Nikhil Gopalkrishnan

CONTACT INFORMATION

LSRC D330
Department of Computer Science
Duke University
Durham, NC 27705 USA

Phone: 919-627-7151
E-mail: nikhil@cs.duke.edu
Website: www.cs.duke.edu/~nikhil

EDUCATION

Duke University, Durham, North Carolina USA

Ph.D. Candidate, Computer Science, 2006 to present

- Dissertation Topic: "**Computational and Experimental DNA Self Assembly**"
- Advisor: John Reif
- GPA 3.40/4.0

SASTRA University, Thanjavur, Tamil Nadu, India

Bachelor of Technology, Computer Science and Engineering, 2002-2006

- GPA 8.5/10

HONORS AND AWARDS

James B. Duke Fellow, 2006 - 2010
Nanoscience Fellowship Award, Fall 2006, Spring 2007

RESEARCH POSITIONS

Duke University, Durham, NC, USA **August 2006 - present**
Graduate Student with Professor John Reif.

- **Computing with DNA molecules**
- **DNA self-assembly**
- **Self-assembly based models of computation**

University of Southern California, Los Angeles, CA, USA **July-August 2005**
Visiting Research Scholar with Turing Prize winner Professor Leonard Adleman.

- **DNA Origami**
- **Physics of computation**

PUBLICATIONS

Posters

- Nikhil Gopalkrishnan, Harish Chandran, and John Reif. **2D and 3D DNA Lattices Via Staggered Assembly of the Double-Decker Tile**. In *9th Annual Conference, Foundations of Nanoscience: Self-Assembled Architectures and Devices*, Snowbird, Utah, 2012.
- Harish Chandran, Sudhanshu Garg, Nikhil Gopalkrishnan, Thom LaBean, and John Reif. **Activatable Tiles: Demonstration of Linear and Directed Self Assembly**. In *9th Annual Conference, Foundations of Nanoscience: Self-Assembled Architectures and Devices*, Snowbird, Utah, 2012.
- Harish Chandran, Nikhil Gopalkrishnan, Sudhanshu Garg, and John Reif. **Speeding up DNA Circuits using Localized Hybridization**. In *8th Annual Conference, Foundations of Nanoscience: Self-Assembled Architectures and Devices*, Snowbird, Utah, 2011. (journal version below)
- Harish Chandran, Nikhil Gopalkrishnan, Bernard Yurke, and John Reif. **Meta-DNA: Synthetic Biology via DNA Nanostructures and Hybridization Reactions**. In *7th Annual Conference, Foundations of Nanoscience: Self-Assembled Architectures and Devices*, Snowbird, Utah, 2010. (journal version below)

Conference Articles

- Harish Chandran, Nikhil Gopalkrishnan, Andrew Phillips, and John Reif. **Localized Hybridization Circuits**. In *DNA Computing and Molecular Programming*, volume 6937 of *Lecture Notes in Computer Science*, pages 64–83. Springer Berlin/ Heidelberg, 2011.
- Nikhil Gopalkrishnan, Harish Chandran, and John Reif. **High-Fidelity DNA Hybridization Using Programmable Molecular DNA Devices**. In *DNA Computing and Molecular Programming*, volume 6518 of *Lecture Notes in Computer Science*, pages 59–70. Springer Berlin / Heidelberg, 2011.
- Harish Chandran, Nikhil Gopalkrishnan, and John Reif. **The Tile Complexity of Linear Assemblies**. In Susanne Albers, Alberto Marchetti-Spaccamela, Yossi Matias, Sotiris E. Nikoletseas, and Wolfgang Thomas, editors, *ICALP (1)*, volume 5555 of *Lecture Notes in Computer Science*, pages 235–253. Springer, 2009. (journal version below)

Journal Articles

- Harish Chandran, Nikhil Gopalkrishnan, and John Reif. **The Tile Complexity of Linear Assemblies**. *To appear in SIAM Journal on Computing*, 2012.
- Harish Chandran, Nikhil Gopalkrishnan, and John Reif. **Tile Complexity of Approximate Squares**. *Algorithmica*, 2012.
- Harish Chandran, Nikhil Gopalkrishnan, Bernard Yurke, and John Reif. **Meta-DNA: Synthetic Biology via DNA Nanostructures and Hybridization Reactions**. *Journal of the Royal Society Interface*, 2012.

Book Chapters

- John Reif, Harish Chandran, Nikhil Gopalkrishnan, and Thomas LaBean. ***Self-assembled DNA Nanostructures and DNA Devices***. Handbook of Nanofabrication. Taylor and Francis Group, 2012. Invited Chapter.
- Harish Chandran, Nikhil Gopalkrishnan, and John Reif. ***DNA NanoRobotics***. NanoRobotics. Springer, 2012. Invited Chapter.
- Harish Chandran, Nikhil Gopalkrishnan, Sudhanshu Garg, and John Reif. ***Biomolecular Computing Systems - From Logic Systems to Smart Sensors and Actuators***. Molecular and Biomolecular Information Processing. Wiley-VCH, 2012. Invited Chapter.

Papers in preparation

Conference Articles

- Manoj Gopalkrishnan and Nikhil Gopalkrishnan. **Exquisite Detection with Chemical Circuits**. *Submitted to DNA18*, 2012.
- Nikhil Gopalkrishnan, Harish Chandran, and John Reif. **Mitigating Leaks in DNA Detectors**. *In preparation.*

Journal Articles

- Harish Chandran, Sudhanshu Garg, Nikhil Gopalkrishnan, and John Reif. **Activatable Tiles: Demonstration of Linear and Directed Self Assembly**. *In preparation.*
- Nikhil Gopalkrishnan, Harish Chandran, and John Reif. **2D and 3D DNA Lattices Via Staggered Assembly of the Double-Decker Tile**. *In preparation.*
- Harish Chandran, Nikhil Gopalkrishnan, Andrew Phillips, and John Reif. **Localized Hybridization Circuits**. *In preparation.*

Talks

Localized Hybridization Circuits

- 17th International Conference on DNA Computing and Molecular Programming, California Institute of Technology. September 19-23th, 2011

Engineering exquisite nanoscale behavior with DNA

- National Center for Biological Sciences, Bangalore. *December 20th, 2011*
- Indian Institute of Science, Bangalore. *January 13th, 2012*
- Tata Institue of Fundamental Research. *January 24th, 2012*

Teaching Experience

Teaching Assistant

- Fall 2007, Spring 2008, Fall 2010: **Design and Analysis of Algorithms**
- Fall 2008: **Discrete Mathematics**
- Spring 2009: **Mathematical Foundations of Computer Science**
- Spring 2011: **Computational Complexity**
- Fall 2011: **Computational Geometry**
- Spring 2012: **Algorithm Paradigms**

Professional Service

Journal Reviewer: **Natural Computing** (2012)

Conference Reviewer: **DNA Computing and Molecular Programming** (2010, 2011)

Conference Assistant: **Foundations of Nanoscience** (2009, 2010, 2011, 2012)

References

John Reif, A. Hollis Edens Distinguished Professor
Trinity College of Arts and Sciences, Duke University
Phone: (919) 660-6568, Email: `reif@cs.duke.edu`

Thom LaBean, Associate Professor
Department of Materials Science and Engineering, NC State University
Email: `thlabean@ncsu.edu`

Chris Dwyer, Associate Professor
Department of Electrical & Computer Engineering, Duke University
Department of Computer Science, Duke University
Phone: (919) 660-5275, Email: `dwyer@ece.duke.edu`

Bernard Yurke, Distinguished Research Fellow
Department of Electrical & Computer Engineering, Boise State University
Phone: (208) 426-4825, Email: `bernardyurke@boisestate.edu`