Willem Vanhulle

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Experience

OTIV (Remote operation of semi-autonomous rail vehicles) Ghent, Belgium
Mid-level software engineer *Apr. 2024 - current*

- **Distributed systems:** Built distributed freight train control system with dynamic presence detection, custom async iterator toolkit, real-time connectivity monitoring with emergency breaking, and GStreamer/WebRTC video streaming.
- **Build systems & CI:** Integrated LSP with Bazel, led Bazel→Cargo migration, wrote CI/CD pipelines from scratch, optimized pipeline runtime by 95%. (`Rust`)
- **Language expertise:** Organized advanced Rust training on undocumented language features, performed deep technical code reviews. (`Rust`)

Inbiose (Microbial production of speciality carbohydrates) Ghent, Belgium
Software engineer *June 2021 - January 2024*

- **Robotics & embedded:** Built industrial fermentation robots, interfaced with legacy hardware (25+ years) and modern sensors, migrated to async programming. (`Python`, `Rust`)

Major professional projects

Emergency breaking mechanism - OTIV *Sept. 2024 - Mar. 2025*

- **Real-time monitoring:** Built heartbeat system detecting connection failures between remote operators and autonomous trains.
- **Stream processing:** Designed pub-sub/TCP stream aggregator with automatic failover and emergency breaking triggers.

Hobby projects

Splitting data streams: Designed runtime-agnostic async stream combinator using low-level primitives (Waker, Poll, Pin). Published as open-source crate. (`Rust`)

Lean computational riddles workshop: Created and delivered workshop on solving computational problems with theorem proving. Interactive problem-solving using dependent types and formal verification. Materials at GitHub. (July 2025) (`Lean`)

Probability arithmetic in Lean: Developed library for simplifying probability calculations in formal mathematics. Extended real number arithmetic for probabilistic proofs. Available at GitHub. (`Lean`)