Filip Nikšić

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Research Interests

In the past, I worked on the analysis, verification, and testing of concurrent and distributed systems. My doctoral research focused on applying combinatorial techniques to systematic and random testing of distributed systems. During my postdoc, my focus shifted to programming models and testing techniques for distributed stream processing. Nowadays, I work on fuzz testing at Google.

Education

09/2012–05/2019 **Max Planck Institute for Software Systems**

Doctor of Engineering (Dr.-Ing.) degree by Technische Universität Kaiserslautern
Dissertation: *Combinatorial Constructions for Effective Testing*
Grade: summa cum laude

10/2009–10/2011 **Department of Mathematics, University of Zagreb**

Enrolled in a doctoral program in mathematics

07/2004–10/2009 **Department of Mathematics, University of Zagreb**

Dipl. Ing. (4-year degree) in Mathematics (profile: Computer Science)
GPA: 4.7 / 5.0

Work Experience

09/2020–*present* **Google, New York City, NY**

Software engineer

10/2018–07/2020 **University of Pennsylvania, Philadelphia, PA**

Postdoctoral researcher, working with Rajeev Alur

09/2012–10/2018 **Max Planck Institute for Software Systems, Kaiserslautern, Germany**

Doctoral researcher, advised by Rupak Majumdar

05/2016–08/2016 **Microsoft, Redmond, WA**

Research intern working on a testing and fault-injection framework for concurrent software. Technologies: C#, .NET Compiler Platform ("Roslyn")

04/2010–09/2012 **IN2 d.o.o., Zagreb, Croatia**

Software engineer developing financial software. Technologies: Oracle DB (SQL, PL/SQL), Java (Spring Framework), and Adobe Flex

Teaching Experience

01/2019–05/2019 **University of Pennsylvania**

Occasional lectures and a student project for CIS 540: Principles of Embedded Computation (Spring 2019)

10/2016–02/2017 **Max Planck Institute for Software Systems (MPI-SWS)**

Teaching assistant: Program Analysis (Winter 2016/2017)

04/2014–07/2014 **Max Planck Institute for Software Systems (MPI-SWS)**

Teaching assistant: Verification of Reactive Systems (Summer 2014)

03/2008–09/2009 **Department of Mathematics, University of Zagreb**

Student assistant: Set Theory (Summer 2008), Introduction to Parallel Computing (Winter 2008), Application of Parallel Computers (Summer 2009).

09/2002–06/2005 **Informatics Club NET, Ivanić-Grad**

Tutored high school students for programming competitions

Professional Service

Artifact evaluation committee: ISSTA 2015, ECOOP 2018, CAV 2019

Conference reviewing committee: OOPSLA 2024

Conference reviews: CAV 2013, CSL 2013, FMCAD 2013, EMSOFT 2014, FMCAD 2014, LICS 2014, CADE 2015, VMCAI 2015, POPL 2016, TACAS 2016, VMCAI 2017, ICALP 2018, CAV 2021, OOPSLA 2025

Journal reviews: ACM Transactions on Computational Logic, Acta Informatica, Order

Technical Skills

Operating systems: GNU/Linux, Mac OS X, Windows

Programming languages: C/C++, C#, Java, Python, PL/SQL, ActionScript (Flex)

Databases: Oracle DB

Language Skills

Croatian (native), English (fluent), German (basic)

Publications

Konstantinos Kallas, Filip Niksic, Caleb Stanford, Rajeev Alur. *Stream Processing with Dependency-guided Synchronization.* PPoPP 2022

Rui Abreu, Franjo Ivančić, Filip Nikšić, Hadi Ravanbakhsh, Ramesh Viswanathan. *Reducing Time-to-Fix for Fuzzer Bugs.* ASE 2021

Rajeev Alur, Phillip Hilliard, Zachary G. Ives, Konstantinos Kallas, Konstantinos Mamouras, Filip Niksic, Caleb Stanford, Val Tannen, Anton Xue. *Synchronization Schemas.* PODS 2021
Invited paper (not peer-reviewed)

Konstantinos Kallas, Filip Niksic, Caleb Stanford, Rajeev Alur. *DiffStream: Differential Output Testing for Stream Processing Programs.* PACMPL 4 (OOPSLA) 2020

Cezara Drăgoi, Constantin Enea, Burcu Kulahcioglu Ozkan, Rupak Majumdar, Filip Niksic. *Testing Consensus Implementations Using Communication Closure.* PACMPL 4 (OOPSLA) 2020

Filip Niksic. *Combinatorial Constructions for Effective Testing.* Doctoral dissertation. Technische Universität Kaiserslautern, May 2019.

Burcu Kulahcioglu Ozkan, Rupak Majumdar, Filip Niksic. *Checking Linearizability Using Hitting Families.* PPoPP 2019

Burcu Kulahcioglu Ozkan, Rupak Majumdar, Filip Niksic, Mitra Tabaei Befrouei, Georg Weissenbacher. *Randomized Testing of Distributed Systems with Probabilistic Guarantees.* PACMPL 2 (OOPSLA) 2018
Recipient of **OOPSLA 2018 Distinguished Paper Award**

Rupak Majumdar, Filip Niksic. *Why is Random Testing Effective for Partition Tolerance Bugs?* PACMPL 2 (POPL) 2018

Dmitry Chistikov, Rupak Majumdar, Filip Niksic *Hitting Families of Schedules for Asynchronous Programs.* CAV 2016

Ivan Gavran, Filip Niksic, Aditya Kanade, Rupak Majumdar, Viktor Vafeiadis. *Rely/Guarantee Reasoning for Asynchronous Programs.* CONCUR 2015

Sumit Gulwani, Mikaël Mayer, Filip Niksic, Ruzica Piskac. *StriSynth: Synthesis for Live Programming*. ICSE 2015

Javier Esparza, Ruslán Ledesma-Garza, Rupak Majumdar, Philipp Meyer, Filip Niksic. *An SMT-Based Approach to Coverability Analysis*. CAV 2014

Johannes Kloos, Rupak Majumdar, Filip Niksic, Ruzica Piskac. *Incremental, Inductive Coverability*. CAV 2013

New York City, March 1, 2025