Mathieu Dutour Sikirić

Software Engineer | Rust, C++, Python

Blockchain & Protocols, Optimization, Compilers, Distributed Systems, Scientific Computing

Summary

I am a Mathematician by training (PhD) who is now a software developer. Senior systems and blockchain engineer (15+ years) specializing in Rust, C++ and high-performance distributed systems. Strong background in compiler technology, blockchain protocol design (L1 and L2), EVM/WebAssembly runtimes, cryptography, and high-frequency trading infrastructure. Extensive experience in scientific computing, optimization, and algorithms. I have proven over the years my ability to adapt to any kind of scientific or engineering endeavour and come up with original ideas.

Key Skills

Artificial Intelligence: MCP (using and writing); Orchestration (Openclaw); Ollama local models.

Programming Languages: Rust (5 years: async/await, Tokio, traits, generics, macro-based code, large multi-crate codebases, WebAssembly); C, C++ (20+ years, modern C++11/14/17/20) with Boost, MPI, CMake, Emscripten, serialization and template metaprogramming; NodeJS/Javascript (2 years); Python (10 years: Numba, SciPy, NumPy, Pandas, packaging); OCaml (1 year); Fortran 90 (15 years); Solidity (3 years); Java (2 months); GAP (20 years); Perl (10 years); Matlab (10 years); Haskell; Go, Elixir, Scala (some practice).

Embedded programming & Cross compilation: Writing Windows applications from Linux/macOS using MXE. Embedded programming with Yocto and using sensors in **C** and **C++**. ARM Cortex-A development for indoor localization hardware (altimeter, time-of-flight ranging); data fusion. Cross compilation to WebAssembly.

Systems & Parallelism: HPC; distributed systems, low-latency/high-throughput optimization; MPI; OpenMP; actor-based systems; lock-free data structures; POSIX/C++11 threads; Qt threads; Threading Building Blocks.

Low-latency techniques: Shared memory, CPU pinning, static polymorphism, kernel bypass, busy loops.

Blockchain & Cryptography: Blockchain protocols (consensus, scalability); EVM and REVM; Solidity smart contracts (Echidna, Certora); sidechains and L2 (rollup-like systems); elliptic curve cryptography, ECDSA, RSA, symmetric crypto, hash functions, zero-knowledge proofs, multi-signature schemes.

Compilers & Optimization: Compiler design (lexer/parser, AST, SSA/ANF IRs, compiler passes); LLVM toolchain; Python-to-native compilation for numerical workloads (Numba); algorithmic optimization for financial and scientific computing.

Databases: Extensive experience with SQL database (SQLlite, PostgreSQL), no-SQL (RocksDB, ScyllaDB, DynamoDB), and columnar/data formats (Apache Parquet/Arrow). Monitoring and observability with Prometheus.

Storage design: Database-agnostic storage layers; adapters for batching, caching, journaling and value splitting; asynchronous data paths.

Mathematics & Scientific Computing: Linear, integer and semidefinite programming (GLPK, SCIP, GUROBI, CSDP); SAT/SMT (Minisat, Z3); computational geometry and polyhedral computations; enumeration (perfect cover, perfect matchings, ordered enumeration, clique enumeration, colorings); numerical methods (finite difference, finite elements, redistribution, implicit/explicit); discrete geometric structures.

Machine Learning: Statistics & Machine Learning: PCA, LASSO, L1-methods; Computer graphics: OpenCV; Spectral clustering, Non-Negative Matrix Factorization.

Graphics & Data: GUI: Qt; Graphics: SVG, OpenSCAD, NCL, Matplotlib; Data formats: Netcdf, Grib, Protocol Buffer, XML, GIS, LaTeX, HTML.

Economics: Equilibrium theory (Ricardo, aggregate demand, $MV = PT$); Price determination (Pareto, Marginal theory); High Frequency Trading (exchange simulator, order types).

Frontend: React, TypeScript, GraphQL, Playwright, Ruby on Rails.

Tools & Workflow: Git (GitHub, GitLab, PR-based workflow, Git-flow); SVN; Mercurial; Docker; AWS, Prometheus; Linux/Unix, macOS, Windows; unit testing, CI, stochastic tests, asserts, performance profiling (gdb, valgrind, sanitizers, TotalView, perf, oprofile); functional, object-oriented, and imperative programming styles.

Work Experience

Senior Optimization Engineer *Oaasis.ai* Jul 2026 – present
Rust, TypeScript

- Design and reformulate LP / MILP / CP models for multi-echelon supply planning: BOM explosion, inventory recursion, capacity and lot-sizing.
- Benchmark and tune solvers; build solver-native models that exploit problem structure.
- Attack the real bottlenecks: weak relaxations, primal heuristics, variable elimination, warm-starting repeated solves.
- Make planner decisions explainable by surfacing binding constraints and penalties, shipping to production in a Rust stack.

Remote Senior Software Engineer *linera.io* Sep 2022 – May 2026
Rust, Solidity

- Core contributor with 560+ merged PRs to the Linera L1 protocol.
- Accelerated smart contract execution by 3× through execution engine optimizations and improved runtime organization.
- Implementation of storage on Linera by building database agnostic interfaces.
- Improvement to the protocol of Linera.
- Implementation of a decentralized exchange on the Linera blockchain.
- Added EVM support alongside Linera's existing WebAssembly runtime.
- Worked on prediction market contract code and the front-end.

Remote Senior Software Engineer *Arrow Markets* Apr 2022 – Aug 2022
Python

- Developed faster numerical algorithms for financial mathematics computations in options markets.
- Implemented calibration and fitting algorithms for option volatility parametrization within arbitrage constraints.

Remote Senior Software Engineer *Simplectica* Mar 2021 – Nov 2021
C++, OCaml, Python

- Developed a high-performance trading system for the Nasdaq and CBOE.
- Did general multiprocessing architecture (between tactics, strategies and book builder).
- Did the simulator of the matching engine of Nasdaq.

Remote Senior Software Engineer *Bodo.ai* Oct 2019 – Sep 2020
C++, SQL, Python

- Co-developed a Python compiler targeting Pandas for extremely high-performance within the Python ecosystem.
- Implemented C++ backends and MPI-based parallelization for large-scale data workloads to achieve massive speedups.
- Added new language features and optimizations to the compiler.

Remote Senior Software Engineer *Alacris* Dec 2018 – Sep 2019
Haskell, OCaml, Solidity, Rust, JavaScript, Docker

- Developed a layer 2 sidechain for Ethereum. User security guaranteed by the smart contract on the Ethereum blockchain.
- Participated in a DSL compiler that allowed to check at compile time the absence of bugs in smart contracts.

Remote Developer *Second Bridge* Jun 2016 – Oct 2017
C++, Perl, Python, Java, Qt

- Developed algorithms for ranging in a system of interconnected cards and position determination.
- Designed network protocols and multithreaded architecture for card-to-card communication.

Scientific Researcher *Rudjer Bošković Institute* Jan 2007 – Nov 2018
Fortran, C++, Matlab, Python

- Implemented an operational ocean wave model for the Croatian Meteorological Agency.
- Developed numerical software for data analysis and large-scale scientific simulations.
- Built data pipelines processing satellite, in-situ, and radar observations at scale.

Education

- Ph.D. in Mathematics, Université Paris 11 Orsay, France.
- M.Sc. in Mathematics and Computer Science, École Normale Supérieure, France.
- B.Sc. in Mathematics, École Normale Supérieure, France.
- Languages: French (native), English (excellent), Croatian (good).

Selected Public Projects

1. **Linera-protocol**: (Rust) L1 blockchain protocol for fast, scalable payments with microchains. Senior developer and core contributor affecting protocol internals, async services, storage engines, and EVM/WebAssembly integration.

2. **voice-analysis.xyz**: (Rust, WebAssembly, Python) Side project: quantitative, explainable feedback on vocal delivery (confidence, charisma, clarity, nervousness, scored over time) from a short recording. Signal-processing and scoring core in Rust compiled to WebAssembly, running entirely in the browser, with in-page Whisper transcription; sole author.

3. **Polyhedral**: (C++20) Library for polyhedral computations (lattices, polytopes, groups, quadratic forms), targeting native platforms and WebAssembly, with bindings for GAP, Python, MCP, Julia and Rust. Primary developer of 170K LOC; multithreaded algorithms and sparse solvers used for record-breaking computations in computational geometry:

   (a) Enumerated the 55083357 C-type domains in dimension 6.

   (b) Enumerated the 2237251040 perfect forms in dimension 9.

4. **Ocean Works**: (C++) Software for plotting, interpolation and oceanographic computations. Sole author and maintainer.

5. **WaveWatch**: (Fortran) Third-generation ocean surface wave forecast system. Implemented key features such as geographical partitioning and implicit evolution schemes.

Nationality:	France	E-mail:	Mathieu.Dutour@gmail.com
Address:	Karlovačka Cesta 28B 10452 Klinča Selo Croatia	Home page:	mathieudutsik.github.io
		GitHub:	github.com/MathieuDutSik
		LinkedIn:	www.linkedin.com/in/mathieu-d-888250229
Time zone:	CET (UTC+1)	Quora:	www.quora.com/Mathieu-Dutour-Sikiric
Cellphone:	+385 99 42 82 000		