Branden Ghena

Contact Information

Department of Computer Science
Northwestern University
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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,W23)
- 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,W23)
- 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)

Northwestern Associated Student Government Faculty & Administrator Honor Roll (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)