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DNA Computing

13th International Meeting on DNA Computing, DNA13
Memphis, TN, USA, June 4-8, 2007
Revised Selected Papers

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Preface

Biomolecular/DNA computing is now well established as an interdisciplinary field where chemistry, computer science, molecular biology, physics, and mathematics come together with the common purpose of fundamental scientific understanding of biology and chemistry and its applications. This international meeting has been the premier forum where scientists with different backgrounds and a common focus meet to present their latest results and entertain visions of the future. In this tradition, about 100 participants converged in Memphis, Tennessee to hold the 13th International Meeting on DNA Computing during June 4–8, 2007, under the auspices of the International Society for Nanoscale Science, Computation and Engineering (ISNSCE) and The University of Memphis.

The call for papers encouraged submissions of original, recent, and promising experimental and theoretical results in the field. The Call for Papers elicited some 62 submissions, almost perfectly balanced among the major theoretical and experimental categories. It is evidence of how well the interdisciplinary nature of the conference has truly matured that the major criterion of quality, agreed upon in advance by the Program Committee (PC), produced a nearly balanced program as well across the two major categories, full papers and talks with an abstract only. The program with the greatest perceived impact consisted of 24 papers for plenary oral talks; in addition, 15 full-paper posters and 10 poster abstracts were accepted, of which 5 authors were invited to give five short demos in a new submission category this year.

The conference program retained the structure now customary for this meeting. It began with four *tutorials* on Monday June 4. The customary introductory tutorials to biochemistry and computation were delivered by Thom LaBean (Duke University, “Basic Bioscience for Computer Scientists”) and Vinhthuy Phan (University of Memphis, “Basic Computer Science for Bioscientists”) in the morning, while Ned Seeman (New York University, “Structural DNA Nanotechnology”), and Byoung-Tak Zhang (Seoul National University, “Molecular Evolutionary Computation *In Vitro* and *In Silico*”) delivered the advanced tutorials in the afternoon. An exciting set of four invited talks by Charles Bennett (IBM Research, “Brownian Molecular Computers and the Thermodynamics of Computation”), David Harel (Weizmann Institute, “*In Silico* Biology”), Paul Rothemund (Caltech, “DNA Origami”) and Steve Skiena (SUNY- Stony Brook, “Designing Useful Viruses”) for the *main conference* provided a most appropriate setting for the recurring themes of self-assembly, encodings, as well as intriguing new trends in what may be termed the design and bio-engineering of robust biocomputers. Perhaps one day we will regard these budding new ideas as the onset of true interdisciplinary outcomes of the DNA conference. On Friday, we held the *Third Symposium on Nanotechnology*, with four pointed lectures on cutting-edge developments in the field by Bob Austin (Princeton University, “The City of Cells: Adaptation and Evolution on a Chip”), William Shih (Harvard Medical School, “From Structural DNA Nanotechnology to Membrane-Protein NMR Structure”), Bernie Yurke (Lucent Technologies, “The Dynamic DNA Nanoworld”) and Todd Yeates (UCLA, “Progress and Challenges in Designing

Proteins for Self-Assembly’’). Complementary poster reception, tours of Memphis’s major attractions, and a banquet at the Botanic Gardens facilitated the discussion of ideas arising from this program.

This volume consists of a selection of invited papers accepted for presentation at the conference and revised after feedback at the event. We can identify roughly six major themes in the contributions, as described in the table of contents. They appear to convey a much clearer focus and purpose in the realization of the potential in the field, despite their apparent similarity to topics addressed early in the history of the conference over a decade ago. Robustness and scalability in analyses, tools, and applications seem to characterize well the overall nature of these contributions, both experimental and theoretical, across all the major themes.

Many people generously provided much of their time and energy in organizing this meeting. We thank all 12 invited speakers for offering thought-provoking talks in the main conference, the symposium, and the tutorials, as well as the authors for their quality submissions. Authors and reviewers also deserve kudos for submissions and their positive attitude and patience in proving the new manuscript submission system at <http://dna13.memphis.edu/subs> effective in alleviating the burden on the PC in the various submission, review and feedback rounds upto camera-ready copy. The invaluable help from the Organizing Committee, assistants Makram Raboudi, Sujoy Roy, Jennifer Grazier, as well as Cheryl Hayes and Yolanda Feifer in the computer science department, made possible a very smooth meeting that everyone seemed to enjoy. We are also indebted to the Steering Committee, led by Lila Kari, for the terse and timely reminders that made possible the content on the following pages. Not least, DNA13 would simply not have been possible without the support of our sponsors. We are grateful to all of them for their contributions.

October 2007

Max H. Garzon
Hao Yan

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