Branden Ghena

Contact Information

Department of Computer Science
Northwestern University
3305 Mudd Hall
Evanston, IL 60208

Cell: +1.734.755.6653
branden@northwestern.edu
https://brandenghena.com

Employment

Assistant Professor of Instruction, Northwestern University (2020–Present)
Department of Computer Science, McCormick School of Engineering
Evanston, Illinois

Education

University of California, Berkeley, Berkeley, California (2017–2020)
PhD — Electrical Engineering and Computer Science
Dissertation: Investigating Low Energy Wireless Networks for the Internet of Things
Advisor: Prabal Dutta

University of Michigan, Ann Arbor, Ann Arbor, Michigan (2013–2017)
M.S.E. Computer Science and Engineering (2017)
PhD Candidate — Computer Science and Engineering
Advisor: Prabal Dutta

Michigan Technological University, Houghton, Michigan (2008–2013)
B.S. Computer Engineering & Electrical Engineering
GPA: 3.98 — Summa Cum Laude

Teaching Experience

Northwestern University, Evanston, Illinois

Instructor, CS211: Fundamentals of Computer Programming II (W21,F21,W22)
- Topics include C and C++ programming, memory management, and the Unix shell.

Instructor, CS213: Introduction to Computer Systems (F20,S21,W22)
- Topics include number representation, control flow, caches, and parallelism.

Instructor, CS343: Operating Systems (F20,S22,F22)
- Topics include concurrency, scheduling, virtual memory, and file systems.

Instructor, CE346: Microprocessor System Design (S21,F21,F22)
- Topics include microcontrollers, communication buses, and embedded software.

Instructor, CS397/497: Wireless Protocols for the Internet of Things (W21,S22)
- Topics include Bluetooth Low-Energy, 802.15.4, and Low-Power Wide-Area Networks.

University of California, Berkeley, Berkeley, California

Instructor, CS61C: Great Ideas in Computer Architecture (Summer 2019)

- Topics include assembly, pipelined processor design, caches, and parallelism.
- 200 students, 3 instructors, 8 TAs, 8 tutors

Graduate Student Instructor, EE 149: Introduction to Embedded Systems (Fall 2018)

- Topics include embedded software, sensors, communication, and modeling cyber-physical systems.
- 60 students, 2 instructors, 3 TAs
- Redesigned lab curriculum to improve student learning and better prepare students for the open-ended course project. New labs use a simplified code development environment with Git, GCC, and Makefiles and a custom hardware platform, Buckler, built upon the nRF52832 dev kit.
- Outstanding Graduate Student Instructor award

Guest Lecturer, EE 149: Introduction to Embedded Systems (Fall 2017–2019)

University of Michigan, Ann Arbor, Ann Arbor, Michigan

Graduate Student Instructor, EECS 370: Computer Organization (Fall 2013)

- Topics include C programming, assembly, pipelined processor design, and caches.
- 350 students, 3 instructors, 8 TAs
- Outstanding Graduate Student Instructor award

Guest Lecturer, EECS 373: Design of Microprocessor-Based Systems (Fall 2014, Winter 2015)

Research Experience

University of California, Berkeley, Berkeley, California
Graduate Student Research Assistant, Electrical Engineering & Computer Science (2017–2020)

University of Michigan, Ann Arbor, Ann Arbor, Michigan
Graduate Student Research Assistant, Computer Science and Engineering (2013–2017)

Michigan Technological University, Houghton, Michigan
Aerospace Enterprise: Designed and built a satellite in conjunction with the Air Force Research Lab which launched in June 2019 (2009–2013)
On-Board Data and Command Team Leader: Led team to complete computer hardware on the satellite, including thermal, wiring, and acceptance testing (2012–2013)
University Nanosatellite Program: First place finish in national competition (2011)

NSF Research Experience for Undergraduates: Research in the field of Hybrid-Electric Vehicles. Studied analytical model for a continuously variable transmission. Created procedure for vehicle coast-down testing (2011)

NASA Jet Propulsion Laboratory, Pasadena, California
Summer Internship: Created testing framework for ASIC processor designs including both hardware and software testing (2013)

Summer Internship: Designed and fabricated a computer board to interface a thruster with a satellite Command and Data Handling system (2012)

Industry Experience

Hitachi Global Storage Technologies, Rochester, Minnesota
Test and Tools Co-op Student: Created hard drive testing tools using TCL and C++ languages. Worked with HDDs and SSDs as well as SATA and SCSI protocols (2010)

Fermi 2 Nuclear Power Plant, Monroe, Michigan
Summer Internship: Created plant configuration management documentation (2009)

Conference, and Journal Publications

1. Thomas Zachariah, Neal Jackson, **Branden Ghena**, and Prabal Dutta. Reliable: Towards reliable communication via bluetooth low energy advertisement networks. In *Proceedings of the 2022 International Conference on Embedded Wireless Systems and Networks*, EWSN'22, October 2022. Acceptance Rate: 14 of 46

2. **Branden Ghena**, Joshua Adkins, Longfei Shangguan, Kyle Jamieson, Phil Levis, and Prabal Dutta. Challenge: Unlicensed lpwans are not yet the path to ubiquitous connectivity. In *Proceedings of the 25th Annual International Conference on Mobile Computing and Networking*, MobiCom'19, October 2019. Acceptance Rate: 30 of 186

3. Joshua Adkins, **Branden Ghena**, Neal Jackson, Pat Pannuto, Samuel Rohrer, Bradford Campbell, and Prabal Dutta. The Signpost Platform for City-Scale Sensing. In *Proceedings of the 17th ACM/IEEE International Conference on Information Processing in Sensor Networks*, IPSN'18, New York, NY, USA, April 2018. ACM. Acceptance Rate: 22 of 83

4. Amit Levy, Bradford Campbell, **Branden Ghena**, Daniel B. Giffin, Pat Pannuto, Prabal Dutta, and Philip Levis. Multiprogramming a 64kB Computer Safely and Efficiently. In *Proceedings of the 26th Symposium on Operating Systems Principles*, SOSP'17, New York, NY, USA, Oct 2017. ACM. Acceptance Rate: 17%

5. Bradford Campbell, Meghan Clark, Samuel DeBruin, **Branden Ghena**, Neal Jackson, Ye-Sheng Kuo, and Prabal Dutta. Perpetual Sensing for the Built Environment. *IEEE Pervasive Computing*, 15(4), 2016

6. Samuel DeBruin, **Branden Ghena**, Ye-Sheng Kuo, and Prabal Dutta. PowerBlade: A Low-Profile, True-Power, Plug-Through Energy Meter. In *Proceedings of the 13th ACM Conference on Embedded Networked Sensor Systems*, SenSys'15. ACM, 2015. Acceptance Rate: 27 of 132

Workshop Publications

1. **Branden Ghena**, Jean-Luc Watson, and Prabal Dutta. Embedded OSes must embrace distributed computing. In *Proceedings of the 1st International Workshop on Next-Generation Operating Systems for Cyber-Physical Systems*, NGOSCPS'19, April 2019

2. Joshua Adkins, **Branden Ghena**, and Prabal Dutta. Freeloader's Guide Through the Google Galaxy. In *Proceedings of the 20th International Workshop on Mobile Computing Systems and Applications*, HotMobile'19, New York, NY, USA, February 2019. ACM. Acceptance Rate: 26 of 57

3. Joshua Adkins, Bradford Campbell, **Branden Ghena**, Neal Jackson, Pat Pannuto, and Prabal Dutta. Energy Isolation Required for Multi-tenant Energy Harvesting Platforms. In *Proceedings of the Fifth ACM International Workshop on Energy Harvesting and Energy-Neutral Sensing Systems*, ENSsys'17, New York, NY, USA, November 2017. ACM. Acceptance Rate: 6 of 18

4. Amit Levy, Bradford Campbell, **Branden Ghena**, Pat Pannuto, Prabal Dutta, and Philip Levis. The Case for Writing a Kernel in Rust. In *Proceedings of the 8th Asia-Pacific Workshop on Systems*, APSys'17, New York, NY, USA, September 2017. ACM

5. Amit Levy, Michael P Andersen, Bradford Campbell, David Culler, Prabal Dutta, **Branden Ghena**, Philip Levis, and Pat Pannuto. Ownership is Theft: Experiences Building an Embedded OS in Rust. In *Proceedings of the 8th Workshop on Programming Languages and Operating Systems*, PLOS 2015. ACM, Oct 2015. Acceptance Rate: 7 of 16

6. Brad Campbell, **Branden Ghena**, and Prabal Dutta. Energy-Harvesting Thermoelectric Sensing for Unobtrusive Water and Appliance Metering. In *Proceedings of the 2nd International Workshop on Energy Neutral Sensing Systems*, ENSsys '14. ACM, November 2014. Acceptance Rate: 9 of 11

7. **Branden Ghena**, William Beyer, Allen Hillaker, Jonathan Pevarnek, and J. Alex Halderman. Green Lights Forever: Analyzing the Security of Traffic Infrastructure. In *8th USENIX Workshop on Offensive Technologies*, WOOT '14. USENIX Association, August 2014. Acceptance Rate: 17 of 35

Magazine, Demo, and Poster Publications

1. Joshua Adkins, **Branden Ghena**, and Prabal Dutta. Signpost: Enabling City-Scale Sensing for Citizens and Scientists. In *GetMobile: Mobile Computing and Communications*, volume 22 of *GetMobile*, New York, NY, USA, September 2018. ACM

2. Joshua Adkins, Bradford Campbell, **Branden Ghena**, Neal Jackson, Pat Pannuto, Samuel Rohrer, and Prabal Dutta. Demo Abstract: Applications on the Signpost Platform for City-Scale Sensing. In *Proceedings of the 17th ACM/IEEE International Conference on Information Processing in Sensor Networks*, IPSN'18, New York, NY, USA, April 2018. ACM

3. Joshua Adkins, Bradford Campbell, **Branden Ghena**, Neal Jackson, Pat Pannuto, and Prabal Dutta. The Signpost Platform for City-Scale Sensing. In *TerraSwarm 2017 Annual Review*, TerraSwarm'17, October 2017

4. Bradford Campbell, **Branden Ghena**, Ye-Sheng Kuo, and Prabal Dutta. Demo Abstract: Swarm Gateway. In *Proceedings of the 3rd ACM International Conference on Systems for Energy-Efficient Built Environments*, BuildSys'16, November 2016

5. Joshua Adkins, Bradford Campbell, **Branden Ghena**, Neal Jackson, Pat Pannuto, and Prabal Dutta. Demo Abstract: The Signpost Network. In *Proceedings of the 14th ACM Conference on Embedded Networked Sensor Systems*, SenSys'16, November 2016

6. Bradford Campbell, **Branden Ghena**, Ye-Sheng Kuo, and Prabal Dutta. Demo Abstract: Swarm Gateway. In *Proceedings of the 3rd ACM International Conference on Systems for Energy-Efficient Built Environments*, BuildSys'16, November 2016

7. Samuel DeBruin, **Branden Ghena**, Ye-Sheng Kuo, and Prabal Dutta. Demo: PowerBlade A Low-Profile, True-Power, Plug-Through Energy Meter. In *Proceedings of the 13th ACM Conference on Embedded Networked Sensor Systems*, SenSys'15. ACM, 2015

Dissertation

1. **Branden Ghena**. Investigating low energy wireless networks for the internet of things. In *University of California, Berkeley Dissertation*, 2020

Awards and Grants

Cole-Higgins Award for Excellence in Teaching, Northwestern University, McCormick School of Engineering (2022)

Instructor of the Year, Northwestern University Computer Science Department (2022)

Outstanding Graduate Student Instructor, UC Berkeley EECS Department (Fall 2018)

Best Demo Runner Up - IPSN'18 (2018)

David Wessel Best Demo Award - Terraswarm Annual Review (2017)

TI Innovation Challenge 2015 - Best Environmental Impact, $2,000 (2015)

National Science Foundation Graduate Research Fellowship, $96,000 plus tuition (2014–2017)

Outstanding Graduate Student Instructor, Michigan EECS Department (Fall 2013)

Michigan Technological University, Electrical and Computer Engineering Departmental Scholar (2012)