

Algorithms and Complexity Theory Lab, IIT M
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Sajin Koroth

Research Interests

- Computational Complexity Theory, especially Circuit Complexity
- Communication Complexity
- Combinatorics

Education

2011–2016 (expected) **PhD in Computer Science, IIT Madras, CGPA 9.25/10.**

2009–2011 **MS by Research in Computer Science, IIT Madras, CGPA 9/10.**

2005–2009 **B.Tech in Computer Science, Govt. College of Engineering, Kannur, 72% (4 year aggregate).**

Publications

Conferences

- Krishnamoorthy Dinesh, Sajin Koroth, and Jayalal Sarma. Characterization and lower bounds for branching programs size using projective dimension. In *The 36th IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science, FSTTCS 2016, Chennai, India, December 13-15, 2016*, 2016.
- Shankar Balachandran and Sajin Koroth. Subclasses of baxter permutations based on pattern avoidance. In Alexander S. Kulikov and Gerhard J. Woeginger, editors, *Computer Science - Theory and Applications - 11th International Computer Science Symposium in Russia, CSR 2016, St. Petersburg, Russia, June 9-13, 2016, Proceedings*, volume 9691 of *Lecture Notes in Computer Science*, pages 192–206. Springer, 2016.
- Sajin Koroth and Jayalal Sarma. Depth lower bounds against circuits with sparse orientation. In Zhipeng Cai, Alex Zelikovsky, and Anu G. Bourgeois, editors, *Computing and Combinatorics - 20th International Conference, COCOON 2014, Atlanta, GA, USA, August 4-6, 2014. Proceedings*, volume 8591 of *Lecture Notes in Computer Science*, pages 596–607. Springer, 2014.

- Saurav Muralidharan, Sajin Koroth, Nevil Anto, and Rafeeqe Pandarachalil. Galaxia: A semi-decentralized system for implementing secure-group p2p networks. In *International Conference on Networks and Communications, 2009. NETCOM '09.*, pages 289–294, 2009

Journals

- Sajin Koroth and Jayalal Sarma. Depth lower bounds against circuits with sparse orientation. *FUNDAMENTA INFORMATICA*, 2016. Accepted with minor revisions

Academic Visits

Long Term visits

- Visiting University of Haifa hosted by Or Meir, August - May 2016
- Attending the Special Semester Program on Complexity Theory at Chebyshev Laboratory, St.Petersburg State University, April-June 2016

Short Term visits

- Visiting Rutgers University hosted by Swastik Kopparty, 7-14 August 2014

Achievements and Awards

- Outstanding TA award for a graduate course on Algorithmic Algebra offered at IIT Madras during Jan-May 2013
- Outstanding TA award for two consecutive semesters on an undergraduate course on Introduction to Programming offered at IIT Madras during July-Dec 2009 and Jan - May 2010
- Ranked 205th (99.5 percentile) in CS-GATE 2009, the national level exam for graduate studies in Computer Science in India

Teaching

Teaching Assistanceship - Graduate Courses

- Advanced Algorithms
- Algorithmic Algebra
- Advanced Complexity Theory
- Advanced Theory of Computation
- Modern Techniques in Theory of Computation
- Approximation Algorithms
- Modern Techniques in Theory of Computation

Teaching Assistanceship - Undergraduate Courses

- Combinatorics
- Data Structures and Algorithms

Talks

- Talk on :Branching Program size lower bounds via Projective Dimension, Theory Lunch Series, Technion - Israel Institute of Technology, 16th November 2016
- Talk on : Linear Algebraic Approaches for Branching Program Lower bounds , A Special Semester on Computational and Proof Complexity, Chebyshev Laboratory, St. Petersburg State University, 1st June 2016
- Talk on : Demystifying Razborov's Method of Approximation, Theory Reading Group at Rutgers University, 13th Aug 2014
- Depth Lower Bounds Against Circuits of Sparse Orientation, Theory Meet at CSE IIT Madras on 30th July 2014 and at COCOON'14
- Towards Seymour's Second Neighborhood Conjecture, Graph Theory Seminar Series, Math IIT Madras, April 28 2014
- Exposition on : "Toward better formula lower bounds: An information complexity approach to the KRW composition conjecture", Complexity Reading Group at Institute of Mathematical Sciences, 28th Feb 2014
- Exposition on : "New algorithms for qbf satisfiability and implications for circuit complexity", Complexity Reading Group at Institute of Mathematical Sciences, 28th Nov 2013
- **NEXP** is not in ACC^0 - an exposition, Theory Meet at CSE IIT Madras, Aug 16 2011
- An introduction to log-rank conjecture, Theory Meet at CSE, IIT Madras, Feb 16 2012
- Approximate sampling and counting using Markov chains, Theory Meet at CSE IIT Madras, Oct 16 2012

Professional Activities

External Reviewer

- 41st International Symposium on Mathematical Foundations of Computer Science (MFCS 2016)
- 32nd International Symposium on Theoretical Aspects of Computer Science (STACS 2015)
- 34th IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2014)
- 8th International Workshop on Algorithms and Computation (WALCOM 2014)

Conference Organisation

- Student Organiser- 8th International Workshop on Algorithms and Computation (WALCOM 2014)

Relevant Courses during MS and PhD

At Indian Institute of Technology Madras

- Advanced Complexity Theory
- Algorithmic Algebra

At Institute of Mathematical Sciences Chennai

- Communication Complexity
- Linear Programming and Combinatorial Optimization
- Mathematical Foundations for Computer Science
- Advanced Graph Theory
- Computational Complexity I
- Algebra and Computation
- Discrete Mathematics
- Algorithms and Data Structures
- Automata and Computability

References

- Jayalal Sarma M. N.
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 - Affiliation : Associate Professor, Dept. of Computer Science and Engineering, IIT Madras - 600036
- Or Meir
 - email : ormeir@cs.haifa.ac.il
 - Affiliation : Senior Lecturer at Department of Computer Science, University of Haifa
- Swastik Kopparty
 - email : swastik@math.rutgers.edu
 - Affiliation : Assistant Professor of Mathematics and Computer Science, Rutgers University
- Alexander S. Kulikov
 - email : alexander.s.kulikov@gmail.com
 - Affiliation : Senior Research Fellow at Laboratory of Mathematical Logic of St. Petersburg Department of Steklov Institute of Mathematics
- N. S. Narayanaswamy
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 - Affiliation : Professor, Dept. of Computer Science and Engineering, IIT Madras - 600036
- Raghavendra Rao B. V.
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 - Affiliation : Assistant Professor, Dept. of Computer Science and Engineering, IIT Madras - 600036