Yuhao Zhu

CONTACT INFORMATION

Assistant Professor
Department of Computer Science
University of Rochester
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Rochester, NY 14627

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RESEARCH INTERESTS

I work on software and hardware design to solve real-world problems that are technically deep and have broad societal impact. To that end, my recent work has focused mostly on visual computing, e.g., Augmented/Virtual Reality, autonomous machines, and digital cultural heritage.

EDUCATION

The University of Texas at Austin
Ph.D., Electrical and Computer Engineering — *May 2017*
M.S.E., Electrical and Computer Engineering — *May 2015*
Dissertation: Energy-Efficient Mobile Web Computing

Beihang University, Beijing, China
B.S., Computer Science and Engineering — *June 2010*

ACADEMIC HONORS

- **2023, ISCA Hall of Frame**
- **2022, MICRO Hall of Frame**
- **2020, NSF CAREER Award**
- **2019, University Research Award, University of Rochester**
- **2017, Google Faculty Research Award**
- **2016, Google Ph.D. Fellowship**
- **2011, Microelectronics and Computer Development Fellowship, UT Austin**

PUBLICATION AWARDS

- **2022, Kostas Pantazos Memorial Award for Outstanding Paper in Visualization and Data Analysis, Society for Imaging Science and Technology**
  "*Digital Reconstruction of Elmina Castle for Mobile Virtual Reality via Point-based Detail Transfer*"
- **2019, IEEE Micro Top Picks of Computer Architecture**
  "*Energy-Efficient Video Processing for Virtual Reality*"
  Originally published at ISCA 2019
- **2018, ACM SIGARCH – IEEE-CS TCCA Outstanding Dissertation Award, Honorable Mention**
  For Dissertation "Energy-Efficient Mobile Web Computing"
- **2014, Best of Computer Architecture Letters Award**
  "*Exploiting Webpage Characteristics for Energy-Efficient Mobile Web Browsing*"
- **2010, Outstanding Undergraduate Thesis Award, Beihang University**
  "*Distributed Time, Conservative Parallel Logic Simulation on GPUs*"

- **2022, IEEE Micro Top Picks of Computer Architecture, Honorable Mention**
  "*ANT: Exploiting Adaptive Numerical Data Type for Low-bit DNN Quantization*"
  Originally published at MICRO 2022
- **2022, IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR), Best Paper Honorable Mention**
  "*Real-Time Gaze Tracking with Event-Driven Eye Segmentation*"
- **2022, IEEE International Symposium on High-Performance Computer Architecture (HPCA), Best Paper Nominee**
  "*S2TA: Exploiting Structured Sparsity for Energy-Efficient Mobile CNN Acceleration*"
- **2020, International Conference on Parallel Architectures and Compilation Techniques (PACT), Best Paper Nominee**
  "*Low-Latency Proactive Continuous Vision*"
- **2019, IEEE/ACM International Symposium on Microarchitecture (MICRO), Best Paper Nominee**
  "*Tigris: Architecture and Algorithms for 3D Perception in Point Clouds*"
- **2018, IEEE Micro Top Picks of Computer Architecture, Honorable Mention**
  "*Euphrates: Algorithm-SoC Co-Design for Low-Power Mobile Continuous Vision*"
  Originally published at ISCA 2018
- **2015, IEEE Micro Top Picks of Computer Architecture, Honorable Mention**
  "*Microarchitectural Implications of Event-driven Server-side Web Applications*"
  Originally published at MICRO 2015

MENTORING AWARDS

- **2020, CRA Outstanding Undergraduate Researcher, Honorable Mention**
  2019, ACM Student Research Competition (ASPLOS 2019), Gold Medalist
  Sam Triest (Advisee)
- **2019, CRA Outstanding Undergraduate Researcher, Honorable Mention**
  2019, A. Richard Newton Young Student Fellow (DAC 2019)
  Qiuyue Sun (Advisee)
- **2020, CRA Outstanding Undergraduate Researcher, Honorable Mention**
  Sifan Ye (Advisee)

PROFESSIONAL POSITIONS

University of Rochester
Assistant Professor, Department of Computer Science — Jan. 2018 - now
Affiliated Faculty, Goergen Institute for Data Science — June 2018 - now

Arm Research
Visiting Researcher — July 2017 - Dec. 2017

Harvard University
Research Fellow — Aug. 2016 - May 2017

The University of Texas at Austin
Graduate Researcher — Aug. 2010 - May 2017
Teaching Assistant — Fall 2010, Spring 2011, Spring 2014

Google Inc.
SWE Intern (Lead of Flow API of the Catapult project) — Summer 2015

AMD Research Lab
Research Intern — Summer 2012, Summer 2013

STMicroelectronics
Co-op Engineer — Summer 2011

Tsinghua University
Undergraduate Researcher — June 2009 - May 2010

PUBLICATIONS

Journal Articles

- Carlos Mauricio Villegas Burgos, Pei Xiong, Liangyu Qiu, Yuhao Zhu, Nick Vamivakas
  Co-designed Metaoptoelectronic Deep Learning
  Optical Express, 2023, (60)15:4356-4365
- Qiang Liu, Yuhui Hao, Weizhuang Liu, Bo Yu, Yiming Gan, Jie Tang, Shao-Shan Liu, Yuhao Zhu
  An Energy Efficient and Runtime Reconfigurable Accelerator for Robotic Localization
  IEEE Transactions on Computers, December 2022
- Shaoshan Liu, Bo Yu, Jie Tang, Yuhao Zhu, Xue Liu
  Communication Challenges in Infrastructure-Vehicle Cooperative Autonomous Driving: A Field Deployment Perspective
  IEEE Wireless Communications, 2022 May 5;29(4):126-31.
- Carlos Mauricio Villegas Burgos, Tianqi Yang, Yuhao Zhu, Nick Vamivakas
  A Design Framework for Metasurface Optics-based Convolutional Neural Networks
  Applied Optics, 2021, (60)15:4356-4365
- Zishen Wan, Bo Yu, Thomas Yuang Li, Jie Tang, Yuhao Zhu, Yu Wang, Arijit Raychowdhury, Shaoshan Liu
  A Survey of FPGA-Based Robotic Computing
  IEEE Circuits and Systems Magazine, 2021, 21(2):48-74
- Yue Leng, Chi-chun Chen, Qiuyue Sun, Jian Huang, Yuhao Zhu
  Energy-Efficient Video Processing for Virtual Reality
  IEEE Micro Special Issue on Top Picks from the 2019 Computer Architecture Conferences, May/June 2020, 40(3):30-36
- Yiming Gan, Yuxian Qiu, Jingwen Leng, Yuhao Zhu
  SVSoC: Speculative Vision Systems-on-a-Chip
  Computer Architecture Letters (CAL), March 2019, 18(1):47-50
- Yuhao Zhu, Vijay Janapa Reddi
  Optimizing General-Purpose CPUs for Energy-Efficient Mobile Web Computing
  ACM Transactions on Computer Systems (TOCS), March 2017, 35(1):1
- Yuhao Zhu, Vijay Janapa Reddi, Robert Adolf, Saketh Rama, Brandon Reagen, Gu-Yeon Wei, David M. Brooks
  Cognitive Computing Safety: The New Horizon for Reliability / The Design and Evolution of Deep Learning Workloads
  IEEE Micro Special Issue on Cognitive Architectures, Jan/Feb 2017, 37(1):15-21

- Peter Bailis, Jean Yang, Vijay Janapa Reddi, Yuhao Zhu
  Research for Practice: Web Security and Mobile Web Computing (Website)
  Communications of the ACM (CACM), Jan 2017, 60(1):50-53
  Also appears in *ACM Queue*, July/Aug 2016, 14(4):80-95.
- Yuhao Zhu, Matthew Halpern, Vijay Janapa Reddi
  The Role of the CPU in Energy-Efficient Mobile Web Browsing
  IEEE Micro Special Issue on Mobile Systems, Jan/Feb 2015, 35(1):26-33
- Yuhao Zhu, Aditya Srikanth, Jingwen Leng, Vijay Janapa Reddi
  Exploiting Webpage Characteristics for Energy-Efficient Mobile Web Browsing
  Computer Architecture Letters (CAL), Oct 2012, 13(1):33-36
  Awarded Best of Computer Architecture Letter in 2014
- Yuhao Zhu, Bo Wang, Yangdong Deng
  Massively Parallel Logic Simulation with GPUs
  ACM Transactions on Design Automation of Electronic Systems (TODAES), June 2011, 16(3):29

Conference Papers

- Tianrui Ma, Yu Feng, Xuan Zhang, Yuhao Zhu
  CamJ: Enabling System-Level Energy Modeling and Architectural Exploration for In-Sensor Visual Computing
  ISCA 2023
- Nisarg Ujjainkar, Jingwen Leng, Yuhao Zhu
  ImaGen: A General Framework for Generating Memory- and Power-Efficient Image Processing Accelerators
  ISCA 2023
- Cong Guo, Jiaming Tang, Weiming Hu, Jingwen Leng, Chen Zhang, Fan Yang, Yunxin Liu, Minyi Guo, Yuhao Zhu
  OliVe: Accelerating Large Language Models via Hardware-friendly Outlier-Victim Pair Quantization
  ISCA 2023
- Yuhao Zhu
  Teaching Color Science to EECS Students Using Interactive Tutorials: Tools and Lessons
  IS&T EI (VDA) 2023
- Elias Neuman-Donihue, Michael Jarvis, Yuhao Zhu
  FastPoints: A State-of-the-Art Point Cloud Renderer for Unity
  IS&T EI (VDA) 2023
- Abhishek Tyagi, Yiming Gan, Shaoshan Liu, Bo Yu, Paul Whatmough, Yuhao Zhu
  Thales: Formulating and Estimating Architectural Vulnerability Factors for DNN Accelerators
  HPCA 2023
- Budmonde Duinkharjav, Kenny Chen, Abhishek Tyagi, Jiayi He, Yuhao Zhu, Qi Sun
  Color-Perception-Guided Display Power Reduction for Virtual Reality
  SIGGRAPH Asia 2022
- Cong Guo, Chen Zhang, Jingwen Leng, Zihan Liu, Fan Yang, Yunxin Liu, Minyi Guo, Yuhao Zhu

ANT: Exploiting Adaptive Numerical Data Type for Low-bit Deep Neural Network Quantization
MICRO 2022
IEEE Micro Top Picks of Computer Architecture (Honorable Mention) in 2022

- Yu Feng, Gunnar Hammonds, Yiming Gan, Yuhao Zhu
  Crescent: Taming Memory Irregularities for Accelerating Deep Point Cloud Analytics
  ISCA 2022
- Gregory Heyworth, Keith T. Knox, Kenneth Boydston, Yuhao Zhu
  Multispectral Scheimpflug: Imaging Degraded Books That Open Less Than 30 Degrees
  IS&T Archiving 2022
- Yiming Gan, Paul Whatmough, Bo Yu, Shaoshan Liu, Yuhao Zhu
  BRAUM: Analyzing and Protecting Autonomous Machine Software Stack
  ISSRE 2022
- Yu Feng, Nathan Goulding-Hotta, Asif Khan, Hans Reyserhove, Yuhao Zhu
  Real-Time Gaze Tracking with Event-Driven Eye Segmentation
  IEEE VR 2022
  Best Paper Nominee; Invited Presentation at IEEE VIS 2022
- Yuhao Zhu
  RTNN: Accelerating Neighbor Search Using Hardware Ray Tracing
  PPoPP 2022
- Zhi-Gang Liu, Paul Whatmough, Yuhao Zhu, Matt Mattina
  S2TA: Exploiting Structured Sparsity for Energy-Efficient Mobile CNN Acceleration
  HPCA 2022
  Best Paper Nominee
- Sifan Ye, Ting Wu, Michael Jarvis, Yuhao Zhu
  Digital Reconstruction of Elmina Castle for Mobile Virtual Reality via Point-based Detail Transfer
  IS&T EI (VDA) 2022
  Kostas Pantazos Memorial Award for Outstanding Paper in Visualization and Data Analysis
- Weizhuang Liu, Bo Yu, Yiming Gan, Qiang Liu, Jie Tang, Shaoshan Liu, Yuhao Zhu
  Archytas: A Framework for Synthesizing and Dynamically Optimizing Accelerators for Robotic Localization
  MICRO 2021
- Joshua Romphf, Elias Neuman-Donihue, Gregory Heyworth, Yuhao Zhu
  Resurrect3D: An Open and Customizable Platform for Visualizing and Analyzing Cultural Heritage Artifacts
  Web3D 2021
- Yangjie Zhou, Mengtian Yang, Cong Guo, Jingwen Leng, Yun Liang, Quan Chen, Minyi Guo, Yuhao Zhu
  Characterizing and Demystifying the Implicit Convolution Algorithm on Commercial Matrix-Multiplication Accelerators
  IISWC 2021
- Shaoshan Liu, Bo Yu, Yahui Liu, Kunai Zhang, Yisong Qiao, Thomas Yuang Li, Jie Tang, Yuhao Zhu

Brief Industry Paper: The Matter of Time — A General and Efficient System for Precise Sensor Synchronization in Robotic Computing
RTAS 2021

- Yiming Gan, Bo Yu, Boyuan Tian, Leimeng Xu, Wei Hu, Shaoshan Liu, Qiang Liu, Yanjun Zhang, Jie Tang, Yuhao Zhu
  Eudoxus: Characterizing and Accelerating Localization in Autonomous Machines
  HPCA 2021
- Yu Feng, Boyuan Tian, Tiancheng Xu, Paul Whatmough, Yuhao Zhu
  Mesorasi: Architecture Support for Point Cloud Analytics via Delayed-Aggregation
  MICRO 2020
- Bo Yu, Wei Hu, Leimeng Xu, Jie Tang, Shaoshan Liu, Yuhao Zhu
  Building the Computing System for Autonomous Micromobility Vehicles: Design Constraints and Architectural Optimizations
  MICRO 2020
- Yiming Gan, Yuxian Qiu, Jingwen Leng, Minyi Guo, Yuhao Zhu
  Ptolemy: Architecture Support for Robust Deep Learning
  MICRO 2020
- Yu Feng, Shaoshan Liu, Yuhao Zhu
  Real-Time Spatio-Temporal LiDAR Point Cloud Compression
  IROS 2020
- Haichuan Yang, Shupeng Gui, Yuhao Zhu, Ji Liu
  Automatic Neural Network Compression by Sparsity-Quantization Joint Learning: A Constrained Optimization-based Approach
  CVPR 2020
- Cong Guo, Bo Yang Hsueh, Jingwen Leng, Yuxian Qiu, Yue Guan, Zehuan Wang, Xiaoying Jia, Xipeng Li, Minyi Guo, Yuhao Zhu
  Accelerating Sparse DNN Models Without Hardware-Support via Tile-wise Sparsity
  SC 2020
- Yiming Gan, Yuxian Qiu, Lele Chen, Jingwen Leng, Yuhao Zhu
  Low-Latency Proactive Continuous Vision
  PACT 2020
  Best Paper Nominee
- Cong Guo, Yangjie Zhou, Jingwen Leng, Yuhao Zhu, Zidong Du, Quan Chen, Chao Li, Minyi Guo, Bin Yao
  Balancing Efficiency and Flexibility for DNN Acceleration via Temporal GPU-Systolic Array Integration
  DAC 2020
- Anand Samajdar, J. Joseph, Yuhao Zhu, Paul Whatmough, Matt Mattina, Tushar Krishna
  A Systematic Methodology for Characterizing Scalability of DNN Accelerators
  ISPASS 2020
- Qiuyue Sun, Amir Taherin, Yawo Siatitse, Yuhao Zhu
  Energy-Efficient 360-Degree Video Rendering on FPGA via Algorithm-Architecture Co-Design
  FPGA 2020

- Yu Feng, Paul Whatmough, Yuhao Zhu
  ASV: Accelerated Stereo Vision System
  MICRO 2019
- Tiancheng Xu, Boyuan Tian, Yuhao Zhu
  Tigris: Architecture and Algorithms for 3D Perception in Point Clouds
  MICRO 2019
  Best Paper Nominee
- Yu Feng, Yuhao Zhu
  PES: Proactive Event Scheduling for Energy-Efficient Mobile Web Computing
  ISCA 2019
- Yue Leng, Chi-chun Chen, Qiuyue Sun, Jian Huang, Yuhao Zhu
  Energy-Efficient Video Processing for Virtual Reality
  ISCA 2019
  IEEE Micro Top Picks of Computer Architecture in 2019
- Yuxian Qiu, Jingwen Leng, Cong Guo, Quan Chen, Chao Li, Minyi Guo, Yuhao Zhu
  Adversarial Defense Through Network Profiling Based Path Extraction
  CVPR 2019
- Haichuan Yang, Yuhao Zhu, Ji Liu
  ECC: Energy-Constrained Deep Neural Network Compression via a Bilinear Regression Model
  CVPR 2019
- Haichuan Yang, Yuhao Zhu, Ji Liu
  Energy-Constrained Compression for Deep Neural Networks via Weighted Sparse Projection and Layer Input Masking
  ICLR 2019
- Yu Wang, Yuhao Zhu, Glenn Ko, Brandon Reagen, Gu-Yeon Wei, David Brooks
  Demystifying Bayesian Inference Workloads
  ISPASS 2019
- Wenzhi Cui, Daniel Richins, Yuhao Zhu, Vijay Janapa Reddi
  Tail Latency in Node.js: Energy Efficient Turbo Boosting for Long Latency Requests in Event-Driven Web Services
  VEE 2019
- Yue Leng, Chi-chun Chen, Qiuyue Sun, Jian Huang, Yuhao Zhu
  Semantic-Aware Virtual Reality Video Streaming
  APSys 2018
- Yuhao Zhu, Anand Samajdar, Matthew Mattina, Paul Whatmough
  Euphrates: Algorithm-SoC Co-Design for Low-Power Mobile Continuous Vision
  ISCA 2018
  IEEE Micro Top Picks of Computer Architecture (Honorable Mention) in 2018
- Yuwei Hu, Jidong Zhai, Dinghua Li, Yifan Gong, Yuhao Zhu, Wei Liu, Lei Su, Jiangming Jin
  BitFlow: Exploiting Vector Parallelism for Binary Neural Networks on CPU
  IPDPS 2018
- Yuhao Zhu, Matthew Mattina, Paul Whatmough
  Mobile Machine Learning Hardware at ARM: A Systems-on-Chip (SoC) Perspec-

tive
SysML 2018

- Yuhao Zhu, Vijay Janapa Reddi
  GreenWeb: Language Extensions for Energy-Efficient Mobile Web Computing
  PLDI 2016

- Matthew Halpern, Yuhao Zhu, Vijay Janapa Reddi
  Mobile CPU's Rise to Power: Quantifying the Impact of Generational Mobile CPU Design Trends on Performance, Energy, and User Satisfaction
  HPCA 2016

- Yuhao Zhu, Daniel Richins, Matthew Halpern, Vijay Janapa Reddi
  Microarchitectural Implications of Event-driven Server-side Web Applications
  MICRO 2015
  IEEE Micro Top Picks of Computer Architecture (Honorable Mention) in 2015

- Yuhao Zhu, Matthew Halpern, Vijay Janapa Reddi
  Event-based Scheduling for Energy-Efficient QoS (eQoS) in Mobile Web Applications
  HPCA 2015

- Matthew Halpern, Yuhao Zhu, Ramesh Peri, Vijay Janapa Reddi
  Mosaic: Cross-Platform User-Interaction Record and Replay Tool for the Fragmented Android Ecosystem
  ISPASS 2015

- Yuhao Zhu, Vijay Janapa Reddi
  WebCore: Architectural Support for Mobile Web Browsing
  ISCA 2014

- Chen Zhou, Xiaofei Wang, Weichao Xu, Yuhao Zhu, Vijay Janapa Reddi, Chris Kim
  Estimation of Instantaneous Frequency Fluctuation in a Fast DVFS Environment Using an Empirical BTI Stress-Relaxation Model
  IRPS 2014

- Yuhao Zhu, Vijay Janapa Reddi
  High-Performance and Energy-Efficient Mobile Web Browsing on Big/Little Systems
  HPCA 2013

- Yuhao Zhu, Yangdong Deng, Yubei Chen
  Hermes: An Integrated CPU/GPU Microarchitecture for IP Routing
  DAC 2011

- Bo Wang, Yuhao Zhu, Yangdong Deng
  Distributed Time, Conservative Parallel Logic Simulation on GPUs
  DAC 2010

Patents

- Yuhao Zhu, Paul Whatmough
  Region of Interest Determination in Video
  US Patent App. 15/875,464

- Yuhao Zhu, Paul Whatmough
  Computer Vision Processing

US Patent App. 16/127,007

Book Chapters

- Yangdong Deng, Yuhao Zhu, Bo Wang
  Asynchronous Parallel Logic Simulation on Modern Graphics Processors
  GPU Solutions to Multi-scale Problems in Science and Engineering, 2013
- Yangdong Deng, Xiaomemg Jiao, Shuai Mu, Kang Kang, Yuhao Zhu
  NPGPU: Network Processing on Graphics Processing Units
  Theoretical and Mathematical Foundations of Computer Science, 2011

TALKS
decks
videos

Invited Talks

- **Rethinking Imaging-Computing Interface**
  University College London, March 2023, Virtual
  Stanford Center for Image Systems Engineering, April 2023, Palo Alto, CA
- **Harnessing and Harvesting the Computer Science-Vision Science Symbiosis**
  RIT Munsell Color Science Laboratory, March 2023, Rochester, NY
  Wu Tsai Neurosciences Institute, Stanford, April 2023, Palo Alto, CA
  Smith Kettlewell Eye Research Institute, April 2023, San Francisco, CA
- **High Performance Embedded Imaging: An Optics, Sensing, and Computing Co-Designed Approach**
  High Performance Computing for Imaging at EI 2023, Jan 2023, San Francisco, CA
- **Color Perception-Guided Display Optimizations: Power and Beyond**
  Meta, Sept 2022, Virtual
- **Go Horizontal, Not Vertical: Addressing Visual Computing Challenges in Autonomous Machines**
  RoboArch Workshop co-located with MICRO 2022, Oct 2022, Chicago, IL
- **RTNN: Accelerating Neighbor Search Using Hardware Ray Tracing**
  WDDSA Workshop co-located with MICRO 2022, Oct 2022, Chicago, IL
- **Improving and Harnessing Software Resiliency in Autonomous Machines**
  Plenary Panel on Reliability of Autonomous Machines, IEEE COMPSAC, June 2022, Virtual
- **Visual Computing: A Horizontal Approach**
  Efficient AI Seminar, Rutgers University, Oct 2022, Virtual
  Keynote Speech, IFIP NPC, Sept 2022, Virtual
  GlobalFoundries, May 2022, Virtual
  University of Massachusetts Amherst, May 2022, Virtual
- **Intelligent Visual Computing**
  Duke University, March 2021, Virtual
  University of Utah, Oct 2021, Virtual
  HALO workshop co-located with ICCAD, Nov 2021, Virtual
- Watt-Wise Web: Architecting a Responsive and Energy-Efficient Mobile Web
  University of Utah, Oct 2020, Virtual
- Architecture Support for Robust Deep Learning: Exploiting Software 1.0 Techniques to Defend Software 2.0

AMD Research, Oct 2020, Virtual

- **Rethinking Computer Systems Stack for Point Cloud Processing**
  Arm Research, Sept 2019, Waltham, MA
- **Getting Computer Systems Ready for Visual Computing in Ten Years**
  Intel Labs, Sept 2019, Hillsboro, OR
  Harvard University, Sept 2019, Cambridge, MA
  Yale University, Oct 2019, New Haven, CT
  University of Michigan, Nov 2019, Ann Arbor, MI
  FastPath Workshop co-located with ISPASS, Aug 2020, Virtual
- **The Next Quintillion Pixels and Beyond: Architecting Next-Generation Mobile Visual Computing Systems**
  Arm Research, Sept 2019, Austin, TX
  UT Austin, Sept 2019, Austin, TX
  Rice University, Sept 2019, Houston, TX
- **Resource-Guaranteed Deep Learning**
  Arm Research, April 2019, Waltham, MA
- **Energy-Efficient Mobile Web: Proactive and Reactive Perspectives**
  Google, April 2018, Seattle, WA
- **Algorithm-SoC Co-design for Energy-Efficient Mobile Continuous Vision**
  Cornell University, Feb 2018, Ithaca, NY
  CogArch Workshop co-located with ASPLOS 2018, March 2018, Williamsburg, VA
  SRI International, April 2018, Princeton, NJ
  Rochester Institute of Technology, Feb 2019, Rochester, NY
- **The Watt Wise Web**
  Texas A&M University, Jan 2017, Teleseminar
  Boston Area Architecture Workshop (BARC), Jan 2017, Cambridge, MA
  ARM Research, Jan 2017, Austin, TX
  UT Austin School of Information, Feb 2017, Austin, TX
- **WebCore: Architectural Support for Mobile Web Browsing**
  Intel, July 2014, Austin, TX
- **High-Performance and EnergyEfficient Mobile Web Browsing on Big/Little Systems**
  UT Austin Programming Language Lunch Seminar, September 2012, Austin, TX
  AMD Research Lab, August 2012, Austin, TX

Conference Presentations

- Teaching Color Sciences to EECS Students Using Interactive Tutorials
  Visual Data Analytics at EI 2023, Jan 2023, San Francisco, CA
- RTNN: Accelerating Neighbor Search Using Hardware Ray Tracing
  PPoPP 2022, April 2022, Virtual
- Tail Latency in Node.js: Energy Efficient Turbo Boosting for Long Latency Requests in Event-Driven Web Services
  VEE 2019, April 2019, Providence, RI

- Algorithm-SoC Co-design for Energy-Efficient Mobile Continuous Vision
  ISCA 2018, June 2018, Los Angeles, CA
- GreenWeb: Language Extensions for Energy-Efficient Mobile Web Computing
  PLDI 2016, June 2016, Santa Barbara, CA
- Energy and Power Measurement on Mobile Devices
  MobiTools co-located with ISCA 2016, June 2016, Seoul, Korea
- The Human Processing Unit (HPU) as a New Approximate Computing Substrate
  WAX 2016 co-located with ASPLOS 2016, April 2016, Atlanta, GA
- Scalable End-to-end Quality Control in Approximate Computing
  WAX 2016 co-located with ASPLOS 2016, April 2016, Atlanta, GA
- Microarchitectural Implications of Event-driven Server-side Web Applications
  MICRO 2015, December 2015, Waikiki, HI (lightening version)
- Exploiting Webpage Characteristics for Energy-Efficient Mobile Web Browsing
  Best of CAL 2014 presented at HPCA 2015, February 2015, San Francisco, CA
- Event-Based Scheduling for Energy-Efficient QoS (eQoS) in Mobile Web Applications
  HPCA 2015, February 2015, San Francisco, CA
- WebCore: Architectural Support for Mobile Web Browsing
  ISCA 2014, June 2014, Minneapolis, MN (lightening version)
- High-Performance and EnergyEfficient Mobile Web Browsing on Big/Little Systems
  HPCA 2013, February 2013, Shenzhen, China
- Hermes: An Integrated CPU/GPU Microarchitecture for IP Routing
  DAC 2011, June 2011, San Diego, CA

SOFTWARE

See the GitHub page of the Horizon Lab.

EXTERNAL SERVICE

Program Committee

- ISCA: 2023 (ERC), 2022 (ERC), 2020, 2019, 2017 (ERC)
- HPCA: 2022, 2019, 2018 (ERC)
- MICRO: 2022, 2021 (ERC), 2020 (ERC), 2019
- MICRO SRC: 2022
- SC: 2022
- IPDPS: 2023
- HPCI: 2022
- ECCV: 2022
- ICCV: 2021
- IEEE VR: 2023
- CVPR: 2022, 2021, 2020
- ICLR: 2022, 2021, 2020
- AAAI: 2022, 2021
- NeurIPS: 2022, 2021, 2020

- WACV: 2021
- ACCV: 2020
- ISLPED: 2021
- IISWC: 2021, 2019
- ISPASS: 2022, 2019
- IEEE Micro Top Picks: 2018
- HCOMP: 2016
- CGO-PPoPP Artifacts Evaluation: 2016, 2015
- TinyToCS Volume IV, III

Solicited Reviewer

- IROS (2023), IEEE TPAMI (2023), IEEE TCAD (2023), IEEE VR (2021), IEEE TCC (2022), IEEE ISMAR (2022), ACM TOCS (2022, 2019), ASPLOS (2021), IEEE TNNLS (2021, 2020), IEEE TSUSC (2020), ACM TWEB (2020), IEEE TC (2020, 2019), IEEE CAL (2022, 2021, 2020, 2018, 2017), IEEE TMC (2017), IEEE Micro (2022, 2020, 2019, 2018, 2017), ACM TACO (2019, 2018, 2016), IEEE ESL (2015), ACM TODAES (2011), ICS (2018), DAC (2012, 2011)

Workshop and Tutorial Organizations

- Workshop and Tutorial Co-Chair, IEEE/ACM International Symposium on Microarchitecture (MICRO), 2022
- Co-chair: Artifact Evaluation Committee, IEEE International Symposium on Workload Characterization (IISWC), 2022
- Co-organizer: RSS2: Workshop on Robustness and Safe Software 2.0 (RSS2) co-located with ASPLOS 2022, 2021
- Co-chair: International Workshop on Performance Analysis of Machine Learning Systems (FastPath) co-located with ISPASS 2021
- Organizer: Infrastructure and Methodology for SoC Performance and Power Modeling Tutorial co-loated with IISWC 2018, ASPLOS 2019, ISCA 2019
- Organizer: Cognitive Edge Computing Workshop co-located with MICRO 2017
- Co-chair: Sensors to Cloud Architectures Workshop co-located with HPCA 2017
- Web chair: Cognitive Edge Computing Workshop co-located with MICRO 2016
- Organizer: MobiTools Workshop co-located with ISCA 2016

DEPARTMENTAL SERVICE

- *PhD Admissions Committee*, 2022-2023, 2021-2022, 2020-2021, 2019-2020, 2018-2019
- *MS Admissions Committee*, 2021-2022
- *Undergraduate Curriculum Committee*, 2021-2022, 2020-2021, 2019-2020
- *Industrial Affiliates Exploration*, 2020-2021
- *Lab Committee*, 2018-2019
- *Colloquium Coordinator*, 2018-2019

OUTREACH ACTIVITIES

University of Rochester Upward Bound Math and Science (https://www.rochester.edu/college/kearnscenter/pre-college/trio-programs.html#math-science)

- Taught three-day workshop each summer to high-schoolers from the Vanguard Collegiate High School and Wilson High School
- Used Raspberry Pi as the platform to introduce programming to students, and incrementally built simple computer vision programs such as edge detectors.

Women in Engineering Program (WEP) (http://www.engr.utexas.edu/wep)

- Speaker at high school-focused summer camps at UT Austin with an emphasis on inspiring high school female about engineering (~75 high school senior women)
- Mentored two female sophomores in the Graduates Linked with Undergraduates in Engineering (GLUE) Program.

TEACHING EXPERIENCE

Instructor (University of Rochester)

- Spring 2023, CSC 252/452 *Computer Organization*
- Fall 2022, CSC 292/572 *Mobile Visual Computing*
- Fall 2022, CSC 412 *Introduction to Augmented and Virtual Reality* (co-instructor)
- Spring 2022, CSC 252/452 *Computer Organization*
- Fall 2021, CSC 292/572 *Mobile Visual Computing*
- Fall 2021, CSC 412 *Introduction to Augmented and Virtual Reality* (co-instructor)
- Spring 2021, CSC 414 *Selected Topics on Augmented and Virtual Reality* (co-instructor)
- Spring 2021, CSC 252/452 *Computer Organization*
- Fall 2020, CSC 292/572 *Mobile Visual Computing*
- Fall 2020, CSC 412 *Introduction to Augmented and Virtual Reality* (co-instructor)
- Spring 2020, CSC 252/452 *Computer Organization*
- Spring 2019, CSC 252/452 *Computer Organization*
- Fall 2018, CSC 292/572 *Mobile Systems Architecture*
- Spring 2018, CSC 252/452 *Computer Organization*

Teaching Assistant (UT Austin)

- Spring 2013, *Dynamic Compilation*, with Vijay Janapa Reddi
- Spring 2011, *Computer Architecture*, with Yale N. Patt
- Fall 2010, *Introduction to Embedded Systems*, with Jonathan W. Valvano

MENTORING

University of Rochester

Ph.D.:

- Yu Feng
- Yiming Gan
- Abhishek Tyagi
- Nisarg Ujjainkar

M.S.:

- Raj Rajwade

- Suumil Roy

Undergraduate:

- Ethan Chen
- Ethan Shahan
- Matan Kotler-Berkowitz
- Junhua Huang

Alumni:

- Shreyan Goswami (M.S. 2022)
- Zeyi Pan (M.S. 2021)
- Hanlin Gao (M.S. 2021)
- Yi Yang (M.S. 2021)
- Chi-chun Chen (M.S. 2019; now at Cray Inc.)
- Boyuan Tian (M.S. 2019; now at UIUC)
- Tianqi Yang (M.S. 2020; now at Amazon)
- Tiancheng Xu (M.S. 2020; now at Rice University)
- Christopher Bruinsma (Spring 2022)
- Jiayi He (Spring 2022)
- Jennifer Yu (Spring 2022)
- Meisen Hu (Summer 2022)
- Ruihan Xu (Summer 2022)
- Muhammad Qasim (Summer 2022)
- Shengyi Jia (Summer 2022)
- Nikhil Khanna (Summer 2022)
- Edmund Sepeku (B.S. 2022; Spring 2021)
- Kharissa King (Spring 2021)
- Elias Neuman-Donihue (B.S. 2022; Summer 2021–Spring 2022)
- Samuel Triest (B.S. 2020; now at CMU)
- Yawo Alphonse Siatitse (B.S. 2020; now at John Hopkins University)
- Qiuyue Sun (B.S. 2020; now at ByteDance)
- Sifan Ye (B.S. 2020; now at Stanford University)
- Weituo Kong (B.S. 2020; now at Brown University)
- Oliver Zhang (now at Univ. of Michigan)
- Noah Helterbrand (B.S. 2020)
- Tolga Furkan Aktas (B.S. 2020)
- Jessica Ervin (B.S. 2020)

Previously at UT Austin

- Hannah Peeler, Undergraduate student, 2016 (now at Arm Research)
- Janna Tulabot, Undergraduate student, 2016
- Matthew Halpern, Ph.D. student, 2013 - 2017 (now at Google)
- Wenzhi Cui, Ph.D. student, 2015 - 2017 (now at Google)

DISSERTATION COMMITTEE

Ph.D. Candidate

- David Lippman (Optics, proposed in 2021): *Freeform gradient-index optical design and metrology for reduced system size and weight*
- Uday Kumar Redd Vengalam (ECE, proposed in 2022)
- Irving Barron (ECE, proposed in 2022)

Ph.D.

- Sayak Chakraborti (CS, 2022): *Opportunistic Resource Management: Resource Utilization in Datacenters*
- Divya Ojha (CS, 2022): *Defending Against Microarchitectural Side Channel Leaks*
- Haichuan Yang (CS, 2020): *Sparse Learning for Model Optimization*
- Daniel Nikolov (Optics, 2020): *Software and Hardware Enabling the Next-Generation Near-Eye Displays*
- Kan Xu (ECE, 2020): *Power Delivery in High Current 3-D Systems*
- Hoda Sadat Ayatollahi Tabatabaei (ECE, 2018): *Energy Balancing in Wireless Networks with MIMO Communications*

M.S.

- Yiwen Fan (Optics, 2020): *Numerical Calculation of Zernike Polynomials and the Sample Selection Method of NURBS Spline Generation*

B.S.

- Sifan Ye (CS, 2020): *3D Reconstruction from Colored Point Clouds with Detail Transfer*
- Samuel Triest (CS, 2020): *Unsupervised Reinforcement Learning in Environments with Strong Priors*
- Benned Hedegaard (CS, 2022): *Sign-Informed Semantic Mapping for Language Interaction*
- Elias Neuman-Donihue (CS, 2022): *Fast Rendering of Massive Point Clouds*