

2012 IEEE International Symposium on Robotic and Sensors Environments

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ROSE 2012

PROCEEDINGS

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2012 IEEE International Symposium on Robotic and Sensors Environments (ROSE) Proceedings

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Welcome Message

On behalf of the organizing committee, it is our pleasure to welcome all participants to the 2012 IEEE International Symposium on Robotic and Sensors Environments (ROSE), being held at Otto-von-Guericke University, in Magdeburg, Germany, on November 16-18, 2012. The IEEE ROSE symposium is sponsored by the Institute of Electrical and Electronic Engineers (IEEE) Instrumentation and Measurement Society (IMS). It is organized in collaboration with the IMS' TC-15 Virtual Systems in Measurements, TC-22 Intelligent Measurement Systems, TC-27 Human-Computer Interface and Interaction, TC-28 Instrumentation for Robotics and Automation, and TC-30 Security and Contraband Detection technical committees.

ROSE 2012 celebrates the tenth edition of this international event since its introduction in 2003. Following a sustained series of successful and constantly growing IEEE ROSE workshops from 2003 to 2010, ROSE became an IEEE Symposium from 2011. Over the years, the event took place in Canada, in Europe and in USA. This year, we continue on the tradition of developing a truly international conference with the participants meeting in Magdeburg, Germany.

As in the previous editions, ROSE addresses all aspects of sensing systems and technologies for robotics and industrial automation, as well as their impact on autonomous robotic and intelligent systems development and applications. For the first time this year, ROSE will expand over three consecutive days with all authors having the opportunity to present their work orally. This way, we encourage all participants to benefit from this exposure to stimulate constructive exchanges and develop productive collaborations. ROSE 2012 also has the privilege to welcome two energetic invited speakers, Prof. Klaus Schilling from Julius-Maximilians University, Würzburg, Germany, and Prof. Ana-Maria Cretu from Université du Québec en Outaouais, who will share with the participants the details of their most recent research in space robotics, telematics, and cognitive sensing systems. Participants will also have the opportunity to visit the robotic testing ground of the Fraunhofer Institute for Factory Operation and Automation IFF.

This year, the ROSE 2012 technical program committee received over 50 full-paper submissions originating from 21 different countries. All submitted manuscripts went through a careful peer-review process. 35 papers presenting contributions of high quality have been selected for publication. The accepted papers span all relevant areas including intelligent sensing and new sensor technologies, 3D imaging and machine vision, distributed sensors and collaborative robotics, human-robot interaction and teleoperation, mobile robots, and control systems. The three-day program is fully loaded with presentations and discussions that demonstrate the great diversity of topics that are relevant to applications of sensing and robotics, and that concentrate around a growing area of interest for a large number of researchers from all around the world.

The organizing committee wants to emphasize and acknowledge the efforts of numerous contributors to the success of the IEEE ROSE series, especially to the technical program committee members who year after year volunteer their time to carefully review the manuscripts and provide constructive comments to authors. Special thanks also go to the local arrangements chairs, Tino Brade and Jürgen Lehmann, at Otto-von-Guericke University, as well as to their institution and professors who kindly accepted to host the conference this year. All demonstrated their entire dedication to the success of ROSE 2012 both technically and logistically. Our appreciation also goes to the IEEE Instrumentation and Measurement Society who repeatedly provides its support and sponsorship to the ROSE conference series, from the very beginning of the adventure, and to Lauren Pasquarelli and Jordan Benton from Conference Catalysts for their constant and rigorous assistance to the organization. Finally, thank you also to all authors and participants who submitted manuscripts of an excellent quality to ROSE and directly contribute to the success of this conference.

Welcome to ROSE 2012! We wish all participants a fruitful experience, and we hope you enjoy the historic Magdeburg capital city.

Dr. Sebastian Zug
General Chair

Dr. Pierre Payeur
Dr. Pinhas Ben-Tzvi
Technical Program Chairs

General Chair

Dr. Sebastian Zug, Otto-von-Guericke University, Germany

Technical Program Chairs

Dr. Pierre Payeur, University of Ottawa, Canada
Dr. Pinhas Ben-Tzvi, George Washington University, USA

Local Arrangement Chairs

Tino Brade, Otto-von-Guericke University, Germany
Jurgen Lehmann, Otto-von-Guericke University, Germany

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Dr. Peter Wide, Northern Research Institute, Norway

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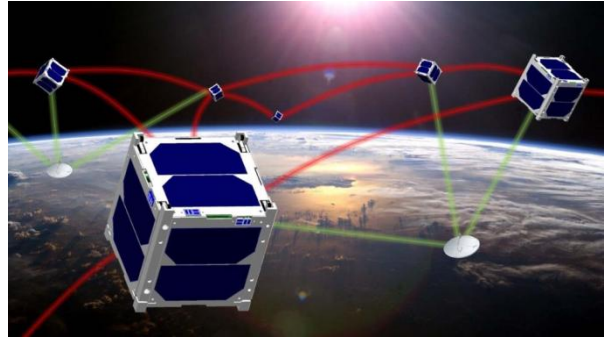
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Arjun Yogeswaran, University of Ottawa, Canada
Djemel Ziou, Université de Sherbrooke, Canada

Invited Speaker: Prof. Klaus Schilling

Julius-Maximilians-University Würzburg
Informatics, Würzburg, Germany

Advanced Relative Navigation Technology for Space Applications

Abstract - Relative navigation is a key enabling technology for a broad spectrum of advanced space exploration missions, including scenarios related to precision landing, satellite formation flights, cooperating rover formations and space debris removal. This presentation addresses innovative sensor technologies as well as terrestrial test environments to characterize the performance for extreme space environments. A survey of challenging future space mission scenarios based on precise relative distance and orientation measurements will be presented. Future multi-vehicle missions exhibit significant application relevance in space, in particular for space applications in planetary surface exploration, communications and Earth observation.



Biography – Klaus Schilling is professor and chair for robotics and telematics at University of Würzburg. He is also president of the research company "Zentrum für Telematik", a corresponding member of the International Academy of Astronautics, chairman of the International Federation for Automatic Control (IFAC) technical committee on "Telematics: Control via Communication Networks", vice-chair and steering committee member of the IFAC technical committee on Aerospace, chair of the IEEE technical committee on Networked Robotics, editor-in-chief of the international journal "Space Technology", and one of six academic members in the scientific board of the Bavarian Research Foundation. He has been playing an active role at EADS/Astrium as head of the "Mission and System Analyses Group" and was responsible for the feasibility phases of several space missions, as well as coordinator and principal investigator of the first German pico-satellite UWE-1 that was launched in 2005. Dr. Schilling was also the recipient of the Walter-Reis-Award 2008 in service robotics. His research interests include autonomous and adaptive

control strategies, telematics methods, mechatronic systems, and control of distributed systems, especially for applications in the design and tele-operation of pico-satellites, industrial mobile robots, sensor systems, tele-education and medical systems.

Invited Speaker: Prof. Ana-Maria Cretu

Université du Québec en Outaouais
Computer Science and Engineering, Gatineau, QC, Canada

Evolving Sensor System Environments with Visual Attention: an Experimental Exploration

Abstract - The research community is experiencing nowadays a significant growth in the amount of sensor data made available to several practical applications, particularly those dealing with visual information. The availability of large datasets poses critical challenges for the selection of only relevant features to allow their timely use and interpretation. As the current generation of algorithms for feature extraction and recognition seems to have somewhat reached its limits, the recent years marked an increasing interest in algorithms inspired from biological human vision as an alternative source of ideas for the development of computational resources to deal with large datasets. In particular, computational models of visual attention have been shown to significantly improve the speed of scene understanding and object recognition by attending only the regions of interest



and distributing the resources where they are required. This paper explores the use and gauges the performance of visual attention mechanisms for identifying an optimal feature set that ensures the identification and classification of objects in images, in two different scenarios: the first one addresses the issue of the identification of different categories of vehicles from multiple viewpoints in a controlled environment, with a relatively known background; the other one explores the capabilities of an improved visual attention model for the identification of buildings in aerial and satellite imaging, characterized by large variations in content and characteristics and by a heavily cluttered background.



Biography - Ana-Maria Cretu obtained her M.A.Sc. and Ph.D. degrees from the School of Electrical Engineering and Computer Science at University of Ottawa, Canada. She is now assistant professor with the Department of Computer Science and Engineering of the Université du Québec en Outaouais, Canada. Her research interests include machine intelligence, soft computing, biologically-inspired computational models, intelligent tactile and vision sensing, and 3D object sensing, modeling and manipulation for virtualized reality applications. She is the author of more than 40 technical papers. She serves as Technical Committee Member for several international conferences, as a reviewer for journals and transactions and as an editorial board member to the Springer journal of *Soft Computing*. Dr. Cretu is a Member of the IEEE Computational Intelligence Society, of the IEEE Systems, Man and Cybernetics Society, and the IEEE Instrumentation and Measurement Society.

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