# Nathaniel Saul

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## Experience

**Washington State University** — Vancouver, WA
*Graduate Research Assistant* — *Aug 2017 - Present*

- Developing methods from Topological Data Analysis for data exploration and feature extraction of complex data.
- Maintaining KeplerMapper, a **Python** library for data exploration that preserves the underlying topology of the space.

**Rohde and Schwarz** — Beaverton, OR
*Software Development Engineer in Test, Contract* — *Mar 2017 - Aug 2017*

- Maintained and extended end-to-end test framework for radio-communication hardware in **Python** and **C++**.
- Developed and maintained **Jenkins** continuous integration infrastructure.
- Developed custom Jenkins automation tools and exposed interfaces to team using **Javascript** and **Flask**.

**Performance Logic, Inc** — Portland, OR
*Applications Developer* — *Apr 2016 - Mar 2017*

- Maintained and expanded cloud based hospital management software using **Javascript** and **C++**.
- Developed an xUnit port for an in-house scripting language and helped incorporate automated testing into software development.
- Helped design and incorporated modern language features into in-house scripting language built on **C++**.
- Developed bug tracking tools and tracking integration for bespoke project management software using **Python**.

**Corios Group, LLC** — Portland, OR
*Junior Analytics Consultant* — *Jul 2015 - Apr 2016*

- Consulted with clients to design and develop custom analytics and modeling solutions in **SAS**.
- Developed a parser in **Python** to translate a bespoke fraud model from a proprietary format to functioning **SAS**.
- Developed hyper-parameter optimization **SAS** extension that increased client marketing campaign profits by 2%.

**University of Hawai'i at Mānoa** — Honolulu, HI
*Undergraduate Research Assistant* — *Sep 2013 - Jun 2015*

- Extended **CGAL** library to parameterize surfaces of MRI and implemented statistical tests on surfaces in **Python**.
- Implement swarm robotic control algorithms and oil spill simulation using **Python** and **NumPy**.
- Developed a real-time plotting application in **Python** for monitoring robotic components.
- Coauthored one publication on tracking algorithms in leading robotics conference.

**Idaho National Laboratories** — Idaho Falls, ID
*Software Development Intern* — *Summer 2013*

- Extended decision diagram in **C++** to include in-place upkeep of node probabilities while building the graph.
- Incorporated algorithm into nuclear safety software using **Delphi**.

## Projects

***KeplerMapper***: Maintainer of open source KeplerMapper library in pypi. designed to integrate with **Scikit-Learn**.

***Code for Good Conference***: Team lead for *blackholes, not blackholes* application to categorize blackhole from spectrum. Lead and mentored team to build the UI for gathering expert labels. Development used **Python**, **Flask**, **Scikit-Learn**, and **Plotly**

***Saulgill, LCC***: Statistical consultant and web master for environmental consultancy.

***Around Abouts***: Developing blog for presenting concepts from Applied Topology to data scientists.

## Education

**Washington State University** — Vancouver, WA

*Doctor of Philosophy in Mathematics; Major GPA: 3.91* — *Aug. 2017 – Present*

Research Assistantship in Topological Data Analysis with Dr. Bala Krishnamoorthy funded by NSF research grant.

***Courses***: Statistical Learning Theory, Nonlinear Optimization, Computational Topology, Graph Theory, Metric Analysis, Algebraic Topology,

**University of Hawaii** — Honolulu, HI

*Bachelor of Arts in Mathematics; Major GPA: 3.60* — *June 2015*

***Courses***: Probability and Statistics, Data Structures and Algorithms, Linear Algebra, Numerical Analysis, Real Analysis, Metric Analysis, Abstract Algebra,

## Publications

M. Fahad, **N. Saul**, Y. Guo, and B. Bingham, Robotic Simulation of Dynamic Plume Tracking by Unmanned Surface Vessels, in Proceedings of IEEE International Conference on Robotics and Automation, Seattle, WA, May 2015.

B. Bingham L. M. Fitzpatrick, K. Krasnosky, F. A. Sanabria, **N. Saul**, M. Fahad, and Y. Guo, "Experimental Evaluation of Fine-Scale Ocean Plume Structure Using Unmanned Surface Vehicles", IEEE Access Journal, under review.

## Presentations

**From Reeb Graph to Mapper: an introduction to TDA**

*Washington State University Mathematics Seminar* — *Sept 2017*

**Statistical analysis of the effects of Kinesio-tape**

*University of Hawai'i Undergraduate Research Symposium* — *May 2015*

**Modeling of fine-scale ocean plume dynamics for robotic control algorithms**

*University of Hawai'i Undergraduate Research Symposium* — *May 2014*

## Grants/Awards

**NITC Scholar Award** — *$500*

**Statistical analysis of the effects of Kinesio-tape**

*University of Hawai'i Undergraduate Research Opportunities Program* — *$5,000*

**Modeling of fine-scale ocean plume dynamics for robotic control algorithms**

*University of Hawai'i Undergraduate Research Opportunities Program* — *$5,000*

**Real-time visualization tools for robotic component communications**

*University of Hawai'i School of Engineering Research Award* — *$2,000*