Ronak Akshay Buch

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Education

University of Illinois at Urbana-Champaign, Urbana, Illinois — *Expected May 2023*

Ph.D. Computer Science
Thesis: *Vector Load Balancing for High-Performance Parallel Applications*
Advisor: Laxmikant Kale
Architecture, Parallel Computing, and Systems

The Ohio State University, Columbus, Ohio — June 2012

B.S. Computer Science and Engineering, Minor in Mathematics
Summa Cum Laude, With Honors in Engineering

Selected Publications

Bryce Adelstein-Lelbach, **Ronak Buch**, Irina P. Demeshko, Patrick Diehl, Hartmut Kaiser, Laxmikant (Sanjay) Kale, Zahra Khatami, Alice Koniges, and Shahrzad Shirzad. *TBAA20: Task-Based Algorithms and Applications.* (2021)

James C. Phillips, David J. Hardy, Julio DC Maia, John E. Stone, João V. Ribeiro, Rafael C. Bernardi, **Ronak Buch**, et al. *Scalable molecular dynamics on CPU and GPU architectures with NAMD.* The Journal of Chemical Physics 153, no. 4 (2020): 044130.

Halie Rando, Marta Farré, Michael P. Robson, Naomi B. Won, Jennifer L. Johnson, **Ronak Buch**, Estelle R. Bastounes, et al. *Construction of Red Fox Chromosomal Fragments from the Short-Read Genome Assembly.* Genes 9, no. 6 (2018).

Bilge Acun, **Ronak Buch**, Laxmikant Kale, and James C. Phillips. *NAMD: Scalable Molecular Dynamics Based on the Charm++ Parallel Runtime System*. In Tjerk P. Straatsma, Katerina B. Antypas, and Timothy J. Williams (Eds.), *Exascale Scientific Applications: Scalability and Performance Portability* (2017). CRC Press.

Michael P. Robson, **Ronak Buch**, and Laxmikant V. Kale. *Runtime Coordinated Heterogeneous Tasks in Charm++.* Second International Workshop on Extreme Scale Programming Models and Middleware (ESPM2 '16).

Abhinav Bhatele, Nikhil Jain, Katherine Isaacs, **Ronak Buch**, Todd Gamblin, Steven H. Langer, and Laxmikant V. Kale. *Optimizing the Performance of Parallel Applications on a 5D Torus via Task Mapping.* IEEE International Conference on High Performance Computing (HiPC '14).

Selected Talks

Vector Load Balancing in Charm++, 21th Annual Workshop on Charm++ and its Applications.

Recent Topics in Dynamic Load Balancing, 16th Annual Workshop on Charm++ and its Applications.

Performance Analysis and Projections, 5th Joint Laboratory for Extreme-Scale Computing Workshop.

Advanced Techniques in Performance Analysis, 11th Workshop of the Joint Laboratory on Petascale Computing.

Teaching Experience

Migratable Objects and Task-Based Parallel Programming with Charm++ (Tutorial). International Conference for High Performance Computing, Networking, Storage and Analysis (SC '17).

Performance Analysis in Charm++ - Tutorial of 15th Annual Workshop on Charm++ and its Applications

HPC Applications Performance Analysis and Debugging - Summer School of 11th Workshop of the INRIA-Illinois-ANL Joint Laboratory on Petascale Computing

Teaching Assistant - CS125: Introduction to Computer Science

Led discussion sections on basics of programming, recursion, data structures, and other topics
Ranked "Excellent" by students

Work Experience

Lawrence Livermore National Laboratory, Livermore, California Summer 2013
Institute for Scientific Computing Research Scholar

- Designed and developed network contention detection scheme for supercomputer networks
- Developed network simulator for testing of network contention schemes
- Studied communication performance of MPI, PAMI, and SPI on Blue Gene/Q

Microsoft, Redmond, Washington Summer 2011
Software Development Engineer Intern

- Developed immersive music application for demoing the C++ development process in Windows 8
- Tested alpha APIs and development experience for Windows 8 applications
- Software presented at 2011 BUILD Conference

Rapleaf, San Francisco, California Spring 2011
Software Engineer Intern

- Modified Java database code to couple with Ruby's ActiveRecord
- Developed location-based demographic inference system
- Developed internal collaboration tool using Ruby on Rails

MIT Lincoln Laboratory, Lexington, Massachusetts Summer 2010
Summer Research Intern

- Analyzed performance of distributed weather forecasting software
- Optimized and parallelized programs using PThreads and OpenMP
- Conducted explorative study on porting algorithms to GPGPU systems

Science Applications International Corporation, Beavercreek, Ohio Summer 2009
Software Engineer Intern

- Developed a cross-platform suite of motion imagery exploitation tools for unmanned aerial vehicles
- Created and maintained virtual machine infrastructure for databases, servers, and video streams
- Authored technical documentation for system administrators, end-users, and internal testing

Honors, Awards, & Scholarships

Best Senior Capstone Project, 2012
Phi Kappa Phi, National Honor Society, 2010
Tau Beta Pi, National Engineering Honor Society, 2010
Ohio State Presidential Scholarship, 2008
National Merit Scholar, 2008

Service

Graduate College Representative, Senate of the Urbana-Champaign Campus, 2016-2017
Graduate College Representative, UIUC Student Senate, 2016-2017
UIUC Graduate Admissions Committee, 2015
UIUC Graduate Ambassador, 2013 - 2018
UIUC Graduate Mentor, 2013 - 2017
Harrison & Scott Awards Review Committee, Ohio State College of Engineering, 2010
FIRST Robotics Mentor, 2010