

BRANDON LUCIA

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RESEARCH INTERESTS

Computer architectures and systems; intermittent computing; parallelism & concurrency;

EDUCATION

University of Washington *June 2013*

Ph.D. in Computer Science & Engineering

Thesis: *"Architectural Support for Concurrent Program Correctness and Reliability"*

Advisor: Luis Ceze

University of Washington *September 2009*

M.S. in Computer Science & Engineering

Tufts University *June 2007*

B.S. in Computer Science

PROFESSIONAL EXPERIENCE

Assistant Professor *2015-present*

Carnegie Mellon University, Department of Electrical and Computer Engineering

Microsoft Research *2013-2014*

Researcher, Advanced and Robust Computing (ARC) Group

HONORS AND AWARDS

Selected for "People of the ACM" profile/interview *2017*

Paper Selected for **IEEE MICRO Top Picks** in Computer Architecture *2017*

Elected Member, DARPA Information Science and Technology Study Group *2016 – 2019*

Recipient, SPLASH/OOPSLA **Distinguished Paper Award** *2015*

Recipient, SPLASH/OOPSLA **Distinguished Artifact Award** *2015*

Recipient, Google Faculty Research Award *2015*

Winner, **Bell Labs Prize** *2015*

Bob Bades Memorial Award for Excellence in Teaching Honorable Mention *2011*

IBM Ph.D. Fellowship *2010*

Paper Selected for **IEEE MICRO Top Picks** in Computer Architecture *2010*

Paper Selected for **IEEE MICRO Top Picks** in Computer Architecture *2009*

Faithful Steward Graduate Fellowship, University of Washington *2007*

Clairmont L. Egtvedt Graduate Fellowship, University of Washington *2007*

CUSP Scholarship, Tufts University *2007*

EXTERNAL RESEARCH FUNDING

National Science Foundation Award #1629196: XPS: Full: Collaborative Research: Rethinking Architecture Support for Memory Consistency (\$481,096) Lead PI, *September 2016 – August 2020*

Intel Science and Technology Center for Visual Cloud Systems (\$262,500) co-PI (team of eight), *September 2016 – August 2019*

Gift from Disney Research (\$78,000) Single PI *September 2015*

National Science Foundation Award # 1526342: CSR:SHF: Small: Programming Language, Runtime System, and Architecture Support for Reliability in Intermittent, Energy-harvesting Computing Devices (\$499,999) Single PI *September 2015 – August 2018*

Google Faculty Research Award (\$71,000) Single PI *August 2015*

Intel-Altera Heterogeneous Architecture Research Platform (HARP) Program (Hardware Donation) co-PI *August 2015*

Google Cloud Platform Credit Award (\$10,000 GCE credit) Single PI *March 2015*

STUDENTS

Kiwan Maeng (**PhD Student**) *Fall 2016 –*

Emily Ruppel (**PhD Student**) *Fall 2016 –*

Vignesh Balaji (**PhD Student**) *Fall 2015 –*

Alexei Colin (**PhD Student**) *Fall 2015 –*

Nuno Machado (**PhD @ IST Lisboa**) *Fall 2013 –*
MSR Summer Intern 2014, CMU Visiting Scholar Summer 2015

Dhruva Tirumala (**Masters RA**) *Spring/Summer 2015*

Graham Harvey (**Undergraduate RA**) *Spring 2015*

Mark McElwaine (**Undergraduate RA**) *Spring/Summer 2015*

PUBLICATION RECORD

Conference Publications

1. Chain: Tasks and Channels for Reliable Intermittent Programs *ASPLOS 2016*
 Alexei Colin and **Brandon Lucia**
2. An Energy-interference-free Hardware/Software Debugger for Intermittent Energy-harvesting Systems
ASPLOS 2016 Alexei Colin, Alanson P. Sample, **Brandon Lucia**
Selected for IEEE Micro Top Picks in Computer Architecture 2017
3. Production-guided Concurrency Debugging *PPoPP 2016*
 Nuno Machado, **Brandon Lucia**, and Luís Rodrigues
4. Energy-interference-free System and Toolchain Support for Energy-harvesting Devices .. *CASES 2015*
(invited)
 Alexei Colin, Alanson P. Sample, **Brandon Lucia**
5. Valor: Efficient, Software-Only Region Conflict Exceptions *OOPSLA 2015*
 Swarnendu Biswas, Minjia Zhang, Michael D. Bond, and **Brandon Lucia**
OOPSLA'15 Distinguished Artifact Award and **OOPSLA'15 Distinguished Paper Award**
6. A Simpler, Safer Programming and Execution Model for Intermittent Systems *PLDI 2015*
Brandon Lucia and Benjamin Ransford
7. Concurrency Debugging with Differential Schedule Projections *PLDI 2015*
 Nuno Machado, **Brandon Lucia**, and Luís Rodrigues
8. Data Provenance Tracking for Concurrent Programs *CGO 2015*
Brandon Lucia and Luis Ceze
9. Cooperative Empirical Failure Avoidance for Multithreaded Programs *ASPLOS 2013*
Brandon Lucia and Luis Ceze

10. IFRit: Interference-free Regions for Dynamic Data-Race Detection *OOPSLA 2012*
Laura Effinger-Dean, **Brandon Lucia**, Dan Grossman, Luis Ceze, and Hans-J. Boehm
11. Isolating and Understanding Concurrency Errors Using *PLDI 2011*
Reconstructed Execution Fragments
Brandon Lucia, Benjamin P. Wood, and Luis Ceze
12. ColorSafe: Architectural Support for Debugging and Dynamically *ISCA 2010*
Avoiding Multi-variable Atomicity Violations
Brandon Lucia, Luis Ceze, and Karin Strauss
13. Conflict Exceptions: Providing Simple Parallel Language *ISCA 2010*
Semantics with Precise Hardware Exceptions
Brandon Lucia, Luis Ceze, Karin Strauss, Shaz Qadeer, and Hans-J. Boehm
14. Finding Concurrency Bugs with Context-Aware Communication Graphs *MICRO 2009*
Brandon Lucia and Luis Ceze
15. DMP: Deterministic Shared-memory MultiProcessing *ASPLOS 2009*
Joseph Devietti, **Brandon Lucia**, Mark Oskin, and Luis Ceze
Selected for IEEE Micro Top Picks '10
16. Atom-Aid: Surviving and Detecting Atomicity Violations *ISCA 2008*
Brandon Lucia, Joseph Devietti, Karin Strauss, and Luis Ceze
Selected for IEEE Micro Top Picks '09

Journal Publications

1. LazyPIM: An Efficient Cache Coherence Mechanism for Processing-in-Memory *Computer Architecture Letters*
Amirali Boroumand, Saugata Ghose, Minesh Patel, Hasan Hassan, Kevin Hsieh, Brandon Lucia, Krishna Malladi, Hongzhong Zheng, and Onur Mutlu
June 2016
2. Concurrency Debugging with Differential Schedule Projections *Trans. on Software Engineering and Methodology, 2015*
Nuno Machado, **Brandon Lucia**, Luís Rodrigues
July 2015

Workshop Publications

1. Non-volatile Memory is a Broken Time Machine *Workshop on Memory System Performance and Correctness 2014 (@ PLDI)*
Benjamin Ransford and **Brandon Lucia**
2. Systems Should Automatically Specialize Code and Data *Workshop on Probabilistic and Approximate Computing 2014 (@ PLDI)*
Brandon Lucia and Todd Mytkowicz
3. Playing Cupid: The IDE as a Matchmaker for Plug-Ins *TOPI 2012 (@ ICSE)*
Todd Schiller and **Brandon Lucia**
4. Automatic Empirical Failure Avoidance Support *WoDET 2012 (@ ASPLOS)*
for Concurrent Software
Brandon Lucia and Luis Ceze
5. Greedy Coherence *HPPC 2011 (@ MICRO)*
Emily Fortuna, **Brandon Lucia**, Adrian Sampson,
Benjamin P. Wood, and Luis Ceze
6. Hardware Watchmachines *PLDI FIT 2011*
Nicholas Hunt, **Brandon Lucia**, and Luis Ceze

7. Lock Prediction *Usenix HotPar 2010*
Brandon Lucia, Joseph Devietti, Tom Bergan,
 Luis Ceze, and Dan Grossman
8. The Case for System Support for Concurrency Exceptions *Usenix HotPar 2009*
 Luis Ceze, Joseph Devietti, **Brandon Lucia**, and Shaz Qadeer
9. Explicitly Parallel Programming with Shared Memory is *WSHCMP 2008 (@ ISCA)*
 Insane: At Least Make it Deterministic!
 Joseph Devietti, **Brandon Lucia**, Luis Ceze and Mark Oskin

TEACHING

- ECE 18-742 Advanced Computer Architecture and Systems** *Spring 2017*
Instructor – Course created and added to core curriculum.
- ECE 18-545 Advanced Digital Design Capstone** *Fall 2016*
Instructor
- ECE 18-545 Advanced Digital Design Capstone** *Fall 2015*
Instructor (co-teaching with Bill Nace)
- ECE 18-847C Special Topics in Computer Architecture: Parallel, Heterogeneous, and Emerging Architectures** *Spring 2015*
Instructor

EXTERNAL COMMUNITY SERVICE

Organization

1. Organizer *DARPA ISAT Workshop on Space Cyber-Infrastructure to Foster Innovation (SCI-FI)*
2. Artifact Evaluation Committee co-chair *PLDI 2017*
3. Student Travel Grant Chair *CGO 2017*
4. Invited Guest Editor *Transactions on Parallel Computing, Special Issue: Best of PPOPP 2016*
5. Program and General Co-chair *1st Workshop on Hilariously Low-power Computing, 2016*
6. Program and General Co-chair *5th Workshop on Determinism and Correctness in Parallel Programming, 2015*
7. Program and General Co-chair ... *1st Microsoft Research Workshop on Ultra Low Power Computing, 2014*

Technical Program Committees

1. 2017 *MICRO, ISCA, ECOOP*
2. 2016 *PPoPP, PLDI, IPDPS, WWW*
3. 2015 *IISWC, IPDPS, APPT, WoDET*
4. 2014 *WoDET*

INVITED TALKS, PRESENTATIONS, AND EVENTS

1. Programming and Debugging Intermittent Computers *Keynote Talk, ENSsys Workshop 2016*
2. Reliable Intermittent Systems *Invited Talk, TU Delft, November 2016*
3. Reliable Intermittent Systems *Invited Talk, Cornell University, August 2016*
4. Reliable Intermittent Systems *Invited Talk, Princeton University, August 2016*
5. Reliable Intermittent Systems *Invited Talk, Texas Instruments, Kilby Research Center, July 2016*

6. Programming and Debugging Intermittent Computers *Invited Talk, MobiTools Workshop 2016*
7. Reliable Intermittent Systems *Invited Talk, Columbia University, May 2016*
8. Reliable Intermittent Systems *Invited Talk, IST Lisbon, March 2016*
9. Reliable Intermittent Systems *Invited Talk Microsoft Research, February 2016*
10. Bell Labs Prize Winner's Lecture *Invited Talk, December 2015*
11. CMU CyLab Partners Conference *Invited Talk, September 2015*
12. Energy-interference-free System and Toolchain Support for Energy-harvesting Devices ... *Invited Talk CASES 2015*
13. System and Toolchain Support for Energy-harvesting Devices *CMU CyLab Partners Conference 2015*
14. Reliable, Programmable Intermittent Systems .. *Invited Talk, Bell Labs Prize, Semi-finalists Meeting, June 2015*
15. Invited Attendee *MSR Faculty Summit 2015*
16. A Simpler, Safer Programming and Execution Model for Intermittent Systems *PLDI 2015*
17. Reliability in Intermittent Systems *Invited Talk at Intel, May 2015*
18. Data Provenance Tracking for Concurrent Programs *CGO 2015*
19. Dealing with the Hidden Challenges of Intermittent Execution .. *CMU ECE Graduate Seminar Series, January 2015*
20. The Hidden Challenges of Intermittent Execution *Invited Talk, MSR Faculty Summit 2014*
21. ISAT: Survivalist/Intermittent Computing and Communications *Invited Expert Panelist*
22. Tools in the Real World *HotPar 2013 (Talk and Panel)*
23. Automatic Empirical Failure Avoidance *ASPLOS 2013*
24. Automatically Avoiding Errors in Concurrent Programs *UW Industry Affiliates 2012*
25. Automatic Empirical Failure Avoidance *WoDET 2012 (@ ASPLOS)*
26. Recon: Isolating and Understanding Concurrency Errors *PLDI 2011*
Using Reconstructed Execution Fragments
27. Understanding Concurrency Errors and Avoiding *Invited Colloquium*
System Failures *at Tufts University*
28. Detecting and Avoiding Errors in Concurrent Software *Dagstuhl Seminar 11011*
29. Conflict Exceptions: Providing Simple Parallel Language *ISCA 2010*
Semantics with Precise Hardware Exceptions
30. ColorSafe: Architectural Support for Debugging and *ISCA 2010*
Dynamically Avoiding Multi-variable Atomicity Violations
31. Finding Concurrency Bugs with Context-Aware *MICRO 2009*
Communication Graphs
32. Finding Concurrency Bugs with Context-Aware *UW Industry Affiliates 2009*
Communication Graphs
33. A Case for System Support for Concurrency Exceptions *Usenix HotPar 2009*
34. Atom-Aid: Surviving and Detecting Atomicity Violations *ISCA 2008*
35. Atom-Aid: Surviving and Detecting Atomicity Violations *UW Industry Affiliates 2008*

PATENTS

1. An Energy-interference-free Hardware-software Debugger for Intermittent Energy-harvesting Systems (Provisional) March 2016
Brandon Lucia and Alanson Sample
2. Systems and Methods for Finding Concurrency Errors. Patent #: US0144372A1 Dec. 2011
Luis Ceze and Brandon Lucia
3. Efficient Deterministic Multiprocessing. Patent #: EP2266026A1 Dec. 2010
Luis Ceze, Joseph Devietti, Mark Oskin, and Brandon Lucia
Licensed for commercial use to Corensic, 2009

OTHER PROFESSIONAL EXPERIENCE

- IBM T.J. Watson Research Center** Summer 2009
Research Intern
- Tufts University** 2006-2007
Undergraduate Research Assistant, Advisor Sam Guyer
- Tufts University** 2005-2006
Undergraduate Research Assistant, Advisor Soha Hassoun
- ExtraHop Networks** Summer 2007
Software Engineering Intern
- UBS Securities, Japan** Summer 2006
Software Engineering Intern

MUSIC EXPERIENCE AND RECORDING CREDITS

- Solo Work** 2008-Present
Computer Music, Percussion <http://brandonlucia.com/music.html>
- **Chango** Ongoing Work
Computer Instrument. <http://brandonlucia.com/chango.html>
 - **Racer Sessions Curatorial Debut - "netcat"** April 15th 2011
with David Balatero. Network Audiolyzation and Live Percussion.
 - **Racer Sessions Curatorial Debut - "No Air Mv. 3" and "Internet Music"** ... January 13th 2012
with Tony Fader. Solo Chango, Speech Synthesis, and Algorithmic Music
 - **Sonarchy Radio on KEXP Seattle** Aired November 27th 2011
with Jen Gilleran (drums), Don Berman (drums), Kate Olson (sax), Steve Treseler (sax). Drums.
 - **Racer Sessions Curatorial Debut - "No Air Mv. 1 & 2"** April 17th 2011
Solo Chango and Headlamp.
 - **Racer Sessions Compilation - "Nondeterminate" (contributed track)** Released Jan. 2011
Table & Chairs Records
 - **Racer Sessions Curatorial Debut - "Nondeterminate"** October 3rd 2010
Solo Audiolyzed Computer Program Execution.
- netcat** 2013-Present
Computer Music, Mixed Percussion <http://netcat.co>
- **Cycles Per Instruction** Released April 2014
Table & Chairs Records
- King Tears Bat Trip** 2011-Present
Computer Music, Mixed Percussion

· **(Self-Titled Album)** Released January 2012
Table & Chairs Records

The Foghorns 2009
Drums

· **A Diamond as Big as the Motel 6** Released December 2009
Beefy Beef Records