

Nik Dennler

Contacts

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Languages

German (native)
English (proficient)
French (the basics)
Spanish (learning)

Programming Languages

Python ❤️, C/C++, Julia,
MATLAB, Bash Scripting

Operating Systems

MacOS,
Linux Ubuntu / Debian,
Microsoft 7 / 10

Further Computer Skills

GIT Version Control,
MySQL Databases,
Microsoft Azure, \LaTeX ,
Vim, MS Office

Education

2021 - now	Dual Ph. D. in Computer Science	Biocomputation Group, University of Hertfordshire, UK Topic: "Event-driven Signal Processing for Gas and Odour Sensing"; combining insights from neuroscience, gas sensing and neuromorphic computing. Joint program with the International Neuromorphic Institute, at the Western Sydney University.
2018 - 2020	M. Sc. in Neural Systems and Computation	Institute for Neuroinformatics, ETH Zurich, Switzerland Focus on biological and artificial neural network dynamics. Studies in neuroscience, machine learning, traditional and modern computer vision, probabilistic foundations of artificial intelligence and neuromorphic engineering. Master Thesis on "Unsupervised Vibration Anomaly Detection Using Spiking Neural Networks" Semester Project on "Mapping and Tracking with Event-based Cameras" Semester Project on "Skip-Connections for Randomized Minimal-Norm Target Propagation with Difference Reconstruction Loss"
2014 - 2018	B. Sc. in Experimental Physics	Physics Institute, University of Zurich, Switzerland Focus on condensed matter physics, particularly on magnetic and electrical phenomena in materials. High emphasis on signal processing, programming and data analysis. Bachelor Thesis on "Fourfold Rotation Symmetry Breaking in URu ₂ Si ₂ "
2013 - 2014	Entry year of the B. Sc. in Mathematics and Physics	ETH Zurich, Switzerland
2008 - 2012	Swiss Federal Matura	Kantonsschule Zofingen, Switzerland Main focus: Mathematics and Physics
2009 - 2010	International Baccalaureate (IB) Exchange Year	Stonewall Jackson High School, USA Graduation with Summa Cum Laude

Experience

2020 - 2021	University Hospital & Physics Institute, University of Basel	Basel, Switzerland <i>Civil Servant, 3 mos. + Data Science Consultant, 2 mos.</i> Technical consulting on circuit design, software engineering, data analysis and the use of machine learning for a novel medical diagnostics sensor
2019	IBM Research	Rüschlikon, Switzerland <i>Visiting Student, 4 mos.</i> Evaluating an electron microscopy pipeline and designing a novel machine learning algorithm to detect material defects from images
2018 - 2019	Sony Electronics	Schlieren, Switzerland <i>Research Assistant and Software Engineer, 12 mos.</i> Part-time (20%) internship with the following responsibilities: <ul style="list-style-type: none"> Developing and implementing computer vision algorithms for aerial robotics Implementing and extending event-based image algorithms for DVS / DAVIS Integrating developed tools in an existing code base (front- & back-end)
2018	Sensirion AG	Stäfa, Switzerland <i>Research Intern, 6 mos.</i> Full-time internship in the Sensor Innovation lab with the following responsibilities: <ul style="list-style-type: none"> Modeling and evaluating various gas sensing principles Designing & building prototypes and experimental measurement pipelines Analysis of time-series data
2016 - 2018	Physics Institute, University of Zurich	Zurich, Switzerland <i>Teaching and Lab Assistant, 2 yrs.</i>

Conference Talk & Workshops

- 2022 **CapoCaccia Workshop Towards Neuromorphic Intelligence** Sardinia, Italy
Lead of work group on "Neuromorphic Olfaction"
- 2022 **The 9th Annual Neuro-Inspired Computational Elements (NICE) Conference** Online
Conference Talk on "Rapid Inference of Geographical Location with an Event-based Electronic Nose"
- 2021 **IEEE International Conference on Artificial Intelligence Circuits and Systems (AICAS)** Online
Conference Talk on "Online Detection of Vibration Anomalies Using Balanced Spiking Neural Networks"

Awards & Grands

- 2023 **Data Challenge: 1st Prize** ISOCS 2023 Winter School, Bormio, Italy
Data Challenge at the 2023 Winter School of the International Society for Olfaction and Chemical Sensing: Learning the sensor representation of a set of odours, then detecting and classifying them in a blind test.
- 2022 **Best Student Paper Presentation** NICE Conference, University of Texas, USA
Conference Talk at The 9th Annual Neuro-Inspired Computational Elements (NICE), on the paper "Rapid Inference of Geographical Location with an Event-based Electronic Nose"
- 2016 **Best Semester Presentation** Physics Institute, University of Zurich, Switzerland
Proseminar on "Transistors: From device physics to modern applications"
- 2012 **Best Matura Thesis** Kantonsschule Zofingen, Switzerland
Thesis on scaled maps based on shortest-paths between cities with regard to the Swiss public transportation network
- 2010 **Top 1% Graduate Recognition** Stonewall Jackson High School, USA

Extracurriculum

- 2019 **Hackathon on Permafrost** Microsoft and ETH Zurich, Switzerland
Pursuing a data-driven project of making predictions on seismic activity based on multi-sensory data and images
- 2015 - 2018 **Managing Board Member, Fachverein Physik** University of Zurich, Switzerland
Representing the physics students in university political affairs and organizing events
- 2017 **Workshop and Organization, Young Physicists Forum 2017** University of Zurich, Switzerland
Organization of an event for all Swiss physics students. Preparation and mentoring of a practical workshop in digital electronics
- 2016 & 2018 **Organization Committee, Albert Einstein Ehrengast** University of Zurich, Switzerland
Organization of multi-day events regarding the visits of the Nobel Prize laureates Klaus von Klitzing and William Phillips

Interests

Professional / Academic

- Biologically inspired sensors, computer architectures and algorithms
- Theoretical and computational neuroscience
- Advanced statistics, machine learning and data analysis
- Open source projects

More

- Rock climbing and mountaineering
- Contemporary Dance
- Visiting and organizing small events (social, cultural or scientific)

List of Publications

Journal Publications

- 2022 **N. Dennler**, S. Rastogi, J. Fonollosa, A. Van Schaik, and M. Schmucker, "Drift in a popular metal oxide sensor dataset reveals limitations for gas classification benchmarks," *Sensors and Actuators B: Chemical*, vol. 361, p. 131668, 2022.
- 2022 M. B. Milde, S. Afshar, Y. Xu, A. Marcireau, D. Joubert, B. Ramesh, Y. Bethi, N. Ralph, S. El Arja, **N. Dennler**, A. v. Schaik, and G. Cohen, "Neuromorphic engineering needs closed-loop benchmarks," *Frontiers in Neuroscience*, p. 112, 2022.
- 2021 **N. Dennler**, A. Foncubierta-Rodriguez, T. Neupert, and M. Sousa, "Learning-based defect recognition for quasi-periodic HRSTEM images," *Micron*, vol. 146, p. 103069, 2021.
- 2021 C. Matt, O. Ivashko, M. Horio, D. Sutter, **N. Dennler**, J. Choi, Q. Wang, M. Fischer, S. Katrych, L. Forro et al., "Decoupling of lattice and orbital degrees of freedom in an iron-pnictide super-conductor," *Phys. Rev. Research*, vol. 3, p. 023220, 2021.
- 2018 J. Choi, O. Ivashko, **N. Dennler**, D. Aoki, K. Von Arx, S. Gerber, O. Gutowski, M. H. Fischer, J. Stremper, M. v. Zimmermann et al., "Pressure-induced rotational symmetry breaking in URu₂Si₂," *Physical Review B*, vol. 98, no. 24, p. 241113, 2018.

Conference Proceedings

- 2022 D. Drix*, **N. Dennler***, and M. Schmucker, "Rapid recognition of olfactory scenes with a portable MOx sensor system using hotplate modulation," in *2022 IEEE International Symposium on Olfaction and Electronic Nose (ISOEN)*. IEEE, 2022.
- 2022 **N. Dennler***, D. Drix*, S. Rastogi, A. van Schaik, and M. Schmucker, "Rapid inference of geographical location with an event-based electronic nose," in *Neuro-Inspired Computational Elements Conference*, 2022.
- 2021 **N. Dennler**, G. Haessig, M. Cartiglia, and G. Indiveri, "Online detection of vibration anomalies using balanced spiking neural networks," in *IEEE 3rd International Conference on Artificial Intelligence Circuits and Systems (AICAS)*, 2021.

Datasets

- 2021 **N. Dennler**, A. Foncubierta-Rodriguez, T. Neupert and Marilyne Sousa, "Dataset: HRSTEM Images of Defective and Non-Defective Quasi-Periodic Materials", Zenodo, 2021, <https://zenodo.org/record/5792917>

* denotes equal contribution