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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. Chapter 3 details this further by presenting two modern architectural styles, i.e. centralized and federated software architectures. In Chapter 4, readers will find a description of the software development processes used to develop software on the car manufacturers' side. Chapter 5 then introduces AUTOSAR - an important standard in automotive software. Chapter 6 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.^The new chapter 7 reports on how machine learning is exploited in automotive software e.g. for image recognition and how both on-board and off-board learning are applied. Next, Chapter 8 presents a method for assessing the quality of the architecture - ATAM (Architecture Trade-off Analysis Method) - and provides a sample assessment, while Chapter 9 presents an alternative way of assessing the architecture, namely by using quantitative measures and indicators. Subsequently Chapter 10 dives deeper into one of the specific properties discussed in Chapter 8 - safety - and details an important standard in that area, the ISO/IEC 26262 norm. Lastly, Chapter 11 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. Compared to the first edition, besides the two new chapters 3 and 7 there are considerable updates in chapters 5 and 8 especially.

Electric and Hybrid Vehicles: Power Sources, Models, Sustainability, Infrastructure and the Market reviews the performance, cost, safety, and sustainability of battery systems for hybrid electric vehicles (HEVs) and electric vehicles (EVs), including nickel-metal hydride batteries and Li-ion batteries. Throughout this book, especially in the first chapters, alternative vehicles with different power trains are compared in terms of lifetime cost, fuel consumption, and environmental impact. The emissions of greenhouse gases are particularly dealt with. The improvement of the battery, or fuel cell, performance and governmental incentives will play a fundamental role in determining how far and how substantial alternative vehicles will penetrate into the market. An adequate recharging infrastructure is of paramount importance for the diffusion of vehicles powered by batteries and fuel cells, as it may contribute to overcome the so-called range anxiety."" Thus, proposed battery charging techniques are summarized and hydrogen refueling stations are described. The final chapter reviews the state of the art of the current models of hybrid and electric vehicles along with the powertrain solutions adopted by the major automakers. Contributions from the worlds leading industry and research experts Executive summaries of specific case studies Information on basic research and application approaches

In den letzten drei Jahrzehnten ist der Anteil der Elektronik in Kraftfahrzeugen dramatisch gestiegen. Die Anteile werden immer größer und der Trend hält, getrieben von steigenden Kunden- und Umweltanforderungen, ungebremst an. Bald wird der Wertanteil der Elektronik am Gesamtfahrzeug bei 20 Prozent liegen. Nahezu alle Funktionen des Fahrzeugs werden heute elektronisch gesteuert, geregelt oder überwacht. Ausgehend von den physikalisch/technischen Grundlagen der Elektronik und Bauelemente werden Funktion und Anwendung von Komponenten und Systemen in Motor und Fahrwerk in Bordnetz, Fahrerassistenzsystemen, Infotainment und Multimedia gezeigt. Kapitel über Softwareentwicklung, Beleuchtung, Passive Sicherheit und Diagnose runden den Inhalt ab.

1 Application Scope This standard specifies the limits and measurement methods for tailpipe emissions and evaporative emissions of the motorcycle with spark-ignition engine, as well as the emission requirements for crankcase, endurance requirements for emission-control devices and technical requirements for on-board diagnostic (OBD) system. This standard specifies the limits and measurement methods for tailpipe emissions of the three-wheeled motorcycle with compression-ignition engine, as well as the endurance requirements for emission-control devices and technical requirements for on-board diagnostic (OBD) system. This standard specifies the type test requirements as well as production conformity inspection and judgment methods for motorcycles. This standard is applicable to the motorcycles driven by spark-ignition engine, with maximum design speed greater than 50km/h or displacement greater than 50ml, and the three-wheeled motorcycles driven by compression-ignition engine, with maximum design speed greater than 50km/h or displacement greater than 50ml.

This Standard specifies the technical requirements and test methods for cybersecurity of hardware, communication, software, and data of vehicle gateway products. This Standard applies to the design and implementation of cybersecurity of vehicle gateway products; can also be used for product testing, evaluation and management.

To list, summarize, and categorize intelligent transportation standards (ITS). Reviews best practices and provides listings for standards developing organizations at national and international levels. Provides guidance as to where to look in the furute to find relevant standards for ITS. Presents strategies for integrating standards in IRS planning, deployment, and operation.

?? ??? ????? ?? ??? ??? ???? ?? ???? ???? ??. ??? ?? ?? ??? ???? ???? ?? ?? ????. ? ??? International Standard Organization (ISO) Technical Committee (TC) 22 (Road Vehicle)? TC 204 (Intelligent Transport System) ??? ?? ???, ? ?? ?? ???? ????? ??? ??? ???? ??. ? ??? ?? ?????? ?? ?? ?? ? ????? ????. ?? ???, 2018??? ?? KS ???? ???? ???? ?? ?? 15?? ?? ?? ?????? ???? ??. ??? ???, KS ???? ??? ??, ?? ??? ???? ????? ?? ? ??? ??? ??? ???? ?? ????. ?? ISO ??? ??? ????? ??? ? ???? ?? ??. ??? ? ??? ??? ?? ????, ?? ????? ?? ??? ?? ??? ?? ??? ??? ? ?? ???.

As the complexity of automotive vehicles increases this book presents operational and practical issues of automotive mechatronics. It is a comprehensive introduction to controlled automotive systems and provides detailed information of sensors for travel, angle, engine speed, vehicle speed, acceleration, pressure, temperature, flow, gas concentration etc. The measurement principles of the different sensor groups are explained and examples to show the measurement principles applied in different types.

This Standard specifies cyber security technical requirements and test methods for vehicle gateway product hardware, communication, firmware, data. This Standard is applicable to the design and implementation of cyber security of vehicle

gateway products. It is also applicable to product testing, evaluation and management.

Featuring contributions from major technology vendors, industry consortia, and government and private research establishments, the Industrial Communication Technology Handbook, Second Edition provides comprehensive and authoritative coverage of wire- and wireless-based specialized communication networks used in plant and factory automation, automotive applications, avionics, building automation, energy and power systems, train applications, and more. New to the Second Edition: 46 brand-new chapters and 21 substantially revised chapters Inclusion of the latest, most significant developments in specialized communication technologies and systems Addition of new application domains for specialized networks The Industrial Communication Technology Handbook, Second Edition supplies readers with a thorough understanding of the application-specific requirements for communication services and their supporting technologies. It is useful to a broad spectrum of professionals involved in the conception, design, development, standardization, and use of specialized communication networks as well as academic institutions engaged in engineering education and vocational training.

Time-Triggered Communication helps readers build an understanding of the conceptual foundation, operation, and application of time-triggered communication, which is widely used for embedded systems in a diverse range of industries. This book assembles contributions from experts that examine the differences and commonalities of the most significant protocols including: TTP, FlexRay, TTEthernet, SAFEbus, TTCAN, and LIN. Covering the spectrum, from low-cost time-triggered fieldbus networks to ultra-reliable time-triggered networks used for safety-critical applications, the authors illustrate the inherent benefits of time-triggered communication in terms of predictability, complexity management, fault-tolerance, and analytical dependability modeling, which are key aspects of safety-critical systems. Examples covered include FlexRay in cars, TTP in railway and avionic systems, and TTEthernet in aerospace applications. Illustrating key concepts based on real-world industrial applications, this book: Details the underlying concepts and principles of time-triggered communication Explores the properties of a time-triggered communication system, contrasting its strengths and weaknesses Focuses on the core algorithms applied in many systems, including those used for clock synchronization, startup, membership, and fault isolation Describes the protocols that incorporate presented algorithms Covers tooling requirements and solutions for system integration, including scheduling The information in this book is extremely useful to industry leaders who design and manufacture products with distributed embedded systems based on time-triggered communication. It also benefits suppliers of embedded components or development tools used in this area. As an educational tool, this material can be used to teach students and working professionals in areas including embedded systems, computer networks, system architectures, dependability, real-time systems, and automotive, avionics, and industrial control systems.

This proceedings book includes papers that cover the latest developments in automotive vehicles and environment, advanced transport systems and road traffic, heavy and special vehicles, new materials, manufacturing technologies and logistics and advanced engineering methods. Authors of the papers selected for this book are experts from research, industry and universities, coming from different countries. The overall objectives of the presentations are to respond to the major challenges faced by the automotive industry, and to propose potential solutions to problems related to automotive technology, transportation and environment, and road safety. The congress is organized by SIAR (Society of Automotive Engineers from Romania) in cooperation with SAE International. The purpose is to gather members from academia, industry and government and present their possibilities for investigations and research, in order to establish new future collaborations in the automotive engineering and transport domain. This proceedings book is just a part of the outcomes of the congress. The results presented in this proceedings book benefit researchers from academia and research institutes, industry specialists, Ph.D. students and students in Automotive and Transport Engineering programs.

This book offers first a short introduction to advanced supervision, fault detection and diagnosis methods. It then describes model-based methods of fault detection and diagnosis for the main components of gasoline and diesel engines, such as the intake system, fuel supply, fuel injection, combustion process, turbocharger, exhaust system and exhaust gas aftertreatment. Additionally, model-based fault diagnosis of electrical motors, electric, pneumatic and hydraulic actuators and fault-tolerant systems is treated. In general series production sensors are used. It includes abundant experimental results showing the detection and diagnosis quality of implemented faults. Written for automotive engineers in practice, it is also of interest to graduate students of mechanical and electrical engineering and computer science.

This book addresses the various challenges and open questions relating to CAN communication networks. Opening with a short introduction into the fundamentals of CAN, the book then examines the problems and solutions for the physical layout of networks, including EMC issues and topology layout. Additionally, a discussion of quality issues with a particular focus on test techniques is presented. Each chapter features a collection of illuminating insights and detailed technical information supplied by a selection of internationally-regarded experts from industry and academia. Features: presents thorough coverage of architectures, implementations and application of CAN transceiver, data link layer and so-called higher layer software; explains CAN EMC characteristics and countermeasures, as well as how to design CAN networks; demonstrates how to practically apply and test CAN systems; includes examples of real networks from diverse applications in automotive engineering, avionics, and home heating technology.

This is a complete reference guide to automotive electrics and electronics. This new edition of the definitive reference for automotive engineers, compiled by one of the world's largest automotive equipment suppliers, includes new and updated material. As in previous editions different topics are covered in a concise but descriptive way backed up by diagrams, graphs, photographs and tables enabling the reader to better comprehend the subject. This fifth edition revises the classical topics of the vehicle electrical systems such as system architecture, control, components and sensors. There is now greater detail on electronics and

their application in the motor vehicle, including electrical energy management (EEM) and discusses the topic of inter system networking within the vehicle. It also includes a description of the concept of hybrid drive a topic that is particularly current due to its ability to reduce fuel consumption and therefore CO2 emissions.This book will benefit automotive engineers and design engineers, automotive technicians in training and mechanics and technicians in garages. It may also be of interest to teachers/ lecturers and students at vocational colleges, and enthusiasts.?

Considered a standard industry resource, the Embedded Systems Handbook provided researchers and technicians with the authoritative information needed to launch a wealth of diverse applications, including those in automotive electronics, industrial automated systems, and building automation and control. Now a new resource is required to report on current developments and provide a technical reference for those looking to move the field forward yet again. Divided into two volumes to accommodate this growth, the Embedded Systems Handbook, Second Edition presents a comprehensive view on this area of computer engineering with a currently appropriate emphasis on developments in networking and applications. Those experts directly involved in the creation and evolution of the ideas and technologies presented offer tutorials, research surveys, and technology overviews that explore cutting-edge developments and deployments and identify potential trends. This second self-contained volume of the handbook, Network Embedded Systems, focuses on select application areas. It covers automotive field, industrial automation, building automation, and wireless sensor networks. This volume highlights implementations in fast-evolving areas which have not received proper coverage in other publications. Reflecting the unique functional requirements of different application areas, the contributors discuss inter-node communication aspects in the context of specific applications of networked embedded systems. Those looking for guidance on preliminary design of embedded systems should consult the first volume: Embedded Systems Design and Verification.

Das Buch vermittelt die Grundlagen, um die Besonderheiten der Elektronik und Software im Kfz nicht nur zu kennen, sondern auch zu verstehen. Zusätzlich wird an Beispielen die Komplexität realer Systeme im Fahrzeug vorgeführt und gezeigt, welche Anwendungen durch die Elektronik erst möglich werden. Das Spannungsfeld zwischen Sicherheit, Zuverlässigkeit und Komplexität prägt in Verbindung mit branchenüblichen Abläufen das Vorgehen bei der Entwicklung, das ein in diesem Bereich tätiger Ingenieur verstehen muss. Die 3. Auflage ...

Anwendungsbezogene Darstellungen sind das Kennzeichen der Buchreihe "Bosch Fachinformation Automobil". Ganz auf den Bedarf an praxisnahem Hintergrundwissen zugeschnitten, findet der Auto-Fachmann ausführliche Angaben von der Starterbatterie über Energiebordnetze und Schaltzeichen, Schaltplänen und Vernetzung bis zu Bussystemen moderner Fahrzeuge. Der Band bietet das Bosch-Fachwissen aus erster Hand und eignet sich damit hervorragend für den Alltag des Entwicklungsingenieurs, für die berufliche Weiterbildung, für Lehrgänge, zum Selbststudium oder zum Nachschlagen in der Werkstatt. Der Inhalt Energiebordnetze – Starterbatterien – Schaltzeichen und Schaltpläne – Elektromagnetische Verträglichkeit (EMV) und Funkentstörung – Grundlagen der Vernetzung – Vernetzung im Kfz – Bussysteme – Architektur elektronischer Systeme Zielgruppen: Entwicklungsingenieure in der Automobil- und Zulieferindustrie Elektrik- und Elektronikentwickler Sachverständige und Gutachter Softwareentwickler Kfz-Meister, Kfz-Techniker in Kfz-Werkstätten Professoren, Dozenten und Studierende an Hoch- und Fachschulen Die Autoren Fachwissen aus erster Hand wird durch die Ingenieure der Bosch-Entwicklungsabteilung garantiert, die den Inhalt als Autoren erarbeitet haben. Der Herausgeber Prof. Dr.-Ing. Konrad Reif leitet den Studiengang Fahrzeugelektronik und Mechatronische Systeme an der Dualen Hochschule Baden-Württemberg, Ravensburg, Campus Friedrichshafen, ist Lehrbeauftragter an der Technischen Universität München und verantwortet die inhaltliche Herausgabe der Bosch Fachinformation Automobil.

This book constitutes the refereed proceedings of the 33nd International Conference on Computer Safety, Reliability, and Security, SAFECOMP 2014, held in Florence, Italy, in September 2014. The 20 revised full papers presented together with 3 practical experience reports were carefully reviewed and selected from 85 submissions. The papers are organized in topical sections on fault injection techniques, verification and validation techniques, automotive systems, coverage models and mitigation techniques, assurance cases and arguments, system analysis, security and trust, notations/languages for safety related aspects, safety and security.

ISO 14229-1Road Vehicles - Unified Diagnostic Services (UDS) - Part 1: Specification and RequirementsISO 14229-1Road Vehicles - Unified Diagnostic Services (UDS), Part 1: Application LayerIntelligent Transport Systems StandardsArtech House Experten aus Automobilindustrie und Hochschulen liefern mit dem Band eine topaktuelle und praxisnahe Einführung in elektrische und elektronische Systeme im Automobil. Nach den Grundlagen der Sensorik, von Bussystemen, Betriebssystemen und der Softwareentwicklung werden elektronische Systeme im Automobil behandelt. Dazu zählen u. a. Motor- und Getriebesteuerung, Energieversorgung, Sicherheits- sowie Navigations- und Fahrerassistenzsysteme. Für die 4. Auflage wurde das Kapitel über Fahrerassistenzsysteme grundlegend überarbeitet und erweitert.

Get up to speed with the latest developments in Automotive Ethernet technology and implementation with this fully revised third edition.

Dieses Fachbuch gibt einen Überblick über die in der Kfz-Elektronik verbreiteten Bussysteme wie CAN, FlexRay, LIN oder MOST, deren Protokolle und die Softwarearchitektur moderner Steuergeräte. Die Beschreibung erfolgt aus der Sicht von Ingenieuren, die diese Systeme in der Praxis einsetzen und in Fahrzeuge integrieren müssen. Ausführlich wird auf die höheren Schichten der ISO, SAE und ASAM-Transport- und Diagnoseprotokolle sowie deren Anwendung eingegangen. Neben der Kommunikation wird die Softwarearchitektur der Steuergeräte mit Betriebssystem und Basissoftware vorgestellt, wie sie im Rahmen von AUTOSAR, OSEK/VDX und HIS definiert werden. Neu in dieser Auflage wurden CAN FD, Automotive Ethernet, OTX und WWH-OBD aufgenommen.

This book gathers selected papers presented at the Inventive Communication and Computational Technologies conference (ICICCT 2019), held on 29–30 April 2019 at Gnanamani College of Technology, Tamil Nadu, India. The respective contributions highlight recent research efforts and advances in a new paradigm called ISMAC (IoT in Social, Mobile, Analytics and Cloud contexts). Topics covered include the Internet of Things, Social Networks, Mobile Communications, Big Data Analytics, Bio-inspired Computing and Cloud Computing. The book is chiefly intended for academics and practitioners working to resolve practical issues in this area.

This document specifies the general requirements, format structure, description of diagnostic trouble codes, for the diagnostic communication symbol set of the vehicle controller area network. This document is applicable to the diagnostic trouble code (DTC)

of the diagnostic communication standard for road vehicle controller area network. The on-board diagnostic system (OBD) needs to report the code, when a fault is detected.

A comprehensive examination of advanced battery management technologies and practices in modern electric vehicles Policies surrounding energy sustainability and environmental impact have become of increasing interest to governments, industries, and the general public worldwide. Policies embracing strategies that reduce fossil fuel dependency and greenhouse gas emissions have driven the widespread adoption of electric vehicles (EVs), including hybrid electric vehicles (HEVs), pure electric vehicles (PEVs) and plug-in electric vehicles (PHEVs). Battery management systems (BMSs) are crucial components of such vehicles, protecting a battery system from operating outside its Safe Operating Area (SOA), monitoring its working conditions, calculating and reporting its states, and charging and balancing the battery system. Advanced Battery Management Technologies for Electric Vehicles is a compilation of contemporary model-based state estimation methods and battery charging and balancing techniques, providing readers with practical knowledge of both fundamental concepts and practical applications. This timely and highly-relevant text covers essential areas such as battery modeling and battery state of charge, energy, health and power estimation methods. Clear and accurate background information, relevant case studies, chapter summaries, and reference citations help readers to fully comprehend each topic in a practical context. Offers up-to-date coverage of modern battery management technology and practice Provides case studies of real-world engineering applications Guides readers from electric vehicle fundamentals to advanced battery management topics Includes chapter introductions and summaries, case studies, and color charts, graphs, and illustrations Suitable for advanced undergraduate and graduate coursework, Advanced Battery Management Technologies for Electric Vehicles is equally valuable as a reference for professional researchers and engineers.

Modern cars are more computerized than ever. Infotainment and navigation systems, Wi-Fi, automatic software updates, and other innovations aim to make driving more convenient. But vehicle technologies haven't kept pace with today's more hostile security environment, leaving millions vulnerable to attack. The Car Hacker's Handbook will give you a deeper understanding of the computer systems and embedded software in modern vehicles. It begins by examining vulnerabilities and providing detailed explanations of communications over the CAN bus and between devices and systems. Then, once you have an understanding of a vehicle's communication network, you'll learn how to intercept data and perform specific hacks to track vehicles, unlock doors, glitch engines, flood communication, and more. With a focus on low-cost, open source hacking tools such as Metasploit, Wireshark, Kayak, can-utils, and ChipWhisperer, The Car Hacker's Handbook will show you how to: –Build an accurate threat model for your vehicle –Reverse engineer the CAN bus to fake engine signals –Exploit vulnerabilities in diagnostic and data-logging systems –Hack the ECU and other firmware and embedded systems –Feed exploits through infotainment and vehicle-to-vehicle communication systems –Override factory settings with performance-tuning techniques –Build physical and virtual test benches to try out exploits safely If you're curious about automotive security and have the urge to hack a two-ton computer, make The Car Hacker's Handbook your first stop.

Explores how the automotive industry can address the increased risks of cyberattacks and incorporate security into the software development lifecycle While increased connectivity and advanced software-based automotive systems provide tremendous benefits and improved user experiences, they also make the modern vehicle highly susceptible to cybersecurity attacks. In response, the automotive industry is investing heavily in establishing cybersecurity engineering processes. Written by a seasoned automotive expert with abundant international industry expertise, Building Secure Cars: Assuring the Software Development Lifecycle introduces readers to various types of cybersecurity activities, measures, and solutions that can be applied at each stage in the typical automotive development process. This book aims to assist auto industry insiders build more secure cars by incorporating key security measures into their software development lifecycle. Readers will learn to better understand common problems and pitfalls in the development process that lead to security vulnerabilities. To overcome such challenges, this book details how to apply and optimize various automated solutions, which allow software development and test teams to identify and fix vulnerabilities in their products quickly and efficiently. This book balances technical solutions with automotive technologies, making implementation practical. Building Secure Cars is: • One of the first books to explain how the automotive industry can address the increased risks of cyberattacks, and how to incorporate security into the software development lifecycle • An optimal resource to help improve software security with relevant organizational workflows and technical solutions • A complete guide that covers introductory information to more advanced and practical topics • Written by an established professional working at the heart of the automotive industry • Fully illustrated with tables and visuals, plus real-life problems and suggested solutions to enhance the learning experience This book is written for software development process owners, security policy owners, software developers and engineers, and cybersecurity teams in the automotive industry. All readers will be empowered to improve their organizations security postures by understanding and applying the practical technologies and solutions inside.

Drawing on a wealth of knowledge and experience and a background of more than 1,000 magazine articles on the subject, engine control expert Jeff Hartman explains everything from the basics of engine management to the building of complicated project cars. Hartman has substantially updated the material from his 1993 MBI book Fuel Injection (0-879387-43-2) to address the incredible developments in automotive fuel injection technology from the past decade, including the multitude of import cars that are the subject of so much hot rodding today. Hartman's text is extremely detailed and logically arranged to help readers better understand this complex topic.

Industrial Applications of Batteries looks at both the applications and the batteries and covers the relevant scientific and technological features. Presenting large batteries for stationary applications, e.g. energy storage, and also batteries for hybrid vehicles or different tools. The important aerospace field is covered both in connection with satellites and space missions. Examples of applications include, telecommunications, uninterruptible power supplies, systems for safety/alarms, car accessories, toll collection, asset tracking systems, medical equipment, and oil drilling. The first chapter on applications deals with electric and hybrid vehicles. Four chapters are devoted to stationary applications, i.e. energy storage (from the electric grid or solar/wind energy), load levelling, telecommunications, uninterruptible power supplies, back-up for safety/alarms. Battery management by intelligent systems and prediction of battery life are dealt with in a dedicated chapter. The topic of used battery collection and recycling, with the description of specific treatments for the different systems, is also extensively treated in view of its environmental relevance. Finally, the world market of these batteries is presented, with detailed figures for the various applications. * Updated and full overview of the power sources for industries * Written by leading scientists in their fields * Well balanced in terms of scientific and technical information

Innovationen im Kraftfahrzeug sind in hohem Maße von der Elektronik bestimmt. Bei der Neubearbeitung dieses bewährten Praxis-Fachbuches wurde diese Entwicklung besonders berücksichtigt. Der Mechatronik wurde ein eigenes Kapitel gewidmet. Die Kapitel Aktoren, Vernetzung im Kfz und Bussysteme wurden neben anderen aktuellen Themen wie Hybridantriebe neu aufgenommen. Vollständig überarbeitet und ergänzt wurden z. B. Sensoren.

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