Advances in Intelligent Systems and Computing 418

Luís Paulo Reis
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Robot 2015: Second Iberian Robotics Conference

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Preface

This book contains a selection of papers accepted for presentation and discussion at ROBOT 2015: Second Iberian Robotics Conference, held in Lisbon, Portugal, November 19th–21st, 2015. ROBOT 2015 is part of a series of conferences that are a joint organization of SPR – "Sociedade Portuguesa de Robótica/Portuguese Society for Robotics", SEIDROB – Sociedad Española para la Investigación y Desarrollo de la Robótica/Spanish Society for Research and Development in Robotics and CEA-GTRob – Grupo Temático de Robótica/Robotics Thematic Group. The conference organization had also the collaboration of several universities and research institutes, including: University of Minho, University of Porto, University of Lisbon, Polytechnic Institute of Porto, University of Aveiro, University of Zaragoza, University of Malaga, LIACC, INESC-TEC and LARSyS.

Robot 2015 builds upon several successful events, including three biennal workshops (Zaragoza- 2007, Barcelona – 2009 and Sevilla – 2011) and the first Iberian Robotics Conference held in 2013 at Madrid. The conference is focussed on the Robotics scientific and technological activities in the Iberian Peninsula, although open to research and delegates from other countries.

Robot 2015 featured three plenary talks by:

- Manuela Veloso, Herbert A. Simon University Professor at Carnegie Mellon University, USA, on "Symbiotic Autonomous Mobile Service Robots";
- Bill Smart, director of the Personal Robotics Group at Oregon State University, USA on "How the Law Will Think About Robots (and Why You Should Care)"; and
- Jon Agirre Ibarbia, co-ordinator of R&D projects at TECNALIA Research & Innovation, Spain, on "Applications in Flexible Manufacturing with Humans and Robots".

Robot 2015 featured 19 special sessions, plus a main/general robotics track. The special sessions were about: Agricultural Robotics and Field Automation; Autonomous Driving and Driver Assistance Systems; Communication Aware Robotics; Environmental Robotics; Social Robotics: Intelligent and Adaptable AAL

Systems; Future Industrial Robotics Systems; Legged Locomotion Robots; Rehabilitation and Assistive Robotics; Robotic Applications in Art and Architecture; Surgical Robotics; Urban Robotics; Visual Perception for Autonomous Robots; Machine Learning in Robotics; Simulation and Competitions in Robotics; Educational Robotics; Visual Maps in Robotics; Control and Planning in Aerial Robotics, the XVI edition of the Workshop on Physical Agents and a Special Session on Technological Transfer and Innovation.

In total, after a careful review process with at least three independent reviews for each paper, but in some cases 4 or 5 reviews, a total of 118 high quality papers were selected for publication, with a total number of authors over 400, from 21 countries, including: Brazil, China, Costa Rica, Croatia, Czech Republic, Ecuador, France, Germany, Italy, India, Iran, The Netherlands, Poland, Portugal, Serbia, Singapore, Spain, Switzerland, United Kingdom, USA and Viet Nam.

ROBOT 2015 was co-located with the RoCKIn Competition 2015, which took place in the Parque das Nações, Lisboa, between 19 and 23 November, nearby the conference venue. RoCKIn is a Coordination Action funded by the European Commission FP7, and its main goal is to foster robotics research, education and dissemination through robot competitions. Thirteen teams from seven countries, including two teams from Mexico, were qualified and competed in RoCKIn@Home and RoCKIn@Work Challenges. Participants from both events had the opportunity to join in social events and to visit both venues, taking advantage of an extraordinary opportunity to follow presentations and actual robot systems showing recent results in this exciting field.

We would like to thank all Special Sessions' organizers for their hard work on promoting their special session, inviting the Program Committee, organizing the Special Session review process and helping to promote the ROBOT 2015 Conference. This acknowledgment goes especially to Vitor Santos, Angel Sappa, Miguel Oliveira, Danilo Tardioli, Alejandro Mosteo, Luis Riazuelo, João Valente, Antonio Barrientos, Luís Santos, Jorge Dias, Raul Morais Santos, Filipe Santos, Germano Veiga, José Lima, Guillermo Heredia, Anibal Ollero, Manuel Silva, Cristina Santos, Manuel Armada, Vicente Matellán, Miguel Ángel Cazorla, Rodrigo Ventura, Nicolas Garcia-Aracil, Alicia Casals, Elena García, José Pedro Sousa, Marta Malé-Alemany, Paulo Gonçalves, Jose Maria Sabater, Jorge Martins, Pedro Torres, Tamás Haidegger, Alberto Sanfeliu, Juan Andrade, João Sequeira, Anais Garrell, Andry Maykol Pinto, Aníbal Matos, Nuno Cruz, Brígida Mónica Faria, Luis Merino, Nuno Lau, Artur Pereira, Bernardo Cunha, Armando Sousa, Fernando Ribeiro, Eduardo Gallego and Oscar Reinoso Garcia.

We would also like to take this opportunity to thank the rest of the organization members (Carlos Cardeira, Brígida Mónica Faria, Manuel Fernando Silva, Daniel Castro Silva and Pedro Fonseca) for their hard and fine work on the local arrangements, publicity, publication and financial issues. We also express our gratitude to the members of all the Program Committees and additional reviewers, as they were crucial for ensuring the high scientific quality of the event and to all the authors and delegates whose research work and participation made this event a

success. Last, but not the least, we acknowledge and thank our editor, Springer, that was in charge of these proceedings, and in particular to Dr. Thomas Ditzinger.

November 2015

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Contents

Part I
Environmental Robotics

A UGV Approach to Measure the Ground Properties of Greenhouses

Alberto Ruiz-Larrea, Juan Jesús Roldán, Mario Garzón, Jaime del Cerro and Antonio Barrientos

Abstract Greenhouse farming is based on the control of the environment of the crops and the supply of water and nutrients to the plants. These activities require the monitoring of the environmental variables at both global and local scale. This paper presents a ground robot platform for measuring the ground properties of the greenhouses. For this purpose, infrared temperature and soil moisture sensors are equipped into an unmanned ground vehicle (UGV). In addition, the navigation strategy is explained including the path planning and following approaches. Finally, all the systems are validated in a field experiment and maps of temperature and humidity are performed.

Keywords Environmental monitoring · Agriculture · Greenhouse · Robotics · UGV · Sensory system · Navigation system

1 Introduction

The agriculture in greenhouses is an appropriate field to implement innovative technologies. In fact, there are many proposals of autonomous systems for the production monitoring, crop irrigation and nutrition, or ventilation and heating in greenhouses (e.g. [14]). Nevertheless, the application of these technologies in the greenhouses is usually restricted to those with experimental purpose or large production. In the common facilities, the implementation of these technologies may be difficult due to their cost and their complexity.

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