

## Karthekeyan Chandrasekaran

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CONTACT INFORMATION	301 Transportation Building 104 S. Mathews Ave Urbana, IL 61801 <i>Phone:</i> 217-300-1160 <i>Email:</i> karthe@illinois.edu <i>URL:</i> <a href="http://karthik.ise.illinois.edu">http://karthik.ise.illinois.edu</a>	
RESEARCH INTERESTS	Optimization, Integer Programming, Probabilistic Methods and Analysis, Randomization	
EDUCATION	<b>Ph.D., Algorithms, Combinatorics, and Optimization</b> Georgia Institute of Technology, Atlanta	Aug, 2012
	<b>B.Tech., Computer Science and Engineering</b> Indian Institute of Technology, Madras	Jun, 2007
APPOINTMENTS	<b>Assistant Professor</b> University of Illinois at Urbana-Champaign, IL Department of Industrial and Enterprise Systems Engineering	Sep, 2014-present
	<b>Affiliate Assistant Professor</b> University of Illinois at Urbana-Champaign, IL Department of Computer Science	Sep, 2014-present
	<b>Simons Postdoctoral Research Fellow</b> Harvard University, Cambridge, MA School of Engineering and Applied Sciences Host: Salil Vadhan	Sep, 2012-Aug, 2014
	<b>Visiting Researcher</b> International Computer Science Institute (ICSI), Berkeley, CA Algorithms Group Host: Richard Karp	Jul-Oct, 2011
	<b>Research Intern</b> Microsoft Research, Bangalore, India Algorithms Research Group Host: Navin Goyal Host: Amit Deshpande	May-Jul, 2009 May-Jul, 2008
	Applied Mathematics Group Host: Satya V. Lokam	May-Jul, 2007
	Microsoft Research, Redmond, WA Algorithms Group Host: Ramarathnam Venkatesan	Jun-Aug, 2006

- TEACHING
- Deterministic Models in Optimization & Lab**, IE 310, IE 311 (Undergraduate), Fall 2017
  - Integer Programming**, IE 511 (Graduate), Spring 2017
  - Operations Research & Lab**, IE 310, IE 311 (Undergraduate), Fall 2016
  - Operations Research & Lab**, IE 310, IE 311 (Undergraduate), Spring 2016
  - Combinatorial Optimization**, IE 598 (Graduate), Fall 2015
  - Integer Programming**, IE 511 (Graduate), Spring 2015
  - University of Illinois, Urbana-Champaign
- STUDENTS
- PhD Advisees**
- Ali Bibaksereshkeh, UIUC (Fall 2017–present)
  - Sahand Mozaffari, UIUC (Fall 2016–present)
  - Chao Xu, UIUC (Fall 2016–present, joint with Prof. Chandra Chekuri)  
- Graduating: Spring 2018
- Undergrad advisees**
- Jingwen Jiang, UIUC (2015–16, currently PhD student at Univ. of Chicago)
- PUBLICATIONS
- Lattice-based Locality Sensitive Hashing is Optimal**  
(with D. Dadush, V. Gandikota, E. Grigorescu)  
- Innovations in Theoretical Computer Science (ITCS'18), Jan 2018
- Hypergraph  $k$ -Cut in Randomized Polynomial Time**  
(with C. Xu, X. Yu)  
- ACM-SIAM Symposium on Discrete Algorithms (SODA'18), 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'18), Jan 2018
- Graph Stabilization: A Survey**  
- Combinatorial Optimization and Graph Algorithms: Communications of NII Shonan Meetings, 2017
- Odd Multiway Cut in Directed Acyclic Graphs**  
(with S. Mozaffari)  
- International Symposium on Parameterized and Exact Computation (IPEC'17), 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'17), Aug 2017
- On the Expansion of Group-Based Lifts**  
(with N. Agarwal, A. Kolla, V. Madan)  
- International Workshop on Randomization and Computation (RANDOM'17), Aug 2017
- Shift Lifts Preserving Ramanujan Property**  
(with A. Velingker)  
- Linear Algebra and its Applications, Vol. 529, 2017
- Local Testing for Membership in Lattices**  
(with M. Cheraghchi, V. Gandikota, E. Grigorescu)  
- Foundations of Software Technology and Theoretical Computer Science (FSTTCS'16), Dec 2016

### **Deciding Orthogonality in Construction-A Lattices**

(with V. Gandikota, E. Grigorescu)

- SIAM Journal on Discrete Mathematics, Vol. 31, Issue 1, 2017

- Prelim. version in Foundations of Software Technology and Theoretical Computer Science (FSTTCS'15), Dec 2015

### **Finding Small Stabilizers for Unstable Graphs**

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

- Mathematical Programming, Vol. 154, Issue 1, 2015

- Prelim. version in Integer Programming and Combinatorial Optimization (IPCO'14), Jun 2014

### **Finding a Most Biased Coin with Fewest Flips**

(with R. Karp)

- Conference on Learning Theory (COLT'14), Jun 2014

### **Faster Private Release of Marginals on Small Databases**

(with J. Thaler, J. Ullman, A. Wan)

- Innovations in Theoretical Computer Science (ITCS'14), Jan 2014

### **Integer Feasibility of Random Polytopes**

(with S. Vempala)

- Innovations in Theoretical Computer Science (ITCS'14), Jan 2014

### **The Cutting Plane Algorithm is Polynomial for Perfect Matchings**

(with L. Végh, S. Vempala)

- Mathematics of Operations Research, Vol 41, No. 1, 2016

- Prelim. version in IEEE Symposium on Foundations of Computer Science (FOCS'12), Oct 2012

### **Algorithms for Implicit Hitting Set Problems**

(with R. Karp, E. Moreno-Centeno, S. Vempala)

- ACM-SIAM Symposium on Discrete Algorithms (SODA'11), Jan 2011

### **Deterministic Algorithms for the Lovász Local Lemma**

(with N. Goyal, B. Haeupler)

- SIAM Journal on Computing, Vol. 42, Issue 6, 2013

- Prelim. version in ACM-SIAM Symposium on Discrete Algorithms (SODA'10), 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'10), Jan 2010

### **Sampling s-Concave Functions**

(with A. Deshpande, S. Vempala)

- International Workshop on Randomization and Computation (RANDOM'09), Aug 2009

### **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

IN REVIEW

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

**Beating the 2-approximation factor for Global Bicut**  
(with K. Bérczi, T. Király, E. Lee, C. Xu)

**Largest Eigenvalue and Invertibility of Symmetric Matrix Signings**  
(with C. Carlson, H-C. Chang, A. Kolla)

**Additive Stabilizers for Unstable Graphs**  
(with C. Gottschalk, J. Könemann, B. Peis, D. Schmand, A. Wierz)

TALKS

**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 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
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**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

**Best Ph.D. Thesis Award**

Sigma Xi Chapter, Georgia Institute of Technology, 2013

**College of Computing Dissertation Prize**

Georgia Institute of Technology, 2012

**Algorithms and Randomness Center (ARC) Fellowship**

Georgia Institute of Technology, Fall 2010, Spring 2012

PROFESSIONAL  
SERVICE

**Program Committee Member**

– International Symposium on Combinatorial Optimization (ISCO), 2018

**Reviewer for conferences**

– STOC (2018, 2017, 2016, 2015, 2011), FOCS (2017, 2016, 2015, 2013, 2010), APPROX (2017), SODA (2017, 2016, 2015), COLT (2016, 2014), IPCO (2016), PODS (2015), CCC (2014), FSTTCS (2013), LATIN (2012), RANDOM (2012), ALT (2012), NIPS (2010)

### **Reviewer for journals**

– *SIAM Journal on Computing* (SICOMP), *Journal of Computer and System Sciences* (JCSS), *Mathematics of Operations Research*, *SIAM Journal on Discrete Mathematics* (SIDMA), *Transactions on Knowledge and Data Engineering*, *Mathematical Programming*, *Discrete Optimization*

### **Session Organizer**

“Algorithmic Learning Theory”, The INFORMS Annual Meeting (2012), Phoenix

## SERVICE

### **College of Engineering, UIUC**

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

### **Department of Industrial and Enterprise Systems Engineering, UIUC**

- Advisory Committee (2017–18, 2016–17)
- Grainger Engineering Breakthrough Initiative (GEBI) Hiring Committee (2017–18, 2015–16)
- Graduate Committee (2016–17)
- Seminars Committee (2015–16)
- ISE-CS Liaison (2014–15)
- Courses and Curriculum Committee (2014–15)
- Space Committee (2014–15)

### **Other**

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

## INSTRUCTIONAL ACTIVITIES

### **PhD Defense Exam Committee**

- Siyang Xie, Civil Engineering, UIUC, Spring 2018
- Venkata Gandikota, Computer Science, Purdue, Spring 2017

### **PhD Preliminary Exam Committee**

- 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 Qualifiers Committee**

- Reza Yousefi Maragheh, ISE, UIUC, Spring 2017
- Runqi Hu, ISE, UIUC, Fall 2015
- Shuanglong Wang, ISE, UIUC, Spring 2015

### **Industry sponsored undergraduate projects advised**

- 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 Noelle Hudak, Jared Dean Konrardy  
(Atkore International), Spring 2016
- Foam Plank Extrusion Batch Process Scrap Reduction  
Michelle Nicole Erickson, Jared Stewart Spivey, Chen Zhang  
(Pregis Corporation), Fall 2015

IMPROVEMENT  
ACTIVITIES  
REFERENCES

**Collins Scholar Program**, Academy for Excellence in Engineering Education, UIUC 2014–15  
Available upon request