Mert Hidayetoglu

Postdoctoral Scholar

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merthidayetoglu.github.io

Research Areas Parallel computing, fast algorithms, inverse problems, programming models.

Education

University of Illinois at Urbana-Champaign
Electrical and Computer Engineering
Doctor of Philosophy, July 2022
w/ computational science and engineering concentration.
Advisors: Weng Cho Chew and Wen-mei Hwu

Bilkent University
Electrical and Electronics Engineering
Master of science, April 2015
Advisors: Levent Gürel and Ömer İlday
Bachelor of science, January 2013

Programming Skills C++, CUDA, MPI, GASNet-EX, Level Zero, Legion, SYCL, OpenMP, Fortran, Python, VHDL

Machines Used Frontier, Aurora, Perlmutter, Delta, Summit, Theta, Blue Waters, DGX-A100, IBM Minsky

Work Experience **Location**

08/2022 – Present *Postdoctoral Scholar*, Stanford University, Computer Science Department — Stanford, CA
Advisor: Alex Aiken
- CommBench: Micro-benchmarking hierarchical networks with multi-GPU, multi-NIC nodes. The software has been used in acceptance of El Capitan.
- HiCCL: A hierarchical communication library for portability across GPU networks.
- Research on compositional-asynchronous communication models.
- Adaptive mesh refinement implementation with Legion programming model.

08/2015 – 08/2022 *Research* Assistant, Coordinated Science Laboratory — Urbana, IL
Computer systems and architecture group.
- Optimized GPU throughput for large-scale sparse/irregular workloads.
- Designed and implemented a memory-centric algorithm (MemXCT) with hierarchical communications (Petascale XCT) for 3D X-ray image reconstruction.
- Scaled MemXCT up to 4,096 KNLs – 256k cores of Theta.
- Solved a TB-scale imaging problem on 24,576 GPUs on Summit.
- Won the 2020 MIT/Amazon/IEEE Graph Challenge in sparse DNN inference [Link].
- Optimization of GPU memory accesses for distributed sparse DNN inference.
- Heterogeneous and out-of-core algorithms for spare DNNs with large models.
- Porting performance of petascale applications, i.e., HPCG, SETSM, and ChaNGa.
- Developed sparse, hierarchical communications (improves throughput by 60%).

08/2015 – 05/2019 *Research Assistant*, University of Illinois at Urbana-Champaign — Urbana, IL
Electrical and Computer Engineering Department.
- Worked on fast and parallel algorithms for wave scattering problems.
- Designed and implemented a massively parallel inverse multiple-scattering imaging algorithm with scaling up to 4,096 GPUs.
- Deployed of large-scale distributed linear and nonlinear optimization methods.
- Developed fast spectral techniques & parallelization for 2.5-dimensional modeling.

05/2019 – 08/2019 *Research Intern*, IBM T. J. Watson Research Center — Cambridge, MA
Data centric systems and high-performance computing group.
- Optimized sparse memory accesses of HPCG benchmark on Summit supercomputer by graph coloring.

05/2018 – 08/2018 *Givens Associate*, Argonne National Laboratory — Lemont, IL
Data science and learning (DSL) and X-ray science (XSD) divisions.
- Worked on supercomputing solutions for image reconstruction.

07/2016 – 08/2016 *Research Assistant*, The University of Hong Kong — Hong Kong S.A.R., China
Department of Electrical and Electronic Engineering.
- On-site collaboration with computational electromagnetics group.

08/2012 – 08/2015 *Co-Founder & Staff*, ABAKUS Computing Technologies — Ankara, Turkey

June 2024

	• Conducted industry- and government-funded research projects. • Organized of CEM'15 Computational Electromagnetics Workshop. • *See other duties under BiLCEM*.	İzmir, Turkey
12/2010 – 10/2014	*Research Assistant*, Bilkent University, Department of Electrical and Electronics Engineering, Computational Electromagnetics Research Center (BiLCEM) • Development of novel and parallel out-of-core electromagnetics solvers. • Accurate and fast solutions of large-scale electromagnetics problems. • Implementation of iterative solvers and preconditioners for solutions of extremely large dense linear systems (up to $N = 2.1$ billion unknowns!). • Assistant in CEM'13 Computational Electromagnetics Workshop.	Ankara, Turkey İzmir, Turkey
06/2011 – 09/2011	*Summer Intern*, BiLCEM • Developed of a parallel mesh refinement code for large-scale geometries. • Assistant in CEM'11 Computational Electromagnetics Workshop.	Ankara, Turkey İzmir, Turkey
06/2010 – 07/2010	*Summer Intern*, ETA Electronic Design Inc. • Implementation and documentation of a testing software for a power distribution system (of MILGEM Turkish cruiser).	Ankara, Turkey
Teaching Experience	*Co-developer*, NVIDIA Accelerated Computing Teaching Kit – Multi-GPU Systems [Link] • Made global impact by reaching to tens of thousands of students through MOOC.	Urbana, IL
	Tutorial Organizer, Conference on Machine Learning and Systems (MLSys 2022). • Sparsity in ML: Understanding and optimizing sparsity in neural networks running on heterogeneous Systems [Link]	Santa Clara, CA Aug. 2022
	Summer School Organizer, Barcelona Supercomputing Center, Programming and Tuning Massively Parallel Systems + Artificial Intelligence (PUMPS+AI) • Lecture: Scalable Algorithms and Supercomputing Applications. • Mentor of a clinic case study: Lattice Boltzman method for multi-GPU clusters. • Lecture: Massively parallel heterogeneous computing. • Mentor of a clinic case study: Runge-Kutta type integrator scheme for a stochastic Schrödinger equation **(mentee won the best poster award and a GPU).**	Barcelona, Spain 2016—present
	Mentor, University of Illinois at Urbana-Champaign, Coordinated Science Laboratory • Mentored undergraduate students on the IBM's C3SR Undergraduate Research in AI (URAI) and Discovery Accelerator Institute (IIDAI) programs.	Urbana, IL
	Teaching Assistant, University of Illinois at Urbana-Champaign Department of Electrical and Computer Engineering • ECE 408 Applied Parallel Programming guest lecture: Programming GPU Cluster • ECE 508 Manycore Parallel Algorithms • ECE 408 Applied Parallel Programming guest lecture: Programming GPU Cluster • ECE 350 Fields and Waves II	Urbana, IL Dec. 2019 Spring 2019 Nov. 2018 Spring 2017
	Instructor, National Center for Supercomputing Applications (NCSA) • Thought a crash course on CUDA to National Geospatial-Intelligence Agency • Mentor to Lawrence Berkeley Lab for NCSA GPU Hackaton	Urbana, IL Nov. 2018 Sept. 2018
	Teaching Assistant, Bilkent University Department of Electrical and Electronics Engineering • EEE 212 Microprocessors (3 Semesters) • EEE 202 Circuit Theory • EEE 491 Electrical and Electronics Engineering Design	Ankara, Turkey 01/2013 – 04/2015
	Undergraduate Tutor, Bilkent University Academic Student Coordination Unit • CS 114 Introduction to Programming for Engineers	Summer 2012
	Coordinator and Lecturer, IEEE Student Branch and Computational Electromagnetics research Center (BiLCEM) • Introduction to Unix/Linux, FORTRAN, parallel computing, parallel programming, and MATLAB classes	11/2011 – 05/2012
Honors, Awards, and Recognitions	ACM/IEEE-CS George Michael Memorial HPC Fellowship 2021 IBM-Illinois C3SR Best Research Recognition ECE Illinois Yi-Min Wang and Pi-Yu Chung Research Award 2020 SC20 Best Paper – Winner (Lead author) ACM Student Research Competition – SC20 1st Place	

ACM SIGHPC Certificate of Appreciation, 2020
MIT/Amazon/IEEE Sparse DNN Graph Challenge Champion 2020 (Lead author)
HPCC Best Paper Award 2019
IEEE TCPP / NSF Travel Grant for IPDPS 2019
ECE Illinois Paul D. Coleman Outstanding Research Award 2018
Argonne National Laboratory Givens Fellowship, Class of 2018
IPDPS PhD Forum Outstanding Poster Presentation 2018 (by public voting, presenter)
Grainger College of Engineering Computational Science and Engineering Fellow, Class of 2018
National Academies Travel Grant for USNC-URSI 2017, 2018
ECE Illinois Dan Vivoli Endowed Fellowship 2017
ECE Illinois Professor Kung Chie Yeh Endowed Fellowship 2016
Turkcell Technology Leaders Graduate Scholarship Program, Class of 2014
TÜBİTAK Graduate Research Scholarship (2013–2014)
Bilkent University EEE Department Research Excellence Award 2013
BiLCEM undergraduate research fellowship (2011–2013)

Professional Service

TPC Member, SC'24 HPC for Machine Learning [Link]
TPC Member, IPDPS'23 Programming Models, Compilers and Runtime Systems [Link]
SC20 SCC Reproducibility Challenge Benchmark Lead Author [Link]
ICCEM 2020 Organizer and Co-Chair of Special Session on Complex Inverse Problems [Link]
IPDPS 2020 Proceedings Vice-Chair for PhD Forum (Cancelled due to COVID-19 Pandemic)
Session Assistant at 2019 (57th) Allerton Conference
Volunteer Student Assistant IPDPS 2018
Co-organizing CEM'17 Int. Computing and Electromagnetics Workshop
Volunteer Student Assistant 2014 IEEE AP-S/URSI Symposium

Reviewing & Editing Activities

ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)
IEEE Transactions on Antennas and Propagation
IEEE Antennas and Propagation Magazine
IEEE International Conference on Computational Electromagnetics (ICCEM)
International Workshop on Computing, Electromagnetics, and Machine Intelligence
IEEE International Parallel and Distributed Processing Symposium (IPDPS, PC Member)
International Symposium on Computer Architecture (ISCA)
Elsevier Parallel Computing (PARCO)
D. Kirk and W.-M. W. Hwu, *Programming Massively Parallel Processors.* 4th ed., 2021.

Involved Projects

Government	**Supporter**
ECP: Exascale computing project	DOE
CORAL: Collaboration of Oak Ridge, Argonne, and Lawrence Livermore	DOE
Rapid analysis of various emerging nanoelectronics (RAVEN)	IARPA
High accuracy, broadband simulation of complex structures with quantum effects, parallel fast algorithm, and integral equation domain decomposition	NSF
Leadership class scientific and engineering computing: Breaking through the limits	NSF
Vancouver II: Improving programmability of contemporary heterogeneous architectures	DOE
Sustained-petascale in action: Blue Waters enabling transformative science and engineering	NSF
Petascale application improvement discovery (PAID-IME)	NSF-NCSA
Parallel electromagnetic equivalence principle algorithm	TÜBİTAK
Breast cancer detection via inverse scattering algorithms	TÜBİTAK
Industry	
Applications driving architectures (ADA) center	SRC-DARPA
Center for cognitive computing systems research (C3SR)	IBM
NVIDIA Center of rxcellence - UIUC	NVIDIA
Radar cross section calculations of chaff clouds	ASELSAN
Jet trainer/figher radar cross section analysis (FX/TX)	TAI-SSM
Computational methods for antennas mounted on platforms (PLANT-I)	ASELSAN-SSM
University	
Alchemy: University technology foundry	Univ. Illinois
A new paradigm in ultrasonic image formation: Inverse Scattering	Univ. Illinois

ASELSAN: *Military Electronic Industries Inc. (of Turkey)*
SSM: *Undersecretariat for Defense Industries (of Turkey)*
TAI: *Turkish Aircraft Industries Inc.*
TÜBİTAK: *Scientific and Technological Research Council of Turkey* (NSF of Turkey)

Book Chapter

W. C. Chew, Q. I. Dai, Q. S. Liu, T. Xia, T. E. Roth, H. Gan, A. Liu, S. C. Chen, **M. Hidayetoglu**, L. J. Liang, S. Sun, and W.-M. Hwu, *New Trends in Computational Electromagnetics.* Ö. Ergül, Ed. London: The Institute of Engineering and Technology, Dec. 2019.

Journal Papers

M. Hidayetoğlu, T. Biçer, S. Garcia de Gonzalo, B. Ren, D. Gürsoy, R. Kettimuthu, I. T. Foster, and W.-M. W. Hwu, "MemXCT: Design, optimization, scaling, and reproducibility of X-ray tomography imaging," *IEEE Trans. Parallel Distrib. Sys. (IEEE TPDS)*, vol. 33, no. 9, 2014–2031, Sep. 2022.

L. L. Meng, **M. Hidayetoğlu**, T. Xia, Wei E. I. Sha, L. J. Jiang, and W. C. Chew, "A wide-band two-dimensional fast multipole algorithm with a novel diagonalization form," *IEEE Trans. Antennas Propag. (IEEE TAP)*, vol. 66, no. 12, pp. 7477–7482, Dec. 2018.

D. J. Ching, **M. Hidayetoğlu**, T. Biçer, and D. Gürsoy, "Rotation-as-fast-axis scanning-probe x-ray tomography: the importance of angular diversity for fly-scan modes," *Appl. Opt.*, vol. 57, no. 30, pp. 8780–8789, Oct. 2018.

M. Hidayetoğlu, M. Oelze, E. Kudeki, and W. C. Chew, "Fast numerical integration techniques for 2.5-Dimensional Inverse Problems," *IEEE J. Multiscale Multiphysics Comput. Tech.*, on revision. [Arxiv]

Conference Papers

*Presenting Author

M. Hidayetoglu, S. Garcia de Gonzalo, E. Slaughter, T. Li, C. Zimmer, T. Bicer, B. Ren, W. Gropp, W. Hwu, Alex Aiken, "CommBench: Micro-benchmarking hierarchical networks with multi-GPU, multi-NIC nodes," *ACM International Conference on Supercomputing (ICS)*, Kyoto, Japan, June 2024.

K. Wu, **M. Hidayetoğlu**, X. Song, S. Huang, D. Zheng, I. Nisa, W. Hwu, "Hector: An efficient programming and compilation framework for implementing relational graph neural networks in GPU architectures," *International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, San Diego, CA, Apr. 2024.

S. W. Min, K. Wu, **M. Hidayetoğlu**, J. Xiong, Xiang Song, and W.-M. Hwu, "Graph neural network training with data tiering," *ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD'22)*, Washington, DC, Aug. 2022. [Arxiv]

S. Duranni, M. S. Chughati, **M. Hidayetoglu**, R. Tahir, A. Dakkak, L. Rauchwerger, F. Zaffar, W.-m. Hwu, "Accelerating Fourier and number-theoretic transforms using tensor cores and warp shuffles," *Int. Conference on Parallel Architectures and Compilation Techniques (PACT 2021)*, Sep. 2021.

S. W. Min, K. Wu, S. Huang, **M. Hidayetoğlu**, J. Xiong, E. Ebrahimi, D. Chen, W.-m. Hwu, "Large graph convolutional network training with GPU-oriented data communication architecture," *International Conference on Very Large Data Bases (VLDB'21)*, Copenhagen, Denmark, Aug. 2021. [Arxiv] **(Implemented in AWS Deep Graph Library v0.8)**

M. Hidayetoğlu*, T. Bicer, S. Garcia de Gonzalo, B. Ren, V. De Andrade, D. Gursoy, R. Kettimuthu, I. T. Foster, and W.-M. W. Hwu, "Petascale XCT: 3D image reconstruction with hierarchical communications on multi-GPU nodes," *The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC20)*, Atlanta, GA, Nov. 2020. **(Best Paper - winner)** [Arxiv]

M. Hidayetoğlu*, C. Pearson, V. S. Mailthody, E. Ebrahimi, J. Xiong, R. Nagi, and W.-M. Hwu, "At-scale sparse deep neural network inference with efficient GPU implementation," *IEEE High Performance Extreme Computing (HPEC'20)*, Waltham, MA, Sep. 2020. **(Graph Challenge Champion)** [Arxiv]

M. Hidayetoğlu*, T. Biçer, S. Garcia de Gonzalo, B. Ren, D. Gürsoy, R. Kettimuthu, I. T. Foster, and W.-M. W. Hwu, "MemXCT: Memory-centric X-ray CT reconstruction with massive parallelization," *The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC19)*, Denver, CO, Nov. 2019. **(~21% acceptance rate, SC20 reproducibility challenge benchmark)**

O. Anjum, S. Garcia de Gonzalo, **M. Hidayetoğlu**, and W.-M. Hwu*, "An efficient GPU implementation technique for higher-order 3D stencils," *Int. Conf. High Performance Computing and Communications (HPCC-2019)*, Zhangjiajie, China, Aug. 2019. **(~19% acceptance rate won the best paper award)**

M. Hidayetoğlu*, C. Pearson, I. El Hajj, L. Gürel, W. C. Chew, and W.-M. Hwu, "A fast and massively parallel inverse solver for multiple-scattering tomographic image reconstruction," *IEEE Int. Parallel Distributed Processing Symp. (IPDPS 2018)*, Vancouver, Canada, May 2018. **(~20% acceptance rate)**

Workshop Papers & Extended Abstracts

C. Pearson*, **M. Hidayetoğlu**, M. Almasri, O. Anjum, I-H. Chung, J. Xiong, and W.-M. Hwu, "Node-aware stencil communication for heterogeneous supercomputers," *Int. Workshop on Automatic Performance Tuning (iWAPT 2020 - IPDPS Workshop)*, New Orleans, LA, May 2020.

M. Hidayetoğlu*, W.-M. Hwu, and W. C. Chew, "Supercomputing for full-wave tomographic image reconstruction in near-real time," *IEEE Int. Symp. on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI 2018)*, Boston, MA, July 2018.

M. Hidayetoğlu*, W.-M. Hwu, and W. C. Chew, "Seeing the invisible: limited-view imaging with multiple-scattering reconstruction," *USNC-URSI Nat. Radio Science Meeting*, Boulder, CO, Jan. 2018.

M. Hidayetoğlu*, C. Pearson, I. El Hajj, W. C. Chew, L. Gürel, and W.-M. Hwu, "Scaling analysis of large inverse multiple-scattering solutions," *The International Conference on High Performance Computing, Networking, Storage and Analysis (SC17)*, Denver, CO, Nov. 2017.

W.-M. Hwu*, **M. Hidayetoğlu**, W. C. Chew, C. Pearson, S. Garcia, S. Huang, and A. Dakkak, "Thoughts on massively parallel heterogeneous computing for solving large problems," *CEM'17 Computing and Electromagnetics Int. Workshop*, Barcelona, Spain, June 2017.

M. Hidayetoğlu*, C. Pearson, L. Gürel, W.-M. Hwu, and W. C. Chew, "Scalable parallel DBIM solutions of inverse-scattering problems," *CEM'17 Computing and Electromagnetics Int. Workshop*, Barcelona, Spain, June 2017.

C. Pearson*, **M. Hidayetoğlu**, Wei Ren, W. C. Chew, and W.-M. Hwu, "Comparative performance evaluation of multi-GPU MLFMM implementation for 2-D VIE problems," *CEM'17 Computing and Electromagnetics Int. Workshop*, Barcelona, Spain, June 2017.

M. Hidayetoğlu*, C. Pearson, W. C. Chew, L. Gürel, and W.-M. Hwu, "Large inverse-scattering solutions with DBIM on GPU-enabled supercomputers," *Applied and Computational Electromagnetics Symp. (ACES 2017)*, Florence, Italy, Mar. 2017.

M. Hidayetoğlu, C. Yang, L. Wang, A. Podkowa, M. Oelze, W.-M. Hwu, and W. C. Chew*, "Large-scale inverse scattering solutions with parallel Born-type fast solvers (Invited)," *Progress on Electromagnetics Research Symp. (PIERS 2016)*, Shangai, China, Aug. 2016.

M. Hidayetoğlu and W. C. Chew*, "On computational complexity of the multilevel fast multipole algorithm in various dimensions," *IEEE Int. Symp. on Antennas and Propagation/USNC-URSI Nat. Radio Science Meeting (AP-S/URSI 2016)*, Fajardo, Puerto Rico, June 2016.

M. Hidayetoğlu and L. Gürel*, "Full-wave and approximate solutions of large electromagnetic scattering problems," *IEEE Int. Symposium on Antennas Propagation and North American Radio Science Meeting (AP-S/URSI 2015)*, Vancouver, Canada, July 2015.

M. Hidayetoğlu* and L. Gürel, "An MPIxOpenMP implementation of the hierarchical parallelization of MLFMA," *Computational Electromagnetics Int. Workshop (CEM'15)*, Izmir, Turkey, July 2015.

M. Hidayetoğlu and L. Gürel*, "Parallel out-of-core MLFMA on distributed-memory computer architectures," *Computational Electromagnetics Int. Workshop (CEM'15)*, Izmir, Turkey, July 2015.

M. Salim*, A. O. Akkirman, **M. Hidayetoğlu**, and L. Gürel, "Comparative benchmarking: matrix multiplication on a multicore processor and a GPU," *Computational Electromagnetics Int. Workshop (CEM'15)*, Izmir, Turkey, July 2015.

M. Hidayetoğlu* and L. Gürel, "MLFMA memory reduction techniques for solving large-scale problems," *2014 IEEE Int. Symp. on Antennas and Propagation and USNC-URSI National Radio Science Meeting (AP-S/URSI)*, Memphis, TN, July 2014.

M. Hidayetoğlu*, B. Karaosmanoğlu, and L. Gürel, "Reducing MLFMA memory with out-of-core implementation and data-structure parallelization," *Computational Electromagnetics Int. Workshop (CEM'13)*, İzmir, Turkey, Aug. 2013.

Invited Talks

Generalized hierarchical communication, Stanford University, Department of Computer Science, Stanford, CA, Sep. 2023. [link]

Optimizing collective communications on hierarchical networks, Barcelona Supercomputing Center, Spain, July 2023.

Performance modeling of sparse matrix multiplication, Stanford University Department of Computer Science, Stanford, CA, Oct. 2022. [Link]

DOE Seminar series on large-scale X-ray tomography on synchrotron accelerator light sources

- CIDR Seminar, Los Alamos National Laboratory, 22 Oct. 2020. Host: Brendt Wohlberg
- XCT Interest Group, Lawrence Berkeley National Laboratory, 18 Nov. 2020. Host: Dula Parkinson

Memory-centric, low complexity image reconstruction for the exascale era of computing, Bilkent University Computer Engineering Department, Ankara, Turkey, Jan. 2020. [Link]

Supercomputing for full-wave tomographic image reconstruction in near-real time, National Magnetic Resonance Research Center, Ankara, Turkey, Sep. 2018. [Link]

Low complexity, petascale, heterogeneous inverse solvers on Blue Waters, Coordinated Science Laboratory, Urbana, IL, Feb. 2018. [Link]

Fast and parallel algorithms for large full-wave image reconstructions, Argonne National Laboratory, Lemont, IL, Dec. 2017. [Link]

Fast and parallel algorithms for inverse multiple-scattering solutions and applications on tomographic imaging, National Center for Supercomputing Applications, Urbana, IL, Sep. 2017. [Link]

Fast and parallel algorithms for multiple-scattering imaging, The University of Hong Kong, Hong Kong S.A.R., China, Aug. 2016. [Link]

Conference Talks

M. Hidayetoğlu*, "Large-scale inverse multiple-scattering imaging on GPU supercomputers with real data," *The 1st Conference on High Performance Computing on Imaging (HPCI), Invited Speaker*. San Francisco, CA, Jan. 2022.

M. Hidayetoğlu*, "Hierarchical Communications for 3D image reconstruction with synchrotron light source and 24,576 GPUs," *The 1st Conference on High Performance Computing on Imaging (HPCI), Invited Speaker*. San Francisco, CA, Jan. 2022.

M. Hidayetoğlu*, W.-M. Hwu, and W. C. Chew, "High performance inverse multiple-scattering imaging," IEEE Int. Conf. Computational Electromagnetics *(ICCEM 2020)*, Singapore, Aug. 2020.

M. Hidayetoğlu, W.-M. Hwu, and W. C. Chew*, "Efficient integration paths for fast 2.5-D Scattering," *Progress in Electromagnetics Research Symp. (PIERS 2018)*, Toyama, Japan, Aug. 2018.

L. L. Meng*, **M. Hidayetoğlu**, T. Xia, W. C. Chew, W. E. I. Sha, and L. J. Jiang, "A novel diagonalization in two-dimensional fast multipole algorithm based on discrete Fourier transform," *Progress on Electromagnetics Research Symp. (PIERS 2017)*, Singapore, Nov. 2017.

W.-M. Hwu*, **M. Hidayetoğlu**, C. Pearson, S. Garcia, S. Huang, and A. Dakkak, "Massively-parallel heterogeneous computing for solving large problems," *CEM'17 Computing and Electromagnetics Int. Workshop*, Barcelona, Spain, June 2017. **(Plenary Talk)**

M. Hidayetoğlu*, A. Podkowa, M. Oelze, W.-M. Hwu, and W. C. Chew, "Fast DBIM solutions on supercomputers with frequency-hopping for imaging of large and high-contrast objects," *Progress on Electromagnetics Research Symp. (PIERS 2017)*, St. Petersburg, Russia, May 2017.

M. Hidayetoğlu*, A. Podkowa, M. L. Oelze, L. Gürel, W.-M. Hwu, and W. C. Chew, "Incorporating multiple scattering in imaging with iterative Born methods," *USNC-URSI Nat. Radio Science Meeting*, Boulder, CO, Jan. 2017.

A. Podkowa*, **M. Hidayetoğlu**, W. C. Chew, and M. Oelze, "Reconstruction of spatially varying sound speed distributions from pulse-echo data," *Meeting Acoustic Society America*, Honolulu, HI, Dec. 2016.

M. Hidayetoğlu and L. Gürel*, "Accelerating hybrid integral-equation and physical-optics solutions with MLFMA," *URSI Atlantic Radio Science Conf. (AT-RASC 2015)*, Gran Canaria, Spain, May 2015.

Posters & Other Presentations

M. Hidayetoğlu and W.-M Hwu (advisor), "Memory-centric 3D image reconstruction with hierarchical communications on multi-GPU node architecture," ACM *Student Research Competition (SRC) of SC20*, Atlanta, GA, Nov. 2020. **(Won the ACM Student Research Competition at SC20)**

S. L. Harrel, M. Taufer, B. Plale, V. M. Vergara, S. Michael, **M. Hidayetoglu**, and T. Bicer, SC20 vSCC Reproducibility Challenge, Aug. 2020. [Link]

M. Hidayetoğlu, Efficient inference on GPUs for the sparse deep neural network challenge 2020, IBM-Illinois Center for Cognitive Systems Research, Urbana, IL, Jul. 2020.

M. Hidayetoglu, Memory-Centric 3D Image Reconstruction on 24,576 GPUs, IBM-Illinois Center for Cognitive Systems Research, Urbana, IL, May 2020.

M. Hidayetoğlu, Remedies Towards Breaching Memory Wall for Sparse Computations, IBM-Illinois Center for Cognitive Systems Research, Urbana, IL, Oct. 2019. [Slides]

M. Hidayetoğlu, Mohammad Al Masri, Carl Pearson, Jinjun Xiong, Rakesh Nagi, Wen-mei W. Hwu, "Efficient sparse veryDNN Inference," *IBM-Illinois C3SR Open House*, Urbana, IL, Oct. 2019.

M. Hidayetoğlu, T. Biçer, S. Garcia de Gonzalo, B. Ren, D. Gürsoy, R. Kettimuthu, W. C. Chew, I. Foster, and W.-M. Hwu, "Memory-centric iterative X-ray image reconstruction," *PhD Forum of IPDPS 2019*, Rio de Janeiro, Brazil, May 2019.

M. Hidayetoğlu, C. Pearson, I. El Hajj, W. C. Chew, L. Gürel, and W.-M. Hwu, "Large and massively-parallel image reconstruction accelerated with the multilevel fast multipole algorithm," *PhD Forum of IPDPS 2018*, Vancouver, Canada, May 2018. **(Won the second place among 32 posters.)**

M. Hidayetoğlu, W. C. Chew, and W.-M. Hwu, "Scalable full-wave image reconstruction on Blue Waters," *Coordinated Science Laboratory Student Research Conference (CSLSC)*, Urbana, IL, Feb. 2018.

M. Hidayetoğlu and W.-M. Hwu, "Massively parallel full-wave (nonlinear) tomographic imaging," *Supercomputing (SC17)*, Denver, CO, Oct. 2017 (showcase for Illinois Parallel Computing Institute.)

M. Hidayetoğlu, C. Pearson, W.-M. Hwu, and W. C. Chew, "A 2-D volume equation solver on GPU for solutions of light scattering problems," *International Year of Light at UIUC*, Urbana, IL, USA, Sep. 2015.

M. Hidayetoğlu and Ö. İlday, "A parallel physical optics solver for solving large-scale electromagnetics scattering problems," *Bilkent IEEE Grad. Research Conf. (GRC'15)*, Ankara, Turkey, Mar. 2015.

M. Hidayetoğlu and L. Gürel, "Hybrid PO-MoM solutions of electromagnetic scattering problems involving PEC geometries," *Bilkent IEEE Grad. Research Conf. (GRC'14)*, Ankara, Turkey, Mar. 2014.

M. Hidayetoğlu and L. Gürel, "Memory reduction by parallelizing data structures of MLFMA," *Bilkent IEEE Graduate Research Conference (GRC'13)*, Ankara, Turkey, Mar. 2013.

M. Hidayetoğlu, B. Karaosmanoğlu, and L. Gürel, "MLFMA solutions of electromagnetic scattering from chaff clouds," *Bilkent IEEE Graduate Research Conference (GRC'12)*, Ankara, Turkey, Mar. 2012.

Dissertation

M. Hidayetoğlu, "Large-scale solutions of electromagnetics problems using the multilevel fast multipole algorithm and physical optics," M.S. Thesis, Bilkent University, Ankara, Turkey, Apr. 2015.

M. Hidayetoğlu, "Hierarchical sparse computations and communications for solving inverse problems on supercomputers with multi-GPU nodes," Ph.D. Dissertation, University of Illinois at Urbana-Champaign, Urbana, USA, July 2022.

Featured News & Stories

Bilkent News, *Mert Hidayetoglu receives ACM/IEEE-CS George Michael Memorial HPC Fellowship*, Nov. 2021 **[**Link]

ACM/IEEE-CS George Michael Memorial HPC Fellowship, Oct. 2021

- **HPC Wire** [Link]
- **ACM News** [Link]
- **IEEE-CS News** [Link]

IBM-Illinois C3SR Newsletter, *C3SR Team named MIT/Amazon/IEEE Graph Challenge champion for accelerating sparse neural network inference on Summit*, Apr. 2021. [Link]

CSL News, *CSL students lead interdisciplinary team, continue to earn accolades*, Feb. 2021 [Link].

SC20 Best Paper Award News, Nov. 2020

- **SC20 Newsletter** [Link]
- **Inside HPC** [Link]
- **Barcelona Supercomputing Center** [Link]
- **Scientific Computing World** [Link]
- **Argonne National Laboratory** [Link]
- **EurekAlert (AAAS)** [Link]
- **Newswise** [Link]
- **HPC Wire** [Link]

CSL News, *CSL team crowned IEEE HPEC Graph Challenge champions*, Oct. 2020. [Link]

CSL News, *CSL student's paper selected for international reproducibility competition*, May 2020. [Link]

SC20 Newsletter, *SC20 Student Cluster Reproducibility Committee chooses benchmark wisely*, Apr. 2020. [Link]

APS Science 2017, *Real-time data analysis and experimental steering at the APS using large-scale computing*, Aug. 2018. [Link]

HPC Wire, *34 University of Illinois researcher teams awarded allocations on Blue Waters supercomputer*, June 2018. [Link]

Blue Waters Annual Report, *Parallelization of the multilevel fast multipole algorithm (MLFMA) on heterogeneous CPU-GPU architectures*, 2017. [Link]

ECE Illinois Newsletter and CSL News, *Hidayetoğlu tackles complex imaging as CSE Fellow*, June 2017. [ECE Link], [CSL Link]

Blue Waters Annual Report, *Parallelization of the multilevel fast multipole algorithm (MLFMA) on heterogeneous CPU-GPU architectures*, 2016. [Link]

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