Amanda Randles

http://amandarandles.com
randles2@llnl.gov
(617) 858-1520

Education

Harvard University, Cambridge, MA
Ph.D. in Applied Physics, Secondary Field in Computational Science, 2013
S.M. in Computer Science, 2010

Duke University, Durham, NC
B.A. in Physics and Computer Science, Minor in Political Science, 2005

Industry Experience

IBM, Rochester, MN
Software Engineer, 2005 – 2009.

- Enabled hardware performance monitor (HPM) library support for Blue Gene/P High Throughput Computing mode.
- Ported, validated, and optimized applications for IBM's massively parallel supercomputer in fields such as computational chemistry (NWCHEM) to molecular docking (DOCK, EUDOC) to bioinformatics (ClustalW, MPI-Blast, HAMMER).
- Designed an automated test harness for running, analyzing, and recording performance tests.
- Optimized MPI collective performance and function implementation.

Research Experience

Biomedical Engineering Department, Duke University,
Durham, NC. Assistant Professor, July 2015 – present.

- Investigating the use of computational models in treatment planning for cardiovascular disease.
- Developing a multiscale model of cancer metastasis with deformable suspended bodies captured using the Immersed Boundary Method coupled to the lattice Boltzmann Method.
- Enabling the study of large-scale cell dynamics in patient-specific vessel geometries using massively parallel models.

Center for Applied Scientific Computing, Lawrence Livermore National Laboratory,
Livermore, CA. Lawrence Fellow, September 2013 – Present

Enabling full circulatory simulation through the optimization of HARVEY, a large-scale lattice Boltzmann parallel code.

Department of Biostatistics and Computational Biology, Dana-Farber Cancer Institute,
Boston, MA. Research Fellow, June 2013 – August 2013.

- Designed a cellular-based computational model to study optimal dosage scheduling of radiation and chemotherapy treatment of glioblastoma.
- Implemented a stochastic computational model to study intra-tumor genetic diversity and growth patterns during chemotherapeutic treatment.

School of Engineering and Applied Sciences, Harvard University, Cambridge, MA
Ph.D. Candidate, 2008 – 2013

- Developing a multi-scale model of cardiovascular hemodynamics coupled to the red blood cell motion using the Lattice Boltzmann method.
- Collaborating with radiologists, and cardiologists to enable patient-specific models.
- Enabled efficient scaling of the application to up to 294,912 processors using irregular domain decomposition, hybrid programming, and deep halo level ghost cells.

• Taught weekly sections for two courses in computational fluid dynamics. **Institute for Scientific Computing Research**, Lawrence Livermore National Laboratory, Livermore, CA
Research Assistant, June 2011 – September 2011

• Established method to calculate thermal and electronic conductivity in dense hydrogen plasmas.
• Implemented the method in a classical molecular dynamics code and conducted sensitivity studies for different statistical potentials.

Wireless Communications Group, MIT Lincoln Laboratory, Lexington, MA
Graduate Research Intern, May 2009 – April 2011

• Developed a parallel simulation of wireless network communications.
• Introduced the coupling of capture and packet erasure coding in networks that use the ALOHA protocol to reduce the loss and delay of multi-slot messages.
• Extended this protocol to encapsulate the simulation of large RFID tag arrays.

Awards and Fellowships

Best Paper, IEEE International Conference on Computational Science (ICCS) 2015
NIH Early Independence Award, 2014
Computing in Cardiology Young Investigator Award, Honorable Mention, 2014
Best Poster, Lawrence Livermore National Laboratory Computation Poster Symposium, 2014
Lawrence Fellowship, Lawrence Livermore National Laboratory, 2013.
U.S. Delegate for Heidelberg Laureate Forum in Heidelberg, 2013.
U.S. Delegate for Nobel Laureates and Students Meeting dedicated to Physics, 2012.
ACM IEEE-CS George Michael Memorial High Performance Computing Fellowship, International Conference for High Performance Computing, Networking, and Analysis. Honorable Mention: 2009. Winner: 2010, 2012.
Google Anita Borg Memorial Scholarship Recipient, 2012.
DOE Computational Science Graduate Fellowship, 2010.
Gordon Bell Finalist, International Conference for High Performance Computing, Networking, Storage and Analysis, 2010.
National Science Foundation Graduate Research Fellowship, 2009.
IBM Early Tenure Innovator, 2008.
Duke University Startup Challenge Finalist, 2005.
Duke University Addy Research Fellowship, 2004.

Selected Patents

97 patents granted and 133 patent applications filed with the U. S. Patent Office primarily in the fields of parallel computing and databases.

Environment based node selection for work scheduling in a parallel computing system, E. Barsness, D.L. Darrington, **A. Peters**, and J.M. Santosuosso. U.S. Patent No. 8,589,931, Nov. 19, 2013.
Optimizing power consumption and performance in a hybrid computer environment, E. Barsness, D.L. Darrington, **A. Peters**, and J.M. Santosuosso. U.S. Patent No. 8,539,256, Sept. 17, 2013.

Selected Refereed Publications

A. Randles and E. Kaxiras. "Parallel in Time Approximation of the Lattice Boltzmann Method for Laminar Flows." Journal of Computational Physics, Volume 270, 1 August 2014, Pages 577-586.
A. Randles and E. Kaxiras, "A Spatio-Temporal Coupling Method to Reduce the Time-to-Solution of Cardiovascular Simulations." Proceedings of the 28th IEEE International Parallel and Distributed Processing Symposium, IPDPS14, 2014.
A. Peters, S. Melchionna, E. Kaxiras, J. Latt, J. Sircar, M. Bernaschi, M. Bisson, and S. Succi, "Multiscale simulation of cardiovascular flows on the IBM Bluegene/P: full heart-circulation system at red-blood cell resolution." Proceedings of the 2010 ACM/IEEE International Conference for High Performance Computing, Networking, Storage, and Analysis (SC), New Orleans, LA. **Gordon Bell Finalist**.