Guest Editor's Foreword

This special issue of *Discrete & Computational Geometry* contains a selection of seven papers whose preliminary versions appeared in the Theoretical Track of the 1999 ACM Symposium on Computational Geometry. These papers show a rich variety of mathematical techniques, and reveal the classical roots of discrete and computational geometry.

Giesen gives necessary and sufficient regularity conditions for a traveling salesman tour to reconstruct a densely sampled curve. Curve reconstruction has gained popularity lately due to applications in computer vision and graphics, yet Giesen's problem traces its lineage to Menger's 1930 definition of arc length.

Bespamyatnikh, Kirkpatrick, and Snoeyink generalize the famous Ham Sandwich Theorem in the plane to divisions of two types of points by any number of disjoint convex pieces.

Pach, Spencer, and Tóth prove new bounds on the crossing numbers of graphs, that is, the minimum number of edge crossings in planar drawings of the graphs. In this paper, they resolve an old conjecture of Erdős and Guy.

Agarwal and Sharir solve a fundamental combinatorial geometry problem associated with robot motion. They prove that the free configuration space of a ball amidst polyhedral obstacles of total complexity n has approximately quadratic complexity.

Agarwal, Aronov, Har-Peled, and Sharir present the fastest known algorithms for computing minimum-width annuli and shells containing points in two, three, and higher dimensions. These algorithms measure the "roundness" of point sets, a problem that arises in high-precision manufacturing.

Edelsbrunner and Grayson present a generalization of the familiar partition of a triangle into four similar triangles by connecting the midpoints of edges. They generalize the construction in two ways: to a simplex in any dimension and to any equal partition of the simplex edges.

Perhaps the only paper in this issue without classical roots is the one by Agarwal, Basch, de Berg, Guibas, and Hershberger. This paper studies the maintenance of triangulations and binary space partitions for "kinetic data," linearly moving points and segments in the plane. Somebody has to define the classical topics of the future!

I invited an eighth paper, "Sharp bounds on geometric permutations," by Smorodinsky, Mitchell, and Sharir, to this special issue, but it was already well along in the *Discrete &*

Computational Geometry pipeline at the time. This paper appeared in issue Number 2 of Volume 23.

A selection of papers from the Applied Track of the symposium will appear in the journal *Computational Geometry: Theory and Applications*.

I would like to thank the authors and referees for their contributions to this special issue.

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1999 SoCG Program Co-Chair