Toghrul Karimov

{email: toghs@mpi-sws.org, website: toghrul-karimov.github.io}

Postdoctoral researcher in the group "Foundations of Algorithmic Verification" at the Max Planck Institute for Software Systems (MPI-SWS), in Saarbrücken, Germany since 1 February 2024.

Education

2019-2024	PhD student at Saarland University and the MPI-SWS, Germany Supervisor: Joël Ouaknine Thesis: Algorithmic verification of linear dynamical systems Received the grade *summa cum laude*, nominated for various dissertation awards (outcomes pending)
2015-2019	MCompSci Computer Science, University of Oxford, UK First Class Honours

Research areas

- I am a theoretical computer scientist working on decision problems that lie at the intersection of number theory, dynamical systems, logic, and automata theory.
- My PhD thesis was about decision problems that arise in verification of linear dynamical systems.

Scholarships and awards

1. CPEC (see `www.perspicuous-computing.science`) mini-project award for a two-week research visit to Oxford University; Deutsche Forschungsgemeinschaft grant 389792660.
2. Keble College Scholarship, 2016-2019. Awarded for excellent performance in exams at the end of each year.
3. The Scholarship of the Ministry of Education of Azerbaijan covering the full costs of my study at the University of Oxford, 2015-2019.

Teaching

Summer 2020	"Automata and sequences", teaching assistant University of Saarland
Winter 2022	"Topics in algorithmic dynamical systems theory", teaching assistant University of Saarland

Talks and presentations

1. From word combinatorics to automatic structures. *Workshop on Recent Developments in Arithmetic Theories and Applications*, Kolkata, India, 2025.
2. On the decidability of Presburger arithmetic expanded with powers. *SODA 2025.*
3. Ode to o-minimality. *Symbolic dynamics and arithmetic expansions* workshop in Roscoff, France, and *Stellenbosch University logic seminar*, South Africa, 2024.
4. The power of Positivity. *LICS 2023.*
5. The model-checking problem for linear dynamical systems. *Bellairs 2023* workshop in Barbados.
6. The pseudo-reachability problem for diagonalisable affine dynamical systems. *MFCS 2022* and *RP 2022.*
7. The pseudo-Skolem problem is decidable. *MFCS 2021.*
8. Invariants and impossibility: from geometric constructions to solving polynomial equations. *Monsoon Math 2021.*
9. Deciding ω-regular properties on linear recurrence sequences. *POPL 2021.*
10. On verification of linear dynamical systems. *Lighthning Talk at MPI-SWS, 2020.*
11. On LTL model-checking for low-dimensional discrete linear dynamical systems. *MFCS 2020.*