Florian Stecker

Mathematician · Software Engineer · Data Scientist

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Summary

I am a postdoctoral researcher in mathematics with experience in software development. I have a long history of experimenting with computers and programming for work and a variety of personal projects. I enjoy learning new things and solving challenging problems.

Technical Skills

- **Programming** on various platforms (web, desktop, µCs, HPC) and in ~20 languages, favorites: C, Rust, Python, Haskell
- **Linux** on servers and desktops; as main desktop OS since 2006; favorite Distro: Arch Linux
- **Data science and machine learning** using Python, numpy, pandas, scikit-learn, Tensorflow/Keras etc.
- **Languages**: English, German (native)

Professional experience

Research interests and activities in mathematics

- Research in pure math on "Discrete subgroups of Lie groups," in remote collaboration with worldwide teams of mathematicians
- Used computer experiments to produce mathematical conjectures, search for proof strategies, and visualize mathematical objects
- As a typical example, we needed to find a construction of certain fractal objects (triangle group limit sets), so I built a "limit set viewer" program which visualized these objects and allowed to quickly check candidate constructions; as a result, we were able to prove the first full characterization of Anosov representations in a higher rank character variety, published as https://arxiv.org/abs/2106.11349
- Instructed undergraduate and graduate classes on Calculus, Number Theory, Topology, Linear Algebra and Discrete Groups; taught ~500 students in total; also mentored students individually in reading courses and student research projects

Postdoctoral researcher and professor *since 2022*

Florida State University Mathematics, Tallahassee, FL

Postdoctoral researcher and professor *2019 - 2022*

University of Texas Mathematics, Austin, TX

Graduate Research Assistant *2015 - 2019*

Heidelberg Institute for Theoretical Studies, Heidelberg, Germany

Other professional activities

Software Developer (part time) *2010 - 2011, 2015*

Siemens Corporate Technology, Munich, Germany

- Worked on an internal simulation tool for electricity and water supply networks, power plant heat exchangers etc., written in C# and C++
- Tracked down and fixed complex bugs in a large code base; quickly became the go-to person for the C# 'frontend'
- Resolved a number of performance bottlenecks which arose when scaling to larger data sets, e.g. by finding an O(n) algorithm to replace an $O(n^3)$ one; this and other improvements allowed to scale the simulation to real world data sets, like the water network of a full town

Systems Administrator (part time) *2012 - 2014*

University of Munich (LMU) Mathematics, Munich, Germany

- Managed ~100 student and employee computers running Debian Linux, supported users, resolved bugs, carried out upgrade to Debian 6.0

Education

Ph.D. in Mathematics *2015 - 2019*

Heidelberg University, Germany

M.S. in Theoretical and Mathematical Physics *2009 - 2015*
B.S. in Physics & Mathematics (double major)

University of Munich, Germany

Selected Projects

More projects, source code, as well as information about my math research are on my website https://florianstecker.net

Balanced ideals in Weyl groups Wrote and optimized a C program for solving a combinatorial problem (finding balanced ideals in Weyl groups); found billions of these, where only a few were known before. Part of the research paper https://arxiv.org/abs/1810.11496

Detecting voids in cosmological simulations As a thesis project in computational astrophysics, implemented an efficient algorithm for finding voids (intergalactic regions without stars) in cosmological simulations, to run on some of the largest supercomputer simulations of the time.

Detecting bird and frog songs by machine learning Fine-tuned a convolutional neural network for sound detection, using Keras/Tensorflow; group project as part of "Erdös institute datascience bootcamp"

Imapidle A small tool keeping a connection to IMAP server and running a command when a new mail arrives, written in Rust

Electronics projects Using Atmel microcontrollers; e.g. built a hat which plays sounds from an SD card

Open source Occasional contributions to popular open source software, e.g. fixing a bug in the Linux kernel