VSEVOLOD LIVINSKII

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LinkedIn ⋄ GitHub

EDUCATION

University of Utah   *August 2018 – Present*
Salt Lake City, USA
School of Computing
Ph.D. student in Computer Science
Research advisor: Prof. John Regehr
GPA: 4.0

Moscow Institute of Physics and Technology   *September 2016 – July 2018*
Moscow, Russia
Department of Radio Engineering and Cybernetics
Master of Science
Program specialization: Info-communication and Computing Systems and Technologies
Research advisor: Dmitry Babokin
GPA: 4.0, graduated with honors

Moscow Institute of Physics and Technology   *September 2012 – July 2016*
Moscow, Russia
Department of Radio Engineering and Cybernetics
Bachelor of Science
Program specialization: Info-communication and Computing Systems and Technologies
Research advisor: Dmitry Babokin
GPA: 3.74

PROFESSIONAL EXPERIENCE

Research Assistant   *August 2018 – present*
University of Utah, Salt Lake City, USA

- Research ways to utilize coverage-guided fuzzing for code generation to test auto-vectorization algorithms and loop optimizations of modern and emerging compilers (in collaboration with Intel)

- YARPGen – random test generator for C/C++ compilers and compilers for data-parallel languages that was able to find more than 340 bugs in LLVM, GCC, ICC, ISPC, DPC++, SDE, and Alive2.

Compiler Verification Intern – AI Software   *May 2021 – August 2021*
Nvidia

- Designed and implemented automated fuzzing system for Machine Learning compilers.
  - Devised generation algorithms
  - Designed fuzzer architecture
  - The solution was adopted by the testing team for regular use
  - Modular fuzzer architecture allowed other team to re-purpose fuzzer for another language in three days

Software Engineering Intern   *May 2020 – August 2020*
Intel Corporation

- Developed and integrated automated fuzzing testing methods for experimental and emerging loop-oriented compilers.

  – Implemented support for DPC++ and ISPC languages in fuzzing system
  – Adapted automated testing system to support emerging compilers
  – Integrated the solution into the primary testing system

Software Engineering Intern   *May 2019 – August 2019*
Intel Corporation, Santa Clara, USA

- Researched test generation methods for loop optimization verification.

  – Created a proof-of-concept prototype
  – Integrated the prototype into the existing testing system
  – Performed analysis of existing solutions
  – Explored domain and devised important use-cases

Software Development Intern   *September 2014 – June 2018*
Intel Corporation, Moscow, Russia

- Research and development of YARPGen – random test generator for C/C++ compilers. This project was performed in a group of two people. As a result, we created an efficient unified compiler-testing pipeline that was able to find 170 software bugs in Clang and GCC.

  – Devised generation algorithms
  – Designed framework architecture
  – Developed, deployed and supported testing system that allows automatic discovery, classification, and reduction of test-cases
  – Introduced a novel metric to quantify compiler random testing quality efficiently
  – Conducted a paper survey, analysis of all of the currently published techniques

- Development and support of experimental LLVM-based compiler with explicit language parallelism (ISPC). It is widely used in ray-tracing and visualization tools running on CPU (open-source Embree and Ospray ray-tracers, proprietary solutions developed by Dreamworks and Pixar).

  – Implemented code generation for Knights Corner, Knights Landing, and Skylake Server architectures
  – Carried out performance tuning to improve the quality of the output code
  – Designed saturation arithmetic math functions and built-in corresponding data types
  – Provided technical expertise for several internal and external customers; orchestrated the testing infrastructure; supported new releases of LLVM
  – Supervised new members as a part of four-person team

PUBLICATIONS AND TALKS

- **V. Livinskii**, D. Babokin, J. Regehr. "Fuzzing Loop Optimizations in Compilers for C++ and Data-Parallel Languages." *Proceedings of the ACM on Programming Languages 7 PLDI, 2023*

- **V. Livinskii**, D. Babokin, J. Regehr. "YARPGen: A Compiler Fuzzer for Loop Optimizations and Data-Parallel Languages" *LLVM Developers' Meeting, 2022*

- **V. Livinskii**, D. Babokin, J. Regehr. "Random testing for C and C++ compilers with YARP-Gen." *Proceedings of the ACM on Programming Languages 4 OOPSLA, 2020*
  Distinguished paper award

- **V. Livinskii**, D. Babokin. "Automatic Optimizations Errors Detection in C/C++ Compilers with Yet Another Random Program Generator" *60th Moscow Institute of Physics and Technology Scientific Conference, 2017*

- **V. Livinskii**, A. Mitrokhin, D. Babokin. "Yet Another Random Program Generator – a random test generator for optimization verification in C/C++ compilers." *59th Moscow Institute of Physics and Technology Scientific Conference, 2016*

- **V. Livinskii**, A. Mitrokhin, D. Babokin. "A survey of random program generation methods for C/C++ compiler testing." *58th Moscow Institute of Physics and Technology Scientific Conference, 2015*

- A. Mitrokhin, **V. Livinskii**, D. Babokin. "LLVM: Advanced Vectorization Support and Drawbacks in the Presence of Explicitly Parallel Code." *58th Moscow Institute of Physics and Technology Scientific Conference, 2015*

ACADEMIC AWARDS

- ACM SIGPLAN Distinguished Paper Award for V. Livinskii, D. Babokin, J. Regehr. Random Testing for C and C++ Compilers with YARPGen.

- Best poster award at *59th Moscow Institute of Physics and Technology Scientific Conference, 2016*

TECHNICAL SKILLS

- **Languages:** C, C++, Python, Bash, x86 Assembly

- **Technologies and Tools:** Fuzzing, Automated Testing, Compilers, Machine Learning, Git, Linux, LLVM, Clang, ISPC