

# Dmitrii Kuvaiskii

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## Research Interests

My research interests lie in the field of dependability in software systems, with a particular focus on fault tolerance and security. Within these fields, I investigate the applicability of modern hardware extensions to increase reliability of real-world applications while imposing low overheads.

## Education

**Ph.D. Candidate** in Computer Science (Dec 2013 - present)

*TU Dresden, Germany*

Advisors: Prof. Dr. Christof Fetzer and Prof. Dr. Pramod Bhatotia

**Master of Science** in Computer Science (Oct 2011 - Nov 2013)

*TU Dresden, Germany*

**Diplom** in Electrical Engineering (Sep 2004 - Jul 2010)

*Bauman University, Moscow, Russia*

## Employment

**Intel Labs, Hillsboro, OR, USA, July 2017 - Sep 2017**

*Datacenter Security Intern*

Responsibilities: developing applications with Intel SGX (C/C++).

Supervisor: Mona Vij.

**Auriga Inc, Moscow, Russia, Sep 2010 - Aug 2011**

*Certification engineer, Software developer*

Responsibilities:

- documenting and testing code of the PikeOS embedded operating system (C);
- writing medical special-purpose programs (C++ and C#).

**Diasoft, Moscow, Russia, Sep 2007 - Aug 2010**

*Software developer*

Responsibilities: programming insurance subsystems using Transact SQL and Delphi.

## Honors and Awards

**Best paper award** at EuroSys'17

**Carter Award (best student paper)** at DSN'15

**Best paper award** at SRDS'14

**Erasmus Mundus Action 2 MULTIC** scholarship, 2011-2013

## Ph.D. Dissertation

**Topic:** Dependable Systems Leveraging new ISA extensions (preliminary)

**Supervisors:** Prof. Dr. Christof Fetzer and Prof. Dr. Pramod Bhatotia

In the context of my Ph.D. dissertation, I investigate and build systems to increase software dependability leveraging recent sets of extensions in Intel processors, with the focus on software-based fault tolerance and security for legacy C/C++ programs.

### Research projects:

Detailed evaluation of Intel MPX and discussion of its applicability in comparison to other bounds-checking approaches [ACM ASPLOS'17]\*;

*SGXBounds*: LLVM-based bounds checker to detect and tolerate security bugs in multithreaded legacy C/C++ programs inside Intel SGX enclaves [EuroSys'17];

*Elzar*: LLVM compiler pass to detect and mask transient CPU faults in multithreaded legacy C/C++ programs using Intel AVX [DSN'16] [code];

*HAFT*: LLVM compiler pass to detect and tolerate transient CPU faults in multithreaded legacy C/C++ programs using Intel TSX [EuroSys'16] [code];

*Δ-Encoding*: Source-to-source compiler to detect transient and permanent CPU faults in legacy C programs utilizing unused IPC resources of modern CPUs [DSN'15].

## Publications

### Conference publications:

Intel MPX Explained

*Oleksii Oleksenko, Dmitrii Kuvaiskii, Pramod Bhatotia, Pascal Felber, and Christof Fetzer*

**ACM ASPLOS 2017**. (Under submission)

*SGXBounds: Memory Safety for Shielded Execution*

*Dmitrii Kuvaiskii, Oleksii Oleksenko, Sergei Arnaudov, Bohdan Trach, Pramod Bhatotia, Pascal Felber, and Christof Fetzer*

**EuroSys 2017**. Best paper award.

Software artifact: <https://github.com/tudinfse/sgxbounds>

*Elzar: Triple Modular Redundancy using Intel Advanced Vector Extensions*

*Dmitrii Kuvaiskii, Oleksii Oleksenko, Pramod Bhatotia, Pascal Felber, and Christof Fetzer*

**DSN 2016**.

Software artifact: <https://github.com/tudinfse/elzar>

**HAFT: Hardware-Assisted Fault Tolerance**

*Dmitrii Kuvaiskii, Rasha Faqeh, Pramod Bhatotia, Pascal Felber, and Christof Fetzer*

**EuroSys 2016.**

Software artifact: <https://github.com/tudinfse/haft>

**$\Delta$ -Encoding: Practical Encoded Processing**

*Dmitrii Kuvaiskii and Christof Fetzer*

**DSN 2015.** Carter Award (best student paper).

**HardPaxos: Replication hardened against hardware errors**

*Diogo Behrens, Dmitrii Kuvaiskii, and Christof Fetzer*

**SRDS 2014.** Best paper award.

## Talks

ACM EuroSys'17, Belgrade, April 2017

*SGXBounds: Memory Safety for Shielded Execution*

ACM EuroSys'16, London, April 2016

*HAFT: Hardware-Assisted Fault Tolerance*

IEEE DSN'16, Toulouse, June 2016

*Elzar: Triple Modular Redundancy using Intel Advanced Vector Extensions*

IEEE DSN'15, Rio de Janeiro, June 2015

*$\Delta$ -Encoding: Practical Encoded Processing*

## Teaching experience

**Teaching assistant:** Distributed Systems Engineering courses, TU Dresden, Dec 2013 - present.

— Concurrent and Distributed Systems lab, Summer Semesters 2014 - 2016

— Principles of Dependable Systems exercises, Winter Semesters 2014 - 2016

— Software Fault Tolerance exercises, Summer Semesters 2014 - 2016

## Professional activities

Shadow PC member: **EuroSys 2016.**

## Skills

**Languages:** C, C++, Assembly (expert), Unix shell, Python, R (competent);

**Frameworks:** LLVM, gdb, Intel Pin, Intel SDE;

**Technologies:** Intel SSE/AVX, Intel TSX, Intel MPX, Intel SGX.

## References

**Prof. Dr. Christof Fetzer**

TU Dresden, Germany

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**Prof. Dr. Pramod Bhatotia**

University of Edinburgh, UK

Email: `pramod.bhatotia@ed.ac.uk`

**Prof. Dr. Pascal Felber**

University of Neuchatel

Email: `pascal.felber@unine.ch`