Willem Vanhulle

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EXPERIENCE

DevLab (Professional training) — Ghent, Belgium
Course instructor — *June. 2025 - current*

- **Systems programming workshops:** Topics include embedded async Rust with Embassy, proving safety properties with proof assistant Lean, scripting for systems engineers. See events. (`Rust`, `Embassy`, `ESP32`, `Raspberry Pico`, `UART`, `Lean`, `Nushell`)
- **Intensive Rust evening course:** Deliver 7-week intensive Rust course for professional software developers. Hands-on approach with interactivity, exercises and focused on C or C++ developers. Course plan and lecture notes at GitHub. (`Nix`, `Rust`, `Typst`)

OTIV (Railway automation) — Ghent, Belgium
Software engineer — *Apr. 2024 - June 2025*

- **Distributed embedded systems:** Hybrid remote control system for freight trains of large railway company. Implement real-time connectivity monitoring using video and telemetry. Re-design software architecture and essential network primitives. (`Rust`, `Tokio`, `GStreamer`, `WebRTC`, `WebSocket`, `Protobuf`, `async`)
- **Learning and development:** Specialised Rust training for internal Rust teams about asynchronous and generic programming. (`Rust`)
- **Safety-critical user interfaces:** Architect multi-monitor native Rust desktop application. Design and maintain front-end components for displaying live train data. Following safety protocols for railway applications. (`Rust`, `Slint`, `HTML`, `CSS`, `front-end`, `UI`)

Inbiose (Biotechnology & fermentation) — Ghent, Belgium
Software engineer — *June 2021 - April 2024*

- **Collaborative scientific front-end:** Collaborative spreadsheet web interface and database. Datagrid caching and conflict resolution on restore. automated data parsing from scientific instruments. (`TypeScript`, `JavaScript`, `Svelte`, `D3.js`)
- **Industrial robotic control:** Control software for in-house fermentation robot. Read out raw signals from electronics and process data from optical sensors. Implement safety mechanisms for failed biochemical experiments using Rust. (`Python`, `Rust`, `C++`, `Visual Basic`, `Windows`, `COM`)

High-school and university (Education) — Brussels & Leuven, Belgium
Part-time mathematics lecturer & tutor — *Nov. 2014 - Jan. 2021*

- **Part-time teacher:** Teach algebra to refugees and adults with learning difficulties about algebra. Create engaging lessons and exercises. (`Python`, `LaTeX`)
- **Freelance tutor:** Tutor high-school and university students in analysis, statistics, linear algebra.

PUBLICATIONS

Master's thesis: Doing homotopy type theory (related to algebraic topology in mathematics) and cubical type theory in proof assistant Agda. See the summary of my thesis.

OPEN-SOURCE CONTRIBUTIONS

Nu-Lint linter for Nu-Shell: A helpful linter for NuShell that aims to help new users to use the top of the can in this new scripting language. Very fast and implemented in Rust. Contains more than 50 lint rules with fixes to help developers, see download page.

Clone-Stream stream processing library: A functional approach to data processing with a type of async iterators. Implemented in Rust with minimal dependencies. Gave a conference talk about this project at EuroRust in Paris. You can download it from crates.io.

ENNReal-Arith tactic for Lean: Published a "tactic" (a kind meta-programming construct) for formally proving properties in proof assistant Lean. This project should help Lean developers formalize new facts of probability theory with Lean, see source code.

SPOKEN LANGUAGES

English, Dutch: Native

EDUCATION

KU Leuven (University)   Leuven, Belgium
Preparation program and Master of Science in Theoretical Physics (terminated early)   *Sep. 2019 - April 2021*

- **Courses:** Statistical mechanics, Data mining and neural networks, Thermodynamics, Analytical mechanics and Electrodynamics.
- **Volunteering:** Guide for international students.

KU Leuven (University)   Leuven, Belgium
Master Pure Mathematics   *Sep. 2017 - June 2019*
Project: Models of univalence in cubical sets

- **Courses:** Cubical type theory, Category theory, Mathematical logic, Algebra, Encryption, Discrete mathematics, Topology, Formal methods and Programming language semantics.
- **Volunteering:** Coordinator student association.

VUB (University)   Brussels, Belgium
Bachelor of Science in Mathematics, Minor Computer Science   *Sep. 2013 - Aug. 2017*
Project: Functional analysis and machine learning

- **Courses:** Functional programming (Lisp, Scheme), Philosophy of mathematics (presented on Coq), Compiler construction, Database design, Algorithms and data-structures, Mathematical logic, Analysis, Algebra, Information theory and Encryption.
- **Volunteering:** Managing computer rooms.

HOBBIES

Community founder and maintainer: Founder of local social group sysghent.be in Ghent. Plan talks about systems programming, book locations for workshops, networking in Ghen.

Linux: Declarative Linux operating system configuration with NixOS. Managing SystemD services and their inter-dependencies. See user-space modules written in Nix and Nu.