an in-depth review of the state of the art of automotive connectivity and cybersecurity with regard to trends, technologies, innovations, and applications. The text describes the challenges of the global automotive market, clearly showing where the multitude of innovative activities fit within the overall effort of cutting-edge automotive innovations, and provides an ideal framework for understanding the complexity of automotive connectivity and cybersecurity. Topics and features: discusses the automotive market, automotive research and development, and automotive electrical/electronic and software technology; examines connected cars and autonomous vehicles, and methodological approaches to cybersecurity to avoid cyber-attacks against vehicles; provides an overview on the automotive industry that introduces the trends driving the automotive industry towards smart mobility and autonomous driving; reviews automotive research and development, offering background on the complexity involved in developing new vehicle models; describes the technologies essential for

the evolution of connected cars, such as cyber-physical systems and the Internet of Things; presents case studies on Car2Go and car sharing, car hailing and ridesharing, connected parking, and advanced driver assistance systems; includes review questions and exercises at the end of each chapter. The insights offered by this practical guide will be of great value to graduate students, academic researchers and professionals in industry seeking to learn about the advanced methodologies in automotive connectivity and cybersecurity.

A Clear Outline of Current Methods for Designing and Implementing Automotive Systems Highlighting requirements, technologies, and business models, the Automotive Embedded Systems Handbook provides a comprehensive overview of existing and future automotive electronic systems. It presents state-of-the-art methodological and technical solutions in the areas of in-vehicle architectures, multipartner development processes, software engineering methods, embedded communications, and safety and dependability assessment. Divided into four parts, the book begins with an introduction to the design constraints of automotive-embedded systems. It also examines AUTOSAR as the emerging de facto standard and looks at how key technologies, such as sensors and wireless networks, will facilitate the conception of partially and fully autonomous vehicles. The next section focuses on networks and protocols, including CAN, LIN, FlexRay, and TTCAN. The third part explores the design processes of electronic embedded systems, along with new design methodologies, such as the virtual platform. The final section presents validation and verification techniques relating to safety issues. Providing domain-specific solutions to various technical challenges, this handbook serves as a reliable, complete, and well-documented source of information on automotive embedded systems.

A vital new publication for scientists and researchers in the field, this book constitutes the refereed proceedings of the 8th International Conference on Product Focused Software Process Improvement, PROFES 2007, held in Riga, Latvia in July 2007. The 29 revised full papers, along with four reports on workshops and tutorials and four keynote addresses were carefully reviewed and selected from 55 submissions. The papers constitute a balanced mix of academic and industrial aspects; they are organized in topical sections for ease of reference.

This book constitutes the refereed proceedings of the Third International Conference on Embedded Software and Systems, ICESS 2007, held in Daegu, Korea, May 2007. The 75 revised full papers cover embedded architecture, embedded hardware, embedded software, HW-SW co-design and SoC, multimedia and HCI, pervasive/ubiquitous computing and sensor network, power-aware computing, real-time systems, security and dependability, and wireless communication.

"This book addresses the complex issues associated with software engineering environment capabilities for designing real-time embedded software systems"--Provided by publisher.

Motivated by Toyota's product development capabilities, Daniel Sörensen examines the question of how much to invest in pursuing parallel design alternatives. A real option to switch is modeled accounting for interproject correlations. Based upon economic theory, five principles for value-maximizing the product development process are presented.

This text analyses the extent of foreign portfolio investment in the U.S. economy and assesses the economic conditions that are attracting such investment and the impact such investments are having on the economy.

Software engineering is playing an increasingly significant role in computing and informatics, necessitated by the complexities inherent in large-scale software development. To deal with these difficulties, the conventional life-cycle approaches to software engineering are now giving way to the "process system" approach, encompassing development methods, infrastructure, organization, and management. Until now, however, no book fully addressed process-based software engineering or set forth a fundamental theory and framework of software engineering processes. Software Engineering Processes: Principles and Applications does just that. Within a unified framework, this book presents a comparative analysis of current process models and formally describes their algorithms. It systematically enables comparison between current models, avoidance of ambiguity in application, and simplification of manipulation for practitioners. The authors address a broad range of topics within process-based software engineering and the fundamental theories and philosophies behind them. They develop a software engineering process reference model (SEPRM) to show how to solve the problems of different process domains, orientations, structures, taxonomies, and methods. They derive a set of process benchmarks-based on a series of international surveys-that support validation of the SEPRM model. Based on their SEPRM model and the unified process theory, they demonstrate that current process models can be integrated and their assessment results can be transformed between each other. Software development is no longer just a black art or laboratory activity. It is an industrialized process that requires the skills not just of programmers, but of organization and project managers and quality assurance specialists. Software Engineering Processes: Principles and Applications is the key to understanding, using, and improving upon effective engineering procedures for software development.

This advanced guide for software engineers is intended to provide useful building blocks for the design of highly complex software. The authors have devised a small, integrated set of software design principles, along with practical models of the principles at work. Includes solutions for simultaneous execution in different configurations and operating systems.

The auto industry is facing tough competition and severe economic constraints. Their products need to be designed "right the first time" with the right combinations of features that not only satisfy the customers but continually please and delight them by providing increased functionality, comfort, convenience, safety, and craftsmanship. Based on t

This book presents the state of the art, challenges and future trends in automotive software engineering. The amount of automotive software has grown from just a few lines of code in the 1970s to millions of lines in today's cars. And this trend seems destined to continue in the years to come, considering all the innovations in electric/hybrid, autonomous, and connected cars. Yet there are also concerns related to onboard software, such as security, robustness, and trust. This book covers all essential aspects of the field. After a general introduction to the topic, it addresses automotive software development, automotive software reuse, E/E architectures and safety, C-ITS and security, and future trends. The specific topics discussed include requirements engineering for embedded software systems, tools and methods used in the automotive industry, software product lines, architectural frameworks, various related ISO standards, functional safety and safety cases, cooperative intelligent transportation systems, autonomous vehicles, and security and privacy issues. The intended audience includes researchers from academia who want to learn what the fundamental challenges are and how they are being tackled in the industry, and practitioners looking for cutting-edge academic findings. Although the book is not written as lecture notes, it can also be used in advanced master's-level courses on software and system engineering. The book also includes a number of case studies that can be used for student projects.

This book introduces the concept of software architecture as one of the cornerstones of software in modern cars. Following a historical overview of the evolution of software in modern cars and a discussion of the main challenges driving that evolution, Chapter 2 describes the main architectural styles of automotive software and their use in cars' software. In Chapter 3, readers will find a description of the software development processes used to develop software on the car manufacturers' side. Chapter 4 then introduces AUTOSAR – an important standard in automotive software. Chapter 5 goes beyond simple architecture and describes the detailed design process for automotive software using Simulink, helping readers to understand how detailed design links to high-level design. Next, Chapter 6 presents a method for assessing the quality of the architecture – ATAM (Architecture Trade-off Analysis Method) – and provides a sample assessment, while Chapter 7 presents an alternative way of assessing the

architecture, namely by using quantitative measures and indicators. Subsequently Chapter 8 dives deeper into one of the specific properties discussed in Chapter 6 – safety – and details an important standard in that area, the ISO/IEC 26262 norm. Lastly, Chapter 9 presents a set of future trends that are currently emerging and have the potential to shape automotive software engineering in the coming years. This book explores the concept of software architecture for modern cars and is intended for both beginning and advanced software designers. It mainly aims at two different groups of audience – professionals working with automotive software who need to understand concepts related to automotive architectures, and students of software engineering or related fields who need to understand the specifics of automotive software to be able to construct cars or their components. Accordingly, the book also contains a wealth of real-world examples illustrating the concepts discussed and requires no prior background in the automotive domain.

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This book explains the topology behind automotive electronics architectures and examines how they can be profoundly augmented with embedded controllers. These controllers serve as the core building blocks of today's vehicle electronics. Rather than simply teaching electrical basics, this unique resource focuses on the fundamental concepts of vehicle electronics architecture, and details the wide variety of Electronic Control Modules (ECMs) that enable the increasingly sophisticated "bells & whistles" of modern designs. A must-have for automotive design engineers, technicians working in automotive electronics repair centers and students taking automotive electronics courses, this guide bridges the gap between academic instruction and industry practice with clear, concise advice on how to design and optimize automotive electronics with embedded controllers.

Nonlinear Estimation and Control of Automotive Drivetrains discusses the control problems involved in automotive drivetrains, particularly in hydraulic Automatic Transmission (AT), Dual Clutch Transmission (DCT) and Automated Manual Transmission (AMT). Challenging estimation and control problems, such as driveline torque estimation and gear shift control, are addressed by applying the latest nonlinear control theories, including constructive nonlinear control (Backstepping, Input-to-State Stable) and Model Predictive Control (MPC). The estimation and control performance is improved while the calibration effort is reduced significantly. The book presents many detailed examples of design processes and thus enables the readers to understand how to successfully combine purely theoretical methodologies with actual applications in vehicles. The book is intended for researchers, PhD students, control engineers and automotive engineers. Hong Chen is a professor at the State Key Laboratory of Automotive Simulation and Control, and the Department of Control Science and Engineering at Jilin University. Bingzhao Gao is an associate professor at the State Key Laboratory of Automotive Simulation and Control at Jilin University.

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