

Amir Ali Ahmadi

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Current Affiliations at Princeton University

Assistant Professor Dept. of Operations Research and Financial Engineering	September 2014 – Present
Affiliated Faculty Dept. of Computer Science	June 2015 – Present
Affiliated Faculty Dept. of Mechanical and Aerospace Engineering	May 2017 – Present
Academic-Athletic Fellow, Men's Tennis Team	October 2015 – Present

Previous Affiliation

2012-2014 Herman Goldstine Fellow Department of Business Analytics and Mathematical Sciences IBM Watson Research Center (Goldstine Fellowship is awarded annually to at most two candidates in all areas of mathematical and computer sciences.)	Sept. 2012 – Aug. 2014
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Postdoctoral Experience

Computer Science and Artificial Intelligence Laboratory (CSAIL) Robot Locomotion Group, Laboratory for Information and Decision Systems (LIDS) Massachusetts Institute of Technology	Sept. 2011 – Sept. 2012
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Education

Massachusetts Institute of Technology Ph.D., Electrical Engineering and Computer Science (Minor in Mathematics) <ul style="list-style-type: none">Thesis: "Algebraic Relaxations and Hardness Results in Polynomial Optimization and Lyapunov Analysis"Advisor: Pablo A. Parrilo – Affiliation: LIDS	2008 – 2011
Massachusetts Institute of Technology S.M., Electrical Engineering and Computer Science (GPA: 5.0/5.0) <ul style="list-style-type: none">Thesis: "Non-monotonic Lyapunov Functions for Stability of Nonlinear and Switched Systems: Theory and Computation"Advisor: Pablo A. Parrilo – Affiliation: LIDS	2006 – 2008
University of Maryland B.S., Electrical Engineering <ul style="list-style-type: none">Ranked (strictly) 1st in the Dept., University Honors, Electrical Eng. Honors B.S., Mathematics <ul style="list-style-type: none">Ranked 1st in the Dept., University Honors	2002 – 2006

Selected Awards and Distinctions

For teaching

1. **Phi Beta Kappa Award for Excellence in Undergraduate Teaching** 2017
Awarded annually to two faculty members across the Princeton campus
2. **Excellence in Teaching of Operations Research Award** (international award given by the Institute for Industrial and Systems Engineers; for the development of ORF 363) 2017
3. **Teaching Award of Princeton University's Engineering Council** 2015
For ORF 363/COS 323: Computing and Optimization, taught in Fall 2014
4. **Princeton Engineering Commendation List for Outstanding Teaching**
 - o Fall 2014, Spring 2015, Fall 2015, Spring 2016, Fall 2016, Spring 2017.

For research

1. **Sloan Fellowship** (in Computer Science) 2017
2. **NSF CAREER Award** (first attempt) 2016-2021
3. **Google Faculty Research Award** 2016
"Aimed to recognize and support world-class, permanent faculty perusing cutting-edge research in areas of mutual interest to Google"
4. **DARPA Faculty Award** 2017
(The career award of the Defense Advanced Research Projects Agency)
5. **Best SICON Paper Prize** 2015
For one of two most outstanding papers published in the SIAM Journal on Control and Optimization in the years 2013-2015
6. **Princeton University's Howard B. Wentz, Jr. Junior Faculty Award** 2016
For excellence in research and teaching
7. **NSF Junior Oberwolfach Fellowship** 2016
Awarded in conjunction with the Mathematisches Forschungsinstitut Oberwolfach in Germany to support the participation of outstanding junior scientists from US universities in research activities at Oberwolfach
8. **AFOSR YIP** (first attempt) 2014-2017
Air Force Office of Scientific Research Young Investigator Program Award (AF career award)
9. **INFORMS Computing Society Prize** 2012
For the best paper or best series of related papers at the interface of Operations Research and Computer Science.
10. **IBM Watson Herman Goldstine Fellowship in Mathematical Sciences** 2012, 2013
Awarded annually to at most two candidates in all areas of mathematical and computer sciences. Only one fellowship awarded in 2012
11. **ICRA Best Paper Award** 2013
For best paper at the 30th IEEE International Conference on Robotics and Automation
12. **NSF Junior Oberwolfach Fellowship** 2015
13. **NSF Junior Oberwolfach Fellowship** 2014
14. **AMS-Simons Travel Award** 2012-2014
Awarded by the American Mathematical Society and the Simons Foundation to assist with research-related travel of early-career mathematicians for two years
15. **Best Student-Paper Award Finalist at CDC** 2008
Awarded at the 47th IEEE Conference on Decision and Control (CDC)
16. **Young Engineer Prize, 1st Place Award**, Washington Society of Engineers 2006
17. **Best undergraduate technical paper, 1st Prize**, District of Columbia Council of Eng. 2006

Selected Publications (full list available at <http://aaa.princeton.edu/publications>)

1. A. A. Ahmadi, G. Hall. **On the construction of converging hierarchies for polynomial optimization based on certificates of global positivity.** Submitted, available on arxiv, 2017.
2. A. A. Ahmadi, J. Zhang. **Semidefinite programming for Nash equilibria in bimatrix games.** Submitted, available on arxiv, 2017.
3. A. A. Ahmadi, E. de Klerk, G. Hall. **Polynomial norms.** Submitted, available on arxiv, 2017.
4. A. A. Ahmadi, A. Majumdar. **DSOS and SDSOS optimization: more tractable alternatives to sum of squares and semidefinite optimization.** Submitted, available on arxiv, 2017.
5. A. A. Ahmadi, G. Hall. **DC Decomposition of nonconvex polynomials with algebraic techniques.** *Mathematical Programming*, 2017.
6. A. A. Ahmadi, G. Hall. **Sum of squares basis pursuit with linear and second order cone programming.** *Contemporary Mathematics*, 2017.
7. A. A. Ahmadi, S. Dash, G. Hall. **Optimization over structured subsets of positive semidefinite matrices with column generation.** *Discrete Optimization*, 2016.
8. A. A. Ahmadi, P.A. Parrilo. **Sum of squares certificates for stability of planar, homogeneous, and switched systems.** *IEEE Trans. on Automatic Control*, 2017.
9. A. A. Ahmadi, P.A. Parrilo. **Some recent directions in algebraic methods for optimization and Lyapunov analysis.** *Geometric and Numerical Foundations of Movements*, Editors: J.P. Laumond, N. Mansard, J.B. Lasserre, *Springer Tracts in Advanced Robotics (Book Chapter)*, 2017.
10. A. A. Ahmadi, R. Jungers. **Lower bounds on complexity of Lyapunov functions for switched systems.** *Nonlinear Analysis: Hybrid Systems*, 2016.
11. A. A. Ahmadi, G. Hall, A. Papachristodoulou, J. Saunderson, and Y. Zheng. **Improving efficiency and scalability of sum of squares optimization: recent advances and limitations.** *In Proceedings of the IEEE Conference on Decision and Control*, 2017.
12. A. A. Ahmadi, A. Majumdar. **Some applications of polynomial optimization in operations research and real-time decision making.** *Optimization Letters*, 2016.
13. R. Jungers, A. A. Ahmadi, P. A. Parrilo, and M. Roozbehani. **A characterization of Lyapunov inequalities for stability of switched systems.** *IEEE Trans. on Automatic Control*, 2017.
14. A. A. Ahmadi, R. Jungers. **Sos-convex Lyapunov functions for stability of nonlinear difference inclusions.** Submitted, 2017.
15. A. A. Ahmadi, G. Hall, A. Makadia, and V. Sindhvani. **Sum of squares polynomials and geometry of 3D environments.** In proceedings of Robotics: Science and Systems, 2017.
16. A. A. Ahmadi, R. Jungers, P. A. Parrilo, and M. Roozbehani. **Joint spectral radius and path-complete graph Lyapunov functions.** *SIAM Journal on Control and Optimization*, 2014. (Winner of the Best SICON Paper Prize, 2013-2015)
17. A. A. Ahmadi and P. A. Parrilo. **A complete characterization of the gap between convexity and sos-convexity.** *SIAM Journal on Optimization*, 2013. (Winner of the 2012 INFORMS Computing Society Prize)
18. A. A. Ahmadi, A. Olshevsky, P. A. Parrilo, and J. N. Tsitsiklis. **NP-hardness of deciding convexity of quartic polynomials and related problems.** *Mathematical Programming*, 2013. (Winner of the 2012 INFORMS Computing Society Prize)
19. A. A. Ahmadi and P. A. Parrilo. **A convex polynomial that is not sos-convex.** *Mathematical Programming*, 2012. (Winner of the 2012 INFORMS Computing Society Prize)
20. (a) A. A. Ahmadi. **Polynomial optimization for analysis of dynamical systems.** *Oberwolfach Reports* (MFO1606b: Applied Koopmanism), *European Mathematical Society*, 2016.
(b) A. A. Ahmadi. **LP and SOCP-based algebraic techniques for nonlinear and integer optimization.** *Oberwolfach Reports* (MFO1543: Mixed-integer nonlinear optimization: a hatchery for modern mathematics), *European Mathematical Society*, 2015.

- (c) A. A. Ahmadi. **Computation of the joint spectral radius with optimization techniques.** *Oberwolfach Reports* (MFO1415: Real algebraic geometry with a view towards systems control and free positivity), *European Mathematical Society*, 2014.
21. A. A. Ahmadi, O. Gunluk. **Robust-to-dynamics linear programming.** In *Proceedings of the IEEE Conference on Decision and Control*, 2015.
 22. A. A. Ahmadi and A. Majumdar. **DSOS and SDSOS optimization: LP and SOCP alternatives to SOS optimization.** In *Proceedings of the 48th Annual Conference on Information Sciences and Systems*, 2014.
 23. A. A. Ahmadi, R. Jungers. **On complexity of Lyapunov functions for switched linear systems.** In *Proceedings of the World Congress of the International Federation of Automatic Control*, 2014.
 24. A. A. Ahmadi, P. A. Parrilo. **Towards scalable algorithms with formal guarantees for Lyapunov analysis of control systems via algebraic optimization.** In *Proceedings of the IEEE Conference on Decision and Control*, 2014.
 25. A. A. Ahmadi, D. Malioutov, R. Luss. **Robust minimum volume ellipsoids and higher order polynomial level sets.** *NIPS Workshop on Optimization in Machine Learning*, 2014.
 26. A. A. Ahmadi. **Computational and Algebraic Aspects of Convexity.** *Newsletter of the INFORMS Computing Society*, 2013.
 27. A. A. Ahmadi. **On the difficulty of deciding asymptotic stability of cubic homogeneous vector fields.** In *Proceedings of the 2012 American Control Conference*, 2012. ([Best presentation award in session on Stability of Nonlinear Systems](#))
 28. A. A. Ahmadi, R. Jungers, P. A. Parrilo, and M. Roozbehani. **Analysis of the joint spectral radius via Lyapunov functions on path-complete graphs.** *Hybrid Systems: Computation and Control (Book Chapter)*, 2011.
 29. A. A. Ahmadi, A. Majumdar, and R. Tedrake. **Complexity of ten decision problems in continuous time dynamical systems.** *The American Control Conference*, 2013.
 30. A. A. Ahmadi, R. Jungers. **Sos-convex Lyapunov functions with applications to nonlinear switched systems.** In *Proceedings of the IEEE Conference on Decision and Control*, 2013.
 31. A. A. Ahmadi, P. A. Parrilo. **Joint spectral radius of rank-one matrices and the maximum cycle mean problem.** In *Proceedings of the IEEE Conference on Decision and Control*, 2012.
 32. A. Majumdar, A. A. Ahmadi, R. Tedrake. **Control and verification of high-dimensional systems via DSOS and SDSOS optimization.** In *Proceedings of the IEEE Conference on Decision and Control*, 2014.
 33. A. Majumdar, A. A. Ahmadi, R. Tedrake. **Control design along trajectories via sum of squares optimization.** In *Proceedings of the IEEE Conference on Robotics and Automation*, 2013.
 34. A. A. Ahmadi, P. A. Parrilo. **Converse results on existence of sum of squares Lyapunov functions.** In *Proceedings of the IEEE Conference on Decision and Control*, 2011.
 35. A. A. Ahmadi, M. Krstic, P. A. Parrilo. **A globally asymptotically stable polynomial vector field with no polynomial Lyapunov function.** In *Proceedings of the IEEE Conference on Decision and Control*, 2011.
 36. A. A. Ahmadi and P. A. Parrilo. **On higher order derivatives of Lyapunov functions.** In *Proceedings of the American Control Conference*, 2011.
 37. A. A. Ahmadi, P. A. Parrilo. **On the equivalence of algebraic conditions for convexity and quasiconvexity of polynomials.** In *Proceedings of the IEEE Conference on Decision and Control*, 2010.
 38. A. A. Ahmadi, P. A. Parrilo. **A positive definite polynomial Hessian that does not factor.** In *Proceedings of the IEEE Conference on Decision and Control*, 2009.
 39. A. A. Ahmadi and P. A. Parrilo. **Non-monotonic Lyapunov functions for stability of discrete time nonlinear and switched systems.** In *Proceedings of the 47th IEEE Conference on Decision and Control*, 2008. ([Best student paper award finalist](#))

Working papers

40. A. A. Ahmadi, O. Gunluk. **Robust-to-dynamics optimization**. In preparation, 2017.
41. A. A. Ahmadi, B. El Khadir. **Time-varying semidefinite programming**. In preparation, 2017.
42. A. A. Ahmadi, M. Curmei, G. Hall. **Monotone regression with polynomials**. In preparation, 2017.
43. A. A. Ahmadi, G. Blekherman, P.A. Parrilo. **Convex ternary quartics are sos-convex**. In preparation, 2017.
44. J. Eisenberg (undergrad student), A. A. Ahmadi. **Determining the boundary of the Major League Baseball strike zone: a semidefinite optimization approach**. In preparation, 2017.
45. M. Wattendorf (undergrad student), A. A. Ahmadi, K. Varshney. **Predicting points in tennis**. In preparation, 2017.

Selected Invited Talks (out of >90)

Plenary talks and talks in single-track invited meetings

1. Dynamical Systems, Control and Optimization (Plenary Speaker), Liege, Belgium 5/15
2. Workshop on Nonconvex Statistical Learning, USC, 5/17
3. Workshop on Hybrid Systems, UT Austin, 6/17
4. Applied Koopmanism, Oberwolfach, 2/16
5. Mixed Integer Nonlinear Optimization, Oberwolfach, 10/15
6. Real Algebraic Geometry with a View Towards Systems Control, Oberwolfach, 4/14
7. The 2016 Mixed Integer Programming Workshop, Univ. of Miami, 5/16
8. Uncertain Dynamical Systems, the Royal Netherlands Academy of Arts and Sciences, 8/14
9. Geometry and Algebra of Linear Matrix Inequalities, CIRM, Marseille, 11/13
10. Mixed Integer Nonlinear Programming, Institut Henri Poincare, Paris, 9/13
11. Polynomial Optimization, Isaac Newton Inst. For Math. Sciences, Cambridge, UK, 7/13

Departmental colloquia and seminars

12. The Program in Applied and Computational Mathematics, Princeton University 9/17
13. Oxford University, Dept. of Mathematics, Numerical Analysis Group 5/17
14. Institute for Advanced Studies, Princeton University 2/17
15. UPenn, Dept. of Electrical and Systems Engineering 10/17
16. Laboratoire d'analyse et d'architecture des systems, Toulouse 6/16
17. Ecole Polytechnique, Dept. of Computer Science, Paris 07/16
18. Lehigh University, Dept. of Industrial and Systems Engineering, 8/16
19. University of Texas at Austin, Dept. of Aerospace Engineering and Engineering Mechanics, 10/16
20. University of Chicago, Booth School of Business, 3/16
21. University of Chicago, Booth School of Business, 12/15
22. Google Research, 11/15
23. Department of Computer Science, Princeton University, 10/15
24. University of Chicago, Dept. of statistics, 5/15
25. Queen's University, Dept. Mathematics and Statistics, 3/15
26. Northwestern Univ., Electrical Engineering & Kellogg School of Management, 5/15
27. Georgia Tech, Dept. of Industrial and Systems Engineering (ISyE), 10/14

28. Univ. of Texas at Austin, Program in Operations Research and Industrial Engineering, 5/15
29. Tilburg University, Dept. of Econometrics and Operations Research, Netherlands, 8/14
30. Institute for Systems Theory and Automatic Control, University of Stuttgart, 4/14
31. Rutgers University, Center for Operations Research, 4/13
32. IBM Research, Dept. of Business Analytics and Math. Sciences, 11/12
33. Princeton University, Dept. of Operations Research and Financial Eng., 2/13
34. NYU, Dept. of Computer Science, 3/13
35. Univ. of Wisconsin, Institute for Discovery, 2/12
36. Boston University, Dept. of Electrical Engineering, 3/12
37. Univ. of Maryland, Dept. of Electrical Engineering, 3/12
38. IBM Research, Dept. of Business Analytics and Math. Sciences, 10/12
39. Universite catholique de Louvain, Dept. of Systems Eng., 11/12
40. Univ. of California San Diego, Dept. of Mechanical and Aerospace Eng., 3/11
41. Univ. of California Davis, Dept. of Mathematics, 3/11
42. MIT, Robot Locomotion Group, 5/11

Invited tutorial lectures

43. Robust optimization based control and planning, International Conference on Robotics and Automation, Stockholm, 5/16
44. INFORMS Optimization Society meeting, Princeton University, 3/16
45. Big data and sparsity in system identification and control, IEEE Conference on Decision and Control, Los Angeles, 12/14
46. Recent advances in semialgebraic geometry: applications in system identification, estimation and filtering, IEEE Conference on Decision and Control, Florence, 12/13
47. Recent advances in scalability of sum of squares optimization: IEEE Conference on Decision and Control, 10/17

Invited talks in other meetings and conferences

48. SIAM Conference on Applied Algebraic Geometry, 8/17
49. Foundations of Computational Mathematics, 7/17
50. SIAM Conference on Applied Algebraic Geometry, 8/15
51. Meeting of the American Mathematical Society, San Antonio, 1/15
52. Meeting of the American Mathematical Society, Wisconsin, 8/12
53. Meeting of the Mathematical Association of America, Boston, '12
54. INFORMS Computing Society, 1/17
55. INFORMS International Conference, Hawaii, 6/16
56. SIAM Conference on Optimization, '11, '14, '17
57. SIAM Conference on Applied Algebraic Geometry, '11, '15
58. International Conference on Continuous Optimization, '13, '16
59. International Symposium on Mathematical Programming, '12, '15
60. INFORMS Annual meeting, '09, '13, '14, '15, '16, '17
61. Modeling and Optimization: Theory and Applications, '14, '16, '17
62. AFOSR Workshop on Dynamics and Control, 8/16, 8/17
63. SIAM Annual Meeting, '17
64. American Control Conference, '18

Teaching

- **ORF 363/ COS 323, “Computing and Optimization”** Fall ‘14, ‘15, ‘16, ‘17 Princeton Univ.
 - Course website: <http://aaa.princeton.edu/orf363>
 - Winner of the Excellence in Teaching of Operations Research Award by the Institute for Industrial and Systems Engineers
 - Winner of the 2017 Phi Beta Kappa Award for Excellence in Undergraduate Teaching by Princeton University
 - Winner of the 2014 Teaching Award of the Engineering Council of Princeton University
 - Princeton Engineering Commendation List for Outstanding Teaching (every semester)
- **ORF 523, “Convex and Conic Optimization”** Spring’15, ‘16, ‘17 Princeton Univ.
 - Course website: <http://aaa.princeton.edu/orf523>
 - Princeton Engineering Commendation List for Outstanding Teaching (every semester)

Funding sources (\$1,570,000 total)

- **NSF CAREER Award** (2016-2021, \$500K)
For project titled “Polynomial Optimization and Dynamical Systems”
Award received on first attempt
- **DARPA Faculty Award** (2017-2019, \$500K)
For project titled “Exploiting Geometry in the Design of Scalable Algebraic Relaxations for Nonconvex Polynomial Optimization”
- **AFOSR Young Investigator Award** (2014-2017, \$360K)
For project titled “Scalable Algorithms with Formal Guarantees for Lyapunov Analysis of Control Systems via Algebraic Optimization”
Award received on first attempt
- **Google Faculty Research Award** (2017-2018, \$82K)
For project titled “Scalable Sum of Squares Optimization for Machine Learning”
- **Sloan Fellowship in Computer Science** (2017-2019, \$60K)
- **Gaspard Monge Program for Optimisation and Operational Research Award** (2016-2017, €13K)
Co-PIs: Leo Liberti, Claudia D’Ambrosio (Ecole Polytechnique, Paris)
For project titled “Fast relaxations of the optimal power flow problem”
- **AMS-Simons Travel Grant** (2012-2014, \$4K)
- **NSF Oberwolfach Fellowship** (three-time recipient: 2014, 2015, 2016, €1.4K)
- **The Howard B. Wentz, Jr. Faculty Award by Princeton SEAS** (\$45K)
- **AFOSR, MURI** (currently in final round of competition)
For project titled “Verifiable, Control-Oriented Learning on the Fly”
In collaboration with Princeton MAE, Math, UT Austin, and Northeastern Univ.

Professional Activities – Service to ORFE, Princeton University, and the research community

ORFE

- Initiator and first organizer of the Princeton Optimization Seminar (41 seminars held in 2014-2017)
 - Past talks: <https://orfe.princeton.edu/events/optimization-seminar/past>
- Organizer of the ORFE Colloquium, Fall 2016 & Spring 2017

- On the PhD Final Public Oral Examination Committee of
 - Changle Lin (advised by Prof. John Mulvey), 9/16
 - Firdevs Ulus (advised by Prf. Birgit Rudloff), 8/15
 - Maximilian Goer (advised by Prof. John Mulvey), 8/15
- On the General/Qualification Examination Committee of
 - Jeffrey Zhang, 5/16
 - Thomas Pumir, 5/16
 - Jing Ye, (advised by Prof. John Mulvey), 5/15
 - Kaizheng Wang (advised by Prof. Jianqing Fan), 5/17
 - Bachir El Khadir, 5/17
 - Sinem Uysal, 8/17
 - Zach Hervieux, 8/17

Princeton University

- Freshman Advisor and Faculty Advisor for Whitman College, 2017-2018
- Freshman Advisor and Faculty Advisor for Whitman College, 2016-2017
- Freshman Advisor and Faculty Advisor for Whitman College, 2015-2016
- Academic-Athletic Fellow of Princeton's Men's Tennis Team, 2015-present
- On the PhD Final Public Oral Examination Committee of
 - Katie Fitch, Mechanical Engineering (advised by Prof. Naomi Leonard), 10/16
 - Chu Wang, PACM (advised by Prof. Bernard Chazelle), 6/16
- On the General Examination Committee of
 - Desmond Zhong, Mechanical Engineering (advised by Prof. Naomi Leonard), 1/17
 - Jose Simoes Bravo Ferreira, PACM (advised by Prof. Amit Singer), 8/15
 - Yuan Liu, PACM (advised by Prof. Amit Singer), 10/15

Research community at large

- Tutorial lectures on algebraic methods in optimization:
 - 2016 International Conference on Robotics and Optimization
 - 2017 IEEE Conference on Decision and Control
 - 2014 IEEE Conference on Decision and Control
 - 2013 IEEE Conference on Decision and Control
- Co-organizer (with my student Georgina Hall) of a workshop on "Solving large-scale semidefinite programs in control, machine learning, and robotics" at the 2016 IEEE Conference on Decision and Control
 - <http://aaa.princeton.edu/largesdps>
- On the organizing committee of:
 - The 2016 INFORMS Optimization Society Conference
 - The 2016 INFORMS International Conference, Cluster on Optimization
- On the technical committee of:
 - IEEE Conference on Decision and Control, '17
 - Control systems society: computational aspects of control system design, '16
 - 5th IFAC Workshop on Estimation and Control in Networked Systems, '15

- DIMACS Workshop on the Geometry of Distances, '16
 - IEEE Symp. on Signal and Information Processing in Finance and Economics, '13
- Organizer of >15 technical sessions at major optimization meetings including ISMP, SIOPT, ICCOPT, INFORMS, MOPTA.
- Mathematics mentor at the Julia Robinson Math Festival (a program aimed at inspiring primary and middle-school students to pursue mathematics), Princeton University, Spring 2015 & Spring 2016
- Co-organizer of the Julia Robinson Math Festival at Princeton University, Spring 2017

Graduate students advised at Princeton University

- Georgina Hall, final year, ORFE (website: <http://scholar.princeton.edu/ghall>)
 - Algebraic techniques for polynomial optimization.
- Jeffrey Zhang, 4th year, ORFE
 - Optimization in game theory.
- Bachir El Khadir, 3rd year, ORFE (website: <https://scholar.princeton.edu/bachir>)
 - Time-varying convex optimization.
- Cemil Dibek, 2nd year, ORFE
 - Co-advised with Prof. Maria Chudnovsky.
 - Semidefinite optimization for graph coloring.

Undergraduate theses advised at Princeton University

Senior theses – Academic year 2016-2017

- Mihaela Curmei, "*Monotonically constrained polynomial regression: an application of sum of squares techniques and semidefinite programming*".
 - Winner of the Proctor and Gamble Prize for best thesis in operations research.
- Ellie McDonald, "*Minimizing, through a mixed integer nonlinear programming problem, the cost of reaching Hawaii's one hundred percent renewable energy goal by 2045*".
 - Winner of the Sigma Xi Book Award for excellence in research.
- Naman Jain, "*An application of computer vision methods for diamond classification: color, clarity, and cut*".
 - Winner of the Admiral W. Mack Memorial Prize for significant contributions to society.
- Ryan Miller, "*The outdoor action trip assignment problem*".
 - Winner of the Joseph Clifton Elgin Prize (awarded by SEAS to a thesis that has done the most to advance the interests of the school and the community at large).
 - Winner of the Kenneth H Condit '13 Prize (awarded for academic achievement and impact on the community).

Senior theses – Academic year 2015-2016

- Jacob Eisenberg, "*Combating Uncertainty with Context: Optimal Lineup Construction in Daily Fantasy Baseball*".
 - Winner of the *Procter & Gamble Award* for outstanding senior thesis in operations research and financial engineering.

- Michael Wattendorf, “Systemic Risk in the Asymmetric Case: Theory and Experiments with Epidemiology using Semidefinite Programming”.
 - Winner of the *Procter & Gamble Award* for outstanding senior thesis in operations research and financial engineering.
- Salena Hess, “Predicting Gentrification in Washington, DC Using Housing Prices and Support Vector Machines”.
- Max Kaplan, “Subway Optimization: New York Metro and London Underground”.

Senior theses – Academic year 2014-2015

- Ben Quazzo, “Levels of the Game: A Statistical and Mathematical Analysis of ATP Grand Slam Competitions from 2005-2012”.
 - Thesis was featured via video on the [Princeton Tigers website](#).
- Janie Gu, “The Minimum Vacation Cost Problem: A Novel Generalization of the Traveling Salesman Problem with Vertex Costs and Flexible Time Windows”.
- Rishita Patlolla, “Redistribution of Unused Pharmaceuticals from Hospitals to Safety-Net Clinics in New Jersey”.

Junior theses – Academic year 2014-2015

- Jacob Eisenberg, “Determining the Boundary of the MLB Strike Zone: A Convex Optimization Approach”
 - In preparation for submission to Journal of Sports Analytics.
- Michael Wattendorf, “Predicting Points in Tennis”.
 - In preparation for submission to Journal of Sports Analytics.

Press

“After almost 20 years, math problem falls”

- MIT News (on the MIT home page, July 15 – 20, 2011)
<http://web.mit.edu/newsoffice/2011/convexity-0715.html>

“Set to optimize”

LIDS Magazine http://lidsmag.lids.mit.edu/2012/set_to_optimize.html

Tennis honors

- Chosen as an Academic-Athletic Fellow of Princeton University’s Men’s Tennis Team (2015)
- Played for the National Junior Tennis Team of Iran (18 and under)
- USTA Boys 18 Singles Winner, Prince George’s Tennis Open, June 2003
- USTA Boys 18 Singles Winner, Stonehenge Tennis Open, September 2002
- United States Tennis Association Division 5 player (2013)
- The 2013 IBM Watson Tennis Tournament (Winner)