Curriculum Vitae

Dan P. Guralnik

Address Electric and Systems Engineering Department
University of Pennsylvania
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Military service Israeli Defence Forces, April 1998 – February 2001

Employment January 2016 – present: Postdoc with AFRL SIRCUS, Electric and Systems Enginnering department, University of Pennsylvania.

August 2011 – December 2015: Postdoc with AFOSR MURI CHASE, Electric and Systems Enginnering department, University of Pennsylvania.

September 2008 – May 2011: Postdoc at University of Oklahoma Mathematics Depratment.

September 2005 – August 2008: Postdoc at Vanderbilt University Mathematics Department.

October 1994 – July 2005: Teaching assistant at Technion IIT Mathematics Department.

Research Interests Applications of geometry and topology to learning and knowledge representation; Topological and geometric quantization structures; Categorical and information-theoretical aspects of metric clustering. Applications of Topology and Geometric Group Theory to autonomy in Robotics through reactive planning; Non-positively curved groups and their asymptotic geometry.

Education B.A. in Mathematics, Cum Laude, Technion IIT, August 1994

M.Sc. in Mathematics, Technion IIT, July 1998

Ph.D. in Mathematics, Technion IIT, defended August 2005

Honors

October 1994 – October 1997: full scholarship for M.Sc. studies
Miriam and Aaron Gutwirth Memorial Fellowship (2003)
March 2001 – March 2005: full scholarship for Ph.D. studies
April 2005 – August 2005: advisor's grant support

Other Training

A semester-long teaching seminar for teaching assistants (weekly sessions), Technion IIT;

"Teaching Methods for officers", Israel Defense Force.

M.Sc. Thesis

A splitting tree for a cusp-uniform group acting on a Peano continuum

Advisor: Bronislaw Wajnryb

Ph.D. Thesis

Coarse decompositions of boundaries for CAT(0) groups

Advisors: Michah Sageev, Bronislaw Wajnryb

Publications

(1) *Functorial Hierarchical Clustering with Overlaps* (with Jared Culbertson and Peter F. Stiller) to appear in Discrete Applied Mathematics.
(2) *Injective metrizability and the duality theory of cubings*, (with Jared Culbertson and Peter F. Stiller), to appear in *Expositiones Mathematicae*.
(3) *Statistical properties of the single linkage hierarchical clustering estimator.* (with Dekang Zhu, Xuezhi Wang, Xiang Li and Bill Moran), Journal of Statistical Planning and Inference, volume 185 (2017), pp. 15–28.
(4) *Discriminative measures for comparison of phylogenetic trees.* (with Omur Arslan and Daniel E. Koditschek), Discrete Applied Mathematics Volume 217, Part 3 (2017), pp. 405–426.
(5) *Detecting Poisoning Attacks on Hierarchical Malware Classification Systems* (with Bill Moran, Ali Pezeshki and Omur Arslan), SPIE Proceedings Volume 10185, Cyber Sensing 2017; 101850E (2017).
(6) *Universal Memory Architectures for Autonomous Machines* (with Daniel E. Koditschek), preprint: `http://repository.upenn.edu/ese_papers/737.`
(7) *Coordinated Robot Navigation via Hierarchical Clustering* (with Omur Arslan and Daniel E. Kodtischek), IEEE Transaction of Robotics, vol. 32, issue 2 (2016), pp. 352–371.
(8) *Statistical Estimation for Single Linkage Hierarchical Clustering* (with Dekang Zhu, Xuezhi Wang, Xiang Li and Bill Moran), Cyber Technology in Automation, Control, and Intelligent Systems (CYBER), 2015 IEEE International Conference on.
(9) *A 'transversal' for minimal invariant sets in CAT(0) boundaries* (with Eric L. Swenson), Trans. Amer. Math. Soc. 365 (2013), no. 6, pp. 3069–3095.
(10) *Toward a memory model for autonomous topological mapping and navigation: The case of binary sensors and discrete actions* (with Daniel E. Koditschek), in: 2012 50th Annual Allerton Conference on Communication, Control, and Computing (Allerton), 2012, pp. 936–945.
(11) *Ends of cusp-uniform groups of locally connected continua – I*, International Journal of Algebra and Computation, vol.15, No.4 (2005) pp. 765–798.

Talks

1) AFRL Workshop on Uncertainty Reperesentation and Management, June 2017
2) SPIE Defense, April 2017
3) SIAM Conference on Imaging Science, May 2016
4) AMS Fall Eastern Sectional Meeting, November 2015
5) AFRL Workshop on Uncertainty Reperesentation and Management, July 2015
6) AFRL Workshop on Uncertainty Reperesentation and Management, May 2014
7) IMA workshop on Topology and Geometry of Networks and Discrete Metric Spaces (poster), April 2014
8) Allerton Conference on Communication, Control and Computing, UIUC, October 2012
9) Geometric Group Theory Conference at Technion IIT, Haifa, Israel, June 2011
10) 45th Annual Topology Spring Conference at Tyler, Texas, March 2011
11) University of Wisconsin Milwaukee, Mathematics Colloquium, April 2010
12) University of Wisconsin, Milwaukee, Geometry and Topology Seminar, April 2010
13) Brigham Young University, Mathematics Colloquium, May 2008
14) OSU at Columbus, Ohio, Geometric Group Theory seminar, May 2008
15) 42nd Annual Topology Spring Conference, Milwaukee, Wisconsin, March 2008
16) University of Chicago, Geometry and Topology seminar, March 2007
17) OSU at Columbus, Ohio, November 2006
18) Midrashah Mathematicae (symposium in Asymptotic Group Theory), Hebrew University of Jerusalem, May 2006 (poster)
19) Conference in Geometric Group Theory, Vanderbilt University, May 2006
20) Groups and Low Dimensional Topology, Universite de Montreal – CRM, July 2001
21) Geometric and combinatorial Group theory conference, Technion – IASM, June 2000
22) Annual meeting of the Israeli Mathematical Union, 2000

Other Talks

1) Applied Topology Seminar, University of Pennsylvania, March 2017

2) Geometry and Topology Seminar, University of Pennsylvania, February 2012

3) Geometry and Topology Seminar, University of Oklahoma, 2008-2010

4) Graduate Student Geometry and Topology Seminar, University of Oklahoma, 2008-2010

5) Graduate Student Seminar, University of Oklahoma, 2008-2010

6) University of Southampton, Computer Science department, March 2008

7) Topology and Group Theory Seminar, Vanderbilt University, 2005-2007

Teaching

1) Topics course ESE 680, Spring 2013, University of Penn

2) Probability for Engineers ESE 301, Spring 2013, University of Penn

3) Linear Algebra for math majors, VU and OU – instructor;

4) Elementary Number Theory, VU – instructor;

5) Calculus sequence, Ordinary Differential Equations, VU and OU – instructor;

6) Graph Theory (Math 275, VU) – instructor.

7) Point-set topology, Technion-IIT: TA
in summer 1997 co-authored a departmental exercise book, intended for students and TA's (about 230 pages).

8) Linear algebra, Technion-IIT: TA (Mathematics and CS/EE students): TA

9) Higher division Algebra courses (Group Theory, Rings and Modules, Field Theory), Technion-IIT: TA (Mathematics students grad/undergrad, CS undergrads)
Also wrote an exercise book in elementary group theory (about 50 pages).

10) Calculus (for EE students), Technion-IIT: TA

11) Complex Functions (for EE students), Technion-IIT: TA

12) Introduction to Analysis (graduate-level course for EE students), Technion-IIT: TA

13) Mathematics for students of Architecture, Technion-IIT: TA.