

AHMAD BINIAZ

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DC 2305, Cheriton School of Computer Science, University of Waterloo
200 University Ave West, Waterloo, ON N2L 3G1, Canada

RESEARCH INTERESTS

- Algorithm Design and Analysis
- Discrete and Computational Geometry
- Algorithmic Graph Theory
- Discrete Mathematics
- Combinatorial Optimization
- Data Structures

EDUCATION

Ph.D. in Computer Science

2013 - 2016

Carleton University, Ottawa, Canada

Supervisors: Anil Maheshwari and Michiel Smid

Thesis: "Matchings in Geometric Graphs"

Overview of required coursework:

<i>Wireless Networks & Mobile Computing</i>	A ⁺
<i>Computational Aspects of Geographic Information Systems</i>	A ⁺
<i>Computational Geometry</i>	A ⁺
<i>Advanced Data Structures</i>	Audit
<i>Algorithm Analysis and Design (Advanced Algorithms)</i>	Audit
<i>Doctoral Comprehensive Exam</i>	PWD*

*I passed my Comprehensive Exam (3 written exams followed by an oral exam) with distinction.

Masters Degree in Computer Engineering

Shiraz University, Shiraz, Iran

Supervisor: Gholamhossein Dastghaibfard

Thesis: "Constrained Higher Order Delaunay Triangulations"

Thesis passed with Excellent Grade (20 out of 20).

Bachelor Degree in Software Engineering

Bu-Ali Sina University, Hamedan, Iran

WORK EXPERIENCE

Postdoctoral Researcher

NSERC postdoctoral fellow, University of Waterloo, Canada

Sep. 2017 - present

Fields postdoctoral fellow, Carleton University, Canada

Jan. 2017 - Aug. 2017

Teaching

<i>Data Structures and Data Management (CS240)</i> ¹	University of Waterloo, Canada	Spring 2018
<i>Courses</i> ²	Carleton University, Canada	2016-2017
<i>Enrichment Mini Courses Program (EMCP)</i> ³	Carleton University, Canada	May 2015
<i>Courses</i> ⁴	Azad University, Iran	2010-2012
<i>Courses</i> ⁴	Payam-Noor University, Iran	2010-2012

¹ My instructor-evaluation average score is 4.23 (out of 5). I was ranked among “top instructors” of the department.

² I taught some lectures of Design and Analysis of Algorithms II (COMP4804), which is a fourth year undergraduate course, Advanced Algorithms (COMP5703) and Computational Geometry (COMP5008), which are graduate level courses.

³ This is an annual program designed for high school students of Eastern Ontario and Western Quebec so that they may explore a field of study or area of interest in a university or college setting.

⁴ I taught design and analysis of algorithms, data structures, discrete mathematics, probability and statistics, programming, digital design, computer architecture, theory of automata.

Research Assistant

Carleton University, Ottawa, Canada

2013 - 2016

Teaching Assistant

<i>Discrete Structures II</i>	Carleton University	Fall 2015, 2016*
<i>Design and Analysis of Algorithms II</i>	Carleton University	Winter 2014, 2015, 2016
<i>Introduction to Computer Science I</i>	Carleton University	Winter 2015
<i>Abstract Data Types/Algorithms</i>	Carleton University	Fall 2013*, 2014
<i>Discrete Structures</i>	Carleton University	Winter 2014
<i>Introduction to Computer Science II</i>	Carleton University	Winter 2013*
<i>Database Systems</i>	Shiraz University	Winter 2007
<i>Digital Design</i>	Bu-Ali Sina University	Winter 2004

* I have been nominated for the Outstanding Teaching Assistant Award.

AWARDS

2017	<i>NSERC Postdoctoral Fellowship</i> Natural Sciences and Engineering Research Council of Canada	2 × \$45,000
2016	<i>Fields Postdoctoral Award</i> Fields Institute and Carleton University	\$35,000
2016-17	<i>Hamlin Graduate Fellowship</i> Dean of Graduate Studies, Carleton University	\$3,000
2016-17	<i>CUASA Scholarship</i> Carleton University Academic Staff	\$2,000
2016-17	<i>Ontario Graduate Scholarship</i> Government of Ontario and Carleton University	\$15,000
2015-16	<i>GSA Student Parent Award</i> Graduate Students' Association, Carleton University (given for academic excellence in graduate studies)	\$500
2015-16	<i>Hamlin Graduate Fellowship</i> Dean of Graduate Studies, Carleton University	\$2,000
2015-16	<i>CUASA Scholarship</i> Carleton University Academic Staff	\$2,698
2015-16	<i>David and Rachel Epstein Foundation Scholarships</i> Carleton University	\$1,000
2015-16	<i>Ontario Graduate Scholarship</i> Government of Ontario and Carleton University	\$15,000
2015	<i>Best student presentation award in CALDAM 2015</i> Given by Springer to the three best presentations given by students	€200
2014-15	<i>Indira Gandhi Memorial Fellowship</i> Dean of Graduate and Postdoctoral Affairs, Carleton University	\$10,000
2013-14	<i>Indira Gandhi Memorial Fellowship</i> Dean of Graduate and Postdoctoral Affairs, Carleton University	\$10,000
2012	<i>Research Fellowship</i> V.P. Research, Azad University, Iran	\$2,000

PUBLICATIONS

Currently Under Review

8. *Rollercoasters: long sequences without short runs.*
T. Biedl, A. Biniáz, R. Cummings, A. Lubiw, F. Manea, D. Nowotka, J. Shallit.
SIAM Journal on Discrete Mathematics (minor revision).
7. *Packing plane spanning trees into a point set.*
A. Biniáz and A. García.
Submitted to Computational Geometry: Theory and Applications.
Special issue of CCCG'18.
6. *Plane and planarity thresholds for random geometric graphs.*
A. Biniáz, E. Kranakis, A. Maheshwari, M. Smid.
Submitted to Discrete Mathematics and Theoretical Computer Science.
5. *Improved bounds for guarding plane graphs with edges*
A. Biniáz, P. Bose, A. Ooms, S. Verdonchot.
Submitted to Graphs and Combinatorics.
4. *Faster algorithms for some optimization problems on collinear points.*
A. Biniáz, P. Bose, P. Carmi, A. Maheshwari, I. Munro, and M. Smid.
Submitted to Journal of Computational Geometry.
3. *On the minimum consistent subset problem.*
A. Biniáz, S. Cabello, A. Maheshwari, P. Carmi, S. Mehrabi, J.-L. De Carufel, and M. Smid.
2. *Continuous minimum membership covering.*
T. Biedl, A. Biniáz, and A. Lubiw.
1. *Plane hop spanners for unit disk graphs.*
A. Biniáz.

Journal Papers

21. *Maximum plane trees in multipartite geometric graphs.*
A. Biniáz, P. Bose, K. Crosbie, J.-L. De Carufel, D. Eppstein, A. Maheshwari, M. Smid.
To appear in Algorithmica, DOI 10.1007/s00453-018-0482-x.
20. *Flip distance to some plane configurations.*
A. Biniáz, A. Maheshwari, M. Smid.
To appear in Computational Geometry: Theory and Applications.
19. *Packing boundary-anchored rectangles and squares.*
T. Biedl, A. Biniáz, A. Maheshwari, S. Mehrabi.
To appear in Computational Geometry: Theory and Applications.
Special issue of CCCG'17.
18. *Spanning trees in multipartite geometric graphs.*
A. Biniáz, P. Bose, D. Eppstein, A. Maheshwari, P. Morin, M. Smid.
Algorithmica, 80(11): 3177-3191, 2018.
17. *Plane bichromatic trees of low degree.*
A. Biniáz, P. Bose, A. Maheshwari, M. Smid.
Discrete & Computational Geometry, 59(4): 864–885, 2018.
16. *Strong matching of points with geometric shapes.*
A. Biniáz, A. Maheshwari, M. Smid.

Computational Geometry: Theory and Applications, 68: 186–205, 2018.
Special issue in memory of Dr. Ferran Hurtado.

15. *Faster algorithms for the minimum red-blue-purple spanning graph problem.*
A. Biniaz, P. Bose, I. van Duijn, A. Maheshwari, M. Smid.
Journal of Graph Algorithms and Applications, 21(4): 527–546, 2017.
14. *Towards plane spanners of degree 3.*
A. Biniaz, P. Bose, J.-L. De Carufel, C. Gavoille, A. Maheshwari, M. Smid.
Journal of Computational Geometry, 8(1): 11–31, 2017.
13. *An optimal algorithm for plane matchings in multipartite geometric graphs.*
A. Biniaz, A. Maheshwari, S. Nandy, M. Smid.
Computational Geometry: Theory and Applications, 63: 1–9, 2017.
12. *Approximation algorithms for the unit disk cover problem in 2D and 3D.*
A. Biniaz, P. Liu, A. Maheshwari, M. Smid.
Computational Geometry: Theory and Applications, 60: 8–18, 2017.
Special issue of CCCG'15
11. *A plane 1.88-spanner for points in convex position.*
M. Amani, A. Biniaz, P. Bose, J.-L. De Carufel, A. Maheshwari, M. Smid.
Journal of Computational Geometry, 7(1): 520–539, 2016.
10. *Plane geodesic spanning trees, Hamiltonian cycles, and perfect matchings in a simple polygon.*
A. Biniaz, P. Bose, A. Maheshwari, M. Smid.
Computational Geometry: Theory and Applications, 57: 27–39, 2016.
9. *Packing plane perfect matchings into a point set.*
A. Biniaz, P. Bose, A. Maheshwari, M. Smid.
Discrete Mathematics and Theoretical Computer Science, 17(2): 119–142, 2015.
8. *Higher-order triangular-distance Delaunay graphs: graph-theoretical properties.*
A. Biniaz, A. Maheshwari, M. Smid.
Computational Geometry: Theory and Applications, 48(9): 646–660, 2015.
7. *Matchings in higher-order Gabriel graphs.*
A. Biniaz, A. Maheshwari, M. Smid.
Theoretical Computer Science, 596: 67–78, 2015.
6. *On the hardness of the full Steiner tree problems.*
A. Biniaz, A. Maheshwari, M. Smid.
Journal of Discrete Algorithms, 34: 118–127, 2015.
5. *Approximating the bottleneck plane perfect matching of a point set.*
K. Abu-Affash, A. Biniaz, P. Carmi, A. Maheshwari, M. Smid.
Computational Geometry: Theory and Applications, 48(9): 718–731, 2015.
4. *On full Steiner trees in unit disk graphs.*
A. Biniaz, A. Maheshwari, M. Smid.
Computational Geometry: Theory and Applications, 48(6): 453–458, 2015.
3. *Fixed-orientation equilateral triangle matching of point sets.*
J. Babu, A. Biniaz, A. Maheshwari, M. Smid.
Theoretical Computer Science, 555: 55–70, 2014.
Special issue of WALCOM'13.
2. *An optimal algorithm for the Euclidean bottleneck full Steiner tree problem.*
A. Biniaz, A. Maheshwari, M. Smid.

Computational Geometry: Theory and Applications, 47(3), 377–380, 2014.

1. *A faster circle-sweep Delaunay triangulation algorithm.*
A. Biniáz and G. Dastghaybifard.
Advances in Engineering Software, 43(1): 1–13, 2012.

Conference papers

29. *Rollercoasters and caterpillars.*
T. Biedl, A. Biniáz, R. Cummings, A. Lubiw, F. Manea, D. Nowotka, and J. Shallit.
In Proceedings of the 45th International Colloquium on Automata, Languages, and Programming (ICALP'18), 18:1–18:15, 2018.
28. *Improved bounds for guarding plane graphs with edges.*
A. Biniáz, P. Bose, A. Ooms, and S. Verdonschot.
In Proceedings of the 16th Scandinavian Symposium and Workshops on Algorithm Theory (SWAT'18), 14:1–14:12, 2018.
27. *Flip distance to some plane configurations.*
A. Biniáz, A. Maheshwari, M. Smid.
In Proceedings of the 16th Scandinavian Symposium and Workshops on Algorithm Theory (SWAT'18), 11:1–11:14, 2018.
26. *On the size of outer-string representations.*
T. Biedl, A. Biniáz, and M. Derka
In Proceedings of the 16th Scandinavian Symposium and Workshops on Algorithm Theory (SWAT'18), 10:1–10:14, 2018.
25. *Faster algorithms for some optimization problems on collinear points.*
A. Biniáz, P. Bose, P. Carmi, A. Maheshwari, I. Munro, and M. Smid.
In Proceedings of the 34th International Symposium on Computational Geometry (SoCG'18), 8:1–8:14, 2018.
24. *Packing plane spanning trees into a point set.*
A. Biniáz and A. García.
Accepted to the 30th Canadian Conference in Computational Geometry (CCCG'18), 2018.
23. *Compatible 4-holes in point sets.*
A. Biniáz, A. Maheshwari, M. Smid.
Accepted to the 30th Canadian Conference in Computational Geometry (CCCG'18), 2018.
22. *Integral unit bar-visibility graphs.*
T. Biedl, A. Biniáz, V. Irvine, P. Kindermann, A. M. Naredla, A. Turcotte.
Accepted to the 30th Canadian Conference in Computational Geometry (CCCG'18), 2018.
21. *Compatible paths on labelled point sets.*
Y. Bahoo, A. Biniáz, P. Cano, F. Chanchary, J. Iacono, K. Jain, E. Khramtcova, A. Lubiw, D. Mondal, K. Sheikhan, C. D. Tóth.
Accepted to the 30th Canadian Conference in Computational Geometry (CCCG'18), 2018.
20. *Rollercoasters: long sequences without short runs.*
T. Biedl, A. Biniáz, R. Cummings, A. Lubiw, F. Manea, D. Nowotka, and J. Shallit
In Proceedings of the 34th European Workshop on Computational Geometry (EuroCG'18), 2018.
19. *Packing boundary-anchored rectangles.*
T. Biedl, A. Biniáz, A. Maheshwari, and S. Mehrabi.
In Proceedings of the 29th Canadian Conference on Computational Geometry (CCCG'17), 138–143, 2017.

18. *Maximum plane trees in multipartite geometric graphs.*
A. Biniaz, P. Bose, K. Crosbie, J.-L. De Carufel, D. Eppstein, A. Maheshwari, and M. Smid.
In Proceedings of the 15th International Symposium on Algorithms and Data Structures (WADS'17), 193–204, 2017.
17. *Towards plane spanners of degree 3.*
A. Biniaz, P. Bose, A. Maheshwari, J.-L. De Carufel, C. Gavoille, and M. Smid.
In Proceedings of the 27th International Symposium on Algorithms and Computation (ISAAC'16), 19:1–19:14, 2016.
16. *A faster algorithm for the minimum red-blue-purple spanning graph problem for points on a circle.*
A. Biniaz, P. Bose, I. van Duijn, A. Maheshwari, and M. Smid.
In Proceedings of the 28th Canadian Conference on Computational Geometry (CCCG'16), 140–146, 2016.
15. *Plane bichromatic trees of low degree.*
A. Biniaz, P. Bose, A. Maheshwari, and M. Smid.
In Proceedings of the 27th International Workshop on Combinatorial Algorithms (IWOCA'16), 68–80, 2016.
14. *A plane 1.88-spanner for points in convex position.*
M. Amani, A. Biniaz, P. Bose, J.-L. De Carufel, A. Maheshwari, and M. Smid.
In Proceedings of the 15th Scandinavian Symposium and Workshops on Algorithm Theory (SWAT'16), 25:1–25:14, 2016.
13. *Bottleneck matchings and Hamiltonian cycles in higher-order Gabriel graphs.*
A. Biniaz, A. Maheshwari, and M. Smid.
In Proceedings of the 32nd European Workshop on Computational Geometry (EuroCG'16), 179–182, 2016.
12. *Plane and planarity thresholds for random geometric graphs.*
A. Biniaz, E. Kranakis, A. Maheshwari, and M. Smid.
In Proceedings of the 11th International Symposium on Algorithms and Experiments for Wireless Sensor Networks (ALGOSENSORS'15), Lecture Notes in Computer Science, Vol. 9536, Springer, pages 1–12, 2015.
11. *Plane geodesic spanning trees, Hamiltonian cycles, and perfect matchings in a simple polygon.*
A. Biniaz, P. Bose, A. Maheshwari, and M. Smid.
In Proceedings of the first International Conference on Topics in Theoretical Computer Science (TTCS'15), Lecture Notes in Computer Science, Vol. 9541, Springer, pages 56–71, 2016.
10. *A faster 4-approximation algorithm for the unit disk cover problem.*
A. Biniaz, P. Liu, A. Maheshwari, and M. Smid.
In Proceedings of the 27th Canadian Conference on Computational Geometry (CCCG'15), pages 262–267, 2015.
9. *An optimal algorithm for plane matchings in multipartite geometric graphs.*
A. Biniaz, A. Maheshwari, S. Nandy, and M. Smid.
In Proceedings of the 14th Algorithms and Data Structures Symposium (WADS'15), Lecture Notes in Computer Science, Vol. 9214, Springer-Verlag, Berlin, pages 66–78, 2015.
8. *Higher-order triangular-distance Delaunay graphs: graph-theoretical properties.*
A. Biniaz, A. Maheshwari, and M. Smid.
In Proceedings of the first International Conference on Algorithms and Discrete Applied Mathematics (CALDAM'15), Lecture Notes in Computer Science, Vol. 8959, Springer, pages 89–100, 2015.

7. *Approximating full Steiner tree in a unit disk graph.*
A. Biniáz, A. Maheshwari, and M. Smid.
In Proceedings of the 26th Canadian Conference in Computational Geometry (CCCG'14), pages 113–117, 2014.
6. *Bottleneck bichromatic plane matching of points.*
A. Biniáz, A. Maheshwari, and M. Smid.
In Proceedings of the 26th Canadian Conference in Computational Geometry (CCCG'14), pages 431–435, 2014.
5. *Fixed-orientation equilateral triangle matching of point sets.*
J. Babu, A. Biniáz, A. Maheshwari, and M. Smid.
In Proceedings of the 7th International Workshop on Algorithms and Computation (WALCOM'13), LNCS 7748, Springer-Verlag Berlin Heidelberg, 2013.
4. *Circumcircular range searching in higher order Delaunay triangulations.*
A. Biniáz.
In Proceedings of the 7th Japan Conference on Computational Geometry and Graphs (JCCGG'09), Japan, 2009.
3. *Slope preserving terrain simplification-an experimental study.*
A. Biniáz.
In Proceedings of the 21st Canadian Conference in Computational Geometry (CCCG'09), pages 59–62, Vancouver, BC, Canada, 2009.
2. *Slope fidelity in terrains with higher order Delaunay triangulations.*
A. Biniáz and G. Dastghaybifard.
In Proceedings of the 16th International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision (WSCG'08), pages 17–23, 2008.
1. *A comparison of plane sweep Delaunay triangulation algorithms.*
A. Biniáz and G. Dastghaybifard.
In Proceedings of the 12th International Computer Society of Iran Computer Conference (CS-ICC'07), Tehran, pages 1315–1320, 2007.

Peer-reviewed Book Chapters

1. *Drainage reality in terrains with higher order Delaunay triangulations.*
A. Biniáz and G. Dastghaybifard.
Chapter 12 in: P. van Oosterom, S. Zlatanova, F. Penninga, and E. M. Fendel, editors, Advances in 3D Geoinformation Systems, pages 199–211, LNG&C (Lecture Notes in Geoinformation and Cartography), Springer Berlin Heidelberg, 2008.

Thesis

2. *Matchings in geometric graphs.*
A. Biniáz.
PhD thesis, School of Computer Science, Carleton University, 2016.
1. *Constrained higher order Delaunay triangulations.*
A. Biniáz.
Master's thesis, Computer Engineering Department, Shiraz University, 2007.

CONTRIBUTIONS TO THE SCIENTIFIC COMMUNITY

Supervisory Background:

Chris Saxton	Winter 2017	honours project	Magdeburg University
Lei Chen	Winter 2016	honours project	Carleton University
Evren Kaya	Fall 2015	DSRI	Carleton University
Kimberly Crosbie	2014-2017	MCS	Carleton University
10 students	2010-2012	honours project	Azad University, Iran

Invited to:

- 7th Annual Workshop on Geometry and Graphs, Barbados, 2019.
- 6th Annual Workshop on Geometry and Graphs, Barbados, 2018.
- NII Shonan Meeting on Geometric Graphs: Theory and Applications, Japan, 2017.
- 5th Annual Workshop on Geometry and Graphs, Barbados, 2017.
- 4th Annual Workshop on Geometry and Graphs, Barbados, 2016.

Program Committees:

- CCCG'19, ICCG'19, CCCG'17

Organizing:

- Fields Workshop on Discrete and Computational Geometry, Ottawa, 2017.
- CCCG'17.
- VP of the Computer Science Graduate Society at Carleton University, 2014-2016.

Refereed for:

- Journals: Algorithmica, DCG, JoCG, CGTA, IPL, JDA, IJGIS
- Conferences: ICALP'18, SoCG'18, GD'18, COCOON'18, WG'18, SoCG'17, STACS'17, IWOCA'17, ESA'16, CALDAM'16, CCCG'15

REFERENCES

Anil Maheshwari, Professor, Graduate Director
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Michiel Smid, Professor
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Prosenjit Bose, Professor
School of Computer Science, Carleton University
Tel. : (613) 520-2600 ext. 4336
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Anna Lubiw, Professor
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Vida Dujmović, Assistant Professor
School of Computer Science and Electrical Engineering, University of Ottawa
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