# Yuhao Zhu


**CONTACT INFORMATION**

Assistant Professor, Computer Science
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**RESEARCH INTERESTS**

My research interests are computer architecture and software design to enable next-generation mobile systems that are energy-efficient, intelligent, and offer desirable end-user experience. To that end, my recent work has focused on domain-specific systems architecture for continuous vision, Virtual Reality, and Web technologies.

**EDUCATION**

**The University of Texas at Austin**
Ph.D., Electrical and Computer Engineering — *May 2017*
Advisor: Vijay Janapa Reddi
Dissertation: Energy-Efficient Mobile Web Computing

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

**HONORS & RECOGNITIONS**

- SIGARCH/TCCA Outstanding Dissertation Award, Honorable Mention, 2018
- Google Faculty Research Award, 2017
- Google Ph.D. Fellowship, 2016
- IEEE Micro Top Picks of Computer Architecture, Honorable Mention, 2016
- Qualcomm Innovation Fellowship Finalist, 2015
- Best of Computer Architecture Letters Award, 2014
- UT Austin Microelectronics and Computer Development Fellowship, 2011-2012
- Outstanding Undergraduate Thesis Award, Beihang University, 2010

**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

### Invited Articles

- 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.

### Journal Articles

- 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, 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 & Significant Workshop Papers

- Yue Leng, Chi-chun Chen, Qiuyue Sun, Jian Huang, Yuhao Zhu
  Semantic-Aware Virtual Reality Video Streaming
  *APSys 2017*
- Yuhao Zhu, Anand Samajdar, Matthew Mattina, Paul Whatmough
  Euphrates: Algorithm-SoC Co-Design for Low-Power Mobile Continuous Vision
  *ISCA 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 2016**

- 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*

## 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*

**ACADEMIC TALKS**

- **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
  *ISCA 2018*, June 2018, Los Angeles, CA
- **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
- 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)
  *Intel invited talk*, July 2014, Austin, TX
- High-Performance and EnergyEfficient Mobile Web Browsing on Big/Little Systems
  *HPCA 2013*, February 2013, Shenzhen, China
  *UT Austin Programming Language Lunch Seminar*, September 2012, Austin, TX
  *AMD Research Lab*, August 2012, Austin, TX
- Hermes: An Integrated CPU/GPU Microarchitecture for IP Routing
  *DAC 2011*, June 2011, San Diego, CA

**SOFTWARE ARTIFACTS**

**SCALE-Sim** (`https://github.com/ARM-software/SCALE-Sim`)
- Systolic CNN AcceLErator Simulator.

**GreenWeb** (`https://codereview.chromium.org/1835303002/`)

- Language and runtime for energy-efficient mobile Web.

**AutoGreen** (https://github.com/yuhao/AutoGreen)
- Framework to annotate Web applications with GreenWeb language extensions.

**Node Benchmark** (https://github.com/nodebenchmark/benchmarks)
- Node.js-based event-driven server workload suite.

**Domino.js** (https://github.com/yuhao/domino.js)
- DOM instrumentation and optimization framework.

## SERVICES

**Program Committee**
- ISPASS 2019: Program Committee
- IEEE Micro Top Picks 2018: Program Committee
- HPCA 2019: Program Committee
- HPCA 2018: External Reviewer Committee
- ISCA 2017: External Reviewer Committee
- HCOMP 2016: Program Committee
- CGO-PPoPP 2015, 2016: Artifacts Evaluation Committee
- TinyToCS Volume III: Program Committee

**Organizing Committee**
- Co-organizer: Cognitive Edge Computing Workshop co-loated with MICRO 2017
- Co-chair: Sensors to Cloud Architectures Workshop co-located with HPCA 2017
- Web chair: Cognitive Edge Computing Workshop co-loated with MICRO 2016
- Co-organizer: MobiTools Workshop co-located with ISCA 2016
- Program Chair: TinyToCS Volume IV

**Solicited Reviewer**
- ICS (2018), IEEE CAL (2018), IEEE TMC (2017), IEEE Micro (2018, 2017), ACM TACO (2016), IEEE ESL (2015), DAC (2012, 2011), ACM TODAES (2011)

## OUTREACH ACTIVITIES

**University of Rochester Upward Bound Math and Science** (https://www.rochester.edu/college/kearnscenter/pre-college/trio-programs.html#math-science)
- Taught a three-day workshop 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 2018, Computer Organization

## Teaching Assistant (UT Austin)

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

**MENTORING**

## University of Rochester

**Ph.D.**:

- Yu Feng (MS: Carnegie Mellon Univ.)
- Yiming Gan (MS: UC Santa Babara)

**MS**:

- Chi-chun Chen (BS: National Taiwan Univ.)

**Undergraduate**:

- Prikshet Sharma
- Qiuyue Sun

**Alumni**:

- **Undergraduate**: Oliver Zhang (now at Univ. of Michigan)
- **Undergraduate**: Noah Helterbrand
- **Undergraduate**: Tolga Furkan Aktas

## Previously at UT Austin

- Hannah Peeler, Undergraduate student, 2016
- Janna Tulabot, Undergraduate student, 2016
- Matthew Halpern, Ph.D. student, 2013 - 2017
- Wenzhi Cui, Ph.D. student, 2015 - 2017