

Vidya Muthukumar

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EDUCATION	University of California, Berkeley <i>2014-2019 (expected)</i> <i>MS/Ph.D, Electrical Engineering and Computer Science</i> Research interests: Game theory, machine learning, mechanism design, information theory. Research adviser: Prof. Anant Sahai Thesis committee: Prof. Jean Walrand, Prof. Peter Bartlett, Prof. Shachar Kariv
	Indian Institute of Technology, Madras, India <i>2010-2014</i> <i>Bachelor of Technology (with Honors), Electrical Engineering</i>
HONORS AND AWARDS	EECS Outstanding Course Development and Teaching Award , 2016 EECS SanDisk Fellowship , 2015: awarded to exemplary first-year EECS graduate students Berkeley Excellence Award , 2014: awarded to incoming graduate students with exemplary academic performance Institute Blues Certificate of Merit, IIT Madras , 2014 for all-round excellence Todai-IIT Scholarship, University of Tokyo , 2012 and 2013: for highest cumulative GPA in the EE department Aditya Birla Group Scholarship , 2010-14: ~ 25 recipients Ranked 109 in India (out of 470,000) in the IIT Joint Entrance Examination , 2010 Ranked 10 in the Karnataka Regional Mathematics Olympiad , 2008. (Wrote the Indian National Mathematics Olympiad, 2009.) Recipient of Kishore Vaigyanik Protsahan Yojana (KVPY) fellowship , 2009 Recipient of National Talent Search Examination (NTSE) scholarship , 2007
PROFESSIONAL EXPERIENCE	Graduate Student Researcher, UC Berkeley <i>Fall 2014-present</i> Supervisor: Prof. Anant Sahai Project: Game theory, learning and spectrum regulation
	Undergraduate Research Intern, Technische Universität München <i>Summer 2014</i> Supervisors: Prof. Gerhard Kramer, Prof. Andrew Thangaraj Project: Stochastic Decoding of LDPC Codes
	Summer Undergraduate Research Fellow, California Institute of Technology <i>Summer 2013</i> Supervisor: Prof. Babak Hassibi Project: Frames From Generalized Group Fourier Transforms and $SL_2(q)$
	Undergraduate Intern, Ittiam Systems Pvt. Ltd., Bangalore <i>Summer 2012</i> Project: Optimization of H.264 encoder for the x86 platform
PUBLICATIONS	Ashwin Pananjady, Cheng Mao, Vidya Muthukumar , Martin Wainwright and Thomas Courtade: "Worst-case vs. Average-case Design for Estimation from Fixed Pairwise Comparisons", submitted to Annals of Statistics. Vidya Muthukumar and Anant Sahai: "Fundamental limits on <i>ex-post</i> enforcement and implications for spectrum rights", to appear in IEEE Transactions on Cognitive Communications and Networking, 2017 issue.

Vidya Muthukumar and Anant Sahai: “Commitment in regulatory spectrum games: Examining the first-player advantage”, IEEE International Symposium on Information Theory, Aachen, 2017.

Vidya Muthukumar and Anant Sahai: “Fundamental limits on *ex-post* enforcement and implications for spectrum rights”, IEEE Symposium on Dynamic Spectrum Access Networks, Baltimore, 2017.

Kate Harrison, **Vidya Muthukumar**, Anant Sahai: “Whitespace Evaluation Software (WEST) and its applications to whitespace in Canada and Australia”, IEEE Symposium on Dynamic Spectrum Access Networks, Stockholm, 2015.

Vidya Muthukumar, Angel Daruna, Vijay Kamble, Kate Harrison, Anant Sahai: “Whitespaces after the USA’s TV incentive auction: a spectrum reallocation case study”, IEEE International Conference on Communications, London, 2015.

Matthew Thill, **Vidya Muthukumar**, Babak Hassibi: “Frames from Generalized Group Fourier Transforms and $SL_2(\mathbb{F}_q)$ ”, IEEE International Conference on Acoustics, Speech and Signal Processing, Florence, 2014.

TALKS

“Commitment in regulatory spectrum games: Examining the first-player advantage”
IEEE International Symposium on Information Theory, Aachen, 2017.

“Fundamental limits on *ex-post* enforcement and implications for spectrum rights”
IEEE Dynamic Spectrum Access Networks, Baltimore, 2017.

“Whitespace Evaluation Software and its applications to whitespace in Canada and Australia”
IEEE Dynamic Spectrum Access Networks, Stockholm, 2015.

“Whitespaces after the USA’s TV incentive auction: a spectrum reallocation case study”
IEEE International Conference on Communications, London, 2015.

TEACHING

Graduate Student Instructor, EE16A, UC Berkeley

Fall 2015

- Member of content development and discussion teams for first full-scale iteration of course, offered to ~ 500 undergraduate students
- Won EECS Department “Outstanding Course Development and Teaching Award”

RESEARCH PROJECTS

Online learning beyond the worst case

2017-present

UC Berkeley with Anant Sahai and Peter Bartlett

- Project focus: to understand the theoretical limits of “best-of-both-worlds” approaches in full-information online learning.

Power of partial commitment in games

2016-present

UC Berkeley with Anant Sahai

- Introduced and studied an information-theoretic notion of partial commitment to Stackelberg strategy
- Current focus: using this framework to better understand finite-play reputation

Estimation and ranking from fixed pairwise comparisons

2017

UC Berkeley with Ashwin Pananjady, Cheng Mao, Martin Wainwright and Thomas Courtade

- Problem setup of ranking and estimation from partial, fixed pairwise comparisons of items with an underlying strongly stochastically transitive model

- Analyzed the performance of computationally feasible estimators in the worst case and average case and minimax rates

Ex-post enforcement for cognitive radio

2016-2017

UC Berkeley with Anant Sahai

- Analyzed fundamental limits on protection that can be guaranteed to a primary and secondary user of spectrum through a game-theoretic lens
- Designed “spectrum jails” mechanism to guarantee rights to primary and secondary

Data-driven analyses of spectrum auction and TV whitespaces

2014-2015

UC Berkeley with Anant Sahai, Kate Harrison, Vijay Kamble, Angel Daruna

- Explored effect of the Federal Communications Commission (FCC)’s upcoming incentive auctions to create LTE spectrum on TV whitespaces
- Contributed to open-source software; improved performance of core algorithm by $\sim 12X$

Stochastic Decoding of LDPC Codes

2013-2014

IIT Madras, Senior Thesis Project; TUM, Germany

- Implemented iterative stochastic decoder for regular LDPC codes, short LDPC codes over $GF(q)$ and compared performance with existing iterative decoders.

Frames From Generalized Group Fourier Transforms and $SL_2(\mathbb{F}_q)$

2013-2014

Caltech, Summer Undergraduate Research Fellowships

- Constructed deterministic, low-coherence matrices for compressed sensing using group theory, representation theory

GRADUATE-LEVEL COURSES

Probability and Stochastic Processes
 Graduate Algorithms
 Introduction to Game Theory
 Theoretical Statistics
 Information Theory

Statistical Learning Theory
 Stochastic Control Systems
 Convex Optimization I
 Advanced Mathematical Statistics
 Coding Theory

SKILLS

Programming Languages & Software: C, C++, Python, Matlab

PROFESSIONAL SERVICE

Reviewing: IEEE International Symposium on Information Theory, IEEE Transactions on Mobile Computing, Proceedings of the IEEE

Women in Computer Science and Engineering, UC Berkeley: Co-president 2016-17, outreach chair 2015-16

EXTRA-CURRICULAR ACTIVITIES

Indian Classical (Carnatic) vocal music: Professionally trained; won intra-college, inter-college, and state-level competitions. Performed at prestigious venues in Bangalore and Chennai.

Western classical piano: Professionally trained; completed all eight grades under the Associated Board of the Royal School of Music, London. Passed all exams with distinction and performed at several high achievers’ concerts.

Other Western music: Played keyboard in a semi-professional band. Won several intra- and inter-college competitions. Composed score for semi-professional theater and short films.

Writing: Won intra-college creative writing events, wrote for campus newsletter.