

Will Crichton

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Abstract

I design principled, practical systems to amplify the intelligence of programmers. My research spans programming languages and human-computer interaction, and I also draw ideas from system design, cognitive psychology, and learning science. My current research is about making advanced programming languages like Rust [easier to learn](#). My dissertation work is about using static analysis to build tools for program comprehension, such as [information flow in the IDE](#). I have also developed systems for [improving auto-generated documentation](#) and [authoring richly-structured documents](#).

Education

- 2016-22 **Stanford University**, Ph.D. in Computer Science.
Advised by [Pat Hanrahan](#) and [Maneesh Agrawala](#).
- 2012-16 **Carnegie Mellon University**, B.S. in Computer Science.
Advised by [Kayvon Fatahalian](#).

Employment

ACADEMIC EMPLOYMENT

- 2022-now **Brown University**, Postdoctoral researcher.
Advised by [Shriram Krishnamurthi](#).
















INDUSTRY EMPLOYMENT

- summer 2017 **Snap, Inc.** Research intern. Designed an elastic and fault-tolerant distributed system for video analytics using Kubernetes, reducing operational costs up to 10×.
- summer 2015 **Jane Street Capital**. Software intern. [Reduced GC overhead](#) in OCaml language runtime. Designed new parallelization strategy for [incremental computation library](#).
- 2015 **Exp.ii**. Web developer. Architected web front-end for education startup, managed hiring pipeline for new developers.
- summer 2014 **Palantir Technologies**. Software intern. Developed logic engine for case management system.
- summer 2013 **Tunessence**. Web developer. Built interactive guitar tab learning tool for guitar learning startup.
- summer 2012 **Pioneer Hi-Bred**. Software engineer. Built BI app for analysis of laboratory efficiency in Pioneer agricultural technology labs.
- 2010-12 **Webspec Design**. Web developer. Created 30+ websites for clients across the country.











Research

LEGEND:  = paper,  = talk recording,  = GitHub repository,  = project website




CONFERENCE PUBLICATIONS

- OOPSLA '23  **A Grounded Conceptual Model for Ownership Types in Rust.**
 Will Crichton, Gavin Gray, Shriram Krishnamurthi.
- PLDI '22    **Modular Information Flow through Ownership.**
Will Crichton, Marco Patrignani, Maneesh Agrawala, Pat Hanrahan.
- CHI '21   **The Role of Working Memory in Program Tracing.**
Will Crichton, Maneesh Agrawala, Pat Hanrahan.
Featured in the [MIT Programming Languages Review](#).
- SIGCSE '21    **Automating Program Structure Classification.**
Will Crichton, Georgia Gabriela Sampaio, Pat Hanrahan.
- KDD '21   **Analysis of Faces in a Decade of US Cable TV News.**
James Hong, Will Crichton, Haotian Zhang, Daniel Y. Fu, Jacob Ritchie, Jeremy Barenholtz, Ben Hannel, Xinwei Yao, Michaela Murray, Geraldine Moriba, Maneesh Agrawala, Kayvon Fatahalian.
- SIGGRAPH '18    **Scanner: Efficient Video Analysis at Scale.**
Fait Poms, Will Crichton, Pat Hanrahan, and Kayvon Fatahalian.

WORKSHOP PUBLICATIONS

- FUNARCH '23  **Typed Design Patterns for the Functional Era.**
Will Crichton.
- HATRA '21   **A New Medium for Communicating Research on Programming Languages.**
Will Crichton.
- HATRA '20  **The Usability of Ownership.**
Will Crichton.
- PLATEAU '20   **Documentation Generation as Information Visualization.**
Will Crichton.
- AI Systems @ SOSP '19   **Rekall: Specifying Video Events using Compositions of Spatiotemporal Labels.**
Daniel Y. Fu, Will Crichton, James Hong, Xinwei Yao, Haotian Zhang, Anh Truong, Avaniika Narayan, Maneesh Agrawala, Christopher Ré, and Kayvon Fatahalian.
- SNAPL '19   **From Theory to Systems: A Grounded Approach to Programming Language Education.**
Will Crichton.

THESES

- 2022   **Revisiting Program Slicing with Ownership-based Information Flow.**
Ph.D. thesis at Stanford.
- 2016  **Lantern: A Query Language for Visual Concept Retrieval.**
Bachelor's thesis at CMU.
Received [Alumni Award for Undergraduate Excellence](#).

Invited Talks

- 2023 **The Art and Science of Teaching Rust.**
Presented at [RustConf](#).
- 2022-23 **Cognitive Design Principles for Programming Tools.**
- MIT HCI Seminar
 - Northeastern PL Seminar
 - Tufts PL Seminar
 - Georgia Tech PL/SE Seminar
 - Barnard CS Seminar
- 2022-23 **Modular Information Flow through Ownership.**
- UC Santa Cruz LSD Seminar
 - Amazon Web Services
 - Rust Formal Methods Interest Group
- 2022 **The Design of [Nota](#).**
Guest lecture in Jeff Heer's course [CSE 599D: "The Future of Scholarly Communication"](#).
- 2021 **Type-Driven API Design in Rust.**
Presented at [Strange Loop](#).
- 2019 **Video Analysis at Scale in the Era of Deep Learning.**
Presented at the [Monterey Bay Aquarium Research Institute](#) Research Seminar.
- 2018 **Data Mining 70,000 Hours of TV News.**
Presented at the "Audiovisual Collections" conference at the [National Library of Sweden](#).

Teaching

INSTRUCTOR

- fall 2017-19 **Programming Languages** ([CS 242](#)). Stanford (3x).
- fall 2013-14 **Game Development on the Web** (1-unit mini course). CMU (2x).

TEACHING ASSISTANT

- spring 2017 **Computer Systems from the Ground Up** ([CS 107e](#)). Stanford.
- fall 2015 **Compiler Design** ([15-411](#)). CMU.
- spring 2015 **Parallel Computer Architecture and Programming** ([15-418](#)). CMU.
- spring 2014 **Parallel and Sequential Data Structures and Algorithms** ([15-210](#)). CMU (Head TA).
- fall 2014 **Parallel and Sequential Data Structures and Algorithms** ([15-210](#)). CMU.
- fall 2013 **Functional Programming** ([15-150](#)). CMU.

Grants

- 2023 **NSF grant #2227863** under Formal Methods in the Field Track II for the [Rust Book Experiment](#).
- 2018 **Magic Grant** from the [Brown Institute for Media Innovation](#) for the [TV News](#) project.
- 2017 **Magic Grant** from the [Brown Institute for Media Innovation](#) for the [Esper](#) project.

Professional Service

ACADEMIC COMMUNITY SERVICE

Organizing Committee

- 2023: HATRA

Program Committee

- 2022: HATRA
- 2021: HATRA

External Review Committee

- 2023: OOPSLA

Reviewer

- 2023: OOPSLA, CHI, UIST
- 2022: CHI, UIST
- 2021: SIGGRAPH, SIGGRAPH Asia
- 2020: UIST
- 2019: SIGGRAPH Asia

UNIVERSITY SERVICE

2016-2022

Ph.D. Admit Weekend Organizer

Awarded the Stanford CS Department Student Service Award all six years for volunteering in this role.

2019

Undergraduate Summer Research Program Organizer

Managed the [CURIS](#) program by running weekly events and facilitating student/faculty relations.

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