

# Felix Effenberger – Résumé

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## Personal Profile

I am a Mathematician (PhD) and computer scientist by training, turned neuroscientist, turned entrepreneur. I work as freelance researcher / software engineer / data scientist / trainer, located in Germany. My research interests are in (computational) neuroscience, (discrete) mathematics and (high-dimensional) data analysis. I am also interested in creating open source software.

## Education

2007–2011 **PhD Mathematics** (summa cum laude)  
*University of Stuttgart, Germany*

Thesis title: *Hamiltonian Submanifolds of Regular Polytopes*  
Advisor: Prof. Wolfgang Kühnel

Research in fields of discrete topology, geometry and combinatorics. Grant by German Research Foundation (DFG), Project Ku 1203/5. Authored open source software simpcomp.

2002–2007 **Diploma Mathematics and Computer Science (MSc. equivalent)** (w/ distinction)  
*University of Stuttgart, Germany*

Thesis Title: *Topology-based Vector Field Visualization on 2-Manifolds*  
Advisor: Prof. Daniel Weiskopf

Areas of study: pure and applied mathematics (analysis, algebra, geometry, topology, statistics, numerical mathematics), computing science (algorithm design, databases, scientific visualization).

## Experience

Sep 2017 – **Co-founder and Chief Technology Officer (CTO)**  
Present *Stealth Silicon Valley Startup, San Francisco, CA*

Worked on neuroscience-inspired signal processing with focus on image and video compression. Responsible for everything tech, managed team of 5 engineers. Scrum master, chose technologies and set coding standards, managed cloud infrastructure, did code reviews. Deep dives into engineering problems where necessary. Raised angel investments and 3m seed round.

**Technologies:** Python, C, C++, Assembly, CUDA, OpenCL, ObjectiveC, Gitlab, Amazon EC2, Microsoft Azure

Sept 2015 – **Postdoctoral Researcher**  
Sep 2017 *Frankfurt Institute for Advanced Studies, Frankfurt, Germany*  
*Ernst Strüngmann Institute, Frankfurt, Germany*

Postdoctoral Advisor: Dr. Hermann Cuntz

Research in neuronal morphology, modeling and data analysis. Published several papers and developed open source software `TREES toolbox 2`.

**Technologies:** Python, Matlab, LaTeX

May 2013 – **Freelance software developer**

Oct 2015 *nextbike GmbH*, Leipzig, Germany

Developed data-driven Android application for service staff of bike sharing service.

Contact: Johannes Vockeroth, CTO

**Technologies:** Android, Java

Jan 2013 – **Co-founder and full stack developer**

Jan 2016 *modelogiq GmbH*, Frankfurt, Germany

Python and Clojure backend developer and JavaScript frontend developer for fintech startup.

**Technologies:** Python, Clojure, JavaScript

Nov 2011 – **Postdoctoral Researcher**

Sep 2015 *Max-Planck-Institute for Mathematics in the Sciences*, Leipzig, Germany

Postdoctoral Advisor: Prof. Jürgen Jost

Research in mathematical neurobiology and computational neuroscience, focus on processes of self-organization in cortical neural networks and the fundamentals of learning (synaptic plasticity). Modeling and analysis of spiking neuron data. Published several research papers, a book chapter, and developed software `hdnet`.

**Technologies:** Python, LaTeX

Jun 2004 – **Research assistant**

Oct 2007 *University of Stuttgart, Institute of Geometry and Topology*, Stuttgart, Germany

Research in fields of discrete topology, discrete geometry, and combinatorics under grant of the German Research Foundation (DFG), Project Ku 1203/5: “Automorphism groups in combinatorial topology”.

## Teaching

**Max-Planck-Institute for Mathematics in the Sciences**, Leipzig, Germany

2014 Seminar: *High-dimensional data analysis*

2014 Lecture: *Self-organization in computational neuroscience* (joint with Anna Levina)

2013 Lecture: *An Introduction to Computational Neuroscience*

**University of Stuttgart**, Stuttgart, Germany

2011	Lecture: <i>Geometry</i> (assisting Prof. E. Teufel)
2010	Lecture: <i>Computer Mathematics</i> (assisting Prof. H. Harbrecht)
2010	Lecture: <i>Programming in C</i> (assisting Prof. H. Harbrecht)
2007	Lecture: <i>Introduction to Algebra and Geometry</i> (assisting Prof. W. Kimmerle)

### Summer schools

2015	Lecturer at <i>Berkeley Summer Course in Mining and Modeling of Neuroscience Data</i> , UC Berkeley, CA, USA
2014	Lecturer and tutor at <i>Data Analysis in Neuroscience</i> , Moscow, Russia
2014	Lecturer at <i>VLatin American School of Computational Neuroscience (LASCON)</i> , Natal, Brazil

### Freelance trainer

2011	Trainer for intensive course <i>Introduction to robotics</i> , 20 hours <i>euro engineering AG</i> , Stuttgart, Germany (now Modis)
2011	Trainer for intensive course <i>Programming C</i> , 30 hours <i>euro engineering AG</i> , Stuttgart, Germany (now Modis)

## Journal Publications

2018	A regularity index for dendrites – local statistics of a neuron’s input space L.Anton-Sanchez*, F.Effenberger*, C.Bielza, P.Larrañaga, H.Cuntz *equal contributions <i>PLOS Computational Biology</i> 14(11):e1006593
2017	Universal features of dendrites through centripetal branch ordering A.Vormberg, F.Effenberger, J.Muellerleile, H.Cuntz <i>PLOS Computational Biology</i> 13(7):e1005615
2015	Self-organization in balanced state networks by STDP and homeostatic plasticity F.Effenberger, J.Jost, A.Levina <i>PLOS Computational Biology</i> 11(9):e1004420
2015	Robust Discovery of Temporal Structure in Multi-neuron Recordings Using Hopfield Networks C.Hillar, F.Effenberger <i>Procedia Computer Science</i> 53, 365–374
2012	Simplicial blowups and discrete normal surfaces in <code>simpcomp</code> F.Effenberger, J.Spreer <i>ACM Communications in Computer Algebra</i> 45(3/4), 173–176
2011	Stacked polytopes and tight triangulations of manifolds F.Effenberger <i>Journal of Combinatorial Theory, Series A</i> , 118(6), 1843–1862

- 2011      `simpcomp`: a GAP toolbox for simplicial complexes  
F.Effenberger, J.Spreer  
*ACM Communications in Computer Algebra*, 44(3/4), 186–189
- 2010      Hamiltonian submanifolds of regular polytopes  
F.Effenberger, W.Kühnel  
*Discrete & Computational Geometry* 43(2), 242–262
- 2010      Finding and classifying critical points of 2d vector fields: a cell-oriented approach using group theory  
F.Effenberger, D.Weiskopf  
*Computing and Visualization in Science* 13(8), 377–396

## Book Chapters

- 2015      Discovery of Salient Low-Dimensional Dynamical Structure in Neuronal Population Activity  
F.Effenberger, C.Hillar  
In *International Workshop on Similarity-Based Pattern Recognition (SIMBAD)*, Springer International
- 2013      A Primer on Information Theory with Applications to Neuroscience  
F.Effenberger  
In *Computational Medicine in Data Mining and Modeling*, Springer New York

## Software

`TREES2` – `TREES` toolbox 2, a neuronal morphology Matlab toolbox.  
Joint work with H.Cuntz

Website: <http://treestoolbox.org>

GitHub: <https://github.com/treestoolbox/treestoolbox>

`hdnet` – Hopfield denoising network.

Joint work with C.Hillar

GitHub: <https://github.com/team-hdnet/hdnet>

Documentation: <http://team-hdnet.github.io/hdnet>

`simpcomp` – a GAP toolbox for simplicial complexes.

Joint work with J.Spreer.

GAP *shared package* (peer reviewed), 2013.

GAP repository: <http://www.gap-system.org/Packages/simpcomp.html>

GitHub: <https://github.com/simpcomp-team/simpcomp>

Documentation: <https://simpcomp-team.github.io/simpcomp>

# Software Engineering Skills

- **Programming Languages**

*Assembly, C, C++, Clojure, CUDA, Go, Java, JavaScript, Matlab, ObjectiveC, OpenCL, Perl, PHP, Python, R, Shell scripting, SQL*

- **Miscellaneous**

*Systems administration in UNIX/Linux environments, DVCS (Git, Mercurial), Productivity applications (LaTeX, office software), Cloud computing (AWS, Azure, Terraform)*