

# Amir Ali Ahmadi

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## Current Affiliation

Assistant Professor September 2014 – Present  
Dept. of Operations Research and Financial Engineering  
Princeton University

Affiliated Faculty June 2015 – Present  
Dept. of Computer Science  
Princeton University

Academic-Athletic Fellow October 2015 – Present  
Men's Tennis Team  
Princeton University

## Previous Affiliation

**2012-2014 Herman Goldstine Fellow** Sept. 2012 – Aug. 2014  
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.)

## Postdoctoral Experience

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

## Education

**Massachusetts Institute of Technology** 2008 – 2011  
**Ph.D., Electrical Engineering and Computer Science** (Minor in Mathematics)

- Thesis: "Algebraic Relaxations and Hardness Results in Polynomial Optimization and Lyapunov Analysis"
- Advisor: Pablo A. Parrilo – Affiliation: LIDS

**Massachusetts Institute of Technology** 2006 – 2008  
**S.M., Electrical Engineering and Computer Science** (GPA: 5.0/5.0)

- Thesis: "Non-monotonic Lyapunov Functions for Stability of Nonlinear and Switched Systems: Theory and Computation"
- Advisor: Pablo A. Parrilo – Affiliation: LIDS

**University of Maryland** 2002 – 2006  
**B.S., Electrical Engineering**

- Ranked (strictly) 1<sup>st</sup> in the Dept., University Honors, Electrical Eng. Honors

**B.S., Mathematics**

- Ranked 1<sup>st</sup> in the Dept., University Honors

## Selected Awards and Distinctions

### For teaching

1. **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
2. **Teaching Award of Princeton University's Engineering Council** 2015  
For ORF 363/COS 323: Computing and Optimization, taught in Fall 2014
3. **Princeton Engineering Commendation List for Outstanding Teaching**
  - o Fall 2014, Spring 2015, Fall 2015, Spring 2016, Fall 2016.

### 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  
(Air Force 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 30<sup>th</sup> 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 47<sup>th</sup> IEEE Conference on Decision and Control (CDC)
16. **Young Engineer Prize, 1<sup>st</sup> Place Award, Washington Society of Engineers** 2006
17. **Best undergraduate technical paper, 1<sup>st</sup> Prize, District of Columbia Council of Eng.** 2006

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

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1. A. A. Ahmadi, E. de Klerk, G. Hall. **Polynomial norms**. Submitted to *Foundations of Computational Mathematics*, 2017.
2. A. A. Ahmadi, G. Hall. **DC Decomposition of nonconvex polynomials with algebraic techniques**. *Mathematical Programming*, accepted for publication, 2016.
3. A. A. Ahmadi, G. Hall. **Sum of squares basis pursuit with linear and second order cone programming**. *Contemporary Mathematics*, to appear, 2017.
4. A. A. Ahmadi, S. Dash, G. Hall. **Optimization over structured subsets of positive semidefinite matrices with column generation**. *Discrete Optimization*, to appear, 2016.
5. A. A. Ahmadi, P.A. Parrilo. **Sum of squares certificates for stability of planar, homogeneous, and switched systems**. *IEEE Trans. on Automatic Control*, to appear, 2017.
6. 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)*, to appear, 2017.
7. A. A. Ahmadi, R. Jungers. **Lower bounds on complexity of Lyapunov functions for switched systems**. *Nonlinear Analysis: Hybrid Systems*, Aug. 2016.
8. A. A. Ahmadi, A. Majumdar. **Some applications of polynomial optimization in operations research and real-time decision making**. *Optimization Letters*, April 2016.
9. A. A. Ahmadi, A. Majumdar. **DSOS and SDSOS optimization: more tractable alternatives to sum of squares and semidefinite optimization**. Submitted for journal publication, 2016.
10. 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*, accepted for publication, 2016.
11. A. A. Ahmadi, R. Jungers. **Sos-convex Lyapunov functions for stability of nonlinear difference inclusions**. Submitted for journal publication, 2016.
12. A. A. Ahmadi, G. Hall, V. Sindhvani. **Sum of squares polynomials and geometry of 3D environments**. Submitted for conference publication, 2016.
13. 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)
14. 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)
15. 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)
16. 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)
17. (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.
18. A. A. Ahmadi, O. Gunluk. **Robust-to-dynamics linear programming**. In *Proceedings of the IEEE Conference on Decision and Control*, 2015.

19. A. A. Ahmadi and A. Majumdar. **DSOS and SDSOS optimization: LP and SOCP alternatives to SOS optimization.** In *Proceedings of the 48<sup>th</sup> Annual Conference on Information Sciences and Systems, 2014.*
20. 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.*
21. 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.*
22. 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.*
23. A. A. Ahmadi. **Computational and Algebraic Aspects of Convexity.** *Newsletter of the INFORMS Computing Society, 2013.*
24. 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](#))
25. 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.*
26. A. A. Ahmadi, A. Majumdar, and R. Tedrake. **Complexity of ten decision problems in continuous time dynamical systems.** *The American Control Conference, 2013.*
27. 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.*
28. 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.*
29. 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.*
30. 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.*
31. 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.*
32. 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.*
33. A. A. Ahmadi and P. A. Parrilo. **On higher order derivatives of Lyapunov functions.** In *Proceedings of the American Control Conference, 2011.*
34. 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.*
35. 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.*
36. A. A. Ahmadi and P. A. Parrilo. **Non-monotonic Lyapunov functions for stability of discrete time nonlinear and switched systems.** In *Proceedings of the 47<sup>th</sup> IEEE Conference on Decision and Control, 2008.* ([Best student paper award finalist](#))

### **Working papers**

37. A. A. Ahmadi, J. Zhang. **Semidefinite programming for Nash equilibria in bimatrix games.** In preparation, 2017.
38. A. A. Ahmadi, O. Gunluk. **Robust-to-dynamics optimization.** In preparation, 2017.

39. A. A. Ahmadi, G. Blekherman, P.A. Parrilo. **Convex ternary quartics are sos-convex.** In preparation, 2017.
40. J. Eisenberg (undergraduate student), A. A. Ahmadi. **Determining the boundary of the Major League Baseball strike zone: a semidefinite optimization approach.** In preparation, 2017.
41. M. Wattendorf (undergraduate student), A. A. Ahmadi. **Predicting points in tennis.** In preparation, 2017.

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### **Selected Invited Talks** (out of >70)

#### **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. Oxford University, Dept. of Mathematics, Numerical Analysis Group 5/17
13. Institute for Advanced Studies, Princeton University 2/17
14. Laboratoire d'analyse et d'architecture des systems, Toulouse 6/16
15. Ecole Polytechnique, Dept. of Computer Science, Paris 07/16
16. Lehigh University, Dept. of Industrial and Systems Engineering, 8/16
17. University of Texas at Austin, Dept. of Aerospace Engineering and Engineering Mechanics, 10/16
18. University of Chicago, Booth School of Business, 3/16
19. University of Chicago, Booth School of Business, 12/15
20. Google Research, 11/15
21. Department of Computer Science, Princeton University, 10/15
22. University of Chicago, Dept. of statistics, 5/15
23. Queen's University, Dept. Mathematics and Statistics, 3/15
24. Northwestern Univ., Electrical Engineering & Kellogg School of Management, 5/15
25. Georgia Tech, Dept. of Industrial and Systems Engineering (ISyE), 10/14
26. Univ. of Texas at Austin, Program in Operations Research and Industrial Engineering, 5/15
27. Tilburg University, Dept. of Econometrics and Operations Research, Netherlands, 8/14
28. Institute for Systems Theory and Automatic Control, University of Stuttgart, 4/14
29. Rutgers University, Center for Operations Research, 4/13
30. IBM Research, Dept. of Business Analytics and Math. Sciences, 11/12
31. Princeton University, Dept. of Operations Research and Financial Eng., 2/13
32. NYU, Dept. of Computer Science, 3/13

33. Univ. of Wisconsin, Institute for Discovery, 2/12
34. Boston University, Dept. of Electrical Engineering, 3/12
35. Univ. of Maryland, Dept. of Electrical Engineering, 3/12
36. IBM Research, Dept. of Business Analytics and Math. Sciences, 10/12
37. Universite catholique de Louvain, Dept. of Systems Eng., 11/12
38. Univ. of California San Diego, Dept. of Mechanical and Aerospace Eng., 3/11
39. Univ. of California Davis, Dept. of Mathematics, 3/11
40. MIT, Robot Locomotion Group, 5/11

### Invited tutorial lectures

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

### Invited talks in other meetings and conferences

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

## Teaching

- **ORF 363/ COS 323, "Computing and Optimization"** Fall 2014, '15, '16 Princeton University
  - Course website: <http://aaa.princeton.edu/orf363>
  - Winner of the 2014 Teaching Award of the Engineering Council
  - Princeton Engineering Commendation List for Outstanding Teaching
- **ORF 523, "Convex and Conic Optimization"** Spring 2015, 2016, 2017 Princeton University
  - Course website: <http://aaa.princeton.edu/orf523>
  - Princeton Engineering Commendation List for Outstanding Teaching

## Funding sources (\$1,541,000 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)

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

### ORFE

- Initiator and first organizer of the Princeton Optimization Seminar (36 seminars held in 2014-2016)
  - 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 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

### 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
  - 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
  - 5<sup>th</sup> 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, Spring 2017

### **Graduate students advised at Princeton University**

#### *Current:*

- Georgina HALL, 5<sup>th</sup> year, ORFE (website: <http://scholar.princeton.edu/ghall> )
  - Advised from August 2014 to date. Funded by the NSF/AFSOR/Google grants for Summer 2015, Summer 2016, Fall 2016 (full AR).
  - Projects include difference of convex programming, more scalable alternatives to sum of squares optimization (a partial collaboration with Sanjeeb Dash, IBM), topics related to computer vision (in collaboration with Vikas Sindhwani, Google NYC), and the study of convex polynomials (in collaboration with Etienne de Klerk, Tilburg University).
- Jeffrey ZHANG, 3<sup>rd</sup> year, ORFE



- Advised from June 2015 to date. Funded by the NSF/AFSOR grants for Summer 2015, Summer 2016, Fall 2016 (half AR).
  - Projects include the use of semidefinite optimization in game theory.
- Bachir EL-KHADIR, 2<sup>nd</sup> year, ORFE
  - Advised from June 2016 to date. Funded by the NSF/AFSOR grants for August 2016, Fall 2016 (half AR).
  - Projects include time-varying convex optimization.
- Cemil Dibek, 1<sup>st</sup> year, ORFE
  - Co-advised with Prof. Maria Chudnovsky.
  - Projects include semidefinite optimization for graph coloring.

*Past:*

- Thomas PUMIR, 3<sup>rd</sup> year, ORFE
  - Advised from June 2015 to May 2016. Funded by the AFSOR grant for Summer 2015.
  - Projects included convex relaxations in combinatorial optimization.
- Elaheasadat NAGHIB, 3<sup>rd</sup> year, ORFE
  - Co-advised with Bob Vanderbei from June 2015 to October 2015.
  - Projects included a nonlinear programming approach to semidefinite optimization.
- Fermi MA, 2<sup>nd</sup> year, COS
  - Advised from June 2016 to August 2016 for a summer project.
  - Projects included algebraic approaches to polynomial optimization.

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### **Undergraduate theses advised at Princeton University**

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*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.

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**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](http://lidsmag.lids.mit.edu/2012/set_to_optimize.html)

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**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)