Vikram Saraph

Contact Information

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Research Interests

Distributed computing, combinatorial topology, applied topology, concurrent data structures, computational biology, complex networks, algebraic topology, computable model theory, group theory, applications of interesting mathematics.

Education

Brown University, Providence, RI

Ph.D., Computer Science, *Expected:* May 2019

- Advisor: Maurice Herlihy

Sc.M., Computer Science, May 2015

M.A., Mathematics, *Expected:* May 2019

University of Notre Dame Notre Dame, IN

B.Sc., Computer Science and Honors Mathematics, May 2013

- *Magna Cum Laude*
- Member of Engineering Honors Program
- Honors Thesis: *A Genetic Algorithm for Network Alignment*
- Advisor: Tijana Milenković
- Member of Seminar for Undergraduate Mathematical Research (SUMR)
- Honors Thesis: *Index Sets of Computable Groups*
- Advisor: Julia Knight

Conference Publications

1. **Saraph, V**, Herlihy, M, and Gafni, E (2016), "Asynchronous Computability Theorems for t-Resilient Systems," accepted to DISC 2016.
2. **Saraph, V** and Herlihy, M (2015), "The Relative Power of Composite Loop Agreement Tasks," accepted to OPODIS 2015, to appear in proceedings.

Journal Publications

1. Vijayan, V, **Saraph, V**, and Milenković, T (2015), "MAGNA++: Maximizing Accuracy in Global Network Alignment via both node and edge conservation," *Bioinformatics* 31(14): 2409-2411.
2. **Saraph, V** and Milenković, T (2014), "MAGNA: Maximizing Accuracy in Global Network Alignment," *Bioinformatics* 30(20): 2931-2940.

Under Review

1. Knight, J and **Saraph, V** (2016), "Scott Sentences for Certain Groups," submitted to *Archive for Mathematical Logic*, arXiv:1606.06353

Honors and Awards

Brown University

- **Honorable Mention, NSF Graduate Research Fellowship**, National Science Foundation 2013-2014

University of Notre Dame

- **Senior G.E. Prize for Honors Mathematics Majors**, Department of Mathematics 2012–2013
- **Robert P. Balles Honors Mathematics Scholar**, Department of Mathematics 2012–2013
- **Upsilon Pi Epsilon Scholarship**, Upsilon Pi Epsilon 2012–2013
- **NSF Scholarship**, Seminar for Undergraduate Mathematical Research 2010–2013

Research Experience

Graduate Research Assistant Aug 2013 –
Department of Computer Science,
Brown University

- Researching the computational power of certain fault-tolerant communication models by via methods from combinatorial topology.
- Implementing nonblocking iterators for various concurrent data structures.

Research Assistant Jun–Aug 2012
Department of Computer Science and Engineering,
University of Notre Dame

- Designed and implemented MAGNA, a genetic algorithm for network comparison. Software is publicly available and has been made open source.
- Analyzed centrality measures of E. coli protein structure networks.

Research Assistant Jun–Aug 2011
Department of Mathematics,
University of California, Santa Barbara

- Researched number-theoretic properties of generating subsets of $\mathbb{Z}_n$.
- Programmed in MATLAB and C++ to gather empirical data.

Conferences and Seminars

Conference Talks

Symposium on Distributed Computing, Paris, France Sept 2016
Asynchronous Computability Theorems for t-Resilient Systems

Conference on Principles of Distributed Systems, Rennes, France Dec 2015
The Relative Power of Composite Loop Agreement Tasks

Young Mathematicians Conference, Columbus, OH Aug 2011
On the Consecutive Attainable Orders of $\mathbb{Z}_n$

Conference Posters

Intelligent Systems for Molecular Biology, Boston, MA July 2014
MAGNA: Maximizing Accuracy in Network Alignment

Joint Mathematics Meetings, Baltimore, MD Jan 2014
Combinatorial Optimization in Network Alignment

Joint Mathematics Meetings, San Diego, CA Jan 2013
On the Computability of Groups

Graduate Seminars Attended

- Geometry and Topology Seminar, Brown University December 8, 2014
- Midwest Computability Seminar, University of Chicago Nov 14, 2012
- MidWest Model Theory Day, University of Illinois–Chicago Oct 23, 2012
- Graduate Student Conference in Logic, University of Notre Dame Apr 28-29, 2012

Teaching Experience

Guest Lecturer

- Distributed Computing through Combinatorial Topology (CSCI 2951-S), Brown University, Spring 2016, two lectures.
- Multiprocessor Synchronization (CSCI 1760), Brown University, Fall 2014, 2015, three lectures.

Teaching Assistant

- Multiprocessor Synchronization (CSCI 1760), Brown University, Fall 2014, 2015
- Logic for Hackers (CSCI 1950-Y), Brown University, Spring 2014
- Computer Architecture (CSE 30321), Notre Dame, Fall 2012
- Honors Analysis (MATH 30850/60), Notre Dame, Fall 2011, Spring 2012

Summer Schools

Summer School on Formal Methods and Networks Jun 10–14, 2013
Department of Computer Science, Cornell University

Thematic Program on Motivic Invariants and Singularities — May 21–25, 2013
Center for Mathematics, University of Notre Dame

Summer School in Logic — Jun 24–Jul 12, 2012
Logic Center, University of California, Los Angeles

Thematic Program on Topology and Field Theories — May 21–26, 2012
Center for Mathematics, University of Notre Dame

Differential Geometry and Abstract Algebra — Jun–Aug, 2010
Notre Dame REU, University of Notre Dame

Work Experience

Computer Consultant — Jul–Aug 2013
Office of Information Technology,
University of Notre Dame

- Processed massive amounts of user account data, interfacing Python with a PostgreSQL database. Code used to tabulate activity over recent years.

Computer Consultant — Jun 2009–May 2013
Engineering and Science Computing,
University of Notre Dame

- Administered the engineering computer cluster.
- Documented software installation and aided faculty with installations.

Computing Skills

Programming:

- Research: C/C++, Python, Java
- From courses: MATLAB, PostgreSQL, Julia, Pyret

Markup:

- Advanced proficiency: LaTeX
- Intermediate proficiency: HTML, CSS

Service

Referee

Journal of Applied and Computational Topology — 2016
Bioinformatics — 2016

Professional Membership

International Society for Computational Biology — 2014 – 2015
Association for Symbolic Logic — 2013 – 2015
Upsilon Pi Epsilon — 2012 –
Invited to Tau Beta Pi