

# Nitin Saurabh

## Curriculum Vitae

### CONTACT INFORMATION

Department of Computer Science & Engineering  
Indian Institute of Technology Hyderabad  
Kandi-502285, Sangareddy  
Telangana, India

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*E-mail:* [nitin@cse.iith.ac.in](mailto:nitin@cse.iith.ac.in)  
[3295.nitin@gmail.com](mailto:3295.nitin@gmail.com)

*Homepage:* <https://nitinsau.github.io>

### RESEARCH INTERESTS

**Computational Complexity theory** and its connections to **Algebra**, **Algorithms** and **Combinatorics**. More specifically, circuit complexity, analysis of Boolean functions, lower bounds, pseudorandomness, algebraic complexity, communication complexity, and fine-grained complexity.

### EMPLOYMENT

**IIT** Hyderabad, India.

Assistant Professor  
Department of Computer Science and Engineering.

Period: January 2022 - till present.

**International Institute of Information Technology**, Hyderabad, India.

Assistant Professor

Period: July 2021 - December 2021.

**Technion - IIT**, Haifa, Israel.

Postdoctoral Fellow  
Faculty of Computer Science.

Period: November 2019 - June 2021.  
Host: [Prof. Yuval Filmus](#).

**Max Planck Institut für Informatik**, Saarbrücken, Germany.

Postdoctoral Fellow  
Department 1: Algorithms and Complexity.

Period: January 2018 - August 2019.  
Host: [Dr. Christian Ikenmeyer](#).

**Charles University**, Prague, Czechia.

Postdoctoral Fellow  
Computer Science Institute of Charles University.  
Faculty of Mathematics and Physics.

Period: September 2016 - November 2017.  
Host: [Prof. Michal Koucký](#).

## EDUCATION

**The Institute of Mathematical Sciences**, Chennai, India.

Integrated Ph.D. in Theoretical Computer Science

Thesis: [Analysis of Algebraic Complexity Classes and Boolean Functions](#).

Period: August 2010 - July 2016 (Thesis defended: December 2016.)

Advisor: [Prof. Meena Mahajan](#).

**Chennai Mathematical Institute**, Chennai, India.

Bachelor of Science (Honours) in Mathematics and Computer Science

Period: August 2007 - April 2010.

## ACADEMIC VISITS

- **University of Warwick**, UK.  
Host: [Prof. Christian Ikenmeyer](#) – March 2023.
- **The Institute of Mathematical Sciences**, India.  
Host: [Prof. Meena Mahajan](#) – June-July 2022.
- **Indian Statistical Institute**, India.  
Host: [Prof. Sourav Chakraborty](#) – November 2019.
- **Microsoft Research**, India.  
Host: [Dr. Satya Lokam](#) – April 2019.
- **Centrum Wiskunde & Informatica**, the Netherlands.  
Host: [Prof. Ronald de Wolf](#) – July/August 2017.
- **St. Petersburg State University**, Russia.  
Period: May to June 2016.
- **Charles University**, Czechia.  
Host: [Prof. Michal Koucký](#) – March 2016.
- **Tel Aviv University**, Israel.  
Period: February 2016.
- **Saarland University**, Germany.  
Period: March 2014.
- **Simon Fraser University**, Canada.  
Host: [Prof. Valentine Kabanets](#) – January to July 2013.
- **Royal Melbourne Institute of Technology**, Australia.  
Period: February 2012.
- **Aarhus University**, Denmark.  
Host: [Prof. Kristoffer Arnsfelt Hansen](#) – August 2011.
- **Microsoft Research**, India.  
Host: [Dr. Satya Lokam](#) – May to July 2011.

## PROFILE

Google Scholar: <https://scholar.google.com/citations?user=JfhhH68AAAAJ>

## PREPRINTS & PUBLICATIONS

▷ Authors are listed in *alphabetical order* in Theoretical Computer Science.

- **Randomized and Quantum Query Complexities of finding a king in a tournament**  
 Nikhil Mande, Manaswi Paraashar and Nitin Saurabh.  
*Preliminary version in 43rd Foundations of Software Technology and Theoretical Computer Science Conference (FSTTCS)* 2023.  
 DOI: <https://doi.org/10.4230/LIPIcs.FSTTCS.2023.30>
- **On the Composition of Randomized Query Complexity and Approximate Degree**  
 Sourav Chakraborty, Chandrima Kayal, Rajat Mittal, Manaswi Paraashar, Swagato Sanyal and Nitin Saurabh.  
*Preliminary version in International Conference on Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques (APPROX/RANDOM)* 2023.  
 (CORE Ranking: A)  
 DOI: <https://doi.org/10.4230/LIPIcs.APPROX/RANDOM.2023.63>
- **Karchmer-Wigderson Games for Hazard-free Computation**  
 Christian Ikenmeyer, Balagopal Komarath and Nitin Saurabh.  
*Preliminary version in 14th Innovations in Theoretical Computer Science (ITCS)* 2023.  
 (CORE Ranking: A)  
 DOI: <https://doi.org/10.4230/LIPIcs.ITCS.2023.74>
- **Rabbits Approximate, Cows Compute Exactly!**  
 Balagopal Komarath, Anurag Pandey and Nitin Saurabh.  
*Preliminary version in 47th International Symposium on Mathematical Foundations of Computer Science (MFCS)* 2022. (CORE Ranking: A)  
 DOI: <https://doi.org/10.4230/LIPIcs.MFCS.2022.65>
- **Tight lower bounds for approximate & exact  $k$ -center in  $\mathbb{R}^d$ .**  
 Rajesh Chitnis and Nitin Saurabh.  
*Preliminary version in 38th International Symposium on Computational Geometry (SoCG)* 2022.  
 (CORE Ranking: A)  
 DOI: <https://doi.org/10.4230/LIPIcs.SoCG.2022.28>
- **Approximate Polymorphisms.**  
 Gilad Chase, Yuval Filmus, Dor Minzer, Elchanan Mossel and Nitin Saurabh.  
*Preliminary version in 54th Symposium on Theory of Computing (STOC)* 2022.  
 (CORE Ranking: A\*)  
 DOI: <https://doi.org/10.1145/3519935.3519966>
- **On the Complexity of Detecting Hazards.**  
 Balagopal Komarath and Nitin Saurabh.  
*Information Processing Letters (IPL)*, 162, 2020.  
 DOI: <https://doi.org/10.1016/j.ipl.2020.105980>
- **Algebraic Branching Programs, Border Complexity, and Tangent Spaces.**  
 Markus Bläser, Christian Ikenmeyer, Meena Mahajan, Anurag Pandey and Nitin Saurabh.  
*Preliminary version in 35th Computational Complexity Conference (CCC)* 2020.  
 (CORE Ranking: A)  
 DOI: <https://doi.org/10.4230/LIPIcs.CCC.2020.21>
- **Lower Bounds for Linear Decision Lists.**  
 Arkadev Chattopadhyay, Meena Mahajan, Nikhil Mande and Nitin Saurabh.  
*Chicago Journal of Theoretical Computer Science (CJTCS)* 2020(1), 2020.  
 DOI: <http://doi.org/10.4086/cjtcs.2020.001>

- Improved Bounds on Fourier Entropy and Min-entropy.**  
 Srinivasan Arunachalam, Sourav Chakraborty, Michal Koucký, Nitin Saurabh and Ronald de Wolf.  
*ACM Transactions on Computation Theory (TOCT)*, 13(4), 2021.  
*Preliminary version in 37th International Symposium on Theoretical Aspects of Computer Science (STACS)* 2020. (CORE Ranking: A)  
 DOI: <https://doi.org/10.1145/3470860>
- Space-optimal quasi-Gray Codes with Logarithmic Read Complexity.**  
 Diptarka Chakraborty, Debarati Das, Michal Koucký and Nitin Saurabh.  
*Preliminary version in 26th European Symposium on Algorithms (ESA)* 2018.  
 (CORE Ranking: A)  
 DOI: <https://doi.org/10.4230/LIPIcs.ESA.2018.12>
- Fourier Entropy-Influence Conjecture for Random Linear Threshold Functions.**  
 Sourav Chakraborty, Sushrut Karmalkar, Srijita Kundu, Satya Lokam and Nitin Saurabh.  
*Preliminary version in 13th Latin American Theoretical Informatics Symposium (LATIN)* 2018.  
 (CORE Ranking: B)  
 DOI: [https://doi.org/10.1007/978-3-319-77404-6\\_21](https://doi.org/10.1007/978-3-319-77404-6_21)
- Some Complete and Intermediate Polynomials in Algebraic Complexity Theory.**  
 Meena Mahajan and Nitin Saurabh.  
*Theory of Computing Systems (TOCS)*, 62(3), 2018. *Special issue of CSR* 2016.  
*Preliminary version in 11th International Computer Science Symposium in Russia (CSR)*, 2016.  
 Winner of the **Best Paper Award** at CSR 2016.  
 DOI: <https://doi.org/10.1007/s00224-016-9740-y>
- VNP=VP in the Multilinear World.**  
 Meena Mahajan, Nitin Saurabh and Sébastien Tavenas.  
*Information Processing Letters (IPL)*, 116(2), 2016.  
 DOI: <http://dx.doi.org/10.1016/j.ipl.2015.08.004>
- Upper Bounds on Fourier Entropy.**  
 Sourav Chakraborty, Raghav Kulkarni, Satya Lokam and Nitin Saurabh.  
*Theoretical Computer Science (TCS)*, vol. 654, 2016. *Special issue of COCOON* 2015.  
*Preliminary version in 21st International Computing and Combinatorics Conference (COCOON)*, 2015. (CORE Ranking: A)  
 DOI: <http://dx.doi.org/10.1016/j.tcs.2016.05.006>
- Homomorphism Polynomials Complete for VP.**  
 Arnaud Durand, Meena Mahajan, Guillaume Malod, Nicolas de Rugy-Altherre and Nitin Saurabh.  
*Chicago Journal of Theoretical Computer Science (CJTCS)* 2016(3), 2016.  
*Preliminary version in 34th Foundations of Software Technology and Theoretical Computer Science Conference (FSTTCS)*, 2014.  
 DOI: <http://dx.doi.org/10.4086/cjtcs.2016.003>
- An Improved Deterministic #SAT Algorithm for Small de Morgan Formulas.**  
 Ruiwen Chen, Valentine Kabanets and Nitin Saurabh.  
*Algorithmica* 76(1), 2016.  
*Preliminary version in 39th International Symposium on Mathematical Foundations of Computer Science (MFCS)*, 2014. (CORE Ranking: A)  
 DOI: <http://dx.doi.org/10.1007/s00453-015-0020-z>
- Counting Paths in Planar Width 2 Branching Programs.**  
 Meena Mahajan, Nitin Saurabh and KartEEK Sreenivasaiah.

*Preliminary version in 18th Computing: the Australasian Theory Symposium (CATS), 2012.*  
URL: <https://crpit.scem.westernsydney.edu.au/abstracts/CRPITV128Mahajan.html>

## AWARDS AND HONOURS

Winner of the **Best Paper Award** at **CSR 2016**.  
<https://nitinsau.github.io/CSR.pdf>

Recipient of the **Canadian Commonwealth Scholarship Program** 2012-13 by the Canadian Bureau for International Education.

This enabled me to visit Simon Fraser University, Canada, where I worked under the guidance of Prof. [Valentine Kabanets](#). <https://nitinsau.github.io/CCSP-award-letter.pdf>

One of the two recipients of the **student travel award** by **ACM India** to attend ACM Turing centenary celebrations, San Francisco, June 2012.  
<https://nitinsau.github.io/ACMPressRelease.pdf>

Recipient (2007-2010) of **Scholarship for Higher Education** (SHE), an INSPIRE Scholarship given by the Department of Science and Technology, Government of India, for undergraduate studies.

Secured the **First** place in the **Regional Mathematics Olympiad (RMO)**, **2006**, in the State of Jharkhand, India.

## TEACHING EXPERIENCE

### Topics in Computing

[Course Lecturer](#).

IIT Hyderabad, India.

Semester: August to December 2023.

<https://nitinsau.github.io/BF-m23-iith.html>

### Algorithms

[Course Lecturer](#).

IIT Hyderabad, India.

Semester: January to May 2023.

<https://nitinsau.github.io/algo-s23-iith.html>

### Computational Complexity

[Course Lecturer](#).

IIT Hyderabad, India.

Semester: August to December 2022.

<https://nitinsau.github.io/CT-m22-iith.html>

### Algorithms

[Course Lecturer](#) (co-taught with Fahad Panolan).

IIT Hyderabad, India.

Semester: January to May 2022.

### Complexity Theory I

[Course Lecturer](#) (co-taught with Girish Varma).

International Institute of Information Technology Hyderabad, India.

Semester: August to December 2021.

<https://nitinsau.github.io/CT-m21-iiith.html>

#### Guest Lecture.

Course: Random Graphs (2019-2020), Course Lecturer: Yuval Filmus.  
Technion - IIT, Haifa, Israel.

#### Introduction to Boolean Function Complexity (Advanced Course).

##### Course Lecturer.

Max Planck Institut für Informatik, Saarbrücken, Germany.

Semester: April to July 2019.

<https://www.mpi-inf.mpg.de/departments/algorithms-complexity/teaching/summer19/bool-complexity/>

<https://nitinsau.github.io/BFC19-notes.html>

#### Discrete Mathematics (Graduate Course).

##### Teaching Assistant.

The Institute of Mathematical Sciences, Chennai, India.

Semester: August to December 2014.

#### Incidence Theorems and their Applications (Reading Group).

jointly organized with Swaroop N P, Syed Meesum and Meena Mahajan.

The Institute of Mathematical Sciences, Chennai, India.

Semester: January to April 2014.

#### Linear Programming and Combinatorial Optimization (Graduate Course).

##### Teaching Assistant.

The Institute of Mathematical Sciences, Chennai, India.

Semester: August to December 2012.

#### TALKS (SELECTED)

- “*Rabbits Approximate, Cows Compute Exactly!*”, Workshop on Algebraic Complexity Theory (WACT), University of Warwick, UK, March 2023.
- “*Improved Upper Bounds on Fourier Entropy*”, Workshop on Sensitivity, Query Complexity, Communication Complexity and Fourier Analysis of Boolean Function, ISI, Kolkata, February 2020.
- “*On Fourier Entropy-Influence Conjecture*”, MPI-INF and MPI-MiS joint workshop on Theoretical Computer Science and Algebraic Geometry, Saarbrücken, January 2019.
- “*Space-optimal quasi-Gray Codes with Logarithmic Read Complexity*”, MPiI, Saarbrücken, February 2018.
- “*Upper Bounds on Fourier Entropy*”, MPiI, Saarbrücken, August 2017.
- “*Some Complete and Intermediate Polynomials in Algebraic Complexity Theory*”, CSR, St. Petersburg, June 2016.
- “*Upper Bounds on Fourier Entropy*”, Charles University, Prague, March 2016.
- “*Homomorphism Polynomials Complete for VP*”, FSTTCS, New Delhi, December 2014.
- “*Deterministic #SAT Algorithm for de Morgan Formulas*”, MFCS, Budapest, August 2014.
- “*Counting Paths in Planar Width 2 Branching Programs*”, CATS, Melbourne, February 2012.

## PROFESSIONAL ACTIVITIES

### Participation in Conferences and Workshops (Selected)

- Simons Lecture Series on Advances in Boolean Function Analysis (**July/August 2020**).
- 35th Computational Complexity Conference, Saarbrücken, Germany (**July 2020**).
- Workshop on Sensitivity, Query Complexity, Communication Complexity and Fourier Analysis of Boolean Function, ISI Kolkata, India (**February 2020**).
- Complexity, Algorithms, Automata and Logic Meet, CMI Chennai, India (**January 2019**).
- MPI-INF and MPI-MiS joint workshop on Theoretical Computer Science and Algebraic Geometry, Saarbrücken, Germany (**January 2019**).
- Summer School on Algorithms and Lower Bounds, Prague, Czechia (**July 2018**).
- S3CS: Swedish Summer School in Computer Science, Stockholm, Sweden (**July 2017**).
- Perspectives on Complexity Theory and Cryptography, Bangalore, India (**January 2017**).
- 11th Computer Science Symposium in Russia, St. Petersburg, Russia (**June 2016**).
- Special semester program on Complexity Theory, St. Petersburg, Russia (**May-June 2016**).
- Workshop on Algebraic Complexity Theory (**Warwick 2023, Bangalore 2019, Paris 2018, Tel Aviv 2016, Saarbrücken 2014**).
- Foundations of Software Technology and Theoretical Computer Science Conference (**December 2014, 2012, 2011 and 2010**).
- Workshop on Computational Complexity at Banff International Research Station, Banff, Canada (**July 2013**).
- Mysore Park workshop on *Recent trends in Algorithms and Complexity*, Infosys Mysore, India (**2012, 2011, and 2010**).
- ACM A.M. Turing Centenary Celebration, San Francisco, USA (**June 2012**).
- ICM-2010 satellite conference on Algebraic and Probabilistic Aspects of Combinatorics and Computing, IISc Bangalore, **2010**.

### Review Service

- **Journals:** Journal of Computer and System Sciences, ACM-TOCT.
- **Conferences:** STOC, FOCS, CCC, SODA, ICALP, STACS, FSTTCS, CSR, RANDOM, ISSAC, ITCS, FAW, ISAAC, CIAC, SWAT.

## REFERENCES

**Dr. Meena Mahajan**

Professor

The Institute of Mathematical Sciences, Chennai

*E-mail:* meena@imsc.res.in

**Dr. Satya V. Lokam**

Senior Researcher

Microsoft Research India, Bangalore

*E-mail:* Satya.Lokam@microsoft.com

**Dr. Michal Koucký**

Professor

Charles University, Prague

*E-mail:* koucky@iuuk.mff.cuni.cz