

Schedule of Talks

27th Annual Fall Workshop on Computational Geometry

November 3–4, 2017

Stony Brook University
Stony Brook, NY



Sponsored by the National Science Foundation and the
Department of Applied Mathematics and Statistics and the
Department of Computer Science,
College of Engineering and Applied Sciences, Stony Brook University

Program Committee:

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| Greg Aloupis (Tufts) | Peter Brass (CCNY) |
| William Randolph Franklin (RPI) | Jie Gao (co-chair, Stony Brook) |
| Mayank Goswami (Queens College) | Matthew P. Johnson (Lehman College) |
| Joseph S. B. Mitchell (co-chair, Stony Brook) | Don Sheehy (University of Connecticut) |
| Jinhui Xu (University at Buffalo) | |

Friday, November 3, 2017: Computer Science (NCS), Room 120

9:20 Opening remarks

Contributed Session 1 Chair: Joe Mitchell

9:30–9:45 “Sampling Conditions for Clipping-free Voronoi Meshing by the VoroCrust Algorithm”, Scott Mitchell, *Ahmed Abdelkader*, Ahmad Rushdi, Mohamed Ebeida, Ahmed Mahmoud, John Owens and Chandrajit Bajaj

9:45–10:00 “Quasi-centroidal Simplicial Meshes for Optimal Variational Methods”, *Xiangmin Jiao*

10:00–10:15 “A Parallel Approach for Computing Discrete Gradients on Multifiltrations”, *Federico Iuricich*, Sara Scaramuccia, Claudia Landi and Leila De Floriani

10:15–10:30 “Parallel Intersection Detection in Massive Sets of Cubes”, W. Randolph Franklin and Salles V.G. Magalhães

10:30–11:00 *Break.*

Contributed Session 2 Chair: Jie Gao

11:00–11:15 “Dynamic Orthogonal Range Searching on the RAM, Revisited”, Timothy M. Chan and *Konstantinos Tsakalidis*

11:15–11:30 “Faster Algorithm for Truth Discovery via Range Cover”, Ziyun Huang, Hu Ding and Jinhui Xu

11:30–11:45 “An Efficient Sum Query Algorithm for Distance-based Locally Dominating Functions”, Ziyun Huang and Jinhui Xu

11:45–12:00 “Approximate Convex Hull of Data Streams”, Avrim Blum, Vladimir Braverman, Ananya Kumar, Harry Lang and Lin Yang

12:00–1:00 Lunch (provided)

1:00–2:00 Invited Talk: “The geometry of data structures”, John Iacono (NYU Tandon School of Engineering and Université Libre de Bruxelles)

Abstract: A technique has been developed to study and analyze data structures called the geometric view. Several examples of the use of this view will be presented including, rotation-based binary search tree data structure, cache-oblivious persistence, and disjoint sets. In all of these examples the main theme is that by moving to the geometric view, details of the data structure that seem cumbersome and hard to approach are abstracted in such a way that allows a simple, yet equivalent, view.

Contributed Session 3 Chair: Jinhui Xu

2:00–2:15 “Online Unit Covering in L_2 ”, *Anirban Ghosh*

2:15–2:30 “An $O(n \log n)$ -Time Algorithm for the k -Center Problem in Trees”, Haitao Wang and Jingru Zhang

2:30–2:45 “Compact Data Structures for Abstract Order Types and Optimal Encodings for SUM Problems”, Jean Cardinal, Timothy Chan, John Iacono, Stefan Langerman and *Aurélien Ooms*

2:45–3:00 “Lightweight Sketches for Mining Trajectory Data”, Maria Astefanoaei, Panagiota Katsikouli, *Mayank Goswami* and Rik Sarkar

3:00–3:30 Break

Contributed Session 4 Chair: Don Sheehy

3:30–3:45 “Calculating the Dominant Guard Set of a Simple Polygon”, Eyup Serdar Ayaz and Alper Ungor

3:45–4:00 “Perfect Polygons”, Hugo A. Akitaya, Erik D. Demaine, Martin L. Demaine, Adam Hesterberg, Joseph S.B. Mitchell and *David Stalfa*

- 4:00–4:15** “Efficient Approximations for the Online Dispersion Problem”, Jing Chen, Bo Li and Yingkai Li
- 4:15–4:30** “Edge Conflicts Can Increase Along Minimal Rotation-Distance Paths”, *Sean Cleary* and Roland Maio
- 4:30–4:45** “Optimal Safety Patrol Scheduling Using Randomized Traveling Salesman Tour”, *Hao-Tsung Yang*, Shih-Yu Tsai, Jie Gao and Shan Lin
- 5:00–6:00** Open Problem Session

Saturday, November 4, 2017: Computer Science (NCS), Room 120

Contributed Session 5 Chair: Jie Gao

- 9:30–9:45** “On the Density of Triangles with Periodic Billiard Paths”, *Ramona Charlton*
- 9:45–10:00** “Nearest Neighbor Condensation with Guarantees”, Alejandro Flores Velazco and David Mount
- 10:00–10:15** “On the Complexity of Random Semi Voronoi Diagrams”, Chenglin Fan and Benjamin Raichel
- 10:15–10:30** “Efficient Algorithms for Computing a Minimal Homology Basis”, Tamal K. Dey, *Tianqi Li* and Yusu Wang
- 10:30–11:00** Break

Contributed Session 6 Chair: Matt Johnson

- 11:00–11:15** “Cardiac Trabeculae Segmentation: an Application of Computational Topology”, Chao Chen, Dimitris Metaxas, Yusu Wang, Pengxiang Wu and Changhe Yuan
- 11:15–11:30** “Topological and Geometric Reconstruction of Metric Graphs in R^n ”, Brittany Fasy, Rafal Komendarczyk, Sushovan Majhi and Carola Wenk
- 11:30–11:45** “Randomized Incremental Construction of Net-Trees”, *Mahmoodreza Jahanseir* and Donald Sheehy
- 11:45–12:00** “On Computing a Timescale Invariant Bottleneck Distance”, *Nicholas J. Cavanna*, Oliver Kisielius and Donald R. Sheehy
- 12:00–1:00** Lunch (provided)

- 1:00–2:00** Invited Talk: “Sublinear algorithms for outsourced data analysis”, Suresh Venkatasubramanian (University of Utah)

Abstract: In the era of outsourcing, communication has replaced computation as an expensive resource. Researchers have proposed numerous models for communication-efficient computing that draw on classical ideas of interactive proofs, updated for our more “sublinear” world.

I’ll talk about the model of streaming interactive proofs and how we can solve classic problems in data analysis like near neighbor search, minimum enclosing balls, and range searching in general with sublinear communication.

Contributed Session 7 Chair: Mayank Goswami

2:00–2:15 “Improved Results for Minimum Constraint Removal”, Eduard Eiben, Jonathan Gemmell, Iyad Kanj and Andrew Youngdahl

2:15–2:30 “Algorithm for Optimal Chance Constrained Knapsack with Applications to Multi-robot Teaming”, Fan Yang and Nilanjan Chakraborty

2:30–2:45 “Freeze Tag Awakening in 2D is NP-hard”, *Hugo Akitaya*, Jingjin Yu and Zachary Abel

2:45–3:00 “Freeze Tag is Hard in 3D”, Erik D. Demaine and Mikhail Rudoy; Matthew P. Johnson (“Easier Hardness for 3D Freeze-Tag”)

3:00–3:30 Break

Contributed Session 8 Chair: W. Randolph Franklin

3:30–3:45 “Declarative vs Rule-based Control for Flocking Dynamics”, Usama Mehmood, Nicola Paoletti, Dung Phan, Radu Grosu, Shan Lin, Scott Stoller, Ashish Tiwari, Junxing Yang and Scott Smolka

3:45–4:00 “Realizing Minimum Spanning Trees from Random Embeddings”, Saad Quader, Alexander Russell and Ion Mandoiu

4:00–4:15 “The Minimum Road Trips Problem”, *Samuel Micka* and Brendan Mumeey

4:15–4:30 “Harder Hardness of Approximation for 2D r -Gather”, Matthew P. Johnson