Dmitry Bagaev, PhD

Senior Software Engineer & Scientist

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English · Dutch · Russian

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Senior software engineer and PhD scientist with a strong mathematical foundation and expertise in software development, machine learning and data science. Brings a unique blend of academic rigor and hands-on industry experience, with a proven track record of leading technical teams, architecting complex systems, and translating cutting-edge research into practical applications.

TECHNICAL SKILLS

Domains & Fields: Machine Learning · Data Science · Software Development · HPC · Cloud Infrastructure · Full-stack Development · API Development · System Design · Signal Processing · Probabilistic Programming · Bayesian Inference · Reactive Programming · Applied AI · Academic Research · Mobility & Transport

Technical Skills & Tools: Software Architecture · API Architecture · API Design · Architect · Parallel Computing · MPI · Slurm · GitHub · Git · Linux · Docker · CI/CD · Google Cloud Platform · SQL · Observability · UI/UX · Open Source Maintenance · Code Review · Release Management

Soft Skills & Management: Team Leadership · Technical Leadership · Students Supervision · Mentorship · Time Management · Community Building · Community Management · Developer Relations · Event Organization · Public Speaking · Project Management · Presentational Skills · Technical Writing · Documentation

Programming Languages: Julia · Python · C · C++ · Fortran · JavaScript · TypeScript · Java · Scala

WORK EXPERIENCE

PostDoc Researcher

2026 – Present · Eindhoven, the Netherlands

TU/e, BIASlab — Electrical Engineering Department, Signal Processing Group, BIASlab

Conducting research at Eindhoven University of Technology on fast and scalable Bayesian inference. I'm a part of the AiM-TT project, which is an AI Learning Initiative for Multi-modal Traffic and Transportation in the Netherlands. AiMTT aims to cultivate a highly skilled and diverse AI talent pool equipped to address the opportunities and challenges of AI in mobility, transport, and logistics. By combining real-world case studies with knowledge development, this initiative fosters deep expertise in the field. I work directly together with Delft university and Nationaal Dataportaal Wegverkeer to solve real problems on Dutch roads.

- Conduct research on fast and scalable Bayesian inference methods for real-world mobility and transportation problems
- Contribute to AiM-TT, a Dutch national AI initiative cultivating expertise in AI for mobility, transport, and logistics
- Collaborate closely with TU Delft and Nationaal Dataportaal Wegverkeer (NDW) on applied research for Dutch road networks
- Mentor PhD and MSc students and contribute to the continued development of the RxInfer.jl ecosystem

Skills: Bayesian Inference · Probabilistic Programming · Research · Julia · Applied AI · Mobility & Transport · Academic Collaboration · Mentoring

Open-Source Maintainer

2023 – Present · GitHub

Open Source — ReactiveBayes founder and main maintainer

Founded and lead ReactiveBayes, a GitHub organization dedicated to high-performance, reactive tools for Bayesian inference and probabilistic programming. Day-to-day I design package APIs, review contributions, cut releases, triage issues, and support a growing community of researchers and engineers who rely on our libraries in academia and industry. Maintaining open source at this scale has taught me to balance stability with innovation, communicate technical decisions clearly across contributors, and sustain long-lived software that people actually depend on.

- Founded ReactiveBayes and maintain 25+ Julia packages with nearly 900 combined GitHub stars — a sizeable reach within the Julia ecosystem, where specialized scientific packages typically attract much smaller audiences than equivalent Python libraries
- Lead developer of RxInfer.jl (~400 stars), one of the most-starred probabilistic programming libraries in Julia, used across academia and industry for scalable Bayesian inference
- Maintain core ecosystem packages including Rocket.jl (~220 stars, the go-to reactive programming library in Julia), ReactiveMP.jl (~120 stars), GraphPPL.jl, and ExponentialFamily.jl
- Shape long-term architecture, design public APIs, review pull requests, and coordinate releases across the package ecosystem
- Support a global user community through GitHub discussions, issue triage, documentation, and in-person meetups
- Advocate for probabilistic programming through talks, tutorials, and collaborations with research groups worldwide

Skills: Open Source · Julia · Software Architecture · API Design · Community Management · Technical Leadership · Code Review · Release Management · Bayesian Inference · Reactive Programming · Documentation · Developer Relations

Chief Technology Officer

2023 – December 2025 · Eindhoven, the Netherlands

Lazy Dynamics — Startup Founder

Co-founded Lazy Dynamics, a startup focused on transforming uncertainty into actionable insights through cutting-edge Probabilistic AI Solutions for enterprise applications.

- Co-founded innovative startup with experienced team members (currently not active at the role)

- Developed comprehensive business skills including product strategy, sales, and marketing
- Gained valuable insights through iterative learning and adaptation
- Engaged with industry leaders and researchers including Erik Meijer, Kevin Murphy, Norman Winarsky, Chris Lattner, and Daniel Lee
- Successfully secured venture capital funding from prominent investors

Skills: Startup · Product · Sales · Marketing · Business Development · Customer Support · Co-development · Pilot projects · API Architect

Eindhoven Events Co-Organizer

August 2022 – Present · Eindhoven, the Netherlands

JuliaLang & PyData Eindhoven — Public Events & Community Management

Co-organize public events and meetups for the Julia and Python communities in Eindhoven, fostering local developer engagement and knowledge sharing. I'm mostly focused on marketing and community management as well as content creation, photos, videos and social media management.

- Co-organized PyData 2025 as main committee member and supervised a team of marketing interns from Fontys
- Co-organized PyData 2024 as main committee member
- Co-organized JuliaCon 2024 as main committee member
- Co-organized PyData 2023 as main committee member
- Led JuliaCon Local Eindhoven 2023 as committee member
- Manage regular meetups and community events for Julia and Python developers

Skills: Community Management · Event Organization · Julia · Python · Public Speaking · Networking · Developer Relations · Marketing

PhD Researcher

2019 – 2025 · Eindhoven, the Netherlands

TU/e, BIASlab — Electrical Engineering Department, Signal Processing Group, BIASlab

Conducted research on novel reactive message-passing frameworks for Bayesian inference. Served as postdoctoral researcher for 18 months following PhD completion.

- Developed RxInfer.jl, a novel reactive message-passing framework for Bayesian inference
- Presented research findings at international conferences and workshops
- Authored and co-developed multiple open-source Julia packages: ReactiveMP.jl, GraphPPL.jl, Rocket.jl, and ExponentialFamily.jl
- Enhanced technical presentation and academic writing capabilities
- Mentored graduate students and supervised master's thesis projects
- Contributed to educational activities through seminar instruction
- Achieved proficiency in Dutch language
- Thesis is available https://research.tue.nl/en/publications/reactive-probabilistic-programming-for-scalable-bayesian-inferenc

Skills: Machine Learning · Bayesian Inference · Reactive Programming · Julia · Open-source · Software Architecture · API Architecture · Presentational Skills · Technical Writing

Software Engineering Intern

1 month in 2017, 1 month in 2018 – 2018 · Houston, Texas, USA

ExxonMobil — ExxonMobil HQ, Houston, Texas

Completed two summer internships at ExxonMobil's headquarters, focusing on the integration of advanced numerical linear solvers into large-scale simulation software. Collaborated closely with a small team to deploy solutions on a high-performance computing cluster with thousands of compute nodes.

- Integrated advanced numerical linear solvers into ExxonMobil's large-scale simulation software
- Collaborated in a small, agile team to deliver high-impact solutions
- Deployed and tested software on a high-performance cluster with 1,000+ nodes
- Gained experience working with extensive legacy codebases
- Enhanced communication and technical skills in an international environment

Skills: C/C++ · Fortran · Linux · MPI · Slurm · Parallel Programming · Numerical Methods · High-Performance Computing · International Collaboration

Software Engineer

2015 – 2019 · Moscow, Russia

Shemyakin and Ovchinnikov Institute of Bioorganic Chemistry RAS — Full-stack Development

Developed VDJdb, a curated database of T-cell receptor (TCR) sequences with known antigen specificities. The database facilitates access to information on T-cell receptor antigen specificities, specifically the recognition of epitopes in MHC contexts. Served as lead developer for the web interface, resulting in a publication in Nature.

- Designed and developed comprehensive RESTful APIs for VDJdb database
- Optimized database queries achieving significant performance improvements
- Led UI/UX design and frontend development for VDJdb web interface
- Architected and deployed production system with 10+ years of operational stability
- Co-authored publication in Nature journal

Skills: Python · JavaScript/Typescript · Angular · CI/CD · Java · Scala · Groovy · Git · Docker · Linux · UI/UX · Observability · SQL · Full-stack development · API Architecture · Architect

EDUCATION

PhD & PostDoc in Electrical Engineering

October 2019 – Present · Eindhoven, the Netherlands

Technical University of Eindhoven — Electrical Engineering Department, Signal Processing Group, BIASlab

Completed PhD in December 2023 with research focused on message-passing based Bayesian inference techniques for large-scale signal processing problems. The primary research outcome was the development of a novel reactive message-passing framework, delivered as an open-source toolbox called RxInfer.jl. Currently a PostDoc.

- Developed RxInfer.jl, a novel reactive message-passing framework for Bayesian inference
- Presented research findings at international conferences and workshops
- Authored and co-developed multiple open-source Julia packages: ReactiveMP.jl, GraphPPL.jl, Rocket.jl, and ExponentialFamily.jl
- Enhanced technical presentation and academic writing capabilities
- Serving as postdoctoral researcher following graduation
- Mentored graduate students and supervised master's thesis projects
- Contributed to educational activities through seminar instruction
- Achieved proficiency in Dutch language
- Thesis is available https://research.tue.nl/en/publications/reactive-probabilistic-programming-for-scalable-bayesian-inferenc

Skills: Machine Learning · Bayesian Inference · Reactive Programming · Julia · Open-source · Software Architecture · Presentational Skills · Technical Writing

Nordic Probabilistic AI School 2022

June 13, 2022 – June 17, 2022 · Helsinki, Finland

The University of Helsinki, Finnish Center for Artificial Intelligence (FCAI) — ProbAI 2022 — Nordic Probabilistic AI School 2022

ProbAI 2022 was the third Nordic Probabilistic AI School, held June 13–17, 2022, at the University of Helsinki, Finland, bringing together 150+ participants for in-person training in probabilistic machine learning. Organised by NAIL, NTNU, and FCAI, it featured key topics like Bayesian neural networks, deep generative models, and variational inference.

- Presented a poster on Reactive Message Passing implementation in Julia programming language
- Participated in lectures on the topic of Bayesian inference, variational inference and efficient sampling
- Gained invaluable knowledge on probabilistic programming and probabilistic AI

Skills: Machine Learning · Bayesian Inference · Variational Methods · Presentational Skills · Poster · Probabilistic Inference

Master of Science

2017 – 2019 · Moscow, Russia

Moscow State University — Faculty of Computational Mathematics and Cybernetics

Focused on advanced software development methodologies, distributed systems, and machine learning applications. Completed thesis on automatic parameter optimization of linear solvers for large-scale reservoir simulations.

- Graduated with honors and received gold medal distinction
- Conducted concurrent studies at the Institute of Numerical Mathematics of the Russian Academy of Sciences
- Led independent research project on automatic parameter optimization of linear solvers for large-scale oil and gas reservoir simulations
- Contributed to collaborative research project on accelerating large-scale reservoir simulations

Skills: Machine Learning · Distributed Systems · Software Architecture · MPI · Parallel Computing · GPU Programming · C/C++ · Fortran · Python

Rome-Moscow School

July 28, 2018 – September 23, 2018 · Moscow, Russia & Rome, Italy

Moscow State University & Tor Vergata University — Rome-Moscow school of Matrix Methods and Applied Linear Algebra

The main purpose of the School is to encourage the ideas exchange and scientific collaborations between Italian and Russian universities and institutions, in the fields of matrix methods and applied linear algebra. The school will take place during a whole month, two weeks in Moscow and two weeks in Rome, offering to young students a long time for learning and thinking over the arguments proposed, not limited to short courses and seminars. The school proposes advanced scientific topics and the opportunity of entering in direct contact with people and institutions of excellence in the field.

- Specialized in Linear Algebra and advanced mathematical concepts
- Focused on Data Structures and algorithmic complexity
- Studied Computational Mathematics and numerical simulations

Skills: Linear Algebra · Computational Mathematics · Numerical Methods · Algorithms · Mathematics · International Collaboration · Travel · C/C++ · Fortran · Python

Institute of Numerical Mathematics RAS

2015 – 2019 · Moscow, Russia

Institute of Numerical Mathematics — Marchuk Institute of Numerical Mathematics of the Russian Academy of Sciences

Conducted concurrent research at the Institute of Numerical Mathematics of the Russian Academy of Sciences, overlapping with both bachelor's and master's studies at Moscow State University. Contributed to a major collaborative project with Exxon Mobil on large-scale reservoir simulation and co-developed the INMOST C++ framework.

- Co-developed INMOST framework: https://github.com/INMOST-DEV/INMOST
- Collaborated with Exxon Mobil on large-scale reservoir simulation (2-month research stay in Houston, Texas)
- Contributed to Samsung Research project on efficient point-cloud processing algorithms

Skills: C/C++ · Numerical Methods · Fortran · Mathematics · Large-scale Computing · Parallel Computing · MPI · OpenMP · CUDA · HPC · SVN · Linux

Institute of Bioorganic Chemistry RAS

2015 – 2019 · Moscow, Russia

Institute of Bioorganic Chemistry — Shemyakin and Ovchinnikov Institute of Bioorganic Chemistry (IBCh), RAS

Contributed to a collaborative research project developing VDJdb, a curated database of T-cell receptor (TCR) sequences with known antigen specificities. The database facilitates access to information on T-cell receptor antigen specificities, specifically the recognition of epitopes in MHC contexts. Served as lead developer for https://vdjdb.com/, resulting in a publication in Nature.

- Developed VDJdb browser: https://vdjdb.com/
- Co-authored publication in Nature journal
- Designed and deployed complex production system with 10+ years of operational stability
- Led UI/UX design and frontend development
- Architected comprehensive system design and implementation
- Not an official part of the education, no diploma, but I'm proud of it

Skills: Python · JavaScript/Typescript · Angular · CI/CD · Java · Scala · Groovy · Git · Docker · Linux · UI/UX · Observability · SQL

Rome-Moscow School

August 20, 2016 – September 3, 2016 · Rome, Italy

MSU & Tor Vergata University — Rome-Moscow school of Matrix Methods and Applied Linear Algebra

The main purpose of the School is to encourage the ideas exchange and scientific collaborations between Italian and Russian universities and institutions, in the fields of matrix methods and applied linear algebra. The school will take place during a whole month, two weeks in Moscow and two weeks in Rome, offering to young students a long time for learning and thinking over the arguments proposed, not limited to short courses and seminars. The school proposes advanced scientific topics and the opportunity of entering in direct contact with people and institutions of excellence in the field.

- First experience of international collaboration
- Specialized in Linear Algebra and advanced mathematical concepts
- Studied Computational Mathematics and numerical simulations

Skills: Linear Algebra · Computational Mathematics · Numerical Methods · Algorithms · Mathematics · International Collaboration · Travel · C/C++ · Fortran · Python

Bachelor of Science

2013 – 2017 · Moscow, Russia

Moscow State University — Faculty of Computational Mathematics and Cybernetics

Moscow State University ranks among Russia's premier institutions, with the Faculty of Computational Mathematics and Cybernetics being one of its most distinguished departments, specializing in computational mathematics and cybernetics development.

- Attended one of Russia's premier academic institutions
- Specialized in Linear Algebra and advanced mathematical concepts
- Focused on Data Structures and algorithmic complexity
- Studied Computational Mathematics and numerical simulations

Skills: C/C++ · Data Structures · Assembler · Mathematics · Computer Science · Simulation

AESC MSU (Kolmogorov Boarding School)

2011 – 2013 · Moscow, Russia

AESC MSU

AESC MSU is a prestigious boarding school affiliated with Moscow State University, consistently ranked among Russia's top educational institutions and frequently achieving first place in national school rankings.

- Institution founded by renowned mathematician Andrey Kolmogorov
- Participated in academic Olympiads and competitions, earning simplified admission to Moscow State University
- Unique boarding school environment bringing together top students from across Russia
- Demonstrated independence by relocating to Moscow at age 15 and residing in dormitory
- Achieved first place in engineering Olympiad, successfully building, testing (and breaking) a Bluetooth-controlled vehicle

Skills: Independence · Physics · Mathematics · Olympiads

TEACHING & SUPERVISION

Teaching Assistant — Bayesian Machine Learning & Information Processing

2026 – Present · Eindhoven, the Netherlands

TU/e — MSc course (5SSD0), hundreds of students

From Q2 2026 I support this MSc course, helping students master probabilistic modelling and message-passing inference. The course uses RxInfer as its primary inference tool and runs interactive lectures and Q&A sessions.

Skills: Bayesian Inference · Probabilistic Programming · Teaching · Mentoring

Teaching Assistant — Software Engineering for Artificial Intelligence

2020 – 2023 · Eindhoven, the Netherlands

TU/e — MSc core course (5ARA0) that grew from ~70 to 200+ students

Supported students at the intersection of software practice and AI during my PhD, as the course scaled to its current size.

Skills: Software Engineering · AI · Teaching · Code Review

Teaching professionalization — University Teaching Qualification (UTQ/BKO)

2026 – Present · Eindhoven, the Netherlands

TU/e — TU/e pedagogical training, with a focus on AI in education

I am pursuing the University Teaching Qualification (UTQ/BKO) at TU/e to formalize my teaching practice on the path to a lecturer role. Having completed the UTQ Foundations module, I am now following the UTQ Supervision module. I am particularly interested in integrating generative AI into teaching and assessment rather than banning it.

- Completed UTQ Foundations (TU/e, 2026)
- Currently following UTQ Supervision (TU/e, 2026) — formal training in guiding PhD and MSc students
- Learning Design Studio "AI in Education" (TU/e, 2026) — redesigning courses for the generative-AI era
- Attended the TU/e AI in Education Summit (May 2026)

Skills: Pedagogy · Course Design · AI in Education · Assessment · Supervision

Open educational resources at scale

2019 – Present · Open source

ReactiveBayes — RxInfer documentation, tutorials, and 40+ worked examples

I treat my open-source work as teaching at scale: the documentation, tutorials, and 40+ worked examples I wrote for the RxInfer ecosystem are used by students, researchers, and practitioners worldwide to learn Bayesian inference. I also build interactive teaching demos for my current AiM-TT postdoc and present regularly at conferences and on podcasts.

Skills: Technical Writing · Tutorials · Documentation · Public Speaking

PhD & MSc project supervision

2021 – Present · Eindhoven, the Netherlands

TU/e · ReactiveBayes — Day-to-day co-supervision; several projects shipped as open-source packages

I co-supervise PhD students and have supervised MSc projects on a day-to-day basis (formal promotorship sits with senior staff). I deliberately steer projects toward results that ship and that others can build on.

- Co-supervising two PhD students approaching graduation, with a third starting in 2026; their work has shipped as released open-source packages — ExponentialFamily.jl / ExponentialFamilyProjection.jl and GraphPPL.jl
- Supervised an MSc project on parallel execution in ReactiveMP.jl (graded 9/10)
- Mentored contributors across the ReactiveBayes community, from first pull request to maintained package
- Formalizing my supervision practice through the TU/e UTQ Supervision module (2026)

Skills: Supervision · Mentoring · Open Source · Research Software

SOFTWARE PROJECTS

I've spent more than a decade somewhere between mathematics and a terminal: a PhD scientist who never quite stopped being an engineer. The work runs from numerical solvers on thousand-node HPC clusters to RESTful APIs, database schemas, and the occasional stubborn UI pixel.

Along the way I've written code in Julia, Python, C, C++, Fortran, JavaScript, TypeScript, Java, Scala, Groovy, and a few others I poked at just to see how they felt. Ask me which language is best and I'll ask whether a spoon beats a fork: tools are tools, and the good ones are all great once you know what you're reaching for.

I founded and maintain ReactiveBayes (25+ open-source Julia packages), built a database that ended up in Nature and has quietly served researchers for 10+ years, and spent two years as a startup CTO learning that sales is harder than message passing. I was reinstalling Linux and patching kernels long before either got easy, and ran Docker back when it still raised eyebrows.

If all of that taught me one thing, it's that software is meant to last: the throwaway script becomes load-bearing, and someone is still running it years later. An LLM can spin up a calculator in seconds; I'd rather build the one that still compiles, deploys, and passes its tests a thousand years from now. Which is the long way of saying I write tests first and mean it.

RxInfer.jl

Initially Personal Project, now under ReactiveBayes Organization — Reactive Message-Passing Bayesian Inference Framework

A comprehensive Julia package for automatic Bayesian inference on factor graphs with reactive message passing. Consists of several open-source packages and has its own organization on GitHub. This project is a core component of my PhD dissertation.

- Main website: https://rxinfer.com/
- Documentation: https://docs.rxinfer.com/stable/
- Examples: https://examples.rxinfer.com/
- Core repository: https://github.com/reactivebayes/RxInfer.jl
- ReactiveMP.jl: https://github.com/reactivebayes/ReactiveMP.jl
- Rocket.jl: https://github.com/reactivebayes/Rocket.jl
- GraphPPL.jl: https://github.com/reactivebayes/GraphPPL.jl
- PhD dissertation: https://research.tue.nl/en/publications/reactive-probabilistic-programming-for-scalable-bayesian-inferenc

Skills: Julia · Bayesian Inference · Reactive Programming · Factor Graphs · Message Passing · Open Source · Collaboration · Resource management · Software Architecture

Rocket.jl

Initially Personal Project, now under ReactiveBayes Organization — Reactive Programming Implementation

An efficient reactive programming implementation in Julia language. The most starred library for reactive programming in Julia, providing high-performance reactive streams and operators.

- Repository: https://github.com/reactivebayes/Rocket.jl
- Most starred reactive programming library in Julia ecosystem
- High-performance reactive streams and operators
- Comprehensive documentation and examples

Skills: Julia · Reactive Programming · Stream Processing · Performance Optimization · Open Source · Software Architecture

VDJdb

VDJdb Project — T-cell Receptor Database Browser

A web application for browsing and querying database of T-cell receptor (TCR) sequences with known antigen specificities. Provides an intuitive interface for database navigation and can query immune repertoire sequencing samples against the database.

- Web application: https://vdjdb.com/
- Publication in Nature: https://www.nature.com/articles/s41592-022-01578-0
- Intuitive interface for TCR database navigation
- Thousands of users per month (which is really a lot for a scientific resource!)
- Query immune repertoire sequencing samples
- Generate sample-level summary of antigen specificities
- Entirely open-sourced https://github.com/antigenomics/vdjdb-web

Skills: Web Development · Database Design · Bioinformatics · UI/UX · Python · JavaScript · Angular · Software Architecture

VDJviz

VDJviz Project — Immune Repertoire Visualization Tool

A versatile immune repertoire web-based graphical user interface application that allows browsing and analyzing immune repertoire sequencing (RepSeq) data with comprehensive visualization capabilities.

- Web application: https://vdjviz.cdr3.net/
- Comprehensive immune repertoire data analysis
- Advanced visualization capabilities
- User-friendly graphical interface
- Entirely open-sourced https://github.com/antigenomics/vdjviz

Skills: Web Development · Data Visualization · Bioinformatics · UI/UX · JavaScript · Angular · Databases

Other

GitHub — A list of small libraries that I maintain on my GitHub account

Sometimes I just have an idea and want to build some simple package that I typically share with the others on GitHub or collaborate with other people.

- A package that serves as an umbrella, defining, exporting, and re-exporting methods essential for Bayesian statistics: https://github.com/ReactiveBayes/BayesBase.jl
- A package that provides a collection of exponential family distributions and offers specialized functionality tailored to this class of distributions: https://github.com/ReactiveBayes/ExponentialFamily.jl
- This package serves as a lightweight extension of Julia's Base.Fix1 and Base.Fix2 functionalities: https://github.com/bvdmitri/FixedArguments.jl
- A package for automatic tests revising for Julia based on Revise.jl: https://github.com/bvdmitri/ReviseTests.jl
- The TinyHugeNumbers package exports tiny and huge objects to represent tiny and huge numbers: https://github.com/ReactiveBayes/TinyHugeNumbers.jl
- A package that is designed to correct specific properties of a matrix using predefined strategies: https://github.com/ReactiveBayes/MatrixCorrectionTools.jl

HOBBY PROJECTS

Cutaway

Personal Project (closed source) — Self-hosted Skydive Video Hub

A closed-source personal project I'm quite proud of — a self-hosted, Dropbox-like video hub built with Claude on bad-weather weekends when there was no jumping to be done. I was tired of WeTransfer for sharing tons of skydiving footage (see my Hobbies), so I built a focused place where my friends and I can upload, organize, lightly edit, and share videos with each other. The source is private, but the website is live.

- Resumable uploads of multi-GB 4K GoPro footage (tus protocol)
- Organize videos into nested collections (per jumper, team, event, date)
- In-browser video trim and optimizations
- Built with Claude on weekends grounded by bad weather

Skills: TypeScript · Next.js · PostgreSQL · Drizzle ORM · Docker · ffmpeg · tus · Better Auth · Self-hosting · Built with Claude

PetoiBittle.jl

Personal Project (open source) — Control a Petoi Bittle Robot Dog from Julia

An open-source Julia library to connect to and control a Petoi Bittle / OpenCat robot dog over a serial port. It pairs a fast, non-allocating low-level command layer with a high-level, beginner-friendly verb API, so you get the speed of talking to the hardware directly with the convenience of expressive, readable commands. The Petoi team liked it enough to feature it on their official users-repositories list.

- Repository: https://github.com/bvdmitri/PetoiBittle.jl
- Documentation: https://bvdmitri.github.io/PetoiBittle.jl/stable/
- Featured on Petoi's official site: https://guide.petoi.com/useful-links/users-repositories

- High-level English-like verbs for every built-in skill (walk_forward, trot_left, sit, greet, back_flip, ...)
- Broad command coverage: gaits, postures, behaviors, joint control, sound, and IMU readout
- Low-level escape hatch (RawCommand / RawQuery) to send any firmware token directly
- Zero-allocation hot path; the whole suite runs without hardware via a transport seam (checked with Aqua.jl and JET.jl)

Skills: Julia · Robotics · Serial Communication · Open Source · API Design · Testing

OPEN SOURCE CONTRIBUTIONS

Julia Programming Language

JuliaLang Organization — Core Language & Ecosystem Contributions

Active contributions to the Julia programming language core and its ecosystem, including bug fixes, feature implementations, and community support.

- Core repository: https://github.com/JuliaLang/julia
- Pull requests: https://github.com/JuliaLang/julia/pulls?q=is%3Apr+author%3Abvdmitri+is%3Aclosed
- Issue contributions: https://github.com/JuliaLang/julia/issues?q=is%3Aissue+author%3Abvdmitri+
- Bug fixes and feature implementations
- Community support and documentation
- Complete re-style of the JuliaCon conference landing page (which is still being used today): https://github.com/bvdmitri/www.juliacon.org

Skills: Julia · Open Source · Bug Fixes · Feature Development · Community Support

vdjtools

vdjtools Project — T-cell & B-cell Repertoire Analysis

Contributions to a comprehensive analysis framework for T-cell and B-cell repertoire sequencing data, supporting advanced immunological research.

- Repository: https://github.com/mikessh/vdjtools
- Comprehensive analysis framework for immune repertoires
- Support for T-cell and B-cell sequencing data
- Advanced immunological research tools

Skills: Bioinformatics · Python · Data Analysis · Immunology · Open Source

Angular Framework

Angular Team — Google Angular Ecosystem

Contributions to the Google Angular ecosystem, including issue reports, feature requests, and community engagement.

- Repository: https://github.com/angular/angular
- Issue contributions: https://github.com/angular/angular/issues?q=author%3Abvdmitri+
- Feature requests and bug reports
- Community engagement and support

Skills: Angular · TypeScript · Web Development · Open Source · Community Support

Neovim

Neovim Project — Modern Vim Editor

Contributions to the Neovim ecosystem, including issue reports, feature suggestions, and community support for the modern Vim editor.

- Repository: https://github.com/neovim/neovim
- Issue contributions: https://github.com/neovim/neovim/issues?q=is%3Aissue+author%3Abvdmitri+is%3Aclosed
- Plugins contributions: https://github.com/fnune/recall.nvim/pulls?q=is%3Apr+is%3Aclosed+author%3Abvdmitri, https://github.com/nvim-neotest/neotest/pulls?q=is%3Apr+author%3Abvdmitri+is%3Aclosed and others
- Feature suggestions and bug reports
- Community support and documentation

Skills: Neovim · Vim Script · Editor Development · Open Source · Community Support

INMOST

INMOST Development — High-Performance Numerical Library

Contributions to INMOST, a high-performance numerical library for large-scale scientific computing and reservoir simulation.

- Repository: https://github.com/INMOST-DEV/INMOST
- Commit history: https://github.com/INMOST-DEV/INMOST/commits/master/?author=bvdmitri
- High-performance numerical computing
- Large-scale scientific simulations
- Reservoir simulation capabilities
- Internship at ExxonMobil in Texas HQ

Skills: C++ · Numerical Computing · HPC · Scientific Computing · Open Source · Internship · International Collaboration

PUBLICATIONS

2933+ Citations **13** h-index **14** i10-index **30+** Publications

Reactive Probabilistic Programming for Scalable Bayesian Inference
Dmitry V. Bagaev · Eindhoven University of Technology · 2023

VDJdb in the pandemic era: a compendium of T cell receptors specific for SARS-CoV-2
M Goncharov, D Bagaev, D Shcherbinin, I Zvyagin, D Bolotin, PG Thomas, ... · Nature methods 19 (9), 1017-1019 · 2022 · 290+ citations

VDJtools: unifying post-analysis of T cell receptor repertoires
M Shugay, DV Bagaev, MA Turchaninova, DA Bolotin, OV Britanova, ... · PLoS computational biology 11 (11), e1004503 · 2015 · 723+ citations

VDJdb: a curated database of T-cell receptor sequences with known antigen specificity
M Shugay, DV Bagaev, IV Zvyagin, RM Vroomans, JC Crawford, G Dolton, ... · Nucleic acids research 46 (D1), D419-D427 · 2018 · 755+ citations

VDJdb in 2019: database extension, new analysis infrastructure and a T-cell receptor motif compendium
DV Bagaev, RMA Vroomans, J Samir, U Stervbo, C Rius, G Dolton, ... · Nucleic acids research 48 (D1), D1057-D1062 · 2020 · 502+ citations

SARS-CoV-2 epitopes are recognized by a public and diverse repertoire of human T cell receptors
AS Shomuradova, MS Vagida, SA Sheetikov, KV Zornikova, D Kiryukhin, ... · Immunity 53 (6), 1245-1257. e5 · 2020 · 303+ citations

MAGERI: Computational pipeline for molecular-barcoded targeted resequencing
M Shugay, AR Zaretsky, DA Shagin, IA Shagina, IA Volchenkov, ... · PLoS computational biology 13 (5), e1005480 · 2017 · 65+ citations

Exploring the pre-immune landscape of antigen-specific T cells
MV Pogorelyy, AD Fedorova, JE McLaren, K Ladell, DV Bagaev, ... · Genome medicine 10 (1), 1-14 · 2018 · 53+ citations

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Variational message passing and local constraint manipulation in factor graphs
0 ^enöz, T van de Laar, D Bagaev, B de Vries Entropy 23 (7), 807 · 2021 · 42+ citations

RxInfer: A Julia package for reactive real-time Bayesian inference
D Bagaev, A Podusenko, B De Vries · Journal of Open Source Software 8 (84), 5161 · 2023 · 39+ citations

Improving parallel efficiency of a complex hydrogeological problem simulation in GeRa
D Bagaev, F Grigoriev, I Kapyrin, I Konshin, V Kramarenko, A Plenkin · Russian Supercomputing Days, 265-277 · 2019 · 16+ citations

Reactive message passing for scalable Bayesian inference
D Bagaev, B de Vries · Scientific Programming 2023 (1), 6601690 · 2023 · 20+ citations

Dynamic optimization of linear solver parameters in mathematical modelling of unsteady processes
D Bagaev, I Konshin, K Nikitin · Russian supercomputing days, 54-66 · 2017 · 10+ citations

Multi-agent trajectory planning with NUV priors
B van Erp, D Bagaev, A Podusenko, 0 ^enöz, B de Vries 2024 American Control Conference (ACC), 2766-2771 · 2024 · 7+ citations

ReactiveMP.jl: A Julia package for reactive variational Bayesian inference
D Bagaev, B van Erp, A Podusenko, B de Vries · Software Impacts 12, 100299 · 2022 · 6+ citations

Message passing-based inference in the Gamma mixture model
A Podusenko, B van Erp, D Bagaev, 0 ^enöz, B de Vries 2021 IEEE 31st International Workshop on Machine Learning for Signal Processing · 2021 · 6+ citations

Expected free energy-based planning as variational inference
B de Vries, W Nuijten, T van de Laar, W Kouw, S Adamiat, T Nisslbeck, ... · arXiv preprint · 2025 · 7+ citations

Gaussian Variational Inference with Non-Gaussian Factors for State Estimation: A UWB Localization Case Study
A Stirling, M Lukashchuk, D Bagaev, W Kouw, JR Forbes · IEEE Robotics and Automation Letters · 2026 · 3+ citations

ExponentialFamilyManifolds.jl: Representing exponential families as Riemannian manifolds
M Lukashchuk, D Bagaev, A Podusenko, 0 ^enöz, B de Vries Proceedings of the JuliaCon Conferences 7 (70) · 2025 · 2+ citations

GraphPPL.jl: A Probabilistic Programming Language for Graphical Models
WWL Nuijten, D Bagaev, B de Vries · Entropy 26 (11) · 2024 · 2+ citations

Riemannian black box variational inference
M Lukashchuk, WWL Nuijten, D Bagaev, 0 ^enöz, B de Vries NeurIPS 2024 Workshop on Bayesian Decision-making and Uncertainty · 2024 · 1+ citations

Message passing-based inference in switching autoregressive models
A Podusenko, B van Erp, D Bagaev, B de Vries · 2022 30th European Signal Processing Conference (EUSIPCO) · 2022 · 1+ citations

Composing Non-Conjugate Factor Graphs with Closed-Form Variational Inference
M Lukashchuk, K Yemets, WM Kouw, D Bagaev, 0 ^enöz, J Beck, ... arXiv preprint · 2026 · 0+ citations

PRESENTATIONS & TALKS

Embedding Julia on Petoi Bittle and Raspberry PI

JuliaCon 2026 · 2026 · Watch on YouTube · Session page

Julia in an embedded setting: adaptive Kalman filter state estimation with RxInfer.jl driving a Petoi Bittle robot dog through PetoiBittle.jl, running autonomously on a Raspberry Pi. Joint work with Wouter Kouw (BIASlab).

PyData Eindhoven @ BrightCape

PyData Eindhoven @ BrightCape · 2026 · Watch on YouTube

Large language models are powerful, but when asked for facts or numerical answers, they can hallucinate with surprising confidence. Is there a way to fix that?

PyData 2025 Opening

PyData Eindhoven 2025 · 2025 · Watch on YouTube

I've been opening the 2026 edition of PyData happening in Eindhoven at High Tech Campus. The event hosted 300+ people with 25+ speakers. The opening followed an awesome keynote from Maurits Hendriks, an Olympic gold-winning coach, talking about data analytics in sports.

What's Wrong with Active Inference and How Lazy Dynamics Is Set to Solve It

ActInf ModelStream 017.1 · 2025 · Watch on YouTube

Analysis of current limitations in active inference frameworks and introduction of Lazy Dynamics as a solution approach

Learning Bayesian Statistics Podcast - Guest Appearance

Learning Bayesian Statistics Podcast · 2024 · Watch on YouTube

Guest appearance discussing Bayesian inference methodologies and reactive programming applications in statistical computing

RxInfer.jl updates and development

4th Applied Active Inference Symposium · 2024 · Watch on YouTube

Overview of RxInfer.jl updates, ongoing development milestones, and key takeaways from the symposium.

RxInfer.jl: A Package for Real-Time Bayesian Inference

JuliaCon 2023 · 2023 · Watch on YouTube

Technical overview of RxInfer.jl package capabilities for real-time Bayesian inference and message passing

Enacting Ecosystems of Shared Intelligence

3rd Applied Active Inference Symposium · 2023 · Watch on YouTube

Discussion of collaborative intelligence systems and their implementation through active inference principles

Building Smarter AI: Active Inference & Nested Models

Active Inference Conference · 2023 · Watch on YouTube

Joint presentation with de Vries, Friedman, and Pashea on active inference frameworks and nested hierarchical modeling approaches

GraphPPL.jl: A Package for Specification of Probabilistic Models

JuliaCon 2022 · 2022 · Watch on YouTube

Introduction to GraphPPL.jl package for declarative specification of probabilistic graphical models

Fast Bayesian Inference with RxInfer.jl

Julia User Group Munich · 2022 · Watch on YouTube

Performance demonstration and practical examples of Bayesian inference workflows using RxInfer.jl

Implementing Active Inference by Message Passing in a Factor Graph

ActInf ModelStream #004.1 · 2021 · Watch on YouTube

Implementation details of active inference algorithms using factor graph message passing techniques

ReactiveMP.jl: Reactive Message Passing-based Bayesian Inference

JuliaCon 2021 · 2021 · Watch on YouTube

Technical introduction to ReactiveMP.jl framework for reactive message passing algorithms in Bayesian inference

Rocket.jl: A Julia package for reactive programming

JuliaCon 2020 · 2020 · Watch on YouTube

Overview of Rocket.jl package for reactive programming patterns and asynchronous data processing in Julia

HOBBIES & INTERESTS

Skydiving

There's something magical about stepping out of a perfectly good airplane at 13,000 feet. Since 2020, I've completed more than 780 jumps, earned my D-license, and became a certified BOSS coach at Skydive Flanders. The rush of freefall at 200 km/h while the world spins below is absolutely incredible and beginning it was perhaps one of the best decisions I've made in my life.

- Modern skydiving is a safe sport with a long history of safety records
- Ignoring strict rules and safety regulations can and will have legal consequences (in contrast to many other sports)
- Not many people are aware of this, but we have two parachutes in case the first doesn't open (or does not work properly) and we also have a computer called AAD inside of our parachute systems that opens the parachute if we are unable

- I'm a certified BOSS (Basis Opleiding Samen Springen) coach, so I can teach you how to jump safely in a group of 2 or 3 people
- You can find me at Skydive Flanders or follow my journey on my Instagram account https://www.instagram.com/bvdmitri/

Lessons: Fast decision making · Risk assessment · Proper equipment maintenance · Mental focus under pressure

Drumming

When Mother Nature grounds my skydiving adventures, I channel that energy into drumming. It's the ultimate full-body workout disguised as music - your arms, legs, and brain all working in perfect sync. The journey from awkward beginner to creating rhythms that make people move has taught me that patience and persistence can transform chaos into harmony (though my neighbors might disagree about the 'harmony' part).

- Requires physical endurance and coordination
- Teaches patience through long learning process
- Develops rhythm and timing skills
- Builds muscle memory and technique

Lessons: Patience and persistence · Physical coordination · Rhythm and timing · Dedication to practice

Snowboarding/Skiing

My love affair with mountain sports began at 14 in Russia, carving my first turns on a snowboard. At 25, I discovered the precision and speed of skiing, and now I'm hooked on both. There's nothing like the feeling of floating through fresh powder or carving perfect turns on groomed runs. And yes, I'm that person who will lecture you about helmets - because the mountain doesn't care about your hairstyle.

- Always wear a helmet - safety first!
- Love both snowboarding and skiing
- Enjoy mountain sports and outdoor activities

Lessons: Safety awareness · Adapting to different conditions · Physical fitness · Mountain sports skills

Wakeboarding

When the mountains are green and the lakes are calling, I trade my skis for a wakeboard. There's something incredibly satisfying about being pulled across the water at high speed, catching air off the wake, and landing tricks that make you feel like a superhero. It's the perfect summer complement to my winter mountain adventures.

- Water sports and lake activities
- Balance and coordination
- Summer sport complement to winter activities
- Great for core strength and fitness

Lessons: Balance and coordination · Water sports skills · Summer fitness · Outdoor recreation

Ship Modelling

When the world shut down during COVID, I discovered the meditative art of ship modeling. There's something deeply satisfying about transforming tiny pieces of wood into majestic vessels that once ruled the seas. Each model is a journey through history, requiring the patience of a monk and the precision of a surgeon. Plus, they make excellent conversation starters in my home.

- Working with wood and small details
- Patience and precision
- Hobby with nice decorations for my home
- Historical and technical interest

Lessons: Patience and precision · Working with small details · Creative problem solving

Video Editing

Behind every great adventure is a story waiting to be told. I love transforming raw footage into compelling narratives that capture the essence of experiences - whether it's documenting academic conferences, creating content for my research lab, or sharing my adrenaline-fueled adventures. It's like being a digital storyteller, weaving together moments to create something that resonates with others.

- Content creation for social media
- Technical video editing skills
- Storytelling through visual media
- Both personal and professional projects

Lessons: Creative storytelling · Technical video skills · Content creation · Visual communication