

# Preface

ROMANSY 2014, the 20th CISM-IFTToMM Symposium on Theory and Practice of Robots and Manipulators has been the twentieth event of a series that was started in 1973 as a first conference activity in the world on Robotics. The first event was held at International Centre for Mechanical Science (CISM) in Udine, Italy on 5–8 September 1973. It was also the first topic conference of International Federation for the Promotion of Mechanism and Machine Science (IFTToMM) and it was directed not only at the IFTToMM community.

The ROMANSY aim was decided at the funding meeting as a conference event representing a forum of reference for discussing the latest advances in Robotics and for facilitating contacts among research people, scholars, students, and professionals from the Industry. From the beginning the acronym ROMANSY was used to name the symposium in short by using the first letter of the words: Robots, Manipulators, and Symposium.

The aim of the ROMANSY Symposium is still focused to bring together researchers, industry professionals, and students from broad ranges of disciplines referring to Robotics, in an intimate, collegial, and stimulating environment. In 2014, after 41 years the ROMANSY event still is very attractive since we have received increased attention toward the initiative, as can be seen by the fact that this Proceedings volume contains contributions by authors from all around the world.

The funding committee that also took the responsibility for the organization of the first ROMANSY event was composed of:

Prof. A. E. Kobrinskii (USSR); Chair  
Prof. L. Sobrero (Italy), Vice-Chair and CISM Director  
Acad. I. I. Artobolevskii (USSR); first IFTToMM President  
Prof. G. Bianchi (Italy)  
Prof. I. Kato (Japan)  
Prof. M. S. Konstantinov (Bulgaria)  
Prof. A. Morecki (Poland)  
Prof. A. Romiti (Italy)  
Prof. B. Roth (USA)

Prof. M. W. Thring (UK)  
 Dr. M. Vukobratovic (Jugoslavia)  
 Prof. H. J. Warnecke (Germany)  
 Prof. D. E. Withney (USA)  
 Mrs. A. Bertozzi (Italy) acting as secretary as from CISM

The funders were the first generation in ROMANSY and they have been active for several decades. Smoothly, new generations have contributed to the leadership of ROMANSY by preserving the original characters of the initiative but challenging to increase the influence and spread of the ROMANSY results within a growing world Robotics community. The current scientific committee is listed below with names of persons who are from a third generation (since they started their activity after 2000) and others, who are even pupils of the funders.

The ROMANSY series was established as cooperation between IFToMM and CISM with an initial plan to have conference events alternatively at the CSIM headquarters in Udine, Italy, and in Poland under the direct responsibility of IFToMM and CISMM leaders together with the scientific committee. Later, as it is still today, it was decided to have the conference events hosted in any world institution where the organizing chair is active. The following is the list of ROMANSY events over time:

- 1973: ROMANSY 1 in Udine, Italy with chairmanship of A. E. Kobrinskii
- 1976: ROMANSY 2 in Jadwisin, Poland with chairmanship of B. Roth
- 1978: ROMANSY 3 in Udine, Italy with chairmanship of L. Sobrero
- 1981: ROMANSY 4 in Zaborow, Poland with chairmanship of A. Morecki
- 1984: ROMANSY 5 in Udine, Italy with chairmanship of G. Bianchi
- 1986: ROMANSY 6 in Cracow, Poland with chairmanship of A. Morecki
- 1988: ROMANSY 7 in Udine, Italy with chairmanship of G. Bianchi and A. Morecki
- 1990: ROMANSY 8 in Cracow, Poland with chairmanship of A. Morecki and G. Bianchi
- 1992: ROMANSY 9 in Udine, Italy with chairmanship of G. Bianchi and A. Morecki
- 1994: ROMANSY 10 in Gdansk, Poland with chairmanship of A. Morecki and G. Bianchi
- 1996: ROMANSY 11 in Udine, Italy with chairmanship of G. Bianchi and A. Morecki
- 1998: ROMANSY 12 in Paris, France with chairmanship of A. Morecki and G. Bianchi and J. C. Guinot
- 2000: ROMANSY 13 in Zakopane, Poland with chairmanship of A. Morecki and G. Bianchi
- 2002: ROMANSY 14 in Udine, Italy with chairmanship of G. Bianchi and J. C. Guinot

- 2004: ROMANSY 15 in Montreal, Canada with chairmanship of J. Angeles and J. C. Piedboeuf
- 2006: ROMANSY 16 in Warsaw, Poland with chairmanship of T. Zielinska
- 2008: ROMANSY 17 in Tokyo, Japan with chairmanship of A. Takanishi and Y. Nakamura
- 2010: ROMANSY 18 in Udine, Italy with chairmanship of W. Schiehlen and V. Parenti-Castelli
- 2012: ROMANSY 19 in Paris, France with chairmanship of P. Bidaud and O. Khatib

Proceedings volumes have been always published to be available also after the symposium to large public of scholars and designers.

This Proceedings volume contains 62 papers that have been selected after review for oral presentation and one invited lecture that prepared by Prof. Bernard Roth to celebrate the 20th anniversary event with his vision and memories. These papers cover several aspects of the wide field of Robotics concerning Theory and Practice of Robots and Manipulators.

We would like to express grateful thanks to the members of the current International Scientific Committee for ROMANSY Symposium for cooperating enthusiastically for the success of the 2014 event:

Philippe Bidaud (France)  
Marco Ceccarelli (Italy)  
I-Ming Chen (Singapore), as Chair of the IFToMM Technical Committee for Robotics and Mechatronics  
Victor Glazunov (Russia)  
Qian Huang (China)  
Oussama Khatib (USA)  
Vincenzo Parenti-Castelli (Italy), CISM representative  
Werner Schiehlen (Germany)  
Atsuo Takanishi (Japan)  
Teresa Zielińska (Poland)

We thank the authors who have contributed with very interesting papers on several subjects, covering many fields of Robotics as Theory and Practice of Robots and Manipulators and additionally for their cooperation in revising papers in a short time in agreement with reviewers' comments. We are grateful to the reviewers for the time and efforts they spent in evaluating the papers with a tight schedule that has permitted the publication of this proceedings volume in time for the symposium.

We thank the Blagonravov Institute of Machines Science (known also as IMASH) of Russian Academy of Science (RAS) in Moscow for having hosted the

ROMANSY 2014 event. We express our special thanks to academician Rivner Ganiev, director of IMASH, for supporting the hosting of ROMANSY 2014 in IMASH.

We would like to thank the members of the Organizing Committee: Academician, Prof. Vasilii Fomin; Mem. RAS., Prof. Alexandr Shiplyuk; Mem. RAS., Prof. Vacheslav Prihodko; Mem. RAS., Prof. Nikolay Bolotnik; Prof. Veniamin Goldfarb; Prof. Irina Demianushko; Prof. Vigen Arakelian; Prof. Alexandr Golovin; Prof. Sergey Yatsun; Prof. Sergey Gavryushin; Prof. Sergey Misyurin; Dr. Raphael Sukhorukov; Prof. Saygid Uvaisov; Prof. Alexey Borisov; Prof. Anrey Korabelnikov; Dr. Oleg Muguin, Dr. Constantin Salamandra; Dr. Nikolay Tatus for their help in the plans for ROMANSY 2014 in Moscow.

We also thank the support of International Federation for the Promotion of Mechanism and Machine Science (IFTToMM) and the auspices of Centre for Mechanical Science (CISM). The long cooperation between IFTToMM and CISM has ensured and will ensure the continuous success of ROMANSY as a unique conference event in the broad area of Robotics with tracking reached achievements and future challenges. Special thanks are expressed to IFTToMM Russia that very enthusiastically supported the plan to have ROMANSY in Moscow and promoted a significant participation of Russian colleagues.

We thank the publisher and Editorial staff of Springer and particularly Dr. Nathalie Jacobs, managing Editor, for accepting and helping in the publication of this volume within the book series on Mechanism and Machine Science (MMS).

We are grateful to our families since without their patience and understanding it would not have been possible for us to organize ROMANSY-2014, the 20th CISM-IFTToMM Symposium on Theory and Practice of Robots and Manipulators.

Moscow, March 2014

Marco Ceccarelli  
Victor A. Glazunov

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Ceccarelli, M.; Glazunov, V. (Eds.)

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