Haibin Zhao

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Marienstraße 12. Karlsruhe 76137, Germany

EDUCATION

Doctor (2021-2024)

Karlsruhe Institute of Technology

The Excellence Initiative
TU9 German Universities of Technology

Research Direction

Electronic Design Automation
Neuromorphic Computing
Machine Learning Acceleration

Supervisor

Prof. Dr. Mehdi B. Tahoori
Prof. Dr. Michael Beigl

Master (2018-2020)

Karlsruhe Institute of Technology

Major: Signal Processing, Robotics
Grade: 1.7 (91%)
Supervisor: Prof. Dr. Uwe Hanebeck

Bachelor (2013-2017)

Chongqing University

Project 985 University
Project World First Class University

Major:

Mechanical Design & Automation
GPA: 3.82 (92%)
Ranking: 1/551 in the department

SKILLS

Languages

Chinese, English (C1), German (C1)

Programming

Strong skills in Python (especially PyTorch) and Matlab
Basick skills in C/C++

LINKS

Github
Personal webpage

RESEARCH

Electronic Design Automation for Neuromorphic Systems

Modeling of neuromorphic circuits (through ML or genetic approaches) and enhancing them for a range of common challenges, such as reliability and practicality.

Acceleration for TinyML & EdgeAI

Reducing the memory requirements and inference time of neural networks through neural network quantization, network pruning, and neural architecture search.

EXPERIENCE

MERAGEM (Modeling, Design, Realization and Automation of Printed Electronics and their Materials)

Leading researcher, printed analog neuromorphic circuit, since 05.2022

Design and optimization of printed analog neuromorphic circuit, including highly-reliable design, fault analysis, low-power design, ultra-low-cost design, etc., of the neuromorphic circuit.

JuBot – funded by the Carls Zeiss Fundation

Researcher, acceleration of human activity recognition, since 04.2023

By proposing task-specified highly-efficient data preprocessing, task-specified neural architecture design, network quantization and pruning, the inference time of human activity recognition (HAR) models can be substantially reduced.

SDIL (Smart Data Innovation Lab)

Lecturer and consultant for AI and ML, 2022- 2023

Lectured the tutorial of AI and PyTorch, developed a web-based automated feature engineering platform, and consulted ML-related projects such as training NNs with ultra-small-scale datasets through Bayesian approach.

Others

Other small and non-systematic projects that provide short-term or transitional funding, e.g., the **Fit2Ear** project that providing personalized otoplasitics from smart phone depth camera funded by Software Campus, or a project about **Kalman filtered compressive sensing** funded by the DFG (German research foundation).

PUBLICATION

[1] Priyanjana Pal, **Haibin Zhao**, Maha El-Sayed Shatta, Michael Hefenbrock, Sina Bakhtavari Mamaghani, Sani Nassif, Michael Beigl, Mehdi B. Tahoori. Analog Printed Spiking Neuromorphic Circuits. In Proceedings of Design, Automation & Test in Europe Conference & Exhibition (DATE), IEEE, 2024. **(co-first author, top EDA conference)**

[2] **Haibin Zhao**, priyanjana Pal, Michael Hefenbrock, Michael Beigl, Mehdi B. Tahoori. Towards Temporal Information Processing- Printed Neuromorphic Circuit with Learnable Filters. In Proceedings of International Symposium on Nanoscale Architectures (NanoArch), ACM, 2023.

[3] **Haibin Zhao**, priyanjana Pal, Michael Hefenbrock, Michael Beigl, Mehdi B. Tahoori. Power-Aware Training for Energy Efficient Printed Neuromorphic Circuits. In Proceedings of International Conference on Computer-Aided Design (ICCAD), IEEE & ACM, 2023. **(top EDA conference)**

[4] **Haibin Zhao**, Michael Hefenbrock, Michael Beigl, Mehdi B. Tahoori. Highly-dependable printed neuromorphic circuits based on additive manufacturing. Flexible and Printed Electronics (IOP-FPE), vol. 8, no. 2, p. 025018, 2023. **(impact factor 3.8)**

[5] **Haibin Zhao**, Brojogopal Sapui, Michael Hefenbrock, Michael Beigl, Mehdi B. Tahoori. Highly-Bespoke Robust Printed Neuromorphic Circuits. In Proceedings of Design, Automation & Test in Europe Conference & Exhibition (DATE), IEEE, 2023. **(top EDA conference)**

[6] **Haibin Zhao**, Michael Hefenbrock, Michael Beigl, Mehdi B. Tahoori. Split Additive Manufacturing for Printed Neuromorphic Circuits. In Proceedings of Design, Automation & Test in Europe Conference & Exhibition (DATE), IEEE, 2023. **(top EDA conference)**

[7] **Haibin Zhao**, Michael Hefenbrock, Michael Beigl, Mehdi B. Tahoori. Aging-Aware Training for Printed Neuromorphic Circuits. In Proceedings of International Conference on Computer-Aided Design (ICCAD), IEEE & ACM, 2022. **(top EDA conference)**

[8] **Haibin Zhao**, Alexander Scholz, Michael Beigl, Si Ni, Surya Abhishek, Jasmin Aghassi-Hagmann. Printed Electrodermal Activity Sensor with Optimized Filter for Stress Detection. In Proceedings of International Symposium on Wearable Computers (ISWC), ACM, 2022. **(top conference in wearable computing)**

[9] Yiran Huang, **Haibin Zhao**, Yexu Zhou, Till Riedel, Michael Beigl. Standardizing Your Training Process for Human Activity Recognition Models – A Comprehensive Review in the Tunable Factors. International Conference on Mobile and Ubiquitous Systems (Mobiquitous), Springer Nature Switzerland, 2023.

[10] **Haibin Zhao**, Yexu Zhou, Till Riedel, Michael Hefenbrock, Michael Beigl. Improving Human Activity Recognition by Learnable Sparse Wavelet Layer. In Proceedings of International Symposium on Wearable Computers (ISWC), ACM, 2022. **(top conference in wearable computing)**

[11] Y. Zhou, **Haibin Zhao**, Yiran Huang, Till Riedel, Michael Hefenbrock, Michael Beigl. TinyHAR- A Lightweight Deep Learning Model Designed for Human Activity Recognition. In Proceedings of International Symposium on Wearable Computers (ISWC), ACM, 2022. **(top conference in wearable computing)**

[12] Tobias Röddiger, Christopher Clarke, Paula Breitling, Tim Schneegans, **Haibin Zhao**, Hans Gellersen, Michael Beigl. Sensing with Earables: A Systematic Literature Review and Taxonomy of Phenomena. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies 6.3 (2022): 1-57. **(impact factor 4.1)**

[13] **Haibin Zhao**, Tobias Röddiger, Michael Beigl. Aircase: Earable Charging Case with Air Quality Monitoring and Soundscape Sonification. In Proceedings of the 2021 ACM International Conference on Ubiquitous Computing, 2021. **(top conference in uniquitous computing)**

[14] **Haibin Zhao**, Christopher Funk, Benjamin Noack, Uwe Haneneck, Michael Beigl. Kalman Filtered Compressive Sensing Using Pseudo-Measurements. In Proceedings of the International Conference on Multi-Sensor Fusion and Integration for Intelligent Systems (MFI), IEEE, 2021.

TEACHING

Graduation thesis

- Yiyi Wang. Inequality Constraints in Machine Learning Through Augmented Lagrangian. Bachelor, KIT, 2024.
- Xue Ma. Training Quantized Neural Networks with ADMM Approach. Master, KIT, 2023.
- Keyi Li. Automated Feature Engineering for Time Series Data. Bachelor, KIT, 2023.
- Yuhong Wang. Neural Evolution for Augmenting Topologies in Printed Neuromorphic Circuits. Master, KIT, 2023.
- Zhidong Yang. Learnable Nonlinear Circuit for Printed Neuromorphic Circuits. Master, KIT, 2022.
- Siyan Li. Weights Assimilation for Split Manufacturing of Printed Neuromorphic Circuits. Bachelor, KIT, 2022.

Proseminar

- Felix Ferber. Quantifying Deep Convolutional Neural Networks with the DoReFa-Net. Proseminar SS 2023.
- Marc Thieme. Neural Network Quantization and Parameterized Clipping Activation. Proseminar SS 2023.
- Jan Langbecker. Wide Reduced-Precision Networks. Proseminar SS 2023.
- Tjaard Pfitzner. An Exploration of Techniques and Trade-offs. Proseminar SS 2023.
- Ilie Borsanov. Circuit Routing in Electronics Design Automation. Proseminar WS 2022.
- Viktor Iliev. Brain-inspired Computation Using Spiking Neural Networks. Proseminar WS 2022.
- Julian Heines. Nonparametric Models for Machine Learning. Proseminar WS 2022.
- Jakub Marceli Trzcinski. Neural Architecture Search for printed Neural Networks. Proseminar WS 2021.

赵海滨

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教育经历

博士 (2021-2024)
卡尔斯鲁厄理工学院
德国精英大学
德国工科 9 校联盟
研究方向
电路设计自动化
神经态计算/类脑计算
机器学习模型加速
指导老师
Prof. Dr. Mehdi B. Tahoori
Prof. Dr. Michael Beigl

硕士 (2018-2020)
卡尔斯鲁厄理工学院
方向: 信号处理、机器人学
成绩: 1.7 (91%)
导师: Prof. Dr. Uwe Hanebeck

本科 (2013-2017)
重庆大学
双一流，985 大学
专业: 机械设计及自动化
绩点: 3.82 (92%)
排名: 机械工程学院 1/551

技能

语言
汉语, 英语 (C1), 德语 (C1)
编程
Python, Matlab, C/C++

链接

[Github](#)

[个人主页](#)

科研内容

神经态计算的电路设计自动化

基于机器学习、遗传算法等途径对神经态电路（类脑计算电路）进行建模，并针对其可靠性（例如对制造误差和老化的稳定性）以及实用性（例如能耗、成本等）进行研究和提升。

边缘人工智能 & 机器学习模型加速

通过神经网络量化、神经网络剪枝和自动神经网络搜索等途径降低神经网络模型对于运行内存的消耗以及运行速度。

项目经历

MERAGEM (Modeling, Design, Realization and Automation of Printed Electronics and their Materials)

资助来源: 巴登符腾堡州科学、研究和艺术部及欧洲研究理事

模拟神经态电路子项目领导人 (2021 年 5 月至今)

负责印刷模拟神经形态电路的设计与优化，领导 3-5 人进行包括神经形态电路的高可靠性设计、故障分析、低功耗设计、低成本设计等在内的研究。

JuBot (Stay Young with Robot)

资助来源: 卡尔蔡司基金会

人类活动识别模型加速项目研究人员 (2023 年 4 月至今)

通过专门为目标任务设计高效数据的预处理、神经架构设计、网络量化和剪枝，来降低人类活动识别（HAR）模型的推理时间。

SDIL (Smart Data Innovation Lab)
讲师和顾问 (2022 年至 2023 年)

讲授人工智能和 PyTorch 的入门教程；开发了基于网页的自动特征工程平台；为人工智能相关项目提供顾问咨询，如通过贝叶斯方法用超小规模数据集训练高效的神经网络等。

其他
其他短期或过渡性项目，如由 Software Campus 资助的 **Fit2Ear** 项目通过智能手机深度摄像头提供个性化耳图，以及由 DFG（德国研究基金会）资助的关于**卡尔曼滤波和压缩传感**项目。

学术论文

[1] Priyanjana Pal, **Haibin Zhao**, Maha El-Sayed Shatta, Michael Hefenbrock, Sina Bakhtavari Mamaghani, Sani Nassif, Michael Beigl, Mehdi B. Tahoori. Analog Printed Spiking Neuromorphic Circuits. In Proceedings of Design, Automation & Test in Europe Conference & Exhibition (DATE), IEEE, 2024. **(co-first author, top EDA conference)**

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教学

专题研讨会

- Felix Ferber. Quantifying Deep Convolutional Neural Networks with the DoReFa-Net. Proseminar SS 2023.
- Marc Thieme. Neural Network Quantization and Parameterized Clipping Activation. Proseminar SS 2023.
- Jan Langbecker. Wide Reduced-Precision Networks. Proseminar SS 2023.
- Tjaard Pfitzner. An Exploration of Techniques and Trade-offs. Proseminar SS 2023.
- Ilie Borsanov. Circuit Routing in Electronics Design Automation. Proseminar WS 2022.
- Viktor Iliev. Brain-inspired Computation Using Spiking Neural Networks. Proseminar WS 2022.
- Julian Heines. Nonparametric Models for Machine Learning. Proseminar WS 2022.
- Jakub Marceli Trzcinski. Neural Architecture Search for printed Neural Networks. Proseminar WS 2021.

毕业论文

- Yiyi Wang. Inequality Constraints in Machine Learning Through Augmented Lagrangian. Bachelor, KIT, 2024.
- Xue Ma. Training Quantized Neural Networks with ADMM Approach. Master, KIT, 2023.
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