Department of Computer Science
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Sajin Koroth

Research Interests

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

Positions

2017- **Postdoctoral Fellow**, *University of Haifa*.

Education

2011–2017 **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 (Peer Reviewed)

- Sajin Koroth and Or Meir. Accepted for publication - improved composition theorems for functions and relations. In *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques – APPROX/RANDOM 2018*, volume -, pages —, August 2018
- 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

Journals

- Sajin Koroth and Jayalal Sarma. Depth lower bounds against circuits with sparse orientation. *Fundam. Inform.*, 152(2):123–144, 2017

Acaedmic Visits

Long Term visits

- Visiting researcher, Simons Institute for the theory of computing, University of California Berkeley, August 2018- December 2018
- Visiting University of Haifa hosted by Or Meir, August 2016 - February 2017
- Attending the Special Semester Program on Complexity Theory at Chebyshev Laboratory, St.Petersburg State University, April-June 2016

Short Term visits

- Swedish Summer School in Computer Science, July 2017
- Visiting Rutgers University hosted by Swastik Kopparty, 7-14 August 2014

Achievements and Awards

- Won the scholarship by the University of Haifa for the academic year 2017-2018 to support excellence in full-time research
- Joint winner of the IBM India Outstanding PhD Thesis Award
- Outstanding TA award for a graudate cousre on Algorithmic Algebra offered at IIT Madras during Jan-May 2013
- Outstanding TA award for two consecutive semesters on an undergraudate 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 - Unergraduate Courses

- Combinatorics
- Data Structures and Algorithms

Talks

- Improved Compostion Theorems for Functions and Relations
  - CS Theory Seminar, Ben Gurion University, March 12, 2018
  - Haifa Theory Group Seminar, CRI, University of Haifa, March 19, 2018
  - Theory lunch at University of Washington, May 18th, 2018
  - Theory lunch at Simon Fraser University, May 23rd, 2018
  - Theory seminar at Simon Fraser University, May 22nd, 2018
  - Theory seminar at Hebrew University of Jerusalem, June 6th, 2018
- Learning Algorithms for Sparsely Oriented Circuits, Theory Meet, IIT Madras, Feb 21st 2017
- Branching Program size lower bounds via Projective Dimension
  - CS Theory Seminar, Hebrew University, Jerusalem, 30th November 2016
  - Theory Lunch Series, Technion - Israel Institute of Technology, 16th November 2016
- 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
- Depth Lower Bounds Against Circuits of Sparse Orientation, Theory Meet at CSE IIT Madras on 30th July 2014

Professional Activities

External Reviewer

- International Symposium on Theoretical Aspects of Computer Science, STACS 2017, STACS 2015
- 41st International Symposium on Mathematical Foundations of Computer Science (MFCS 2016)
- 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.
  - email : jayalal@cse.iitm.ac.in
  - 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 Labarotary of Mathematical Logic of St. Petersburg Department of Steklov Institute of Mathematics