

# BARIS KASIKCI

*Assistant Professor*

Electrical Engineering and Computer Science  
University of Michigan

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## RESEARCH INTERESTS

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My research is centered around developing techniques, tools, and environments that help developers build more reliable, secure, and efficient software. I am interested in developing techniques and building systems that allow programmers to better reason about their code. I am also interested in system support for emerging hardware platforms, efficient runtime instrumentation, hardware and runtime support for enhancing system security, and program analysis.

## EDUCATION

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### **Ecole Polytechnique Fédérale de Lausanne (EPFL)**

*Lausanne, Switzerland*

*Ph.D. in Computer Science*

Sep. 2010–Dec. 2015

Thesis: Techniques for Detection, Root Cause Diagnosis,  
and Classification of In-Production Concurrency Bugs

Advisor: Prof. George Candea

### **Middle East Technical University (METU)**

*Ankara, Turkey*

*M.Sc. in Electrical and Electronics Engineering*

Sep. 2006–Jun. 2009

Thesis: Variability Modeling in Software Product Lines

*Graduated with the top grade*

Advisor: Prof. Semih Bilgen

*B.Sc. in Electrical and Electronics Engineering*

Sep. 2002–Jun. 2006

Project: Embedded Target Estimation, Detection, and Tracking

*Graduated with High Honors*

Advisor: Prof. Arzu Koc

## AWARDS AND HONORS

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Jay Lepreau Best Paper Award, OSDI	2018
Outstanding Reviewer Award, WWW	2017
Patrick Denantes Memorial Prize for outstanding PhD thesis, EPFL	2016
EuroSys Roger Needham Award for Best PhD. Thesis in Computer Systems in Europe	2016
Intel Corp. Software and Services Group, Grant	2014–2016
VMware Inc., Doctoral Fellowship	2014–2015
EPFL, Doctoral Fellowship	2010–2011
Scientific and Technological Research Council of Turkey, Master Scholarship	2006–2008
Middle East Technical University, Dean’s High Honor List	2006
Middle East Technical University, Award for Best Team Performance, Undergraduate Final Project	2006
Turkish Customs Association, Scholarship	2002–2006

## FUNDING

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<b>Intel Faculty Award, Automated Performance Optimization, 75K USD, PI 2018</b>
<b>Intel Gift, SysTEX’18 Workshop Sponsorship, 2K USD, PI 2018</b>
<b>Michigan Cambridge Research Initiative, 15K USD, PI 2018</b>
<b>Applications Driving Architectures, 1,245M USD, PI 2018</b>
<b>Intel Faculty Award, Performance Debugging, 75K USD, PI 2017</b>

## EMPLOYMENT

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<b>University of Michigan</b> Assistant Professor Electrical Engineering and Computer Science Department	<i>Ann Arbor, Michigan, USA</i> Sep. 2017–present
<b>Microsoft Research</b> Researcher Research on computer systems and networks	<i>Cambridge, United Kingdom</i> Aug. 2016–Aug. 2017

**Ecole Polytechnique Fédérale de Lausanne (EPFL)**

Postdoctoral Researcher  
Research on software security

*Lausanne, Switzerland*

Dec. 2015–Jul. 2016

- I developed infrastructure that relies on hardware support to improve software security.

Research Assistant

Sep. 2010–Dec. 2015

Research on software reliability with an emphasis on concurrent software

- I developed **Gist**, the first technique for accurately, efficiently, and automatically diagnosing the root causes of in-production failures, by using a combination of static and dynamic program analysis.
- I developed **RaceMob**, the first automated in-production data race detection technique that can be kept always-on and provides high accuracy, by combining static data race detection with adaptive, crowdsourced dynamic data race detection.
- I developed **Portend**, a high-accuracy technique to classify data races according to their potential consequences under arbitrary memory models, by using symbolic program analysis to explore multiple program paths and schedules to determine the effects of data races.
- I developed **Bias-Free Sampling**, a technique that allows efficient sampling of rarely executed code (where bugs often lurk) without over-sampling frequently executed code, by using a new sampling algorithm and existing hardware support.

**Intel Corp.**

Research Intern

*Santa Clara, CA, USA*

Jul. 2015–Sep. 2015

Automated root cause diagnosis of failures and security enhancements using hardware support

- I developed a tool that allows developers to determine which program statements operate on a given data type at runtime using a mix of static program analysis and hardware support. In our experiments, this tool reduces the number of statements to examine during debugging by an order of magnitude. This tool is being extended internally at Intel.
- I began investigating hardware support for enhancing system security, in particular, efficient path profiling for auditing and detecting control flow hijack attacks.

**VMware Inc.**

Research and Development Intern

*Palo Alto, CA, USA*

Jun. 2014–Sep. 2014

Automated debugging and runtime control flow tracking

- I implemented a runtime for efficient control flow tracking in software. This work formed the basis of my **Gist** work on root cause diagnosis.
- I designed and implemented an infrastructure to remotely debug and profile VMware VCenter virtual machine management software, while it is running in production. This infrastructure is used by VCenter developers at VMWare.

**Microsoft Research**

Research Intern

*Redmond, WA, USA*

Jun. 2013–Sep. 2013

Efficient runtime execution sampling technique and low overhead coverage measurement

- I worked on the design of the **Bias-Free Sampling** framework for efficient runtime sampling. I designed and implemented the bias-free sampling framework for managed code (i.e., C#). This tool is internally used at Microsoft.
- I designed and implemented a fault injection tool to detect resource leakage problems using dynamic binary instrumentation.

## Siemens Corporate Technology

Senior Software Engineer  
Embedded home and industrial automation software

Istanbul, Turkey  
Mar. 2008–May 2010

- I designed and implemented a real-time embedded gateway software between Siemens communication processors and a building automation system using C++ on top of VxWorks.

## Aselsan Electronic Industries

Software Engineer  
Embedded motor control and functional testing infrastructure

Ankara, Turkey  
May 2006–Mar. 2008

- I was responsible for a real-time embedded control software for turret motor control. I also designed and implemented a full-system functional testing software using C++ on top of VxWorks for Power PC architectures.

Student Intern  
Embedded software development

Jun. 2005–Jul. 2005

- I developed embedded control software for a night vision camera using C++ and PIC assembly on a PIC microcontroller.

## PEER-REVIEWED PUBLICATIONS

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- [1] Morpheus: A Vulnerability-Tolerant Secure Architecture Based on Ensembles of Moving Target Defenses with Churn. Mark Gallagher, Lauren Biernacki, Shibo Chen, Zelalem Birhanu Aweke, Salessawi Ferede Yitbarek, Misiker Tadesse Aga, Austin Harris, Zhixing Xu, Baris Kasikci, Valeria Bertacco, Sharad Malik, Mohit Tiwari, and Todd Austin. *Intl. Conf. on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, Providence, RI, March 2019.
- [2] REPT: Reverse Debugging of Failures in Deployed Software. Xinyang Ge Weidong Cui, Baris Kasikci, Ben Niu, Upamanyu Sharma, Ruoyu Wang, and Insu Yun. *OSDI*, Carlsbad, USA, October 2018.
- [3] Foreshadow: Extracting the Keys to the Intel SGX Kingdom with Transient Out-of-Order Execution. Jo Van Bulck, Marina Minkin, Ofir Weisse, Daniel Genkin, Baris Kasikci, Frank Piessens, Mark Silberstein, Thomas F. Wenisch, Yuval Yarom, and Raoul Strackx. *USENIX Security*, Baltimore, USA, August 2018.
- [4] Cntr: Lightweight OS Containers. Jorg Thalheim, Pramod Bhatotia, Pedro Fonseca, and Baris Kasikci. *USENIX ATC*, Boston, USA, July 2018.
- [5] Foreshadow-NG: Breaking the Virtual Memory Abstraction with Transient Out-of-Order Execution. Ofir Weisse, Jo Van Bulck, Marina Minkin, Daniel Genkin, Baris Kasikci, Frank Piessens, Mark Silberstein, Raoul Strackx, Thomas F. Wenisch, and Yuval Yarom. *Technical report*, 2018.
- [6] Lazy Diagnosis of In-Production Concurrency Bugs. Baris Kasikci, Weidong Cui, Xinyang Ge, and Ben Niu. *Symp. on Operating Systems Principles (SOSP)*, Shanghai, China, October 2017.
- [7] Failure Sketching: A Technique for Automated Root Cause Diagnosis of In-Production Failures. Baris Kasikci, Benjamin Schubert, Cristiano Pereira, Gilles Pokam, and George Candea. *Symp. on Operating Systems Principles (SOSP)*, Monterey, CA, October 2015.
- [8] Failure Sketches: A Better Way to Debug. Baris Kasikci, Benjamin Schubert, Cristiano Pereira, Gilles Pokam, Madanlal Musuvathi, and George Candea. *Workshop on Hot Topics in Operating Systems*, Kartause Ittingen, Switzerland, May 2015.
- [9] Automated Classification of Data Races Under Both Strong and Weak Memory Models. Baris Kasikci, Cristian Zamfir, and George Candea. *ACM Transactions on Programming Languages and Systems (TOPLAS)*, May 2015.

- [10] Efficient Tracing of Cold Code Via Bias-Free Sampling. Baris Kasikci, Thomas Ball, George Candea, John Erickson, and Madanlal Musuvathi. *USENIX ATC*, Philadelphia, PA, June 2014.
- [11] Lockout: Efficient Testing for Deadlock Bugs. Ali Kheradmand, Baris Kasikci, and George Candea. *5th Workshop on Determinism and Correctness in Parallel Programming (WoDet)*, Salt Lake City, UT, March 2014.
- [12] RaceMob: Crowdsourced Data Race Detection. Baris Kasikci, Cristian Zamfir, and George Candea. *Symp. on Operating Systems Principles (SOSP)*, Farmington, PA, November 2013.
- [13] Automated Debugging for Arbitrarily Long Executions. Cristian Zamfir, Baris Kasikci, Johannes Kinder, Edouard Bugnion, and George Candea. *Workshop on Hot Topics in Operating Systems*, Santa Ana Pueblo, NM, May 2013.
- [14] CORD: A Collaborative Framework for Distributed Data Race Detection. Baris Kasikci, Cristian Zamfir, and George Candea. *Workshop on Hot Topics in Dependable Systems (HotDep)*, Hollywood, CA, October 2012.
- [15] Data Races vs. Data Race Bugs: Telling the Difference with Portend. Baris Kasikci, Cristian Zamfir, and George Candea. *Intl. Conf. on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, London, UK, March 2012.
- [16] Scalable Modeling of Software Product Line Variability. Baris Kasikci and Semih Bilgen. *Workshop on Scalable Modeling Techniques for Software Product Lines (SCALE)*, San Francisco, CA, August 2009.

## TALKS

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### **Towards Continuous In-Production Failure Diagnosis**

- Ohio State University (Invited Talk) July 2018
- Greater Chicago Area Systems Research Workshop, University of Chicago (Invited Talk) May 2018
- Purdue University (Invited Talk) May 2018

### **Hardware-Software Co-Design for Debugging and Performance Analysis**

- Workshop on Resilient Systems, TU Dresden (Keynote) Apr. 2017

### **Symbolic Execution: A Gentle Introduction**

- Cyber In Bretagne Summer School (Invited Talk) Jul. 2016

### **Stamping Out Concurrency Bugs**

- Royal Holloway, University of London, Seminar Apr. 2016
- Georgia Institute of Technology, Seminar Apr. 2016
- Carnegie Mellon University, Seminar Apr. 2016
- University of Southern California, Seminar Mar. 2016
- University of Rochester, Seminar Mar. 2016
- Microsoft Research Redmond, Seminar Mar. 2016
- Microsoft Research Cambridge, Seminar Mar. 2016
- MPI Software Systems, Seminar Mar. 2016
- University College London, Seminar Mar. 2016
- Rice University, Seminar Feb. 2016
- University of Toronto, Seminar Feb. 2016
- University of Michigan, Seminar Feb. 2016

• Boston University, Seminar	Feb. 2016
• Georgia Institute of Technology, Seminar	Feb. 2016
• VMWare Research, Seminar	Feb. 2016
• University of British Columbia, Seminar	Feb. 2016
• Simon Fraser University, Seminar	Jan. 2016
<b>Automated Root Cause Diagnosis of In-Production Failures</b>	
• Symposium on Operating System Principles (SOSP)	Oct. 2015
• Intel Corp.	Sep. 2015
• Google	Sep. 2015
• VMware Inc.	Sep. 2015
<b>Failure Sketches: A Better Way to Debug</b>	
• EcoCloud Annual Event	Jun. 2015
• Hot Topics in Operating Systems (HotOS)	May 2015
<b>Efficient Tracing of Cold Code via Bias-Free Sampling</b>	
• USENIX Annual Technical Conference (USENIX ATC)	Jun. 2014
<b>Lockout: Efficient Testing for Deadlock Bugs</b>	
• Workshop on Determinism and Correctness in Parallel Programming (WoDet)	Mar. 2014
<b>RaceMob: Crowdsourced Data Race Detection.</b>	
• Symposium on Operating System Principles (SOSP)	Oct. 2013
• EPFL Systems Seminar	Oct. 2013
<b>CoRD: A Collaborative Framework for Distributed Data Race Detection</b>	
• Workshop on Hot Topics in System Dependability (HotDep)	Oct. 2012
<b>Data Races vs. Data Race Bugs: Telling the Difference with Portend</b>	
• International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)	Mar. 2012
<b>How to Build Reliable Software?</b>	
• Seminar talk to the incoming undergraduate students at EPFL	Sep. 2011

## PROFESSIONAL SERVICE

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### PC Chair

Workshop on System Software for Trusted Execution (SysTEX) (co-located with CCS'18)	2018
Symposium on Cloud Computing (SoCC) Poster Session	2018

### PC Member

Symposium on Operating Systems Principles (SOSP)	2019
EuroSys	2019
International Conference on Virtual Execution Environments (VEE)	2019
International Conference on Distributed Computing Systems (ICDCS)	2019
EuroSys Roger Needham PhD Award Committee	2019
2019 EuroSys Doctoral Workshop (EuroDW)	2019
Symposium on Cloud Computing (SoCC)	2018
International Conference on Distributed Computing Systems (ICDCS)	2017
World Wide Web Conference (WWW)	2017
International Symposium on Software Testing and Analysis (ISSTA), Artifact Evaluation Committee	2014

### Journal Reviewer

Transactions on Architecture and Code Optimization	2018
Transactions on Software Engineering	2015
Transactions on Software Engineering and Methodology	2015

## Extended Review Committee

Intl. Conf. on Architectural Support for Programming Languages and Operating Systems (ASPLOS) 2018

## Shadow PC Member

EuroSys Conference on Computer Systems (EuroSys) 2013, 2015

## External Reviewer

Symp. on Operating Systems Principles (SOSP) 2011, 2013

EuroSys Conf. on Computer Systems (EuroSys) 2011, 2012

USENIX Annual Technical Conf. (USENIX ATC) 2011

Intl. Conf. on Compiler Construction (CC) 2017

Workshop on Hot Topics in Operating Systems (HotOS) 2011, 2013

Conf. on Innovative Data Systems Research (CIDR) 2013

Intl. Conf. on Dependable Systems and Networks (DSN) 2011, 2013

Symposium on Cloud Computing (SOCC) 2012

Intl. SPIN Workshop on Model Checking of Software (SPIN) 2011

## Committee Member

EPFL Doctoral School of Computer and Communication Sciences Audit Committee 2015

## TEACHING

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**Introduction to Operating Systems (EECS 482)** (undergrad level, University of Michigan) 2018, 2019

**Advanced Topics in Operating Systems (EECS 582)** (grad level, University of Michigan) 2017, 2019

## RESEARCH MENTORING

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### PhD

Tanvir Ahmed Khan Jan 2018–

Kevin Loughlin Sep 2018–

Andrew Loveless Sep 2018–

Jiacheng Ma Sep 2018–

Ian Neal Sep 2018–

Ofir Weisse Sep 2017–

Gefei Zuo Sep 2018–

### Master's

John Wu Sep 2018–

### Undergraduate

Yifan Dai May 2018–

Liran Xiao May 2018–

Yifan Zhao May 2018–

Yimeng Zhou May 2018–

## LANGUAGES

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English: fluent  
French: fluent  
Turkish: native  
German: beginner

## REFERENCES

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Available upon request