Ronak Akshay Buch

rabuch2@illinois.edu

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).

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).

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).

Work Experience

University of Illinois at Urbana-Champaign, Urbana, Illinois Autumn 2012 - Present
Research Assistant, Prof. Laxmikant Kale, Parallel Programming Laboratory

Core developer of Charm++ parallel runtime system and Projections performance analysis tool
Significant work in load balancing, parallel I/O, collectives, heterogeneity, performance tracing
Collaborated with external scientists to design and optimize production applications
Mentored several undergraduate and junior graduate students

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

The Ohio State University, Columbus, Ohio Autumn 2011 - Spring 2012
Research Assistant, Prof. James Davis, Computer Vision Laboratory

Designed and implemented gestural input system using Kinect
Built gestural user interface to manipulate camera networks
Developed denoising system for sensor data ingestion

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

Teaching Experience

Supercomputing 2017, Denver, Colorado November 2017
Migratable Objects and Task-Based Parallel Programming with Charm++ (Tutorial)
Joint Laboratory for Extreme-Scale Computing Workshop, Sophia Antipolis, France June 2014
HPC Applications Performance Analysis and Debugging (Summer School)
University of Illinois at Urbana-Champaign, Urbana, Illinois Autumn 2012
Teaching Assistant - CS 125: Introduction to Computer Science

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

Skills

Languages: *Active:* C/C++, Java, Python *Dormant:* CUDA, MATLAB, C#, Ruby
Tools/Areas: HPC, Charm++, MPI, OpenMP, Performance Optimization, git, LaTeX, Sysadmin

Honors, Awards, & Scholarships

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

Service

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