

Sensor Modelling Design And Data Processing For Autonomous Navigation World Scientific Series In Robotics And Intelligent Systems

This invaluable book comprehensively describes evolutionary robotics and computational intelligence, and how different computational intelligence techniques are applied to robotic system design. It embraces the most widely used evolutionary approaches with their merits and drawbacks, presents some related experiments for robotic behavior evolution and the results achieved, and shows promising future research directions. Clarity of explanation is emphasized such that a modest knowledge of basic evolutionary computation, digital circuits and engineering design will suffice for a thorough understanding of the material. The book is ideally suited to computer scientists, practitioners and researchers keen on computational intelligence techniques, especially the evolutionary algorithms in autonomous robotics at both the hardware and software levels. Sample Chapter(s). Chapter 1: Artificial Evolution Based Autonomous Robot Navigation (184 KB). Contents: Artificial Evolution Based Autonomous Robot Navigation; Evolvable Hardware in Evolutionary Robotics; FPGA-Based Autonomous Robot Navigation via Intrinsic Evolution; Intelligent Sensor Fusion and Learning for Autonomous Robot Navigation; Task-Oriented Developmental Learning for Humanoid Robots; Bipedal Walking Through Reinforcement Learning; Swing Time Generation for Bipedal Walking Control Using GA Tuned Fuzzy Logic Controller; Bipedal Walking: Stance Ankle Behavior Optimization Using Genetic Algorithm. Readership: Researchers in evolutionary robotics, and graduate and advanced undergraduate students in computational intelligence.

This book provides a comprehensive introduction to embedded systems for smart appliances and energy management, bringing together for the first time a multidisciplinary blend of topics from embedded systems, information technology and power engineering. Coverage includes challenges for future resource distribution grids, energy management in smart appliances, micro energy generation, demand response management, ultra-low power stand by, smart standby and communication networks in home and building automation.

This book constitutes the refereed proceedings of the 7th International Work-Conference on Ambient Assisted Living, IWAAL 2015, held in Puerto Varas, Chile, in December 2015. The 20 full papers presented with 7 short papers were carefully reviewed and selected from 31 submissions. The focus of the papers is on following topics: ambient assisted living for tele-care and tele-rehabilitation; ambient assisted living environments; behaviour analysis and activity recognition; sensing for health and wellbeing; human interaction and perspectives in ambient assisted living solutions. Big data modeling is very challenging to handle using traditional database modeling and management systems. This book will teach you how to model big data using the latest and more efficient tools such as ERWIN, ANACONDA (Python), and WEKA to model data.

This book constitutes the joint refereed proceedings of the 14th International Conference on Next Generation Wired/Wireless Advanced Networks and Systems, NEW2AN 2014, and the 7th Conference on Internet of Things and Smart Spaces,

ruSMART 2014, held in St. Petersburg, Russia, in August 2014. The total of 67 papers was carefully reviewed and selected for inclusion in this book. The 15 papers selected from ruSMART are organized in topical sections named: smart spaces core technologies, smart spaces for geo-location and e-tourism apps, smart space supporting technologies, and video solutions for smart spaces. The 52 papers from NEW2AN deal with the following topics: advances in wireless networking, ad hoc networks and enhanced services, sensor- and machine-type communication, networking architectures and their modeling, traffic analysis and prediction, analytical methods for performance evaluation, materials for future communications, generation and analysis of signals, business aspects of networking, progress on upper layers and implementations, modeling methods and tools, techniques, algorithms, and control problems, photonics and optics, and signals and their processing.

Comprehensive Remote Sensing covers all aspects of the topic, with each volume edited by well-known scientists and contributed to by frontier researchers. It is a comprehensive resource that will benefit both students and researchers who want to further their understanding in this discipline. The field of remote sensing has quadrupled in size in the past two decades, and increasingly draws in individuals working in a diverse set of disciplines ranging from geographers, oceanographers, and meteorologists, to physicists and computer scientists. Researchers from a variety of backgrounds are now accessing remote sensing data, creating an urgent need for a one-stop reference work that can comprehensively document the development of remote sensing, from the basic principles, modeling and practical algorithms, to various applications. Fully comprehensive coverage of this rapidly growing discipline, giving readers a detailed overview of all aspects of Remote Sensing principles and applications Contains 'Layered content', with each article beginning with the basics and then moving on to more complex concepts Ideal for advanced undergraduates and academic researchers Includes case studies that illustrate the practical application of remote sensing principles, further enhancing understanding

A number of industrial processes involve variables that cannot be reliably measured in real time using online sensors. Many such variables are required as inputs in control schemes to ensure safe and efficient plant operation. Laboratory analysis, which is a reliable method of measuring these variables, is slow and infrequent. Thus, mathematical models called soft sensors which can estimate these hard to measure variables from the abundantly available online process measurements have been used in a number of industrial applications. Among the various soft sensor applications of online prediction, process monitoring, fault detection and isolation, the focus of this thesis is on online prediction and parameter estimation applications. Just-In-Time (JIT) modeling is a unique framework wherein a local model is created every time a prediction is required. One of the most critical components of JIT models is the similarity criterion which determines the data used in the local models and their associated weights. To handle nonlinear and time varying systems simultaneously under the JIT framework, a new similarity metric which incorporates time, along with the traditional space distance, to evaluate sample weights, is proposed. Further, a query based method to determine the bandwidth of the local models adaptively, as an alternative to the offline global method, is also developed. Next, the distance-angle similarity criterion used in modeling dynamic systems under the JIT technique is studied. An improved weighing scheme is then proposed which enables a more accurate selection of data for local modeling and provides a better interpretation of results. Again, for this proposed weighing scheme also, an alternative to the global bandwidth estimation, called the point-based method, is proposed. In the field of online soft sensor

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prediction and parameter estimation applications, adaptive linear regression algorithms such as recursive least squares and moving window least squares are widely used because of their simplicity and ease of implementation. However, these methods are not robust to outlying values. We develop a new robust and adaptive algorithm with a cautious parameter update strategy. The proposed algorithm is also quite flexible and a number of variants are easily formulated. Finally, advantages of the methods are clearly illustrated by applications to numerical examples, experimental data and industrial case studies.

A practical and self-contained guide to the principles, techniques, models and tools of imaging spectroscopy. Bringing together material from essential physics and digital signal processing, it covers key topics such as sensor design and calibration, atmospheric inversion and model techniques, and processing and exploitation algorithms. Readers will learn how to apply the main algorithms to practical problems, how to choose the best algorithm for a particular application, and how to process and interpret hyperspectral imaging data. A wealth of additional materials accompany the book online, including example projects and data for students, and problem solutions and viewgraphs for instructors. This is an essential text for senior undergraduate and graduate students looking to learn the fundamentals of imaging spectroscopy, and an invaluable reference for scientists and engineers working in the field. This set of proceedings is based on the International Conference on Advances in Building Technology in Hong Kong on 4-6 December 2002. The two volumes of proceedings contain 9 invited keynote papers, 72 papers delivered by 11 teams, and 133 contributed papers from over 20 countries around the world. The papers cover a wide spectrum of topics across the three technology sub-themes of structures and construction, environment, and information technology. The variety within these categories spans a width of topics, and these proceedings provide readers with a good general overview of recent advances in building research.

The Visible Infrared Imager Radiometer Suite (VIIRS) is the next-generation multispectral imaging instrument to fly on US operational, polar-orbiting meteorological satellites. VIIRS will gather data across 22 spectral bands and be used to create products for a variety of applications including weather forecasting and climate change studies. VIIRS

This edited open access book presents the comprehensive outcome of The European DataBio Project, which examined new data-driven methods to shape a bioeconomy. These methods are used to develop new and sustainable ways to use forest, farm and fishery resources. As a European initiative, the goal is to use these new findings to support decision-makers and producers -- meaning farmers, land and forest owners and fishermen. With their 27 pilot projects from 17 countries, the authors examine important sectors and highlight examples where modern data-driven methods were used to increase sustainability. How can farmers, foresters or fishermen use these insights in their daily lives? The authors answer this and other questions for our readers. The first four parts of this book give an overview of the big data technologies relevant for optimal raw material gathering. The next three parts put these technologies into perspective, by showing useable applications from farming, forestry and fishery. The final part of this book gives a summary and a view on the future. With its broad outlook and variety of topics, this book is an enrichment for students and scientists in bioeconomy, biodiversity and renewable resources.

Discover powerful universal techniques to speed up electronic sensor design with this comprehensive guide.

Over half a century after the discovery of the piezoresistive effect, microsystem technology has experienced considerable developments. Expanding the opportunities of microelectronics to non-electronic systems, its number of application fields continues to increase. Microsensors are one of the most important fields, used in medical applications and micromechanics. Microfluidic systems are also a significant area, most

commonly used in ink-jet printer heads. This textbook focuses on the essentials of microsystems technology, providing a knowledgeable grounding and a clear path through this well-established scientific discipline. With a methodical, student-orientated approach, Introduction to Microsystem Technology covers the following: microsystem materials (including silicon, polymers and thin films), and the scaling effects of going micro; fabrication techniques based on different material properties, descriptions of their limitations and functional and shape elements produced by these techniques; sensors and actuators based on elements such as mechanical, fluidic, and thermal (yaw rate sensor components are described); the influence of technology parameters on microsystem properties, asking, for example, when is the function of a microsystem device robust and safe? The book presents problems at the end of each chapter so that you may test your understanding of the key concepts (full solutions for these are given on an accompanying website). Practical examples are included also, as well as case studies that enable a better understanding of the technology as a whole. With its extensive treatment on the fundamentals of microsystem technology, this book also serves as a compendium for engineers and technicians working with microsystem technology.

Formal engineering methods are intended to offer effective means for integration of formal methods and practical software development technologies in the context of software engineering. Their purpose is to provide effective, rigorous, and systematic techniques for significant improvement of software productivity, quality, and tool supportability. In comparison with formal methods, a distinct feature of formal engineering methods is that they emphasize the importance of the balance between the qualities of simplicity, visualization, and preciseness for practicality. To achieve this goal, formal engineering methods must be developed on the basis of both formal methods and existing software technologies in software engineering, and they must serve the improvement of the software engineering process. ICFEM 2008 marks the tenth anniversary of the first ICFEM conference, which was held in Hiroshima in 1997. It aims to bring together researchers and practitioners who are interested in the development and application of formal engineering methods to present their latest work and discuss future research directions. The conference offers a great opportunity for researchers in both formal methods and software engineering to exchange their ideas, experience, expectation and to find out whether and how their research results can help advance the state of the art.

Civil infrastructure systems are generally the most expensive assets in any country, and these systems are deteriorating at an alarming rate. In addition, these systems have a long service life in comparison to most other commercial products. As well, the introduction of intelligent materials and innovative design approaches in these systems is painfully slow due to heavy reliance on traditional construction and maintenance practices, and the conservative nature of design codes. Feedback on the "state of the health" of constructed systems is practically nonexistent. In the quest for lighter, stronger and corrosion-resistant structures, the replacement of ferrous materials by high-strength fibrous ones is being actively pursued in several countries around the world, both with respect to the design of new structures as well as for the rehabilitation and strengthening of existing ones. In North America, active research in the design of new highway bridges is focused on a number of specialty areas, including the

replacement of steel reinforcing bars in concrete deck slabs by randomly distributed low-modulus fibers, and the replacement of steel prestressing cables for concrete components by tendons comprising super-strong fibers. Research is also being conducted on using FRPs to repair and strengthen existing structures.

This invaluable book presents an unbiased framework for modelling and using sensors to aid mobile robot navigation. It addresses the problem of accurate and reliable sensing in confined environments and makes a detailed analysis of the design and construction of a low cost optical range finder. This is followed by a quantitative model for determining the sources and propagation of noise within the sensor. The physics behind the causes of erroneous data is also used to derive a model for detecting and labelling such data as false. In addition, the author's data-processing algorithms are applied to the problem of environmental feature extraction. This forms the basis of a solution to the problem of mobile robot localisation. The book develops a relationship between the kinematics of a mobile robot during the execution of successive manoeuvres, and the sensed features. Results which update a mobile vehicle's position using features from 2D and 3D scans are presented.

This book constitutes the refereed proceedings of the First International Conference on Quantitative Ethnography, ICQE 2019, held in Madison, Wisconsin, USA, in October 2019. It consists of 23 full and 9 short carefully reviewed papers selected from 52 submissions. The contributions come from a diverse range of fields and perspectives, including learning analytics, history, and systems engineering, all attempting to understand the breadth of human behavior using quantitative ethnographic approaches. This book constitutes the refereed conference proceedings of the 12th International Symposium, W2GIS 2013, held in Banff, Canada, in April 2013. The 11 revised full papers and 5 short papers presented were carefully selected from 28 submissions. The program covers a wide range of topics including Spatial Semantics and Databases, Location-based Services and Applications, Trajectory Representation and Sensor Web, Spatial Analysis and Systems and Map Generation and Modeling.

The Most Complete and Up-to-Date Account of Advanced Sensor Networking Technologies Handbook of Sensor Networking: Advanced Technologies and Applications provides a complete professional reference and practitioner's guide to today's advanced sensor networking technologies. The handbook focuses on both established and recent sensor networking theory,

In this book, new results or developments from different research backgrounds and application fields are put together to provide a wide and useful viewpoint on these headed research problems mentioned above, focused on the motion planning problem of mobile ro-bots. These results cover a large range of the problems that are frequently encountered in the motion planning of mobile robots both in theoretical methods and practical applications including obstacle avoidance methods, navigation and localization techniques, environmental modelling or map building methods, and vision signal processing etc. Different methods such as potential fields, reactive behaviours, neural-fuzzy based methods, motion control methods and so on are studied. Through this book and its references, the reader will definitely be able to get a thorough overview on the current research results for this specific topic in robotics. The book is intended for the readers who are interested and active in the field of robotics and especially for those who want to study and develop their own methods in motion/path planning or

control for an intelligent robotic system.

Bio-threat detection is a problem of paramount importance to the modern society. One of the major requirements of a system that could detect such threats is to have a low false alarm rate. An important reason behind false alarms is the inability of the system to take into consideration the ambient aerosol background of the location under consideration. This is because aerosol backgrounds typically differ across locations—one agent may be naturally present in one location but might be unusual for some other location. Although work has been done in the past to characterize aerosol backgrounds of certain locations, there is no general algorithm available that creates an aerosol background model at a particular location. This work centers on the design and implementation of a Sensor Modeling Toolbox. The toolbox assumes that the sensor data comes from a Gaussian mixture distribution; therefore, it uses Gaussian mixture models (GMM) to model the sensor data. The Expectation Maximization algorithm is used to estimate the parameters of the GMM and the Bayesian Information Criterion (BIC) is used to select the best model by considering both the log-likelihood and model complexity (number of parameters to be estimated) of the GMM. The toolbox provides various functionalities, the major ones being to create a model for a set of sensor observations, to generate a model for the aerosol background at a particular location, and to assess similarity between two sets of sensor readings by introducing two novel distance functions. The functionalities of the toolbox are evaluated on two real-world datasets that were obtained from aerosol sensors deployed on the campus of the University of Houston. Due to the unavailability of labeled data, this work assesses the quality of the obtained results by comparing them with the characteristics of the raw-input data and shows that they are in good agreement. It is also observed that it is usually better to remove outliers from datasets before creating a GMM. The experimental results demonstrate that the toolbox is useful to model and analyze aerosol data and that it provides important capabilities for building a successful bio-threat detection system in the future.

This book constitutes the refereed conference proceedings of the 15th International Conference on Rough Sets, Fuzzy Sets, Data Mining and Granular Computing, RSFDGrC 2015, held in Tianjin, China in November 2015 as one of the co-located conference of the 2015 Joint Rough Set Symposium, JRS 2015. The 44 papers were carefully reviewed and selected from 97 submissions. The papers in this volume cover topics such as rough sets: the experts speak; generalized rough sets; rough sets and graphs; rough and fuzzy hybridization; granular computing; data mining and machine learning; three-way decisions; IJCRS 2015 data challenge.

The 28th EG-ICE International Workshop 2021 brings together international experts working at the interface between advanced computing and modern engineering challenges. Many engineering tasks require open-world resolutions to support multi-actor collaboration, coping with approximate models, providing effective engineer-computer interaction, search in multi-dimensional solution spaces, accommodating uncertainty, including specialist domain knowledge, performing sensor-data interpretation and dealing with incomplete knowledge. While results from computer science provide much initial support for resolution, adaptation is unavoidable and most importantly, feedback from addressing engineering challenges drives fundamental computer-science research. Competence and knowledge transfer goes both ways. Der

28. Internationale EG-ICE Workshop 2021 bringt internationale Experten zusammen, die an der Schnittstelle zwischen fortgeschrittener Datenverarbeitung und modernen technischen Herausforderungen arbeiten. Viele ingenieurwissenschaftliche Aufgaben erfordern Open-World-Resolutionen, um die Zusammenarbeit mehrerer Akteure zu unterstützen, mit approximativen Modellen umzugehen, eine effektive Interaktion zwischen Ingenieur und Computer zu ermöglichen, in mehrdimensionalen Lösungsräumen zu suchen, Unsicherheiten zu berücksichtigen, einschließlich fachspezifischen Domänenwissens, Sensordateninterpretation durchzuführen und mit unvollständigem Wissen umzugehen. Während die Ergebnisse aus der Informatik anfänglich viel Unterstützung für die Lösung bieten, ist eine Anpassung unvermeidlich, und am wichtigsten ist, dass das Feedback aus der Bewältigung technischer Herausforderungen die computer-wissenschaftliche Grundlagenforschung vorantreibt. Kompetenz und Wissenstransfer gehen in beide Richtungen.

Bridge Maintenance, Safety, Management, Resilience and Sustainability contains the lectures and papers presented at The Sixth International Conference on Bridge Maintenance, Safety and Management (IABMAS 2012), held in Stresa, Lake Maggiore, Italy, 8-12 July, 2012. This volume consists of a book of extended abstracts (800 pp) and a DVD (4057 pp) co

This book constitutes the refereed proceedings of the joint International Conferences Formal Modeling and Analysis of Timed Systems, FORMATS 2004, and Formal Techniques in Real-Time and Fault-Tolerant Systems, FTRTFT 2004, held in Grenoble, France, in September 2004. The 24 revised full papers presented together with abstracts of 2 invited talks were carefully reviewed and selected from 70 submissions. Among the topics addressed are formal verification, voting systems, formal specification, dependable automation systems, model checking, timed automata, real-time testing, fault-tolerance protocols, fail-safe fault tolerance, real-time scheduling, satisfiability checking, symbolic model checking, stochastic hybrid systems, timed Petri nets, and event recording automata.

This book constitutes the proceedings of the International Conference on Research and Education in Robotics, EUROBOT 2011, held in Prague, Czech Republic, in June 2011. The 28 revised full papers presented were carefully reviewed and selected from numerous submissions. The papers present current basic research such as robot control and behaviour, applications of autonomous intelligent robots, and perception, processing and action; as well as educationally oriented papers addressing issues like robotics at school and at university, practical educational robotics activities, practices in educational robot design, and future pedagogical activities.

Proceedings of the International Conference on Cybernetics and Informatics (ICCI 2012) covers the hybridization in control, computer, information, communications and applications. ICCI 2012 held on September 21-23, 2012, in Chongqing, China, is organized by Chongqing Normal University, Chongqing University, Nanyang Technological University, Shanghai Jiao Tong University, Hunan Institute of Engineering, Beijing University, and sponsored by National Natural Science Foundation of China (NSFC). This two volume publication includes selected papers from the ICCI 2012. Covering the latest research advances in the area of computer, informatics, cybernetics and applications, which mainly includes the computer, information, control, communications technologies and applications.

Real-Time Data Analytics for Large-Scale Sensor Data covers the theory and applications of hardware platforms and architectures, the development of software methods, techniques and tools, applications, governance and adoption strategies for the use of massive sensor data in real-time data analytics. It presents the leading-edge research in the field and identifies future

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challenges in this fledgling research area. The book captures the essence of real-time IoT based solutions that require a multidisciplinary approach for catering to on-the-fly processing, including methods for high performance stream processing, adaptively streaming adjustment, uncertainty handling, latency handling, and more. Examines IoT applications, the design of real-time intelligent systems, and how to manage the rapid growth of the large volume of sensor data Discusses intelligent management systems for applications such as healthcare, robotics and environment modeling Provides a focused approach towards the design and implementation of real-time intelligent systems for the management of sensor data in large-scale environments

The book addresses issues towards the design and development of Wireless Sensor Network based Smart Home and fusion of Real-Time Data for Wellness Determination of an elderly person living alone in a Smart Home. The fundamentals of selection of sensor, fusion of sensor data, system design, modelling, characterizations, experimental investigations and analyses have been covered. This book will be extremely useful for the engineers and researchers especially higher undergraduate, postgraduate students as well as practitioners working on the development of Wireless Sensor Networks, Internet of Things and Data Mining.

Welcome to the proceedings of the 2005 IFIP International Conference on - bedded and Ubiquitous Computing (EUC 2005), which was held in Nagasaki, Japan, December 6–9, 2005. Embedded and ubiquitous computing is emerging rapidly as an exciting new paradigm to provide computing and communication services all the time, - erywhere. Its systems are now pervading every aspect of life to the point that they are hidden inside various appliances or can be worn unobtrusively as part of clothing and jewelry. This emergence is a natural outcome of research and technological advances in embedded systems, pervasive computing and c- munications, wireless networks, mobile computing, distributed computing and agent technologies, etc. Its tremendous impact on academics, industry, gove- ment, and daily life can be compared to that of electric motors over the past century, in fact it but promises to revolutionize life much more profoundly than elevators, electric motors or even personal computers. The EUC 2005 conference provided a forum for engineers and scientists in academia, industry, and government to address profound issues including te- nical challenges, safety, and social, legal, political, and economic issues, and to present and discuss their ideas, results, work in progress, and experience on all aspects of embedded and ubiquitous computing.

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