

KEVIN WILKINGHOFF

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EDUCATION

Ph.D. (Dr.rer.nat.) in Computer Science University of Bonn Thesis: <i>Audio Embeddings for Semi-Supervised Anomalous Sound Detection</i> Supervisors: Frank Kurth, Reinhard Klein	10/2022-present Bonn, Germany
M.Sc. in Computer Science, grade: 1.3 (with distinction) University of Bonn Thesis: <i>Neural Networks in Speaker Identification</i> , grade: 1.0 (very good) Supervisors: Frank Kurth, Andreas Weber	10/2014-05/2017 Bonn, Germany
B.Sc. in Mathematics, grade: 2.2 (good) University of Münster Thesis: <i>Homogenisierung nichtlinearer elliptischer Differentialgleichungen</i> , grade: 1.3 (very good) Supervisors: Mario Ohlberger, Caterina Ida Zeppieri	10/2010-02/2014 Münster, Germany
Abitur, grade: 2.8 (satisfactory) Freiherr-vom-Stein-Gymnasium	08/2000-06/2009 Hamm, Germany

PROFESSIONAL EXPERIENCE

Visiting Research Scientist Mitsubishi Electric Research Laboratories	07/2024-present Cambridge, MA, USA
Research Associate Fraunhofer Institute for Communication, Information Processing and Ergonomics	06/2017-07/2024 Wachtberg, Germany
Student Assistant Fraunhofer Institute for Communication, Information Processing and Ergonomics	10/2016-06/2017 Wachtberg, Germany
Student Assistant Institute of Materials Research, German Aerospace Center	01/2014-12/2014 Cologne, Germany
Student Assistant Institute for Numerical Simulation, University of Bonn	11/2013-03/2014 Bonn, Germany
Civilian Service St. Marien-Hospital	08/2009-04/2010 Hamm, Germany

INTERESTS

Anomalous Sound Detection
Keyword Spotting
Representation Learning
Sound Event Detection

HONORS AND AWARDS

IEEE ICASSP 2023 Outstanding Reviewer Recognition (top 4%)	06/2023
DCASE 2021 Best Paper Award	11/2021
DCASE 2021 Challenge Judges' Award - Task 2 (rank 3/27)	11/2021
Kölner VDI Förderpreis 2018 (third prize)	01/2019
AFCEA Bonn Studienpreis 2018 (first prize)	08/2018

PUBLICATIONS

PREPRINTS

- [1] Kevin Wilkinghoff. “AdaProj: Adaptively Scaled Angular Margin Subspace Projections for Anomalous Sound Detection with Auxiliary Classification Tasks”. Submitted to 9th Workshop on Detection and Classification of Acoustic Scenes and Events (DCASE), arXiv:2403.14179. 2024.
- [2] Kevin Wilkinghoff and Alessia Cornaggia-Urrigshardt. “Multi-Sample Dynamic Time Warping for Few-Shot Keyword Spotting”. Accepted for presentation at 32nd European Signal Processing Conference (EUSIPCO), arXiv:2404.14903. 2024.

ARTICLES IN PEER-REVIEWED JOURNALS

- [1] Kevin Wilkinghoff and Frank Kurth. “Why do Angular Margin Losses work well for Semi-Supervised Anomalous Sound Detection?” In: *IEEE/ACM Transactions on Audio, Speech and Language Processing (TASLP)* 32 (2024). Presented at IEEE ICASSP 2024, pp. 608–622.

ARTICLES IN PEER-REVIEWED CONFERENCE AND WORKSHOP PROCEEDINGS

- [1] Fabian Fritz, Alessia Cornaggia-Urrigshardt, Lukas Henneke, Frank Kurth, and Kevin Wilkinghoff. “Analyzing the Impact of HF-Specific Signal Degradation on Automatic Speech Recognition”. In: *International Conference on Military Communications and Information Systems (ICMCIS)*. IEEE, 2024.
- [2] Fahrettin Gökgöz, Alessia Cornaggia-Urrigshardt, and Kevin Wilkinghoff. “Strong Label Generation for Preparing Speech Data in Military Applications Using CTC Loss”. In: *International Conference on Military Communications and Information Systems (ICMCIS)*. IEEE, 2024.
- [3] Kevin Wilkinghoff. “Self-Supervised Learning for Anomalous Sound Detection”. In: *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, 2024, pp. 276–280.
- [4] Kevin Wilkinghoff and Keisuke Imoto. “F1-EV Score: Measuring the Likelihood of Estimating a Good Decision Threshold for Semi-Supervised Anomaly Detection”. In: *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, 2024, pp. 256–260.
- [5] Kevin Wilkinghoff and Alessia Cornaggia-Urrigshardt. “TACos: Learning Temporally Structured Embeddings for Few-Shot Keyword Spotting with Dynamic Time Warping”. In: *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, 2024, pp. 9941–9945.
- [6] Alessia Cornaggia-Urrigshardt, Fabian Fritz, Lukas Henneke, Frank Kurth, Christian Schlich, and Kevin Wilkinghoff. “Language Recognition for SSB modulated HF Radio Signals of Short Duration”. In: *15th ITG Conference on Speech Communication (ITG Speech)*. VDE, 2023, pp. 240–244.
- [7] Paul M. Baggenstoss and Kevin Wilkinghoff. “Novel Generative Classifier for Acoustic Events”. In: *31st European Signal Processing Conference (EUSIPCO)*. IEEE, 2023, pp. 196–200.
- [8] Kevin Wilkinghoff and Fabian Fritz. “On Using Pre-Trained Embeddings for Detecting Anomalous Sounds with Limited Training Data”. In: *31st European Signal Processing Conference (EUSIPCO)*. IEEE, 2023, pp. 186–190.
- [9] Kevin Wilkinghoff. “Design Choices for Learning Embeddings from Auxiliary Tasks for Domain Generalization in Anomalous Sound Detection”. In: *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, 2023.
- [10] Kevin Wilkinghoff and Alessia Cornaggia-Urrigshardt. “On choosing decision thresholds for anomalous sound detection in machine condition monitoring”. In: *24th International Congress on Acoustics (ICA)*. **Invited Paper**. The Acoustical Society of Korea, 2022.
- [11] Jonas D. Rockbach, Luka-Franziska Bluhm, Isabel Schlangen, Laura Over, Sabine Apfeld, Lukas Henneke, and Kevin Wilkinghoff. “Towards Human-Machine Integration for Signal Intelligence Applications”. In: *14th Symposium Sensor Data Fusion (SDF)*. IEEE, 2022.
- [12] Alessia Cornaggia-Urrigshardt, Nikita Jarocky, Frank Kurth, Sebastian Urrigshardt, and Kevin Wilkinghoff. “SCALA-Speech: An Interactive System for Finding and Analyzing Speech Content in Audio Data”. In: *52. Jahrestagung der Gesellschaft für Informatik (GI-Jahrestagung)*. Vol. P-326. LNI, GI, 2022, pp. 81–90.
- [13] Alessia Cornaggia-Urrigshardt, Fahrettin Gökgöz, Frank Kurth, Hans-Christian Schmitz, and Kevin Wilkinghoff. “Speech Recognition Lab”. In: *International Conference on Military Communications and Information Systems (ICMCIS)*. Vol. 205. Procedia Computer Science. Elsevier, 2022, pp. 218–228.

- [14] Kevin Wilkinghoff. “Combining Multiple Distributions based on Sub-Cluster AdaCos for Anomalous Sound Detection under Domain Shifted Conditions”. In: *Workshop on Detection and Classification of Acoustic Scenes and Events (DCASE)*. **Best Paper Award**. 2021, pp. 55–59.
- [15] Kevin Wilkinghoff, Alessia Cornaggia-Urrigshardt, and Fahrettin Gökgöz. “Two-Dimensional Embeddings for Low-Resource Keyword Spotting Based on Dynamic Time Warping”. In: *14th ITG Conference on Speech Communication (ITG Speech)*. VDE, 2021, pp. 9–13.
- [16] Kevin Wilkinghoff. “Sub-Cluster AdaCos: Learning Representations for Anomalous Sound Detection”. In: *International Joint Conference on Neural Networks (IJCNN)*. IEEE, 2021.
- [17] Kevin Wilkinghoff. “Using Look, Listen, and Learn Embeddings for Detecting Anomalous Sounds in Machine Condition Monitoring”. In: *Workshop on Detection and Classification of Acoustic Scenes and Events (DCASE)*. 2020, pp. 215–219.
- [18] Kevin Wilkinghoff. “On Open-Set Classification with L3-Net Embeddings for Machine Listening Applications”. In: *28th European Signal Processing Conference (EUSIPCO)*. IEEE, 2020, pp. 800–804.
- [19] Kevin Wilkinghoff. “On Open-Set Speaker Identification with I-Vectors”. In: *Odyssey - The Speaker and Language Recognition Workshop (Odyssey)*. ISCA, 2020, pp. 408–414.
- [20] Hans-Christian Schmitz, Frank Kurth, Kevin Wilkinghoff, Uwe Müllerschkowski, Christian Karrasch, and Volker Schmid. “Towards Robust Speech Interfaces for the ISS”. In: *International Conference on Intelligent User Interfaces (IUI) Companion*. ACM, 2020, pp. 110–111.
- [21] Hans-Christian Schmitz, Alessia Cornaggia-Urrigshardt, Fahrettin Gökgöz, Samantha Kent, and Kevin Wilkinghoff. “Calm Interfaces for Integrated C2 Systems”. In: *International Command and Control Research and Technology Symposium (ICCRTS)*. 2019.
- [22] Kevin Wilkinghoff and Frank Kurth. “Open-Set Acoustic Scene Classification with Deep Convolutional Autoencoders”. In: *Workshop on Detection and Classification of Acoustic Scenes and Events (DCASE)*. New York University, 2019, pp. 258–262.
- [23] Kevin Wilkinghoff. “General-Purpose Audio Tagging by Ensembling Convolutional Neural Networks based on Multiple Features”. In: *Workshop on Detection and Classification of Acoustic Scenes and Events (DCASE)*. Tampere University of Technology, 2018, pp. 44–48.
- [24] Kevin Wilkinghoff. “Accurately Capturing Speech Feature Distributions by Extending Supervectors for Robust Speaker Recognition”. In: *13th ITG Symposium on Speech Communication (ITG Speech)*. VDE, 2018, pp. 81–85.
- [25] Kevin Wilkinghoff, Paul M. Baggenstoss, Alessia Cornaggia-Urrigshardt, and Frank Kurth. “Robust Speaker Identification by Fusing Classification Scores with a Neural Network”. In: *13th ITG Symposium on Speech Communication (ITG Speech)*. VDE, 2018, pp. 261–265.
- [26] Frank Kurth and Kevin Wilkinghoff. “Robust Detection of Jittered Multiply Repeating Audio Events using Iterated Time-Warped ACF”. In: *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, 2018, pp. 276–280.
- [27] Paul M. Baggenstoss, Kevin Wilkinghoff, and Frank Kurth. “Glottal Mixture Model (GLOMM) for Speaker Identification on Telephone Channels”. In: *25th European Signal Processing Conference (EUSIPCO)*. IEEE, 2017, pp. 2734–2738.

TECHNICAL REPORTS FOR ACADEMIC CHALLENGES

- [1] Kevin Wilkinghoff and Yacine Bel-Hadj. *FKIE-VUB System for DCASE2024 Challenge Task 2: First-Shot Unsupervised Anomalous Sound Detection for Machine Condition Monitoring*. Tech. rep. Ranked 19/28. DCASE2024 Challenge, 2024.
- [2] Kevin Wilkinghoff. *Fraunhofer FKIE Submission for Task 2: First-Shot Unsupervised Anomalous Sound Detection for Machine Condition Monitoring*. Tech. rep. Ranked 4/24. DCASE2023 Challenge, 2023.
- [3] Kevin Wilkinghoff and Alessia Cornaggia-Urrigshardt. *Fraunhofer FKIE Submission for Task 5: Few-Shot Bioacoustic Event Detection*. Tech. rep. Ranked 6/8. DCASE2023 Challenge, 2023.
- [4] Kevin Wilkinghoff. *An Outlier Exposed Anomalous Sound Detection System for Domain Generalization in Machine Condition Monitoring*. Tech. rep. Ranked 10/32. DCASE2022 Challenge, 2022.
- [5] Kevin Wilkinghoff. *Utilizing Sub-Cluster Adacos for Anomalous Sound Detection under Domain Shifted Conditions*. Tech. rep. Ranked 3/27, **Judges’ Award**. DCASE2021 Challenge, 2021.
- [6] Kevin Wilkinghoff. *Anomalous Sound Detection with Look, Listen, and Learn Embeddings*. Tech. rep. Ranked 8/40. DCASE2020 Challenge, 2020.

- [7] Kevin Wilkinghoff and Frank Kurth. *Open-Set Acoustic Scene Classification with Deep Convolutional Autoencoders*. Tech. rep. Ranked 19/39 and 3/7. DCASE2019 Challenge, 2019.
- [8] Kevin Wilkinghoff. *Open-Set Speaker Recognition with Augmented i-Vectors*. Tech. rep. Ranked 8/13 and 6/13. MCE2018 Challenge, 2018.
- [9] Kevin Wilkinghoff. *General-Purpose Audio Tagging by Ensembling Convolutional Neural Networks based on Multiple Features*. Tech. rep. Ranked 14/39. DCASE2018 Challenge, 2018.

TEACHING EXPERIENCE

UNIVERSITY COURSE INVOLVEMENT

Teaching Assistant: Advisor 04/2019-09/2022
 Institute of Computer Science, University of Bonn Bonn, Germany

Summer 2022: Lab: Audio
 Winter 2021: Seminar: Audio
 Summer 2021: Lab: Audio
 Winter 2020: Seminar: Audio
 Summer 2019: Praktikum: Sensordatenfusion

Student Assistant: Tutor 10/2014-09/2016
 Mathematical Institute and Institute of Computer Science, University of Bonn Bonn, Germany

Summer 2016: Artificial Life, Lineare Algebra für Informatiker und Lehramt
 Winter 2015: Analysis 1, Technical Neural Nets
 Summer 2015: Analysis 2, Artificial Life
 Winter 2014: Analysis 1

Student Assistant: Tutor 10/2012-09/2013
 Mathematical Institute and Institute of Computer Science, University of Münster Münster, Germany

Summer 2013: Diskrete Strukturen
 Winter 2012: Analysis 1

ADVISED THESES

- [1] Rouaa Maadanli. "Active Learning for Few-Shot Keyword Spotting". Joint advison with Alessia Cornaggia-Urrigshardt, Supervisor: Frank Kurth, in progress. Master's Thesis. University of Bonn, 2024.
- [2] Johannes Schmidt. "Acoustic Flow Rate Estimation of Water in Urban Sewage Systems". Supervisor: Frank Kurth. Master's Thesis. University of Bonn, Mar. 2024.
- [3] Fabian Fritz. "Classifying Sounds into Broad Categories as Pre-Processing for Social Media Analysis". Supervisor: Frank Kurth. Master's Thesis. University of Bonn, Nov. 2022.

COMMUNITY SERVICE

Industry Liaison Chair (Europe) DCASE2024 Workshop
 Technical Support for DCASE Community 06/2023 - present
 Website and Social Media Chair DCASE2022 Workshop

PEER REVIEW ACTIVITIES

CONFERENCES AND WORKSHOPS

EURASIP European Signal Processing Conference (EUSIPCO)
 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)
 IEEE International Joint Conference on Neural Networks (IJCNN)
 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)
 ISCA Conference of the International Speech Communication Association (Interspeech)
 ITG Conference on Speech Communication (ITG Speech)
 Workshop on Detection and Classification of Acoustic Scenes and Events (DCASE)

JOURNALS

Elsevier Pattern Recognition Letters (PRL)

Elsevier Internet of Things (IoT)

IEEE Access

IEEE/ACM Transactions on Audio, Speech and Language Processing (TASLP)

IEEE Aerospace and Electronic Systems Magazine (AESM)

Noise Control Engineering Journal (NCEJ)

The Journal of the Acoustical Society of America (JASA)