

# Toghrul Karimov

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## Education

since Sep 2019	PhD student at Max Planck Institute for Software Systems, Germany Supervisor: Joël Ouaknine Area: Verification of linear dynamical systems
2015-2019	MCompSci Computer Science, University of Oxford, UK First Class Honours Bachelor's thesis: On the Černý conjecture in theory of finite automata Master's thesis: Synchronization problems in Markov decision processes
2013-2015	IB Diploma Programme, 41/45 points, 7/7 in Further Mathematics Dünya School, Baku, Azerbaijan

## Research Areas

- Broadly speaking, I am interested in applying techniques from algebra, number theory and logic to solving open problems in theoretical computer science and control theory.
- My PhD thesis is about finding algorithms that verify imperative programs (e.g. prove that a given program always terminates) using theory of (linear) dynamical systems.

## Publications

- T. Karimov, E. Lefauchaux, J. Ouaknine, D. Purser, J. Worrell, and M. Whiteland.  
What's decidable about linear loops?  
*POPL 2022, Proceedings of the ACM on Programming Languages, Volume 6, issue POPL.*
- C. Baier, F. Funke, S. Jantsch, T. Karimov, E. Lefauchaux, F. Luca, J. Ouaknine, D. Purser, M. A. Whiteland, and J. Worrell.  
The Orbit Problem for parametric linear dynamical systems.  
*Proceedings of CONCUR 2021, LIPIcs 203.*
- J. D'Costa, T. Karimov, R. Majumdar, J. Ouaknine, M. Salamati, S. Soudjani, and J. Worrell.  
The Pseudo-Skolem Problem is decidable.  
*Proceedings of MFCS 2021, LIPIcs 202.*
- S. Almagor, T. Karimov, E. Kelmendi, J. Ouaknine, and J. Worrell.  
Deciding  $\omega$ -regular properties on linear recurrence sequences.  
*POPL 2021, Proceedings of the ACM on Programming Languages, Volume 5, issue POPL.*
- C. Baier, F. Funke, S. Jantsch, T. Karimov, E. Lefauchaux, J. Ouaknine, A. Pouly, D. Purser, and M. A. Whiteland.

Reachability in dynamical systems with rounding.

*Proceedings of FSTTCS 2020, LIPIcs 182.*

- T. Karimov, J. Ouaknine, and J. Worrell.  
On LTL model-checking for low-dimensional discrete linear dynamical systems.  
*Proceedings of MFCS 2020, LIPIcs 170.*

## Teaching

**Summer 2020**

Automata and Sequences, teaching assistant  
University of Saarland

## Talks and Presentations

- Invariants and impossibility: from geometric constructions to solving polynomial equations.  
*Monsoon Math 2021.*
- Deciding  $\omega$ -regular properties on linear recurrence sequences. *POPL 2021.*
- On verification of linear dynamical systems. *Lightning Talk at MPI-SWS, 2020.*
- On LTL model-checking for low-dimensional discrete linear dynamical systems. *MFCS 2020.*