Henry (Hank) Hoffmann

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RESEARCH INTERESTS

Deploying a computer system requires engineers to meet multiple—often competing—goals; e.g., high performance and low energy consumption. This creates a great burden on designers who must be experts in both their application domain and in the myriad system issues that affect high-level goals like power, energy, reliability, performance, and more. To alleviate this burden, I have created **self-aware** computing systems that understand these high-level goals and automatically adapt their behavior to meet those goals optimally. This is interdisciplinary work has created new techniques for using **learning** and **control theory** to build computer systems that provide formal guarantees that they will be meet their goals in complex, dynamic environments. While I publish in a wide range of computing venues, the underlying thread of my work has a unifying thesis: **all computer systems are improved when made self-aware so that they dynamically adapt to their goals using a combination of machine learning and control theory.**

Recently, I have turned my focus to using these techniques to **control machine learning and AI**. In other words, I am now building learning systems which dynamically adapt their internal structure and resource usage to meet accuracy, energy, performance, and (most recently) security goals at inference time.

ACADEMIC APPOINTMENTS

Associate Professor	July 2018 to present
Assistant Professor	January 2013 to July 2018

Department of Computer Science,
University of Chicago

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA USA

Ph.D., Electrical Engineering and Computer Science, February 2013

- Thesis: *SEEC: A framework for Self-Aware Computing*
- Co-Advisors: Edwin Sibley Webster Professor Srinivas Devadas and Professor Anant Agarwal

S.M., Electrical Engineering and Computer Science, June 2003

- Thesis: *Stream Algorithms and Architecture*
- Adviser: Professor Anant Agarwal

University of North Carolina at Chapel Hill

B.S. with Highest Honors and Highest Distinction,
Mathematical Sciences, May 1999

- Presidential Early Career Award for Scientists and Engineers (**PECASE**) 2019
- FSE **Test of Time 2021 Honorable Mention** for "Managing performance vs. accuracy trade-offs with loop perforation" from FSE 2011
- Member of the (informal) **ASPLOS Hall of Fame**
- **IEEE Micro Top Picks Honorable Mention** for ISCA 2021 paper: "Exploiting Long-Distance Interactions and Tolerating Atom Loss in Neutral Atom Quantum Architectures"
- **IEEE Micro Top Picks Honorable Mention** for ASPLOS 2018 paper: CALOREE: Learning Control for Learning Control for Predictable Latency and Low Energy
- RTAS 2021 **Outstanding Paper Award**
- **Best Paper and Best Student Paper Nomination** at Supercomputing 2019 for "PoDD: power-capping dependent distributed applications"
- **Karsten Schwann Best Paper Award** at ICAC 2019 for "CoPPer: Soft Real-Time Application Performance Using Hardware Power Capping"
- Granted **Early Tenure** by University of Chicago 2018
- **Best Artifact** SEAMS 2017
- **DOE Early Career** Research Program 2015.
- **Best Paper Award** at the Embedded Operating Systems Workshop 2014
- Work on Self-aware computing named one of ten **"World Changing Ideas"** by Scientific American (Dec., 2011)
- Implementation of BDTI Wireless Communication Benchmark (OFDM) on Tilera TILEPro64 achieved **highest performance on a programmable processor** (as of 01/2023)
- **Best Paper Award** HPEC 2005
- Appointed **MIT Lincoln Laboratory Doctoral Scholar** (Declined appointment)
- Appointed **MIT Lincoln Laboratory Masters Scholar**
- **Phi Beta Kappa**
- **Pi Mu Epsilon**
- **B.S. with Highest Honors and Highest Distinction**

Key
Publications:
Self-aware
Computing
See below for full publication list

Applying Control Theory to Manage Computer System Dynamics:

- Shu Wang, Henry Hoffmann, and Shan Lu. Agilectrl: A self-adaptive framework for configuration tuning. In *The 30th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering* **ESEC/FSE**, 2022
- Shu Wang, Chi Li, William Sentosa, Henry Hoffmann, and Shan Lu. Understanding and Auto-Adjusting Performance-Sensitive Configurations. In *Proceedings of the Twenty-third International Conference on Architectural Support for Programming Languages and Operating Systems,* **ASPLOS**, 2018
- Martina Maggio, Alessandro Vittorio Papadopoulos, Antonio Filieri, and Henry Hoffmann. Automated control of multiple software goals using multiple actuators. In *Symposium on the Foundations of Software Engi-*

neering **FSE**, 2017

- Antonio Filieri, Henry Hoffmann, and Martina Maggio. Automated Design of Self-adaptive Software with Control-theoretical Formal Guarantees. In *36th International Conference on Software Engineering,* **ICSE**, 2014

- Henry Hoffmann, Stelios Sidiroglou, Michael Carbin, Sasa Misailovic, Anant Agarwal, and Martin C. Rinard. Dynamic Knobs for Responsive Power-aware Computing. In *Proceedings of the 16th International Conference on Architectural Support for Programming Languages and Operating Systems,* **ASPLOS**, 2011

Applying Machine Learning to Manage Computer System Complexity:

- Yi Ding, Avinash Rao, Hyebin Song, Rebecca Willett, and Henry Hoffmann. NURD: negative-unlabeled learning for online datacenter straggler prediction. In *The Proceedings of the Conference on Machine Learning and Systems* **MLSys**, 2022

- Mingzhe Hao, Levent Toksoz, Nanqinqin Li, Edward Edberg Halim, Henry Hoffmann, and Haryadi S. Gunawi. LinnOS: Predictability on unpredictable flash storage with a light neural network. In *14th USENIX Symposium on Operating Systems Design and Implementation,* **OSDI**, 2020

- Yi Ding, Nikita Mishra, and Henry Hoffmann. Generative and multiphase learning for computer systems optimization. In *International Symposium on Computer Architecture,* **ISCA**, 2019

- Huazhe Zhang and Henry Hoffmann. Maximizing Performance Under a Power Cap: A Comparison of Hardware, Software, and Hybrid Techniques. In *Proceedings of the Twenty-first International Conference on Architectural Support for Programming Languages and Operating Systems,* **ASPLOS**, 2016

- Nikita Mishra, Huazhe Zhang, John D. Lafferty, and Henry Hoffmann. A Probabilistic Graphical Model-based Approach for Minimizing Energy Under Performance Constraints. In *Proceedings of the Twentieth International Conference on Architectural Support for Programming Languages and Operating Systems,* **ASPLOS**, 2015

- *Combining Control and Learning for Managing Complex, Dynamic Systems:*

  - Ahsan Pervaiz, Yao Hsiang Yang, Adam Duracz, Ferenc Bartha, Ryuichi Sai, Connor Imes, Robert Cartwright, Krishna Palem, Shan Lu, and Henry Hoffmann. GOAL: Supporting general and dynamic adaptation in computing systems. In *Proceedings of the ACM SIGPLAN International Symposium on New Ideas, New Paradigms, and Reflections on Programming and Software* **Onward!**, 2022

  - Nikita Mishra, Connor Imes, John D. Lafferty, and Henry Hoffmann. CALOREE: Learning Control for Predictable Latency and Low Energy. In *Proceedings of the Twenty-third International Conference on Architectural Support for Programming Languages and Operating Systems,* **ASPLOS**, 2018

- Muhammed Husni Santriaji and Henry Hoffmann. GRAPE: Minimizing Energy for Interactive GPU Applications. In *49th Annual IEEE/ACM International Symposium on Microarchitecture* **MICRO**, 2016
- Yanqi Zhou, Henry Hoffmann, and David Wentzlaff. CASH: Supporting IaaS Customers with a Sub-core Configurable Architecture. In *Proceedings of the Twenty-first International Symposium on Computer Architecture,* **ISCA**, 2016
- Henry Hoffmann. JouleGuard: Energy Guarantees for Approximate Applications. In *Proceedings of the 25th Symposium on Operating Systems Principles,* **SOSP**, 2015

KEY
PUBLICATIONS:
CONTROLLING
MACHINE
LEARNING AND
AI
SEE BELOW FOR FULL
PUBLICATION LIST

- Tejas Kannan and Henry Hoffmann. Protecting adaptive sampling from information leakage on low-power sensors. In *27th ACM International Conference on Architectural Support for Programming Languages and Operating Systems, Lausanne,* **ASPLOS**, 2022
- Yuliana Zamora, Logan Ward, Ganesh Sivaraman, Ian Foster, and Henry Hoffmann. Proxima: Accelerating the Integration of Machine Learning in Atomistic Simulations. In *International Conference on Supercomputing* **ICS**, 2021
- Tejas Kannan and Henry Hoffmann. Budget RNNs: Multi-Capacity Neural Networks to Improve In-Sensor Inference under Energy Budgets. In *27th IEEE Real-Time and Embedded Technology and Applications Symposium,* **RTAS**, 2021
- Chengcheng Wan, Henry Hoffmann, Shan Lu, and Michael Maire. Orthogonalized SGD and nested architectures for anytime neural networks. In *Proceedings of the 37th International Conference on Machine Learning,* **ICML**, 2020
- Chengcheng Wan, Muhammad Husni Santriaji, Eri Rogers, Henry Hoffmann, Michael Maire, and Shan Lu. ALERT: accurate learning for energy and timeliness. In Ada Gavrilovska and Erez Zadok, editors, *USENIX Annual Technical Conference,* **USENIX ATC**, 2020
- Kuntai Du, Ahsan Pervaiz, Xin Yuan, Aakanksha Chowdhery, Qizheng Zhang, Henry Hoffmann, and Junchen Jiang. Server-driven video streaming for deep learning inference. In Henning Schulzrinne and Vishal Misra, editors, *Proceedings of the ACM Special Interest Group on Data Communication on the applications* **SIGCOMM**, 2020

GRANTS

Total Funding for which I am/was PI or co-PI: **$19,523,901** (counts only funds for University of Chicago, not partner institutions or subcontracts).

- *UpDown Computer: Intelligent Data Movement and Encoding for Graph Computing*
  - IARPA
  - Investigators: Andrew Chien (PI), Henry Hoffmann, Yanjing Li, Michael Maire, David Gleich (Purdue), and Tactical Computing Labs
  - Period: 2022–2025
  - Amount: $5,755,376 (for Chicago)

- *Collaborative Research: PPoSS: LARGE: ScaleStuds: Foundations for Correctness Checkability and Performance Predictability of Systems at Scale*
  - National Science Foundation
  - Investigators: Haryadi Gunawi (PI), Shan Lu, and Henry Hoffmann (University of Chicago) and others
  - Period: 2021–2026
  - Amount: $3,125,000

- *Towards a Goal-oriented, Adaptive Array of Sensors*
  - Army Research Office
  - Investigators: Henry Hoffmann (PI) and Heather Zheng
  - Period: 2021–2023
  - Amount: $1,000,000

- *CNS-1764039, CNS: Medium: Accurate Anytime Learning for Energy and Timeliness in Software Systems*
  - National Science Foundation
  - Investigators: Shan Lu, Michael Maire, and Henry Hoffmann (University of Chicago)
  - Period: 2020–2024
  - Amount: $1,200,000

- *PPoSS: Planning: CP2: Towards Systems Correctness Checkability and Performance Predictability at Scale*
  - National Science Foundation
  - Investigators: Haryadi Gunawi, Shan Lu, and Henry Hoffmann (University of Chicago)
  - Period: 2020–2021
  - Amount: $247,993

- *Towards a Goal-Oriented, Adaptive Array of Things*
  - Army Research Office
  - Investigators: Henry Hoffmann (University of Chicago)
  - Period: 2019–2023
  - Amount: $1,550,002

- *CNS-1764039, CNS: Medium: Understanding and Automatically Adjusting Performance Sensitive Software Configurations*
  - National Science Foundation
  - Investigators: Henry Hoffmann and Shan Lu (University of Chicago)
  - Period: 2018–2022
  - Amount: $1,149,113

- *CCF-1822949, SPX: Collaborative Research: Rethinking Data Center Abstractions Utilizing Warehouse-Scale Shared Memory*
  - National Science Foundation
  - Investigators: Henry Hoffmann (University of Chicago) and David Wentzlaff (Princeton University)

- Period: 2018–2017
- Amount: $500,000 (for University of Chicago)

- *Controlling Tunable Parameters in the HMP Scheduler*
  - Huawei
  - Investigators: Henry Hoffmann (University of Chicago)
  - Period: 2017
  - Amount: $50,000 (for University of Chicago)

- *Proteus: Controlling Resource-Adaptive Embedded Software*
  - DARPA
  - Investigators: Krishna Palem (Rice), Henry Hoffmann (University of Chicago), and others
  - Period: 2015–2018
  - Amount: $1,645,000 (for University of Chicago)

- *EAGER: HAWKEYE: A Cross-Layer Resilient Architecture to Tradeoff Program Accuracy and Resilience Overheads*
  - NSF
  - Investigators: Omer Khan (UConn) and Henry Hoffmann (University of Chicago)
  - Period: 2015–2016
  - Amount: $150,000 (for University of Chicago)

- *CNS-1526304, CSR: Small: BreezeFS: File System Transformation for Cloud and Multistore Era*
  - National Science Foundation
  - Investigators: Haryadi Gunawi and Henry Hoffmann (University of Chicago)
  - Period: 2015–2017
  - Amount: $498,013

- *DOE-0000217037, Early Career Research Program: CALORIE: A Constraint Language and Optimizing Runtime for Exascale Power Management*
  - Department of Energy
  - Investigator: Henry Hoffmann (University of Chicago)
  - Period: 2015–2019
  - Amount: $758,230

- *DOE-1439156, Argo: An Exascale Operating System and Runtime*
  - Department of Energy
  - Investigators: Pete Beckman (Argonne National Laboratory), Henry Hoffmann (University of Chicago), and others
  - Period: 2013–2016
  - Amount: $368,518 (for University of Chicago)

- *CCF-1439156, XPS: FULL: CCA: Collaborative Research: CASH: Cost-aware Adaptation of Software and Hardware*
  - National Science Foundation

- Investigators: David Wentzlaff (Princeton), Henry Hoffmann (University of Chicago)
- Period: 2014–2017
- Amount: $300,000 (for University of Chicago)

- *CNS-1405959, II-New: RIVER: A Research Infrastructure to explore Volatility, Energy-efficiency, and Resilience*

  - National Science Foundation
  - Investigators: Andrew A. Chien, Haryadi Gunawi, Henry Hoffmann, and others
  - Period: 2014–2016
  - Amount: $997,432

- *DARPA-5710003441, Carbon: Embedded Organic Computing*

  - Defense Advanced Research Projects Administration
  - Investigators: Srinivas Devadas (MIT), Henry Hoffmann, and others
  - Period: 2012–2015
  - Amount: $199,224 (for University of Chicago)

CONFERENCE
& SELECTED
WORKSHOP
PUBLICATIONS

2023
- Gokul Subramanian Ravi, Kaitlin N. Smith, Jonathan M. Baker, Tejas Kannan, Nathan Earnest, Ali Javadi-Abhari, Henry Hoffmann, and Frederic T. Chong. Navigating the dynamic noise landscape of variational quantum algorithms with QISMET. In *Proceedings of the 28th ACM International Conference on Architectural Support for Programming Languages and Operating Systems* **ASPLOS**, 2023
- Gokul Subramanian Ravi, Pranav Gokhale, Yi Ding, William M. Kirby, Kaitlin N. Smith, Jonathan M. Baker, Peter J. Love, Henry Hoffmann, Kenneth R. Brown, and Frederic T. Chong. CAFQA: clifford ansatz for quantum accuracy. In *Proceedings of the 28th ACM International Conference on Architectural Support for Programming Languages and Operating Systems* **ASPLOS**, 2023

2022
- Tejas Kannan and Henry Hoffmann. Protecting adaptive sampling from information leakage on low-power sensors. In *27th ACM International Conference on Architectural Support for Programming Languages and Operating Systems, Lausanne,* **ASPLOS**, 2022
- Shu Wang, Henry Hoffmann, and Shan Lu. Agilectrl: A self-adaptive framework for configuration tuning. In *The 30th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering* **ESEC/FSE**, 2022
- Yi Ding, Avinash Rao, Hyebin Song, Rebecca Willett, and Henry Hoffmann. NURD: negative-unlabeled learning for online datacenter straggler predic-

tion. In *The Proceedings of the Conference on Machine Learning and Systems* **MLSys**, 2022

- Chengcheng Wan, Shicheng Liu, Sophie Xie, Yifan Liu, Henry Hoffmann, Michael Maire, and Shan Lu. Automated testing of software that uses machine learning apis. In *44th International Conference on Software Engineering,* **ICSE**, 2022
- Ahsan Pervaiz, Yao Hsiang Yang, Adam Duracz, Ferenc Bartha, Ryuichi Sai, Connor Imes, Robert Cartwright, Krishna Palem, Shan Lu, and Henry Hoffmann. GOAL: Supporting general and dynamic adaptation in computing systems. In *Proceedings of the ACM SIGPLAN International Symposium on New Ideas, New Paradigms, and Reflections on Programming and Software* **Onward!**, 2022
- Tapan Srivastava, Huazhe Zhang, and Henry Hoffmann. Penelope: Peer-to-peer power management. In *the 51st International Conference on Parallel Processing* **ICPP**, 2022
- Mingqing Zhang, Philip Parsch, Henry Hoffmann, and Alejandro Masrur. Analyzing can's timing under periodically authenticated encryption. In *Design, Automation & Test in Europe Conference & Exhibition* **DATE**, 2022

2021
- Jonathan M. Baker, Andrew Litteken, Casey Duckering, Henry Hoffmann, Hannes Bernien, and Fred Chong. Exploiting long-distance interactions and tolerating atom loss in neutral atom quantum architectures. In *International Symposium on Computer Architecture,* **ISCA**, 2021
- Chengcheng Wan, Shicheng Liu, Henry Hoffmann, Michael Maire, and Shan Lu. Are Machine Learning Cloud APIs Used Correctly? In *International Conference on Software Engineering,* **ICSE**, 2021
- Yuliana Zamora, Logan Ward, Ganesh Sivaraman, Ian Foster, and Henry Hoffmann. Proxima: Accelerating the Integration of Machine Learning in Atomistic Simulations. In *International Conference on Supercomputing* **ICS**, 2021
- Tejas Kannan and Henry Hoffmann. Budget RNNs: Multi-Capacity Neural Networks to Improve In-Sensor Inference under Energy Budgets. In *27th IEEE Real-Time and Embedded Technology and Applications Symposium,* **RTAS**, 2021
- Yi Ding, Ahsan Pervaiz, Michael Carbin, and Henry Hoffmann. Generalizable and interpretable learning for configuration extrapolation. In *29th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering,* **FSE**, 2021
- Sophie Welber, Valerie Zhao, Claire Dolin, Olivia Morkved, Henry Hoffmann, and Blase Ur. Do users have contextual preferencesfor smartphone power management? In Judith Masthoff, Eelco Herder, Nava Tintarev, and Marko Tkalcic, editors, *Proceedings of the 29th ACM Conference on User Modeling, Adaptation and Personalization,* **UMAP**, 2021

2020
- Chengcheng Wan, Henry Hoffmann, Shan Lu, and Michael Maire. Orthogonalized SGD and nested architectures for anytime neural networks. In *Proceedings of the 37th International Conference on Machine Learning,* **ICML**, 2020

- Mingzhe Hao, Levent Toksoz, Nanqinqin Li, Edward Edberg Halim, Henry Hoffmann, and Haryadi S. Gunawi. LinnOS: Predictability on unpredictable flash storage with a light neural network. In *14th USENIX Symposium on Operating Systems Design and Implementation,* **OSDI**, 2020

- Chengcheng Wan, Muhammad Husni Santriaji, Eri Rogers, Henry Hoffmann, Michael Maire, and Shan Lu. ALERT: accurate learning for energy and timeliness. In Ada Gavrilovska and Erez Zadok, editors, *USENIX Annual Technical Conference,* **USENIX ATC**, 2020

- Chi Li, Shu Wang, Henry Hoffmann, and Shan Lu. Statically inferring performance properties of software configurations. In *Fifteenth EuroSys Conference,* **Eurosys**, 2020

- Kuntai Du, Ahsan Pervaiz, Xin Yuan, Aakanksha Chowdhery, Qizheng Zhang, Henry Hoffmann, and Junchen Jiang. Server-driven video streaming for deep learning inference. In Henning Schulzrinne and Vishal Misra, editors, *Proceedings of the ACM Special Interest Group on Data Communication on the applications* **SIGCOMM**, 2020

- Ardhi Wiratama Baskara Yudha, Reza Pulungan, Henry Hoffmann, and Yan Solihin. A simple cache coherence scheme for integrated CPU-GPU systems. In *57th ACM/IEEE Design Automation Conference,* **DAC**, 2020

- Ivana Marincic and Hank Hoffmann Venkat Vishwanath. Providing Fairness in Heterogeneous Multicores with a Predictive, Adaptive Scheduler. In *34th IEEE International Parallel and Distributed Processing Symposium,* **IPDPS**, 2020

2019

- Huazhe Zhang and Henry Hoffmann. PoDD: Power-capping dependent distributed applications. In *The International Conference for High Performance Computing, Networking, Storage, and Analysis,* **Supercomputing**, 2019

- Yi Ding, Nikita Mishra, and Henry Hoffmann. Generative and multi-phase learning for computer systems optimization. In *International Symposium on Computer Architecture,* **ISCA**, 2019

- Connor Imes, Huazhe Zhang, Kevin Zhao, and Henry Hoffmann. Copper: Soft real-time application performance using hardware power capping. In *16th International Conference on Autonomic Computing,* **ICAC**, 2019

- Pranav Gokhale, Yongshan Ding, Thomas Propson, Christopher Winkler, Nelson Leung, Yunong Shi, David I. Schuster, Henry Hoffmann, and Frederic T. Chong. Partial compilation of variational algorithms for noisy intermediate-scale quantum machines. In *52nd Annual IEEE/ACM International Symposium on Microarchitecture,* **MICRO**, 2019

- Yunong Shi, Nelson Leung, Pranav Gokhale, Zane Rossi, David I. Schuster, Henry Hoffmann, and Frederic T. Chong. Optimized compilation of aggregated instructions for realistic quantum computers. In *Proceedings of the Twenty-fourth International Conference on Architectural Support for Programming Languages and Operating Systems,* **ASPLOS**, 2019

2018

- Nikita Mishra, Connor Imes, John D. Lafferty, and Henry Hoffmann. CALOREE: Learning Control for Predictable Latency and Low Energy. In *Proceedings of the Twenty-third International Conference on Architectural Support for Programming Languages and Operating Systems,* **ASPLOS**, 2018

- Bernard Dickens III, Ariel J. Feldman, Haryadi Gunawi, and Henry Hoffmann. StrongBox: Confidentiality, Integrity, and Performance using Stream Ciphers for Full Drive Encryption. In *Proceedings of the Twenty-third International Conference on Architectural Support for Programming Languages and Operating Systems,* **ASPLOS**, 2018

- Shu Wang, Chi Li, William Sentosa, Henry Hoffmann, and Shan Lu. Understanding and Auto-Adjusting Performance-Sensitive Configurations. In *Proceedings of the Twenty-third International Conference on Architectural Support for Programming Languages and Operating Systems,* **ASPLOS**, 2018

- Muhammed Husni Santriaji and Henry Hoffmann. MERLOT: Architectural Support for Energy-Efficient Real-time Processing in GPUs. In *24th IEEE Real-Time and Embedded Technology and Applications Symposium,* **RTAS**, 2018

- Nikita Mishra, Connor Imes, Henry Hoffmann, and John D. Lafferty. Controlling ai engines in dynamic environments. In *1st Annual Conference on the Intersection of Systems and Machine Learning,* **SysML**, 2018

- Gökalp Demirci, Henry Hoffmann, and David H. K. Kim. Approximation algorithms for scheduling with resource and precedence constraints. In *35th International Symposium on Theoretical Aspects of Computer Science,* ***STACS***, 2018

- Zhixuan Zhou and Henry Hoffmann. GraphZ: Improving the Performance of Large-Scale Graph Analytics on Small-Scale Machines. In *34th IEEE International Conference on Data Engineering* ***ICDE***, 2018

- Gökalp Demirci, Ivana Marincic, and Henry Hoffmann. A divide and conquer algorithm for dag scheduling under power constraints. In *The International Conference for High Performance Computing, Networking, Storage, and Analysis,* **Supercomputing**, 2018

- Connor Imes, Steven A. Hofmeyr, and Henry Hoffmann. Energy-efficient application resource scheduling using machine learning classifiers. In *Proceedings of the International Conference on Parallel Processing,* **ICPP**, 2018

- Huazhe Zhang and Henry Hoffmann. Performance & energy tradeoffs for dependent distributed applications under system-wide power caps. In *Proceedings of the International Conference on Parallel Processing,* **ICPP**, 2018

- Muhammad Husni Santriaji and Henry Hoffmann. Formalin: Architectural support for power & performance aware GPU. In *IEEE Conference on Control Technology and Applications,* **CCTA**, 2018

2017
- Zhaoxia Deng, Lunkai Zhang, Nikita Mishra, Henry Hoffmann, and Fred Chong. Memory cocktail therapy: A general learning-based framework to optimize dynamic tradeoffs in nvms. In *50th Annual IEEE/ACM International Symposium on Microarchitecture,* **MICRO**, 2017

- Martina Maggio, Alessandro Vittorio Papadopoulos, Antonio Filieri, and Henry Hoffmann. Automated control of multiple software goals using multiple actuators. In *Symposium on the Foundations of Software Engineering* **FSE**, 2017

- Nikita Mishra, John D. Lafferty, and Henry Hoffmann. ESP: A machine learning approach to predicting application interference. In *14th International Conference on Autonomic Computing,* **ICAC**, 2017

- Martina Maggio, Alessandro Vittorio Papadopoulos, Antonio Filieri, and Henry Hoffmann. Self-adaptive video encoder: Comparison of multiple adaptation strategies made simple. In *12th IEEE/ACM International Symposium on Software Engineering for Adaptive and Self-Managing Systems,* **SEAMS**, 2017
- Ivana Marincic, Venkatram Vishwanath, and Henry Hoffmann. Polimer: An energy monitoring and power limiting interface for HPC applications. In *Proceedings of the 5th International Workshop on Energy Efficient Supercomputing,* **E2SC@SC**, 2017

2016

- Huazhe Zhang and Henry Hoffmann. Maximizing Performance Under a Power Cap: A Comparison of Hardware, Software, and Hybrid Techniques. In *Proceedings of the Twenty-first International Conference on Architectural Support for Programming Languages and Operating Systems,* **ASPLOS**, 2016
- Yanqi Zhou, Henry Hoffmann, and David Wentzlaff. CASH: Supporting IaaS Customers with a Sub-core Configurable Architecture. In *Proceedings of the Twenty-first International Symposium on Computer Architecture,* **ISCA**, 2016
- Anne Farrell and Henry Hoffmann. Meantime: Achieving both minimal energy and timeliness with approximate computing. In *USENIX Annual Technical Conference,* **USENIX ATC**, 2016
- Muhammed Husni Santriaji and Henry Hoffmann. GRAPE: Minimizing Energy for Interactive GPU Applications. In *49th Annual IEEE/ACM International Symposium on Microarchitecture* **MICRO**, 2016
- Connor Imes, Lars Bergstrom, and Henry Hoffmann. A portable interface for runtime energy monitoring. In *Symposium on the Foundations of Software Engineering* **FSE**, 2016
- Mischa Möstl, Johannes Schlatow, Rolf Ernst, Henry Hoffmann, Arif Merchant, and Alexander Shraer. Self-aware systems for the internet-of-things. In *Proceedings of the Eleventh IEEE/ACM/IFIP International Conference on Hardware/Software Codesign and System Synthesis,* **CODES**, 2016
- Connor Imes and Henry Hoffmann. Bard: A unified framework for managing soft timing and power constraints. In *International Conference on Embedded Computer Systems: Architectures, Modeling and Simulation,* **SAMOS**, 2016
- Connor Imes, David H. K. Kim, Martina Maggio, and Henry Hoffmann. Portable multicore resource management for applications with performance constraints. In *10th IEEE International Symposium on Embedded Multicore/Manycore Systems-on-Chip,* **MCSOC**, 2016
- Saeid Barati and Hank Hoffmann. Providing Fairness in Heterogeneous Multicores with a Predictive, Adaptive Scheduler. In *International Parallel and Distributed Processing Symposium Workshops,* **IPDPS Workshops**, 2016
- Daniel A. Ellsworth, Tapasya Patki, Swann Perarnau, Sangmin Seo, Abdelhalim Amer, Judicael A. Zounmevo, Rinku Gupta, Kazutomo Yoshii, Henry Hoffmann, Allen D. Malony, Martin Schulz, and Peter H. Beckman. Systemwide Power Management with Argo. In *International Parallel and Distributed Processing Symposium Workshops* **IPDPS Workshops**, 2016

2015
- Henry Hoffmann. JouleGuard: Energy Guarantees for Approximate Applications. In *Proceedings of the 25th Symposium on Operating Systems Principles,* **SOSP**, 2015
- Nikita Mishra, Huazhe Zhang, John D. Lafferty, and Henry Hoffmann. A Probabilistic Graphical Model-based Approach for Minimizing Energy Under Performance Constraints. In *Proceedings of the Twentieth International Conference on Architectural Support for Programming Languages and Operating Systems,* **ASPLOS**, 2015
- Connor Imes, David H. K. Kim, Martina Maggio, and Henry Hoffmann. POET: A Portable Approach to Minimizing Energy Under Soft Real-time Constraints. In *21st IEEE Real-Time and Embedded Technology and Applications Symposium,* **RTAS**, 2015
- Antonio Filieri, Henry Hoffmann, and Martina Maggio. Automated multi-objective control for self-adaptive software design. In *Proceedings of the 2015 10th Joint Meeting on Foundations of Software Engineering,* **ESEC/FSE**, 2015
- Antonio Filieri, Martina Maggio, Konstantinos Angelopoulos, Nicolás D'Ippolito, Ilias Gerostathopoulos, Andreas B. Hempel, Henry Hoffmann, Pooyan Jamshidi, Evangelia Kalyvianaki, Cristian Klein, Filip Krikava, Sasa Misailovic, Alessandro Vittorio Papadopoulos, Suprio Ray, Amir Molzam Sharifloo, Stepan Shevtsov, Mateusz Ujma, and Thomas Vogel. Software engineering meets control theory. In *10th IEEE/ACM International Symposium on Software Engineering for Adaptive and Self-Managing Systems,* **SEAMS**, 2015
- David H. K. Kim, Connor Imes, and Henry Hoffmann. Racing and pacing to idle: Theoretical and empirical analysis of energy optimization heuristics. In *2015 IEEE 3rd International Conference on Cyber-Physical Systems, Networks, and Applications,* **CPSNA**, 2015
- Gushu Li, Xiaoming Chen, Guangyu Sun, Henry Hoffmann, Yongpan Liu, Yu Wang, and Huazhong Yang. A stt-ram-based low-power hybrid register file for gpgpus. In *Proceedings of the 52nd Annual Design Automation Conference* **DAC**, 2015
- Swann Perarnau, Rajeev Thakur, Kamil Iskra, Ken Raffenetti, Franck Cappello, Rinku Gupta, Peter H. Beckman, Marc Snir, Henry Hoffmann, Martin Schulz, and Barry Rountree. Distributed monitoring and management of exascale systems in the argo project. In *Distributed Applications and Interoperable Systems - 15th IFIP WG 6.1 International Conference,* **DAIS**, 2015
- Tung Thanh Hoang, Amirali Shambayati, Henry Hoffmann, and Andrew A. Chien. Does arithmetic logic dominate data movement? a systematic comparison of energy-efficiency for FFT accelerators. In *26th IEEE International Conference on Application-specific Systems, Architectures and Processors,* **ASAP**, 2015

2014
- Antonio Filieri, Henry Hoffmann, and Martina Maggio. Automated Design of Self-adaptive Software with Control-theoretical Formal Guarantees. In *36th International Conference on Software Engineering,* **ICSE**, 2014
- Henry Hoffmann. Coadapt: Predictable behavior for accuracy-aware applications running on power-aware systems. In *26th Euromicro Conference on*

Real-Time Systems, **ECRTS**, 2014

- Yildiz Sinangil, Sabrina M Neuman, Mahmut E Sinangil, Nathan Ickes, Glauber Bezerra, Eric Lau, Jason E Miller, Henry C Hoffmann, Srinivas Devadas, and Anantha P Chandraksan. A self-aware processor soc using energy monitors integrated into power converters for self-adaptation. In **VLSI** *Circuits Digest of Technical Papers, 2014 Symposium on.* IEEE, 2014

- Henry Hoffmann and Martina Maggio. PCP: A generalized approach to optimizing performance under power constraints through resource management. In *11th International Conference on Autonomic Computing,* **ICAC**, 2014

- Tung Thanh Hoang, Amirali Shambayati, Calvin Deutschbein, Henry Hoffmann, and Andrew A. Chien. Performance and energy limits of a processor-integrated FFT accelerator. In *IEEE High Performance Extreme Computing Conference,* **HPEC**, 2014

- Waqar Hussain, Roberto Airoldi, Henry Hoffmann, Tapani Ahonen, and Jari Nurmi. Design of an accelerator-rich architecture by integrating multiple heterogeneous coarse grain reconfigurable arrays over a network-on-chip. In *IEEE 25th International Conference on Application-Specific Systems, Architectures and Processors,* **ASAP**, 2014

- Connor Imes and Henry Hoffmann. Minimizing energy under performance constraints on embedded platforms. In *Proceedings of the Embed With Linux 2014 Workshop,* **EWiLi**, 2014

- Waqar Hussain, Henry Hoffmann, Tapani Ahonen, and Jari Nurmi. Constraint-driven frequency scaling in a coarse grain reconfigurable array. In *2014 International Symposium on System-on-Chip,* **ISSoC *2014***, 2014

2013
- Henry Hoffmann, Martina Maggio, Marco D. Santambrogio, Alberto Leva, and Anant Agarwal. A generalized software framework for accurate and efficient management of performance goals. In *Proceedings of the International Conference on Embedded Software,* **EMSOFT**, 2013

- Henry Hoffmann. Racing and pacing to idle: an evaluation of heuristics for energy-aware resource allocation. In *Proceedings of the Workshop on Power-Aware Computing and Systems,* **HotPower**, 2013

- Martina Maggio and Henry Hoffmann. ARPE: A tool to build equation models of computing systems. In *8th International Workshop on* **Feedback Computing**, 2013

2012
- Henry Hoffmann, Jim Holt, George Kurian, Eric Lau, Martina Maggio, Jason E. Miller, Sabrina M. Neuman, Mahmut E. Sinangil, Yildiz Sinangil, Anant Agarwal, Anantha P. Chandrakasan, and Srinivas Devadas. Self-aware Computing in the Angstrom Processor. In *The 49th Annual Design Automation Conference 2012,* **DAC**, 2012

- Filippo Sironi, Davide B. Bartolini, Simone Campanoni, Fabio Cancare, Henry Hoffmann, Donatella Sciuto, and Marco D. Santambrogio. Metronome: operating system level performance management via self-adaptive computing. In *The 49th Annual Design Automation Conference 2012,* **DAC**, 2012

2011
- Henry Hoffmann, Stelios Sidiroglou, Michael Carbin, Sasa Misailovic, Anant Agarwal, and Martin C. Rinard. Dynamic Knobs for Responsive Power-

aware Computing. In *Proceedings of the 16th International Conference on Architectural Support for Programming Languages and Operating Systems,* **ASPLOS**, 2011

- Stelios Sidiroglou-Douskos, Sasa Misailovic, Henry Hoffmann, and Martin C. Rinard. Managing performance vs. accuracy trade-offs with loop perforation. In *SIGSOFT/FSE'11 19th ACM SIGSOFT Symposium on the Foundations of Software Engineering* (**FSE-19**) *and ESEC'11: 13rd European Software Engineering Conference (***ESEC-13***), Szeged, Hungary, September 5-9, 2011*, 2011

- Omer Khan, Henry Hoffmann, Mieszko Lis, Farrukh Hijaz, Anant Agarwal, and Srinivas Devadas. ARCc: A case for an architecturally redundant cache-coherence architecture for large multicores. In *Computer Design, International Conference on* **ICCD**, 2011

- Martina Maggio, Henry Hoffmann, Marco D. Santambrogio, Anant Agarwal, and Alberto Leva. Decision making in autonomic computing systems: comparison of approaches and techniques. In *Proceedings of the 8th ACM international conference on Autonomic computing* **ICAC**, 2011

- Filippo Sironi, Andrea Cuoccio, Henry Hoffmann, Martina Maggio, and Marco D. Santambrogio. Evolvable systems on reconfigurable architecture via self-aware adaptive applications. In *2011 NASA/ESA Conference on Adaptive Hardware and Systems,* **AHS**, 2011

2010
- Sasa Misailovic, Stelios Sidiroglou, Henry Hoffmann, and Martin C. Rinard. Quality of service profiling. In *Proceedings of the 32nd ACM/IEEE International Conference on Software Engineering,* **ICSE**, 2010

- Martin C. Rinard, Henry Hoffmann, Sasa Misailovic, and Stelios Sidiroglou. Patterns and statistical analysis for understanding reduced resource computing. In *Proceedings of the 25th Annual ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications,* **OOPSLA**, 2010

- Henry Hoffmann, Jonathan Eastep, Marco D. Santambrogio, Jason E. Miller, and Anant Agarwal. Application heartbeats for software performance and health. In *Proceedings of the 15th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming,* **PPOPP**, 2010

- Martina Maggio, Henry Hoffmann, Marco D. Santambrogio, Anant Agarwal, and Alberto Leva. Controlling software applications via resource allocation within the heartbeats framework. In *Proceedings of the 49th IEEE Conference on Decision and Control,* **CDC**, 2010

- Henry Hoffmann, David Wentzlaff, and Anant Agarwal. Remote store programming. In *High Performance Embedded Architectures and Compilers, 5th International Conference,* **HiPEAC**, 2010

- Henry Hoffmann, Jonathan Eastep, Marco D. Santambrogio, Jason E. Miller, and Anant Agarwal. Application heartbeats: a generic interface for specifying program performance and goals in autonomous computing environments. In *Proceedings of the 7th International Conference on Autonomic Computing,* **ICAC**, 2010

- Filippo Sironi, Marco Triverio, Henry Hoffmann, Martina Maggio, and Marco D. Santambrogio. Self-aware adaptation in fpga-based systems. In *International*

Conference on Field Programmable Logic and Applications, **FPL**, 2010

- Filippo Sironi, Andrea Cuoccio, Henry Hoffmann, Martina Maggio, and Marco D. Santambrogio. Evolvable systems on reconfigurable architecture via self-aware adaptive applications. In *2011 NASA/ESA Conference on Adaptive Hardware and Systems,* **AHS**, 2011
- James Psota, Jason E. Miller, George Kurian, Henry Hoffmann, Nathan Beckmann, Jonathan Eastep, and Anant Agarwal. ATAC: improving performance and programmability with on-chip optical networks. In *International Symposium on Circuits and Systems* **ISCAS**, 2010
- Henry Hoffmann, Srinivas Devadas, and Anant Agarwal. A pattern for efficient parallel computation on multicore processors with scalar operand networks. In *Proceedings of the 2010 Workshop on Parallel Programming Patterns* **ParaPLoP**, 2010

2006
- M. Drake, Henry Hoffmann, Rodric M. Rabbah, and Saman P. Amarasinghe. MPEG-2 decoding in a stream programming language. In *20th International Parallel and Distributed Processing Symposium* **IPDPS**, 2006

2005
- Nadya Travinin, Henry Hoffmann, Robert Bond, Hector Chan, Jeremy Kepner, and Edmund Wong. Automatic parallelization with pmapper. In *2005 IEEE International Conference on Cluster Computing* **CLUSTER**, 2005

2004
- Michael Bedford Taylor, Walter Lee, Jason E. Miller, David Wentzlaff, Ian Bratt, Ben Greenwald, Henry Hoffmann, Paul Johnson, Jason Sungtae Kim, James Psota, Arvind Saraf, Nathan Shnidman, Volker Strumpen, Matthew Frank, Saman P. Amarasinghe, and Anant Agarwal. Evaluation of the raw microprocessor: An exposed-wire-delay architecture for ILP and streams. In *31st International Symposium on Computer Architecture* **ISCA**, 2004

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- Michael B. Taylor, Jason Kim, Jason Miller, David Wentzlaff, Fae Ghodrat, Ben Greenwald, Henry Hoffmann, Paul Johnson, Walter Lee, Arvind Saraf, Nathan Shnidman, Volker Strumpen, Saman Amarasinghe, and Anant Agarwal. A 16-issue Multiple-Program-Counter Microprocessor with Point-to-Point Scalar Operand Network. In *Proceedings of the IEEE International Solid-State Circuits Conference* **ISSCC**, February 2003

2002
- Michael I. Gordon, William Thies, Michal Karczmarek, Jasper Lin, Ali S. Meli, Andrew A. Lamb, Chris Leger, Jeremy Wong, Henry Hoffmann, David Maze, and Saman P. Amarasinghe. A stream compiler for communication-exposed architectures. In *Proceedings of the 10th International Conference on Architectural Support for Programming Languages and Operating Systems* **ASPLOS**, 2002

2001
- James M. Lebak, Jim Daly, Hank Hoffmann, Jeremy Kepner, Jan Matlis, Patrick Richardson, Edward Rutledge, and Glenn Schrader. Software fault recovery for real-time signal processing on massively parallel computers. In **PPSC**, 2001

JOURNAL
PUBLICATIONS

2021
- Kathryn E. Schertz, James Saxon, Carlos Cardenas-Iniguez, Lus M. A. Bettencourt, Yi Ding, Henry Hoffmann, and Marc G. Berman. Neighborhood street activity and greenspace usage uniquely contribute to predicting crime. **npj Urban Sustainability**, 1, 2021

2020
- Henry Hoffmann, Axel Jantsch, and Nikil D. Dutt. Embodied self-aware computing systems. **Proc. IEEE**, 108(7):1027–1046, 2020
- Saurabh Bagchi, Vaneet Aggarwal, Somali Chaterji, Fred Douglis, Aly El Gamal, Jiawei Han, Brian J. Henz, Henry Hoffmann, Suman Jana, Milind Kulkarni, Felix Xiaozhu Lin, Karen B. Marais, Prateek Mittal, Shaoshuai Mou, Xiaokang Qiu, and Gesualdo Scutari. Vision paper: Grand challenges in resilience: Autonomous system resilience through design and runtime measures. **IEEE Open J. Comput. Soc.**, 1:155–172, 2020

2019
- Saeid Barati, Ferenc A. Bartha, Swarnendu Biswas, Robert Cartwright, Adam Duracz, Donald S. Fussell, Henry Hoffmann, Connor Imes, Jason E. Miller, Nikita Mishra, Arvind, Dung Nguyen, Krishna V. Palem, Yan Pei, Keshav Pingali, Ryuichi Sai, Andrew Wright, Yao-Hsiang Yang, and Sizhuo Zhang. Proteus: Language and runtime support for self-adaptive software development. **IEEE Software**, 36(2):73–82, 2019

2017
- Antonio Filieri, Martina Maggio, Konstantinos Angelopoulos, Nicolás D'Ippolito, Ilias Gerostathopoulos, Andreas Berndt Hempel, Henry Hoffmann, Pooyan Jamshidi, Evangelia Kalyvianaki, Cristian Klein, Filip Krikava, Sasa Misailovic, Alessandro Vittorio Papadopoulos, Suprio Ray, Amir Molzam Sharifloo, Stepan Shevtsov, Mateusz Ujma, and Thomas Vogel. Control strategies for self-adaptive software systems. **ACM Transactions on Autonomous and Adaptive Systems**, 11(4):24:1–24:31, 2017
- Waqar Hussain, Henry Hoffmann, Tapani Ahonen, and Jari Nurmi. Power mitigation by performance equalization in a heterogeneous reconfigurable multicore architecture. **Signal Processing Systems**, 87(3), 2017

2016
- Can Hankendi, Henry Hoffmann, and Ayse Coskun. Adapt&cap: Coordinating system- and application-level adaptation for power-constrained systems. **IEEE Design & Test**, 33(1):68–76, 2016
- Waqar Hussain, Roberto Airoldi, Henry Hoffmann, Tapani Ahonen, and Jari Nurmi. HARP2: an x-scale reconfigurable accelerator-rich platform for massively-parallel signal processing algorithms. **Signal Processing Systems**, 85(3), 2016

2015
- Qinfeng Shi, Henry Hoffmann, and Omar Khan. A hw-sw multicore architecture to tradeoff program accuracy and resilience overheads. **Computer Architecture Letters**, 14(2):85–89, 2015

2014
- Connor Imes and Henry Hoffmann. Minimizing energy under performance constraints on embedded platforms: resource allocation heuristics for homogeneous and single-isa heterogeneous multi-cores. **SIGBED Review**, 11(4), 2014

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- Martina Maggio, Henry Hoffmann, Marco D. Santambrogio, Anant Agarwal, and Alberto Leva. Power optimization in embedded systems via feedback control of resource allocation. **IEEE Trans. Contr. Sys. Techn.**, 21(1), 2013

2012
- Henry Hoffmann, Anant Agarwal, and Srinivas Devadas. Selecting Spatiotemporal Patterns for Development of Parallel Applications. **IEEE Trans. Parallel Distrib. Syst.**, 23(10):1970–1982, 2012
- Martina Maggio, Henry Hoffmann, Alessandro V. Papadopoulos, Jacopo Panerati, Marco D. Santambrogio, Anant Agarwal, and Alberto Leva. Comparison of decision-making strategies for self-optimization in autonomic computing systems. **ACM Trans. Auton. Adapt. Syst.**, 7(4), December 2012

2007
- David Wentzlaff, Patrick Griffin, Henry Hoffmann, Liewei Bao, Bruce Edwards, Carl Ramey, Matthew Mattina, Chyi-Chang Miao, John F. Brown III, and Anant Agarwal. On-chip interconnection architecture of the tile processor. **IEEE Micro**, 27(5), 2007

2005
- James Lebak, Jeremy Kepner, Henry Hoffmann, and Edward Rutledge. Parallel vsipl++: An open standard software library for high-performance parallel signal processing. **Proceedings of the IEEE**, 93(2):313–330, 2005

2004
- Volker Strumpen, Henry Hoffmann, and Anant Agarwal. Stream algorithms and architecture. **J. Instruction-Level Parallelism**, 6, 2004

2002
- Michael Bedford Taylor, Jason Sungtae Kim, Jason E. Miller, David Wentzlaff, Fae Ghodrat, Ben Greenwald, Henry Hoffmann, Paul Johnson, Jae W. Lee, Walter Lee, Albert Ma, Arvind Saraf, Mark Seneski, Nathan Shnidman, Volker Strumpen, Matthew Frank, Saman P. Amarasinghe, and Anant Agarwal. The raw microprocessor: A computational fabric for software circuits and general-purpose programs. **IEEE Micro**, 22(2), 2002
- William Thies, Michal Karczmarek, Michael I. Gordon, David Maze, Jeremy Wong, Henry Hoffmann, Matthew Brown, and Saman P. Amarasinghe. A common machine language for grid-based architectures. **SIGARCH Computer Architecture News**, 30(3):13–14, 2002

INVITED TALKS
- Henry Hoffmann Controlling (ML-based) Computing Systems Invited talk, Stanford, October 2022.
- Henry Hoffmann Controlling (ML-based) Computing Systems Invited talk, MIT, September 2022.
- Henry Hoffmann Controlling (ML-based) Computing Systems Invited talk, EPFL, March 2022.
- Henry Hoffmann. On the Interoperability of Energy-aware Systems. In *Dagstuhl Seminar on Power and Energy Aware Computing on Heterogeneous Systems (PEACHES)* 2022.
- Henry Hoffmann. On the Security of Energy-aware Systems. In *Dagstuhl Seminar on Power and Energy Aware Computing on Heterogeneous Systems (PEACHES)* 2022.
- Henry Hoffmann Keynote Talk: Self-aware Computing: Combining Learning

and Control to Manage Complex, Dynamic Systems In Workshop on ML for Computer Architecture and Systems, co-located with ISCA 2020.

- Henry Hoffmann Keynote Talk: Self-aware Computing: Combining Learning and Control to Manage Complex, Dynamic Systems In 2nd Annual Workshop on AI for Designing Architectures, co-located with ISCA 2019.
- Henry Hoffmann Invited Talk: Scheduling Parallel Programs under Power Constraints: Algorithmic Advances and Practical Concerns. In 15th Cloud Control Workshop 2019.
- Henry Hoffmann. Invited Talk: Configuration Parameters Make Computing Systems Fragile (Anti-Resilient) or Set Goals not Parameters. In CRISP Grand Challenges Workshop at Purdue University 2019.
- Henry Hoffmann. Keynote Talk: Managing Complex, Dynamic Systems with Self-aware Computing. In 14th International Workshop on Scheduling and Resource Management for Parallel and Distributed Systems (SRMPDS) at ICPP 2018
- Henry Hoffmann. AutoConf: Understanding and Automatically Adjusting Performance-related Software Configurations In *Tutorial on Runtimes in the Cloud* at ISCA 2018
- Henry Hoffmann. Self-aware Computing: Combining Learning and Control to Manage Complex, Dynamic Systems UC Irvine, June 2018
- Henry Hoffmann. Invited Talk: Tackling Complexity and Dynamics with Self-aware Computing Systems In *12th Workshop on Feedback Computing* at ICAC 2017
- Henry Hoffmann. Keynote Talk: What is the Big Deal About Approximate Computing? In *the First Workshop on Emerging Parallel and Distributed Runtime Systems and Middleware* at IPDPS 2016.
- Henry Hoffmann. Keynote Talk: The Self-aware Computing Model and Challenges for Cyber Physical Systems In *The First Workshop on Self-aware Cyber Physical Systems* at Cyber Physical Systems Week 2016.
- Henry Hoffmann. A Case for Coordinating Accuracy-aware Applications and Power-aware Systems. In *Dagstuhl Seminar on Model-driven Approaches for Self-aware Computing* 2014.
- Henry Hoffmann. Untapped Potential for Homogeneous Multicores. In *ISSoC* 2014.
- Henry Hoffmann. Coordinating Accuracy-aware applications and power-aware systems. In *G/I Dagstuhl Seminar on Control Theory Meets Software Engineering*.
- Henry Hoffmann. SEEC: A Self-aware Framework for Managing Goals and Constraints in Modern Computing Systems In *MIT Industrial Affiliates Program*, May 2012.
- Henry Hoffmann. SEEC: A Self-aware Computational Model. In *High Peformance Embedded Computing Workshop*, September 2011.
- Henry Hoffmann. Angstrom's Self-Aware Execution Model. In *Second ParalleX Execution Model Workshop* (PEMWS-2), April 2011.
- Henry Hoffmann. Reducing Energy Consumption with Code Perforation. In *2nd Annual Conference on Computational Sustainability*, June 2010.
- Yale Patt, Roger Espasa, Henry Hoffmann, Walid Najjar, Paolo Faraboshi

(moderator). Panel Discussion: Heterogeneous vs. Homogeneous Computing. In *High Performance Embedded Architectures and Compilers*, January 2010.

BOOK CHAPTERS	• Waqar Hussain, Henry Hoffmann, Tapani Ahonen, and Jari Nurmi. *Design Transformation from a Single-Core to a Multi-Core Architecture Targeting Massively Parallel Signal Processing Algorithms*, pages 7–28. Springer International Publishing, 2017

- Jeffrey O Kephart, Martina Maggio, Ada Diaconescu, Holger Giese, Henry Hoffmann, Samuel Kounev, Anne Koziolek, Peter Lewis, Anders Robertsson, and Simon Spinner. Reference scenarios for self-aware computing. In *Self-Aware Computing Systems*, pages 87–106. Springer International Publishing, 2017
- Michael B. Taylor, Walter Lee, Jason Miller, David Wentzlaff, Ian Bratt, Ben Greenwald, Henry Hoffmann, Paul Johnson, Jason Kim, James Psota, Arvind Saraf, Nathan Shnidman, Volker Strumpen, Matt Frank, Roderic Rabbah, Saman Amarasinghe, and Anant Agarwal. *Stream Multicore Processors*, chapter 14, pages 309–338. Springer, Dordrecht, The Netherlands, 2007.
- Michael B. Taylor, Walter Lee, Jason E. Miller, David Wentzlaff, Ian Bratt, Ben Greenwald, Henry Hoffmann, Paul Johnson, Jason Kim, James Psota, Arvind Saraf, Nathan Shnidman, Volker Strumpen, Matt Frank, Saman Amarasinghe, and Anant Agarwal. *Tiled Multicore Processors*, chapter 1, pages 1–34. Springer, New York, NY, USA, 2009.

PATENTS

- Frederic T Chong, I Yunong Shi, Nelson Leung, Pranav Gokhale, Henry Hoffmann, David Schuster. System and method of optimizing instructions for quantum computers Patent Application, October 2021. US 17/273,938.
- Bernard Dickens III, Haryadi Gunawi, Ariel Feldman, Henry Hoffmann Stream ciphers for digital storage encryption Patent, October 2021. US 11139959.
- Henry Hoffmann, John Lafferty, Nikita Mishra Apparatus and method for optimizing quantifiable behavior in configurable devices and systems Patent, May 2021. US
- Nadya Travinin Bliss and Henry Hoffmann. Method and apparatus performing automatic mapping for a multi-processor system. Patent, July 2011. US 7983890 B2.

DEGREES SUPERVISED
PhD: 11
MS: 13

Of the 11 PhD students I have graduated, 5 are from backgrounds that are historically under-represented in computer science.

Yuliana Zamora

- Degree received: MS 2019, PhD 2022

Muhammad Husni Santriaji

- Degree received: MS 2019, PhD 2022

Yi Ding

- Degree received: PhD 2020

Anne Farrell

- Degree received: MS 2016, PhD 2020

Bernard Dickens III

- Degree received: MS 2017, PhD 2020

Saeid Barati

- Degree received: MS 2015, PhD 2020

Gokalp Demirci (co-supervised with Janos Simon)

- Degree received: PhD 2019

Huazhe (Harper) Zhang

- Degree received: MS 2015, PhD 2019

Connor Imes

- Degree received: MS 2015, PhD 2018

Zhixuan Zhou

- Degree received: MS 2015, PhD 2018

Nikita Mishra (co-supervised with John Lafferty)

- Degree received: MS 2015, PhD 2017

Will Kong

- Degree received: MS 2019
- Current Position: PhD student, University of Chicago

Ivana Marincic

- Degree received: MS 2018

Lee Ehudin

- Degree received: BS/MS 2017

Tristan Rasmussen

- Degree received: BS/MS 2015

Professional Service (outside my institution)

- Program Committee for ASPLOS 2023
- Program Committee for ASPLOS 2022
- Program Committee for ISCA 2022
- Program Committee for ASPLOS 2021
- Program Committee for RTAS 2020
- Program Committee for ICPP 2020
- Program Committee for ASPLOS 2019
- Program Committee for ASPLOS 2018
- Program Committee for SOSP 2017.
- External Review Committee for MICRO 2017.

- External Review Committee for ASPLOS 2017.
- External Review Committee for PLDI 2016.
- Vice Chair for Architecture IPDPS 2016.
- Program Committee ICCD 2015.
- Publications Chair HPCA 2015.
- Program Committee System Software Track Supercomputing 2014.
- Program Committee System Software Track Supercomputing 2013.
- Co-chair of 4th International Workshop on Computing in Heterogeneous, Autonomous 'N' Goal-oriented Environments (co-located with DAC 2014)
- Co-chair of 3rd International Workshop on Computing in Heterogeneous, Autonomous 'N' Goal-oriented Environments (co-located with DAC 2013)
- Co-chair of 2nd International Workshop on Computing in Heterogeneous, Autonomous 'N' Goal-oriented Environments (co-located with DAC 2012)
- Program Committee for 9th International Conference on Embedded and Ubiquitous Computing 2011
- Reviewer for 2nd Annual Symposium on Cloud Computing 2011
- Co-chair of 1st International Workshop on Computing in Heterogeneous, Autonomous 'N' Goal-oriented Environments (co-located with ASPLOS 2011)
- Program Committee for 2nd Annual Workshop on Computer Architecture and Operating Systems co-design 2010
- Reviewer for International Symposium on Computer Architecture 2010
- Reviewer for International System-on-Chip Conference 2005

PROFESSIONAL SERVICE (WITHIN MY INSTITUTION)

- Computer Science Executive Committee 2022–present
- Co-founder and Chair CS Department Equity, Diversity, and Inclusion Committee 2020–present
- Dean's CS Department Chair Search Committee 2020
- Member PSD Equity, Diversion, and Inclusion Coordination Team 2018–present
- Computer Science PhD Admissions Committee 2013–2016, 2018–present
- Computer Science Faculty Hiring Committee 2019–2021, 2022–present
- Graduate Student Awards Committee 2017–2019
- Graduate Student Curriculum Committee 2017–2020
- Computer Systems Lunch Seminar Organizer (Summer 2016, Winter 2015, Winter 2014, Winter 2013)
- Computer Science Distinguished Lecturer Series Organizer 2016
- Committee to Address Undergraduate Enrollment Expansion (and report to the Dean) 2016
- Computer Science Junior Faculty Hiring Committee (Systems) 2013–2016

COURSES TAUGHT

University of Chicago

CMSC 23010 Parallel Computing	**Fall 2022**
CMSC 33001 Topics in Computer Systems	**Spring 2022**
CMSC 16200 Honors Introduction to Computer Science 2	**Winter 2022**
CMSC 23010 Parallel Computing	**Fall 2021**
CMSC 23010 Parallel Computing	**Spring 2021**
CMSC 16200 Honors Introduction to Computer Science 2	**Winter 2021**
CMSC 23010 Parallel Computing	**Spring 2020**

CMSC 16200 Honors Introduction to Computer Science 2	**Winter 2020**
CMSC 33001 Adaptive and Energy-aware Computing	**Fall 2019**
CMSC 23010 Parallel Computing	**Spring 2019**
CMSC 16200 Honors Introduction to Computer Science 2	**Winter 2019**
CMSC 33001 Power and Energy-aware Computing	**Fall 2018**
CMSC 23010 Parallel Computing	**Winter 2018**
CMSC 32200 Computer Architecture	**Fall 2017**
CMSC 15400 Introduction to Computer Systems	**Spring 2017**
CMSC 23010 Parallel Computing	**Winter 2017**
CMSC 32200 Computer Architecture	**Fall 2016**
CMSC 15400 Introduction to Computer Systems	**Spring 2016**
CMSC 23010 Parallel Computing	**Winter 2016**
CMSC 33001 Power and Energy-aware Computing	**Fall 2015**
CMSC 15400 Introduction to Computer Systems	**Spring 2015**
CMSC 33001 Power and Energy-aware Computing	**Winter 2015**
CMSC 32200 Computer Architecture	**Fall 2014**
CMSC 15400 Introduction to Computer Systems	**Spring 2014**
CMSC 23010 Parallel Computing	**Winter 2014**
CMSC 32200 Computer Architecture	**Fall 2013**
CMSC 23010 Parallel Computing	**Spring 2013**
CMSC 33001 Power and Energy-aware Computing	**Winter 2013**

PROFESSIONAL
EXPERIENCE
(OUTSIDE
ACADEMIA)

Self-employed, Cambridge, MA

Consultant on Multicore Application Development **February 2008 to 2011**

- Implemented BDTI OFDM Receiver Benchmark using 64 cores on Tilera TILE64 processor architecture
- Optimized single core performance of BDTI OFDM Receiver Benchmark on TILE64
- Optimized communication in parallel implementation of BDTI OFDM Receiver Benchmark on TILE64 and TILEPro64
- Designed parallel FFT for TILEPro64 architecture

Tilera Corporation, Westborough, MA

Design Engineer **December 2005 to February 2008**

- Designed programming abstraction to increase productivity of engineers developing parallel DSP code
- Contributed to design of architecture and programming model for a family of new parallel, multicore architectures
- Engaged with customers to understand their needs and how Tilera could better serve them
- Addressed technical and engineering questions on business development and sales calls
- Presented technical information on architecture, software, and applications to numerous customers
- Educated several customers on programming Tilera's hardware and parallel programming in general

- Ported many customer applications to Tilera hardware, including H.264 encoders, MPEG-2 encoders, 20+ DSP benchmarks, printing/imaging benchmarks, and wireless processing benchmarks
- Implemented scalable, real-time HD H.264 encoder executed on over 60 processors
- Implemented scalable, faster than real-time MPEG-2 encoder executed on over 60 processors

MIT Lincoln Laboratory, Lexington, MA

Associate Technical Staff   **June 2003 to September 2004**

Assistant Technical Staff   **July 1999 to June 2003**

- Designed and implemented algorithms, software, and run-time system for automatic parallelization of MATLAB programs
- Designed and implemented a C++ library for high performance parallel signal processing and scientific computing
- Designed and implemented algorithms, software, and run-time system for automatic parallelization of C++ digital signal processing programs
- Designed and implemented novel parallel algorithms for digital signal processing and linear algebra
- Evaluated emerging microarchitectures for use as embedded digital signal processing platforms
- Demonstrated to U.S. Navy viability of software and COTS solutions for real-time radar signal processing
- Implemented large-scale, parallel signal processing software for radar and sonar systems
- Mentored junior employees
- Prepared numerous technical presentations and documents

SAS Institute, Inc., Cary, NC

Summer Student   **May 1998 to August 1998**

- Implemented C++ software to enable distribution of SAS databases
- Wrote test programs for existing SAS functionality
- Implemented an automated overnight regression test suite