BRANDON LUCIA

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+1 · (518) · 256 · 0485 ◇ blucia@andrew.cmu.edu◇ https://brandonlucia.com

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

Sathaye Family Career Development Associate Professor *2020-present*
Carnegie Mellon University, Department of Electrical and Computer Engineering

Assistant Professor *2015-2020*
Carnegie Mellon University, Department of Electrical and Computer Engineering

Microsoft Research *2013-2014*
Researcher, Advanced and Robust Computing (ARC) Group

HONORS, AWARDS, AND ACCOMPLISHMENTS

Sloan Foundation Faculty Fellowship ..... *February 2021*
ASPLOS Best Paper Award ..... *March 2020*
Received VMWare Early Career Grant Award ..... *February 2020*
Paper on Orbital Edge Computing Selected **Best of Computer Architecture Letters** and IEEE Computer Research Spotlight ..... *December 2019*
Named Sathaye Family Career Development Associate Professor of ECE ..... *July 2019*
Received IEEE Technical Committee on Computer Architecture Young Computer Architect Award ... *June 2019*
Successfully launched intermittent computing ChipSat as part of NASA KickSat-2 mission ... *March 2019*
Paper Selected for **IEEE MICRO Top Picks** in Computer Architecture Honorable Mention *2018*
National Science Foundation CAREER Award *2018*
IISWC Best Paper Award *2018*
ASPLOS Best Paper Award *2018*
Selected for "People of the ACM" profile/interview *2017*
Paper Selected for **IEEE MICRO Top Picks** in Computer Architecture *2016*
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 Bandes Memorial Award for Excellence in Teaching Honorable Mention *2011*
IBM Ph.D. Fellowship *2010*
Paper Selected for **IEEE MICRO Top Picks** in Computer Architecture *2009*

Paper Selected for **IEEE MICRO Top Picks** in Computer Architecture *2008*
Faithful Steward Graduate Fellowship, University of Washington *2007*
Clairmont L. Egtvedt Graduate Fellowship, University of Washington *2007*
CUSP Scholarship, Tufts University *2007*

RESEARCH FUNDING – AS PI

Sloan Foundation Faculty Fellowship. ($75,000) ..... *February 2021*

US Army Contracting Command - Aberdeen Proving Ground: Devloping efficient ultra-low-power AI/ML algorithms and applications deployed at the edge. ($1,000,000) ..... *November 2020 – November 2021*

National Science Foundation Award #2007998: SHF: Small: Practical and Formal Foundations for Intermittent Computer Systems ($493,875) ..... *June 2020 – May 2023*

Gift from Lockheed Martin ($68,000) ..... *September 2019*

SRC JUMP Supplementary Funding: Architecture and System Support for Efficient Graph Processing at the Edge ($450,000) ..... w/ Christopher Batten *September 2018 – September 2023*

Kavcic-Moura Fund Award: Perpetual Autonomous Networked Systems with Global Infrastructure-free Operation ($1,350,000) ..... w/ Anthony Rowe, Swarun Kumar, Vyas Sekar *March 2018 – February 2021*

National Science Foundation Award #1751029: CAREER: System Support for Capable, Reliable Intermittent Systems ($654,500) ..... *January 2018 – December 2022*

National Science Foundation Award #1629196: XPS: Full: Collaborative Research: Rethinking Architecture Support for Memory Consistency ($825,000) ..... w/ Michael Bond *September 2016 – August 2020*

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) ..... *September 2015 – August 2018*

Gift from Disney Research ($78,000) ..... *September 2015*

Google Faculty Research Award ($71,000) ..... *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) ..... *March 2015*

RESEARCH FUNDING – AS CO-PI

SRC JUMP Research Center "Computing on Network Infrastructure for Pervasive Perception, Cognition, and Action" ($27,000,000) ..... Anthony Rowe, Prabal Dutta, Jeffery Bilmes, Rastislav Bodik, Danijela Cabric, David Culler, Ramesh Govindan, Rajesh Gupta, Hao Li, Chris Harrison, James Hoe, Brandon Lucia, Bryan Parno, Jan Rabaey, Vyas Sekar, Virginia Smith, Mani Srivastava, Deian Stefan, Paulo Tabuadua, Claire Tomlin, John Wawrzynek *January 2018 – January 2023*

National Science Foundation Award #1815882: "SHF: Small: Deep Neural Network Inference on Energy-harvesting Devices" ($450,000) ..... Nathan Beckmann and Brandon Lucia *October 2018 – October 2021.*

Intel Science and Technology Center for Visual Cloud Systems ($3,500,000) ..... David Andersen, Kayvon Fatahalian, Mahadev Satyanarayanan, Greg Ganger, Phil Gibbons, Todd Mowry, Brandon Lucia, Andy Pavlo, Deva Ramanan, and Patrick Hanrahan *September 2016 – September 2019*

PHD STUDENTS

McKenzie Van Der Hagen ..... *Fall 2019 –*

Harsh Desai ..... *Fall 2018 –*

Bradley Denby ..... *Fall 2018 –*

Graham Gobieski (co-advised w/ Nathan Beckmann) ..... *Fall 2017 –*

Milijana Surbatovich (co-advised w/ Limin Jia) ..... *Fall 2017 –*

Kiwan Maeng ..... *Fall 2016 – Summer 2021*
First employment: Tenure-track Assistant Professor at Pennsylvania State University.

Emily Ruppel ..... *Fall 2016 –*

Vignesh Balaji ..... *Fall 2015 – Summer 2021*
First employment: Researcher at NVidia Research.

Alexei Colin ..... *Fall 2015 – Summer 2018*
First employment: Researcher at USC Information Science Institute.

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

PUBLICATION RECORD

Conference Publications

1. Understanding and Improving Failure Tolerant Training for Deep Learning Recommendation with Partial Recovery ..... *MLSys 2021*
   Kiwan Maeng, Shivam Bharuka, Isabel Gao, Mark Jeffrey, Vikram Saraph, Bor-Yiing Su, Caroline Trippel, Jiyan Yang, Mike Rabbat, Brandon Lucia, Carole-Jean Wu
2. P-OPT: Practical Optimal Cache Replacement for Graph Structured Data ..... *HPCA 2021*
   Vignesh Balaji, Neal Crago, Aamer Jaleel, Brandon Lucia
   HPCA 2021 Best Paper Award Nominee
3. Automatically Enforcing Fresh and Consistent Inputs in Intermittent Systems ..... *PLDI 2021*
   Milijana Surbatovich, Limin Jia, Brandon Lucia
4. The Role of Edge Offload for Hardware-Accelerated Mobile Devices ..... *HotMobile 2021*
   Mahadev Satyanarayanan, Nathan Beckmann, Grace A. Lewis, Brandon Lucia
5. SNAFU: An Ultra-low-power CGRA-generation Framework and Architecture ..... *ISCA 2021*
   Graham Gobieski, Brandon Lucia, Nathan Beckmann
6. Toward a Formal Foundation for Intermittent Computing ..... *OOPSLA 2020*
   Milijana Surbatovich, Brandon Lucia, and Limin Jia
7. Adaptive Low-Overhead Scheduling for Periodic and Reactive Intermittent Execution ..... *PLDI 2020*
   Kiwan Maeng and Brandon Lucia
8. Orbital Edge Computing: Nanosatellite Constellations as a New Class of Computing System *ASPLOS 2020*
   Bradley Denby and Brandon Lucia
   ASPLOS 2020 Best Paper Award
9. Architectural Support for Avoiding Failures with Fail-Stop Memory Consistency ..... *ASPLOS 2020*
   Rui Zhang, Swarnendu Biswas, Vignesh Balaji, Michael Bond, Brandon Lucia
10. Combining Data Duplication and Graph Reordering to Accelerate Parallel Graph Processing .. *HPDC 2019*
    Vignesh Balaji and Brandon Lucia

11. MANIC: An Energy-Efficient, Parallel Architecture for Ultra-Low-Power Embedded Systems . *MICRO 2019*
    Graham Gobieski, Amolak Nagi, Nathan Serafin, Mehmet Meric Isgenc, Nathan Beckmann, and Brandon Lucia
12. I/O Dependent Idempotence Bugs in Intermittent Systems ..... *OOPSLA 2019*
    Milijana Surbatovich, Limin Jia, and Brandon Lucia
13. The Computing Landscape of the 21st Century ..... *HotMobile 2019*
    Mahadev Satyanarayanan, Wei Gao, Brandon Lucia
14. Rethinking Support for Region Conflict Exceptions ..... *IPDPS 2019*
    Swarnendu Biswas, Rui Zhang, Michael Bond, Brandon Lucia
15. CoNDA: Enabling Efficient Near-Data Accelerator Communication by Optimizing Data Movement *ISCA 2019*
    Amirali Boroumand, Saugata Ghose, Minesh Patel, Rachata Ausavarungnirun, Hasan Hassan, Brandon Lucia, Kevin Hsieh, Nastaran Hajinazar, Krishna T. Mallad, Hongzhong Zheng, Onur Mutlu
16. Degree-directed Data Replication for Fast Graph Analytics ..... *HPDC 2019*
    Vignesh Balaji and Brandon Lucia
17. Supporting Peripherals in Intermittent Systems with Just-In-Time Checkpoints ..... *PLDI 2019*
    Kiwan Maeng and Brandon Lucia
18. Transactional Concurrency for Intermittent Systems ..... *PLDI 2019*
    Emily Ruppel and Brandon Lucia
19. Intelligence Beyond the Edge: Inference on Intermittent Embedded Systems ..... *ASPLOS 2019*
    Graham Gobieski, Brandon Lucia, and Nathan Beckmann
20. When is Graph Reordering an Optimization? ..... *IISWC 2018*
    Vignesh Balaji and Brandon Lucia
    IISWC 2018 Best Paper Award
21. Adaptive Dynamic Checkpointing for Safe Efficient Intermittent Computing ..... *OSDI 2018*
    Kiwan Maeng and Brandon Lucia
22. Intermittent Deep Neural Network Inference ..... *SysML 2018*
    Graham Gobieski, Nathan Beckmann, and Brandon Lucia
23. Termination Checking and Task Decomposition for Task-Based Intermittent Programs ..... *CC 2018*
    Alexei Colin and Brandon Lucia
24. SOFRITAS: Serializable Ordering-Free Regions for Increasing Thread Atomicity Scalably ... *ASPLOS 2018*
    Christian Delozier, Ariel Eizenberg, Brandon Lucia, Joseph Devietti
25. A Reconfigurable Energy Storage Architecture for Energy-harvesting Devices ..... *ASPLOS 2018*
    Alexei Colin, Emily Ruppel, Brandon Lucia
    ASPLOS 2018 Best Paper Award *and* **Selected for IEEE Micro Top Picks '18 Honorable Mention**
26. Alpaca: Intermittent Execution Without Checkpoints ..... *OOPSLA 2017*
    Kiwan Maeng, Alexei Colin, Brandon Lucia
27. An Energy-Aware Debugger for Intermittently Powered Systems ..... *IEEE Micro, Top Picks 2017*
    Alexei Colin, Graham Harvey, Alanson Sample, Brandon Lucia
28. Intermittent Computing: Challenges and Opportunities ..... *SNAPL 2017*
    Brandon Lucia, Vignesh Balaji, Alexei Colin, Kiwan Maeng, and Emily Ruppel
29. Chain: Tasks and Channels for Reliable Intermittent Programs ..... *OOPSLA 2016*
    Alexei Colin and **Brandon Lucia**

30. 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 2016
31. Production-guided Concurrency Debugging ..... *PPoPP 2016*
Nuno Machado, **Brandon Lucia**, and Luís Rodrigues
32. Energy-interference-free System and Toolchain Support for Energy-harvesting Devices .. *CASES 2015 (invited)*
Alexei Colin, Alanson P. Sample, **Brandon Lucia**
33. 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***
34. A Simpler, Safer Programming and Execution Model for Intermittent Systems ..... *PLDI 2015*
Brandon Lucia and Benjamin Ransford
35. Concurrency Debugging with Differential Schedule Projections ..... *PLDI 2015*
Nuno Machado, **Brandon Lucia**, and Luís Rodrigues
36. Data Provenance Tracking for Concurrent Programs ..... *CGO 2015*
Brandon Lucia and Luis Ceze
37. Cooperative Empirical Failure Avoidance for Multithreaded Programs ..... *ASPLOS 2013*
Brandon Lucia and Luis Ceze
38. IFRit: Interference-free Regions for Dynamic Data-Race Detection ..... *OOPSLA 2012*
Laura Effinger-Dean, **Brandon Lucia**, Dan Grossman, Luis Ceze, and Hans-J. Boehm
39. Isolating and Understanding Concurrency Errors Using ..... *PLDI 2011*
Reconstructed Execution Fragments
Brandon Lucia, Benjamin P. Wood, and Luis Ceze
40. ColorSafe: Architectural Support for Debugging and Dynamically ..... *ISCA 2010*
Avoiding Multi-variable Atomicity Violations
Brandon Lucia, Luis Ceze, and Karin Strauss
41. 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
42. Finding Concurrency Bugs with Context-Aware Communication Graphs ..... *MICRO 2009*
Brandon Lucia and Luis Ceze
43. DMP: Deterministic Shared-memory MultiProcessing ..... *ASPLOS 2009*
Joseph Devietti, **Brandon Lucia**, Mark Oskin, and Luis Ceze
Selected for IEEE Micro Top Picks '09
44. Atom-Aid: Surviving and Detecting Atomicity Violations ..... *ISCA 2008*
Brandon Lucia, Joseph Devietti, Karin Strauss, and Luis Ceze
Selected for IEEE Micro Top Picks '08

Journal Publications

1. Power-aware Heterogeneous Architecture Scaling for Energy-harvesting computers ..... *Computer Architecture Letters Vol. 19, Issue 1, Jan-June 2020*
Harsh Desai and Brandon Lucia
2. Orbital Edge Computing: High Throughput Data Processing with Nanosatellites ..... *Computer Architecture Letters*
Bradley Denby and Brandon Lucia
April 2019

Selected as Best of CAL 2019
Selected for IEEE Computer Spotlight on Transactions 2020

3. 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
4. Concurrency Debugging with Differential Schedule Projections ..... *Trans. on Software Engineering and Methodology, 2015*
   Nuno Machado, **Brandon Lucia**, Luís Rodrigues
   July 2015

Workshop Publications

1. Migratory Trash Clouds ..... *ASPLOS "Wild and Crazy Ideas" 2018*
   Emily Ruppel, Alexei Colin, and Brandon Lucia
2. Non-volatile Memory is a Broken Time Machine .... *Workshop on Memory System Performance and Correctness 2014 (@ PLDI)*
   Benjamin Ransford and **Brandon Lucia**
3. Systems Should Automatically Specialize Code and Data *Workshop on Probabilistic and Approximate Computing 2014 (@ PLDI)*
   Brandon Lucia and Todd Mytkowicz
4. Playing Cupid: The IDE as a Matchmaker for Plug-Ins ..... *TOPI 2012 (@ ICSE)*
   Todd Schiller and **Brandon Lucia**
5. Automatic Empirical Failure Avoidance Support ..... *WoDET 2012 (@ ASPLOS)*
   for Concurrent Software
   Brandon Lucia and Luis Ceze
6. Greedy Coherence ..... *HPPC 2011 (@ MICRO)*
   Emily Fortuna, **Brandon Lucia**, Adrian Sampson,
   Benjamin P. Wood, and Luis Ceze
7. Hardware Watchmachines ..... *PLDI FIT 2011*
   Nicholas Hunt, **Brandon Lucia**, and Luis Ceze
8. Lock Prediction ..... *Usenix HotPar 2010*
   Brandon Lucia, Joseph Devietti, Tom Bergan,
   Luis Ceze, and Dan Grossman
9. The Case for System Support for Concurrency Exceptions ..... *Usenix HotPar 2009*
   Luis Ceze, Joseph Devietti, **Brandon Lucia**, and Shaz Qadeer
10. 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 18-213 Introduction to Computer Systems ..... *Fall 2020*
Instructor (co-teaching with Brian Railing)

ECE 18-742 Advanced Computer Architecture and Systems ..... *Spring 2020*
Instructor

ECE 18-742 Advanced Computer Architecture and Systems ..... *Fall 2019*
Instructor

ECE 18-213 Introduction to Computer Systems ..... *Spring 2019*
Instructor (co-teaching with Seth Goldstein)

ECE 18-742 Advanced Computer Architecture and Systems ..... *Fall 2018*
Instructor

ECE 18-742 Advanced Computer Architecture and Systems ..... *Spring 2018*
Instructor

ECE 18-500 ECE Design Experience ..... *Fall 2017*
Instructor

ECE 18-742 Advanced Computer Architecture and Systems ..... *Spring 2017*
Instructor

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. General Chair ..... *6th Annual ACM Workshop on Energy-Neutral Systems (ENSsys) 2019*
2. Invited Contributor NSF Visioning Workshop on Grand Challenges in Inter-disciplinary Research 2018
3. ASPLOS Wild and Crazy Ideas Program Chair ..... *ASPLOS 2019*
4. Publicity Chair ..... *PLDI 2018*
5. Steering Committee ..... *ACM Workshop on Energy-Neutral Systems (ENSsys)*
6. Program Chair ..... *ACM WOrkshop on Energy-Neutral Systems (ENSsys) 2017*
7. Organizer ..... *DARPA ISAT Workshop on Space Cyber-Infrastructure to Foster Innovation (SCI-FI)*
8. Artifact Evaluation Committee co-chair ..... *PLDI 2017, 2018*
9. Student Travel Grant Chair ..... *CGO 2017*
10. Invited Guest Editor ..... *Transactions on Parallel Computing, Special Issue: Best of PPoPP 2016*
11. Program and General Co-chair ..... *1st Workshop on Hilariously Low-power Computing, 2016*
12. Program and General Co-chair ..... *5th Workshop on Determinism and Correctness in Parallel Programming, 2015*
13. Program and General Co-chair ... *1st Microsoft Research Workshop on Ultra Low Power Computing, 2014*

Technical Program Committees

1. 2021 ..... *ASPLOS, HPCA, Usenix ATC, PLDI*
2. 2020 ..... *ASPLOS, Usenix ATC*
3. 2019 ..... *ISCA, ASPLOS, OOPSLA*
4. 2018 ..... *ISCA, PLDI*
5. 2017 ..... *MICRO, ISCA, ECOOP*
6. 2016 ..... *PPoPP, PLDI, IPDPS, WWW*

7. 2015 ..... *IISWC, IPDPS, APPT, WoDET*
8. 2014 ..... *WoDET*

INVITED TALKS, PRESENTATIONS, AND EVENTS

1. Energy-minimal Computer Architectures for Nanosatellite Systems ..... *Invited Talk, DARPA SSITH Program Review, February 2021*
2. Reliable Intermittent Computing on Earth and in Space .. *Invited Talk, Microsoft Research, February 2021*
3. Reliable Intermittent Computing on Earth and in Space ..... *Invited Talk, OOPSLA REBASE 2020*
4. Reliable Intermittent Computer Systems ...in Space! ... *Invited Talk, Workshop on Negative Results, Outcomes, Postmortems, and Experience Reports (NOPE) 2019 (co-located with ASPLOS 2019)*
5. Reliable Intermittent ChipSat-Based Computer Systems *Invited Talk, Breakthrough Starshot ChipSat Workshop, March 2019*
6. Reliable Intermittent Systems ..... *Invited Talk, Stanford, March 2019*
7. Reliable Intermittent Systems ..... *Invited Talk, MIT, March 2019*
8. "Getting Started with Intermittent Computing" ..... *Interactive Tutorial, MICRO 2018*
9. SRC JUMP CONIX Research Center Annual Review ..... *Invited Talk, September 2018*
10. Programming Languages Mentoring Workshop ..... *Invited Talk, June 2018*
11. Reliable Intermittent Systems ..... *Invited Talk, EnerHarv Conference, June 2018*
12. Programming Intermittent Systems .... *Invited Lecture, IDEA League Doctoral School on Transiently Powered Computing, November 2017*
13. Intermittent Visual Computing ... *Invited Talk, Intel Science and Technology Center on Visual Cloud Systems Retreat, November 2017*
14. Reliable Intermittent Systems .. *Invited Talk, Workshop on Software Correctness and Reliability, ETH Zurich, October 2017*
15. Programming Intermittent Systems ..... *Invited Talk, Symposium on Advances in Programming Languages, May 2017*
16. Open Challenges in Intermittent Computing ..... *Invited Talk, Duke University, May 2017*
17. Programming and Debugging Intermittent Computers ... *Keynote Talk, Workshop on Energy-neutral Systems, November 2016*
18. Reliable Intermittent Systems ..... *Invited Talk, TU Delft, November 2016*
19. Reliable Intermittent Systems ..... *Invited Talk, Cornell University, August 2016*
20. Reliable Intermittent Systems ..... *Invited Talk, Princeton University, August 2016*
21. Reliable Intermittent Systems ..... *Invited Talk, Texas Instruments, Kilby Research Center, July 2016*
22. Programming and Debugging Intermittent Computers ..... *Invited Talk, MobiTools Workshop 2016*
23. Reliable Intermittent Systems ..... *Invited Talk, Columbia University, May 2016*
24. Reliable Intermittent Systems ..... *Invited Talk, IST Lisbon, March 2016*
25. Reliable Intermittent Systems ..... *Invited Talk Microsoft Research, February 2016*
26. Bell Labs Prize Winner's Lecture ..... *Invited Talk, December 2015*
27. CMU CyLab Partners Conference ..... *Invited Talk, September 2015*
28. Energy-interference-free System and Toolchain Support for Energy-harvesting Devices ... *Invited Talk CASES 2015*

29. System and Toolchain Support for Energy-harvesting Devices *CMU CyLab Partners Conference 2015*
30. Reliable, Programmable Intermittent Systems .. *Invited Talk, Bell Labs Prize, Semi-finalists Meeting, June 2015*
31. Invited Attendee ..... *MSR Faculty Summit 2015*
32. A Simpler, Safer Programming and Execution Model for Intermittent Systems ..... *PLDI 2015*
33. Reliability in Intermittent Systems ..... *Invited Talk at Intel, May 2015*
34. Data Provenance Tracking for Concurrent Programs ..... *CGO 2015*
35. Dealing with the Hidden Challenges of Intermittent Execution .. *CMU ECE Graduate Seminar Series, January 2015*
36. The Hidden Challenges of Intermittent Execution ..... *Invited Talk, MSR Faculty Summit 2014*
37. ISAT: Survivalist/Intermittent Computing and Communications ..... *Invited Expert Panelist*
38. Tools in the Real World ..... *HotPar 2013 (Talk and Panel)*
39. Automatic Empirical Failure Avoidance ..... *ASPLOS 2013*
40. Automatically Avoiding Errors in Concurrent Programs ..... *UW Industry Affiliates 2012*
41. Automatic Empirical Failure Avoidance ..... *WoDET 2012 (@ ASPLOS)*
42. Recon: Isolating and Understanding Concurrency Errors ..... *PLDI 2011*
    Using Reconstructed Execution Fragments
43. Understanding Concurrency Errors and Avoiding ..... *Invited Colloquium*
    System Failures *at Tufts University*
44. Detecting and Avoiding Errors in Concurrent Software ..... *Dagstuhl Seminar 11011*
45. Conflict Exceptions: Providing Simple Parallel Language ..... *ISCA 2010*
    Semantics with Precise Hardware Exceptions
46. ColorSafe: Architectural Support for Debugging and ..... *ISCA 2010*
    Dynamically Avoiding Multi-variable Atomicity Violations
47. Finding Concurrency Bugs with Context-Aware ..... *MICRO 2009*
    Communication Graphs
48. Finding Concurrency Bugs with Context-Aware ..... *UW Industry Affiliates 2009*
    Communication Graphs
49. A Case for System Support for Concurrency Exceptions ..... *Usenix HotPar 2009*
50. Atom-Aid: Surviving and Detecting Atomicity Violations ..... *ISCA 2008*
51. Atom-Aid: Surviving and Detecting Atomicity Violations ..... *UW Industry Affiliates 2008*

PATENTS

1. A System for Orbital Edge Computing in Batteryless Nanosatellite Systems. USPTO Application #17/220,861 ..... April 2021
   Brandon Lucia and Bradley Denby
2. Ultra-low-power vector-dataflow processor architecture. Provisional Filed. USPTO Application #63/143061 & #63/090752 ..... August 2020
   Brandon Lucia, Nathan Beckmann, and Graham Gobieski
3. An Energy-interference-free Hardware-software Debugger for Intermittent Energy-harvesting Systems. Patent App. Ser. #15/938,216 ..... October 2018
   Brandon Lucia and Alanson Sample
4. Systems and Methods for Finding Concurrency Errors. Patent #: US0144372A1 ..... Dec. 2011
   Luis Ceze and Brandon Lucia

5. 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 *https://brandonlucia.com/music.html*

- **Chango** ..... *Ongoing Work*
  Computer Instrument. *https://brandonlucia.com/chango.html*
- **Racer Sessions Curatorial Debut - "netcat"** ..... *April 15^{th} 2011*
  with David Balatero. Network Audiolyzation and Live Percussion.
- **Racer Sessions Curatorial Debut - "No Air Mv. 3" and "Internet Music"** ..... *January 13^{th} 2012*
  with Tony Fader. Solo Chango, Speech Synthesis, and Algorithmic Music
- **Sonarchy Radio on KEXP Seattle** ..... *Aired November 27^{th} 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 17^{th} 2011*
  Solo Chango and Headlamp.
- **Racer Sessions Compilation - "Nondeterminate" (contributed track)** ..... *Released Jan. 2011*
  Table & Chairs Records
- **Racer Sessions Curatorial Debut - "Nondeterminate"** ..... *October 3^{rd} 2010*
  Solo Audiolyzed Computer Program Execution.

netcat *2013-Present*
Computer Music, Mixed Percussion *https://netcat.co*

- **Before the Orbit** ..... *Released March 2020*
  Independent Release
- **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