Felix Effenberger – Résumé

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.
Scientific visit (1 month) at Cornell University, Ithaca, NY, USA. Collaboration with Prof. Edward Swartz.

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).
Scientific visit (9 months) at Simon Fraser University, Burnaby, BC, Canada. Collaboration with Prof. Daniel Weiskopf.

Experience

Sep 2017 – Present **Co-founder and Chief Technology Officer (CTO)**
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 – Sep 2017 **Postdoctoral Researcher**
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 – Oct 2015 **Freelance software developer**
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 – Jan 2016 **Co-founder and full stack developer**
modelogiq GmbH, Frankfurt, Germany

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

Technologies: Python, Clojure, JavaScript

Nov 2011 – Sep 2015 **Postdoctoral Researcher**
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 – Oct 2007 **Research assistant**
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: *Geometry* (assisting Prof. E. Teufel)

2010 Lecture: *Computer Mathematics* (assisting Prof. H. Harbrecht)

2010 Lecture: *Programming in C* (assisting Prof. H. Harbrecht)

2007 Lecture: *Introduction to Algebra and Geometry* (assisting Prof. W. Kimmerle)

Summer schools

2015 Lecturer at *Berkeley Summer Course in Mining and Modeling of Neuroscience Data*, UC Berkeley, CA, USA

2014 Lecturer and tutor at *Data Analysis in Neuroscience*, Moscow, Russia

2014 Lecturer at *V Latin American School of Computational Neuroscience* (LASCON), Natal, Brazil

Freelance trainer

2011 Trainer for intensive course *Introduction to robotics*, 20 hours
euro engineering AG, Stuttgart, Germany (now Modis)

2011 Trainer for intensive course *Programming C*, 30 hours
euro engineering AG, 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
PLOS Computational Biology 14(11):e1006593

2017 Universal features of dendrites through centripetal branch ordering
A.Vormberg, F.Effenberger, J.Muellerleile, H.Cuntz
PLOS Computational Biology 13(7):e1005615

2015 Self-organization in balanced state networks by STDP and homeostatic plasticity
F.Effenberger, J.Jost, A.Levina
PLOS Computational Biology 11(9):e1004420

2015 Robust Discovery of Temporal Structure in Multi-neuron Recordings Using Hopfield Networks
C.Hillar, F.Effenberger
Procedia Computer Science 53, 365–374

2012 Simplicial blowups and discrete normal surfaces in `simpcomp`
F.Effenberger, J.Spreer
ACM Communications in Computer Algebra 45(3/4), 173–176

2011 Stacked polytopes and tight triangulations of manifolds
F.Effenberger
Journal of Combinatorial Theory, Series A, 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`

Professional Service

- **Reviewer**

  COSYNE Conference, *Discrete and Computational Geometry*, *European Journal of Combinatorics*, *Journal of Combinatorial Theory, Series A*, *Nature Scientific Reports*, *Neural Networks*, *PLOS Computational Biology*, *PLOS One*

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)