

Guest Editorial

Special Section on the 2014 Workshop on the Algorithmic Foundations of Robotics

IT IS A PLEASURE to present Part I of the Special Section on the 11th Workshop on the Algorithmic Foundation of Robotics (WAFR), which was held at Boğaziçi University, Istanbul, Turkey, during August 3–5, 2014. WAFR is a prestigious biennial single-track workshop on algorithms for robotics and automation. It features cutting-edge research in a broad range of planning problems (such as manipulation, motion, path, multi-robot, and kynodynamic planning), geometric and topological computation, and novel applications like surgical planning, active sensing, and informative path planning. A total of 42 contributed papers were presented at WAFR 2014; invited talks were given by Vijay Kumar on “Aerial Robot Swarms,” Çağatay Başdoğan on “Haptic Role Exchange and Negotiations for Human Robot Interaction,” and Oussama Khatib on “Working With the New Robots.”

Part I of the Special Section contains revised and extended versions of four of the best papers presented at WAFR 2014. All four papers have undergone the same thorough review process as regular papers. Part II of the Special Section will appear in one of the next issues of T-ASE.

The paper “Planning Paths for Package Delivery in Heterogeneous Multi-Robot Teams” by Mathew, Smith, and Waslander considers a team of a truck restricted to travel along a street network and a quadrotor that can carry one package at the time. The authors address the question of finding the shortest cooperative route that enables the quadrotor to deliver items to a given set of locations.

The paper “Efficient Multi-Robot Motion Planning for Unlabeled Discs in Simple Polygons” by Adler, de Berg, Halperin, and Solovey focuses on unlabeled motion planning for multiple discs inside a simple polygon. In the unlabeled version of motion planning, each disc is allowed to be moved to any (instead of a specific) goal placement, as long as in the end every goal placement is occupied. Contrary to the standard problem, the unlabeled version admits a polynomial-time solution provided a distance constraint is fulfilled.

The paper “Towards Arranging and Tightening Knots and Unknots with Fixtures” by Wang, Bell, and Balkcom presents a two-phase tying approach for knots using fixtures and simple pulling motions. The fixture that is used is specific to a particular knot and the authors outline a design process for a suitable fixture for a given knot.

The paper “Planning Curvature and Torsion Constrained Ribbons in 3D With Application to Intracavitary Brachytherapy” by Patil, Pan, Abbeel, and Goldberg presents a two-stage approach to the problem of planning multiple disjoint ribbons of finite thickness along torsion and curvature constrained curves in space. The problem has, amongst others, applications in intracavitary brachytherapy.

We owe many thanks to the Associate Editors and Reviewers for their efforts to guarantee the high standards of the IEEE TRANSACTIONS ON AUTOMATION SCIENCE AND ENGINEERING, to Editorial Assistant Samantha Jacobs for streamlining the review process and communication with the authors, and to Editor-in-Chief Ken Goldberg for offering the opportunity of having a Special Section devoted to WAFR 2014. We also thank the program committee members, the invited speakers, the authors, and the local organizers for making WAFR 2014 a tremendous success.

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