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The Springer Proceedings in Advanced Robotics (SPAR) publishes 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.

The publications within the “Springer Proceedings in Advanced Robotics” are primarily proceedings and post-proceedings of important conferences, symposia and congresses. They cover significant recent developments in the field, both of a foundational and applicable character. Also considered for publication are edited monographs, contributed volumes and lecture notes of exceptionally high quality and interest.

An important characteristic feature of the series is the short publication time and world-wide distribution. This permits a rapid and broad dissemination of research results.

More information about this series at <http://www.springer.com/series/15556>



Ken Goldberg · Pieter Abbeel ·
Kostas Bekris · Lauren Miller
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Algorithmic Foundations of Robotics XII

Proceedings of the Twelfth Workshop
on the Algorithmic Foundations of Robotics

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Foreword

At the dawn of the century's third decade, robotics is reaching an elevated level of maturity and continues to benefit from the advances and innovations in its enabling technologies. These all are contributing to an unprecedented effort to bringing robots to the human environment in hospitals and homes, factories, and schools, in the field for robots fighting fires, making goods and products, picking fruits and watering the farmland, saving time and lives. Robots today hold the promise for making a considerable impact in a wide range of real-world applications from industrial manufacturing to health care, transportation, and exploration of the deep space and sea. Tomorrow, robots will become pervasive and touch upon many aspects of modern life.

The *Springer Tracts in Advanced Robotics (STAR)* was launched in 2002 with the goal of bringing to the research community the latest advances in the robotics field based on their significance and quality. During the latest fifteen years, the STAR series has featured publication of both monographs and edited collections. Among the latter, the proceedings of thematic symposia devoted to excellence in robotics research, such as ISRR, ISER, FSR, and WAFR, have been regularly included in STAR.

The expansion of our field as well as the emergence of new research areas has motivated us to enlarge the pool of proceedings in the STAR series in the past few years. This has ultimately led to launching a sister series in parallel to STAR. The *Springer Proceedings in Advanced Robotics (SPAR)* is dedicated to the timely dissemination of the latest research results presented in selected symposia and workshops.

This volume of the SPAR series brings the proceedings of the twelfth edition of the Workshop Algorithmic Foundations of Robotics (WAFR). WAFR went back to its roots and was held from December 18 to 20, 2016, in San Francisco, California, the same city in which the very first WAFR was held in 1994.

The volume edited by Ken Goldberg, Pieter Abbeel, Kostas Bekris, and Lauren Miller is a collection of 58 contributions spanning a wide range of applications in manufacturing, medicine, distributed robotics, human–robot interaction, intelligent prosthetics, computer animation, computational biology, and many other areas.

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. A very fine addition to the series!

More information about the conference, including videos of the presentations can be found under the conference's website: <http://wafr2016.berkeley.edu>

January 2020

Bruno Siciliano
Oussama Khatib
SPAR Editors

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