

# Willem Vanhulle

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## EXPERIENCE

### OTIV (Remote operation of semi-autonomous rail vehicles)

Mid-level software engineer

Ghent, Belgium

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)

Software engineer

Ghent, Belgium

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)

## PROGRAMMING LANGUAGES

**Rust:** Advanced (2 years). Systems programming: complex trait bounds, zero-cost async combinators, embedded HALs. Stack: Tokio/Embassy (async), Axum (web), Zenoh (pub-sub), Serde, Prost (protobuf), Statig (state machines).

**Coq, Agda, Haskell:** Intermediate (3 years). Formal verification for systems software, type theory research, proof-assistant development.

**HTML, SASS, TypeScript, JavaScript, SQL:** Advanced (3 years). Backend development: Express.js APIs, database design, type-safe web services.

**Python:** Advanced (6 years). High-performance computing, property-based testing (Hypothesis), algorithmic optimization, data pipeline design.