

Cmps03 Compass Module

This volume deals with controllability and observability properties of nonlinear systems, as well as various ways to obtain input-output representations. The emphasis is on fundamental notions as (controlled) invariant distributions and submanifolds, together with algorithms to compute the required feedbacks.

This book consists of 18 chapters divided in four sections: Robots for Educational Purposes, Health-Care and Medical Robots, Hardware - State of the Art, and Localization and Navigation. In the first section, there are four chapters covering autonomous mobile robot Emmy III, KCLBOT - mobile nonholonomic robot, and general overview of educational mobile robots. In the second section, the following themes are covered: walking support robots, control system for wheelchairs, leg-wheel mechanism as a mobile platform, micro mobile robot for abdominal use, and the influence of the robot size in the psychological treatment. In the third section, there are chapters about I2C bus system, vertical displacement service robots, quadruped robots - kinematics and dynamics model and Epi.q (hybrid) robots. Finally, in the last section, the following topics are covered: skid-steered vehicles, robotic exploration (new place recognition), omnidirectional mobile robots, ball-wheel mobile robots, and planetary wheeled mobile robots.

This book presents a unique examination of mobile robots and embedded systems, from introductory to intermediate level. It is structured in three parts, dealing with Embedded Systems (hardware and software design, actuators, sensors, PID control, multitasking), Mobile Robot Design (driving, balancing, walking, and flying robots), and Mobile Robot Applications (mapping, robot soccer, genetic algorithms, neural networks, behavior-based systems, and simulation). The book is written as a text for courses in computer science, computer engineering, IT, electronic engineering, and mechatronics, as well as a guide for robot hobbyists and researchers.

This book is a great investment for those interested in developing camera related projects for the Arduino. These camera applications can involve security, surveillance, photography, toys, robots, and drones. Specifically, this book covers the Omnivision ov7670 digital camera and its use with the Arduino microcontroller. This book takes an interactive hands on approach and shows the reader in a step by step guide how to use the ov7670 with the Arduino and an SD card reader/writer to take photos, save them to an SD card, and then to convert them to an easily viewable format. This book will save you many hours or even weeks of frustration in trying to get this camera to work correctly. This book also gives you the basic background on the Arduino and digital cameras in general so that you will be able to develop camera projects for cameras other than the ov7670. Who this book is for: 1. Beginners to the Arduino interested in developing custom Arduino camera related projects that are suitable for photography, surveillance, security applications or for use with drones and robots. 2. High school and university students needing a quick start guide to using a low cost digital camera in their school projects. Key Selling Points: 1. Provides an interactive "hands on example" based beginner's quick start guide to using the extremely popular Omnivision ov7670 camera with the Arduino including using the undocumented features and incorrectly documented features that are necessary to get the camera to operate correctly. 2. Provides a good starting point for Arduino based camera applications as diverse as image processing, photography, surveillance, and home security with professional quality reusable code for the reader to use in his or her own projects. 3. Covers the FIFO version of the ov7670 which is the preferred camera version for most camera projects. Table of Contents: Chapter 1: Introducing the Omnivision OV7670 Camera A. What is the OV7670 Camera? B. Key Camera Terminology C. OV7670 Camera with AL422B FIFO Memory Overview D. Summary of Steps Needed for Taking a Photo Chapter 2: Introducing the Arduino A. What is an Arduino? B. The Arduino Mega 2560 C.

Arduino Development System Requirements D. Arduino Software IDE E. Hands on Example: A simple Arduino "Hello World" program with an LED Chapter 3: Arduino Programming Language Basics A. C/C++ Language for Arduino Overview Chapter 4: Digital Design Review A. How Data is Stored in the ov7670 Camera B. Decimal Numbers (Base 10 Representation) C. Binary Numbers (Base 2 Representation) D. Hexadecimal Numbers (Base 16 Representation) E. Converting a Binary Number (Base 2) to a Hex Number (Base 16) F. Converting a Hexadecimal Number (Base 16) to a Binary Number (Base 2) G. Hands On Example: Setting Registers on the OV7670 Camera H. Boolean Variables, Logic and Truth Tables I. The Clock Pulse J. Reading Schematics K. Design Overview for the OV7670 Camera with FIFO Memory Chapter 5: Taking Photos with the Omnivision ov7670 Camera - Part 1 A. Overview of SD Card Storage for the Arduino B. Overview of Arduino's I2C Interface C. Hands on Example: Testing the I2C Interface with the OV7670 Camera D. Overview of the Omnivision ov7670 FIFO Camera Image Capture Software E. Overview of FFmpeg Chapter 6: Taking Photos with the Omnivision ov7670 Camera - Part 2 A. Hands on Example: Taking a picture with the camera, saving the picture to the SD card storage, and viewing the image on your computer. Appendix A: Camera Register Defines Appendix B: Image Capture Program Variables

Provides instructions for building a variety of projects that are able to communicate with one another, including a video game controlled by a stuffed monkey and a battery powered GPS that reports its location over Bluetooth.

Ausgewählte Beiträge zu aktuellen Themen: Das 20. Fachgespräch Autonome Mobile Systeme (AMS 2007) ist ein Forum für Wissenschaftler/innen aus Forschung und Industrie, die auf dem Gebiet der autonomen mobilen Systeme arbeiten. Es bietet Raum für Gedankenaustausch und Diskussion und fördert bzw. initiiert Kooperationen auf diesem Forschungsgebiet. Das diesjährige Fachgespräch beschäftigt sich hauptsächlich mit dem Bereich der kognitiven Automobile und Laufmaschinen.

Praised by experts for its clarity and topical breadth, this visually appealing, comprehensive source on PCs uses an easy-to-understand, step-by-step approach to teaching the fundamentals of 80x86 assembly language programming and PC architecture. This edition has been updated to include coverage of the latest 64-bit microprocessor from Intel and AMD, the multi core features of the new 64-bit microprocessors, and programming devices via USB ports. Offering readers a fun, hands-on learning experience, the text uses the Debug utility to show what action the instruction performs, then provides a sample program to show its application. Reinforcing concepts with numerous examples and review questions, its oversized pages delve into dozens of related subjects, including DOS memory map, BIOS, microprocessor architecture, supporting chips, buses, interfacing techniques, system programming, memory hierarchy, DOS memory management, tables of instruction timings, hard disk characteristics, and more. For learners ready to master PC system programming. Sensor Fusion - Foundation and Applications comprehensively covers the foundation and applications of sensor fusion. This book provides some novel ideas, theories, and solutions related to the research areas in the field of sensor fusion. The book explores some of the latest practices and research works in the area of sensor fusion. The book contains chapters with different methods of sensor fusion for different engineering as well as non-engineering applications. Advanced applications of sensor fusion in the areas of mobile robots, automatic vehicles, airborne threats, agriculture, medical field and intrusion detection are covered in this book. Sufficient evidences and analyses have been provided in the chapter to show the effectiveness of sensor fusion in various applications. This book would serve as an invaluable reference for professionals involved in various applications of sensor fusion.

Embedded systems are products such as microwave ovens, cars, and toys that rely on an internal microprocessor. This book is oriented toward the design engineer or programmer who

writes the computer code for such a system. There are a number of problems specific to the embedded systems designer, and this book addresses them and offers practical solutions. Offers cookbook routines, algorithms, and design techniques Includes tips for handling debugging management and testing Explores the philosophy of tightly coupling software and hardware in programming and developing an embedded system Provides one of the few coherent references on this subject

Technology is constantly changing. New microcontrollers become available every year and old ones become redundant. The one thing that has stayed the same is the C programming language used to program these microcontrollers. If you would like to learn this standard language to program microcontrollers, then this book is for you! ARM microcontrollers are available from a large number of manufacturers. They are 32-bit microcontrollers and usually contain a decent amount of memory and a large number of on-chip peripherals. Although this book concentrates on ARM microcontrollers from Atmel, the C programming language applies equally to other manufacturers ARMs as well as other microcontrollers. The book features: Use only free or open source software; Learn how to download, set up and use free C programming tools; Start learning the C language to write simple PC programs before tackling embedded programming -- no need to buy an embedded system right away!; Start learning to program from the very first chapter with simple programs and slowly build from there; No programming experience is necessary!; Learn by doing -- type and run the example programs and exercises; Sample programs and exercises can be downloaded from the Internet; A fun way to learn the C programming language; Ideal for electronic hobbyists, students and engineers wanting to learn the C programming language in an embedded environment on ARM microcontrollers. This book has been motivated by an urgent need for designing and implementation of innovative control algorithms and systems for tracked vehicles. Nowadays the unmanned vehicles are becoming more and more common. Therefore there is a need for innovative mechanical constructions capable of adapting to various applications regardless the ground, air or water/underwater environment. There are multiple various activities connected with tracked vehicles. They can be distributed among three main groups: design and control algorithms, sensoric and vision based information, construction and testing mechanical parts of unmanned vehicles. Scientists and researchers involved in mechanics, control algorithms, image processing, computer vision, data fusion, or IC will find this book useful.

this authoritative guide delves deeply into this groundbreaking technology and delivers a programming guide and application notes dedicated to the OOPic environment. This title includes a full object listing as well as an IDE (Integrated Development Interface) hardware and software guide and a CD-OM with all project and experiment codes that you incorporate to customise your own projects. Stay ahead of the robotics curve, tap into the power of OOPic microcontrollers with this indispensable volume!

This book provides a comprehensive coverage on robot fish including design, modeling and optimization, control, autonomous control and applications. It gathers contributions by the leading researchers in the area. Readers will find the book very useful for designing and building robot fish, not only in theory but also in practice. Moreover, the book discusses various important issues for future research and development, including design methodology, control methodology, and autonomous control strategy. This book is intended for researchers and graduate students in the fields of robotics, ocean engineering and related areas.

Mobile robotics has until now focused on issues like design of controllers and robot hardware. It is now ready to embrace theoretical methods from dynamical systems theory, statistics and system identification to produce a formalized approach based on quantitative analyses and computer models of the interaction between robot, task and environment. This book is a step towards a theoretical understanding of the operation of autonomous mobile robots. It presents cutting-edge research on the application of chaos theory, parametric and non-parametric

statistics and dynamical systems theory in this field. Practical examples and case studies show how robot behaviour can be logged, analysed, interpreted and modelled, aiding design of controllers, analysis of agent behaviour and verification of results. As the first book to apply advanced scientific methods to mobile robots it will interest researchers, lecturers and post-graduate students in robotics, artificial intelligence and cognitive science.

Seven years have passed since the publication of the previous edition of this book. During that time, sensor technologies have made a remarkable leap forward. The sensitivity of the sensors became higher, the dimensions became smaller, the sensitivity became better, and the prices became lower. What have not changed are the fundamental principles of the sensor design. They are still governed by the laws of Nature. Arguably one of the greatest geniuses who ever lived, Leonardo Da Vinci, had his own peculiar way of praying. He was saying, "Oh Lord, thanks for Thou do not violate your own laws." It is comforting indeed that the laws of Nature do not change as time goes by; it is just our appreciation of them that is being renewed. Thus, this new edition examines the same good old laws of Nature that are employed in the designs of various sensors. This has not changed much since the previous edition. Yet, the sections that describe the practical designs are revised substantially. Recent ideas and developments have been added, and less important and nonessential designs were dropped. Probably the most dramatic recent progress in the sensor technologies relates to wide use of MEMS and MEOMS (micro-electro-mechanical systems and micro-electro-opto-mechanical systems). These are examined in this new edition with greater detail. This book is about devices commonly called sensors. The invention of a microprocessor has brought highly sophisticated instruments into our everyday lives. Out-of-print for years, this highly sought-after volume, remains the most popular reference on inertial navigation systems analysis. Finally, this classic book is back in print and readily available only from Artech House. Authored by a pioneer in the field, this authoritative resource focuses on terrestrial navigation, but is also useful for air and sea applications. Packed with valuable, time-saving equations and models, the book helps engineers design optimal navigation systems by comparing the performance of the various types of system mechanizations. Although applications and technology have changed over the years, this book remains the best source for fundamental inertial navigation system knowledge, from notational conventions, reference frames, and geometry of the earth, to unified error analysis, self-alignment techniques, and the development of a system error model. This well-illustrated, timeless reference belongs on the shelf of every practicing engineer working in this area.

Offering comprehensive coverage of the convergence of real-time embedded systems scheduling, resource access control, software design and development, and high-level system modeling, analysis and verification Following an introductory overview, Dr. Wang delves into the specifics of hardware components, including processors, memory, I/O devices and architectures, communication structures, peripherals, and characteristics of real-time operating systems. Later chapters are dedicated to real-time task scheduling algorithms and resource access control policies, as well as priority-inversion control and deadlock avoidance. Concurrent system programming and POSIX programming for real-time systems are covered, as are finite state machines and Time Petri nets. Of special interest to software engineers will be the chapter devoted to model checking, in which the author discusses temporal logic and the NuSMV model

checking tool, as well as a chapter treating real-time software design with UML. The final portion of the book explores practical issues of software reliability, aging, rejuvenation, security, safety, and power management. In addition, the book: Explains real-time embedded software modeling and design with finite state machines, Petri nets, and UML, and real-time constraints verification with the model checking tool, NuSMV Features real-world examples in finite state machines, model checking, real-time system design with UML, and more Covers embedded computer programming, designing for reliability, and designing for safety Explains how to make engineering trade-offs of power use and performance Investigates practical issues concerning software reliability, aging, rejuvenation, security, and power management Real-Time Embedded Systems is a valuable resource for those responsible for real-time and embedded software design, development, and management. It is also an excellent textbook for graduate courses in computer engineering, computer science, information technology, and software engineering on embedded and real-time software systems, and for undergraduate computer and software engineering courses.

Reconfigurable computing (RC) technologies offer the promise of substantial performance gains over traditional architectures by customizing, sometimes at run-time, the topology of the underlying architecture to match the specific needs of a given application. Contemporary configurable architectures allow for the definition of architectures with functional and storage units that match the specific needs of a given computation, in terms of function, bit-width and control structures. Compared to standard microprocessor architectures, advantages are possible in terms of power consumption on a broad range of different application fields. Moreover, the flexibility enabled by reconfiguration is also seen as a basic technique for overcoming transient failures in emerging device structures. Techniques for achieving reconfigurable systems are numerous and require the joint development of reconfigurable hardware systems to support the dynamic behavior, e.g., suitable programming models, tools and languages, to support the reconfiguration process during run-time as well as during design-time. This includes verification techniques that can demonstrate formally correct reconfiguration sequences at each stage. While there are many problems, the existence and development of technologies such as recent multi- and many-core processor architectures, dynamically reconfigurable and multi-grain computing architectures, as well as application-specific processors suggest that there is a very strong need for adaptive and reconfigurable systems.

Research on humanoid robots has been mostly with the aim of developing robots that can replace humans in the performance of certain tasks. Motion planning for these robots can be quite difficult, due to their complex kinematics, dynamics and environment. It is consequently one of the key research topics in humanoid robotics research and the last few years have witnessed considerable progress in the field. Motion Planning for Humanoid Robots surveys the remarkable recent advancement in both the theoretical and the practical aspects of humanoid motion planning. Various motion planning frameworks are presented in Motion Planning for Humanoid Robots, including one for skill coordination and learning, and one for manipulating and grasping tasks. The problem of planning sequences of contacts that support acyclic motion in a highly constrained environment is addressed and a motion planner that enables a humanoid robot to push an object to a desired location on a cluttered table is described.

The main areas of interest include: • whole body motion planning, • task planning, • biped gait planning, and • sensor feedback for motion planning. Torque-level control of multi-contact behavior, autonomous manipulation of moving obstacles, and movement control and planning architecture are also covered. Motion Planning for Humanoid Robots will help readers to understand the current research on humanoid motion planning. It is written for industrial engineers, advanced undergraduate and postgraduate students.

Computer Vision is the most important key in developing autonomous navigation systems for interaction with the environment. It also leads us to marvel at the functioning of our own vision system. In this book we have collected the latest applications of vision research from around the world. It contains both the conventional research areas like mobile robot navigation and map building, and more recent applications such as, micro vision, etc. The first seven chapters contain the newer applications of vision like micro vision, grasping using vision, behavior based perception, inspection of railways and humanitarian demining. The later chapters deal with applications of vision in mobile robot navigation, camera calibration, object detection in vision search, map building, etc.

Der Band dokumentiert das 21. Fachgespräch Autonome Mobile Systeme (AMS 2009). Die Veranstaltung bietet Wissenschaftlern aus Forschung und Industrie ein Forum für den Gedankenaustausch und eine Basis, um Kooperationen auf diesem Forschungsgebiet zu initiieren. Die Beiträge befassen sich mit Themen wie humanoide Roboter und Flugmaschinen, Perzeption und Sensorik, Kartierung und Lokalisation, Regelung, Navigation, Lernverfahren, Systemarchitekturen sowie mit der Anwendung von autonomen mobilen Systemen.

* With this book readers might well be able to build the next Mars Rover. * First book out on Java robotics. * The biggest selling point about this book is that no one else shows readers how to combine the power of their PC with a robust programming language in Java to create exciting robotics. * The book is a great teaching aid (in robotics or software) that establishes a new paradigm for thinking about robotics along with simpler ways to do things, i.e., vs. the old way using microcontrollers.

The book on Ontology in Information Science explores a broad set of ideas and presents some of the state-of-the-art research in this field concisely in 12 chapters. This book provides researchers and practitioners working in the field of ontology and information science an opportunity to share their theories, methodologies, experiences, and experimental results related to ontology development and application in various areas. It also includes the design aspects of domain ontologies considering the architecture, development strategy, and selection of tools. The intended audience of this book will mainly consist of researchers, research students, and practitioners in the field of ontology and information science.

Embedded Systems with PIC Microcontrollers: Principles and Applications is a hands-on introduction to the principles and practice of embedded system design using the PIC microcontroller. Packed with helpful examples and illustrations, the book provides an in-depth treatment of microcontroller design as well as programming in both assembly language and C, along with advanced topics such as techniques of connectivity and networking and real-time operating systems. In this one book students get all they need to know to be highly proficient at embedded systems design. This text combines

embedded systems principles with applications, using the 16F84A, 16F873A and the 18F242 PIC microcontrollers. Students learn how to apply the principles using a multitude of sample designs and design ideas, including a robot in the form of an autonomous guide vehicle. Coverage between software and hardware is fully balanced, with full presentation given to microcontroller design and software programming, using both assembler and C. The book is accompanied by a companion website containing copies of all programs and software tools used in the text and a 'student' version of the C compiler. This textbook will be ideal for introductory courses and lab-based courses on embedded systems, microprocessors using the PIC microcontroller, as well as more advanced courses which use the 18F series and teach C programming in an embedded environment. Engineers in industry and informed hobbyists will also find this book a valuable resource when designing and implementing both simple and sophisticated embedded systems using the PIC microcontroller. *Gain the knowledge and skills required for developing today's embedded systems, through use of the PIC microcontroller. *Explore in detail the 16F84A, 16F873A and 18F242 microcontrollers as examples of the wider PIC family. *Learn how to program in Assembler and C. *Work through sample designs and design ideas, including a robot in the form of an autonomous guided vehicle. *Accompanied by a CD-ROM containing copies of all programs and software tools used in the text and a 'student' version of the C compiler. Making Things Talk Practical Methods for Connecting Physical Objects" O'Reilly Media, Inc."

Some basics. Software design. Hardware design. Building the TVT 6 5/8.

Transparency.

Designed for beginners, undergraduate students, and robotics enthusiasts, Practical Robot Design: Game Playing Robots is a comprehensive guide to the theory, design, and construction of game-playing robots. Drawing on years of robot building and teaching experience, the authors demonstrate the key steps of building a robot from beginning to end, wi

Super series are a set of workbooks to accompany the flexible learning programme specifically designed and developed by the Institute of Leadership & Management (ILM) to support their Level 3 Certificate in First Line Management. The learning content is also closely aligned to the Level 3 S/NVQ in Management. The series consists of 34 workbooks. Each book will map on to a course unit (34 books/units).

In this updated edition the main thrust is on applied Kalman filtering. Chapters 1-3 provide a minimal background in random process theory and the response of linear systems to random inputs. The following chapter is devoted to Wiener filtering and the remainder of the text deals with various facets of Kalman filtering with emphasis on applications. Starred problems at the end of each chapter are computer exercises. The authors believe that programming the equations and analyzing the results of specific examples is the best way to obtain the insight that is essential in engineering work.

For the latest twenty to thirty years, a significant number of AUVs has been created for the solving of wide spectrum of scientific and applied tasks of ocean development and research. For the short time period the AUVs have shown the efficiency at performance of complex search and inspection works and opened a

number of new important applications. Initially the information about AUVs had mainly review-advertising character but now more attention is paid to practical achievements, problems and systems technologies. AUVs are losing their prototype status and have become a fully operational, reliable and effective tool and modern multi-purpose AUVs represent the new class of underwater robotic objects with inherent tasks and practical applications, particular features of technology, systems structure and functional properties.

All life came from sea but all robots were born on land. The vast majority of both industrial and mobile robots operate on land, since the technology to allow them to operate in and under the ocean has only become available in recent years. A number of complex issues due to the unstructured, hazardous undersea environment, makes it difficult to travel in the ocean while today's technologies allow humans to land on the moon and robots to travel to Mars . . Clearly, the obstacles to allowing robots to operate in a saline, aqueous, and pressurized environment are formidable. Mobile robots operating on land work under nearly constant atmospheric pressure; their legs (or wheels or tracks) can operate on a firm footing; their bearings are not subjected to moisture and corrosion; they can use simple visual sensing and be observed by their creators working in simple environments. In contrast, consider the environment where undersea robots must operate. The pressure they are subjected to can be enormous, thus requiring extremely rugged designs. The deep oceans range between 19,000 to 36,000 ft. At a mere 33-foot depth, the pressure will be twice the normal one atmosphere pressure of 29.4 psi. The chemical environment of the sea is highly corrosive, thus requiring the use of special materials. Lubrication of moving parts in water is also difficult, and may require special sealed, waterproof joints.

In recent years, robots have been built based on cognitive architecture which has been developed to model human cognitive ability. The cognitive architecture can be a basis for intelligence technology to generate robot intelligence. In this edited book the robot intelligence is classified into six categories: cognitive intelligence, social intelligence, behavioral intelligence, ambient intelligence, collective intelligence and genetic intelligence. This classification categorizes the intelligence of robots based on the different aspects of awareness and the ability to act deliberately as a result of such awareness. This book aims at serving researchers and practitioners with a timely dissemination of the recent progress on robot intelligence technology and its applications, based on a collection of papers presented at the 1st International Conference on Robot Intelligence Technology and Applications (RiTA), held in Gwangju, Korea, December 16-18, 2012. For a better readability, this edition has the total 101 papers grouped into 3 chapters: Chapter I: Cognitive Intelligence, Social Intelligence and Behavioral Intelligence, Chapter II: Ambient Intelligence, Collective Intelligence and Genetic Intelligence, Chapter III: Intelligent Robot Technologies and Applications.

This book presents the cutting edge developments within a broad field related to robotic sailing. The contributions were presented during the 8th International

Robotic Sailing Conference, which has taken place as a part of the 2015 World Robotic Sailing Championships in Mariehamn, Åland (Finland), August 31st – September 4th 2015. Since more than a decade, a series of competitions such as the World Robotic Sailing Championship have stimulated a variety of groups to work on research and development around autonomous sailing robots, which involves boat designers, naval architects, electrical engineers and computer scientists. While many of the challenges in building a truly autonomous sailboat are still unsolved, the books presents the state of the art of research and development within platform optimization, route and stability planning, collision avoidance, power management and boat control.

This book constitutes the refereed proceedings of the 14th Conference on Advances in Autonomous Robotics, TAROS 2013, held in Oxford, UK, in August 2013. The 36 revised full papers presented together with 25 extended abstracts were carefully reviewed and selected from 89 submissions. The papers cover various topics such as artificial intelligence, bio-inspired and aerial robotics, computer vision, control, humanoid and robotic arm, swarm robotics, verification and ethics.

The Architecture of Computer Hardware, Systems Software and Networking is designed help students majoring in information technology (IT) and information systems (IS) understand the structure and operation of computers and computer-based devices. Requiring only basic computer skills, this accessible textbook introduces the basic principles of system architecture and explores current technological practices and trends using clear, easy-to-understand language. Throughout the text, numerous relatable examples, subject-specific illustrations, and in-depth case studies reinforce key learning points and show students how important concepts are applied in the real world. This fully-updated sixth edition features a wealth of new and revised content that reflects today's technological landscape. Organized into five parts, the book first explains the role of the computer in information systems and provides an overview of its components. Subsequent sections discuss the representation of data in the computer, hardware architecture and operational concepts, the basics of computer networking, system software and operating systems, and various interconnected systems and components. Students are introduced to the material using ideas already familiar to them, allowing them to gradually build upon what they have learned without being overwhelmed and develop a deeper knowledge of computer architecture.

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