



# Alex Sanchez-Stern

## Curriculum Vitae

### Education

- 2016–Present **Doctor of Philosophy, Computer Science**, *University of California, San Diego*.
- 2015–2016 **Masters of Science, Computer Science**, *The University of Washington*.  
Honors
- 2012–2015 **Bachelors of Science, Computer Science**, *The University of Washington*.  
Honors

### Masters Thesis

- Title *Dynamic Analysis of Floating Point Errors with Herbgrind*
- Supervisor Professor Zachary Tatlock
- Description Numerical computation using floating point numbers is notoriously difficult to reason about, even in idealized environments. This thesis presents the development of a tool which can analyze the runtime behavior of programs written in a variety of environments and languages, and extract inaccurate floating point computation for improvement.

### Bachelors Thesis

- Title *Algebraic Simplification for the Herbie Project*
- Supervisor Professor Zachary Tatlock
- Description The ability to simplify arbitrary mathematical expressions is extremely useful in many applications, including the Herbie numerical synthesis tool, but is exponential in general. This thesis presents a set of data structures and heuristics that allow thousands of expressions to be simplified every second.

### Experience

#### Vocational

- December 2013–**Research Assistant**, UNIVERSITY OF WASHINGTON, Seattle.  
 September 2013– Worked with another research assistant to develop the Herbie system for automatically improving the accuracy of floating point code  
 September 2016  
 Detailed achievements:
- Worked with Pavel Panchekha and Zachary Tatlock in developing the high level design of the system over the course of two years.
  - Worked closely with Pavel Panchekha to write the implementation of the system, including specifically:
    - Independently developing the algebraic simplification system
    - Writing the top level code which controls the various subsystems
    - Developing the experimental loop variant of Herbie to continue the work described in the paper.
  - Authored a paper on our work together with Pavel Panchekha, Zachary Tatlock, and James Wilcox.
    - Our paper was published at the Programming Languages Design and Implementation 2015 conference.
  - Authored a second paper with Pavel Panchekha, Zachary Tatlock, Chen Qiu, and international collaborators Nasrine Damouche and Matthieu Martel on a new format and benchmark suite for cross-tool floating point benchmarks.
- June 2013–**College Tech**, SEATTLE SCHOOLS DISTRICT, Seattle.  
 September 2013– Maintained existing educational and teacher machines, and set up and installed new machines, at a variety of schools in the Seattle Schools District.  
 September 2011–**Assistant Operations Engineer**, CASA LATINA, Seattle.  
 2011–January 2013– Wrote tests and data aggregation and display code for the Machete job registration system, under James Carter.  
 July 2011–**Intern**, BENSUSSEN DEUTSCH & ASSOCIATES, INC, Woodinville.  
 September 2011– Performed market research, handled product returns, and managed product testing.

## Awards

- 2015 Marygates Research Scholarship
- 2015 Distinguished Paper – PLDI 2015

## Computer skills

- Basic JAVA, HASKELL, COQ, RUST
- Intermediate PYTHON, HTML, C++, L<sup>A</sup>T<sub>E</sub>X, Linux
- Advanced RACKET, C