

Abhin Shah

Email - abhin@mit.edu

EDUCATION

Massachusetts Institute of Technology, USA (MIT) 2018 - Present
Ph.D. in Electrical Engineering and Computer Science (EECS) CGPA: 5.0/5.0
Advisors: Prof. Gregory Wornell and Prof. Devavrat Shah
Awards: Presidential Graduate Fellowship (2018-19)
Labs: Laboratory of Information and Decision Systems, Research Laboratory of Electronics

Indian Institute of Technology, Bombay, India (IIT Bombay) 2014 - 2018
Bachelor of Technology in Electrical Engineering (with Honours) CGPA: 9.61/10.00
Advisor: Prof. Nikhil Karamchandani
Awards: Institute Undergraduate Research Award 01 (2017), Institute Academic Prize (2016-17)

RESEARCH INTERESTS

Graphical Models, Causal Inference, Statistical Inference, Applied Probability, Optimization

RESEARCH EXPERIENCE

- Graduate Research* • Learning sparse graphical models with continuous variables beyond the Gaussian case.
- Undergraduate Thesis* • Developed placement + delivery schemes with order optimal rates based on global and local popularity of files in the coded caching problem with non-identical file popularity.
- Undergraduate Research* • Analyzed the transient response of quantum dot thermal machines driven by hyperfine interaction acting as a source of Shannon information flow.

INTERNSHIPS

- IBM Research* 2020 Research Summer Intern-PhD
Manager: Kush Varshney
Mentors: Kartik Ahuja, Karthikeyan Shanmugam, Dennis Wei, Amit Dhurandhar
• Used invariant risk minimization to build robust estimators for causal treatment effect estimation from observational data.
- EPFL* Summer Research Intern (2017)
Advisor: Michael Gastpar
• Proposed a polynomial-time deterministic algorithm with significantly lower complexity than the state of the art to compute the minimum transmission cost in the cooperative data exchange problem with weighted costs.

PUBLICATIONS

- Working papers • **Abhin Shah**, Devavrat Shah, Gregory W. Wornell, “On learning Continuous Markov Random Fields.”
• **Abhin Shah**, Kartik Ahuja, Amit Dhurandhar, Karthikeyan Shanmugam, Kush Varshney, Dennis Wei, “Invariant Treatment Effect Estimation.”
- Conference • **Abhin Shah**, Nikhil Karamchandani, Suhas Diggavi, “Coded Caching: Global vs Local Content Popularity,” 16th Canadian Workshop on Information Theory, 2019
• Su Li, **Abhin Shah**, Michael Gastpar, “Cooperative Data Exchange with Weighted Cost based on d-Basis Construction,” 55th Annual Allerton Conference on Communication, Control, and Computing, 2017
- Journal • **Abhin Shah**, Sai Vinjanampathy and Bhaskaran Muralidharan, “Classical information driven quantum dot thermal machines,” Annals of Physics, 2018

GRADUATE COURSEWORK

Math Mathematical Statistics, An Algorithmist’s Toolkit, Fundamentals of Probability, Optimization methods
EECS Algorithms for Inference, Inference and Information, Random Graphs, Information Theory and Coding, Network Information Theory, Error Correcting Codes

TEACHING AND MENTORSHIP EXPERIENCE

Teaching	Teaching Assistant, Algorithms for Inference, MIT	Fall 2020
	Teaching Assistant, Linear Algebra, IIT Bombay	Spring 2016
	Teaching Assistant, Quantum Physics, IIT Bombay	Fall 2015
Mentoring	Institute Student Mentor, IIT Bombay	2017-18
	<ul style="list-style-type: none">Mentored 12 freshmen from diverse background for their overall development and addressing their academic and general issues; attended training by Tata Institute of Social Sciences.	
	Department Academic Mentor, Electrical Engineering, IIT Bombay	2016-18
	<ul style="list-style-type: none">Selected twice based on peer review and inter-personal skills for one-to-one mentoring of academically weak students and aided two students to clear their backlogs and get better grades.	

SCHOLASTIC ACHIEVEMENTS

Awards	<ul style="list-style-type: none">Receipient of the Presidential Graduate Fellowship (2018-19) awarded by MIT to recruit the most outstanding students worldwide to pursue graduate studies at the institute.Awarded the Institute Undergraduate Research Award 01 in recognition to exemplary contribution towards research via the undergraduate research project at IIT Bombay.Secured Semester Performance Index of 10.00/10.00 in 7th semester at IIT Bombay.Conferred the Institute Academic Prize in 2017 for standing 2nd (out of 66) in the junior year.Secured AP grade for exceptional performance (Awarded to less than top 2% of a class) in 2 courses namely, Quantum Transport in Nanoscale Devices & Electromagnetic Waves.Awarded the best project (PepperShield) for social cause at Tech and RnD Exposition, IIT Bombay.All India Rank 126 out of 1.4 million students with a percentile of 99.99 in IIT-JEE-Advanced 2014.Selected for a 4 day nurturance camp in 2011 conducted by National Council for Education Research & Training in collaboration with Homi Bhabha Centre for Science Education (TIFR).National Talent Search Scholarship, since 2008, awarded by Government of India.
Olympiads	<ul style="list-style-type: none">Selected among national top 1 % for Indian National Physics (INPhO) and Mathematics (INMO) Olympiads and Indian National Junior Science Olympiad (INJSO).Awarded bronze medal at the 32nd Annual Mathematics Olympiad, IIT Bombay.

PROGRAMMING LANGUAGES

Python, MATLAB, C++, Java, HTML, CSS, JavaScript, L^AT_EX

EXTRA-CURRICULAR ACTIVITIES

Cricket	Ex-member of the MIT Cricket Club.
Abacus	Participated in International Standard Abacus Computation conducted by UCMAS (Malaysia).
Electronics	Designed RC plane, Autonomous Arduino based Line Follower, RC Robot car at IIT Bombay.
Chess	Winner at district level Chess championship.
Hockey	Won bronze medal in the Hockey General Championship, IIT Bombay.
Football	Represented the hostel team in the Football General Championship, IIT Bombay.

REFERENCES

Prof. Gregory W. Wornell PhD advisor, MIT Email Webpage	Prof. Devavrat Shah PhD advisor, MIT Email Webpage	Dr. Kush Varshney Internship manager, IBM Research Email Webpage
Prof. Nikhil Karamchandani Undergraduate advisor, IIT Bombay Email Webpage	Prof. Bhaskaran Muralidharan IIT Bombay Email Webpage	Prof. Michael Gastpar Internship advisor, EPFL Email Webpage