

# Aparna Chandramowlishwaran

Department of Electrical Engineering and Computer Science

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## Education

- 2007 – 2013 **Georgia Institute of Technology**, Atlanta, GA  
*M.S/Ph.D., Computational Science and Engineering*  
Dissertation: *The Fast Multipole Method at Exascale.*  
Advisor: Richard W. Vuduc
- 2003 – 2007 **Anna University**, Chennai, India  
*B.Engg., Computer Science and Engineering.*

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## Professional Experience

- 2020 - present **University of California**, Irvine, CA  
*Associate Professor, EECS.*
- 2015 - 2020 **University of California**, Irvine, CA  
*Assistant Professor, EECS.*
- Summer 2019 **Argonne National Lab**, Lemont, IL  
*Visiting Scientist.*
- Summer 2016 **Microsoft Research**, Redmond, WA  
*Visiting Researcher.*
- 2013 - 2014 **Massachusetts Institute of Technology**, Cambridge, MA  
*Research Scientist, CSAIL.*

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## Awards

- 2018 **Google Faculty Research Award**
- 2018 **NSF CAREER Award**
- 2018 **Best Poster Award, ICPADS.**
- 2017 **Innovation in Teaching Award, UCI School of Engineering.**
- 2010 **Gordon Bell Prize, Supercomputing (SC).**
- 2010 **Best Paper Award, IPDPS.**
- 2010 **Outstanding Graduate Research Assistant Award, College of Computing, Georgia Institute of Technology.**
- 2009 **Best Paper Finalist, Supercomputing (SC).**
- 2007 **Best All-round Performer Award, Undergraduate class of Computer Science and Engineering.**

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## Fellowships

2012-2013 **Intel PhD Fellowship**

2011 **Microsoft Research PhD Fellowship Finalist**

2010-2011 **ACM/IEEE George A. Michael Memorial HPC Fellowship**

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## Publications

- [1] Octavi Obiols-Sales, Abhinav Vishnu, Nicholas Malaya, and Aparna Chandramowlishwaran. *SURFNet: Super-resolution of Turbulent Flows with Transfer Learning using Small Datasets*. **PACT**, 2021. (accepted).
- [2] Shu-Mei Tseng, Bogdan Nicolae, Franck Cappello, and Aparna Chandramowlishwaran. *Demystifying asynchronous I/O Interference in HPC applications*. **IJHPCA**, 2021.
- [3] Rohit Zambre, Damodar Sahasrabudhe, Hui Zhou, Martin Berzins, Aparna Chandramowlishwaran, and Pavan Balaji. *Logically Parallel Communication for Fast MPI+ Threads Applications*. **TPDS**, 2021.
- [4] Hengjie Wang, Robert Planas, Aparna Chandramowlishwaran, and Ramin Bostanabad. *Train Once and Use Forever: Solving Boundary Value Problems in Unseen Domains with Pre-trained Deep Learning Models*. **arXiv**, 2021.
- [5] Behnam Pourghassemi, Jordan Bonecutter, Zhou Li, and Aparna Chandramowlishwaran. *adPerf: Characterizing the Performance of Third-party Ads*. **SIGMETRICS/POMACS**, 2021.
- [6] Damodar Sahasrabudhe, Rohit Zambre, Aparna Chandramowlishwaran, and Martin Berzins. *Optimizing the hypre solver for manycore and GPU architectures*. **Journal of Computational Science**, 2021.
- [7] Hengjie Wang and Aparna Chandramowlishwaran. *Pencil: A pipelined algorithm for distributed stencils*. **SC**, 2020.
- [8] Behnam Pourghassemi, Ardalan Amiri Sani, and Aparna Chandramowlishwaran. *Only Relative Speed Matters: Virtual Causal Profiling*. **IFIP Performance/PER**, 2020.
- [9] Behnam Pourghassemi, Chenghao Zhang, Joo Hwan Lee, and Aparna Chandramowlishwaran. *On the limits of parallelizing CNNs on GPUs*. **SPAA**, 2020.
- [10] Octavi Obiols-Sales, Abhinav Vishnu, Nicholas Malaya, and Aparna Chandramowlishwaran. *CFDNet: A deep learning-based accelerator for fluid simulations*. **ICS**, 2020.
- [11] Rohit Zambre, Aparna Chandramowlishwaran, and Pavan Balaji. *How I Learned to Stop Worrying about User-Visible Endpoints and Love MPI*. **ICS**, 2020.
- [12] Rohit Zambre, Megan Grodowitz, Aparna Chandramowlishwaran, and Pavel Shamis. *Breaking Band: A Breakdown of High-performance Communication*. **ICPP**, 2019.
- [13] Shu-Mei Tseng, Bogdan Nicolae, George Bosilca, Emmanuel Jeannot, Aparna Chandramowlishwaran, and Franck Cappello. *Towards Portable Online Prediction of Network Utilization using MPI-level Monitoring*. **EuroPar**, 2019.

- [14] Behnam Pourghassemi, Ardalan Amiri Sani, and Aparna Chandramowliswaran. *What-If Analysis of Page Load Time in Web Browsers Using Causal Profiling*. **SIGMETRICS/POMACS**, 2019.
- [15] Hengjie Wang and Aparna Chandramowliswaran. *Multi-criteria partitioning of multi-block structured grids*. **ICS**, 2019.
- [16] Laleh Aghababaie Beni, Saikiran Ramanan, and Aparna Chandramowliswaran. *Portal: A High-Performance Language and Compiler for Parallel N-body Problems*. **IPDPS**, 2019.
- [17] Rohit Zambre, Aparna Chandramowliswaran, and Pavan Balaji. *Scalable Communication Endpoints for MPI+Threads Applications*. **ICPADS**, 2018.
- [18] Bahareh Mostafazadeh, Ferran Marti, Feng Liu, and Aparna Chandramowliswaran. *Roofline Guided Design and Analysis of a Multi-stencil CFD Solver for Multicore Performance*. **IPDPS**, 2018.
- [19] Zhihao Yao, Zongheng Ma, Yingtong Liu, Ardalan Amiri Sani, and Aparna Chandramowliswaran. *Sugar: Secure GPU Acceleration in Web Browsers*. **ASPLOS**, 2018.
- [20] Behnam Pourghassemi and Aparna Chandramowliswaran. *cudaCR: An in-kernel application-level checkpoint/restart scheme for CUDA-enabled GPUs*. **CLUSTER**, 2017.
- [21] Laleh Aghababaie Beni and Aparna Chandramowliswaran. *PASCAL: A Parallel Algorithmic SCALable Framework for N-body Problems*. **EuroPar**, 2017.
- [22] Bahareh Mostafazadeh Davani, Ferran Marti, Behnam Pourghassemi, Feng Liu, and Aparna Chandramowliswaran. *Unsteady Navier-Stokes Flow on GPU Architectures*. **AIAA**, 2017.
- [23] Rohit Zambre, Lars Bergstrom, Laleh A. Beni, and Aparna Chandramowliswaran. *Parallel Performance-Energy Predictive Modeling of Browsers: Case Study of Servo*. **HiPC**, 2016.
- [24] Kasra Moazzemi, Rainer Doemer, and Aparna Chandramowliswaran. *A SystemC model for N-body problems and its Parallel Design Space Exploration*. **Technical Report**, University of California Irvine, 2016.
- [25] Jee Whan Choi, Aparna Chandramowliswaran, Kamesh Madduri, and Richard Vuduc. *A CPU-GPU Hybrid Implementation and Model-Driven Scheduling of the Fast Multipole Method*. **GPGPU**, 2014.
- [26] Richard Vuduc, Kenneth Czechowski, Aparna Chandramowliswaran, and Jee Whan Choi. *Courses in High-Performance Computing for Scientists and Engineers*. **EduPar**, 2012.
- [27] Aparna Chandramowliswaran, Jee Whan Choi, Kamesh Madduri, and Richard Vuduc. *Brief Announcement: Towards a Communication Optimal Fast Multipole Method and its Implications at Exascale*. **SPAA**, 2012.
- [28] Aparna Chandramowliswaran and Richard Vuduc. *Communication-Optimal Parallel N-body Solvers*. **IPDPS PhD Forum**, 2012.
- [29] Ilya Lashuk, Aparna Chandramowliswaran, Harper Langston, Tuan-Ahn Nguyen, Rahul Sampath, Aashay Shringarpure, Richard Vuduc, Lexing Ying, Denis Zorin, and George

- Biros. *A massively parallel adaptive Fast Multipole Method on heterogeneous architectures*. **CACM**, 2012.
- [30] Kenneth Czechowski, Casey Battaglini, Chris McClanahan, Aparna Chandramowlishwaran, and Richard Vuduc. *Balance principles for algorithm-architecture co-design*. **HotPar**, 2011.
- [31] Aparna Chandramowlishwaran, Kamesh Madduri, and Richard Vuduc. *Diagnosis, Tuning, and Redesign for Multicore Performance: A Case Study of the Fast Multipole Method*. **SC**, 2010.
- [32] Abtin Rahimian, Ilya Lashuk, Dhairya Malhotra, Aparna Chandramowlishwaran, Logan Moon, Rahul Sampath, Aashay Shringarpure, Shravan Veerapaneni, Jeffery Vetter, Richard Vuduc, Denis Zorin, and George Biros. *Petascale direct numerical simulation of blood flow on 200k cores and heterogeneous architectures*. **SC**, 2010.
- [33] Aparna Chandramowlishwaran, Samuel Williams, Leonid Oliker, Ilya Lashuk, George Biros, and Richard Vuduc. *Optimizing and tuning the Fast Multipole Method for state-of-the-art multicore architectures*. **IPDPS**, 2010.
- [34] Aparna Chandramowlishwaran, Kathleen Knobe, and Richard Vuduc. *Performance evaluation of Concurrent Collections on high-performance multicore computing systems*. **IPDPS**, 2010.
- [35] Aparna Chandramowlishwaran, Kathleen Knobe, and Richard Vuduc. *Applying the Concurrent Collections Programming Model to Asynchronous Parallel Dense Linear Algebra*. **PPoPP**, 2010.
- [36] Richard Vuduc, Aparna Chandramowlishwaran, Jee Whan Choi, Murat Efe Guney, and Aashay Shringarpure. *On the limits of GPU acceleration*. **HotPar**, 2010.
- [37] Ilya Lashuk, Aparna Chandramowlishwaran, Harper Langston, Tuan-Anh Nguyen, Rahul Sampath, Aashay Shringarpure, Richard Vuduc, Lexing Ying, Denis Zorin, and George Biros. *A massively parallel adaptive Fast Multipole Method on heterogeneous architectures*. **SC**, 2009.
- [38] Zoran Budimlić, Aparna Chandramowlishwaran, Kathleen Knobe, Geoff Lowney, Vivek Sarkar, and Leo Treggiari. *Multi-core implementations of the Concurrent Collections programming model*. **CPC**, 2009.
- [39] Zoran Budimlić, Aparna Chandramowlishwaran, Kathleen Knobe, Geoff Lowney, Vivek Sarkar, and Leo Treggiari. *Declarative Aspects of Memory Management in the Concurrent Collections Parallel Programming Model*. **DAMP**, 2009.
- [40] Aparna Chandramowlishwaran, Abhinav Karhu, Ketan Umare, and Richard Vuduc. *Numerical algorithms with tunable parallelism*. **STMCS** at CGO, 2008.
- [41] David A. Bader, Aparna Chandramowlishwaran, and Virat Agarwal. *On the Design of Fast Pseudo-Random Number Generators for the Cell Broadband Engine and an Application to Risk Analysis*. **ICPP**, 2008.

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## Funding

- 2019 - 2020 Exploring design strategies for MPI scalable endpoints  
*Argonne National Laboratory, DOE sub-contract 7F-30219*  
PI: Aparna Chandramowlishwaran.  
Awarded: \$140,287
- 2019 - 2021 EAGER: N-Body Algorithms for Mobile and Social Data  
*National Science Foundation, Award 1939237*  
PI: Athina Markopoulou, Co-PIs: Aparna Chandramowlishwaran and Carter Butts.  
Awarded: \$300,000
- 2018 Scalable Tools for Profiling Web browsers  
*Google Faculty Research Award*  
PI: Aparna Chandramowlishwaran.  
Awarded: \$75,000
- 2018 - 2021 MRI: Acquisition of a High-Performance Computing Cluster for Research and Teaching at UC Irvine  
*National Science Foundation, Award 1828779*  
PI: Aparna Chandramowlishwaran, Co-PIs: Filipp Furche and Dana Roode.  
Awarded: \$400,000, UCI cost share: \$171,429, Total: \$571,429
- 2018 - 2023 CAREER: HiPer: A CFD solver for High-Performance Turbulent Flow Simulations on Massively Parallel Machines  
*National Science Foundation, Award 1750549*  
PI: Aparna Chandramowlishwaran.  
Awarded: \$500,000
- 2017 - 2019 Optimization Techniques for Network Fabric Resource Utilization  
*Argonne National Laboratory, DOE sub-contract 7F-30219*  
PI: Aparna Chandramowlishwaran.  
Awarded: \$123,649
- 2016 Parallelizing the Web Browser for Performance and Energy-efficiency  
*Mozilla Research Grants*  
PI: Aparna Chandramowlishwaran.  
Awarded: \$76,078
- 2015 - 2016 What is the best on-chip architecture for N-body simulations?  
*Kane Kim Collaborative Fellowship*  
PI: Aparna Chandramowlishwaran, Co-PI: Rainer Döemer.  
Awarded: \$50,000
- 2015 - 2018 XPS: EXPL: DSD: Portal: A Language and Compiler for Parallel N-body Computations  
*National Science Foundation, Award 1533917*  
PI: Aparna Chandramowlishwaran.  
Awarded: \$316,000

2015 - 2016 Development of the Next Generation Air Quality Model - New Approaches to Parallelization and Portability  
*CORCL Multi-Investigator Research Grant*  
PI: Donald Dabdub, Co-PI: Aparna Chandramowlishwaran.  
Awarded: \$10,000

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## Talks

- Keynote** PPOPP PMAM (2020), SPNS (2012).
- Conference** Intelligence 2025 (2018), EuroPar (2017), SPAA (2012), SIAM CSE (2013, 2011), SC (2011, 2010), IPDPS (2010), SIAM PP (2012, 2010), ICPP (2008).
- Workshop** TACC (2020), PADAL (2017), DOE CSADS (2012), CnC (2010, 2009).
- Seminars** SPCL\_Bcast online seminar at ETH Zurich (2021), UCI Fluid Dynamics Seminar (2021), Lawrence Berkeley National Lab (2020), Argonne National Lab (2018), Imperial College London (2017), Dagstuhl Germany (2017), University of California Irvine (2016, 2014), IBM T. J. Watson Research Center (2012), Intel (2012), University of Chicago (2012), Tokyo University (2012), Georgia Tech (2012).
- Panels** AI4S at SC (2020), ScienceCloud at HPDC (2019).
- Outreach** UCI COSMOS (2018), Athena Olympiad (2018).

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## Teaching

- EECS 120 **Fundamentals of Parallel Computing**, UC Irvine  
*Spring 2020.*
- EECS 224 **Intro to High-Performance Computing**, UC Irvine  
*Winter 2021, Spring 2020, Spring 2019, Winter 2018, Spring 2017, Spring 2016, Winter 2015.*
- EECS 114 **Data Structures and Algorithms**, UC Irvine  
*Winter 2020, Winter 2019.*
- EECS 117 **Parallel Computer Systems**, UC Irvine  
*Spring 2019, Winter 2018, Winter 2017, Winter 2016, Spring 2015.*
- EECS 215 **Design and Analysis of Algorithms**, UC Irvine  
*Fall 2016.*
- EECS 6.172 **Performance Engineering of Software Systems**, MIT  
*Fall 2014.*

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## Service

- Journal** *Associate Editor*, ACM TOPC (2019 - 2021).

**Organization** *Research Posters Chair*, ISC (2022); *ML for HPC Area Vice-Chair*, SC (2021); *ML, AI, and Emerging Technologies Track Chair*, ISC (2021); *Research Posters Deputy Chair*, ISC (2021); *General Co-Chair*, IPDPS (2021); *Minisymposium Organizer*, SIAM CSE (2021); *Panel Chair*, SIAM PP (2020); *Publicity Chair*, PPOPP (2020); *Program Co-Chair*, CHIWW (2018); *Application, Algorithms, and Libraries Track Co-Chair*, CLUSTER (2017); *Program Chair*, CnC workshop at LCPC (2015).

**Program Committee** PPOPP (2021, 2020, 2019, 2018, 2016), SC (2021, 2020, 2019, 2018, 2017, 2016), SC AI4S (2020), CCGrid (2020), SIGMETRICS (2020), IPDPS (2019, 2018, 2014), PACT (2019, 2016), HPC Asia (2019), DSS (2019), ICS (2019), HPDC ScienceCloud (2019), CCGrid SCRAMBL (2019), ASPLOS (2018), HiPC (2018, 2017, 2016), CLUSTER (2018), Supercomputing Asia (2018), ICCP (2016, 2015), IISWC (2015), SBAC-PAD (2015, 2014), ALCHEMY workshop at ICCS (2014).

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## On-Campus UC Irvine Committees

- 2019-2020 NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) Program Faculty Mentor
- 2017-present UCI Research Cyberinfrastructure Center (RCIC) Executive Committee
- 2017-present UCI Research Cyberinfrastructure Center (RCIC) Advisory Committee
- 2017-2018 CSE Steering Committee
- 2017-2018 Microsoft Research Ph.D. Fellowship Program Faculty Review Committee
- 2016-2017 CSE Steering Committee - Vice Chair
- 2016-2017 CpE Lecturer with Security Of Employment (LSOE) Search Committee
- 2015-2017 EECS Strategic Planning Committee
- 2015-2016 Faculty Mentor Program (FMP) Fellowship Committee
- 2015-2016 President's Dissertation Year (PDY) Fellowship Committee
- 2015-2016 CSE Steering Committee
- 2015-2016 UCI Research Cyberinfrastructure (RCI) Vision workgroup
- 2015-present CpE Preliminary Exam (Algorithms)