Sayan Ghosh

Washington State University,
The School of Electrical Engineering and Computer Science,
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EDUCATION

2015 - present
Washington State University, Pullman, WA
PhD, Computer Science
School of Electrical Engineering and Computer Science
Expected Graduation: Fall, 2018
Academic Status: PhD candidate. Passed PhD qualifying and preliminary exam.
PhD program commitee members: Dr. Assefaw Gebremedhin (WSU), Dr. Carl Hauser (WSU), Dr. Ananth Kalyanaraman (WSU) and Dr. Pavan Balaji (ANL)

2012 - 2014
University of Houston, Houston, TX
Doctoral student, Computer Science
Dept. of Computer Science

2010 - 2012
University of Houston, Houston, TX
MS, Computer Science
Title: *Energy Efficiency of Parallel Scientific Kernels*
Dept. of Computer Science, August 2012

2002 - 2006
Asansol Engineering College, Asansol, India
Bachelor of Technology, July 2006
Information Technology

EXPERIENCES

Alternate Sponsored Fellow — Advanced Computing, Mathematics and Data Division, Pacific Northwest National Laboratory
Fall 2017 - Spring 2018
Richland, WA
Supervisor: Dr. Mahantesh Halappanavar

Development of distributed-memory graph analytic applications such as graph matching and clustering.

Graduate Research Assistant — Scalable Algorithms for Data Science Lab, Washington State University
Spring 2015 - Spring 2017
Pullman, WA
Graduate Adviser: Dr. Assefaw Gebremedhin

My research is in improving the parallel efficiency and programmability of scientific applications using one-sided programming model for distributed memory architectures.

Graduate Research Assistant — HPCTools Group, University of Houston

Spring 2011 - Fall 2014
Houston, TX
Graduate Adviser: Dr. Barbara M. Chapman

Power/energy analysis and modeling of scientific kernels on manycore systems. Parallel programming on shared-memory and distributed clusters using compiler directives and one-sided programming models.

Graduate Research Assistant

Structural Bioinformatics Group,
University of Texas Health Science Center
Spring 2010 - Fall 2010
Houston, TX
Graduate Adviser: Dr. Stefan Birmanns

Worked on extending the functionality of *Sculptor*, which is a multi-resolution docking and visualization software package for bio-molecular systems. Also assisted the advisor in teaching a course on Data Structures for Graduate students.

Software Developer

Thomson Reuters
July 2008 - Dec 2009
Bangalore, India

Worked on analyzing the data to remove inconsistencies/redundancies and providing inputs in creation of content specific database schema, and creating ETL packages to ingest data into relational databases.

Software Developer

NTT Data (formerly Keane), India Pvt. Ltd.
July 2006 - July 2008
Bangalore, India

Worked on relational database/data warehouse development and design on business domains such as Healthcare and Public sector.

RECENT INTERNSHIPS

- May-Aug 2018, Internship at Data Sciences division, Pacific Northwest National Laboratory, Richland, WA: Working on distributed-memory graph analytic algorithms, such as community detection and maximal weight matching.
  Supervisor: Dr. Mahantesh Halappanavar
- May-Aug 2017, Internship at Data Sciences division, Pacific Northwest National Laboratory, Richland, WA: Worked on distributed-memory network community detection.
  Supervisor: Dr. Mahantesh Halappanavar
- May-Aug 2016, Internship at Mathematical and Computer Sciences division (MCS), Argonne National Laboratory, Chicago, IL: Worked on C++ bindings for MPI-3 RMA.
  Supervisor: Dr. Pavan Balaji
- May-Aug 2014, Internship at Mathematical and Computer Sciences division (MCS), Argonne National Laboratory, Chicago, IL: Worked on optimizing the AXPY interface of Elemental, a distributed dense-matrix library.
  Supervisor: Dr. Pavan Balaji
- May-Aug 2013, Internship at Argonne Leadership Computing Facility (ALCF), Argonne National Laboratory, Chicago, IL: Worked on designing and prototyping a one-sided communication runtime on top of MPI-3 called OSPRI (One-sided Primitives) and creating an OpenSHMEM implementation using MPI-3.
  Supervisor: Dr. Jeff Hammond
- May-Aug 2012, Internship at Total R&T, Houston, Texas: Worked on evaluation of directive based programming models like OpenMP, PGI, HMPP and OpenACC on Finite Difference kernels on GPU and multicore CPUs.
  Supervisors: Dr. Terrence Liao and Dr. Henri Calandra

- Jun-Sept 2011, Internship at Pacific Northwest National Laboratory, Richland, Washington: Worked on power/energy profiling of scientific kernels on multi-GPU platform.
  Supervisors: Dr. Darren Kerbyson, Dr. Kevin Barker and Dr. Abhinav Vishnu

PRESENTATIONS /PUBLICATIONS

- Journals
  - Sayan Ghosh, Terrence Liao, Henri Calandra and Barbara Chapman, "Performance of CPU/GPU compiler directives on ISO/TTI kernels". Computing Journal, Springer Vienna, November, 2013.
- Papers
  - Workshops
    * 2013 1st OpenSHMEM Workshop: Experiences, Implementations and Tools, 2013: "Implementing OpenSHMEM using MPI-3 one-sided communication" by Jeff Hammond, Sayan Ghosh and Barbara Chapman
    * 2013 Workshop on Performance Modeling, Benchmarking and Simulation of High Performance Computer Systems (PMBS13), in conjunction with SC'13: "Performance Analysis of the NWChem TCE for Different Communication Patterns" by Priyanka Ghosh, Jeff Hammond, Sayan Ghosh and Barbara Chapman
    * 5th International Workshop on Multi-/Many-core Computing Systems (MuCoCoS) Workshop in conjunction with SC'12. Sayan Ghosh, Terrence Liao, Henri Calandra and Barbara Chapman, "Experiences with OpenMP, PGI, HMPP and OpenACC directives on ISO/TTI kernels".
    * In Proceedings of Application Accelerators in High Performance Computing (SAAHPC), 2012 Symposium. Sayan Ghosh, Sunita Chandrasekaran and Barbara Chapman. "Energy Analysis of Parallel Scientific Kernels on Multiple GPUs".
  - Conferences
    * 32nd IEEE International Parallel and Distributed Processing Symposium (IPDPS). Sayan Ghosh, Mahantesh Halappanavar, Antonino Tumeo, Ananth Kalyanaraman, Hao Lu, Daniel Chavarria-Miranda, Arif Khan, Assefaw Gebremedhin, "Distributed Louvain Algorithm for Graph Community Detection".
    * 45th International Conference on Parallel Processing (ICPP). Sayan Ghosh, Jeff Hammond, Antonio J. Peña, Pavan Balaji, Assefaw Gebremedhin and Barbara Chapman, "One-Sided Interface for Matrix Operations using MPI-3 RMA: A Case Study with Elemental".
    * 23rd International Conference on High Performance Computing, Data, and Analytics (HiPC). Sayan Ghosh and Assefaw Gebremedhin, "Parallelization of Bin Packing on Multicore Systems".
    * 8th International Conference on Partitioned Global Address Space Programming Models (PGAS), 2014. Naveen Namashivayam, Sayan Ghosh, Dounia Khaldi, Deepak Eachempati and Barbara Chapman. "Native Mode-Based Optimizations of Remote Memory Accesses in OpenSHMEM for Intel Xeon Phi". (*Best Paper*)
- Posters
  - 2016 SIAM workshop on Combinatorial Scientific Computing (CSC'16) - "Towards a More Asynchronous GraphBLAS" by Sayan Ghosh and Assefaw Gebremedhin
  - 2013 Rice Oil and Gas HPC Workshop, Rice University, Houston, Texas: Poster presentation - "Performance of ISO/TTI kernels on CPU/GPU using OpenMP, PGI, HMPP and OpenACC directives" by Sayan Ghosh, Terrence Liao, Henri Calandra and Barbara Chapman

- 2013 Nvidia GPU Technology Conference, San Jose, California: Poster presentation - "Power and Energy Prediction of Multi-GPU kernels Using Non-linear Regression" by Sayan Ghosh, Sunita Chandrasekaran and Barbara Chapman
- Sayan Ghosh, Sunita Chandrasekaran and Barbara Chapman, "Statistical Power and Energy Modeling of multi-GPU kernels". General poster. SC'12
- Sayan Ghosh and Barbara Chapman. "Programming Strategies for GPUs and their Power Consumption". In Proceedings of the 2011 International Conference on Parallel Architectures and Compilation Techniques (PACT)

TEACHING ASSISTANTSHIPS

- Spring 2016, Washington State University, EECS, Distributed Computing, CPTS 464/564 (*Course Instructor:* Dr. Dave Bakken)
- Fall 2015, Washington State University, EECS, Computer Communication Networks, CPTS 455 (*Course Instructor:* Dr. Carl Hauser)
- Spring 2015, Washington State University, EECS, Distributed Computing, CPTS 464/564 (*Course Instructor:* Dr. Dave Bakken)
- Fall 2010, UT Health Science Center, Introductory Course on Data Structures (*Course Instructor:* Dr. Stefan Birmanns). This was an unofficial appointment, just assisted my advisor in taking the course.

ACTIVITIES/ GRANTS

- Participant, 2018 Argonne Training Program on Extreme-Scale Computing (ATPESC), July 29-August 10, St. Charles, IL
- NSF/IEEE TCPP Travel grant, 32rd International Parallel and Distributed Processing Symposium (IPDPS), Vancouver, BC, Canada
- NSF/IEEE TCPP Travel grant, 23rd International Conference on High Performance Computing, Data, and Analytics (HiPC), Hyderabad, India
- Student Volunteer, Supercomputing 2016, Salt Lake City, Utah
- Booth setup personnel, Gulf Coast Advanced Supercomputing (GCAS) booth, Supercomputing 2014, New Orleans, Louisiana
- Booth duty at Gulf Coast Advanced Supercomputing (GCAS) booth, Supercomputing 2013, Denver, Colorado
- Student Volunteer at Architectural Support for Programming Languages and Operating Systems (ASPLOS) conference, Rice University, Houston, 2013
- Co-taught a classroom session on OpenACC at Nvidia Global Technology Conference (GTC), San Jose, CA, 2013
- Booth duty at OpenMP booth and Gulf Coast Advanced Supercomputing (GCAS) booth, Supercomputing 2012, Salt Lake City, Utah
- Represented University of Houston in OpenMP booth at Multicore Developers Conference, San Jose, CA, 2011

MEMBERSHIPS

- ACM Special Interest Group in High Performance Computing (SIGHPC)
- Institute of Electrical and Electronics Engineers (IEEE)
- Society for Industrial and Applied Mathematics (SIAM)