

# Nathan TouroUX

SYSTEM AND BACKEND SOFTWARE ENGINEER - DOCTOR IN SUBATOMIC PHYSICS

## Contact

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## Technical Skills

- Rust | Haskell | Java | C++ | Python
- git | awk | sed | bash | vim | helix
- ArchLinux | MacOS
- Parallel programming (CPU and GPU)
- Encryption (TLS, WebSockets)
- Relativistic hydrodynamics
- Stochastic simulations
- Numerical integration

## Soft Skills

- Creative Problem Solving
- Scientific Communication
- Improvisation | Rigor

## Languages

French	Native
English	Fluent
Japanese	Begginer

## Hobbies & Interests

- Japanese Language
- Programming
- Numerical analysis
- Fantasy novels/comics/cartoon
- Board games

## ABOUT ME

Pasionate about programming and simulations. Tried numerous programming languages, yet stayed true to Rust and Haskell. Driven by programming challenges, especially involving optimization and type level programming.

## PROFESSIONAL EXPERIENCE

2024 – 2025 **Full stack Rust developer**

LETSCAN

📍 NANTES, FRANCE

Technical leader of a team of 3 developpers dedicated to efficient signal processing.

- Developpement of a CPU and GPU backend for efficient signal processing.
- Creation and implementation of a compute server, a web client, and a native app connected by encrypted connections to analyse and synthesise signals.
- Creation of a mobile app dedicated to the classification of baby emotions. For this purpose, an AI model was trained on the output of the signal analysis method developped by the company.

2020 - 2024 **High performance software developpement (HPC) and numerical simulation**

SUBATECH, OSAKA UNIVERSITY, YITP

📍 NANTES, FRANCE AND OSAKA AND KYOTO, JAPAN

- Creation and implementation in Rust of a general implicit integration method applied to relativistic hydrodynamics.
- Emphasis on improved accuracy and efficiency compared to existing methods.

2018 - 2020 **Research internship**

SUBATECH

📍 NANTES, FRANCE

- Creation and implementation in Rust of a Partial Differential Equation (PDE) solver on GPU.
- Focus on efficiency with GPU parallel programming required by the time-consuming nature of stochastic simulations.
- Developpement of a PDE compiler for GPU to study various equations.

## EDUCATION

2020 - 2025 **PhD in Physics: numerical fluid dynamics**

IMT ATLANTIQUE, SUBATECH, OSAKA UNIVERSITY, YITP

📍 NANTES, FRANCE AND OSAKA, JAPAN

Double degree program PhD between France and Japan. Granted the MEXT scholarship from the Japanese government.

Courses: Heavy-ion Collisions, Relativistic Hydrodynamics, Non-equilibrium Physics, Antimatter, Integrity and Ethics.

2018 - 2020 **Master in Particle physics**

NANTES UNIVERSITY

📍 NANTES, FRANCE

Courses: Quantum Field Theory, Perturbation Theory, N-body Problem, Solid State Physics, Atomic Physics, Group Theory, Signal Theory, Monte Carlo Simulations, Statistics, Numerical Analysis.

## PUBLICATIONS

2025 N. Attieh, **N. TouroUX**, M. Bluhm, M. Kitazawa, T. Sami, and M. Nahrgang, "Renormalized critical dynamics and fluctuations in model A in the Hohenberg-Halperin classification", *Phys. Rev. C* 111(2):24906, 2025, doi: 10.1103/PhysRevC.111.024906.

2024 **N. TouroUX**, M. Kitazawa, K. Murase, and M. Nahrgang, "Efficient Solver of Relativistic Hydrodynamics with an Implicit Runge-Kutta Method", *PTEP* 2024(6):63, 2024, doi: 10.1093/ptep/ptae058.

## PROJECTS

### BoxArray

📍 [HTTPS://CRATES.IO/CRATES/BOXARRAY](https://crates.io/crates/boxarray)

BoxArray is an open-source Rust library dedicated to safely allocate fixed-size arrays on the heap. Especially, it uses unsafe Rust code for efficiency while guaranteeing correct usage through type level programming.