

# AHMAD BINIAZ

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## RESEARCH INTERESTS

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- Discrete and Computational Geometry
- Algorithmic Graph Theory
- Data Structures

## EDUCATION

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**Ph.D. in Computer Science** 2013 - 2016  
*Carleton University, Ottawa, Canada*

Supervisors: Anil Maheshwari and Michiel Smid

Thesis: “Matchings in Geometric Graphs”

Nominated for Carleton University Senate Medal for outstanding work at the doctoral level.

Overview of required coursework:

COMP 5304	<i>Wireless Networks &amp; Mobile Computing</i>	A+
COMP 5204	<i>Computational Aspects of Geographic Information Systems</i>	A+
COMP 5008	<i>Computational Geometry</i>	A+
COMP 5408	<i>Advanced Data Structures</i>	Audit
COMP 5703	<i>Algorithm Analysis and Design (Advanced Algorithms)</i>	Audit
COMP 6907	<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** 2005 - 2007  
*Shiraz University, Shiraz, Iran*

Supervisor: Gholamhossein Dastghaibifard

Thesis: “Constrained Higher Order Delaunay Triangulations”

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

**Bachelor Degree in Software Engineering** 2000 - 2004  
*Bu-Ali Sina University, Hamedan, Iran*

## WORK EXPERIENCE

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### Post-doctoral Researcher

*Carleton University, Ottawa, Canada*

*January 2017 - present*

As a post-doctoral researcher, I conduct research related to Computational Geometry and Graph Theory in the Computational Geometry Lab.

### Research assistant in computer science

*Carleton University, Ottawa, Canada*

*2013 - 2016*

### Teaching assistant in computer science

*Carleton University, Ottawa, Canada*

*2013 - 2016*

### **Faculty member in computer engineering**

*Azad University of Lamerd, Fars, Iran*

*2007 - 2012*

### **Instructor in computer engineering**

*Tabnak University, Lamerd, Fars, Iran*

*2008 - 2010*

*Payam-Noor University, Lamerd, Fars, Iran*

*2007 - 2010*

*Fazl Educational Institute, Shiraz, Fars, Iran*

*2004 - 2007*

*Azad University of Mamasani, Fars, Iran*

*2005 - 2006*

As a faculty member/instructor, I have taught the following courses: design and analysis of algorithms, data structures, discrete mathematics, probability and statistics, programming, digital design, computer architecture, theory of automata, etc.

As a teacher assistant I have been TA for the following courses:

<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 2006
<i>Digital Design</i>	Bu-Ali Sina University	Winter 2002

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

## **CONTRIBUTIONS TO THE SCIENTIFIC COMMUNITY**

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### **Refereed for:**

- Algorithmica
- Computational Geometry: Theory and Applications (CGTA)
- Information Processing Letters (IPL)
- Journal of Discrete Algorithms (JDA)
- International Journal of Geographical Information Science (IJGIS)
  
- International Symposium on Computational Geometry (SoCG)
- Symposium on Theoretical Aspects of Computer Science (STACS)
- European Symposium on Algorithms (ESA)
- Canadian Conference in Computational Geometry (CCCG)
- Conference on Algorithms and Discrete Applied Mathematics (CALDAM)

### **Organizing Background:**

- Since January 2014, I am the Vice-President of the Computer Science Graduate Society at Carleton University.
  
- I was also a member of organizing committee for the following workshops which held at Azad University of Lamerd, Fars, Iran to improve the technical proficiency of the lecturers and faculty members. I was also the speaker in all of them.

Virtual University and E-learning Workshop	2011
Workshop on Animation with Macromedia Flash Mx	2010
Workshop on Ms Office (Word, PowerPoint, Excel, and FrontPage)	2009
Weblog and Homepage Designing	2008
Fundamentals of Internet	2008

- During my undergrad and master studies, I was always a member of the Computer Engineering Society in Bu-Ali Sina and Shiraz Universities in Iran. As part of my membership, my responsibilities included: scheduling and booking seminar rooms for different events and workshops and setting up audiovisual equipment.

## SUPERVISION OF UNDERGRADUATE AND GRADUATE STUDENTS

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I have supervised more than 20 undergraduate students at Azad University of Lamerd, Iran, and more than 10 undergraduate students at Azad University of Mamasani, Iran.

I am involved in the supervision of the following students at Carleton University:

- Evren Kaya, USRA student, supervised by Anil Maheshwari and Michiel Smid, Summer 2015
- Kimberly Crosbie, master student, supervised by Anil Maheshwari and Michiel Smid, started Fall 2015.
- Lei Chen, undergraduate honours project, supervised by Michiel Smid, Winter 2016.

## AWARDS

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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

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Currently Under Review

1. *Spanning trees in multipartite geometric graphs.*  
A. Biniaz, P. Bose, D. Eppstein, A. Maheshwari, P. Morin, M. Smid.
2. *Towards plane spanners of degree 3.*  
A. Biniaz, P. Bose, A. Maheshwari, J.-L. De Carufel, C. Gavoille, M. Smid.  
A preliminary version accepted to ISAAC 2016.
3. *Faster algorithms for the minimum red-blue-purple spanning graph problem.*  
A. Biniaz, P. Bose, I. van Duijn, A. Maheshwari, M. Smid.  
A preliminary version appeared in CCCG 2016.
4. *Plane bichromatic trees of low degree.*  
A. Biniaz, P. Bose, A. Maheshwari, M. Smid.  
A preliminary version appeared in IWOCA 2016.
5. *Plane and planarity thresholds for random geometric graphs.*  
A. Biniaz, E. Kranakis, A. Maheshwari, M. Smid.  
A preliminary version appeared in ALGOSENSORS 2015.
6. *An optimal algorithm for plane matchings in multipartite geometric graphs.*  
A. Biniaz, A. Maheshwari, S. Nandy, M. Smid.  
A preliminary version appeared in WADS 2015.

## Journal Papers

1. *A plane 1.88-spanner for points in convex position.*  
M. Amani, A. Biniaz, P. Bose, J.-L. De Carufel, A. Maheshwari, M. Smid.  
Accepted to the Journal of Computational Geometry.
2. *Strong matching of points with geometric shapes.*  
A. Biniaz, A. Maheshwari, M. Smid.  
Accepted to Computational Geometry: Theory and Applications, special issue in memoriam: Ferran Hurtado.
3. *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, special issue of CCCG'15, 60: 8–18, 2017.
4. *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.
5. *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.
6. *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.
8. *On the hardness of the full Steiner tree problems.*  
A. Biniaz, A. Maheshwari, M. Smid.  
Journal of Discrete Algorithms, 34: 118–127, 2015.

9. *Approximating the bottleneck plane perfect matching of a point set.*  
K. Abu-Affash, A. Biniáz, P. Carmi, A. Maheshwari, M. Smid.  
Computational Geometry: Theory and Applications, 48(9): 718–731, 2015.
10. *On full Steiner trees in unit disk graphs.*  
A. Biniáz, A. Maheshwari, M. Smid.  
Computational Geometry: Theory and Applications, 48(6): 453–458, 2015.
11. *Fixed-orientation equilateral triangle matching of point sets.*  
J. Babu, A. Biniáz, A. Maheshwari, M. Smid.  
Theoretical Computer Science, special issue of WALCOM’13, 555: 55-70, 2014.
12. *An optimal algorithm for the Euclidean bottleneck full Steiner tree problem.*  
A. Biniáz, A. Maheshwari, M. Smid.  
Computational Geometry: Theory and Applications, 47(3), 377–380, 2014.
13. *A faster circle-sweep Delaunay triangulation algorithm.*  
A. Biniáz and G. Dastghaybifard.  
Advances in Engineering Software, 43(1): 1–13, 2012.

### Conference papers

1. *Towards plane spanners of degree 3.*  
A. Biniáz, P. Bose, A. Maheshwari, J.-L. De Carufel, C. Gavoille, M. Smid  
In Proceedings of the 27th International Symposium on Algorithms and Computation (ISAAC’16), 19:1-19:14, 2016.
2. *A faster algorithm for the minimum red-blue-purple spanning graph problem for points on a circle.*  
A. Biniáz, P. Bose, I. van Duijn, A. Maheshwari, M. Smid.  
In Proceedings of the 28th Canadian Conference on Computational Geometry (CCCG’16), 140-146, 2016.
3. *Plane bichromatic trees of low degree.*  
A. Biniáz, P. Bose, A. Maheshwari, M. Smid.  
In Proceedings of the 27th International Workshop on Combinatorial Algorithms (IWOCA’16), 68-80, 2016.
4. *A plane 1.88-spanner for points in convex position.*  
M. Amani, A. Biniáz, P. Bose, J.-L. De Carufel, A. Maheshwari, M. Smid.  
In Proceedings of the 15th Scandinavian Symposium and Workshops on Algorithm Theory (SWAT’16), 25:1-25:14, 2016.
5. *Bottleneck matchings and Hamiltonian cycles in higher-order Gabriel graphs.*  
A. Biniáz, A. Maheshwari, M. Smid.  
In Proceedings of the 32nd European Workshop on Computational Geometry (EuroCG’16), 179-182, 2016.
6. *Plane and planarity thresholds for random geometric graphs.*  
A. Biniáz, E. Kranakis, A. Maheshwari, 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.
7. *Plane geodesic spanning trees, Hamiltonian cycles, and perfect matchings in a simple polygon.*  
A. Biniáz, P. Bose, A. Maheshwari, 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.

8. *A faster 4-approximation algorithm for the unit disk cover problem.*  
A. Biniáz, P. Liu, A. Maheshwari, 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. Biniáz, A. Maheshwari, S. Nandy, 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.
10. *Higher-order triangular-distance Delaunay graphs: graph-theoretical properties.*  
A. Biniáz, A. Maheshwari, 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.
11. *Approximating full Steiner tree in a unit disk graph.*  
A. Biniáz, A. Maheshwari, M. Smid.  
In Proceedings of the 26th Canadian Conference in Computational Geometry (CCCG'14), pages 113–117, 2014.
12. *Bottleneck bichromatic plane matching of points.*  
A. Biniáz, A. Maheshwari, M. Smid.  
In Proceedings of the 26th Canadian Conference in Computational Geometry (CCCG'14), pages 431–435, 2014.
13. *Fixed-orientation equilateral triangle matching of point sets.*  
J. Babu, A. Biniáz, A. Maheshwari, M. Smid.  
In Proceedings of the 7th International Workshop on Algorithms and Computation (WALCOM'13), LNCS 7748, Springer-Verlag Berlin Heidelberg, 2013.
14. *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.
15. *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.
16. *Slope fidelity in terrains with higher order Delaunay triangulations.*  
A. Biniáz, 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.
17. *A comparison of plane sweep Delaunay triangulation algorithms.*  
A. Biniáz, 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, 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.

## **OTHER STRENGTHS**

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<b>Technical Strengths</b>	Pascal, C\C++, Python, Java, PHP, MySQL, Lisp
<b>Languages</b>	English (IELTS=7), Farsi (native), Arabic (good at reading and writing)