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Recent Advances in Information Science

Proceedings of the 15th International Conference on Software Engineering, Parallel and Distributed Systems (SEPADS '16)

Proceedings of the 10th International Conference on Computer Engineering and Applications (CEA '16)

Barcelona, Spain, February 13-15, 2016

Recent Advances in Information Science

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Preface

This year the 15th International Conference on Software Engineering, Parallel and Distributed Systems (SEPADS '16) and the 10th International Conference on Computer Engineering and Applications (CEA '16) were held in Barcelona, Spain, February 13-15, 2016. The conferences provided a platform to discuss software engineering, PDS' architectures, PDS' software, PDS' algorithms and applications, network architecture, synchronous networks, protocols and applications, database security etc. with participants from all over the world, both from academia and from industry.

Their success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of these conferences are published in this Book that will be sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to many Journals for further evaluation.

Conferences such as these can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

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Plenary Lecture 1

A Survey on Recently Developed Bio-Inspired Optimization Algorithms

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Abstract: Bioinspired algorithms have been applied in almost every area of science and engineering with a great increase in the number of relevant publications.In this study,a categorization of bio-inspired algoritms is made ,some recent algorithms are introduced and many applications of the bio-insired algorithms are given. Bio-inspired algorithms have a great importance in computational sciences, which are essential to many scientific disciplines and engineering applications. Many computational methods are derived from biology or nature. Genetic algorithms, neural networks, cellular automata, bacteria inspired algorithms bat inspired algorithms bee inspired algorithms biogeography-based algorithms cat swarm algorithms cuckoo inspired algorithms luminous insect inspired algorithms,fish inspired algorithms and others play important role today in computation and engineering.

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Plenary Lecture 2

Complex Networks Morphodynamics – Concepts, Algorithms and Implementation

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Abstract: One of the main characteristics of complexity is the emergence of properties due to dynamical processes. Our objective is to contribute to the formalization of these emergent properties studying dynamical structures. The structures of complexity proposed here, are interaction systems as the core of self-organization mechanisms. Dynamical networks are efficient tools to express some local or global properties of evolving topology. They capture structural aspects of complex systems representing entities as nodes and interactions between them as links. The presentation presents adaptive algorithms for complex networks dynamics, leading to identify emergent organizations in these networks. One of this algorithms, named AntCo2, is bio-inspired by social insect system behavior and lead to detect emergent structures inside complex networks. Some applications are presented relating to urban morphodynamics analysis of the communication networks of the city. Practical study case are developed to analyze network vulnerability in case of urban technological risk, using Multi-scale measures on dynamical complex systems. The simulations and results detailed in this presentation, are powered by the GraphStream Library which is a java package for dynamic complex networks (http://graphstream-project.org).

Brief Biography of the Speaker: Professor Cyrille Bertelle: Cyrille Bertelle is full professor in Computer Sciences in Normandie University, Le Havre, France since 2005. His activities concern complex systems modelling: their conceptual formalization, their distributed implementation and their applications in various domains: ecosystems, game theory, logistics, urban dynamics and territorial intelligence. He focuses his studies on emerging computing using collective intelligence methods and complex networks. He is co-founder of a regional institute on complex systems in Normandie (ISCN) and co-representative of Complex Systems Digital Campus (CS-DC) UNESCO UniTwin. He is currently Vice-President for Research and Development in Le Havre University.

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Plenary Lecture 3

On Some Challenges for Big Data Applications

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Abstract: Big Data is a term that describes large volume of data, both structured and unstructured. It is composed of text, image, video, audio, mobile or other forms of data collected from multiple data sets and is rapidly growing in size and complexity. Big Data has created a huge volume of multidimensional data within a very short time period. This raises several new challenges including how to classify Big Data for multiple data sets, how to analyze Big Data for different forms of data and how to visualize Big Data without loss of information. As the data can not be processed using traditional systems, it poses numerous challenges to the research community.Modern application domains throughout science and technology offer many opportunities for gathering and processing large amounts of data.Unfortunately, the deployment of resources for data acquisition and analysis is complicated by the fact that data are frequently obtained from multiple different sources, while the final objective involves an aggregation of these diverse data sets. Mobile Big Data has been already in our lives, being enriched rapidly and thus has to be carefully analyzed to achieve relevant information.This provides unique opportunities to understand behaviors and requirements of mobile users for real-time decisions in various applications. Nowadays new data systems and technologies are required to handle mobile Big Data in a high scalable, cost effective and fault-tolerant fashion. Three major Big Data markets, i.e., infrastructure, software and services are expected to grow over the next years. Infrastructure consists of computing, networking, storage. Thus, various disciplines such such as statistics, machine learning, graph theory, networking, parallel computing, security, are welcome. The purpose of this Plenary Lecture is to deal with some challenges for Big Data applications. The presentation is organized in three parts. In the first part, demands for Big Data followed with basic Map Reduce structure is presented, together with general architecture. Next, the second part invokes challenges for mobile Big Data applications. Finally, the third part deals with Big Data in mobile cloud sensing. A few open challenges issues that might foster future research are pointed out.

Brief Biography of the Speaker: Prof. Dr Zoran Bojkovic (http://www.zoranbojkovic.com) from the University of Belgrade, Serbia is the permanent Visiting Professor at the University of Texas at Arlington, UTA, TX, USA, EE Department, Multimedia System Lab. As Assistant Professor, he was a visiting researcher at Stanford University, Stanford, CA, USA, Information System Lab., hosted by Prof. Robert M. Gray. Until now, he was a visiting professor at more than 20 Universities worldwide and taught a number of courses in the field of digital signal processing, communication and computer networks, wire/wireless multimedia communications. Prof. Zoran Bojkovic is the co-author of 7 International Books published by Prentice-Hall, Wiley, CRC Press Taylor&Francis Group, Springer, Elsevier, etc. Some of the Books have been adopted in different countries and universities and have been translated in China, India, Canada, Singapore. Also, he is co-editor in 75 International Books and Conference Proceedings. He served and is still serving as Editor-in-Chief, Associate Editor, Guest Editor , Editorial Board Member and Reviewer in International Journals. He has published more than 460 papers in peer-reviewed journals and conference proceedings. Prof. Zoran Bojkovic has conducted many Keynote/Plenary/Invited Lectures, Workshops/ Tutorials, Seminars. As a result of numerous international collaboration, he participated in many international scientific and industrial projects. He is a LSM of IEEE, Member of EURASIP, IASTED, SERC Korea, expert in AMSET, expert in European Project Services, full member of Engineering Academy of Serbia, member of Serbian Scientific Society.

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Plenary Lecture 4

Contemporary Software Science: Theoretical Foundations of Software Engineering

Professor Yingxu Wang
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Abstract: It was not a surprise that software had not been constrained by any known physical principles and laws. However, it is a surprise that the software community would comfortably accept this exceptional phenomenon without deeply exploring what the fundamental properties, principles, and laws are, which underpin software and software engineering. This indicates an indispensable need of basic studies on software science for exploring a much wider range of scientific foundations for software engineering beyond conventional computer science. This keynote lecture presents the theoretical foundations of software science rooted in contemporary abstract sciences such as denotational mathematics, information science, intelligence science, system science, computer science, cognitive science, cognitive informatics, brain science, formal linguistics, neuroinformatics, cognitive computing, and management science, as well as the domain properties of application fields of software systems. A general mathematical model of software is introduced and a set of fundamental properties and laws of software is revealed. In this approach, any software system is perceived as an application instance based on the generic theories. This leads to the notion of software science as a discipline that studies the formal properties and mathematical models of software, general methodologies for rigorous and efficient software development, and coherent theories and principles underpinning software behaviors and software engineering practices.

Brief Biography of the Speaker: Yingxu Wang is professor of cognitive informatics, brain science, software science, and denotational mathematics, President of International Institute of Cognitive Informatics and Cognitive Computing (ICIC, http://www.ucalgary.ca/icic/). He is a Fellow of ICIC, a Fellow of WIF (UK), a P.Eng of Canada, and a Senior Member of IEEE and ACM. He is/was visiting professor (on sabbatical leave) at Oxford University (1995), Stanford University (2008|2016), UC Berkeley (2008), and MIT (2012), respectively. He received a PhD in Computer Science from the Nottingham Trent University in 1998 and has been a full professor science 1994. He is the founder and steering committee chair of the annual IEEE International Conference on Cognitive Informatics and Cognitive Computing (ICCI*CC) since 2002. He is founding Editor-in-Chief of Int'l Journal of Cognitive Informatics & Natural Intelligence, founding Editor-in-Chief of Int'l Journal of Software Science & Computational Intelligence, Associate Editor of IEEE Trans. on SMC - Systems, and Editor-in-Chief of Journal of Advanced Mathematics & Applications. Dr. Wang is the initiator of a few cutting-edge research fields such as cognitive informatics, denotational mathematics (concept algebra, process algebra, system algebra, semantic algebra, inference algebra, big data algebra, fuzzy truth algebra, and fuzzy probability algebra, visual semantic algebra, granular algebra), abstract intelligence (?I), the neural circuit theory, mathematical models of the brain, cognitive computing, cognitive learning engines, cognitive knowledge base theory, and basic studies across contemporary disciplines of intelligence science, robotics, knowledge science, computer science, information science, brain science, system science, software science, data science, neuroinformatics, cognitive linguistics, and computational intelligence. He has published 400+ peer reviewed papers and 29 books in aforementioned transdisciplinary fields. He has presented 30 invited keynote speeches in international conferences. He has served as general chairs or program chairs for more than 20 international conferences. He is the recipient of dozens international awards on academic leadership, outstanding contributions, best papers, and teaching in the last three decades. He is one of the popular scholars according to the big data system of ResearchGate worldwide stats.

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Plenary Lecture 5

Methodological Approach for Creating Applications Using Neuro-Fuzzy Systems

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Abstract: Artificial Intelligence and Intelligent Systems have been widely used in many applications, because of the powerful capabilities they have and the diverse kind of solutions that have been made using these techniques. Artificial Neural Networks have great capabilities for learning from data, finding patterns, generalization activities, they can be used as associative memories and can give accurate answers to complex problems because of theirs structures. On the other hand, fuzzy logic can be used for representing the human behavior concerning classification capabilities using multivalued processes instead of the conventional bivaluated processes used for binary descriptions. This give smoother and more accurate solutions because of its similarity to human processing. Both techniques have been successfully used for many applications and also have been developed diverse configurations for using them jointly using the best capabilities of both techniques, creating structures for representing highly complex systems using simple structures. In this plenary lecture it will be presented a methodological approach for creating applications using neuro-fuzzy systems and it will be presented some examples of developed applications in areas as: Fault detection and isolation, operational condition prediction and virtual sensors design, times series forecasting, modeling and identification, among others.

Brief Biography of the Speaker: Francklin Rivas-Echeverria Systems Engineer, MSc. in Control Engineering and Applied Science Doctor. Full professor in Control Systems Department, at Universidad de Los Andes, Venezuela. He has been invited professor in the Engineering School at Pontificia Universidad Cat?lica del Ecuador-sede Ibarra (PUCESI, Ecuador), Laboratoire d'Architecture et d'Analyse des Systemes (LAAS, Toulouse-France) and some Venezuelan and international Universities. He has also been technical advisor for “Venezuelan Oil Company” (PDVSA), “Aluminum Venezuelan Company” (VENALUM), “Steel Venezuelan Company” (SIDOR), Trolleybus System in Venezuela (TROLMERIDA), Kuwait Oil Company (Kuwait), Halliburton (USA), among others. He has created and is the Director of the Intelligent Systems Laboratory. Over 230 publications in high level conferences and journals: the main topics of his papers are: Artificial Intelligence, Intelligent Control, Automation Systems and Industrial Applications. He has applied his results in areas as: Processes Control and Supervision, Oil production, Steel production processes, education among others. Also, has developed several tools for automatic control teaching. He is coauthor of four books. Halliburton awarded him a recognition for “contributions and dedication to the development of petroleum technology”. Recognition awarded by “Revista Gerente” as one of the 100 most successful Managers in Venezuela. He has been chairman and invited plenary lecturer in several conferences around the world, he has presented and published more than 30 papers in WSEAS Conferences Proceedings and Journals.

Plenary Lecture 6

Competitive Management with Application to the Manufacturing Systems of the Mechanics Buildings

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Abstract: In present day, the data from manufacturing system monitoring are transformed in knowledge only in case of scientific research activity, then the knowledge are disseminated to be applied. The cycle is too long and the knowledge arrive with great delay and indirectly to the manufacturing system. The achievement of the permanent cycle to transform on-line information into knowledge will be followed, to generate action which to be implemented into system immediately and directly. In present day, the models used in manufacturing systems management (analytic, numeric, neuronal) refer to component elements of the systems. The models building is in all cases based on off-line experimental investigation of the element, compose of experimental dataset and using it to select the most suitable model. The cases of comportamental modeling systems don't report in special literature. The new concept of the manufacturing system management will be developed on base of the comportamental modeling which will describe the interaction among elements (technological system, manufacturing products, marketing). The competitive management system means the competitiveness evaluation and, on its base, the intervention on the manufacturing system through the instructions regarding the development way of the manufacturing process to obtain maximum competitiveness. On the other hand, as a result of the competitiveness evaluation, the management system must give the competitive offers which will enter in auctions. To realize these two objects, the competitive management system uses reinforcement learning method to know the market and on-line unsupervised learning method to know the manufacture system. Through application of the competitiveness management at manufacturing system of the mechanics buildings, we can release a management of these systems.

Brief Biography of the Speaker: Daniela Ghelase graduated the Faculty of Machine Manufacturing at the "Politehnica" University of Bucharest in 1985 and she obtained PhD in Industrial Engineering at "Dunarea de Jos" University of Galati (2002). Her Research fields includes: flexible systems manufacturing, numerical simulation of manufacturing processes and surfaces generation, optimal computer-aided design of gear-sets, quality assurance and management. Now, dr. Ghelase is Associate Professor at Faculty of Engineering Braila, "Dunarea de Jos" University of Galati. She published as author or co-author over 100 articles in journals and internationals conferences proceedings (Hungary, Italy, Hong Kong, Spain, Portugal, Poland, South Africa, Ukraine, Bulgaria, Moldavia, USA). Daniela Ghelase wrote 5 books in her research field. In 2005 she was visiting professor at The City University of Hong Kong. She is Member of following professional and scientific associations: IAENG - International Associations of Engineers; IFAC – International Federation of Automatic Control, SAAM - South African for Theoretical and Applied Mechanics, ARoTMM - Romanian Association for Theory of Machines and Mechanisms, ACM-V - Multidisciplinary Research Association of the West Zone. Dr. Daniela Ghelase is Expert of Romanian National University Research Council – CNCSIS.

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Plenary Lecture 7

Application of the Knowledge Management on Machining System

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Abstract: Knowledge management (KM) has become an effective way of managing organization's intellectual capital or, in other words, organization's full experience, skills and knowledge that is relevant for more effective performance in future. The system presented in this paper consists of KM model (PC), mechatronic system (CNC machining center), user unit (PC, SMS) and data, information converter unit. KM model consists of knowledge bank compare, internet and network connection, commentary and management units. Operations of CNC Machining Center which is the main production unit of the system can be controlled both by the machine tool control panel and by e-mail, network from distant places. Also, the machine tool equipped with a lot of sensors so that the machine tool performance can be monitored and unexpected conditions can be controlled. Motivated by the literature discussed above, this paper presents a knowledge management structure of the machining system to provide competitiveness of the enterprise. In today's society can get access a immense volume of information from almost anywhere. But only information is not sufficiently. The feature of knowledge society is not that it has large amounts of information, but inside always it has to know more. To this information to become useful, it must be transformed into knowledge and then used efficiently in company management. What we propose in this paper is to provide manager, based knowledge he has, (economic and technical knowledge) a model of KM to his enterprise to be competitive. When there is a model that interconnects data and information, the model has the potential to be a knowledge. A such model, which is knowledge, provides when the model is well understood, a high level of certainty or prediction regarding how less static models will evolve over time. We intend to offer an enterprise manager a such model. KM provides the necessary information for solving the problems of adaptation, progress and competence of enterprise to cope with changes occurring in the environment.

Brief Biography of the Speaker: Luiza Daschievici graduated a 5 years Mechanical Engineering degree program at the "Dunarea de Jos" University of Galati, in 1994; PhD in Mechanical Engineering - at "Dunarea de Jos" University of Galati (2000). Since 1994 she followed the academic carrier at Dunarea de Jos University of Galati as assistant and associate professor. Her research fields are the following: technology of the manufacturing process; cutting process modeling; tribology of parts machines; techniques of complex modelling of the manufacturing systems; the reliableness of the mechanics systems. Now, dr. Daschievici Luiza is Associate Professor at the Faculty of Engineering Braila, "Dunarea de Jos" University of Galati. Dr. Daschievici Luiza participated in over 5 research projects supported by Romanian Ministry of Education and Science. She published as author or co-author over 100 articles in journals and internationals conferences proceedings (Hungary, Italy, Hong Kong, Spain, Portugal, Poland, South Africa, Ukraine, Bulgaria, Moldavia, Japan, Great Britain, USA). Daschievici Luiza wrote 5 books in her research field. She is member of professional and scientific associations: IAENG - International Associations of Engineers; IFAC – International Federation of Automatic Control, SAAM - South African for Theoretical and Applied Mechanics, ARoTMM - Romanian Association for Theory of Machines and Mechanisms, ACM-V - Multidisciplinary Research Association of the West Zone. Dr. Daschievici Luiza is expert of Romanian National University Research Council – CNCSIS.

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Plenary Lecture 8

Hybrid Optimization Techniques for Parameter Based Machine Learning Approaches

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Abstract: Machine learning approaches are widely used in solving complex real problems involving classification and regression tasks, concept learning, image and voice recognition, robotics, etc. In this talk we focus on two machine learning methods: Support Vector Machines (SVMs) and reinforcement learning. Both methods are dependent on one or several parameters whose choice strongly influences the performance of the methods. Therefore the need arises to find techniques for the automatic optimization of the parameters. SVMs are supervised learning methods used for solving classification and regression tasks. Medicine, biology, chemistry, environmental sciences, weather forecasting and financial forecasting are only a few fields requiring these kinds of tasks. Considering a set of data defined by a set of features and a label (target value), the aim of SVMs is to provide, based on a training data set, a model which predicts the target value of data instances which are given only by their features. The accuracy of the model is established by using a testing data set. If the data is linearly separable the model supplies an optimal classification hyperplane with maximal margin. In the non-linear case, the data are mapped into a higher dimensional Hilbert space where they become linearly separable. The classifier (decision function) is obtained in terms of a kernel function without having to know the mapping function. There are several simple kernel functions that can be used, all of them depending on one or more parameters. The accuracy of the model is influenced by the choice of these parameters, but a more difficult problem we face is the strong dependence of the model on the data. For instance, one model could act well on data from the medical field, having a bad behavior on the same data belonging to the economical field. Therefore there is not a standard method for the choice of the model parameters. On the other hand it was proved that single kernel functions can not accurately model the real complex problems. One of our aims is to introduce an approach for building optimal SVM complex kernels. The choice of the parameters is made using different genetic algorithms and wasp algorithms. We implemented and validated the proposed approach on many data sets. A comparison of the accuracy obtained by using different genetic algorithms was also performed. Reinforcement learning is dedicated to learn optimal choices based on a system of rewards or penalties. Reinforcement learning was successfully used in solving tasks such as learning to control a mobile robot, learning to drive an autonomous vehicle, learning to play games, designing multi-agent systems, etc. Learning automata are based on learning algorithms named reinforcement schemes. These schemes must allow the automata to learn from their previous actions and to adapt to changes in their environment. Absolutely expedient learning schemes represent the unique class of reinforcement schemes for which necessary and sufficient design conditions are available. We introduce a general two-parameter dependent absolute expedient reinforcement scheme and propose an approach based on a breeder genetic algorithm for parameters' optimization. We automatically found the optimal values for the learning parameters of three reinforcement schemes, derived from our general one, in order to reach the best performance with respect to the number of iterations in the learning process.

Brief Biography of the Speaker: Dana Simian received a degree in Engineering from the University of Sibiu, Romania, a degree in Mathematics from the University Babes-Bolyai of Cluj-Napoca, Romania and the Ph.D. from Babes-Bolyai University of Cluj-Napoca, Romania. She graduated many courses in Computer Science. She is the director of the Research Center on Informatics and Information Technology at the Faculty of Science, "Lucian Blaga" University of Sibiu, Romania. Her research and fields of expertise include modeling and optimization, theory of algorithms, machine learning, artificial intelligence, theory of computation, computational geometry, applied mathematics, numerical analysis and numerical calculus. She is a member of many international scientific committees and reviewer of many scientific publications. She serves as editor of various journals and is author of numerous publications.

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Plenary Lecture 9

A Framework and Integrated System for Intelligent Robotic Applications

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Abstract: I present an overview of our research efforts to build an intelligent robot capable of addressing real-world problems. Tombatossals, a multipurpose humanoid torso, integrates research accomplishments under the common framework of multimodal active perception and exploration for physical interaction and manipulation. Its main components are three subsystems for visuomotor learning, object grasping and sensor integration for physical interaction. Its actuators, sensors, software and computer architectures are described, along with a summary of employed techniques and results. The robot current abilities, including perception, manipulation and task execution, are also explained. Finally, I will summarize several challenges, experiments and projects showing the capabilities of the system. Our contribution to the integrated design of an intelligent robotic system is in this combination of different sensing, planning and motor systems in a novel framework. The talk will be partly based on my lastest three books titled: Robot Physical Interaction through the Combination of Vision, Tactile and Force Feedback, The Visual Neuroscience of Robotic Grasping, and Robust Motion Detection in Real-Life Scenarios, all published by Springer.

Brief Biography of the Speaker: Angel P. del Pobil is a professor at Jaume I University (Spain), where he was the founding director of the UJI Robotic Intelligence Laboratory. He has been Co-Chair of two Technical Committees of the IEEE Robotics and Automation Society and is a member of the Governing Board of the Intelligent Autonomous Systems (IAS) Society (2012-present) and EURON (European Robotics Research Network of Excellence, 2001-2009). He has over 250 publications, including 13 books, the last three published recently by Springer. Prof. del Pobil was co-organizer of some 50 workshops and tutorials including: five at ICRA (1996, 2000, 2010-2012), ten at IROS (2000, 2004-2013), three at RSS (2008-2010, 2012), ECAI'04, ICAR'05 and ACM/IEEE HRI 2010. He was Program Co-Chair of the 11th International Conference on Industrial and Engineering Applications of Artificial Intelligence, and General Chair of the 13th International Conference on Adaptive Behaviour (SAB 2014) and of five editions of the International Conference on Artificial Intelligence and Soft Computing (2004-2008). He is Associate Editor for ICRA (2009-2015) and IROS (2007-2012) and has served on the program committees of over 130 international conferences, such as IJCAI, ICPR, ICRA, IROS, EUROS, IAS, ICAR, CIRA, etc. The UJI Robotic Intelligence Lab has organized 12 consecutive editions of IURS, the International UJI Robotics School. He has been General Chair for IURS 2005 on Robotics and Neuroscience, IURS 2006 on Humanoid Robots, IURS 2009 on Visuomotor Coordination, IURS 2012 on Perceptual Robotics and the 2015 IEEE-RAS Summer School on Experimental Methodology, Performance Evaluation and Benchmarking in Robotics. He has been involved in robotics research for the last 30 years. Professor del Pobil has been invited speaker of 63 tutorials, plenary talks, and seminars in 14 countries. He serves as associate or guest editor for 12 journals, and as expert for research evaluation at the European Commission, the US National Science Foundation and the Spain Ministry of Science. He has supervised 16 Ph.D. Thesis, including winner and finalists of the Georges Giralt EURON PhD Award and the Robotdalen Scientific Award Honorary Mention. He has been Principal Investigator of 30 research projects. Del Pobil is an active member of the IEEE Robotics and Automation Society and a lifetime member of the Association of the Advancement of Artificial Intelligence (AAAI). Recent projects at the Robotic Intelligence Lab funded by the European Commission include: FP6 GUARDIANS (Group of Unmanned Assistant Robots Deployed In Aggregative Navigation supported by Scent detection), FP7 EYESHOTS (Heterogeneous 3-D Perception Across Visual Fragments), and FP7 GRASP (Emergence of Cognitive Grasping through Emulation, Introspection, and Surprise).

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