Toghrul Karimov

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Employment

04/2025 - present	Postdoctoral researcher working with Valérie Berthé
	IRIF, CNRS, Paris and Max Planck Institute for Software Systems (MPI-SWS), Saarbrücken, Germany
	Funded by the ERC Synergy Grant "DnyAMiCs"
03/2024 - 03/2025	Postdoctoral researcher working with Joël Ouaknine
	MPI-SWS, Saarbrücken, Germany

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*,
2015-2019	MCompSci Computer Science, University of Oxford, United Kingdom
	First Class Honours

Research areas

- I am a theoretical computer scientist working on decision problems that lie at the intersection of dynamical systems, number theory, logic, and automata theory.

- My PhD thesis was about decision problems that arise in verification of linear dynamical systems.

Scholarships and awards

1. ACM-SIGBED Best Paper Award at the conference Hybrid Systems: Computation and Control (HSCC) 2024 for the paper "Linear dynamical systems with continuous weight functions" together with R. Aghamov, C. Baier, J. Ouaknine, and J. Piribauer.

2. Distinguished Paper Award at the conference Logic in Computer Science (LICS) 2024 for the paper "On the decidability of monadic second-order logic with arithmetic predicates" together with V. Berthé, J. Nieuvweld, J. Ouaknine, M. Vahanwala, and J. Worrell.

3. CPEC (see www.perspicuous-computing.science and Deutsche Forschungsgemeinschaft grant 389792660) mini-project award for a two-week research visit to Oxford University, June 2022.

4. Keble College Scholarship, 2016-2019. Awarded for excellent performance in exams at the end of each year.

5. 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. Invited talk, *Workshop on Recent Developments in Arithmetic Theories and Applications*, Kolkata, India, 2025.

2. On the decidability of Presburger arithmetic expanded with powers. *SODA 2025, New Orleans, United States.*

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*, Boston, United States.

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*, Vienna, Austria, and *RP 2022*, Saarbrücken, Germany.

7. The pseudo-Skolem problem is decidable. *MFCS 2021*, Tallinn, Estonia.

8. Invariants and impossibility: from geometric constructions to solving polynomial equations. *Monsoon Math 2021*, an online camp for Indian students.

9. Deciding ω-regular properties on linear recurrence sequences. *POPL 2021*.

10. On verification of linear dynamical systems. *Lighthning Talk at MPI-SWS, 2020, Saarbrücken, Germany.*

11. On LTL model-checking for low-dimensional discrete linear dynamical systems. *MFCS 2020*.