

Antoine Vigneron

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EMPLOYMENT

Ulsan National Institute of Science and Technology (UNIST) Associate Professor, School of Electrical and Computer Engineering	Ulsan, Korea January 2016 - present
King Abdullah University of Science and Technology (KAUST) Adjunct Associate Professor of Computer Science Associate Professor of Computer Science	Thuwal, Saudi Arabia January 2016 - present October 2010 - December 2015
Institut National de la Recherche Agronomique (INRA) Research Scientist. With tenure, on leave since October 2010	Jouy-en-Josas, France January 2006 - Present
National University of Singapore (NUS) Assistant Professor of Computer Science	Singapore July 2002 - December 2005

EDUCATION

Hong Kong University of Science and Technology (HKUST) Ph.D. in Computer Science Advisor: Prof. Siu-Wing Cheng	Hong Kong November 2002
École Polytechnique M.Sc. in Computer Science, summa cum laude Engineer Diploma	Paris June 1999 July 1998
Lycée Henri IV Undergraduate Mathematics	Paris September 1992 - June 1995

RESEARCH INTERESTS

Computational geometry, algorithms design and analysis, computational complexity, discrete geometry, computational biology, geographic information systems.

TEACHING EXPERIENCE

Ulsan National Institute of Science and Technology		
<i>Discrete Mathematics</i>	Undergraduate, lectures	Spring 2016
<i>Introduction to Algorithms</i>	Undergraduate, lectures	Spring 2016
King Abdullah University of Science and Technology		
<i>Computational complexity</i>	Graduate, lectures	Fall 2014
<i>Combinatorial optimization</i>	Graduate, lectures	Spring 2014, 2015
<i>Computational geometry</i>	Graduate, lectures	Fall 2011, 2012, 2013
<i>Algorithmic paradigms</i>	Graduate, lectures and tutorials	Spring 2011, 2012, 2013

National University of Singapore

<i>Computational geometry</i>	Undergraduate, lectures and tutorials	Spring 2003, 2004
<i>Data structures and algorithms</i>	Undergraduate, lectures and tutorials	Fall 2002, 2003

Hong Kong University of Science and Technology

<i>Data structures</i>	Undergraduate, tutorials	Spring 2002
<i>Theory of computation</i>	Undergraduate, tutorials	Fall and Spring 2001

Double-degree program NUS-Grandes écoles Fall 2004 - Spring 2005

I taught 1st year undergraduate mathematics and physics to students of the National University of Singapore that were enrolled in the double degree program with French grandes écoles. The topics included *analysis, linear algebra, classical mechanics, and electromagnetism*. I gave lectures and tutorials.

PROFESSIONAL ACTIVITIES

Guest editor

Special issue on ISAAC 2013, *International Journal of Computational Geometry & Applications* 24:4 (2014).

Program committees

11th International Conference and Workshops on Algorithms and Computation (WALCOM)	2017
31st International Symposium on Computational Geometry (SoCG)	2015
24th International Symposium on Algorithms and Computation (ISAAC)	2013
3rd International Conference on Contemporary Computing (IC3)	2010
21st Symposium on Computational Geometry (SoCG)	2005

Referee for journals

ACM Journal of Experimental Algorithmics, ACM Transactions on Algorithms, Algorithmica, BMC Bioinformatics, BMC Structural Biology, Chicago Journal of Theoretical Computer Science, Computational Geometry: Theory and Applications, Discrete Applied Mathematics, Discrete & Computational Geometry, Information Processing Letters, Journal of Discrete Algorithms, International Journal of Computational Geometry and Applications, International Journal of Foundations of Computer science, Journal of the ACM, Journal of Computational Geometry, Journal of Information Science and Engineering, Journal of Optimization Theory and Applications, Mathematics in Computer Science, SIAM Journal on Computing, SIAM Journal on Discrete Mathematics, Theoretical Computer Science.

Referee for conferences

Symposium on Computational Geometry (SoCG 2001, 2004, 2008–2015, 2017), ACM-SIAM Symposium on Discrete Algorithms (SODA 2008, 2009, 2011–2014), European symposium on Algorithms (ESA 2008, 2013–2015), International Symposium on Theoretical Aspects of Computer Science (STACS 2013, 2016), Scandinavian Workshop on Algorithm Theory (SWAT 2004, 2008, 2010), Workshop on Algorithms and Data Structures (WADS 2011, 2015), Latin American conference on Theoretical Informatics (LATIN 2014), International Symposium on Algorithms and Computation (ISAAC 2003, 2006, 2007, 2009–2012, 2014, 2015), International Combinatorics and Computing Conference (COCOON 2005), International Conference on Algorithms and Complexity (CIAC 2017), Canadian Conference on Computational Geometry (CCCG 2011), International Conference on Research in Computational Molecular Biology (RECOMB 2008), Computing: the Australasian Theory Symposium (CATS 2009), SIGGRAPH Asia 2012.

Others

Invited talk at the *Fall Workshop on Algorithms & Computation* (Korea, 2016). Invited tutorial at the *3rd Japan-Korea Joint Workshop on Computational Geometry* (2016). Reviewing grant proposals for the *Austrian Science Fund* (2012, 2014), the *French National Research Agency* (2015), the *Chilean National Science and Technology Commission* (2015). Member of the organizing committee, workshop *Biomolecular Dynamics: Computation Meets Experiment* at KAUST (2013). Member of the organizing committee of the *Korean Workshop on Computational Geometry* (2009). Member of the scientific committee of the *National Olympiad in Informatics* of Singapore (2003, 2004 and 2005). Member of the local arrangements committees of the *16th ACM Symposium on Computational Geometry* (SoCG 2000).

RESEARCH GRANTS

As the principal investigator

KrW 30,000k	UNIST, <i>Generalized Path Planning Problems</i>	2016–2017
€ 80,000	European Union, Marie Curie Reintegration Grant	2006–2008
SG\$ 25,400	National University of Singapore, <i>Approximating a Voronoi Cell</i>	2003–2005
SG\$ 13,700	National University of Singapore, <i>Straight Skeletons: Theory and Practice</i>	2002–2005

Others

US\$ 87,000	KAUST, <i>Protein loop prediction from NMR data</i> Co-principal investigator with Dr. Xin Gao	2012–2014
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ADVISING

Postdoctoral research fellows

Niels Lubbes	2013–2015
Abdellah Elfallahi	2007–2008

PhD students

Liam Mencil	2014–2015
Anas Ismail	2012–2015
Daniel Binham	2011–present
Tristan Bitard-Feildel (co-supervised with J.-F. Gibrat)	Graduated in 2012

Master thesis

Liam Mencil	Graduated in 2014
Alejandro Gollaz, Anas Ismail, Lie Yan	Graduated in 2012

Directed research (graduate level)

Lie Yan	2012
Daniel Binham, Oscar Becerril Lio, Alejandro Gollaz	2011

Final year projects

Desmond Khoo Peng, Zhou Hui, Zachary Leung	2005
Chua Kai Meng	2004

Research internships

Hyeyun Yang	2017
Juyoung Yon	2008
Bhaskara Adytia	2005

OTHERS

Erdős number: 2 (Through Boris Aronov)

PUBLICATIONS

Refereed international journal articles

- [J1] Siu-Wing Cheng, Liam Mencil, and Antoine Vigneron. A faster algorithm for computing straight skeletons. *ACM Transactions on Algorithms*, 12(3):44:1–44:21, 2016.
- [J2] Hervé Fournier, Anas Ismail, and Antoine Vigneron. Computing the Gromov hyperbolicity of a discrete metric space. *Information Processing Letters*, 115(6–8):576–579, 2015.
- [J3] Antoine Vigneron and Lie Yan. A faster algorithm for computing motorcycle graphs. *Discrete & Computational Geometry*, 52(3):492–514, 2014. **On invitation**, special issue on SoCG' 13.
- [J4] Antoine Vigneron. Geometric optimization and sums of algebraic functions. *ACM Transactions on Algorithms*, 10(1):4:1–4:20, 2014.
- [J5] Hee-Kap Ahn, Sang Won Bae, Otfried Cheong, Joachim Gudmundsson, Takeshi Tokuyama, and Antoine Vigneron. A generalization of the convex Kakeya problem. *Algorithmica*, 70(2):152–170, 2014. **On invitation**, special issue on LATIN '12.
- [J6] Hee-Kap Ahn, Sang Won Bae, Christian Knauer, Mira Lee, Chan-Su Shin, and Antoine Vigneron. Realistic roofs over a rectilinear polygon. *Computational Geometry: Theory and Applications*, 46(9):1042–1055, 2013.
- [J7] Hee-Kap Ahn, Sang-Sub Kim, Christian Knauer, Lena Schlipf, Chan-Su Shin, and Antoine Vigneron. Covering and piercing disks with two centers. *Computational Geometry: Theory and Applications*, 46(3):253–262, 2013.
- [J8] Hervé Fournier and Antoine Vigneron. A deterministic algorithm for fitting a step function to a weighted point-set. *Information Processing Letters*, 113(3):51–54, 2013.
- [J9] Siu-Wing Cheng, Jiongxin Jin, Antoine Vigneron, and Yajun Wang. Approximate shortest homotopic paths in weighted regions. *International Journal of Computational Geometry and Applications*, 22(1):83–102, 2012. **On invitation**, special issue on ISAAC '10.
- [J10] Hee-Kap Ahn, Christian Knauer, Marc Scherfenberg, Lena Schlipf, and Antoine Vigneron. Computing the discrete Fréchet distance with imprecise input. *International Journal of Computational Geometry and Applications*, 22(1):27–44, 2012. **On invitation**, special issue on ISAAC '10.
- [J11] Hee-Kap Ahn, Otfried Cheong, Jirí Matousek, and Antoine Vigneron. Reachability by paths of bounded curvature in a convex polygon. *Computational Geometry: Theory and Applications*, 45(1–2):21–32, 2012.
- [J12] Peter Brass, Christian Knauer, Hyeon-Suk Na, Chan-Su Shin, and Antoine Vigneron. The aligned k-center problem. *International Journal of Computational Geometry and Applications*, 21(2):157–178, 2011.

- [J13] Otfried Cheong, Antoine Vigneron, and Juyoung Yon. Reverse nearest neighbor queries in fixed dimension. *International Journal of Computational Geometry and Applications*, 21(2):179–188, 2011.
- [J14] Hervé Fournier and Antoine Vigneron. Fitting a step function to a point set. *Algorithmica*, 60(1):95–109, 2011. **On invitation**, special issue on ESA '08.
- [J15] Siu-Wing Cheng, Hyeon-Suk Na, Antoine Vigneron, and Yajun Wang. Querying approximate shortest paths in anisotropic regions. *SIAM Journal on Computing*, 39(5):1888–1918, 2010.
- [J16] Boris Aronov, Mark de Berg, Otfried Cheong, Joachim Gudmundsson, Herman Haverkort, Michiel Smid, and Antoine Vigneron. Sparse geometric graphs with small dilation. *Computational Geometry: Theory and Applications*, 40(3):207–219, 2008.
- [J17] Siu-Wing Cheng, Hyeon-Suk Na, Antoine Vigneron, and Yajun Wang. Approximate shortest paths in anisotropic regions. *SIAM Journal on Computing*, 38(3):802–824, 2008.
- [J18] Hervé Fournier and Antoine Vigneron. A tight lower bound for computing the diameter of a 3D convex polytope. *Algorithmica*, 49(3):245–257, 2007.
- [J19] Hee-Kap Ahn, Otfried Cheong, Chong-Dae Park, Chan-Su Shin, and Antoine Vigneron. Maximizing the overlap of two planar convex sets under rigid motions. *Computational Geometry: Theory and Applications*, 37(1):3–15, 2007. **On invitation**, special issue on SoCG '05.
- [J20] Siu-Wing Cheng and Antoine Vigneron. Motorcycle graphs and straight skeletons. *Algorithmica*, 47(2):159–182, 2007.
- [J21] Hee-Kap Ahn, Peter Brass, Otfried Cheong, Hyeon-Suk Na, Chan-Su Shin, and Antoine Vigneron. Inscribing an axially symmetric polygon and other approximation algorithms for planar convex sets. *Computational Geometry: Theory and Applications*, 33(3):152–164, 2006.
- [J22] Helmut Alt, Otfried Cheong, and Antoine Vigneron. The Voronoi diagram of curved objects. *Discrete & Computational Geometry*, 34(3):439–453, 2005.
- [J23] Prosenjit Bose, Pat Morin, and Antoine Vigneron. Packing two disks into a polygonal environment. *Journal of Discrete Algorithms*, 2(3):373–380, 2004.
- [J24] Rob Duncan, Jianbo Qian, Antoine Vigneron, and Binhai Zhu. Polynomial time algorithms for three-label point labeling. *Theoretical Computer Science*, 296(1):75–87, 2003.
- [J25] Otfried Cheong, Chan-Su Shin, and Antoine Vigneron. Computing farthest neighbors on a convex polytope. *Theoretical Computer Science*, 296(1):47–58, 2003. **On invitation**, special issue on COCOON '01.
- [J26] Antoine Vigneron. Reporting intersections among thick objects. *Information Processing Letters*, 85(2):87–92, 2003.
- [J27] Jean-Daniel Boissonnat and Antoine Vigneron. An elementary algorithm for reporting intersections of red/blue curve segments. *Computational Geometry: Theory and Applications*, 21(3):167–175, 2002.
- [J28] Antoine Vigneron, Lixin Gao, Giuseppe F. Italiano, Bo Li, and Mordecai J. Golin. An algorithm for finding a k-median in a directed tree. *Information Processing Letters*, 74(1-2):81–88, 2000.

In refereed international conference proceedings

- [C1] Daniel Binham, Pedro Machado Manhães de Castro, and Antoine Vigneron. Reachability in a planar subdivision with direction constraints. In *Proceedings of the 33rd International Symposium on Computational Geometry (to appear)*, SoCG '17, 2017.
- [C2] Sang Won Bae, Chan-Su Shin, and Antoine Vigneron. Tight bounds for beacon-based coverage in simple rectilinear polygons. In *Proceedings of the 12th Latin American International Conference on Theoretical Informatics*, LATIN '16, pages 110–122, 2016.
- [C3] Siu-Wing Cheng, Man-Kwun Chiu, Jiongxin Jin, and Antoine Vigneron. Navigating weighted regions with scattered skinny tetrahedra. In *Proceedings of the 26th International Symposium on Algorithms and Computation*, ISAAC '15, pages 35–45, 2015.
- [C4] Siu-Wing Cheng, Jiongxin Jin, and Antoine Vigneron. Triangulation refinement and approximate shortest paths in weighted regions. In *Proceedings of the 26th ACM-SIAM Symposium on Discrete Algorithms*, SODA '15, pages 1626–1640, 2015.
- [C5] Siu-Wing Cheng, Liam Mencil, and Antoine Vigneron. A faster algorithm for computing straight skeletons. In *Proceedings of the 16th European Symposium on Algorithms*, ESA '14, pages 272–283, 2014.
- [C6] Antoine Vigneron and Lie Yan. A faster algorithm for computing motorcycle graphs. In *Proceedings of the 29th Symposium on Computational Geometry*, SoCG '13, pages 17–26, 2013.
- [C7] Hee-Kap Ahn, Sang Won Bae, Otfried Cheong, Joachim Gudmundsson, Takeshi Tokuyama, and Antoine Vigneron. A generalization of the convex Kakeya problem. In *Proceedings of the 10th Latin American International Conference on Theoretical Informatics*, LATIN '12, pages 1–12, 2012.
- [C8] Hee-Kap Ahn, Sang-Sub Kim, Christian Knauer, Lena Schlipf, Chan-Su Shin, and Antoine Vigneron. Covering and piercing disks with two centers. In *Proceedings of the 22nd International Symposium on Algorithms and Computation*, ISAAC '11, pages 50–59, 2011.
- [C9] Hee-Kap Ahn, Sang Won Bae, Christian Knauer, Mira Lee, Chan-Su Shin, and Antoine Vigneron. Generating realistic roofs over a rectilinear polygon. In *Proceedings of the 22nd International Symposium on Algorithms and Computation*, ISAAC '11, pages 60–69, 2011.
- [C10] Siu-Wing Cheng, Jiongxin Jin, Antoine Vigneron, and Yajun Wang. Approximate shortest homotopic paths in weighted regions. In *Proceedings of the 21st International Symposium on Algorithms and Computation*, ISAAC '10, pages 109–120, 2010.
- [C11] Hee-Kap Ahn, Christian Knauer, Marc Scherfenberg, Lena Schlipf, and Antoine Vigneron. Computing the discrete Fréchet distance with imprecise input. In *Proceedings of the 21st International Symposium on Algorithms and Computation*, ISAAC '10, pages 422–433, 2010.
- [C12] Antoine Vigneron. Geometric optimization and sums of algebraic functions. In *Proceedings of the 21st ACM-SIAM Symposium on Discrete Algorithms*, SODA '10, pages 906–917, 2010.
- [C13] Sunil Arya, David M. Mount, Antoine Vigneron, and Jian Xia. Space-time tradeoffs for proximity searching in doubling spaces. In *Proceedings of the 16th European Symposium on Algorithms*, ESA '08, pages 112–123, 2008.
- [C14] Hervé Fournier and Antoine Vigneron. Fitting a step function to a point set. In *Proceedings of the 16th European Symposium on Algorithms*, ESA '08, pages 442–453, 2008.

- [C15] Siu-Wing Cheng, Hyeon-Suk Na, Antoine Vigneron, and Yajun Wang. Querying approximate shortest paths in anisotropic regions. In *Proceedings of the 23rd Symposium on Computational Geometry*, SoCG '07, pages 84–91, 2007.
- [C16] Siu-Wing Cheng, Hyeon-Suk Na, Antoine Vigneron, and Yajun Wang. Approximate shortest paths in anisotropic regions. In *Proceedings of the 18th ACM-SIAM Symposium on Discrete Algorithms*, SODA '07, pages 766–774, 2007.
- [C17] Hervé Fournier and Antoine Vigneron. Lower bounds for geometric diameter problems. In *Proceedings of the 7th Latin American Conference on Theoretical Informatics*, LATIN '06, pages 467–478, 2006.
- [C18] Boris Aronov, Mark de Berg, Otfried Cheong, Joachim Gudmundsson, Herman Haverkort, and Antoine Vigneron. Sparse geometric graphs with small dilation. In *Proceedings of the 16th International Conference on Algorithms and Computation*, ISAAC '05, pages 50–59, 2005.
- [C19] Hee-Kap Ahn, Otfried Cheong, Chong-Dae Park, Chan-Su Shin, and Antoine Vigneron. Maximizing the overlap of two planar convex sets under rigid motions. In *Proceedings of the 21st Symposium on Computational Geometry*, SoCG '05, pages 356–363, 2005.
- [C20] Hee-Kap Ahn, Peter Braß, Otfried Cheong, Hyeon-Suk Na, Chan-Su Shin, and Antoine Vigneron. Approximation algorithms for inscribing or circumscribing an axially symmetric polygon to a convex polygon. In *Proceedings of the 10th International Conference on Computing and Combinatorics*, COCOON '04, pages 259–267, 2004.
- [C21] Siu-Wing Cheng and Antoine Vigneron. Motorcycle graphs and straight skeletons. In *Proceedings of the 13th ACM-SIAM Symposium on Discrete Algorithms*, SODA '02, pages 156–165, 2002.
- [C22] Otfried Cheong, Chan-Su Shin, and Antoine Vigneron. Computing farthest neighbors on a convex polytope. In *Proceedings of the 7th International Conference on Computing and Combinatorics*, COCOON '01, pages 159–169, 2001.
- [C23] Prosenjit Bose, Pat Morin, and Antoine Vigneron. Packing two disks into a polygonal environment. In *Proceedings of the 7th International Conference on Computing and Combinatorics*, COCOON '01, pages 142–149, 2001.
- [C24] Hee-Kap Ahn, Otfried Cheong, Jiří Matoušek, and Antoine Vigneron. Reachability by paths of bounded curvature in convex polygons. In *Proceedings of the 16th Symposium on Computational Geometry*, SoCG '00, pages 251–259, 2000.

Other contributions

- [O1] Anas Ismail and Antoine Vigneron. A new trajectory similarity measure for GPS data. In *6th ACM SIGSPATIAL International Workshop on GeoStreaming*, IWGS' 15, pages 19–22, 2015.
- [O2] Tristan Bitard-Feildel, Antoine Vigneron, and Jean-François Gibrat. Protein structure prediction with a half coarse grained model and empirical functions. In *Journées Ouvertes en Biologie, Informatique et Mathématiques*, JOBIM '11, pages 283–284, 2011.
- [O3] Hee-Kap Ahn, Sang-Sub Kim, Christian Knauer, Hyeon-Suk Na, Lena Schlipf, Chan-Su Shin, and Antoine Vigneron. Covering and piercing disks with two centers. In *Proceedings of the 27th European Workshop on Computational Geometry*, EuroCG '11, pages 63–66, 2011.
- [O4] Otfried Cheong, Antoine Vigneron, and Juyoung Yon. Reverse nearest neighbor queries in fixed dimension. In *Proceedings of the 13rd Korea-Japan Joint Workshop on Algorithms and Computation*, WAAC '10, 2010.

- [O5] Hee-Kap Ahn, Christian Knauer, Marc Scherfenberg, Lena Schlipf, and Antoine Vigneron. Computing the discrete Fréchet distance with imprecise input. In *Proceedings of the 26th European Workshop on Computational Geometry*, EuroCG '10, pages 13–16, 2010.
- [O6] Otfried Cheong, Antoine Vigneron, and Juyoung Yon. Reverse nearest neighbor queries in fixed dimension. In *Proceedings of the 3rd Annual Meeting of Asian Association for Algorithms and Computation*, AAAC '10, 2010.
- [O7] Siu-Wing Cheng, Jiongxin Jin, Antoine Vigneron, and Yajun Wang. Approximate shortest homotopic paths in weighted regions. In *Proceedings of the 2nd Annual Meeting of Asian Association for Algorithms and Computation*, AAAC '09, 2009.
- [O8] Hee-Kap Ahn, Christian Knauer, Marc Scherfenberg, Lena Schlipf, and Antoine Vigneron. Computing the discrete Fréchet distance with imprecise input. In *Proceedings of the 12th Korea-Japan Joint Workshop on Algorithms and Computation*, WAAC '09, 2009.
- [O9] Sunil Arya, David M. Mount, Antoine Vigneron, and Jian Xia. Approximate Voronoi diagrams in doubling spaces. In *Proceedings of the 1st Annual Meeting of Asian Association for Algorithms and Computation*, AAAC '08, 2008.
- [O10] Boris Aronov, Mark de Berg, Otfried Cheong, Joachim Gudmundsson, Herman Haverkort, and Antoine Vigneron. Sparse geometric graphs with small dilation. In *Proceedings of the 8th Korea-Japan Joint Workshop on Algorithms and Computation*, WAAC'05, 2005.
- [O11] Hee-Kap Ahn, Otfried Cheong, Chong-Dae Park, Chan-Su Shin, and Antoine Vigneron. Approximation algorithms for maximizing the overlap of two planar convex sets under rigid motions. In *Proceedings of the Korean Computer Congress*, KCC '05, 2005.
- [O12] Kumar Gaurav Bijay and Antoine Vigneron. A practical approach to approximating diameter of point-set in low dimensions. In *Proceedings of the 17th Canadian Conference on Computational Geometry*, CCCG '05, pages 3–6, 2005.
- [O13] Sunil Arya and Antoine Vigneron. Approximating a Voronoi cell. Technical Report HKUST-TCSC-2003-10, Hong Kong University of Science and Technology, 2003.
- [O14] Antoine Vigneron. *Algorithms for computing some geometric diagrams*. PhD thesis, Hong Kong University of Science and Technology, 2002.
- [O15] Antoine Vigneron. A note on three-label point labeling. Technical Report HKUST-TCSC-2001-10, Hong Kong University of Science and Technology, 2001.
- [O16] Jean-Daniel Boissonnat and Antoine Vigneron. An elementary algorithm for reporting intersections of red/blue curve segments. In *Proceedings of the 12th Canadian Conference on Computational Geometry*, CCCG '00, 2000.
- [O17] Antoine Vigneron. Algorithmes élémentaires pour reporter les intersections d'objets courbes. Master's thesis, École Polytechnique, 1999.