

Ian Glen Neal
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Summary

My goal, both in my graduate research and in my work in industry settings (e.g., Microsoft Research and IBM Research), is to help developers write correct and efficient systems. To this end, I aim to design tools and techniques that allow developers to automate difficult software development tasks, such as bug detection (e.g., software testing), bug correction (e.g., program repair), and bug reproduction (e.g., root cause diagnosis). I ultimately want developers to spend less time debugging and more time innovating! As my research touches many aspects of software engineering, I am broadly interested in: compiler design, program analysis, testing and verification, and system security.

Education

The University of Michigan Sept. 2018–Present
Ph.D. in Computer Science and Engineering (Candidate) **GPA: 3.961**
Professional Development Certificate: Diversity, Equity, and Inclusion
Advisor: Assistant Professor **Baris Kasikci**
Thesis: Automating the Detection, Correction, and Reproduction of Failures in Modern Software Systems

The University of Michigan Sept. 2018–Jan. 2021
M.Sc.E. in Computer Science and Engineering **GPA: 3.961**

The University of Texas at Austin Aug. 2013–May 2018
B.Sc. in Computer Science
Special Honors: Turing Scholars Honors Program
Thesis: The Advantages of a Transactional Interface: Porting Applications to TxFS
B.Sc. in Electrical Engineering
Minor in Biblical Hebrew

Recent Employment

Microsoft Research Remote in USA
Research Intern in Microsoft Systems Research Group and Microsoft Azure May 2022–Aug. 2022

- Prototyped automated incident reproduction techniques for services running on Microsoft Azure.
- Developed an unsupervised, time-series clustering analysis to find correlations between metric anomalies and production incidents.
- Implemented a reproduction system that faithfully reproduces incident symptoms by manipulating the service environment (e.g., adding workload, resource contention).

IBM Research Remote in USA
Research Intern in Hybrid Cloud May 2021–Aug. 2021

- Developed new testing infrastructure to verify network functions across hardware and software.
- Created extensions to the KLEE symbolic execution framework to support testing network applications.
- Wrote and filed a patent collaboratively on research contributions.

University of Michigan Ann Arbor, Michigan, USA
Graduate Research Assistant Sept. 2018–Present

- Creating novel techniques for accurately and efficiently finding, fixing, and reproducing bugs.
- Creating novel techniques for improving the reliability of persistent main memory (PM) systems.
- Automating incident reproduction in active collaboration with Microsoft Azure Systems Research.

Microsoft

Redmond, Washington, USA

Software Engineering Intern

May 2018–Aug. 2018

- Created real-time video processing module to automatically adjust brightness for low-vision users.
- Led invention of novel techniques for smooth brightness adjustment.
- Filed 3 US patents based on my intellectual contributions.

Peer-Reviewed Publications

- [1] Kevin Loughlin, **Ian Neal**, Jiacheng Ma, Elisa Tsai, Ofir Weisse, Satish Narayanasamy, Baris Kasikci. DOLMA: Securing Speculation with the Principle of Transient Non-Observability. In Proceedings of the 30th USENIX Security Symposium (USENIX Security '21). August 2021. [\[link\]](#)
- [2] Tanvir Ahmed Khan, **Ian Neal**, Gilles Pokam, Barzan Mozafari, Baris Kasikci. DMon: Efficient Detection and Correction of Data Locality Problems Using Selective Profiling. In Proceedings of the 15th USENIX Symposium on Operating Systems Design and Implementation (OSDI '21). July 2021. [\[link\]](#)
- [3] **Ian Neal**, Andrew Quinn, Baris Kasikci. HIPPOCRATES: Healing Persistent Memory Bugs Without Doing Any Harm. In Proceedings of the 26th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS '21). April 2021. [\[link\]](#)
- [4] **Ian Neal**, Gefei Zuo, Eric Shiple, Tanvir Ahmed Khan, Youngjin Kwon, Simon Peter, Baris Kasikci. Rethinking File Mapping for Persistent Memory. In Proceedings of the 19th USENIX Conference on File and Storage Technologies (FAST '21). February 2021. [\[link\]](#)
- [5] **Ian Neal**, Ben Reeves, Ben Stoler, Andrew Quinn, Youngjin Kwon, Simon Peter, Baris Kasikci. AGAMOTTO: How Persistent is your Persistent Memory Application?. In Proceedings of the 14th USENIX Symposium on Operating Systems Design and Implementation (OSDI '20). November 2020. **IEEE Micro 2021 Top Picks Honorable Mention.** [\[link\]](#)
- [6] Ofir Weisse, **Ian Neal**, Kevin Loughlin, Thomas F. Wenisch, and Baris Kasikci. NDA: Preventing Speculative Execution Attacks at Their Source. In Proceedings of the 52nd Annual IEEE/ACM International Symposium on Microarchitecture (MICRO '19). October 2019. **IEEE Micro 2019 Top Picks Honorable Mention.** [\[link\]](#)
- [7] Yige Hu, Zhiting Zhu, **Ian Neal**, Youngjin Kwon, Tianyu Cheng, Vijay Chidambaram, and Emmett Witchel. TxFS: Leveraging File-System Crash Consistency to Provide ACID Transactions. In 2018 USENIX Annual Technical Conference (USENIX ATC '18). July 2018. **Awarded Best Paper.** [\[link\]](#)

Workshop Presentations

- [9] **Ian Neal**, Andrew Quinn, Baris Kasikci. Towards Bug-free Persistent Memory Applications. In the 12th Annual Non-Volatile Memories Workshop (NVMW '21). March 2021. [\[link\]](#)

Patents

Method to Verify Functionality of Hardware Network Pipelines via Symbolic Execution (IBM)	Pending
Video Frame Brightness Filter (Microsoft)	US Patent 10,909,403 [link]
User-Specific Video Frame Brightness Filter (Microsoft)	US Patent 10,778,932 [link]
Color-Specific Video Frame Brightness Filter (Microsoft)	US Patent App. 16/210,667 [link]

Recent Honors and Awards

Richard F. and Eleanor A. Towner Prize for Distinguished Academic Achievement	2022
Facebook Fellowship Finalist	2021
IEEE Micro 2021 IEEE Top Picks Honorable Mention	2021
IEEE Micro 2019 IEEE Top Picks Honorable Mention	2019
USENIX Annual Technical Conference Best Paper Award	2018
Richard H. Orenstein Graduate Fellowship in Memory of Murray Orenstein	2018–2019

National Science Foundation (NSF) Research Experiences for Undergraduates (REU) Grant
CRA Outstanding Undergraduate Researcher Award (Honorable Mention)

2018
2017