Georgy Dunaev



Software Engineer & Formal Verification Specialist · M.Sc. Mathematics

Location Berlin / Potsdam, Germany

Email georgedunaev@gmail.com · CV@obelisk.mozmail.com

Profiles georgydunaev.github.io · github.com/georgydunaev · linkedin.com/in/georgy-dunaev

Projects obeliskproofassistant.github.io · Archive of Formal Proofs (AFP)

PROFILE SUMMARY

Software engineer and mathematician with 3+ years of professional backend experience (OCaml, C++, Python, Linux) and extensive research expertise in formal verification, interactive theorem proving (Lean 4, Rocq/Coq, Isabelle, HOL4, SML), and mathematical foundations. Author of an AFP mechanization in Isabelle/ZF and architect of the *Obelisk* proof assistant. Holds M.Sc. in Computer Science (Lomonosov MSU) and M.Sc. candidate in Mathematics at the University of Potsdam. Demonstrated expertise in multi-agent autonomous systems, container orchestration, and zero-leak security pipelines. Based in Berlin/Potsdam.

PROFESSIONAL EXPERIENCE

10/2024 – 04/2025

Teaching Assistant (Tutor) in Mathematics

University of Potsdam, Institute of Mathematics, Potsdam, Germany

- Conducted weekly exercise sessions, practical tutorials, and graded assignments for mathematics courses.
- Communicated rigorous mathematical reasoning clearly to students in German and English.

08/2020 – 09/2024

Independent Researcher & Systems Developer (Formal Verification)

Self-directed Research & Development, Potsdam / Berlin

- Architected and implemented the *Obelisk* proof assistant in Standard ML (Poly/ML), featuring an LCF-style architecture, Morse–Kelley class theory, and zero implicit computation.
- Formalized classical foundations, metatheorems around Gödel's incompleteness (diagonal lemma, Löb's theorem), and contextual category semantics in Rocq and Isabelle.
- Published mechanization *Recursion Theorem in ZF* in the peer-reviewed Archive of Formal Proofs (Isabelle/ZF).

06/2019 – 07/2020

Software Developer (OCaml / Backend)

BI.ZONE (Cybersecurity & Systems), Moscow

- Engineered backend services for a distributed virtualization platform using asynchronous OCaml.
- Implemented automated testing harnesses for C++ and Python components, integrating CI/CD test scenarios.
- Maintained high standards of code correctness, concurrency safety, and system performance.

04/2017 – 04/2019

Software Developer & Verification Researcher

Blockchain FinTech Start-up, Moscow

- Designed and formally verified smart-contract specifications using code-generation and formal methods.
- Contributed to core distributed ledger logic, cryptographic protocols, and backend integration.

12/2015 – 12/2016

Junior R&D; Engineer
LG Electronics (Advanced R&D; Laboratory), Moscow

- Developed firmware and prototype applications for STM32 microcontrollers in C/C++.
- Captured and processed biometric image data (iris, fingerprint sensors) with custom analytical pipelines.
- Constructed real-time 3D interactive graphics simulations for VR (Oculus Rift).

EDUCATION

10/2024 – Present

M.Sc. Mathematics (Degree Candidate)
University of Potsdam, Faculty of Science, Institute of Mathematics
Specialization: Mathematical Logic, Foundations of Mathematics, Model Theory, Formal Methods.

09/2017 – 06/2019

M.Sc. Computer Science & Mathematical Logic
Lomonosov Moscow State University, Faculty of Mechanics and Mathematics
Department of Mathematical Logic and Theory of Algorithms.
Master's Thesis: *"Implementation of the mathematical foundations in Rocq (Coq)"* — mechanized models of first-order theories and ZFC with the Axiom of Choice.

09/2012 – 06/2016

B.Sc. Applied Mathematics & Computer Science
Bauman Moscow State Technical University (BMSTU), Faculty of Fundamental Sciences
Graduated with solid foundations in algorithmic analysis, differential equations, and scientific computing.

KEY PROJECTS & PUBLICATIONS

2019 – Present

Obelisk Proof Assistant
obeliskproofassistant.github.io
Interactive proof assistant for Morse–Kelley class theory with higher-order logic features. Employs an LCF-style trusted kernel in Standard ML with explicit syntactic trees and clean syntax.

05/2020

Publication: Recursion Theorem in ZF
Archive of Formal Proofs (Isabelle/ZF) – isa-afp.org/entries/Recursion-Addition.html
Peer-reviewed mechanization of the recursion theorem following Hrbacek and Jech, modeling Peano arithmetic in ZF.

TECHNICAL SKILLS

Proof Assistants & Logic	Isabelle (Isabelle/ZF, Isabelle/HOL), Rocq (Coq), Lean 4, HOL4, SML; Morse–Kelley Class Theory, Sequent Calculus, de Bruijn Indices, TPTP Exporters
Functional & Systems	OCaml, Standard ML (Poly/ML, CakeML) – primary; C++ (STL, Multi-threading, CUDA), Python (pytest, asyncio) – proficient; Rust, Go, JavaScript, Bash – working knowledge
Multi-Agent & Systems	Multi-Agent Systems, Autonomous Coding Workflows, Task Supervisors, Docker Container Networking, Socket-level Bridge Forwarding, LLM Guardrails
Verification & Security	Formal Verification, Invariant Specification, Zero-Leak Pre-commit Security Scanners, SMT Solvers (Z3), Type Theory, Denotational Semantics
Tools & Infrastructure	Linux/UNIX, Git, Docker, CI/CD pipelines, Make, LaTeX, Wolfram Mathematica, GDB, Valgrind

LANGUAGES

English	C2 / Fluent (IELTS C1 certificate, academic and professional fluency)
German	B2 Working Proficiency (B1 certification from Zessko, University of Potsdam)
Russian	Native

PERSONAL DETAILS

Location	Berlin / Potsdam, Germany

Work Authorization	Student visa (140 full / 280 half days/year); eligible for EU Blue Card / Skilled Worker Visa (§18b AufenthG) upon full-time graduation/offer (Anabin H+)

Berlin, Germany