



Timo Lohrenz

Speech and Machine Learning Researcher

Contact

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- 👤 Married, 1 daughter (5 y/o)
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Skills

Programming

Python	5 yrs
Bash	8 yrs
Perl	5 yrs
Matlab	8 yrs
C++	4 yrs

Software

Kaldi ASR	8 yrs
PyTorch	5 yrs
PyCharm	4 yrs
fairseq	4 yrs
Slurm	5 yrs
Linux	8 yrs

Language

English	Full Proficient (C2)
German	Native

Summary

Striving to push boundaries of speech technology, I am exploring new methods to improve automatic speech recognition (ASR) since 2013. Starting with the idea to incorporate more than just single-channel audio information, I conducted research on information fusion (e.g., audiovisual) for hybrid and end-to-end-based ASR. This led to a novel regularization method for transformer models that improves model performance in additional applications such as machine translation and automatic lip-reading, without additional complexity.

Work Experience

Co-Founder & Tech Lead

Dec 2019 - today

ai.lift - Training & Consulting iTUBS mbh

Braunschweig, Germany

Lead and supervision of a small team of engineers & students for industrial research projects. Conduct interactive training courses on machine learning for a variety of industry clients.

Early-Stage Researcher

Oct 2015 - today

Institute for Communications Technology, Technische Universität Braunschweig

Braunschweig, Germany

Internal project lead on several speech-related research projects. Innovated and lead the application for research funding. Writing code and scientific papers about machine learning. Teaching pattern- and speech recognition lectures. Supervision of 10+ student theses. Responsible for the institute's central GPU cluster (acquisition, installation, administration).

Speech Engineer Intern

Nov 2012 - May 2013

Siemens Audiology Solutions

Erlangen, Germany

Developed a robust and low-ressource feature extraction, which is now used for acoustic scene classification in hearing aids.

Projects

AI-Assisted Anomaly Detection for IT monitoring

Dec 2019 - today

Research project with comNet GmbH and Porsche AG

Developed a graph neural network based anomaly detection model that is deployed to constantly monitor an IT environment of 1000+ hosts. See our press release [here](#).

Audiovisual Speech Recognition for a German Speech Assistant Plattform

March 2020 - Feb 2023

Research project as part of a large consortium of industry and academic partners

Developed a prototype audiovisual ASR engine for the german SPEAKER speech assistant (see [here](#)) based on large self-supervised pretrained transformer models.

Achievements

ITG Speech Communication 2016

Best Student Paper Award

Timo Lohrenz, Simon Receveur, Tim Fingscheidt, EXIT Charts for Turbo Automatic Speech Recognition: A Case Study, Proc. of ITG, Paderborn, Germany, October 2016.

Project Proposals

Raised 1.45M € research funds

Lead the successful application of 4 different machine learning related research projects totalling to 1.45M € of research funds.

Reviewing Activities

Journals

IEEE Trans. on Audio Speech and Language Processing
EURASIP Journal on Audio, Speech, and Music Processing

Conferences

IEEE ICASSP (2017-2022), IEEE SLT (2021), IEEE ASRU (2019), VDE ITG SpeCom (2020)

Hobbies

My passion for speech and audio originates from being a guitar enthusiast and playing in semi-professional rock/metal bands. With my current band *Bucketlist* we released several singles, an album, and played approximately 70 shows around northern Germany.

I love hiking and being in nature to clear my mind and try my best at photography.

Information Fusion for Automatic Speech Recognition

Feb 2019 - April 2022

Research project funded by DFG (German Research Foundation)

Starting with hybrid automatic speech recognition models, I conducted basic research on novel approaches to incorporate additional information into the decoding process. Afterwards, I pioneered new fusion methods for transformer-based end-to-end speech recognition. Finally, I invented a general regularization method for transformer models called *relaxed attention*, which increases model performance with a simple modification of the multi-head attention weights.

Acoustic Keyword Spotting for Video Recruiting

Jan 2017 - Dec 2018

Research project with viasto GmbH

Developed a deep neural network based acoustic keyword spotter that could flexibly search for large amounts of keywords in prerecorded recruiting interviews.

Education

PhD Studies

Oct 2015 - today

Technische Universität Braunschweig

Thesis: "*Hybrid and End-to-End Automatic Speech Recognition: Fusion and Beyond*". In total 14 scientific publications (thereof 10 as first author on ASRU, Interspeech, SLT and ITG). Investigated novel information fusion approaches for ASR, leading to the relaxed attention method for general transformer models.

Master Studies, Electrical Engineering

May 2013 - Sep 2015

Technische Universität Braunschweig

Specialization: Communications Technology, Grade: 1.2 with honors, Thesis: "*Convergence Behavior Analysis in Digital Communications and Turbo Automatic Speech Recognition*"

Bachelor Studies, Electrical Engineering

Oct. 2009 - Apr. 2013

Technische Universität Braunschweig

Specialization: Communications Technology, Grade: 2.1; Thesis: "*Robustness Optimization of a Feature Extraction for Speaker Verification*"

Publications (Selection)

Relaxed Attention for Transformer Models

Timo Lohrenz, Björn Möller, Zhengyang Li, Tim Fingscheidt, arxiv:2209.09735, Sept. 2022

Relaxed Attention: A Simple Method to Boost Performance of End-to-End Automatic Speech Recognition

Timo Lohrenz, Patrick Schwarz, Zhengyang Li, Tim Fingscheidt, Proc. of ASRU, pp. 177-184, Cartagena, Columbia, Dec. 2021

Multi-Encoder Learning and Stream Fusion for Transformer-Based End-to-End Automatic Speech Recognition

Timo Lohrenz, Zhengyang Li, Tim Fingscheidt, Proc. of Interspeech, pp. 2846-2850, Brno, Czech Republic, Sept. 2021

On Temporal Context Information for Hybrid BLSTM-Based Phoneme Recognition

Timo Lohrenz, Zhengyang Li, Tim Fingscheidt, Proc. of ASRU, pp. 516-523, Singapore, Singapore, Dec. 2019