Automotive Ecu Design With Functional Safety For Electro

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Tool-Based Requirement Traceability between Requirement and Design Artifacts Springer Nature
This book constitutes the proceedings of the First International Conference on Computational Intelligence and Information Technology, CIIT 2011, held in Pune, India, in November 2011. The 58 revised full papers, 67 revised short papers, and 32 poster papers presented were carefully reviewed and selected from 483 initial submissions. The papers are contributed by innovative academics and industrial experts in the field of computer science, information technology, computational engineering, mobile communication and security and offer a stage to a common forum, where a constructive dialog on theoretical concepts, practical ideas and results of the state of the art can be developed.
Embedded System Design: Topics, Techniques and Trends CRC Press
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.
An Introduction CRC Press
Every computing system has two, and only two attributes: Data Value and Data timing, which represent fully the system functionalities from the system external behavior point of view. The data driven system engineering is the approach to develop the system by focusing on the two attributes mentioned above, in which, the data values are derived by the system operation concept design, and the data timing is derived by the system latency design. Based on which, this book provides a full range of system and software engineering development activities: Requirement Elicitation Requirement Engineering System and Software Architecture Design System Operation Concept Design System and Software Structure Design Electronic Architect Design Functionality Allocation Failure Mode and Effect Analysis (FMEA) Safety Cybersecurity (full compliant with UN ECE 155/156) System and software Verification System and Software Integration and Verification System and Software Black Box Verification each of which has its own clearly defined scope and approach, which is different from the conventional development, in some cases even different from some ISO standards, for example: Safety Development: the safety requirements for every part in a vehicle are cascaded from the vehicle safety requirements, which is different from the Concept Phase in the Part 3 of ISO 26262, and the functional safety development will be fully covered by (1) Reliability (2) Availability (3) Quality. Error Detection and Protection: there are only two types of errors to be detected in a computing system: Data Value error and Data Timing error, to detect which, there are only two aspects to be considered: (1) input data (2) middle data and output data in addition to the platform error detection. The approaches of detection and protection include (1) data transfer protocol check, (2) data range and reasonable value check, (3) execution time check and control. FMEA: this book provides the optimized approach by following the data relationships between the input data, middle data and output data, which will be both inductive and deductive, and re-use the system operation concept that is built at the system development first phase, to make the development efficient. Cybersecurity: this book provides the full solution to cover the UN ECE 155 by implementing three aspects: (1) Trusted contents in the ECU (2) Authenticated access to the ECU (3) Authenticated communication with the ECU. Requirement Engineering: This book makes the goal and scope of requirement engineering in the computing system development specific, accurate and measurable by defining the scope as: the requirement engineering is to use the computer executable information to describe the system under development which consists only two types of information: Signal and Test Case, and defining the requirement quality measurement as: (1) Signals, either input or output signals, shall be computer readable. (2) Test cases shall be executable in the system. System Architecture Design: The goal of system architecture design is to provide the platform that transfers and transforms the input signal to become the required output signal via some middle data. This book introduces the following system functional modulizations based on the AUTOSAR that satisfies a generic automotive ECU structure: (1) Feature Function (2) Diagnostic Service (3) Cybersecurity Function (4) Serial Signal Manager (5) Application Mode Manager (6) AUTOSAR, and based on the characteristics of those functions, the book provides the approach to design the electronic architecture and allocate the functions to the architecture.
John Wiley & Sons
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.
Design for Maintainability Springer Science & Business Media
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.

A System Level Perspective Springer Science & Business Media

Setting out core theory and reviewing a range of new methods, theoretical problems and applications, this handbook shows how hybrid dynamical systems can be modelled and understood. Sixty expert authors involved in the recent research activities and industrial application studies provide practical insights on topics ranging from the theoretical investigations over computer-aided design to applications in energy management and the process industry. Structured into three parts, the book opens with a thorough introduction to hybrid systems theory, illustrating new dynamical phenomena through numerous examples. Part II then provides a survey of key tools and tool integration activities. Finally, Part III is dedicated to applications, implementation issues and system integration, considering different domains such as industrial control, automotive systems and digital networks. Three running examples are referred to throughout the book, together with numerous illustrations, helping both researchers and industry professionals to understand complex theory, recognise problems and find appropriate solutions.

Selected Papers from the 2011 International Conference on Electric and Electronics (EEIC 2011) in Nanchang, China on June 20-22, 2011, Volume 4 Springer Science & Business Media

Electrical, Control Engineering and Computer Science includes the papers from ECECS2015 (Hong Kong, 30-31 May 2015), which was organized by the American Society of Science and Engineering (ASEE), a non-profit society for engineers and scientists. Presenting new theories, ideas, techniques and experiences related to all aspects of electrical enginee

Forensics in Telecommunications, Information and Multimedia John Wiley & Sons

Data Driven System EngineeringAutomotive ECU DevelopmentJames Wen

Computational Intelligence and Information Technology Cambridge University Press

This volume includes extended and revised versions of a set of selected papers from the International Conference on Electric and Electronics (EEIC 2011) , held on June 20-22 , 2011, which is jointly organized by Nanchang University, Springer, and IEEE IAS Nanchang Chapter. The objective of EEIC 2011 Volume 4 is to provide a major interdisciplinary forum for the presentation of new approaches from Communication Systems and Information Technology, to foster integration of the latest developments in scientific research. 137 related topic papers were selected into this volume. All the papers were reviewed by 2 program committee members and selected by the volume editor Prof. Ming Ma. We hope every participant can have a good opportunity to exchange their research ideas and results and to discuss the state of the art in the areas of the Communication Systems and Information Technology.

Reliability of Organic Compounds in Microelectronics and Optoelectronics Springer

Automotive Control is a rapidly developing field for both researchers and industrial practitioners. The field itself is wide ranging and includes engine control, vehicle dynamics, on-board diagnosis and vehicle control issues in intelligent vehicle highway systems. Leading researchers and industrial practitioners were able to discuss and evaluate current developments and future research directions at the first international IFAC workshop on automotive control. This publication contains the papers covering a wide range of topics presented at the workshop.

Systems, Software and Services Process Improvement Springer Nature

This book constitutes the refereed proceedings of two joint events: the 25th International Workshop on Software Measurement (IWSM) and the 10th International Conference on Software Process and Product Measurement (Mensura), referred to as IWSM-Mensura 2015 and held in Kraków, Poland, in October 2015. Software measurement is a key methodology in estimating, managing, and controlling software development and management projects. The 13 papers presented in this volume were carefully reviewed and selected from 32 submissions. They present various theoretical and empirical results related to software measurement and its application in industrial projects.

Communication Systems and Information Technology Springer Science & Business Media

Processes for developing safety-critical systems impose special demands on ensuring requirements traceability. Achieving valuable traceability information, however, is especially difficult concerning the transition from requirements to design. Bernhard Turban analyzes systems and software engineering theories cross-cutting the issue (embedded systems development, systems engineering, software engineering, requirements engineering and management, design theory and processes for safety-critical systems). As a solution, the author proposes a new tool approach to support designers in their thinking in order to achieve traceability as a by-product to normal design activities and to extend traceability information with information about design decision rationale.

Proceedings of SAE-China Congress 2014: Selected Papers Springer Science & Business Media

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.

Mechatronic Systems CRC Press

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.

Automotive Embedded Systems Springer

This volume constitutes the refereed proceedings of the 21st EuroSPI conference, held in Luxembourg, in June 2014. The 18 revised papers presented together with 11 invited papers in this volume were carefully reviewed and selected. They are organized in topical sections on SPI and very small entities; process improvement frameworks; testing and improvement issues; SPI and people issues; SPI and quality issues; software processes in various contexts. The volume also contains selected keynote papers from EuroSPI workshops and invited papers covering the topic of creating environments supporting innovation and improvement.

Key Technologies, Innovations, and Applications Springer

These Proceedings gather outstanding papers submitted to the 2014 SAE-China Congress, the majority of which are from China, the most dynamic car market in the world. The book covers a wide range of automotive topics, presenting the latest technical achievements in the industry. Many of the approaches it presents can help technicians to solve the practical problems that most affect their daily work.

Third International ICST Conference, e-Forensics 2010, Shanghai, China, November 11-12, 2010, Revised Selected Papers Elsevier

An emerging trend in the automobile industry is its convergence with information technology (IT). Indeed, it has been estimated that almost 90% of new automobile technologies involve IT in some form. Smart driving technologies that improve safety as well as green fuel technologies are quite representative of the convergence between IT and automobiles. The smart driving technologies include three key elements: sensing of driving environments, detection of objects and potential hazards and the generation of driving control signals including warning signals. Although radar-based systems are primarily used for sensing the driving environments, the camera has gained importance in advanced driver assistance systems (ADAS). This book covers system-on-a-chip (SoC) designs—including both algorithms and hardware—related with image sensing and object detection by using the camera for smart driving systems. It introduces a variety of algorithms such as lens correction, super resolution, image enhancement and object detections from the images captured by low-cost vehicle camera. This is followed by implementation issues such as SoC architecture, hardware accelerator, software development environment and reliability techniques for automobile vision systems. This book is aimed for the new and practicing engineers in automotive and chip-design industries to provide some overall guidelines for the development of automotive vision systems. It will also help graduate students understand and get started for the research work in this field.

Advances in Computing and Information Technology Springer

This book constitutes the proceedings of the First International Conference on Advances in Computing and Information Technology, ACITY 2011, held in Chennai, India, in July 2011. The 55 revised full papers presented were carefully reviewed and selected from numerous submissions. The papers feature significant contributions to all major fields of the Computer Science and Information Technology in theoretical and practical aspects.

Automotive Embedded Systems Handbook Springer

Perhaps nothing characterizes the inherent heterogeneity in embedded sys tems than the ability to choose between hardware and software implementations of a given system function. Indeed, most embedded systems at their core repre sent a careful division and design of hardware and software parts of the system To do this task effectively, models and methods are necessary functionality. to capture application behavior, needs and system implementation constraints. Formal modeling can be valuable in addressing these tasks. As with most engineering domains, co-design practice defines the state of the it seeks to add new capabilities in system conceptualization, mod art, though eling, optimization and implementation. These advances -particularly those related to synthesis and verification tasks -direct1y depend upon formal under standing of system behavior and performance measures. Current practice in system modeling relies upon exploiting high-level programming frameworks, such as SystemC, Esterel, to capture design at increasingly higher levels of ab straction and attempts to reduce the system implementation task. While raising the abstraction levels for design and verification tasks, to be really useful, these approaches must also provide for reuse, adaptation of the existing intellectual property (IP) blocks.

Part I Springer

This book covers the start-of-the-art research and development for the emerging area of autonomous and intelligent systems. In particular, the authors emphasize design and validation methodologies to address the grand challenges related to safety. This book offers a holistic view of a broad range of technical aspects (including perception, localization and navigation, motion control, etc.) and application domains (including automobile, aerospace, etc.), presents major challenges and discusses possible solutions.

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