

Alexi Turcotte

CISPA Helmholtz Center for Information Security
Saarbrücken, Germany
☎ (+49) 0171 920 3122
✉ alexi.turcotte [at] cispa [dot] de

Current Position

2023-date **Postdoctoral Researcher**, *CISPA Helmholtz Institute for Information Security, Saarbrücken, Saarland, Germany*.
Advised by Andreas Zeller.
Fuzzing highly-constrained software systems, building analyzers for data science languages, and improving analysis of JavaScript bundles.

Education

2018-2023 **PhD in Computer Science**, *Northeastern University, Boston, MA, USA*.
Advised by Frank Tip and Jan Vitek.
Thesis: *Optimizing Asynchronous JavaScript Applications*
Program analysis of JavaScript, and type systems and language design for R. Broadly, worked on dynamic languages, data science languages, fuzzing, program analysis, and optimizations.

2016-2018 **MMath in Computer Science**, *University of Waterloo, Waterloo, Ontario, Canada*.
Advised by Gregor Richards.
Thesis: *Reasoning About FFIs: Blame and Nondeterministic Formal Semantics*.
Formulated a scheme to define formal semantics for languages interoperating using foreign function interfaces (FFIs) without modelling the foreign language.

2012-2016 **BSc Math and Computer Science**, *Laurentian University, Sudbury, Ontario, Canada*.
Advised by Hafida Boudjellaba.
Thesis: *Optimal Parameters for Predator-Prey Models*.
Developed a method to estimate parameters for a Lotka-Volterra predator-prey model.

Select Papers

- ICSE'26 Wenyan Xu, **Alexi Turcotte**, and Cristian-Alexandru Staicu. *D-BUNDLR: Destructing JavaScript Bundles for Effective Static Analysis*.
- ICSE'26 Farideh Khalili and Satyajit Gokhale, **Alexi Turcotte**, Dale Xu, and Frank Tip. *Remediating Superfluous Re-Rendering in React Applications*.
- ASE'25 **Alexi Turcotte** and Neev Nirav Mehta. *The Fault in our Stats*.
- FSE'25 **Alexi Turcotte** and Zheyuan Wu. *Expressing and Checking Statistical Assumptions*.
ACM SIGSOFT Distinguished paper award!
- TSE'24 Denini Silva, Martin Gruber, Satyajit Gokhale, Ellen Arteca, **Alexi Turcotte**, Marcelo d'Amorim, Wing Lam, Stefan Winter, and Jonathan Bell. *The effects of computational resources on flaky tests*.
- ASE'23 **Alexi Turcotte**, Satyajit Gokhale, and Frank Tip. *Increasing the Responsiveness of Web Applications by Introducing Lazy Loading*.
- ASE'22 **Alexi Turcotte**, Mark W. Aldrich, and Frank Tip. *Reformulator: Automated Refactoring of the N+1 Problem in Database-Backed Applications*.
- EMSE'22 **Alexi Turcotte**, Ellen Arteca, Ashish Mishra, Saba Alimadadi, and Frank Tip. *Stubifier: Debloating Dynamic Server-Side JavaScript Applications*.

- ICSE'22 **Alexi Turcotte**, Michael D. Shah, Mark W. Aldrich, and Frank Tip. *DrAsync: Identifying and Visualizing Anti-Patterns in Asynchronous JavaScript*. **Best Artifact Award!**
- OOPSLA'22 Satyajit Gokhale, **Alexi Turcotte**, and Frank Tip. *Automatic Migration from Synchronous to Asynchronous JavaScript APIs*.
- OOPSLA'20 **Alexi Turcotte**, Aviral Goel, Filip Křikava, and Jan Vitek. *Designing Types for R, Empirically*.
- ECOOP'19 **Alexi Turcotte**, Ellen Arteca, and Gregor Richards. *Reasoning About Foreign Function Interfaces Without Modelling the Foreign Language*.
- OOPSLA'17 Gregor Richards, Ellen Arteca, and **Alexi Turcotte**. *The VM Already Knew That: Leveraging Compile-Time Knowledge to Optimize Gradual Typing*.

Other Papers

- ASE'22 Mark W. Aldrich, **Alexi Turcotte**, Matthew Blanco, and Frank Tip. *Augur: Dynamic (Tool) Taint Analysis for Asynchronous JavaScript*.
- SLE'22 **Alexi Turcotte**, Pierre Donat-Bouillud, Filip Křikava, and Jan Vitek. *signatr: A Data-Driven Fuzzing Tool for R*.
- MSR'22 Ellen Arteca and **Alexi Turcotte**. *npm-filter: Automating the Mining of Dynamic Information from npm Packages*.
- DMTCS'22 Ahmad Biniāz, Kshitij Jain, Anna Lubiw, Zuzana Masárová, Tillmann Miltzow, Debajyoti Mondal, Anurag Murty Naredla, Josef Tkadlec, and Alexi Turcotte. *Token Swapping on Trees*. Discrete Mathematics & Theoretical Computer Science. (Contributors listed in alphabetical order.)
- VIS'20 Cameron Moy, Julia Belyakova, **Alexi Turcotte**, Sara Di Bartolomeo, and Cody Dunne. *Just typical: Visualizing Common Function Type Signatures in R*.
- ICOOOLPS'19 **Alexi Turcotte** and Jan Vitek. *Towards a Type System for R*.
- CCCG'18 Therese Biedl, Ahmad Biniāz, Veronika Irvine, Philipp Kindermann, Anurag Murty Naredla, and Alexi Turcotte. *Integral Unit Bar-Visibility Graphs*. Canadian Conference on Computational Geometry. (Contributors listed in alphabetical order.)
- LATIN'18 Therese Biedl, Martin Derka, Veronika Irvine, Anna Lubiw, Debajyoti Mondal, and Alexi Turcotte. *Partitioning Orthogonal Histograms into Rectangular Boxes*. Latin American Theoretical INformatics Symposium. (Contributors listed in alphabetical order.)

Posters

- 2017 Alexi Turcotte and Ellen Arteca. *Multi-Objective Root Growth Optimization*. Poster session at the EQuALS Conference.
- 2017 Ellen Arteca and Alexi Turcotte. *Modified Constrained Blind Amplitude Reconstruction*. Poster session at the EQuALS Conference.

Service

- 2026 OOPSLA Program Committee
- 2026 OOPSLA Web Co-Chair
- 2025 ISSTA Program Committee
- 2024 ISSTA Program Committee
- 2023 ACM Transactions on Software Engineering and Methodology (TOSEM) Reviewer

- 2023 IEEE Transactions on Software Engineering (TSE) Reviewer
- 2022 ISSTA Artifact Evaluation Committee
- 2020 ISSTA Artifact Evaluation Committee
- 2020 ECOOP Artifact Evaluation Committee
- 2019 OOPSLA Artifact Evaluation Committee

Experience

- 2023-Date **Postdoc**, *CISPA (w/ Andreas Zeller), Germany*.
Lots of cool and fun research.
- 2019 **Research Intern**, *Oracle Labs, Switzerland*.
Worked on dynamic software updating and hot code reloading in the Graal/Truffle framework.
- 2015 **Software Developer**, *AdvanceWorx Canada*.
Developed a few iOS apps which interfaced with the FLIR One thermal camera, notably an app for adjusting visualizations of thermal video and images.
- 2015 **Research Assistant**, *Laurentian University*.
Wrote front-end and data processing code to assist Dr. Francois Caron's lab in using the DOMFLuor MATLAB package.
- 2014 **UCOSP: Umple (Model-Oriented Programming)**, *University of Ottawa*.
Umple is a UML-to-source compiler. Implemented the UML specialization feature in the Umple compiler and UmpleOnline interface.
- 2014 **Research Assistant (Statistics and Data Analysis)**, *Laurentian University*.
Worked on some small projects with Dr. Hafida Boudjellaba, notably on correlation analysis between actual and imaged (with 3D medical imaging device) operated area for tumor removal procedure.
- 2014 **Researcher**, *DreamStar*.
Developed and implemented algorithm to detect REM cycles through heart rate data. Involved data normalization, noise reduction, and testing against EEG sleep cycle data.
- 2013-2018 **Teaching Assistant**, *Laurentian University and University of Waterloo*.
Marking and running labs and tutorials for a variety of courses, including 3rd year algorithms (CS341) at Waterloo, and 3rd year theory of computation (COSC3106) at Laurentian.

University Service

- 2021-2022 Faculty Hiring Committee for the Khoury College of Computer Sciences at Northeastern (**I received a Distinguished Service Award for this!**)
- 2020-2021 PhD Student Admissions Committee
- 2018-2019 Curriculum Committee for the College of Computer and Information Science at Northeastern

Invited Talks

- Oct 2023 *Detecting and Repairing Anti-Patterns in Asynchronous JavaScript*
@ University of Stuttgart
- Feb 2023 *Detecting and Repairing Anti-Patterns in Asynchronous JavaScript*
@ University of Aarhus
- Feb 2023 *Detecting and Repairing Anti-Patterns in Asynchronous JavaScript*
@ CISPA Helmholtz Center for Information Security
- Dec 2022 *Detecting and Repairing Anti-Patterns in Asynchronous JavaScript*
@ City University of New York (CUNY) Graduate Research Day, NYC, NY, USA

Nov 2022 *Detecting and Repairing Anti-Patterns in Asynchronous JavaScript*
@ Simon Fraser University (SFU), Vancouver, BC, Canada

Languages

Programming Rust, Java, C, C++, C#, Objective C, Swift, Python, R, MATLAB/Octave, Rocq, TypeScript and JavaScript, Racket, CodeQL

Natural English (Fluent), French (Fluent), German (Intermediate)

Misc

Github reallyTG

Service I received an “Outstanding Service Award” from Northeastern for my service on the hiring committee in the 2022 hiring season.

Citizenship Canada

Hackathons I like them, my team placed top 5 in the Great Canadian Appathon 4 (a gamejam) and won “Most Innovative Game”!

NSERC Held an NSERC PGS-D Scholarship