Hector Suzanne

Building trust in software.
Type systems, model checking, SMT, OCaml

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EXPERIENCE

Postdoctoral researcher — LMF, Université Paris-Saclay — Sept 2025 – Sept 2027

Extension of the Cubicle model checker for parameterized concurrent systems. With Sylvain Conchon.

- **Designed transactional extension**: distributed control flow constructs with rollback semantics
- Implemented an **expanded verification engine** (safety proofs, **invariant generation**) on top of Cubicle's, with a focus on **maintainability** and **performance**
- Current: testing properties for model coverage via mutation techniques.

PhD in Computer Science — LIP6, Sorbonne Université — Feb 2021 – Mar 2025

Reusable Static Resource Analyses for High-level Languages, with Emmanuel Chailloux. Compile-time prediction of memory usage for functional-imperative programs.

- Built *Autobill*: a **resource analyser** for a suite of typed-functional languages, supporting **Call-by-Push-Value and monadic effects**.
- Re-interpreted **amortized resource analysis as a constraint-solving** problem, so that bounds are inferred as polynomials by off-the-shelf SMT solvers and optimizers.

Teaching and Outreach — Sorbonne Université & Université Paris-Saclay — Feb 2022 — May 2026

- Labs and Work sessions: **240 hours taught** across PhD and postdoctorate, covering L1 to M1 level
- Intro to Python; Functional Programming with OCaml; Discrete Maths; Program analysis and semantics
- **Elected PhD representative** on the lab council (2 years term), member of the consultative post-grad council
- Volunteer organiser for the *ETAPS'22* conference and *SWERC'25* programming competition

PUBLICATIONS

- H. Suzanne, S. Conchon. **Transaction-Guided Parameterized Model Checking in TxCubicle**. ICFEM 2026, To appear in LNCS.
- H. Suzanne. **Reusable Static Resource Analyses for High-level Languages**. PhD thesis, Sorbonne Université, 2025.
- H. Suzanne, E. Chailloux. **A Reusable Machine-Calculus for Automated Resource Analyses**. LOPSTR 2023, LNCS 14330. doi:10.1007/978-3-031-45784-5_5

SOFTWARE

- **TxCubicle** (Github). Model checker for infinite-state array transition systems with a tightly integrated SMT solver; adds control flow, transactions and transaction-guided invariant generation.
- **Autobill** (Github). Type checker and interpreter for ML-style languages with call-by-value and call-by-push-value semantics; linear types indexed by sizes and resources, polynomial bound generation via SMT-solver.

EDUCATION

- **MSc Mathematics, "Logic, Mathematics, and Foundations of CS"** (logic, proof theory, category theory) — Université Paris-Cité, 2020–2021
- **MSc Software Engineering, "Sciences and Techniques of Software"** research track — Sorbonne Université, 2018–2020
- **Licence in Computer Science** — ENS Paris-Saclay (admitted with rank 42th), 2016–2017

SKILLS

Languages	OCaml (primary), Python, Coq/Rocq, SMT; some C, some Haskell
Methods	Constraints solvers (unification, SMT, substructural, polymorphic), model checking, MCMT, formalization, specification, proof theory, category theory
Human	French (native), English (C2, Cambridge CAE grade A)