# LEGGED ROBOTS THAT BALANCE ARTIFICIAL INTELLIGENCE

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Bioinspired Legged Locomotion - Maziar Ahmad Sharbafi 2017-11-21
Bioinspired Legged Locomotion: Models, Concepts, Control and Applications explores the universe of legged robots, bringing in perspectives from engineering, biology, motion science, and medicine to provide a comprehensive overview of the field. With comprehensive coverage, each chapter brings outlines, and an abstract, introduction, new developments, and a summary. Beginning with bio-inspired locomotion concepts, the book's editors present a thorough review of current literature that is followed by a

more detailed view of bouncing, swinging, and balancing, the three fundamental sub functions of locomotion. This part is closed with a presentation of conceptual models for locomotion. Next, the book explores bio-inspired body design, discussing the concepts of motion control, stability, efficiency, and robustness. The morphology of legged robots follows this discussion, including biped and quadruped designs. Finally, a section on high-level control and applications discusses neuromuscular models, closing the book with examples of applications and discussions of performance, efficiency, and robustness. At the end, the editors share their perspective on the future directions of each area, presenting state-of-the-art knowledge on the subject using a structured and consistent approach that will help researchers in both academia and industry formulate a better understanding of bioinspired legged robotic locomotion and quickly apply the concepts in research or products. Presents state-of-the-art control approaches with biological relevance Provides a thorough understanding of the principles of organization of biological locomotion Teaches the organization of complex systems based on low-dimensional motion concepts/control Acts as a guideline reference for future robots/assistive devices with legged architecture Includes a selective bibliography on the most relevant published articles

*An Overview on Balancing and Stabilization Control of Biped Robots* - Hayder Al-Shuka 2017-10-17

Academic Paper from the year 2017 in the subject Engineering - Robotics, , language: English, abstract: Researchers dream of developing autonomous humanoid robots which behave/walk like a human being. Biped robots, although complex, have the greatest potential for use in human-centered environments such as the home or office. Studying biped robots is also important for understanding human locomotion and improving control strategies for prosthetic and orthotic limbs. Control systems of humans walking in cluttered environments are complex, however, and may involve multiple local controllers and commands from the cerebellum. Although biped robots have been of interest over the last four decades, no unified stability/balance criterion adopted for stabilization of miscellaneous walking/running modes of biped robots has so far been available. The literature is scattered and it is difficult to construct a unified background for the balance strategies of biped motion. The zero-moment point (ZMP) criterion, however, is a conservative indicator of stabilized motion for a class of biped robots. Therefore, we offer a

systematic presentation of multi-level balance controllers for stabilization and balance recovery of ZMP-based humanoid robots.

50 Years of Artificial Intelligence - Max Lungarella 2007-12-10

This Festschrift volume, published in celebration of the 50th Anniversary of Artificial Intelligence, includes 34 refereed papers written by leading researchers in the field of Artificial Intelligence. The papers were carefully selected from the invited lectures given at the 50th Anniversary Summit of AI, held at the Centro Stefano Franscini, Monte Verit , Ascona, Switzerland, July 9-14, 2006. The summit provided a venue for discussions on a broad range of topics.

**Robotics Research** - Antonio Bicchi 2017-07-24

ISRR, the "International Symposium on Robotics Research", is one of robotics pioneering Symposia, which has established over the past two decades some of the field's most fundamental and lasting contributions. This book presents the results of the seventeenth edition of "Robotics Research" ISRR15, offering a collection of a broad range of topics in robotics. The content of the contributions provides a wide coverage of the current state of robotics research.: the advances and challenges in its theoretical foundation and technology basis, and the developments in its traditional and new emerging areas of applications. The diversity, novelty, and span of the work unfolding in these areas reveal the field's increased maturity and expanded scope and define the state of the art of robotics and its future direction.

Legged Robots that Balance - Marc H. Raibert 1986

This book, by a leading authority on legged locomotion, presents exciting engineering and science, along with fascinating implications for theories of human motor control. It lays fundamental groundwork in legged locomotion, one of the least developed areas of robotics, addressing the possibility of building useful legged robots that run and balance.The book describes the study of physical machines that run and balance on just one leg, including analysis, computer simulation, and laboratory experiments. Contrary to expectations, it reveals that control of such machines is not particularly difficult. It describes how the principles of locomotion discovered with one leg can be extended to systems with several legs and reports preliminary experiments with a quadruped machine that runs using these principles.Raibert's work is unique in its emphasis on dynamics and active balance, aspects of the problem that have played a minor role in most

previous work. His studies focus on the central issues of balance and dynamic control, while avoiding several problems that have dominated previous research on legged machines.Marc Raibert is Associate Professor of Computer Science and Robotics at Carnegie-Mellon University and on the editorial board of The MIT Press journal, Robotics Research. Legged Robots That Balance is fifteenth in the Artificial Intelligence Series, edited by Patrick Winston and Michael Brady.

**Intelligent Autonomous Systems 9** - Tamio Arai 2006

" The papers in this publication cover both the applied as well as the theoretical aspects of intelligent autonomous systems. Autonomy and adaptivity are key aspects of truly intelligent artificial systems, dating from the first IAS conference in 1989. New directions of research have recently emerged from the synergetic interaction of many fields, such as cognitive science, operations research, mathematics, robotics, mechanics, electronics, informatics and economics, interdisciplinary as well as transdisciplinarily. One key insight is that to realize both intelligence and autonomy, it is crucial to build real-world devices and abstract principles of design from them. The goal of IAS-9 is to lay out new scientific ideas and design principles for artificial systems able to survive in nature and in our society. "

*Embodied Artificial Intelligence* - Fumiya Iida 2004-07-08

Originating from a Dagstuhl seminar, the collection of papers presented in this book constitutes on the one hand a representative state-of-the-art survey of embodied artificial intelligence, and on the other hand the papers identify the important research trends and directions in the field. Following an introductory overview, the 23 papers are organized into topical sections on - philosophical and conceptual issues - information, dynamics, and morphology - principles of embodiment for real-world applications - developmental approaches - artificial evolution and self-reconfiguration

**Military Robots** - Cecilia Pinto McCarthy 2017-07

With the use of high-technology, military robots analyze the world around them and help carry out missions and tasks. Describes the development and challenges associated with manufacturing drones, bomb disposal robots and more. Includes glossary, websites, and bibliography for further reading. missions and tasks. With the use of high-technology computers and sensors, Military Robots have helped with surveillance, defusing bombs, and numerous other

unique scenarios. Correlates with STEM instruction and NexGen standards. Includes glossary, websites, and bibliography for further reading.

**Artificial Vision for Mobile Robots** - Nicholas Ayache 1991

To give mobile robots real autonomy, and to permit them to act efficiently in a diverse, cluttered, and changing environment, they must be equipped with powerful tools for perception and reasoning. Artificial Vision for Mobile Robots presents new theoretical and practical tools useful for providing mobile robots with artificial vision in three dimensions, including passive binocular and trinocular stereo vision, local and global 3D map reconstructions, fusion of local 3D maps into a global 3D map, 3D navigation, control of uncertainty, and strategies of perception. Numerous examples from research carried out at INRIA with the Esprit Depth and Motion Analysis project are presented in a clear and concise manner. Nicolas Ayache is Research Director at INRIA, Le Chesnay, France. Contents. General Introduction. Stereo Vision. Introduction. Calibration. Image Representation. Binocular Stereo Vision Constraints. Binocular Stereo Vision Algorithms. Experiments in Binocular Stereo Vision. Trinocular Stereo Vision, Outlook. Multisensory Perception. Introduction. A Unified Formalism. Geometric Representation. Construction of Visual Maps. Combining Visual Maps. Results: Matching and Motion. Results: Matching and Fusion. Outlook.

**Introduction to Autonomous Mobile Robots, second edition** - Roland Siegwart 2011-02-18

The second edition of a comprehensive introduction to all aspects of mobile robotics, from algorithms to mechanisms. Mobile robots range from the Mars Pathfinder mission's teleoperated Sojourner to the cleaning robots in the Paris Metro. This text offers students and other interested readers an introduction to the fundamentals of mobile robotics, spanning the mechanical, motor, sensory, perceptual, and cognitive layers the field comprises. The text focuses on mobility itself, offering an overview of the mechanisms that allow a mobile robot to move through a real world environment to perform its tasks, including locomotion, sensing, localization, and motion planning. It synthesizes material from such fields as kinematics, control theory, signal analysis, computer vision, information theory, artificial intelligence, and probability theory. The book presents the techniques and technology that enable mobility in a series of interacting modules. Each chapter treats a different aspect of mobility, as the book moves from low-level

to high-level details. It covers all aspects of mobile robotics, including software and hardware design considerations, related technologies, and algorithmic techniques. This second edition has been revised and updated throughout, with 130 pages of new material on such topics as locomotion, perception, localization, and planning and navigation. Problem sets have been added at the end of each chapter. Bringing together all aspects of mobile robotics into one volume, Introduction to Autonomous Mobile Robots can serve as a textbook or a working tool for beginning practitioners. Curriculum developed by Dr. Robert King, Colorado School of Mines, and Dr. James Conrad, University of North Carolina-Charlotte, to accompany the National Instruments LabVIEW Robotics Starter Kit, are available. Included are 13 (6 by Dr. King and 7 by Dr. Conrad) laboratory exercises for using the LabVIEW Robotics Starter Kit to teach mobile robotics concepts.

**Robotics** - Yoky Matsuoka 2011-08-05

Papers from a flagship robotics conference that cover topics ranging from kinematics to human-robot interaction and robot perception. Robotics: Science and Systems VI spans a wide spectrum of robotics, bringing together researchers working on the foundations of robotics, robotics applications, and the analysis of robotics systems. This volume presents the proceedings of the sixth Robotics: Science and Systems conference, held in 2010 at the University of Zaragoza, Spain. The papers presented cover a wide range of topics in robotics, spanning mechanisms, kinematics, dynamics and control, human-robot interaction and human-centered systems, distributed systems, mobile systems and mobility, manipulation, field robotics, medical robotics, biological robotics, robot perception, and estimation and learning in robotic systems. The conference and its proceedings reflect not only the tremendous growth of robotics as a discipline but also the desire in the robotics community for a flagship event at which the best of the research in the field can be presented.

**Introduction to AI Robotics, second edition** - Robin R. Murphy 2019-10-01

A comprehensive survey of artificial intelligence algorithms and programming organization for robot systems, combining theoretical rigor and practical applications. This textbook offers a comprehensive survey of artificial intelligence (AI) algorithms and programming organization for robot systems. Readers who master the topics covered will be able to design and evaluate an artificially intelligent robot for

applications involving sensing, acting, planning, and learning. A background in AI is not required; the book introduces key AI topics from all AI subdisciplines throughout the book and explains how they contribute to autonomous capabilities. This second edition is a major expansion and reorganization of the first edition, reflecting the dramatic advances made in AI over the past fifteen years. An introductory overview provides a framework for thinking about AI for robotics, distinguishing between the fundamentally different design paradigms of automation and autonomy. The book then discusses the reactive functionality of sensing and acting in AI robotics; introduces the deliberative functions most often associated with intelligence and the capability of autonomous initiative; surveys multi-robot systems and (in a new chapter) human-robot interaction; and offers a "metaview" of how to design and evaluate autonomous systems and the ethical considerations in doing so. New material covers locomotion, simultaneous localization and mapping, human-robot interaction, machine learning, and ethics. Each chapter includes exercises, and many chapters provide case studies. Endnotes point to additional reading, highlight advanced topics, and offer robot trivia.

**Progress in Artificial Intelligence** - Luis Miguel Correia 2013-09-04

This book constitutes the refereed proceedings of the 16th Portuguese Conference on Artificial Intelligence, EPIA 2013, held in Angra do Hero? smo, Azores, Portugal, in September 2013. The 45 revised full papers presented were carefully reviewed and selected from a total of 157 submissions. The papers are organized in the following topical sections: ambient intelligence and affective environments; artificial intelligence in transportation systems; artificial life and evolutionary algorithms; computational methods in bioinformatics and systems biology; general artificial intelligence; intelligent robotics; knowledge discovery and business intelligence; multi-agent systems: theory and applications; social simulation and modeling; and text mining and applications.

**Robotics** - Hugh Durrant-Whyte 2012-06-29

Papers from a flagship conference reflect the latest developments in the field, including work in such rapidly advancing areas as human-robot interaction and formal methods. Robotics: Science and Systems VII spans a wide spectrum of robotics, bringing together researchers working on the algorithmic or mathematical foundations of robotics, robotics

applications, and analysis of robotics systems. This volume presents the proceedings of the seventh annual Robotics: Science and Systems conference, held in 2011 at the University of Southern California. The papers presented cover a wide range of topics in robotics, spanning mechanisms, kinematics, dynamics and control, human-robot interaction and human-centered systems, distributed systems, mobile systems and mobility, manipulation, field robotics, medical robotics, biological robotics, robot perception, and estimation and learning in robotic systems. The conference and its proceedings reflect not only the tremendous growth of robotics as a discipline but also the desire in the robotics community for a flagship event at which the best of the research in the field can be presented.

**Assistive Robotics** - Hongye Su 2015-08-13

This book provides state-of-the-art scientific and engineering research findings and developments in the area of mobile robotics and associated support technologies around the theme of assistive robotics. The book contains peer reviewed articles presented at the CLAWAR 2015 conference. The book contains a comprehensive collection of papers on legged locomotion with numbers of legs from two upward to multi-legs, which includes robots cable of climbing walls, poles, or more complex structures such as continuing the distinctive CLAWAR themes. There are also a strong showing of articles covering human assist devices, notably exoskeletal and prosthetic devices, as well as social robots designed to meet the growing challenges of global ageing population. Contents: Plenary Presentations:Infrastructure Robotics: Opportunities and Challenges (Gamini Dissanayake)Understanding Animal Locomotion Using Bio-Inspired Robotics and Soft Robotics (Tianmiao Wang)Assistive Robots:A Behavior Adaptation Method Based on Hierarchical POMDPs (Y Tao, Y Chen, D Xu and J Zheng)Design and Control of Exoskeleton for Elderly Mobility (G Al Rezage, M O Tokhi and S K Ali)Assessing Human Robot Interaction: The Role of Long-Run Experiments (I Ferreira and J S Sequeira)Autonomous Robots:Wall Climbing Robot Motion Simulation in Non-Deterministic Area with Existing Moving Objects (V G Gradetsky, M M Knyazkov, A M Nunuparov, E A Semyonov and A N Sukhanov)Design and Implementation of a Scansorial Robot (M A H Hassan and M O Tokhi)Biologically-Inspired Systems and Solutions:A Bio-Inspired Behavior Based Bipedal Locomotion Control ? B4LC Method for Bipedal Upslope Walking (J Zhao, Q Liu, S Schuetz and K Berns)Design and Implementation of a

Smart Robotic Shark with Multi-Sensors (S Chen, J Yu, X Li and J Yuan)Control Algorithm for Walking Robot with Mosaic Body (A V Panchenko, I A Orlov and V E Pavlovsky)Innovative Design of Clawar:A Novel Inspection Robot Moving on High-Voltage Power Transmission Line (T Guanghong and F Lijin)Rise-Rover: A Wall-Climbing Robot with High Reliability and Load-Carrying Capacity (J Xiao, B Li, K Ushiroda and Q Song)Inspection and Innovative Sensing:An Innovative Torque Sensor Design for the Lightest Hydraulic Quadruped Robot (H Khan, F Cannella, D Caldwell and C Semini)Mapping Repetitive Structural Tunnel Environments for a Biologically Inspired Climbing Robot (G Paul, S Mao, L Liu and R Xiong)Locomotion:Application of Local Slopes in the Study of Metastable Walking (A T Safa, M Naraghi and A Alasty)A Mechanism of Particle Swarm Optimization on Motor Patterns in the B4LC System (Q Liu, J Zhao, S Schuetz and K Berns)Dynamical Analysis of Large Deflection Compliant Leg During Terrestrial Locomotion (T Fang, X Wang, Z Chen, M Xu and S Zhang)Manipulation, Intelligence and Learning for CLAWAR:Radiation Dosing Software Control of a Robot System for the Atlas Scanning Facility (H Marin-Reyes and R French)Acquisition Slope Surface Walking for Humanoids via Transfer Learning (Y Wang, X Han, Z Liu, D Luo and X Wu)Medical and Rehabilitation Robotics:A Real-Time Gait Phase Detection Method for Prosthesis Control (J Li, X Zhou, C Li, W Li, H Zhang and H Gu)Powered Knee Orthosis for Performance of Assistance and Rehabilitation Purposes (M Shysh, A Safonov, A Telesh and U Schmucker)Modelling and Simulation of CLAWAR:Wall Climbing Robot Motion with Adaptive Vacuum Contact Devices (V G Gradetsky, M M Knyazkov, A A Kryukova, E A Semyonov and A N Sukhanov)Combination of Affine Deformation and Dynamic Movement Primitive in Learning Human Motion for Redundant Manipulator (J Hu and R Xiong)Perception, Localization and Rescue Operations:Multi-Session Slam Over Low Dynamic Workspace Using RGBD Sensor (Y Wang, R Xiong, S Huang and J Wu)Mechanism and Anti-Explosion Design of an Omnitread Serpentine Robot for Searching in Coal Mines (G Liu, J Yan, C Li, Z Han, L Zhu, J Zhao and L Li)Planning and Control:Lidar-Based Navigation-Level Path Planning for Field-Capable Legged Robots (I Havoutis, D G Caldwell and C Semini)A Simple Modeling Method and Trajectory Planning for a Car-Like Climbing Robot Used to Strip Coating from the Outer Surface of Pipes

Underwater (H Wang, C Yang, X Deng and J Fan)Underwater and Sea Robotics:Towards Deep-Sea Monitoring with SMIS ? Experimental Trials of Deep-Sea Acoustic Localization (S Neumann, D Oertel, H W rn, M Kurowski, D Dewitz, J J Waniek, D Kaiser and R Mars)Mechanical Design of a Two-Joint Robotic Fish (C Zhang, J Yu and M Tan)A Novel Hydraulic Mechanism for Bio-Inspired Undulating Robot: Modeling and Morphological Analysis (H Xu, T Hu, X Zhang and L Zhang)and other papers Readership: Systems and control engineers, electrical engineers, mechanical engineers in academic, research and industrial settings; engineers and practitioners in the public services sectors in health care, manufacturing, supply and delivery services.

**Technology Developments: the Role of Mechanism and Machine Science and IFToMM** - Marco Ceccarelli 2011-05-26

This is the first book of a series that will focus on MMS (Mechanism and Machine Science). This book also presents IFToMM, the International Federation on the Promotion of MMS and its activity. This volume contains contributions by IFToMM officers who are Chairs of member organizations (MOs), permanent commissions (PCs), and technical committees (TCs), who have reported their experiences and views toward the future of IFToMM and MMS. The book is composed of three parts: the first with general considerations by high-standing IFToMM persons, the second chapter with views by the chairs of PCs and TCs as dealing with specific subject areas, and the third one with reports by the chairs of MOs as presenting experiences and challenges in national and territory communities. This book will be of interest to a wide public who wish to know the status and trends in MMS both at international level through IFToMM and in national/local frames through the leading actors of activities. In addition, the book can be considered also a fruitful source to find out "who's who" in MMS, historical backgrounds and trends in MMS developments, as well as for challenges and problems in future activity by IFToMM community and in MMS at large.

**Cambrian Intelligence** - Rodney Allen Brooks 1999

Until the mid-1980s, AI researchers assumed that an intelligent system doing high-level reasoning was necessary for the coupling of perception and action. In this traditional model, cognition mediates between perception and plans of action. Realizing that this core AI, as it was known, was illusory, Rodney A. Brooks turned the field of AI on its head by introducing the behavior-based approach to robotics.

The cornerstone of behavior-based robotics is the realization that the coupling of perception and action gives rise to all the power of intelligence and that cognition is only in the eye of an observer. Behavior-based robotics has been the basis of successful applications in entertainment, service industries, agriculture, mining, and the home. It has given rise to both autonomous mobile robots and more recent humanoid robots such as Brooks' Cog. This book represents Brooks' initial formulation of and contributions to the development of the behavior-based approach to robotics. It presents all of the key philosophical and technical ideas that put this "bottom-up" approach at the forefront of current research in not only AI but all of cognitive science.

*Climbing and Walking Robots and the Supporting Technologies for Mobile Machines* - G. Muscato 2003-11-07

Bringing together academics, researchers, and industrialists, Climbing and Walking Robots 2003 (CLAWAR 2003) provides a forum for cross-fertilization in the different specialities so that both state-of-the-art and industrial applications can be reported on. Original contributions, both industrial and those in new/emerging fields, provide a full picture of climbing and walking robots. The interest in climbing and walking robots (CLAWAR) has increased considerably over recent years, addressing many application fields such as exploration/intervention in extreme environments, personal services, emergency rescue operations, transportation, entertainment, etc., and envisage humanoid robots evolving into mechatronic replicas of ourselves. Topics covered include: Biological Inspired Systems Medical Systems Control of CLAWAR Design Methodology System Modelling and Simulation Modularity and System Architecture Gait Generation and Stability of CLAWAR Biped Locomotion Multi-legged Locomotion Micro Machines Applications Climbing Robots Actuators, Sensors, Navigation, and Sensors Fusion CLAWAR Network Workpackages

Hydraulically Actuated Hexapod Robots - Kenzo Nonami 2013-11-29

Legged robots are a promising locomotion system, capable of performing tasks that conventional vehicles cannot. Even more exciting is the fact that this is a rapidly developing field of study for researchers from a variety of disciplines. However, only a few books have been published on the subject of multi-legged robots. The main objective of this book is to describe some of the major control issues concerning walking robots that the authors have

faced over the past 10 years. A second objective is to focus especially on very large hydraulically driven hexapod robot locomotion weighing more than 2,000 kg, making this the first specialized book on this topic. The 10 chapters of the book touch on diverse relevant topics such as design aspects, implementation issues, modeling for control, navigation and control, force and impedance control-based walking, fully autonomous walking, walking and working tasks of hexapod robots, and the future of walking robots. The construction machines of the future will very likely resemble hydraulically driven hexapod robots like the ones described in this book – no longer science fiction but now a reality.

CONTROL SYSTEMS, ROBOTICS AND AUTOMATION – Volume XXII - Heinz D. Unbehauen 2009-10-11

This Encyclopedia of Control Systems, Robotics, and Automation is a component of the global Encyclopedia of Life Support Systems EOLSS, which is an integrated compendium of twenty one Encyclopedias. This 22-volume set contains 240 chapters, each of size 5000-30000 words, with perspectives, applications and extensive illustrations. It is the only publication of its kind carrying state-of-the-art knowledge in the fields of Control Systems, Robotics, and Automation and is aimed, by virtue of the several applications, at the following five major target audiences: University and College Students, Educators, Professional Practitioners, Research Personnel and Policy Analysts, Managers, and Decision Makers and NGOs.

Quadrupedal Locomotion - Pablo Gonz[?] lez de Santos 2007-02-17

Walking machines have advantages over traditional vehicles, and have already accomplished tasks that wheeled or tracked robots cannot handle. Nevertheless, their use in industry and services is currently limited in scope. This book brings together methods and techniques that have been developed to deal with obstacles to wider acceptance of legged robots. Part I provides an historical overview. Part II concentrates on control techniques, as applied to four-legged robots.

Embedded Robotics - Thomas Br[?] unl 2022-03-23

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.

Advanced Intelligent Computing Theories and Applications: With Aspects of Artificial Intelligence - De-Shuang Huang 2010-07-30

The International Conference on Intelligent Computing (ICIC) was formed to provide an annual forum dedicated to the emerging and challenging topics in artificial intel- gence, machine learning, pattern recognition, image processing, bioinformatics, and computational biology. It aims to bring together researchers and practitioners from both academia and industry to share ideas, problems, and solutions related to the m- tifaceted aspects of intelligent computing. ICIC 2010, held in Changsha, China, August 18–21, 2010, constituted the 6th - ternational Conference on Intelligent Computing. It built upon the success of ICIC 2009, ICIC 2008, ICIC 2007, ICIC 2006, and ICIC 2005, that were held in Ulsan, Korea, Shanghai, Qingdao, Kunming, and Hefei, China, respectively. This year, the conference concentrated mainly on the theories and methodologies as well as the emerging applications of intelligent computing. Its aim was to unify the picture of contemporary intelligent computing techniques as an integral concept that highlights the trends in advanced computational intelligence and bridges theoretical research with applications. Therefore, the theme for this conference was "Advanced Intelligent Computing Technology and Applications." Papers focusing on this theme were solicited, addressing theories, methodologies, and applications in science and technology.

Proceedings of the International Conference on Artificial Intelligence and Computer Vision (AICV2020) - Aboul-Ella Hassanien 2020-03-23

This book presents the proceedings of the 1st International Conference on Artificial Intelligence and Computer Visions (AICV 2020), which took place in Cairo, Egypt, from April 8 to 10, 2020. This international conference, which highlighted essential research and developments in the fields of artificial intelligence and computer visions, was organized by the Scientific Research Group in Egypt (SRGE). The book is divided into sections, covering the following topics: swarm-based optimization mining and data analysis, deep learning and applications, machine learning and applications, image processing and

computer vision, intelligent systems and applications, and intelligent networks.

Advances in Computational Intelligence - Ildar Batyrshin 2019-01-02

The two-volume set LNAI 11288 and 11289 constitutes the proceedings of the 17th Mexican International Conference on Artificial Intelligence, MICAI 2018, held in Guadalajara, Mexico, in October 2018. The total of 62 papers presented in these two volumes was carefully reviewed and selected from 149 submissions. The contributions are organized in topical as follows: Part I: evolutionary and nature-inspired intelligence; machine learning; fuzzy logic and uncertainty management. Part II: knowledge representation, reasoning, and optimization; natural language processing; and robotics and computer vision.

**Fundamentals of Robotic Mechanical Systems** - Jorge Angeles 2013-03-09

Mechanical engineering, an engineering discipline borne of the needs of the industrial revolution, is once again asked to do its substantial share in the call for industrial renewal. The general call is urgent as we face profound is sues of productivity and competitiveness that require engineering solutions, among others. The Mechanical Engineering Series features graduate texts and research monographs intended to address the need for information in contemporary areas of mechanical engineering. The series is conceived as a comprehensive one that covers a broad range of concentrations important to mechanical engineering graduate education and research. We are fortunate to have a distinguished rost er of consulting editors on the advisory board, each an expert in one the areas of concentra tion. The names of the consulting editors are listed on the next page of this volume. The areas of concentration are: applied mechanics; biome chan ics; computational mechanics; dynamic systems and control; energetics; mechanics of materials; processing; thermal science; and tribology.

**Neural Systems for Robotics** - Omid Omidvar 2012-12-02

Neural Systems for Robotics represents the most up-to-date developments in the rapidly growing aplication area of neural networks, which is one of the hottest application areas for neural networks technology. The book not only contains a comprehensive study of neurocontrollers in complex Robotics systems, written by highly respected researchers in the field but outlines a novel approach to solving Robotics problems. The importance of

neural networks in all aspects of Robot arm manipulators, neurocontrol, and Robotic systems is also given thorough and in-depth coverage. All researchers and students dealing with Robotics will find Neural Systems for Robotics of immense interest and assistance. Key Features * Focuses on the use of neural networks in robotics-one of the hottest application areas for neural networks technology * Represents the most up-to-date developments in this rapidly growing application area of neural networks * Contains a new and novel approach to solving Robotics problems

Experimental Robotics IX - Marcelo H. Ang 2006-03-09

The International Symposium on Experimental Robotics (ISER) is a series of bi-annual meetings which are organized in a rotating fashion around North America, Europe and Asia/Oceania. The goal of ISER is to provide a forum for research in robotics that focuses on novelty of theoretical contributions validated by experimental results. The meetings are conceived to bring together, in a small group setting, researchers from around the world who are in the forefront of experimental robotics research. This unique reference presents the latest advances across the various fields of robotics, with ideas that are not only conceived conceptually but also verified experimentally. It collects contributions on the current developments and new directions in the field of experimental robotics, which are based on the papers presented at the Ninth ISER held in Singapore.

*Neurobiology of Motor Control* - Scott L. Hooper 2017-09-05

A multi-disciplinary look at the current state of knowledge regarding motor control and movement—from molecular biology to robotics The last two decades have seen a dramatic increase in the number of sophisticated tools and methodologies for exploring motor control and movement. Multi-unit recordings, molecular neurogenetics, computer simulation, and new scientific approaches for studying how muscles and body anatomy transform motor neuron activity into movement have helped revolutionize the field. Neurobiology of Motor Control brings together contributions from an interdisciplinary group of experts to provide a review of the current state of knowledge about the initiation and execution of movement, as well as the latest methods and tools for investigating them. The book ranges from the findings of basic scientists studying model organisms such as mollusks and Drosophila, to biomedical researchers investigating

vertebrate motor production to neuroengineers working to develop robotic and smart prostheses technologies. Following foundational chapters on current molecular biological techniques, neuronal ensemble recording, and computer simulation, it explores a broad range of related topics, including the evolution of motor systems, directed targeted movements, plasticity and learning, and robotics. Explores motor control and movement in a wide variety of organisms, from simple invertebrates to human beings Offers concise summaries of motor control systems across a variety of animals and movement types Explores an array of tools and methodologies, including electrophysiological techniques, neurogenic and molecular techniques, large ensemble recordings, and computational methods Considers unresolved questions and how current scientific advances may be used to solve them going forward Written specifically to encourage interdisciplinary understanding and collaboration, and offering the most wide-ranging, timely, and comprehensive look at the science of motor control and movement currently available, Neurobiology of Motor Control is a must-read for all who study movement production and the neurobiological basis of movement—from molecular biologists to roboticists.

*Artificial Intelligence For Dummies* - John Paul Mueller 2021-10-25

Forget far-away dreams of the future. Artificial intelligence is here now! Every time you use a smart device or some sort of slick technology—be it a smartwatch, smart speaker, security alarm, or even customer service chat box—you're engaging with artificial intelligence (AI). If you're curious about how AI is developed—or question whether AI is real—Artificial Intelligence For Dummies holds the answers you're looking for. Starting with a basic definition of AI and explanations of data use, algorithms, special hardware, and more, this reference simplifies this complex topic for anyone who wants to understand what operates the devices we can't live without. This book will help you: Separate the reality of artificial intelligence from the hype Know what artificial intelligence can accomplish and what its limits are Understand how AI speeds up data gathering and analysis to help you make informed decisions more quickly See how AI is being used in hardware applications like drones, robots, and vehicles Know where AI could be used in space, medicine, and communication fields sooner than you think Almost 80 percent of the devices you interact with every day depend on some sort of AI. And

although you don't need to understand AI to operate your smart speaker or interact with a bot, you'll feel a little smarter—dare we say more intelligent—when you know what's going on behind the scenes. So don't wait. Pick up this popular guide to unlock the secrets of AI today!

**Climbing and Walking Robots** - Manuel Armada 2006-01-16

These proceedings present a full state-of-the-art picture of the popular and motivating field of climbing and walking robots, featuring recent research by leading climbing and walking robot experts in various industrial and emerging fields.

Embedded Robotics - Thomas Br? unl 2008-09-20

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.

**Robots and Biological Systems: Towards a New Bionics?** - Paolo Dario 2012-12-06

Bionics evolved in the 1960s as a framework to pursue the development of artificial systems based on the study of biological systems. Numerous disciplines and technologies, including artificial intelligence and learningdevices, information processing, systems architecture and control, perception, sensory mechanisms, and bioenergetics, contributed to bionics research. This volume is based on a NATO Advanced Research Workshop within the Special Programme on Sensory Systems for Robotic Control, held in Il Ciocco, Italy, in June 1989. A consensus emerged at the workshop, and is reflected in the book, on the value of learning from nature in order to derive guidelines for the design of intelligent machines which operate in unstructured environments. The papers in the book are grouped into seven chapters: vision and dynamic systems, hands and tactile perception, locomotion, intelligent motor control, design technologies, interfacing robots to nervous systems, and robot societies and self-organization.

The Coming Robot Revolution - Yoseph Bar-Cohen 2009-04-20

Making a robot that looks and behaves like a human

being has been the subject of many popular science fiction movies and books. Although the development of such a robot facesmanychallenges,themakingofavirtualhumanhaslongbeenpotentiallypossible. With recent advances in various key technologies related to hardware and software, the making of humanlike robots is increasingly becoming an engineering reality. Development of the required hardware that can perform humanlike functions in a lifelike manner has benefitted greatly from development in such technologies as biologically inspired materials, artificial intelligence, artificial vision, and many others. Producing a humanlike robot that makes body and facial expressions, communicates verbally using extensive vocabulary, and interprets speech with high accuracy is ext- mely complicated to engineer. Advances in voice recognition and speech synthesis are increasingly improving communication capabilities. In our daily life we encounter such innovations when we call the telephone operators of most companies today. As robotics technology continues to improve we are approaching the point where, on seeing such a robot, we will respond with "Wow, this robot looks unbelievably real!" just like the reaction to an artificial flower. The accelerating pace of advances in related fields suggests that the emergence of humanlike robots that become part of our daily life seems to be imminent. These robots are expected to raise ethical concerns and may also raise many complex questions related to their interaction with humans.

**From Animals to Animats 7** - Bridget Hallam 2002
Proceedings of the Seventh International Conference on Simulation of Adaptive Behavior

**Design of Dynamic Legged Robots** - Sangbae Kim 2017-03-20
Focuses on the mechanical design of legged robots, from the history through to the present day. Discusses some of the main challenges to actuator design in legged robots and examines a recently developed technology called proprioceptive actuators in order to meet the needs of today's legged machines.

**Human and Machines** - Jun Gu 2022-10-13
This book shares Chinese scholars' philosophical views on artificial intelligence. The discussions range from the foundations of AI—the Turing test and creation of machine intelligence—to recent applications of AI, including decisions in games, natural languages, pattern recognition, prediction in economic contexts, autonomous behaviors, and

collaborative intelligence, with the examples of AlphaGo, Microsoft's Xiao Bing, medical robots, etc. The book's closing chapter focuses on Chinese machines and explores questions on the cultural background of artificial intelligence. Given its scope, the book offers a valuable resource for all members of the general public who are interested in the future development of artificial intelligence, especially from the perspective of respected Chinese scholars.

*Climbing and Walking Robots and the Support Technologies for Mobile Machines* - Phillippe Bidaud 2002-11-08

Robotic technology advances for a wide variety of applications Climbing and Walking Robots and the Support Technologies for Mobile Machines explores the increasing interest in real-world robotics and the surge in research and invention it has inspired. Featuring the latest advances from leading robotics labs around the globe, this book presents solutions for perennial challenges in robotics and suggests directions for future research. With applications ranging from personal services and entertainment to emergency rescue and extreme environment intervention, the groundbreaking work presented here provides a glimpse of the future.

The Triumph of Artificial Intelligence - G nter Cisek 2021-10-25

The book demonstrates to readers interested in social life in an understandable way how AI works and how it will dramatically change all areas of life. From the history of AI to its techniques and its diverse fields of application to its ethical-philosophical implications, all relevant aspects are presented in detail. The author does not remain descriptive, but also takes a critical stance on AI development in clear words. For the reader, the explanations are designed as a professional support corset, in order to be able to act as a knowledgeable counterpart to the AI experts. The last two chapters take the reader into the future of life with super AI. With daring scenarios, the author alerts the reader in an enjoyable way to the breathtaking and socially highly explosive perspectives associated with AI and the ethical and philosophical questions that arise from it. This book is a translation of the original German 1st edition Machtwechsel der Intelligenzen by G nter Cisek, published by Springer Fachmedien Wiesbaden GmbH, part of Springer Nature in 2021. The translation was done with the help of artificial intelligence (machine translation by the service DeepL.com). A subsequent human revision was done primarily in terms of content, so that the book will

read stylistically differently from a conventional translation. Springer Nature works continuously to further the development of tools for the production of books and on the related technologies to support the authors.

**Transcultural Artificial Intelligence and Robotics in Health and Social Care** - Irena Papadopoulos 2022-04-29

Transcultural Artificial Intelligence and Robotics in Health and Social Care provides healthcare professionals with a deeper understanding of the incredible opportunities brought by the emerging field of AI robotics. In addition, it provides robotic researchers with the point-of-view of healthcare professionals to understand what the healthcare sector – as well as the market – really needs from robotics technology. By doing so, the book fills an important gap between both fields in order to leverage new developments and collaborative work in favor of global patients. The book is aimed at the non-technical reader, especially health and social care professionals, and explains in a simple way the technological principles applied in the development of socially assistive humanoid AI robots (SAHR), the values which guide such developments, the ethics related to them, and research approaches in the field, with a focus on achieving a culturally competent SAHR. Presents user-friendly and stage-by-stage information to help readers appreciate how AI robots work and how they can be integrated in their work environments Explains why AI and socially assistive robotics need to be culturally competent Helps reduce readers' fears and change negative prejudices they may have about robots as a relevant tool for healthcare Written by experts in AI robotics and the creators of transcultural health/social robotics Informed by the largest trial conducted with real patients