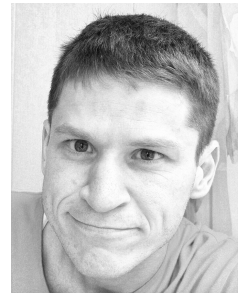# Ayrat Khalimov

Université Libre de Bruxelles, Belgium
ayrat.khalimov@gmail.com
Date of birth: Sep 27, 1986.

Research Interests

Formal methods, reactive synthesis, register automata, parameterized synthesis.

Research Experience

October 2022 – now	Post-doc (with R.Ehlers) at TU Clausthal, Germany *Topic: new synthesis approaches.*
August 2019 – September 2022	Post-doc (with E.Filiot) at ULB, Belgium *Topic: synthesis of data transducers.*
March 2018 – Oct 2018	Post-doc (with O.Kupferman) at Hebrew University, Israel *Topic: register-bounded synthesis.*
Jan 2012 – Jan 2018	PhD (with R.Bloem) at Graz University of Technology, Austria *Thesis "Reactive Synthesis: Branching Logics and Parameterized Systems"*
Apr 2011 – Sep 2011	Internship at Dependable Systems Lab, EPFL, Switzerland *Topic: symbolic execution (KLEE).*

Work Experience

March 2009 – Dec 2010	C# dev (full-time)	Consult Invest, Moscow, Russia
Aug 2007 – Aug 2008	C++ dev (part-time)	CellTroy Technologies, Moscow, Russia
Aug 2006 – Aug 2007	Java dev (part-time)	Institue of Precision Mechanics, Moscow, Russia

Education

July 2007 – July 2009	Master from Moscow Institute of Physics and Technology, Russia *Thesis "An Approach to Compute Cell Leakages"*
Sep 2003 – July 2007	Bachelor from Moscow Institute of Physics and Technology, Russia Study subject: Applied Physics and Mathematics *Thesis "Computer Simulation of Sensor Networks"*

Software

All the tools are available at https://github.com/5nizza/:

- PARTY: synthesizer from LTL and CTL* (winner at SyntComp'17) (`python`).

- sdf: synthesizer from AIGER format and symbolic bounded synthesizer (`c++`).

- I maintain and contribute LTL benchmarks for the synthesis competition SyntComp:
  https://github.com/SYNTCOMP/benchmarks/

Teaching

- 2020–2022: TA in the semester course "Embedded Systems Design", at ULB, Belgium.

- 2020–2022: TA in the semester course "Formal Methods", at ULB, Belgium.

- 2013–2017: TA and lectures in the semester course "Selected Topics in Design and Verification", TU Graz, Austria.

- 2013–2017: TA in the semester course "Verification and Testing", TU Graz, Austria.

Community Service

- Reviewer for CAV'12, FMCAD'12, CAV'13, FMCAD'13, FoSSaCS'13, Acta'14, CAV'15, CONCUR'15, CAV'16, AAMAS'16, IPL'16, ICTCS'17, SAS'17, DATE'17, VMCAI'17, FMCAD'17, ATVA'18, CAV'18, FMCSD'18, TCS'18, Acta'19, TACAS'19, CAV'19, SYNT'20, CONCUR'20, LICS'20, CONCUR'21, FMSD'22, CAV-AE'22, TACAS'23

- Helped with GandAlf'20 conference: https://di.ulb.ac.be/verif/gandalf2020/

- Co-organizer of RiSE workshop http://arise.or.at/rise-workshop-2016/

Five Selected Publications

- **Decidability of Parameterized Verification**, 2015.
  Authors: Roderick Bloem, Swen Jacobs, Ayrat Khalimov, Igor Konnov, Sasha Rubin, Helmut Veith, Josef Widder.
  This book surveys and unifies existing work on parameterized model checking problem.
  My role: I wrote Chapter 7 on parameterized model checking of mobile networks.

- **Tight Cutoffs for Guarded Protocols with Fairness**.
  Conference: VMCAI (Verification, Model Checking, and Abstract Interpretation), 2016.
  Authors: Simon Außerlechner, Swen Jacobs, Ayrat Khalimov.
  My role: one of main investigators, co-writer.

- **Bounded Synthesis for Streett, Rabin, and CTL***.
  Conference: Computer Aided Verification (CAV), 2017.
  Authors: Ayrat Khalimov and Roderick Bloem.
  My role: lead investigator, co-writer.

- **Bounded Synthesis of Register Transducers**.
  Conference: Automated Technology for Verification and Analysis (ATVA), 2018.
  Authors: Ayrat Khalimov, Benedikt Maderbacher, Roderick Bloem.
  My role: lead investigator and writer.

- **Church Synthesis on Register Automata over Linearly Ordered Data Domains**.
  Conference: Symposium on Theoretical Aspects of Computer Science (STACS), 2021.
  Authors: Léo Exibard, Emmanuel Filiot, Ayrat Khalimov.
  My role: one of main investigators and writers.

Other Publications

Léo Exibard, Emmanuel Filiot, and Ayrat Khalimov. **Generic Solution to Register-Bounded Synthesis with Application to Discrete Orders**. In *International Colloquium on Automata, Languages and Programming (ICALP)*, 2022.

Ayrat Khalimov and Orna Kupferman. **Register-Bounded Synthesis**. In *Conference on Concurrency Theory (CONCUR)*, 2019.

Ayrat Khalimov. ***Reactive synthesis: branching logic & parameterized systems***. PhD dissertation, Graz University of Technology, 2018.

P. Klampfl, R. Koenighofer, R. Bloem, A. Khalimov, A. Abu-Yonis, and S. Moran. **OpenSEA: Semi-Formal Methods for Soft Error Analysis**. *ArXiv e-prints*, 2017.

Roderick Bloem, Sven Schewe, and Ayrat Khalimov. **CTL* Synthesis via LTL Synthesis**. In *Workshop on Synthesis (SYNT)*. 2017.

Roderick Bloem, Swen Jacobs, Ayrat Khalimov, Igor Konnov, Sasha Rubin, Helmut Veith, and Josef Widder. **Decidability in Parameterized Verification**. *SIGACT News*, 2016.

Ayrat Khalimov. **Specification Format for Reactive Synthesis Problems**. In *Workshop on Synthesis, SYNT*, 2015.

Benjamin Aminof, Swen Jacobs, Ayrat Khalimov, and Sasha Rubin. **Parameterized Model Checking of Token-Passing Systems**. In *Verification, Model Checking, and Abstract Interpretation (VMCAI)*, 2014.

Roderick Bloem, Swen Jacobs, and Ayrat Khalimov. **Parameterized Synthesis Case Study: AMBA AHB**. In *Workshop on Synthesis (SYNT)*, 2014.

Ayrat Khalimov, Swen Jacobs, and Roderick Bloem. **PARTY Parameterized Synthesis of Token Rings**. In *Computer Aided Verification (CAV)*, 2013.

Ayrat Khalimov, Swen Jacobs, and Roderick Bloem. **Towards Efficient Parameterized Synthesis**. In *Verification, Model Checking, and Abstract Interpretation (VMCAI)*, 2013.