

Karthekeyan Chandrasekaran

CONTACT INFORMATION	301 Transportation Building 104 S. Mathews Ave Urbana, IL 61801	<i>Phone:</i> +1-217-300-1160 <i>Email:</i> karthe@illinois.edu <i>URL:</i> http://karthik.ise.illinois.edu
RESEARCH INTERESTS	Optimization, Integer Programming, Probabilistic Methods and Analysis, Randomization	
EDUCATION	Ph.D., Algorithms, Combinatorics, and Optimization Georgia Institute of Technology, Atlanta	Aug, 2012
	B.Tech., Computer Science and Engineering Indian Institute of Technology, Madras	Jun, 2007
APPOINTMENTS	Assistant Professor University of Illinois at Urbana-Champaign, IL Department of Industrial and Enterprise Systems Engineering	Sep, 2014-present
	Affiliate Assistant Professor University of Illinois at Urbana-Champaign, IL Department of Computer Science	Sep, 2014-present
	Simons Postdoctoral Research Fellow Harvard University, Cambridge, MA School of Engineering and Applied Sciences Host: Salil Vadhan	Sep, 2012-Aug, 2014
	Visiting Researcher International Computer Science Institute (ICSI), Berkeley, CA Algorithms Group Host: Richard Karp	Jul-Oct, 2011
	Research Intern Microsoft Research, Bangalore, India Algorithms Research Group Host: Navin Goyal Host: Amit Deshpande	May-Jul, 2009 May-Jul, 2008
	Applied Mathematics Group Microsoft Research, Redmond, WA Algorithms Group Host: Ramarathnam Venkatesan	Jun-Aug, 2006
TEACHING	Graduate (UIUC) <ul style="list-style-type: none">• Combinatorial Optimization, IE 598• Integer Programming, IE 511	Fall 2015, Spring 2018 Spring 2015, Spring 2017
	Undergraduate (UIUC) <ul style="list-style-type: none">• Deterministic Models in Optimization & Lab, IE 310, IE 311• Operations Research & Lab, IE 310, IE 311	Fall 2017, Fall 2018 Spring 2016, Fall 2016

STUDENTS

PhD Advisees

- Ali Bibak, UIUC (2017–present)
- Sahand Mozaffari, UIUC (2016–present)
- Chao Xu, UIUC (PhD, May 2018, joint with Prof. Chandra Chekuri)
Thesis title: “Cuts and Connectivity in Graphs and Hypergraphs”
Currently at Yahoo! Research, New York

Undergrad Advisees

- Jingwen Jiang, UIUC (2015–16, currently PhD student at Univ. of Chicago)

CONFERENCE PUBLICATIONS

Improving the smoothed complexity of FLIP for max cut problems

(with A. Bibak, C. Carlson)

- (To appear in) ACM-SIAM Symposium on Discrete Algorithms (SODA), Jan 2019

Lattice-based Locality Sensitive Hashing is Optimal

(with D. Dadush, V. Gandikota, E. Grigorescu)

- Innovations in Theoretical Computer Science (ITCS), Jan 2018

Hypergraph k -Cut in Randomized Polynomial Time

(with C. Xu, X. Yu)

- ACM-SIAM Symposium on Discrete Algorithms (SODA), Jan 2018

A tight $\sqrt{2}$ -approximation for Linear 3-Cut

(with K. Bérczi, T. Király, V. Madan)

- ACM-SIAM Symposium on Discrete Algorithms (SODA), Jan 2018

Odd Multiway Cut in Directed Acyclic Graphs

(with S. Mozaffari)

- International Symposium on Parameterized and Exact Computation (IPEC), Sep 2017

Global and fixed-terminal cuts in digraphs

(with K. Bérczi, T. Király, E. Lee, C. Xu)

- International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX), Aug 2017

On the Expansion of Group-Based Lifts

(with N. Agarwal, A. Kolla, V. Madan)

- International Workshop on Randomization and Computation (RANDOM), Aug 2017

Local Testing for Membership in Lattices

(with M. Cheraghchi, V. Gandikota, E. Grigorescu)

- Foundations of Software Technology and Theoretical Computer Science (FSTTCS), Dec 2016

Deciding Orthogonality in Construction-A Lattices

(with V. Gandikota, E. Grigorescu)

- Foundations of Software Technology and Theoretical Computer Science (FSTTCS), Dec 2015

Finding Small Stabilizers for Unstable Graphs

(with A. Bock, J. Könnemann, B. Peis, L. Sanità)

- Integer Programming and Combinatorial Optimization (IPCO), Jun 2014

Finding a Most Biased Coin with Fewest Flips

(with R. Karp)

- Conference on Learning Theory (COLT), Jun 2014

Faster Private Release of Marginals on Small Databases

(with J. Thaler, J. Ullman, A. Wan)
- Innovations in Theoretical Computer Science (ITCS), Jan 2014

Integer Feasibility of Random Polytopes

(with S. Vempala)
- Innovations in Theoretical Computer Science (ITCS), Jan 2014

The Cutting Plane Algorithm is Polynomial for Perfect Matchings

(with L. Végh, S. Vempala)
- IEEE Symposium on Foundations of Computer Science (FOCS), Oct 2012

Algorithms for Implicit Hitting Set Problems

(with R. Karp, E. Moreno-Centeno, S. Vempala)
- ACM-SIAM Symposium on Discrete Algorithms (SODA), Jan 2011

Deterministic Algorithms for the Lovász Local Lemma

(with N. Goyal, B. Haeupler)
- ACM-SIAM Symposium on Discrete Algorithms (SODA), Jan 2010

Thin Partitions: Isoperimetric Inequalities and Sampling Algorithms for some Non-convex Families

(with D. Dadush, S. Vempala)
- ACM-SIAM Symposium on Discrete Algorithms (SODA), Jan 2010

Sampling s -Concave Functions

(with A. Deshpande, S. Vempala)
- International Workshop on Randomization and Computation (RANDOM'09), Aug 2009

JOURNAL
PUBLICATIONS

Additive Stabilizers for Unstable Graphs

(with C. Gottschalk, J. Könemann, B. Peis, D. Schmand, A. Wierz)
- (To appear in) Discrete Optimization

Beating the 2-approximation factor for Global Bicut

(with K. Bérczi, T. Király, E. Lee, C. Xu)
- (To appear in) Mathematical Programming

Local Testing of Lattices

(with M. Cheraghchi, V. Gandikota, E. Grigorescu)
- SIAM Journal on Discrete Mathematics, Vol 32, Issue 2, 2018

Shift Lifts Preserving Ramanujan Property

(with A. Velingker)
- Linear Algebra and its Applications, Vol. 529, 2017

Deciding Orthogonality in Construction-A Lattices

(with V. Gandikota, E. Grigorescu)
- SIAM Journal on Discrete Mathematics, Vol. 31, Issue 1, 2017

The Cutting Plane Algorithm is Polynomial for Perfect Matchings

(with L. Végh, S. Vempala)
- Mathematics of Operations Research, Vol. 41, No. 1, 2016

Finding Small Stabilizers for Unstable Graphs

(with A. Bock, J. Könemann, B. Peis, L. Sanità)
- Mathematical Programming, Vol. 154, Issue 1, 2015

Deterministic Algorithms for the Lovász Local Lemma

(with N. Goyal, B. Haeupler)
- SIAM Journal on Computing, Vol. 42, Issue 6, 2013

An Observation about Variations of the Diffie-Hellman Assumption
(with R. Bhaskar, S. V. Lokam, P. L. Montgomery, R. Venkatesan, Y. Yacobi)
- Serdica Journal of Computing, Vol. 3, No. 3, 2009

Vulnerabilities in Anonymous Credential Systems
(with R. Bhaskar, S. V. Lokam, P. L. Montgomery, R. Venkatesan, Y. Yacobi)
- Electronic Notes in Theoretical Computer Science, Vol. 197, No. 2, 2008

BOOK CHAPTERS **Graph Stabilization: A Survey**
- Combinatorial Optimization and Graph Algorithms: Communications of NII Shonan Meetings, 2017

IN REVIEW **Improving the Integrality Gap for Multiway Cut**
(with K. Bérczi, T. Király, V. Madan)

Odd Multiway Cut in Directed Acyclic Graphs
(with S. Mozaffari, M. Mnich)

Hypergraph k -cut in randomized polynomial time
(with C. Xu, X. Yu)

A tight $\sqrt{2}$ -approximation for Linear 3-Cut
(with K. Bérczi, T. Király, V. Madan)

Spectral Aspects of Symmetric Matrix Signings
(with C. Carlson, H-C. Chang, N. Kakimura, A. Kolla)

On the Expansion of Group-Based Lifts
(with N. Agarwal, A. Kolla, V. Madan)

DISTINGUISHED TALKS **Beating the 2-factor for Bicut**
Workshop on Combinatorial Optimization, Corsica Oct, 2018

k -Cut in Graphs, Hypergraphs and Beyond
Workshop on Combinatorial Optimization, Corsica Oct, 2018

INVITED TALKS **Hypergraph k -cut in randomized polynomial time**
University of Colorado, Boulder Nov, 2018
ISMP '18, Bordeaux Jul, 2018
Eötvös Loránd University, Budapest Jun, 2018
Flexible Network Design Workshop, Maryland May, 2018
University of Illinois, Urbana-Champaign Apr, 2018
Northwestern University, Evanston Mar, 2018
Purdue University, West Lafayette Feb, 2018

Beating the 2-factor for Bicut
University of Chicago, Chicago Nov, 2017

Global and fixed-terminal cuts in digraphs
Midwest Theory Day, Indiana University, Bloomington Apr, 2017
ACO25, Georgia Institute of Technology, Atlanta Jan, 2017

Lattice Optimization

University of Illinois, Urbana-Champaign	Apr, 2016
Stabilizers for Unstable Graphs	
INFORMS '16, Nashville	Nov, 2016
Workshop in Current Trends in Combinatorial Optimization, Shonan, Japan	Apr, 2016
ISMP '15, Pittsburgh	Jul, 2015
Local Testing for Membership in Lattices	
Hausdorff Institute for Mathematics, Bonn, Germany	Nov, 2015
University of Illinois, Urbana-Champaign	Sep, 2015
Finding Small Stabilizers for Unstable Graphs	
INFORMS '14, San Francisco	Nov, 2014
Purdue University, West Lafayette	Oct, 2014
University of Illinois, Urbana-Champaign	Sep, 2014
Flexible Network Design Workshop, Lugano, Switzerland	Aug, 2014
Finding a Most Biased Coin with Fewest Flips	
EPFL, Lausanne, Switzerland	Jul, 2014
RWTH Aachen University, Aachen, Germany	Jun, 2014
Conference on Learning Theory 2014, Barcelona, Spain	Jun, 2014
Integer Feasibility of Random Polytopes	
Microsoft Research, Redmond	Mar, 2014
Massachusetts Institute of Technology, Cambridge	Mar, 2014
Innovations in Theoretical Computer Science 2014, Princeton	Jan, 2014
Faster Private Release of Marginals on Small Databases	
University of Waterloo, Ontario, Canada	Oct, 2013
Purdue University, West Lafayette	Sep, 2013
A Polynomial-time Cutting Plane Algorithm for Perfect Matchings	
Northeastern University, Boston	Dec, 2013
Brown University, Providence	Oct, 2013
Flexible Network Design Workshop, Toronto, Canada	Aug, 2013
Bellairs Workshop on Combinatorial Optimization, Barbados	Apr, 2013
Carnegie Mellon University, Pittsburgh	Jan, 2013
IEEE Symposium on Foundations of Computer Science 2012, New Brunswick	Oct, 2012
Harvard University, Cambridge	Oct, 2012
Toyota Technological Institute, Chicago	Jun, 2012
A Discrepancy based Approach to Integer Programming	
Toyota Technological Institute, Chicago	Jun, 2012
SIAM Conference on Discrete Mathematics, Halifax, Canada	Jun, 2012
Workshop on Computation and Phase Transitions, Atlanta	Jun, 2012
Discrete Optimization Seminar, Georgia Institute of Technology, Atlanta	Jan, 2012
INFORMS '11, Charlotte	Nov, 2011
Microsoft Research, Silicon Valley	Nov, 2011
IBM Research, Almaden	Sep, 2011
University of California, Berkeley	Aug, 2011
Algorithms for Implicit Hitting Set Problems	
Random Structures and Algorithms, Atlanta	May, 2011
ACM-SIAM Symposium on Discrete Algorithms 2011, San Francisco	Jan, 2011
Microsoft Research, Bangalore, India	Dec, 2010
Indian Institute of Technology, Madras, India	Dec, 2010
ACO Student Seminar, Georgia Institute of Technology, Atlanta	Apr, 2010

Algorithms for the Lovász Local Lemma
 Indian Institute of Technology, Madras Dec, 2010
 Combinatorics Seminar, Georgia Institute of Technology, Atlanta Sep, 2009

Sampling Star-shaped Bodies
 Microsoft Research, Bangalore, India Jul, 2009

Sampling s-Concave Functions
 INFORMS '09, San Diego Oct, 2009
 RANDOM-APPROX 2009, Berkeley Aug, 2009
 Microsoft Research, Bangalore, India Jun, 2009

AWARDS AND HONORS

Sharp Outstanding Teaching Award in Industrial Engineering 2018
 University of Illinois, Urbana-Champaign

Teachers Ranked as Excellent by their Students
 Combinatorial Optimization (Grad level) Spring 2018
 Deterministic Models in Optimization (Undergrad level) Fall 2017

Best Ph.D. Thesis Award 2013
 Sigma Xi Chapter, Georgia Institute of Technology

College of Computing Dissertation Prize 2012
 Georgia Institute of Technology

Algorithms and Randomness Center (ARC) Fellowship Fall 2010, Spring 2012
 Georgia Institute of Technology

PROFESSIONAL SERVICE

Program Committee Member
 – International Symposium on Combinatorial Optimization (ISCO), 2018

Reviewer for conferences
 – SOSA (2019), SODA (2019, 2018, 2017, 2016, 2015), FOCS (2018, 2017, 2016, 2015, 2013, 2010),
 ESA (2018), RANDOM (2018, 2012), ICALP (2018), STOC (2018, 2017, 2016, 2015, 2011), AP-
 PROX (2017), COLT (2016, 2014), IPCO (2016), PODS (2015), CCC (2014), FSTTCS (2013),
 LATIN (2012), ALT (2012), NIPS (2010)

Reviewer for journals
 – Discrete Optimization, Mathematical Programming, Mathematics of Operations Research, SIAM
 Journal on Computing (SICOMP), SIAM Journal on Discrete Mathematics (SIDMA), Journal of
 Computer and System Sciences (JCSS), Transactions on Knowledge and Data Engineering (TKDE),
 Science China Mathematics

Session Organizer

- *Recent progress in graph cut problems*
 International Symposium on Mathematical Programming (ISMP), Bordeaux, 2018
- *Algorithmic Learning Theory*
 INFORMS Annual Meeting, Phoenix, 2012

SERVICE

Department of Industrial and Enterprise Systems Engineering, UIUC

- Marketing and Outreach Committee 2018-19
- Graduate Committee 2016-17, 18-19
- Advisory Committee 2016-18
- Grainger Engineering Breakthrough Initiative (GEBI) Hiring Committee 2015-16, 17-18

- Seminars Committee (as Chair) 2015–16
- ISE-CS Liaison 2014–15
- Courses and Curriculum Committee 2014–15
- Space Committee 2014–15

College of Engineering, UIUC

- College of Engineering Committee 2015–16
– Evaluated the revised CS curriculum and new CS courses
- Library Committee 2014–15

Other

- Illinois Council of Teachers of Mathematics (ICTM) Math Contest Oral Judge 2016, 2017, 2018

**INSTRUCTIONAL
ACTIVITIES**

PhD Defense Exam Committee

- Vivek Madan, Computer Science, UIUC, Summer 2018
- Shalmoli Gupta, Computer Science, UIUC, Summer 2018
- Mayank Baranwal, Mechanical Science and Engineering, UIUC, Spring 2018
- Hee Youn Kwon, Industrial Engineering, UIUC, Spring 2018
- Chao Xu, Computer Science, UIUC, Spring 2018
(as Director of Research)
- Siyang Xie, Civil Engineering, UIUC, Spring 2018
- Venkata Gandikota, Computer Science, Purdue, Spring 2017

PhD Preliminary Exam Committee

- Yipu Wang, Computer Science, UIUC, Fall 2018
- Wenda Zhang, Industrial Engineering, UIUC, Fall 2018
- Hee Youn Kwon, Industrial Engineering, UIUC, Fall 2017
- Chao Xu, Computer Science, UIUC, Spring 2017
- Shalmoli Gupta, Computer Science, UIUC, Spring 2017
- Vivek Madan, Computer Science, UIUC, Spring 2017
- Siyang Xie, Civil Engineering, UIUC, Spring 2017
- Mayank Baranwal, Mechanical Science and Engineering, UIUC, Fall 2016
- Venkata Gandikota, Computer Science, Purdue, Fall 2015

PhD Oral Qualifiers Committee

- Timothy Murray, ISE, UIUC, Spring 2018
- Menglong Li, ISE, UIUC, Spring 2018
- Reza Yousefi Maragheh, ISE, UIUC, Spring 2017
- Runqi Hu, ISE, UIUC, Fall 2015
- Shuanglong Wang, ISE, UIUC, Spring 2015

Industry sponsored undergraduate projects advised

- Tango Autonomous Mower Path Planning Algorithm Improvement
Shaan Bhakta, Daniel Hill, Xinhang Li, Rikin Mehta
John Deere Technology Innovation Center, Fall 2018
- Volumetric Analysis for Packaging Accuracy and Cost Reduction
Gregory Chew, Lucas Gutzwiller, Callahan Skiles, Danielle Stasik
Tucker Rocky Distributing, Spring 2018

- Yard Layout Optimization for Trailer Loading Efficiency
Henry Doyle, Xueru Rong, Benjamin Wegloski
Morton Buildings, Inc., Fall 2017
- Logistics Optimization of Regionally Located Construction Equipment
Sean Kelley, Thomas Kukec, Jin Hwan Lee, Scott Shiro
Morton Buildings, Inc., Fall 2016
- Tube Product Scrap Analysis and Reduction
Aly Mohamed Said Elalfy, Christine Hudak, Jared Konrardy
Atkore International, Spring 2016
- Foam Plank Extrusion Batch Process Scrap Reduction
Michelle Erickson, Jared Spivey, Chen Zhang
Pregis Corporation, Fall 2015

IMPROVEMENT
ACTIVITIES

Collins Scholar Program

Academy for Excellence in Engineering Education, UIUC

2014–15