

Dmitry Bagaev, PhD

Senior Software Engineer & Scientist

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English · Dutch · Russian

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Software engineer and scientist in Eindhoven with a PhD in Bayesian inference and a background in computational mathematics. I founded and maintain ReactiveBayes (RxInfer.jl and 35+ Julia packages), was CTO of the startup Lazy Dynamics, and earlier built the web platform of VDJdb, an immunology database published in Nature Methods. Currently a postdoc at TU/e, working on Bayesian inference for Dutch road traffic.

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 · WebGPU · Video Processing · Open Source Maintenance · Code Review · Release Management

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

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

WORK EXPERIENCE

Postdoc Researcher

2026 – Present · Eindhoven, the Netherlands

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

Research on fast and scalable Bayesian inference at Eindhoven University of Technology. I'm part of AiM-TT (AI Learning Initiative for Multi-modal Traffic and Transportation), a Dutch national programme on AI for traffic and transport, and work with TU Delft and the Nationaal Dataportaal Wegverkeer (NDW) on problems on Dutch roads.

- Conduct research on fast and scalable Bayesian inference methods for real-world mobility and transportation problems
- Part of AiM-TT, a Dutch national programme on 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

I founded and lead ReactiveBayes, a GitHub organization for reactive Bayesian inference and probabilistic programming in Julia. Day-to-day I design package APIs, review contributions, cut releases, triage issues, and help the researchers and engineers who use the libraries in academia and industry.

- Founded ReactiveBayes and maintain 35+ Julia packages with 900+ combined GitHub stars
- 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 most-starred 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
- Present the libraries in talks and tutorials, and collaborate with research groups that use them

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 building probabilistic AI solutions for enterprise applications.

- Co-founded the company with an experienced team
- Worked on product strategy, sales and marketing alongside the technical side
- Discussed the work with industry leaders and researchers including Erik Meijer, Kevin Murphy, Norman Winarsky, Chris Lattner, and Daniel Lee
- Raised venture capital funding

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

Eindhoven Events Co-Organizer

August 2022 – Present · Eindhoven, the Netherlands

JuliaLang & PyData Eindhoven — Public Events & Community Management

I co-organize public events and meetups for the Julia and Python communities in Eindhoven. My part is mostly marketing and community management, plus photos, videos and social media.

- 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
- Co-organized 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

Postdoc Researcher

2024 – 2025 · Eindhoven, the Netherlands

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

Stayed at BIASlab as a postdoc for 18 months after my PhD, continuing the research on reactive message passing and the development of RxInfer.jl.

- Continued development of RxInfer.jl and the ReactiveBayes packages
- Mentored PhD and MSc students

Skills: Bayesian Inference · Probabilistic Programming · Research · Julia · Open Source · Mentoring

PhD Researcher

October 2019 – December 2023 · Eindhoven, the Netherlands

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

Research on reactive message-passing frameworks for Bayesian inference. The main outcome is RxInfer.jl, an open-source Julia package for scalable Bayesian inference.

- 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
- Mentored graduate students and supervised master's thesis projects
- Contributed to educational activities through seminar instruction
- Learned Dutch to a working level
- Thesis: 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 · Presentation Skills · Technical Writing

Software Engineering Intern

2017 – 2018 · Houston, Texas, USA

ExxonMobil — ExxonMobil HQ, Houston, Texas

Two one-month summer internships at ExxonMobil's headquarters, in 2017 and 2018, integrating advanced numerical linear solvers into large-scale simulation software. I worked with a small team to deploy them on a high-performance computing cluster with thousands of compute nodes.

- Integrated advanced numerical linear solvers into ExxonMobil's large-scale simulation software
- Deployed and tested software on a high-performance cluster with 1,000+ nodes
- Worked in a large legacy codebase

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, which researchers use to look up which epitopes a TCR recognizes in an MHC context. I was the lead developer of the VDJdb web platform and a co-author of the VDJdb papers, including the 2022 one in Nature Methods.

- Designed and built the REST API for the VDJdb database
- Optimized database queries
- Led UI/UX design and frontend development for the VDJdb web interface
- Built and deployed the production system, which has been running for 10+ years
- Co-authored the VDJdb paper in Nature Methods (2022)

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

EDUCATION

PhD in Electrical Engineering

October 2019 – December 2023 · Eindhoven, the Netherlands

Eindhoven University of Technology (TU/e) — Electrical Engineering Department, Signal Processing Group, BIASlab

PhD on message-passing based Bayesian inference for large-scale signal processing problems, completed in December 2023. The main research outcome is a reactive message-passing framework, released as the open-source Julia package RxInfer.jl.

- Dissertation: Reactive Probabilistic Programming for Scalable Bayesian Inference
- Developed RxInfer.jl, a reactive message-passing framework for Bayesian inference
- Presented the research at international conferences and workshops
- Thesis: 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 · Presentation 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

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. It was organized by NAIL, NTNU and FCAI and covered Bayesian neural networks, deep generative models and variational inference.

- Presented a poster on Reactive Message Passing implementation in Julia programming language
- Attended lectures on Bayesian inference, variational inference and efficient sampling

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

Master of Science

2017 – 2019 · Moscow, Russia

Moscow State University — Faculty of Computational Mathematics and Cybernetics

Master's in computational mathematics. 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

A school on matrix methods and applied linear algebra, run jointly by Moscow State University and Tor Vergata University of Rome, with parts in Moscow and in Rome.

- Lectures and projects on matrix methods and applied linear algebra
- 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. Worked on a joint project with ExxonMobil on large-scale reservoir simulation and co-developed the INMOST C++ framework.

- Co-developed INMOST framework: https://github.com/INMOST-DEV/INMOST
- Collaborated with ExxonMobil on large-scale reservoir simulation (two one-month stays 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

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

My first time at the Rome-Moscow school on matrix methods and applied linear algebra, run jointly by Moscow State University and Tor Vergata University of Rome.

- First experience of international collaboration
- Lectures on linear algebra, 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

Bachelor's in computational mathematics at the Faculty of Computational Mathematics and Cybernetics of Moscow State University.

- Linear algebra, data structures and algorithmic complexity
- 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

Specialized physics and mathematics boarding school of Moscow State University, founded by Andrey Kolmogorov.

- Took part in academic Olympiads, which earned simplified admission to Moscow State University
- Moved to Moscow alone at 15 and lived in the school 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 using generative AI in teaching and assessment.

- 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), on redesigning courses to account for generative AI
- 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 the work at conferences.

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'm a PhD scientist who also works as a software engineer, and I've been doing both for more than ten years. My work ranges from numerical solvers running on HPC clusters with thousands of nodes to web backends and frontends.

I've written code in Julia, Python, C, C++, Fortran, JavaScript, TypeScript, Java, Scala, Groovy and a few other languages I only tried briefly. I don't have a favourite and pick whichever one suits the problem.

I founded and maintain ReactiveBayes (35+ open-source Julia packages). I built a database that ended up in Nature Methods and that researchers have used for over 10 years, and I spent two years as a startup CTO, where I learned that sales is harder than message passing. I was reinstalling Linux and patching kernels long before either got easy, and learned to code back when autocomplete could only finish a variable name.

I care most about software that keeps working for years, since scripts written for one-off use often end up running much longer than planned. That's why I write tests first.

RxInfer.jl

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

A 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
- RxInfer 6 (October 2026): runs on ReactiveMP 7 with message-passing rules in registered rule packages, a much faster first inference thanks to a precompile workload, and Reactant compilation for multi-step models

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

Reactive programming for Julia: fast reactive streams and operators. It is the most-starred reactive programming library in Julia.

- Repository: https://github.com/ReactiveBayes/Rocket.jl

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 a database of T-cell receptor (TCR) sequences with known antigen specificities. It can also match immune repertoire sequencing samples against the database.

- Web application: https://vdjdb.com/
- Publication in Nature Methods: https://www.nature.com/articles/s41592-022-01578-0
- 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 web application for browsing, analyzing and visualizing immune repertoire sequencing (RepSeq) data.

- Web application: https://vdjviz.cdr3.net/
- Entirely open-sourced https://github.com/antigenomics/vdjviz

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

Other

GitHub — Small libraries I maintain, on my account and under ReactiveBayes

Small packages I built when I needed them and shared on GitHub.

- BayesBase.jl, an umbrella package that defines and re-exports common methods for Bayesian statistics: https://github.com/ReactiveBayes/BayesBase.jl
- ExponentialFamily.jl, a collection of exponential family distributions with functions specific to that class: https://github.com/ReactiveBayes/ExponentialFamily.jl
- FixedArguments.jl, a lightweight extension of Julia's Base.Fix1 and Base.Fix2: https://github.com/bvdmitri/FixedArguments.jl
- ReviseTests.jl, which re-runs Julia tests automatically on code changes, built on Revise.jl: https://github.com/bvdmitri/ReviseTests.jl
- TinyHugeNumbers.jl, which exports tiny and huge objects to represent tiny and huge numbers: https://github.com/ReactiveBayes/TinyHugeNumbers.jl
- MatrixCorrectionTools.jl, which corrects 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 personal project I'm quite proud of: a self-hosted, Dropbox-like video hub I built with Claude on bad-weather weekends when there was no jumping to be done. I was tired of using WeTransfer for all our skydiving footage (see my Hobbies), so I built a place where my friends and I can upload, organize, lightly edit and share videos. 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
- 360 footage stitched and stabilized in the browser with web360 (open source): https://github.com/bvdmitri/web360
- Built with Claude on weekends grounded by bad weather

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

web360

Personal Project (open source) — Stitch & Stabilize 360 Video in the Browser

An open-source TypeScript library that stitches and stabilizes raw 360 camera recordings entirely in the browser, on WebGPU and WebCodecs. It opens a recording and turns it into stabilized equirectangular frames; playback and encoding are left to the application. I built it to bring 360 skydiving footage to Cutaway without a desktop editor in the loop.

- Repository: https://github.com/bvdmitri/web360
- npm package: https://www.npmjs.com/package/@bvdmitri/web360
- Documentation: https://bvdmitri.github.io/web360/
- Stitches Insta360 dual-fisheye footage into equirectangular frames, matching exposure and colour across the seam and correcting rolling shutter; renders GoPro equi-angular cube maps
- Gyro-based stabilization levelled by the accelerometer, with smooth, lock, horizon and follow modes
- Yields VideoFrames for encoding and draws flat views along keyframed paths, with lenses from linear to tiny planet
- Reads only headers, telemetry and calibration, never whole multi-GB files into memory
- Insta360 ONE R and GoPro MAX2 supported and covered by test fixtures; powers 360 videos in Cutaway

Skills: TypeScript · WebGPU · WebCodecs · Computer Vision · Video Processing · Open Source · Testing

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 has a fast, non-allocating low-level command layer with a beginner-friendly verb API on top. 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

Bug fixes, small features and issue reports for the Julia language and its ecosystem.

- Core repository: https://github.com/JuliaLang/julia
- Pull requests: https://github.com/JuliaLang/julia/pulls?q=is%3Apr+author%3Abvdmitri+is%3Aclosed
- Issues: https://github.com/JuliaLang/julia/issues?q=is%3Aissue+author%3Abvdmitri
- Complete restyle of the JuliaCon conference landing page (still in use): 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 an analysis framework for T-cell and B-cell repertoire sequencing data.

- Repository: https://github.com/antigenomics/vdjtools
- Co-authored the VDJtools paper in PLOS Computational Biology (2015)

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

Angular Framework

Angular Team — Google Angular Ecosystem

Issue reports and feature requests for the Angular framework.

- Repository: https://github.com/angular/angular
- Issues: https://github.com/angular/angular/issues?q=author%3Abvdmitri

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

Neovim

Neovim Project — Modern Vim Editor

Issue reports for Neovim and pull requests to Neovim plugins.

- Repository: https://github.com/neovim/neovim
- Issues: 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

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

INMOST

INMOST Development — High-Performance Numerical Library

Co-developed INMOST, a C++ library for large-scale numerical simulation, including reservoir simulation.

- Repository: https://github.com/INMOST-DEV/INMOST
- Commit history: https://github.com/INMOST-DEV/INMOST/commits/master/?author=bvdmitri
- Used in a joint project with ExxonMobil, including internships at its Houston headquarters

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

PUBLICATIONS

2,933+ 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

VDJviz: a versatile browser for immunogenomics data
DV Bagaev, IV Zvyagin, EV Putintseva, M Izraelson, OV Britanova, ... · BMC Genomics 17 (1), 453 · 2016 · 51+ citations

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 Global 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 opened PyData Eindhoven 2025 at the High Tech Campus, an event with 300+ attendees and 25+ speakers. The opening was followed by a keynote from Maurits Hendriks, an Olympic gold medal-winning coach, on 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

Where current active inference frameworks fall short, and how Lazy Dynamics approaches the problem.

Learning Bayesian Statistics Podcast - Guest Appearance

Learning Bayesian Statistics Podcast · 2024 · Watch on YouTube

Guest on the Learning Bayesian Statistics podcast, talking about Bayesian inference and reactive programming.

RxInfer.jl updates and development

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

Recent RxInfer.jl updates and development milestones.

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

JuliaCon 2023 · 2023 · Watch on YouTube

An overview of RxInfer.jl for real-time Bayesian inference with message passing.

Enacting Ecosystems of Shared Intelligence

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

Collaborative intelligence systems built on 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 and nested hierarchical models.

GraphPPL.jl: A Package for Specification of Probabilistic Models

JuliaCon 2022 · 2022 · Watch on YouTube

An introduction to GraphPPL.jl for declarative specification of probabilistic graphical models.

Fast Bayesian Inference with RxInfer.jl

Julia User Group Munich · 2022 · Watch on YouTube

Examples of fast Bayesian inference workflows with RxInfer.jl.

Implementing Active Inference by Message Passing in a Factor Graph

ActInf ModelStream #004.1 · 2021 · Watch on YouTube

How to implement active inference with message passing on a factor graph.

ReactiveMP.jl: Reactive Message Passing-based Bayesian Inference

JuliaCon 2021 · 2021 · Watch on YouTube

An introduction to ReactiveMP.jl, a framework for reactive message passing in Bayesian inference.

Rocket.jl: A Julia package for reactive programming

JuliaCon 2020 · 2020 · Watch on YouTube

An overview of Rocket.jl for reactive programming and asynchronous data processing in Julia.

HOBBIES & INTERESTS

Skydiving

I started skydiving in 2020. Since then I've made 780+ jumps, earned my D-license and become a certified BOSS coach at Skydive Flanders. Most jumps start at 13,000 feet with freefall at around 200 km/h, and starting was one of the best decisions I've made.

- Modern skydiving is a safe sport with a strong safety record
- Breaking the rules and safety regulations has legal consequences, unlike in many other sports
- Every rig has two parachutes, plus an automatic activation device (AAD), a small computer that opens the reserve if the jumper can't
- 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 the weather keeps me on the ground, I play drums. It takes arms, legs and timing working together, and progress is slow but easy to hear. So are the practice sessions, according to my neighbors.

- Requires physical endurance and coordination
- A long learning process that takes patience

Lessons: Patience and persistence · Coordination · Regular practice

Snowboarding/Skiing

I started snowboarding at 14 in Russia and picked up skiing at 25. Now I do both, in fresh powder and on groomed runs. I'm also the person who will tell you to wear a helmet.

- Always wear a helmet

Lessons: Safety awareness · Adapting to different conditions · Physical fitness

Wakeboarding

In summer I swap skis for a wakeboard. I ride on lakes, jump the wake and keep working on new tricks.

- Balance and coordination
- Core strength

Ship Modeling

I started building wooden ship models during the COVID lockdowns. Each one is a lot of small, careful work, and the finished ones decorate my home.

- Working with wood and small details
- Historical and technical interest

Lessons: Patience and precision · Creative problem solving

Video Editing

I edit videos of conferences, of my research lab and of my own jumps. Below are some I made for BIASlab and for JuliaCon and PyData Eindhoven.

- Content for social media
- Both personal and professional projects
- Built Cutaway (self-hosted video hub) and web360 (in-browser 360 stitching) for my skydiving footage

Lessons: Storytelling · Video editing · Content creation