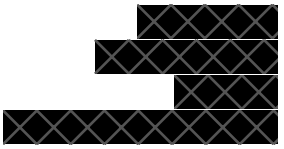
Dr. Tobias Röddiger

Group Leader (Wearable Systems)
Karlsruhe Institute of Technology



Education

11/2019-07/2023	PhD (summa cum laude), **Karlsruhe Institute of Technology**, Germany Computer Science (Dr. Ing.), "*Earables: Wearable Computing on the Ears"*. Advisor: Prof. Dr. Michael Beigl. Secondary Advisor: Prof. Dr. Hans Gellersen.
10/2013-10/2019	B.Sc. & M.Sc. in Computer Science, **Karlsruhe Institute of Technology**, Germanyng Specialization: Cognitive Systems (AI), Telematics. Minor: Finance and Economics. Thesis: "*Wearability and Design of a Fully-Integrated Sleep Tracker"*.
2006-2013	Part-Time Student, **Hector Seminar**, Germany Highly selective study program (by Dr. H.W. & J. Hector, co-founder SAP).

Professional Experience

09/2024-now	Visiting Researcher, **University of Cambridge**, United Kingdom (Hybrid) Mobile Systems Research Laboratory (Prof. Dr. Cecilia Mascolo)
10/2023-now	Group Leader, **Karlsruhe Institute of Technology**, Germany *Wearable Systems* within TECO at the Faculty of Computer Science.
03/2023-now	Founder, **TOBI Technologies**, Germany Spinoff dedicated to commercializing embedded wearable research (OpenEarable).
08/2022-11/2022	Visiting Researcher, **Massachusetts Institute of Technology**, Cambridge, USA Space Exploration Initiative at Responsive Environments (Prof. Dr. Joseph Paradiso).
11/2019-09/2023	Research and Teaching Assistant, **Karlsruhe Institute of Technology**, Germany TECO (Prof. Dr. Michael Beigl) at the Faculty of Computer Science.
04/2017-09/2017	Visiting Researcher, **Lancaster University**, Lancaster, United Kingdom Interactive Systems (Prof. Dr. Hans Gellersen) in the Department of Computer Science.
10/2017-10/2020	Freelancer, **Various Projects**, Karlsruhe, Germany Development of various websites e.g. coronazähler.de (> 5 million users).
10/2016-12/2016	Intern, **Microsoft**, Prague, Czech Republic Identity and Authentication Team of Skype.
10/2014-10/2017	Founder, **enCourage Labs,** Karlsruhe, Germany Development agency for different cross-platform smartphone apps.

Honors and Awards

2024	**Informatics Europe Best Dissertation Award 2023,** best dissertation in computer science among all member universities in Europe.

	Best Paper Award, OpenWearables 2024
	Most-Read Paper 2023, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies
	Special Recognition for Outstanding Review, ACM Conference on Human Factors in Computing Systems (CHI)
	Helmholtz Dissertation Award 2023, research track "Information", awarded across all Helmholtz research units in Germany
2023	**Blanc & Fischer Dissertation Innovation Award,** across all KIT departments
	Special Recognition for Outstanding Review, ACM Conference on Human Factors in Computing Systems (CHI)
2022	**Special Recognition for Outstanding Review**, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies
2021	**Special Recognition for Outstanding Review**, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies
2020	**Best Paper Award** ACM International Symposium on Wearable Computers
	Best Master Thesis Award in Computer Science (sponsored by SICK)
	Special Recognition for Outstanding Review, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies
2019	**Best Paper Award,** Earcomp 2019
	Audience Award, HackZurich (Europe's largest Hackathon, 360 participants)
2018	**1st Prize,** Deeptech:AI Hackathon (70 participants)
	1st Prize, OpenCodes Hackathon (150 participants)
2017	**1st Prize,** InsurHack Hackathon (130 participants)
	1st Prize + Audience Award, Coding Chemistry Hackathon (approx. 80 participants)
2016	**1st Prize,** Accenture DigiHack Prague (400 participants in parallel in 8 countries)
	1st Prize, code_n Hackathon (50 participants)
	1st Prize, Xamarin Evolve Mini Hacks in Orlando (USA)
2015	**1st Prize,** Microsoft Imagine Cup Germany, world finalist in Redmond (USA)
	1st Prize, XHack Karlsruhe
2009	**1st Prize,** Jugend forscht (Schüler experimentieren), Rhein-Neckar Area Germany

External Funding

Total funding awarded **820,000€**.

SoftwareCampus, German Ministry of Education and Research
pcbGPT: Automated Circuit Design with Large Language Models (project lead by my student Tobias King), 01/2025 - 06/2026, 115,000€

Gradware to Utilization: OpenEarable 2.0, The Helmholtz Pilot Program Core Informatics at KIT, (as sole lead on proposal development and execution), 06/2024 - 12/2024, 50,000€

[redacted]
technology exploration of ear-based sensing for health applications (as sole lead on proposal development and execution), 05/2024 - 04/2025, 100,000€

[redacted]
embedded ML + wearables incl. large three months data campaign (as sole lead on proposal development and execution), 07/2022 - 06/2023, 175,000€

[redacted]
embedded machine learning with audio signals (as sole lead on proposal development and execution), 08/2021 - 03/2022, 60,000€

[redacted]
embedded machine learning tutorials (as sole lead on proposal development and execution), 11/2021 - 03/2022, 21,000€

[redacted]
custom wearable and embedded machine learning (as sole lead on proposal development and execution), 11/2020 - 04/2021, 22,000€

SoftwareCampus, German Ministry of Education and Research
Fit2Ear: Personalized AI-generated Otoplastic (as sole lead on proposal development and execution), 03/2021 - 03/2022, 97,000€

BMBF Project Grant, German Ministry of Education and Research, StartMTI
Aura: Diagnosing Sleep Apnea Using a Wearable Patch (as sole lead on proposal development and execution), 08/2019 - 03/2022, 180,000€

Scholarships

03/2024 **CITRIS Health Innovation Intensive,** health innovation program funded by the German Government at UC Berkeley, UC Santa Cruz, UC Merced, and UC Davis

09/2022-11/2022 **KIT Research Travel Grant,** research visit at MIT
DAAD IFI International Research Stays for CS, resigned (conflicting grants)

Invited Talks

Invited Talks

TU Wien, Wien, Austria, Host: Dr. Florian Wolling, 01/2025
Night of Biosignals, Karlsruhe, Germany, Host: PD Dr. Axel Loewe, 11/2024
Informatics Europe, Malta, Host: Prof. Dr. Dimka Karastoyanova, 10/2024
University of Cambridge, United Kingdom, Host: Prof. Dr. Cecilia Mascolo, 09/2024
University of Freiburg, Germany. Host: Prof. Dr. Oliver Amft, 07/2024
kd2school, Annweiler, Germany. Host: Dr. Michael Knierim, 03/2024
Karlsruhe Institute of Technology, Germany. Host: Dr. Niels Feldmann. 02/2024.
Bosch Sensortec GmbH, Stuttgart, Germany. Host: Aibin Lazar. 01/2024.
Karlsruhe Institute of Technology, Germany. Host: Dr. Jürgen Spitzer. 11/2023.
Biosignals Connect, Karlsruhe, Germany. Host: Dr. Michael Knierim. 08/2023.
MIT Media Lab, Cambridge, USA. Host: Prof. Dr. Joseph Paradiso. 11/2022.
MIT Media Lab, Cambridge, USA. Host: Prof. Dr. Joseph Paradiso. 04/2022.
Bosch Sensortec GmbH, Stuttgart, Germany. Host: PD Dr. Victor Pankratius. 07/2021.
BASF SE, Ludwigshafen, Germany, Host: Dr. Martin Brudermüller (CEO), 02/2018.

Teaching Experience

Winter 2024/25

Ubiquitous Computing - Lecture & Exercise (5 ECTS), 10 students
- elective Master's course in computer science, redesigned course from the ground up
- teaching quality index "100%" (perfect score)

Mobile Computing & Internet of Things Exercise (2.5 ECTS), ~ 60 students
- teaching quality index of "100%" (perfect score)

Summer 2024

Software Engineering in Practice (9 ECTS), 9 students

Winter 2023/24

Mobile Computing & Internet of Things Exercise (2.5 ECTS), ~ 60 students
- teaching quality index of "100%" (perfect score)
- arranged guest talks by Bosch Sensortec and Amazon Web Services

Summer 2023

Software Engineering in Practice (9 ECTS), 10 students

Winter 2022/23

Mobile Computing & Internet of Things Exercise (in 5 ECTS lecture), ~ 60 students

Winter 2021/22

Mobile Computing & Internet of Things Exercise (in 5 ECTS lecture), ~ 60 students
Mobile Computing Proseminar (3 ECTS), 1 student

Summer 2021

Designing and Conducting Experimental Studies (4 ECTS), 4 students
Mobile Computing Proseminar (3 ECTS), 1 student

Winter 2020/21

Mobile Computing & Internet of Things Exercise (in 5 ECTS lecture), ~ 60 students
Software Engineering in Practice (9 ECTS), 10 students
Designing & Conducting Experimental Studies Seminar (4 ECTS), 3 students
Mobile Computing Proseminar (3 ECTS), 1 student

Summer 2020

Software Engineering in Practice (9 ECTS), 10 students

	Interactive Analytics Seminar (4 ECTS), 4 students **Ubiquitous Computing and Mobile Computing Seminar** (3 ECTS), 1 student
Winter 2019/20	**Software Engineering in Practice** (9 ECTS), 20 students **Mobile Computing Proseminar** (3 ECTS)**,** 1 student

Research Group

PhDs	Supraja Ramesh	11/2024-now
	Michael Küttner	10/2024-now
	Phillip Lepold	10/2024-now
	Valeria Zitz	09/2024-now
	Jonas Hummel	08/2024-now
	Tobias King	08/2023-now
Student Research Assistants	Jonas Greifenhain	07/2024-now
	Felix Schmitt	11/2023-now
	Lukas Probst	06/2023-05/2024
	Dennis Moschina	01/2023-now
	Oliver Bagge	01/2023-now
	Nils Kerwer	01/2023-06/2023
	Mark Schenkel	07/2022-12/2023
	Vladimir Bashkuev	02/2022-04/2023
	Ömer Yağmurlu	01/2022-12/2023
	Anja Hansen	11/2021-05/2022
	Murat Kurnaz,	11/2021-12/2023
	Philipp Lepold,	02/2021-09/2024
	Dylan Ray Roodt	01/2021-08/2024
	Michael Küttner	11/2019-09/2024
	Jennifer Münk	11/2019-11/2020

Daniel Wolffram 11/2019-09/2020

Master and Bachelor Theses

I have supervised **7** master theses (30 ECTS) [M], **18** bachelor theses (15 ECTS) [B], and **4** research in practice projects (24 ECTS) [R].

2024	[R]	Dennis Moschina, “A Lightweight Runtime for Edge Earable Apps”
	[R]	Moritz Clus, “Design of a Generic Earpiece for Biopotential Measurement with Dry-Electrodes and Integrated Analog Frontend”
	[B]	Felix Schlotter, “Detection Method for One-sided Chewing Behavior using Combined Sensor Technology”
	[B]	Jonas Leichtle, “Sleep Onset Detection for Music Control Using In-Ear EEG”
	[B]	Martin Flipe, “Influence of Vibrotactile Stimulation on Alpha Waves and Relaxation: Comparison of Different Body Locations”
	[B]	Nick Oelmann, “Gesture Detection with Smooth Pursuit Ear-based EOG”
	[M]	Anja Hansen, “BodyPursuit Interaction: Synchronizing Gaze with Body Motion”
	[M]	Philipp Lepold, “Open-Source Hardware for Biopotential Sensing with OpenEarable”
	[R]	Richard Sirius Hanser, “EarCapAuth: Capacitive Ear-Shape Sensing for Earable User Authentication”
	[B]	Dennis Moschina, “Coupling Heart Rate with Vibrotactile Cues to Induce Sleep”
2023	[M]	David Laubenstein, “Ear-Based Temperature Probing: Sensor Placement and Fusion for Wearable Applications”
	[B]	Tianchen Wang, “Gaze Smooth Pursuit Interaction based on Hand Gestures”
	[M]	Julian Westermann (co-supervised with Dr. Peter Zeile), “Low-Cost Lidar-Based Overtaking Detection for Bicycles”
2022	[M]	Tobias King (co-supervised with Yexu Zhou), “Hardware-Aware Neural Architecture Search for Time Series Classification”
	[B]	Kathrin Blum, “Eye Tracking with Around-the-Ear Electrodes”
	[B]	Leonardo Weng, “CPR Support with a Earable Real Time Feedback System”
	[B]	Jan Ettrich, “Benchmarking Tool for Embedded Feature Extraction”
2021	[R]	Stefan Herrmann, “Cardiopulmonary Resuscitation Support: Comparison of Wrist-, Chest-, and Ear-Worn Devices and Estimation Algorithms”

	[B]	Pierre Brosemer, “Real-Time Matching of Video-Extracted Skeleton Data with Motion Data from Wearable Devices”
	[B]	Anja Hansen, “Matching Video-Extracted Motion Skeleton Data with Acceleration Data from Wearable Devices”
	[B]	Erwin Müller, “Predicting the Relative Head Yaw Angle from Earable Audio Features”
	[B]	Stefan Hermann (co-supervised with Paula Breitling), “Using Wearables to Improve Quality of Cardiopulmonary Resuscitation”
2020	[B]	Dennis Osipov, “Stress Prediction in Urban Traffic Using Wrist-Measured Bio Signals and Smartphone Sensors”
	[B]	Julian Westermann (co-supervised with Dr. Peter Zeile), “The Influence of Traffic and Vibrations on the Stress Experienced by eScooter Drivers”
	[B]	Victoria Karl, “Real-Time Stroke Sensing for Rowboats”
	[B]	Michael Küttner, “Development and Evaluation of a Compression Algorithm for Periodic Medical Sensor Data”
	[B]	David Laubenstein, “Classification of Respiratory Events with Earables and Machine Learning”
	[M]	Jennifer Muenk (co-supervised with Paula Breitling), “Predictive Wound Documentation”
	[M]	Christian Dinse, “Design and Validation of an Ear-Worn System for Detecting Apnea Events”

Voluntary Service

Organizer	General Chair, **OpenWearables 2024, 2025** (workshop at Ubicomp) Local Chair, **Mensch und Computer 2024** Technology Chair, **Ubicomp 2021**
Editor	**Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)** Associate Editor (February 2025 - now)
Program Committee	**International Workshop on Open Wearables Computers (OpenWearables)** 2025, 2024
	International Symposium on Wearable Computers (ISWC) 2024
	IEEE International Conference on Activity and Behavior Computing (ABC) 2025, 2024

Steering Committee

OpenWearables (workshop at Ubicomp)

External Reviewer

Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)
11/2024, 05/2024, 02/2024, 11/2023, 08/2023, 02/2023, 11/2022, 05/2022, 02/2022, 11/2021, 08/2021, 05/2021, 02/2021, 11/2020, 08/2020, 05/2020

ACM CHI Conference on Human Factors in Computing Systems (CHI)
2024, 2023, 2022, 2020

ACM International Symposium on Wearable Computers (ISWC)
2024, 2023, 2022, 2021, 2020

ACM Symposium on User Interface Software and Technology (UIST)
2024, 2023

ACM MobileHCI
2024

IEEE Computer
10/2024, 06/2024, 02/2024, 03/2023, 07/2022, 02/2022, 05/2020

Taylor & Francis Ergonomics
04/2021

Open Source and Other Projects

[OpenEarable] openearable.com, MIT License, 255★ (GitHub)
World's first open-source ear-based sensing development platform.

[edge-ml] edge-ml.org, MIT License, 38★ (GitHub)
End-to-end, browser-based machine learning framework for microcontrollers.

[GazeHeatmap] github.com/TobiasRoeddiger/GazePointHeatMap, MIT License, 142★ (GitHub)
Command line tool to generate heatmap plots from gaze data.

[coronazähler] coronazaehler.de, 5+ million unique visitors, 100+ million sessions
First website in Germany to scrape COVID cases automatically from public sources.

[enCourage] encourage-now.com, 5k+ downloads
App to send distress calls in case of emergency. Idea integrated in all iPhones today.

[AstroAnt] media.mit.edu/projects/astroant-1/overview/, miniature lunar swarm robot
Tiny robot with magnetic wheels that will measure the surface temperature of the MAPP-1 rover on the moon.

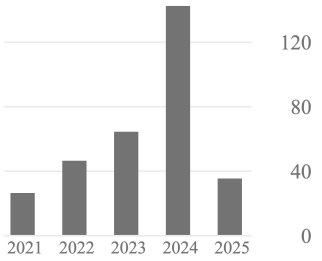
Summary of Academic Achievements

31 publications including:

- **9** peer-reviewed conference papers
- **5** peer-reviewed journal papers
- **8** peer-reviewed workshop papers
- **6** lightly reviewed demos and posters
- **4** technical reports
- **1** patent pending

Citations: **330**
h-index: **9**
i10-index: **8**

based on Google Scholar (February 14th, 2025)



My research has received **4 best paper awards**, **3 dissertation awards,** and **1 Master thesis award**.

My publications have appeared at various top venues in different communities with competitive acceptance rates of **20-30%.** Out of all publications, **11** papers were published in A or A* venues (according to conferenceranks.com). The research communities I publish in include:

- Ubiquitous Computing — ACM IMWUT
- Wearable Computing — ACM ISWC, ACM AHs
- Human-Computer Interaction — ACM CHI

Three Selected Papers

T. Röddiger, M. Küttner, P. Lepold, T. King, C. Clarke, J. A. Paradiso, M. Beigl. (2025) "OpenEarable 2.0: Open-Source Earphone Platform for Physiological Ear Sensing" Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, 9(1), 1-33. *(Accepted, Publication Pending)*

T. Röddiger, C. Clarke, P. Breitling, T. Schneegans, H. Zhao, H. Gellersen, and M. 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):1–57, 2022.

T. Röddiger, C. Clarke, D. Wolffram, M. Budde, and M. Beigl. "EarRumble: Discreet Hands-and Eyes-Free Input by Voluntary Tensor Tympani Muscle Contraction" In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems. Yokohama, Japan, May 2021.

Peer-Reviewed Conference Papers

[C9] T. King, **T. Röddiger**, D. Laubenstein, and M. Beigl. "Systematic Comparison of Ear Temperature Probing Positions for Continuous Wearable Vital Sign Monitoring". In 2024 International Symposium on Wearable Computers. Melbourne, Australia, October 2024

[C8] M. T. Knierim, D. Puhl, G. Ivucic, and **T. Röddiger**. "OpenBCI + 3D-Printed Headphones = Open ExG Headphones – An Open-Source Research Platform for Biopotential Earable Applications". Late Breaking Work of the 2023 CHI Conference on Human Factors in Computing Systems. Hamburg, Germany, April 2023.

[C7] **T. Röddiger,** C. Clarke, D. Wolffram, M. Budde, and M. Beigl. "EarRumble: Discreet Hands-and Eyes-Free Input by Voluntary Tensor Tympani Muscle Contraction" In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems. Yokohama, Japan, May 2021.

[C6] S. Hermann, P. Breitling, **T. Röddiger,** and M. Beigl. "Cardiopulmonary Resuscitation Support: Comparison of Wrist-, Chest-, and Ear-Worn Devices and Estimation Algorithms". In 2021 International Symposium on Wearable Computers. Online, Virtual, September 2021.

[C5] E. Pescara, A. Stubenbord, **T. Röddiger,** L. Fang, and M. Beigl. "Where Should I look? Comparing Reference Frames for Spatial Tactile Cues". 2021 International Symposium on Wearable Computers. Online, Virtual, September 2021.

[C4] **T. Röddiger,** M. Beigl, M. Hefenbrock, D. Wolffram, and E. Pescara. "Detecting Episodes of Increased Cough Using Kinetic Earables". In Augmented Humans Conference 2021. Virtual, Online, February 2021.

[C3] L. Fang, **T. Röddiger,** H. Sun, N. Willenbacher, and M. Beigl. "FLECTILE: 3D-Printable Soft Actuators for Wearable Computing". In Proceedings of the 2020 ACM International Symposium on Wearable Computers. Online, Virtual, Sept. 2020. **Best Paper Award.**

[C2] **T. Röddiger,** M. Beigl, and A. Exler. "Design Space and Usability of Earable Prototyping". In Proceedings of the 2020 International Symposium on Wearable Computers, pages 73–78, 2020.

[C1] **T. Röddiger,** M. Beigl, D. Wolffram, M. Budde, and H. Sun. "PDMSkin: On-Skin Gestures with Printable Ultra-Stretchable Soft Electronic Second Skin". In Proceedings of the Augmented Humans International Conference, Online, Virtual, March 2020.

Peer-Reviewed Journal Papers

[J5] **T. Röddiger,** M. Küttner, P. Lepold, T. King, C. Clarke, J. A. Paradiso, M. Beigl. (2025) "OpenEarable 2.0: Open-Source Earphone Platform for Physiological Ear Sensing" Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, 9(1), 1-33.

[J4] M. T. Knierim, C. Zimny, G. Ivucic, and **T. Röddiger**. (2025) "Advancing Wearable BCI: Headphone EEG for Cognitive Load Detection in Lab and Field" Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, 9(1), 1-27.

[J3] Y. Zhou, H. Zhao, Y. Huang, **T. Röddiger,** M. Kurnaz, T. Riedel, and M. Beigl. (2024). "AutoAugHAR: Automated Data Augmentation for Sensor-based Human Activity Recognition". Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, 8(2), 1-27.

[J2] **T. Röddiger,** C. Clarke, P. Breitling, T. Schneegans, H. Zhao, H. Gellersen, and M. 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):1–57, 2022.

[J1] **T. Röddiger,** M. Beigl, D. Dörner, and M. Budde. "Responsible, Automated Data Gathering for Timely Citizen Dashboard Provision During a Global Pandemic (COVID-19)". Digital Government: Research and Practice, 2(1):1–9, 2020.

Peer-Reviewed Workshop Papers

[W8] P. Lepold, **T. Röddiger,** T. King, K. Kunze, C. Maurer, and M. Beigl. (2024, October). "OpenEarable ExG: Open-Source Hardware for Ear-Based Biopotential Sensing Applications". In Companion of the 2024 on ACM International Joint Conference on Pervasive and Ubiquitous Computing (pp. 916-920).
Best Paper Award.

[W7] **T. Röddiger**, J. Stuchbury-Wass, M. Ciliberto, P. Lepold, and M. Beigl. (2024, October). "OpenEarable 1.4: Dual Microphones Earpiece to Capture In-Ear and Outer-Ear Audio Signals". In Companion of the 2024 on ACM International Joint Conference on Pervasive and Ubiquitous Computing (pp. 930-933).

[W6] H. Zhao, **T. Röddiger**, Y. Feng., and M. Beigl. (2024, October). "Fit2Ear: Generating Personalized Earplugs from Smartphone Depth Camera Images". In Companion of the 2024 on ACM International Joint Conference on Pervasive and Ubiquitous Computing (pp. 679-684).

[W5] Y. Zhou, T. King, Y. Huang, H. Zhao, T. Riedel, **T. Röddiger,** and M. Beigl. (2024, March). "Enhancing Efficiency in HAR Models: NAS Meets Pruning". In 2024 IEEE International Conference on Pervasive Computing and Communications Workshops and other Affiliated Events (PerCom Workshops) (pp. 33-38). IEEE.

[W4] D. Moschina, **T. Röddiger**, and M. Beigl. "Vertical Jump Test Using an Earable Accelerometer". In Adjunct Proceedings of the 2023 ACM International Joint Conference on Pervasive and Ubiquitous Computing & the 2023 ACM International Symposium on Wearable Computing. Cancun, Mexico, October 2023.

[W3] **T. Röddiger,** T. King, D. R. Roodt, C. Clarke, and M. Beigl. "OpenEarable: Open Hardware Earable Sensing Platform". In Adjunct Proceedings of the 2022 ACM International Joint Conference on Pervasive and Ubiquitous Computing and the 2022 ACM International Symposium on Wearable Computers. Online, Virtual, October 2022.

[W2] H. Zhao, **T. Röddiger,** and M. Beigl. "AirCase: Earable Charging Case with Air Quality Monitoring and Soundscape Sonification". In Adjunct Proceedings of the 2021 ACM International Joint Conference on Pervasive and Ubiquitous Computing. Online, Virtual, October 2021.

[W1] **T. Röddiger,** D. Wolffram, D. Laubenstein, M. Budde, and M. Beigl. "Towards Respiration Rate Monitoring Using an In-Ear Headphone Inertial Measurement Unit". In Proceedings of the 1st International Workshop on Earable Computing, EarComp'19, page 48–53. Association for Computing Machinery, 2019**.**
Best Paper Award.

Theses

[T2] **T. Röddiger**, "Earables: Wearable Computing on the Ears". Karlsruhe Institute of Technology, Karlsruhe, Germany, July 2023. **Blanc & Fischer Innovation Award '23**, **Helmholtz Dissertation Award '23**, **Informatics Europe Best Dissertation Award '24**

[T1] **T. Röddiger**, "Exploring the Wearability and Design of a Full-Integrated Sleep Tracker". Karlsruhe Institute of Technology, Karlsruhe, Germany, October 2019.
SICK Best Master Thesis in CS 2019 Award.

Lightly Reviewed Posters and Demos

[D6] T. Röddiger, M Knierim, P. Lepold, T. King, and M. Beigl. (2024). "OpenEarable Suite: Open-Source Hardware to Sense 30+ Phenomena on the Ears". In Mensch und Computer 2024-Workshopband (pp. 10-18420). Gesellschaft für Informatik eV.

[D5] S. Makarem, **T. Röddiger,** T. Riedel, and M. Beigl. (2024). "PictographAI: Interactive Generation of Stylized Pictographs for Presentations". In Mensch und Computer 2024-Workshopband (pp. 10-18420). Gesellschaft für Informatik eV.

[D4] S. Hermann, **T. Röddiger,** and M. Beigl. "Towards Detecting Complete Chest Recoil from Smartphone Vibration Strength during Cardiopulmonary Resuscitation". In Proceedings of the 2022 ACM International Symposium on Wearable Computers. Online, Virtual, 2022.

[D3] **T. Röddiger,** C. Dinse, and M. Beigl. "Wearability and Comfort of Earables During Sleep". In 2021 International Symposium on Wearable Computers. Online, Virtual, 2021.

[D2] **T. Röddiger**, D. Doerner, and M. Beigl. "ARMart: AR-based Shopping Assistant to Choose and Find Store Items". In Proceedings of the 2018 ACM International Joint Conference and 2018 International Symposium on Pervasive and Ubiquitous Computing and Wearable Computers. Singapore, Singapore, October 2018.

[D1] **T. Röddige**r, M. Beigl, M. Köpke, and M. Budde. "VOCNEA: Sleep Apnea and Hypopnea Detection Using a Novel Tiny Gas Sensor" In Proceedings of the 2018 ACM International Symposium on Wearable Computers. Singapore, Singapore, October 2018.

Technical Reports

[R4] Z. Wang, R. Yu, X. Wang, J. Ding, J. Tang, J. Fang, Z. He, Z. Li, **T. Röddiger**, W. Xu, X. Zhang, H.-A. Gao, N. Gao, C. Yu, Y. Shi, and Y. Wang. "Computing with Smart Rings: A Systematic Literature Review". arXiv preprint arXiv:2502.02459. 2025.
(under submission)

[R3] R. Hanser., **T. Röddiger**., T. Riedel, and M. Beigl. (2024). EarCapAuth: Biometric Method for Earables Using Capacitive Sensing Eartips. arXiv preprint arXiv:2411.04657.
(under submission)

[R2] T. King, Y. Zhou, **T. Röddiger**, and M Beigl. "MicroNAS: Memory and Latency Constrained Hardware-Aware Neural Architecture Search for Time Series Classification on Microcontrollers". arXiv preprint arXiv:2310.1838. 2023.
(under submission)

[R1] N. Schwabe, Y. Zhou, L. Hielscher, **T. Röddiger,** T. Riedel, and S. Reiter. ”Tools and Methods for Edge-AI-Systems”. at-Automatisierungstechnik, 70(9):767–776, 2022.

Patents

[P1] **Sensor System and Methodology for Determining a User's Chewing Behavior,** (pending), DE102021210223A1. Tobias Röddiger, Michael Beigl, Victor Pankratius.