

Luis Barba

Postdoc

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Nationality: Mexican



Education

- 2004–2009 **Bachelor in Mathematics**, *Universidad Nacional Autónoma de México (UNAM)*, Mexico City, Mexico.
Average: 97.1%
- 2009–2011 **Master's degree in Computer Science**, *Universidad Nacional Autónoma de México (UNAM)*, Mexico City, Mexico.
Average: 100%, Graduated with highest honors (Mención Honorífica)
- 2012–2016 **PhD in Computer Science**, *Carleton University and Université Libre de Bruxelles*, Ottawa, Canada, Brussels, Belgium.
Senate Medal

Teaching Experience

- 2009 **Teacher assistant**, *UNAM*, Graph Theory.
- 2009 **Teacher assistant**, *UNAM*, Selected Topics of Discrete Mathematics.
- 2010 **Teacher assistant**, *UNAM*, Linear Algebra.
- 2016 **Teacher assistant**, *ETH*, Diskrete Mathematik.

Grants

- 2016–2018 **ETH Postdoctoral Fellowship**, 100,850.- CHF / year.
- 2013–2016 **Vanier Canada Graduate Scholarships**, \$50,000 CAD / year.
- 2013–2016 **CONACyT scholarship for graduate studies abroad**, \$12,000 USD / year.
- 2013 **Ontario Graduate Scholarship (OGS) at Carleton University for 2013–2014, (Declined)**, \$15,000 CAD / year.
- 2012–2013 **Fund for Research Training in Industry and Agriculture, FRIA-FNRS**, 21,600 euros / year.
- 2009–2011 **Conacyt National scholarship for graduate studies**, \$96,000 MXN / year.
- 2011 **UNAM Graduation encouraging program (Programa de fomento a la graduación)**, Awards for being the first student to graduate from my class, \$25,000 MXN.

Awards

- 2016 **Senate medal, Carleton University**, *This represents the highest recognition of academic excellence that Carleton University bestows upon graduate students.*
- 2015 **Best student presentation award, SoCG'15**, *Given to the best presentation given by a student during the 31st Symposium on Computational Geometry.*

- 2013 **Best student presentation award, SoCG'13**, *Given to the best presentation given by a student during the 29th Symposium on Computational Geometry.*
- 2012 **Silver Medal Alfonso Caso**, *Given to the most distinguished student in all graduate programs in Computer Science and Engineering for the year 2011 at Universidad Nacional Autónoma de México.*

Invited talks

- Tokyo, Japan Compatible connectivity-augmentation of planar disconnected graphs. ETH Zürich-University of Tokyo Strategic partnership symposium. January 20th, 2017
- Zurich, Switzerland Compatible connectivity-augmentation of planar disconnected graphs. GWOP'15, ETH-Zurich. June 1st, 2015
- Zurich, Switzerland Linear time algorithms for geodesic problems on simple polygons. Mittagsseminar, ETH-Zurich. May 12th, 2015
- Zurich, Switzerland Detecting intersections between convex polyhedra. Mittagsseminar, ETH-Zurich. September 16th, 2014
- Beijing, China Detecting intersections between convex polyhedra. China Theory Week, Tsinghua University. September 9th, 2014
- Eindhoven, Netherlands Bichromatic compatible matchings. 9th Dutch Computational Geometry Day, TU Eindhoven. October 24th, 2013
- Graz, Austria Flip distance in bichromatic matchings. CG Seminar, TU Graz. September 9th, 2013

Conference presentations

- Eindhoven, Netherlands A linear-time algorithm for the geodesic center of a simple polygon (*Best student presentation award*). 31st Symposium on Computational Geometry (SoCG'15). June 22-25, 2015
- San Diego, USA Compatible connectivity-augmentation of planar disconnected graphs. 26th ACM-SIAM Symposium on Discrete Algorithms (SODA'15). January 4-6, 2015
- San Diego, USA Optimal detection of intersections between convex polyhedra. 26th ACM-SIAM Symposium on Discrete Algorithms (SODA'15). January 4-6, 2015
- Halifax, Canada Continuous Yao graphs. 26th Canadian Conference on Computational Geometry (CCCG'14). August 11-13, 2014
- Kyoto, Japan Linear transformation distance for bichromatic matchings. 30th Symposium on Computational Geometry (SoCG'14). June 8-11, 2014
- Montevideo, Uruguay Optimal algorithms for constrained 1-center problems. 11th Latin American Theoretical Informatics Symposium (LATIN'14). March 31-April 4, 2013
- Oaxaca, Mexico Isoperimetric enclosures. 1st Mexican Conference on Discrete Mathematics and Computational Geometry (MCDMCG'13). November 11-15, 2013
- Tokyo, Japan Sum of Squared Edges for MST of a Point Set in a Unit Square. 15th Japan Conference on Discrete and Computational Geometry and Graphs (JCDCGG'13). September 17-19, 2013
- Rio de Janeiro, Brazil Bichromatic compatible matchings (*Best student presentation award*). 29th Symposium on Computational Geometry (SoCG'13). June 17-20, 2013
- Charlottetown, Canada Circle separability queries in logarithmic time. 24th Canadian Conference on Computational Geometry (CCCG'12). August 8-10, 2012

- Charlottetown, Canada Disk constrained 1-center queries. 24th Canadian Conference on Computational Geometry (CCCG'12). August 8-10, 2012
- Assisi, Italy The Erdős-Sós Conjecture for Geometric Graphs. 28th European Workshop on Computational Geometry. March 19-21, 2012
- A. de Henares, Spain Dynamic circle separability between convex polygons. XIV Spanish Meeting on Computational Geometry. June 27 - 30, 2011
- Pachuca, Hgo. México Círculos de radio mínimo con centro en una línea recta de consulta (Minimum enclosing circles with center on a query line). XVI Coloquio Victor Neumann-Lara de Teoría de las Gráficas, Combinatoria y sus aplicaciones (XVI Victor Neumann-Lara conference in Graph Theory, Combinatorics and their applications). February 28 - March 4, 2011

Currently under review

- submitted **Linear transformation distance for bichromatic matchings**, *O. Aichholzer, L. Barba, T. Hackl, A. Pilz, and B. Vogtenhuber*, Submitted to Computational Geometry, Theory and Applications. Special Issue in Memoriam: Ferran Hurtado, 2015.

Journal papers

- accepted **Incremental voronoi diagrams**, *S. Allen, L. Barba, J. Iacono, and S. Langerman*, Accepted to Discrete and Computational Geometry, 2017.
- accepted **Column planarity and partially-simultaneous geometric embedding**, *L. Barba, W. Evans, M. Hoffmann, V. Kusters, M. Saumell, and B. Speckmann*, Accepted to Journal of Graph Algorithms and Applications, 2017.
- published **Drawing the horton set in an integer grid of minimum size**, *L. Barba, F. Duque, R. Fabila-Monroy, and C. Hidalgo-Toscano*, Computational Geometry: Theory and Applications, 63, :10-19, 2017.
- published **A Linear-Time Algorithm for the Geodesic Center of a Simple Polygon**, *H. Ahn, L. Barba, P. Bose, J. de Carufel, M. Korman, and E. Oh*, Discrete and Computational Geometry, 2015.
- published **Asymmetric polygons with maximum area**, *L. Barba, L. Caraballo, D. Jose-Miguel, R. Fabila-Monroy, and E. Perez*, European Journal of Operational Research, 2015.
- published **Compatible connectivity-augmentation of planar disconnected graphs**, *G. Aloupis, L. Barba, P. Carmi, V. Dujmović, F. Frati, and P. Morin*, Discrete and Computational Geometry, 2015.
- published **Space-time trade-offs for stack-based algorithms**, *L. Barba, M. Korman, S. Langerman, K. Sadakane, and R. Silveira*, Algorithmica, 2014.
- published **Theta-3 is connected**, *O. Aichholzer, S. Bae, L. Barba, P. Bose, M. Korman, A. van Renssen, P. Taslakian, and S. Verdonschot*, Computational Geometry, Theory and Applications, 47, (9), :910-917, 2014.
- published **Bichromatic compatible matchings**, *G. Aloupis, L. Barba, S. Langerman, and D. Souvaine*, Computational Geometry, Theory and Applications, 2014.
- published **Isoperimetric enclosures**, *G. Aloupis, L. Barba, J. de Carufel, S. Langerman, and D. Souvaine*, Graph and Combinatorics, 31, (2), :361-392, 2015.

published **The Erdős-Sós conjecture for geometric graphs**, *L. Barba, R. Fabila-Monroy, D. Lara, J. Leaños, C. Rodríguez, G. Salazar, and F. Zaragoza*, Discrete Mathematics and Theoretical Computer Science, 15, (1), :93-100, July 2012.

published **Computing the visibility polygon using few variables**, *L. Barba, M. Korman, S. Langerman, and R. Silveira*, Computational Geometry, Theory and Applications, pages 70-79, 2011.

Conference papers

published **Subquadratic algorithms for algebraic generalizations of 3SUM**, *L. Barba, J. Cardinal, J. Iacono, S. Langerman, A. Ooms, and N. Solomon*, In Proceedings of the 33th Symposium on Computational Geometry, 2017.

published **Dynamic graph coloring**, *L. Barba, J. Cardinal, M. Korman, S. Langerman, A. van Renssen, M. Roeloffzen, and S. Verdonschot*, In Proceedings of the 16th Algorithms and Data Structures Symposium, 2017.

published **Deterministic algorithms for unique sink orientations of grids**, *L. Barba, M. Milatz, J. Nummenpalo, and A. Thomas*, In Proceedings of the 22nd International Computing and Combinatorics Conference, 2016.

published **The farthest-point geodesic voronoi diagram of points on the boundary of a simple polygon**, *H. Ahn, L. Barba, and E. Oh*, In Proceedings of the 32st Symposium on Computational Geometry, 2016.

published **Incremental voronoi diagrams**, *S. Allen, L. Barba, J. Iacono, and S. Langerman*, In Proceedings of the 32st Symposium on Computational Geometry, 2016.

published **A Linear-Time Algorithm for the Geodesic Center of a Simple Polygon**, *H. Ahn, L. Barba, P. Bose, J. de Carufel, M. Korman, and E. Oh*, In Proceedings of the 31st Symposium on Computational Geometry, volume 34, pages 209-223, 2015.

published **Column planarity and partial simultaneous geometric embedding for outerplanar graphs**, *L. Barba, M. Hoffmann, and V. Kusters*, , In Proceedings of the European Workshop on Computational Geometry, EuroCG'15, 2015.

published **Compatible connectivity-augmentation of planar disconnected graphs**, *G. Aloupis, L. Barba, P. Carmi, V. Dujmović, F. Frati, and P. Morin*, In Proceedings of the 26th ACM-SIAM Symposium on Discrete Algorithms, pages 1602-1615, 2015.

published **Optimal detection of intersections between convex polyhedra**, *L. Barba and S. Langerman*, In Proceedings of the 26th ACM-SIAM Symposium on Discrete Algorithms, pages 1641-1654, 2015.

published **Drawing the horton set in an integer grid of minimum size**, *L. Barba, F. Duque, R. Fabila-Monroy, and C. Hidalgo-Toscano*, , In Proceedings of the 26th Canadian Conference on Computational Geometry, CCCG'14, August 2014.

published **Continuous Yao graphs**, *L. Barba, P. Bose, J. de Carufel, M. Damian, R. Fagerberg, A. van Renssen, P. Taslakian, and S. Verdonschot*, , In Proceedings of the 26th Canadian Conference on Computational Geometry, CCCG'14, August 2014.

published **Linear transformation distance for bichromatic matchings**, *O. Aichholzer, L. Barba, T. Hackl, A. Pilz, and B. Vogtenhuber*, In Proceedings of the 30th Symposium on Computational Geometry, SoCG'14, page 154, 2014.

- published **Weight balancing on boundaries and skeletons**, *L. Barba, J. de Carufel, O. Cheong, M. Dobbins, R. Fleischer, A. Kawamura, M. Korman, Y. Okamoto, J. Pach, Y. Tang, T. Tokuyama, S. Verdonschot, and T. Wang*, , In Proceedings of the 30th Symposium on Computational Geometry, SoCG'14, 2014.
- published **New and improved spanning ratios for Yao graphs**, *L. Barba, P. Bose, M. Damian, R. Fagerberg, W. Keng, J. O'Rourke, A. van Renssen, P. Taslakian, S. Verdonschot, and G. Xia*, , In Proceedings of the 30th Symposium on Computational Geometry, SoCG'14, 2014.
- published **Optimal algorithms for constrained 1-center problems**, *L. Barba, P. Bose, and S. Langerman*, In Proceedings of the 11th Latin American Theoretical INformatics Symposium, LATIN'14, pages (84-95), March 2014.
- published **Isoperimetric enclosures**, *G. Aloupis, L. Barba, J. de Carufel, S. Langerman, and D. Souvaine*, In Proceedings of the 1st Mexican Conference on Discrete Mathematics and Computational Geometry, MCDMCG'13, pages 47-56, November 2013.
- published **Theta-3 is connected**, *O. Aichholzer, S. Bae, L. Barba, P. Bose, M. Korman, A. van Renssen, P. Taslakian, and S. Verdonschot*, In Proceedings of the 25th Canadian Conference on Computational Geometry, CCCG'13, pages 205-210, August 2013.
- published **Computing covers of plane forests**, *L. Barba, A. Beingessner, P. Bose, and M. Smid*, In Proceedings of the 25th Canadian Conference on Computational Geometry, CCCG'13, pages 217-222, August 2013.
- published **On k -enclosing objects in a coloured point set**, *L. Barba, S. Durocher, R. Fraser, F. Hurtado, S. Mehrabi, D. Mondal, J. Morrison, M. Skala, and M. Wahid*, In Proceedings of the 25th Canadian Conference on Computational Geometry, CCCG'13, pages 229-234, August 2013.
- published **On the stretch factor of the theta-4 graph**, *L. Barba, P. Bose, J. de Carufel, A. van Renssen, and S. Verdonschot*, In Proceedings of the 13th Algorithms and Data Structures Symposium, WADS'13, pages 109-120, August 2013.
- published **Bichromatic compatible matchings**, *G. Aloupis, L. Barba, S. Langerman, and D. Souvaine*, In Proceedings of the 29th Symposium on Computational Geometry, SoCG'13, pages 267-276, June 2013.
- published **Space-time trade-offs for stack-based algorithms**, *L. Barba, M. Korman, S. Langerman, K. Sadakane, and R. Silveira*, In Proceedings of the 30th Symposium on Theoretical Aspects of Computer Science, STACS'13, pages 281-292, February-March 2013.
- published **Circle separability queries in logarithmic time**, *G. Aloupis, L. Barba, and S. Langerman*, In Proceedings of the 24th Canadian Conference on Computational Geometry, CCCG'12, pages 121-125, August 2012.
- published **Disk constrained 1-center queries**, *L. Barba*, In Proceedings of the 24th Canadian Conference on Computational Geometry, CCCG'12, pages 15-19, August 2012.
- published **The Erdős-Sós conjecture for geometric graphs**, *L. Barba, R. Fabila-Monroy, D. Lara, J. Leaños, C. Rodríguez, G. Salazar, and F. Zaragoza*, , In Proceedings of the European Workshop on Computational Geometry, EuroCG'12, March 2012.
- published **Computing the visibility polygon using few variables**, *L. Barba, M. Korman, S. Langerman, and R. Silveira*, In Proceedings of the 22nd International Symposium on Algorithms and Computation (ISAAC'11), pages 70-79, Yokohama, Japan, 2011.

published **On edge-disjoint empty triangles of point sets**, *L. Barba, J. Cano, J. Urrutia, and T. Sakai*, In Proceedings of the XIV Spanish Meeting on Computational Geometry, EGC 2011, pages 15-18, July 2011.

published **Dynamic circle separability between convex polygons**, *L. Barba and J. Urrutia*, In Proceedings of the XIV Spanish Meeting on Computational Geometry, EGC 2011, pages 43-46, June 2011.

Pending submission

arxiv **A lower bound for deterministic asynchronous rendez-vous on the line**, *L. Barba, P. Bose, J. de Carufel, S. Langerman, and A. Por*, Available in TBD, 2016.

arxiv **Top-down skiplists**, *L. Barba and P. Morin*, Available in ArXiv, 2014.

Chapters in Books

In Collection **On edge-disjoint empty triangles of point sets**, *L. Barba, J. Cano, J. Urrutia, and T. Sakai*, In Pach, J., editor, Thirty Essays on Geometric Graph Theory, Algorithms and Combinatorics, Springer, 2012.

Theses

PhD's Thesis **On proximity problems in Euclidean spaces**, *L. Barba*, Universite Libre de Bruxelles and Carleton University, 2016.

Master's Thesis **Problemas de proximidad sobre objetos geométricos en el plano (On proximity problems of geometric objects in the plane)**, *L. Barba*, Universidad Nacional Autónoma de México, under the supervision of Professor Jorge Urrutia, 2011.

Bachelor's Thesis **Algoritmos de optimización sobre trayectorias monótonas en gráficas coloreadas por aristas (Optimization algorithms on monotone paths in edge-colored graphs)**, *L. Barba*, Universidad Nacional Autónoma de México, under the supervision of Professor Hortensia Galeana, 2009.

Research stays

May 2015 **ETH, Zurich, Switzerland**, Visiting: Michael Hoffmann.

June 2014 **Tohoku University, Sendai, Japan**, Visiting: Matias Korman.

September 2013 **TU Graz, Graz, Austria**, Visiting: Oswin Aichholzer.

June, July 2011 **Université Libre de Bruxelles, Brussels, Belgium**, Visiting: Dr. Stefan Langerman.

Languages

Spanish Main language

English 92%

French 80%

German 50%

Italian 50%

111 points on TOEFL iBT

Programing

Programming Languages Java, Objective C, PHP, ActionScript 3.0
Data Bases MySQL, Microsoft SQL

Research Interest

Computational Geometry, Data structures, Discrete Geometry, Graph Theory, Algorithm design