

Sergei Novozhilov

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PROFILE

I am a final-year PhD candidate at the Hong Kong University of Science and Technology (HKUST), advised by Prof. Amir Goharshady and co-supervised by Prof. Dimitris Papadopoulos. My research focuses on enhancing the security, efficiency, and reliability of complex software systems by bridging the gap between theoretical computer science and practical applications. I specialize in **Formal Methods** and **Program Analysis**, developing techniques to provide formal guarantees about software behavior. My work includes analyzing termination properties of **Probabilistic Programs** and automatically synthesizing tight resource bounds for recursive systems. A primary application domain for my research is **Blockchain and Decentralized Finance (DeFi)**, where I leverage my expertise in **Algorithms and Optimization** to address critical challenges.

PUBLICATIONS

- *The order of authors is alphabetical, as per my research group policy. My name is in bold.
- **Hermes: Scalable and Robust Structure-Aware Optimal Routing for Decentralized Exchanges**: Soroush Farokhnia, **Sergei Novozhilov**, Sanaz Safaei, Jiasi Shen, to appear in IEEE Blockchain, 2025
- **Combinatorial Parameterized Algorithms for Chemical Descriptors based on Molecular Graph Sparsity**: Giovanna Kobus Conrado, Amir Kafshdar Goharshady, Harshit Jitendra Motwani, **Sergei Novozhilov**, to appear in LAGOS, 2025
- **On the Almost-Sure Termination of Probabilistic Counter Programs**: **Sergei Novozhilov**, Mingqi Yang, Mingshuai Chen, Zhiyang Li, Jianwei Yin, CAV (2), 2025, pp. 82-104
- **Efficient Synthesis of Tight Polynomial Upper-Bounds for Systems of Conditional Polynomial Recurrences**: Amir Kafshdar Goharshady, S. Hitarth, **Sergei Novozhilov**, ESOP (2), 2025, pp. 1-30
- **Pixiu: Optimal Block Production Revenues on Cardano**: Togzhan Barakbayeva, Soroush Farokhnia, Amir Kafshdar Goharshady, Markus Gufler, **Sergei Novozhilov**, Blockchain, 2024, pp. 491-496

SCHOLARSHIPS AND GRANTS

- **Ethereum Foundation Grant (ESP)**: 233,000 HKD, 2024
- **Professor Samuel Chanson Best PGTA Award**: For excellence in teaching assistance, 2023-2024
- **RedBird PhD Award Program**: HKUST, 40,000 HKD, 2022. An award for excellent PhD candidates, in recognition of their outstanding academic performance and research capacity.
- **Global Research Immersion Program for Young Scientists (GripS)**: Based in Zhejiang University
- **Gazprom Neft Scholarship**: 2018-2022. Industrial company scholarship for outstanding academic performance in Mathematics at Saint Petersburg State University.

PROFESSIONAL SERVICE

- **Manuscript Reviewer**: TACAS (2025, 2026), SETTA (2025), Journal of Systems Architecture (2025)
- **Artifact Reviewer**: TACAS (2026)

SOCIAL ENGAGEMENT

- **Undergraduate Project Supervision (2022, 2023)**: Supervising exchange students at the Hong Kong University of Science and Technology
- **Jury Member (2018, 2019, 2020)**: Part of the regional jury in All-Russian School Olympiad in Mathematics.
- **Teacher for Mathematics Summer and Winter Camps (2018, 2019)**: Responsible for curriculum development, teaching, and problem-solving sessions for a group of 20 students.

EDUCATION

- **The Hong Kong University of Science and Technology** Hong Kong, China
PhD in Computer Science and Engineering Sep. 2022 — Present
 - **Academics**: Top-2 student in an Advanced algorithms course
 - **Teaching**: Experience assisting in teaching of a honourous course in discrete mathematics
- **Computer Science Center** Saint Petersburg, Russia
Evening courses in Computer Science, Data Science, Robotics, Software Engineering. Sep. 2020 — Aug. 2022
- **Saint Petersburg State University** Saint Petersburg, Russia
Undergraduate Program in Mathematics and Computer Science. Sep. 2017 — May 2021
 - **Degree**: Bachelor of Mathematics.
 - **Thesis**: Functional Limit Theorem in the Random Fourier Features Method.
 - **Academic Performance**: GPA 3.8 with all grades at least 3 (the university has the following grading system: the grade for each course is based on the results of checking assignments and a result of the final examination. If the result is more than 60% then the grade is 2, if it is more than 75% then the grade is 3 and if more than 90% then the grade is 4).

WORK EXPERIENCE

- **The Hong Kong University of Science and Technology** Hong Kong, China
Teaching Assistant *Fall 2023, Fall 2024, Fall 2025*
 - **Courses:** Honors Design and Analysis of Algorithms (Fall 2024); Honors Discrete Mathematical Tools for Computer Science (Fall 2023, Fall 2025).
 - **Award:** Received the **Professor Samuel Chanson Best PGTA Award** for 2023-2024.
- **The Hong Kong University of Science and Technology** Hong Kong, China
Instructor *Fall 2022*
 - **Course:** Introduction to Combinatorial Optimization
- **Huawei, Saint Petersburg Research Center** Saint Petersburg, Russia
Intern (Part-time, Contractor), Media Algorithms Team *Oct. 2021 – Aug. 2022*
 - **Responsibility:** Research on Computer Vision, Geometric Algorithms, and Computer-Human Interactions. Prototyping.
 - **Technology Stack:** Python, OpenCV, scikit-learn, PyTorch.
- **JetBrains** Remote
Intern (Full-time), Kotlin for Data Science Team *Jul. 2021 - Sep. 2021*
 - **Responsibility:** Contribution to the open-source project Multik — a linear algebra library in Kotlin.
 - **Technology stack:** Kotlin, Fortran, Numerical Analysis.
 - **Result:** Implementation of SVD decomposition, eigenvalue/eigenvector computation, Hessenberg form, linear equation solving, PLU decomposition, QR decomposition, and matrix inversion.
- **Euler International Mathematical Institute** Saint Petersburg, Russia
Research Assistant (Part-time) *Jan. 2020 — Jan. 2021*
 - **Responsibility:** Carrying out mathematical research, participation in the scientific life of the institute, and teaching assistance.

COMPETITIONS

- **North Countries Universities Mathematical Competition (2019):** Second prize.
- **All-Russian School Olympiad in Mathematics, Finalist (2017):** Absolute result: 41st place. Ranked in the top 0.1% of students taking part in the Russian Mathematical Olympiad.
- **All-Russian School Olympiad in Mathematics, Finalist (2016):** Absolute result: 72nd place. Ranked in the top 0.1% of students taking part in the Russian Mathematical Olympiad.