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Summary of Yr 2 STAR Volumes

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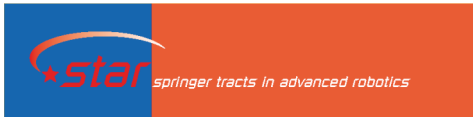
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EURON WP9 □ Book Series Deliverable DR.9.2 □ Summary of Yr2 STAR volumes



STAR Book Series

<http://www.springer.com/series/5208>

Aims and Scope

The Springer Tracts in Advanced Robotics (STAR) publish new developments and advances in the fields of robotics research – rapidly and informally but with a high quality. The intent is to cover all the technical contents, applications, and multidisciplinary aspects of robotics, embedded in the fields of Mechanical Engineering, Computer Science, Electrical Engineering, Mechatronics, Control, and Life Sciences – as well as the methodologies behind them. Within the scope of the series are monographs, lecture notes, selected contributions from specialized conferences and workshops, as well as selected PhD theses. The STAR series was launched in 2001 under the auspices of the EURON Thematic Network (FP5). Since May 2004, it is being continued and expanded under the auspices of the EURON Network of Excellence (FP6).

At the dawn of the new millennium, robotics is undergoing a major transformation in scope and dimension. From a largely dominant industrial focus, robotics is rapidly expanding into the challenges of unstructured environments. Interacting with, assisting, serving, and exploring with humans, the emerging robots will increasingly touch people and their lives. The goal of the STAR series is to bring, in a timely fashion, the latest advances and developments in robotics on the basis of their significance and quality. It is our hope that the wider dissemination of research developments will stimulate more exchanges and collaborations among the research community and contribute to further advancement of this rapidly growing field.

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Volumes printed

MONOGRAPHS

T. Lefebvre, H. Bruyninckx, J. De Schutter, *Nonlinear Kalman Filtering for Force-Controlled Robot Tasks* [Finalist of the 3rd EURON Georges Giralt Ph.D. Thesis Award]

The monograph written by Tine Lefebvre, Herman Bruyninckx and Joris De Schutter is focused on how to achieve more robot autonomy by means of reliable processing skills. The latest developments in the areas of contact modelling, nonlinear parameter estimation and task plan optimisation for improved estimation accuracy are discussed. Kalman filtering techniques are applied to identify the contact state based on force sensing between a grasped object and the environment. The potential of the work is to be found not only for industrial robot operation in space, sub-sea or nuclear scenarios, but also for service robots operating in unstructured environments co-habited by humans where autonomous compliant tasks require active sensing. Remarkably, the doctoral thesis at the basis of this monograph was a finalist for the Fourth EURON Georges Giralt PhD Award devoted to the best PhD thesis in Robotics in Europe.

Y. Xu, Y. Ou, *Control of Single Wheel Robot*

The monograph written by Yangsheng Xu and Yongsheng Ou is the culmination of a considerable body of research by the first author with the recent support of the second author's Ph.D. dissertation. The work builds upon a novel concept in locomotion of nonholonomic underactuated robots, a field which has lately been attracting more and more scholars. Design, modelling and control of a single-wheel, gyroscopically stabilized robot are explained in detail, and its advantages over multiwheel vehicles are discussed. The volume offers a comprehensive treatment of the subject matter from the theoretical development to experimental testing, while foreseeing a number of potential applications of the new design in service robotics. Certainly of interest to researchers in mobile robot dynamics and control.

G. Antonelli, *Underwater Robots: Motion and Force Control of Vehicle-Manipulator System, 2nd Edition*

The volume by Gianluca Antonelli is the second edition of a successful monograph, which was one of the first volumes to be published in the series. Being focused on an important class of robotic systems, namely underwater vehicle-manipulator systems, this volume improves the previous material while expanding the state-of-the-art in the field. New features deal with fault-tolerant control and coordinated control of autonomous underwater vehicles. A well-balanced blend of theoretical and experimental results.

J. Andrade-Cetto, A. Sanfeliu, *Environment Learning for Indoor Mobile Robots* [Winner of the 4th EURON Georges Giralt Ph.D. Thesis Award]

The monograph written by Juan Andrade-Cetto and Alberto Sanfeliu is focused on a popular research topic in the latest few years, namely Simultaneous Localization and Map Building (SLAM). The estimation theoretical aspects are covered with resort to the widely-adopted Extended Kalman Filtering (EKF) technique. Further to the design of the estimator, the controller design is also discussed in the work along with its implications on closing the perception-action loop. Both simulation and experimental results for indoor mobile robots are presented to show the effectiveness of the proposed methods. Remarkably, the doctoral thesis at the basis of this monograph received the prize of the Fourth Edition of the EURON Georges Giralt PhD Award devoted to the best PhD thesis in Robotics in Europe.

G.R. Taylor, L. Kleeman, *Visual Perception and Robotic Manipulation*

The monograph written by Geoffrey Taylor and Lindsay Kleeman is an evolution of the first Author's Ph.D. dissertation. This book provides an integrated systems view of computer vision and robotics, covering a range of fundamental topics including robust and optimal sensor design, visual servoing, 3D object modelling and recognition, and multi-cue tracking. The treatment is in-depth, with details of theory, real-time implementation, and extensive experimental results. As such, the book has wide appeal to both theoretical and practical roboticists. Furthermore, the culmination of the work with the demonstration of two real-world domestic tasks represents a first step towards the realization of autonomous robots for service applications. This is the first book in the series to be accompanied by a comprehensive multimedia supplement.

EDITED COLLECTIONS

M. Erdmann, D. Hsu, M. Overmars, F. van der Stappen (Eds), *Algorithmic Foundations of Robotics VI*

The biennial *Workshop on Algorithmic Foundations of Robotics (WAFR)* has traditionally published archival volumes of high reference value. Since its latest edition, WAFR has found a more suitable home within STAR, together with other thematic symposia devoted to excellence in robotics research. The Sixth edition of *Algorithmic Foundations of Robotics* edited by Michael Erdmann, David Hsu, Mark Overmars, and Frank van der Stappen offers a collection of a broad range of topics in advanced robotics. The contents of these contributions represent a cross-section of the current state of robotics research from one particular aspect: algorithms, and how they reflect on the theoretical basis of subsequent developments. Validation of algorithms, design concepts, or techniques is the common thread running through this focused collection. Rich by topics and authoritative contributors, WAFR culminates with this unique reference on the current developments and new directions in the field of algorithmic foundations.

F. Barbagli, D. Prattichizzo, K. Salisbury (Eds), *Multi-Point Physical Interaction with Real and Virtual Objects*

The edited volume by Federico Barbagli, Domenico Prattichizzo and J. Kenneth Salisbury is the outcome of a well-attended workshop which took place during the 2004 IEEE International Conference on Robotics and Automation. The authors of the sixteen chapters are recognised as leading scholars internationally. A number of challenging problems on the forefront of today's research on physical interaction with real and virtual objects are covered, with special emphasis on modelling contacts between objects, grasp planning algorithms, haptic perception, and advanced design of hands, devices and interfaces. Besides the theoretical advancement, most contributions survey the state-of-the-art in the field, report a number of practical applications to real systems, and discuss possible future developments. This is the first focused STAR volume in the popular area of haptics.

M. Ang, O. Khatib (Eds), *Experimental Robotics: The Ninth International Symposium*

Since its inception some sixteen years ago, the *International Symposium on Experimental Robotics (ISER)* was published by Springer. Since the past edition, ISER has found a more suitable home under STAR, together with other thematic symposia devoted to excellence in robotics research. The Ninth edition of *Experimental Robotics* edited by Marcelo H. Ang Jr. and Oussama Khatib offers in its thirteen-chapter volume a collection of a broad range of topics in robotics. The contents of these contributions represent a cross-section of the current state of robotics research from one particular aspect: experimental work, and how it reflects on the theoretical basis of subsequent developments. Experimental validation of algorithms, design concepts, or techniques is the common thread running through this large collection of widely diverse contributions. From its warm social program to its excellent technical program, ISER culminates with this unique reference on the current developments and new directions in the field of experimental robotics.

H. Christensen (Ed), *European Robotics Symposium 2006*

The *European Robotics Symposium* (EUROS) is a baby-born international scientific event promoted by EURON, the European Robotics Network linking most of the European research teams since its inception in 2000. As STAR was launched four years ago under the auspices of EURON, it is just natural EUROS finds its parental home under STAR, together with the other thematic symposia devoted to excellence in robotics research: FSR, ISER, ISRR, WAFR. The First edition is edited by Henrik Christensen, the EURON Coordinator. The contents of the sixteen-chapter volume represent a cross-section of forefront robotics research, ranging from robotics and systems to learning, autonomy and failure detection, from vision and navigation to localization and mapping. Thanks to the conscientious cooperation of the contributors, to the committed work of the international programme committee, and last but not least to the devotion and enthusiasm of the editor, this volume has been prepared in a record time to be available at the time of the symposium. From its warm social program to its excellent technical program, EUROS culminates with this unique reference, which aims at inaugurating a sound track in the STAR series.

S. Yuta, H. Asama, S. Thrun, E. Prassler, T. Tsubouchi (Eds), *Field and Service Robotics: Recent Advances in Research and Applications*

Since its inception in 1996, FSR, the *International Conference on Field and Service Robotics* has published archival volumes of high reference value. With the launching of STAR, a more suitable home is found for this and other thematic symposia devoted to excellence in robotics research. The Fourth edition of *Field and Service Robotics* edited by Shin'ichi Yuta, Hajime Asama, Sebastian Thrun, Erwin Prassler and Takashi Tsubouchi offers in its twelve-chapter volume a collection of a broad range of topics in advanced robotics. The contents of these contributions represent a cross-section of the current state of robotics research from one particular aspect: field and service applications, and how they reflect on the theoretical basis of subsequent developments. Pursuing technologies aimed at realizing skilful, smart, reliable, robust field and service robots is the big challenge running throughout this focused collection. Rich by topics and authoritative contributors, FSR culminates with this unique reference on the current developments and new directions in field and service robotics.

P. Corke, S. Sukkarieh (Eds), *Field and Service Robotics: Results of the 5th International Conference FSR*

Since its inception in 1996, FSR, the *International Conference on Field and Service Robotics* has published archival volumes of high reference value. Starting its past edition in 2003, FSR has found its natural home within STAR, together with other thematic symposia devoted to excellence in robotics research. The Fifth edition of *Field and Service Robotics* edited by Peter Corke and Salah Sukkarieh offers in its eleven-chapter volume a collection of a broad range of topics in advanced robotics. The contents of these contributions represent a cross-section of the current state of robotics research from one particular aspect: field and service applications, and how they reflect on the theoretical basis of subsequent developments. Pursuing technologies aimed at realizing robots operating in complex and dynamic environments is the big challenge running throughout this focused collection. Rich by topics and authoritative contributors, FSR culminates with this unique reference on the current developments and new directions in field and service robotics.

Volumes accepted

MONOGRAPHS

Stand-by from previous period

M. Otake, *Electroactive Polymer Gel Robots: Modeling and Control of Artificial Muscles*

S.P. DiMaio, *Modelling, Simulation and Planning of Needle Motion in Soft Tissues*

M. Montemerlo, S. Thrun, *FastSLAM: A Factored Solution to the Simultaneous and Localization Mapping Problem*

G. Duchemin, Ph. Pognet, E. Dombre, F. Pierrot, *Interaction Modelling, Design and Control Issues in Medical Robotics: Application in Reconstructive Surgery*

W.H. Zhu, *The Virtual Decomposition Approach to Robot Control*

Current

U. Frese, *Efficient Simultaneous Localization and Mapping using Hierarchical Maps*

K.O. Arras, *Feature-based Robot Navigation in Known and Unknown Environments*

L. Birglen, T. Laliberté, C. Gosselin, *Underactuated Robotic Hands*

C. Ott, *Cartesian Impedance Control of Flexible Joint Robots*

EDITED COLLECTIONS

Stand-by from previous period

M. Jefferies, W.-K. Yeap (Eds), *Spatial Mapping Approaches in Robotic and Natural Mapping Systems*

Current

C. Laugier, R. Chatila (Eds), *Autonomous Navigation in Dynamic Environment: Models and Algorithms*

Proposals rejected [9]

Proposals recommended for revision [3]

Proposals under review [4]