

# Nitin Saurabh

## Curriculum Vitae

### CONTACT INFORMATION

Technion - Israel Institute of Technology  
Faculty of Computer Science  
Haifa 3200003  
Israel

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*E-mail:* nitinsau@cs.technion.ac.il  
3295.nitin@gmail.com  
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### PERSONAL INFORMATION

Date of Birth: April 27, 1990.  
Nationality: Indian.

### 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

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

Postdoctoral Fellow  
Faculty of Computer Science.

Period: November 2019 - till present.  
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

- **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=JfhhbH68AAAAJ>

#### PREPRINTS & PUBLICATIONS

- **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.  
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.  
*Preliminary version in 37th International Symposium on Theoretical Aspects of Computer Science (STACS)* 2020.  
DOI: <https://doi.org/10.4230/LIPIcs.STACS.2020.45>
- **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.  
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.  
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.ip1.2015.08.004>
- **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.  
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.  
DOI: <http://dx.doi.org/10.1007/s00453-015-0020-z>
- **Counting Paths in Planar Width 2 Branching Programs.**  
Meena Mahajan, Nitin Saurabh and Karteeek 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 was working 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

**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/>

**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)

- “*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 (**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.
- **Conferences:** FOCS, CCC, SODA, ICALP, STACS, FSTTCS, CSR, RANDOM, ISSAC, 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

**Dr. Sourav Chakraborty**

Associate Professor

Indian Statistical Institute, Kolkata

*E-mail:* sourav@isical.ac.in

**Dr. V. Arvind**

Professor

The Institute of Mathematical Sciences, Chennai

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**Dr. Christian Ikenmeyer**

Senior Lecturer

University of Liverpool

*E-mail:* christian.ikenmeyer@liverpool.ac.uk

**Dr. Yuval Filmus**

Assistant Professor

Technion - IIT, Haifa, Israel

*E-mail:* yuvalfi@cs.technion.ac.il