

# Kiril Solovey

## CURRICULUM VITÆ

### PERSONAL INFORMATION

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**Address:** 496 Lomita Mall, William F. Durand Building, Rm. 009,  
Department of Aeronautics & Astronautics, Stanford University, CA, USA  
**E-mail:** kirilsol@stanford.edu  
**Homepage:** kirilsol.github.io

**Research Interests:** Algorithmic aspects of robotics, motion planning, sampling-based algorithms, multi-robot systems, autonomous mobility-on-demand, computational geometry

### EDUCATION AND ACADEMIC POSITIONS

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- 2018–present** Postdoctoral Scholar, Department of Aeronautics & Astronautics, Stanford University. Autonomous Systems Laboratory; PI: Prof. Marco Pavone.
- 2013–2018** Ph.D. in Computer Science, Tel-Aviv University, Israel.  
Dissertation Topic: “Multi-Robot Motion Planning: Theory and Practice”;  
Advisor: Dan Halperin.
- 2010–2013** M.Sc. in Computer Science, **magna cum laude**, Tel-Aviv University, Israel.  
Dissertation Topic: “ $k$ -Color Multi-Robot Motion Planning”; Advisor: Dan Halperin.
- 2007–2010** B.Sc. in Computer Science, **magna cum laude**, Tel-Aviv University, Israel.

### TEACHING EXPERIENCE

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Selected teaching activities in the School of Computer Science, Tel Aviv University:

- 2012–2018** Teaching assistant, *Computer Architecture* (150 undergraduate students per semester). Responsibilities included teaching weekly recitations (3h per week), teaching lecture classes (3-6h per semester), holding office hours and managing online forum, writing homework assignments, designing and grading final exam, curriculum design. **For my role in this course I earned several teaching awards (see below).**
- 2018** Teaching assistant, *Algorithmic Robotics and Motion Planning* (20 graduate students). Responsibilities included teaching lecture classes (9h) and holding office hours.
- 2013** *Teaching assistant* in the undergraduate course “Workshop in Robot Motion Planning”.

## HONORS AND AWARDS

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- 2018** RSS Pioneers travel grant, *Robotics: Science and Systems Foundation*
- 2018** **Fulbright Post-doctoral Scholar Award** (\$47,500), *United States-Israel Educational Foundation (USIEF)*
- 2015-18** **Clore Scholars Programme** (\$87,000), *Clore Israel Foundation*
- 2017** **Best paper award**, for “Scalable Asymptotically-Optimal Multi-Robot Motion Planning”, *International Symposium on Multi-Robot and Multi-Agent Systems*
- 2016** Rector’s excellence in teaching list, *Tel-Aviv University (TAU)*
- 2016** **Excellence in teaching award**, School of Computer Science, TAU
- 2015** **Rector’s excellence in teaching award**, TAU
- 2015** **Best student paper award**, and finalist for best paper, for “On the Hardness of Unlabeled Multi-Robot Motion Planning”, *Robotics: Science and Systems* conference
- 2014,15** Internship Grant, Ministry of Science, Technology, and Space, Israel
- 2015** Deutsch Prize, *School of Computer Science, TAU*
- 2011,13,14** Excellence Scholarship, *Selim and Rachel Benin Scholarship Fund*.
- 2014** Aharon and Ephraim Katzir Travel Grant of the *Batsheva de Rothschild Fund*
- 2014** Prof. Rahamimoff Travel Grant for Young Scientists of the *US-Israel Binational Science Foundation* (declined)
- 2012** Intel Award, *Intel*, Israel
- 2011** Excellence Scholarship in Memory of Brucker Haim, *Faculty of Exact Sciences, TAU*
- 2010** Yearly Stipend for Promising M.Sc. Students, *School of Computer Science, TAU*
- 2010** Dean’s Honor List, *Faculty of Exact Sciences, TAU*
- 2009** Excellence Award for B.Sc. students, *School of Computer Science, TAU*

## PUBLICATIONS

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### JOURNAL PAPERS

1. **Kiril Solovey** and Michal Kleinbort,  
“The Critical Radius in Sampling-based Motion Planning.”  
Special issue (**invited**), *International Journal of Robotics Research*, 2019.
2. Michal Kleinbort, **Kiril Solovey**, Zakary Littlefield, Kostas E. Bekris, and Dan Halperin,  
“Probabilistic completeness of RRT for geometric and kinodynamic planning with forward propagation.”  
*IEEE Robotics and Automation Letters*, 2018.
3. Andrew Dobson, **Kiril Solovey**, Rahul Shome, Dan Halperin, and Kostas E. Bekris,  
“dRRT\*: Scalable and Informed Asymptotically-Optimal Multi-Robot Motion Planning.”  
Special issue (**invited**), *Autonomous Robots*, 2018.
4. Aviel Atias, **Kiril Solovey**, Oren Salzman, and Dan Halperin,  
“Effective Metrics for Multi-Robot Motion-Planning.”  
Special issue (**invited**), *International Journal of Robotics Research*, 2018.
5. **Kiril Solovey**, Oren Salzman and Dan Halperin,  
“New Perspective on Sampling-Based Motion Planning via Random Geometric Graphs.”  
Special issue (**invited**), *International Journal of Robotics Research*, 2018.
6. **Kiril Solovey** and Dan Halperin,  
“On the Hardness of Unlabeled Multi-Robot Motion Planning.”  
Special issue (**invited**), *International Journal of Robotics Research*, 35(14): 1750-1759, 2016.

7. Oren Salzman, **Kiril Solovey** and Dan Halperin,  
“Motion Planning for Multi-Link Robots by Implicit Configuration-Space Tiling.”  
*IEEE Robotics and Automation Letters*, 1(2): 760-767, 2016.
8. **Kiril Solovey\***, Oren Salzman\* and Dan Halperin (\* equal contribution),  
“Finding a Needle in an Exponential Haystack: Discrete RRT for Exploration of Implicit Roadmaps in Multi-Robot Motion Planning.”  
Special issue (**invited**), *International Journal of Robotics Research*, 35(5): 501-513, 2016.
9. Aviv Adler, Mark de Berg, Dan Halperin and **Kiril Solovey** (alphabetical order),  
“Efficient Multi-Robot Motion Planning for Unlabeled Discs in Simple Polygons.”  
Special issue (**invited**), *Transactions on Automation Science and Engineering*, 12(4): 1309-1317, 2015.
10. **Kiril Solovey** and Dan Halperin,  
“ $k$ -Color Multi-Robot Motion Planning.”  
Special issue (**invited**), *International Journal of Robotics Research*, 33(1): 82-97, 2014.

#### PEER-REVIEWED CONFERENCE PROCEEDINGS

1. **Kiril Solovey**, Mauro Salazar and Marco Pavone,  
“Scalable and Congestion-aware Routing for Autonomous Mobility-on-Demand via Frank-Wolfe Optimization.”  
In *Robotics: Science and Systems*, Freiburg im Breisgau, Germany, 2019.
2. Michal Kleinbort, **Kiril Solovey**, Zakary Littlefield, Kostas E. Bekris, and Dan Halperin,  
“Probabilistic completeness of RRT for geometric and kinodynamic planning with forward propagation.”  
In *International Conference on Robotics and Automation*, Montreal, QC, Canada, 2019.
3. Rahul Shome, **Kiril Solovey**, Jingjin Yu, Dan Halperin and Kostas Bekris,  
“Fast, High-Quality Dual-Arm Rearrangement in Synchronous, Monotone Tabletop Setups.”  
In *Workshop on the Algorithmic Foundations of Robotics*, Universidad Politecnica de Yucatan, Merida, Mexico, 2018.
4. **Kiril Solovey** and Michal Kleinbort,  
“The Critical Radius in Sampling-based Motion Planning.”  
In *Robotics: Science and Systems*, Carnegie Mellon University, PA, USA, 2018.
5. Andrew Dobson, **Kiril Solovey**, Rahul Shome, Dan Halperin, and Kostas E. Bekris,  
“Scalable Asymptotically-Optimal Multi-Robot Motion Planning.”  
In *International Symposium on Multi-Robot and Multi-Agent Systems*, **best paper award**, 2017.
6. **Kiril Solovey** and Dan Halperin,  
“Efficient sampling-based bottleneck pathfinding over cost maps.”  
In *International Conference on Intelligent Robots and Systems*, Vancouver, BC, Canada, 2017.
7. Aviel Atias, **Kiril Solovey** and Dan Halperin,  
“Effective Metrics for Multi-Robot Motion-Planning.”  
In *Robotics: Science and Systems*, MIT, MA, USA, 2017.
8. **Kiril Solovey** and Dan Halperin,  
“Asymptotically-Optimal Bottleneck Pathfinding with Applications to Fréchet-Type Optimization.”  
In *European Symposium on Algorithms*, 76:1-76:16, Aarhus, Denmark, 2016.
9. **Kiril Solovey**, Oren Salzman and Dan Halperin,  
“New Perspective on Sampling-Based Motion Planning via Random Geometric Graphs.”  
In *Robotics: Science and Systems*, University of Michigan, MI, USA, 2016.

10. **Kiril Solovey**, Jingjin Yu, Or Zamir and Dan Halperin,  
“Motion Planning for Unlabeled Discs with Optimality Guarantees.”  
In *Robotics: Science and Systems*, Sapienza University of Rome, Italy, 2015.
11. **Kiril Solovey** and Dan Halperin,  
“On the Hardness of Unlabeled Multi-Robot Motion Planning.”  
In *Robotics: Science and Systems*, **finalist for best paper, and winner of best student paper**, Sapienza University of Rome, Italy, 2015. Also in *International Symposium on Computational Geometry, Young Researchers Forum*, Eindhoven, The Netherlands, 2015.
12. Aviv Adler, Mark de Berg, Dan Halperin and **Kiril Solovey** (alphabetical order),  
“Efficient Multi-Robot Motion Planning for Unlabeled Discs in Simple Polygons.”  
In *Workshop on Algorithmic Foundations of Robotics*, p 1-17, Istanbul, Turkey, 2014. Also in *European Workshop on Computational Geometry*, Ein Gedi, Israel, 2014.
13. **Kiril Solovey\***, Oren Salzman\* and Dan Halperin (\* equal contribution),  
“Finding a Needle in an Exponential Haystack: Discrete RRT for Exploration of Implicit Roadmaps in Multi-Robot Motion Planning.”  
In *Workshop on Algorithmic Foundations of Robotics*, p 591-607, Istanbul, Turkey, 2014.
14. **Kiril Solovey** and Dan Halperin,  
“ $k$ -Color Multi-Robot Motion Planning.”  
In *Workshop on Algorithmic Foundations of Robotics*, p 191-207, Cambridge, MA, USA, 2012.

## DISSERTATIONS

- **Kiril Solovey**,  
“Multi-Robot Motion Planning: Theory and Practice.”  
PhD thesis, *Tel Aviv University*, March 2018. Advisor: Dan Halperin.
- **Kiril Solovey**,  
“ $k$ -Color Multi-Robot Motion Planning.”  
Master’s thesis, *Tel Aviv University*, February 2013. Advisor: Dan Halperin.

## BOOK CHAPTERS

- Dan Halperin, Lydia Kavraki and **Kiril Solovey** (alphabetical order),  
“Robotics”, in the *Handbook of Discrete and Computational Geometry*, Eds. Jacob E. Goodman, Joseph O’Rourke, and Csaba D. Toth. CRC Press LLC, 2017.

## MANUSCRIPTS AND WORK IN PROGRESS

- Robin Brown, Federico Rossi, **Kiril Solovey**, Michael T. Wolf, and Marco Pavone,  
“Exploiting Locality and Structure for Distributed Optimization in Multi-Agent Systems”,  
Submitted to *European Control Conference*, 2020.
- Matthew Tsao, **Kiril Solovey**, and Marco Pavone,  
“Sample Complexity of Probabilistic Roadmaps via Epsilon-nets”,  
Submitted to *International Conference on Robotics and Automation*, 2020.
- Shushman Choudhury, **Kiril Solovey**, Mykel Kochenderfer, and Marco Pavone,  
“Efficient Large-Scale Multi-Drone Delivery Using Transit Networks”,  
Submitted to *International Conference on Robotics and Automation*, 2020.

- Michal Kleinbort, **Kiril Solovey**, Riccardo Bonalli, Kostas Bekris, and Dan Halperin, “RRT2.0 for Fast and Optimal Kinodynamic Sampling-Based Motion Planning”, Submitted to *IEEE Robotics and Automation Letters*, and *International Conference on Robotics and Automation*, 2020.
- **Kiril Solovey**, Lucas Janson, Edward Schmerling, Emilio Frazzoli, and Marco Pavone, “Revisiting the Asymptotic Optimality of RRT\*”, Submitted to *International Conference on Robotics and Automation*, 2020.
- **Kiril Solovey**, “Complexity of Planning”, Section on “Motion Planning”, in the *Encyclopedia of Robotics*, Eds. Marcelo H. Ang Jr., Oussama Khatib, and Bruno Siciliano; Section Ed. Lydia E. Kavraki. Springer Press, in preparation, 2019.
- Rahul Shome, **Kiril Solovey**, Jingjin Yu, Dan Halperin and Kostas Bekris, “Fast, High-Quality Dual-Arm Rearrangement in Synchronous, Monotone Tabletop Setups.” Submitted to a special issue (**invited**) of *Transactions on Automation Science and Engineering*, 2019.
- Saptarshi Bandyopadhyay\*, **Kiril Solovey**\*, Federico Rossi, Michael T. Wolf, and Marco Pavone, “Distributed Predictive Task Allocation in Multi-Robot Systems”, In preparation, 2019.

## RESEARCH VISITS

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- 2017** Microsoft Research, Theory Group, led by Yuval Peres, Redmond, WA, USA (two weeks).
- 2016** IEEE RAS Summer School on Multi-Robot Systems, National University of Singapore.
- 2015** Workshop on Geometric Problems on Sensor Networks and Robots, IBM Research, Yorktown Heights, NY, USA.
- 2014** Kavraki Lab, led by Lydia Kavraki, Rice University, Houston, TX, USA (three weeks).
- 2014** PRACSYS Group, led by Kostas Bekris, Rutgers University, Piscataway, NJ, USA (one week).

## TALKS AND PRESENTATIONS

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### INVITED TALKS

- “Scalable and Congestion-aware Routing for Autonomous Mobility-on-Demand via Frank-Wolfe Optimization.”
  - Computer Science Department Colloquium, Rutgers University, New Brunswick, NJ, USA, August, 2019.
  - Computational Geometry Seminar, School of Computer Science, Tel Aviv University, Israel, July, 2019.
  - TASP Seminar, Technion, Haifa, Israel, July, 2019.
  - ILIAD Lab, Department of Computer Science, Stanford University, CA, USA, February, 2019.
- Guest lecturer at AA274, “Principles of Robotic Autonomy”, Department of Aeronautics and Astronautics, Stanford University, CA, USA, March, 2019.
- “The critical radius in sampling-based motion planning”
  - Foundations of Robotics Seminar, Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, USA, October, 2017.

- Autonomous Systems Laboratory, Department of Aeronautics and Astronautics, Stanford University, CA, USA, October, 2017.
- School of Computer Science, University of British Columbia, Vancouver, BC, Canada, September, 2017.
- “Introduction to Sampling-Based Robot Motion Planning”. Theory Group, Microsoft Research, Redmond, WA, USA, April 2017.
- “Recent Progress in Multi-Robot Motion Planning.”
  - Courses “Introduction to Robotics” and “Multi-Robot Systems”, Computer Science Department, Bar Ilan University, Ramat Gan, Israel, April 2015.
  - Group Seminar at Kavradi Lab, Rice University, Houston, TX, USA, September 2014.
  - Group Seminar at PRACSYS Group, Rutgers University, Piscataway, NJ, USA, September 2014.

## CONFERENCE AND WORKSHOP TALKS

- “Scalable and Congestion-aware Routing for Autonomous Mobility-on-Demand via Frank-Wolfe Optimization.”  
*Robotics: Science and Systems*, Freiburg im Breisgau, German, 2019.
- “The Critical Radius in Sampling-based Motion Planning.”  
*Robotics: Science and Systems* and *RSS Pioneers*, Carnegie Mellon University, PA, USA, 2018.
- “Efficient sampling-based bottleneck pathfinding over cost maps”  
*International Conference on Intelligent Robots and Systems*, Vancouver, BC, Canada, September 2017.
- “Applications of Random Geometric Graphs in Robot Motion Planning.”  
*Workshop on Random Geometric Graphs and their Applications in Complex Networks*, Banff, Alberta, Canada, November 2016.
- “Asymptotically-Optimal Bottleneck Pathfinding with Applications to Fréchet-Type Optimization.”  
*European Symposium on Algorithms*, Aarhus, Denmark, August 2016.
- “New Perspective on Sampling-Based Motion Planning via Random Geometric Graphs.”  
*Robotics: Science and Systems*, Ann Arbor, MI, USA, June 2016.
- “On the Hardness of Unlabeled Multi-Robot Motion Planning.”
  - *Robotics: Science and Systems*, Rome, Italy, July 2015.
  - *International Symposium on Computational Geometry, Young Researchers Forum*, Eindhoven, The Netherlands, June 2015.
- “Motion Planning for Unlabeled Discs with Optimality Guarantees.”  
*Robotics: Science and Systems*, Rome, Italy, July 2015.
- “Efficient Multi-Robot Motion Planning for Unlabeled Discs in Simple Polygons.”
  - *Workshop on Algorithmic Foundations of Robotics*, Istanbul, Turkey, August 2014.
  - *European Workshop on Computational Geometry*, Ein Gedi, Israel, March 2014.
- “Finding a Needle in an Exponential Haystack: Discrete RRT for Exploration of Implicit Roadmaps in Multi-Robot Motion Planning.”  
*Workshop on Algorithmic Foundations of Robotics*, Istanbul, Turkey, August 2014.
- “Pebbles, Manifolds and Multi-Robot Motion Planning .”  
*Computational Geometry Learning Research Workshop*, Berlin, Germany, December 2012.

- “*k*-Color Multi-Robot Motion Planning.”
  - *Workshop on Algorithmic Foundations of Robotics*, Cambridge, MA, USA, June 2012.
  - *Israeli Conference on Robotics*, Tel Aviv, Israel, November 2013.

## SERVICE

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### COMMITTEES AND ORGANIZATION

- Program committee, *Workshop on the Algorithmic Foundations of Robotics*, Oulu, Finland, 2020.
- Publicity chair and session chair, *International Symposium on Multi-Robot and Multi-Agent Systems*, Rutgers University, New Brunswick, NJ, USA, 2019.
- Program committee, *RSS Pioneers*, Freiburg, Germany, 2019.

### JOURNAL REVIEWER

- IEEE Transactions on Automation Science and Engineering
- IEEE Robotics and Automation Letters
- International Journal of Robotics Research
- Journal of Computational Geometry
- IEEE Transactions on Industrial Informatics
- Artificial Intelligence Journal
- Robotica
- Journal of Field Robotics
- IEEE Transactions on Robotics
- IEEE Transactions on Control of Network Systems
- Robotics and Autonomous Systems

### CONFERENCE REVIEWER

- Robotics: Science and Systems
- IEEE/RSJ International Conference on Intelligent Robots and Systems
- IEEE International Conference on Robotics and Automation
- International Symposium on Computational Geometry
- International Workshop on the Algorithmic Foundations of Robotics
- European Symposium on Algorithms
- International Colloquium on Automata, Languages and Programming
- IEEE International Conference on Systems, Man, and Cybernetics
- Conference on Robot Learning

## MILITARY SERVICE

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**2004–2007** Full mandatory army service, Human Resources Branch, Israeli Defence Force.