

# Tobias Röddiger

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## Experience

### Massachusetts Institute of Technology, Visiting Ph.D. Student

*Boston, USA*

- developing "OpenEarable", a multi-sensory in-ear platform for human-in-the-loop studies *Sep. '22 - now*
- contributing to AstroAnt, a miniature robot flying to the moon in 2023, working on the firmware and bootloader

### Karlsruhe Institute of Technology, Ph.D. Student

*Karlsruhe, GER*

- thesis topic "Earables: Wearable Computing on the Ears", supervised by Prof. Dr. Michael Beigl *Nov. '19 - now*
- hands on development of projects in machine learning, embedded systems, and hearables (see "Selected Projects")
- published 14 papers at world-class venues incl. Ubicomp and CHI (two best paper awards, see "Selected Papers")
- leading a team of ten research assistants split into three teams and filed three patents in different fields
- working on research projects together with two industry-leading companies, overseeing budget as well as deadlines
- participated "Software Campus" which trains doctoral candidates management and leadership skills
- giving yearly practice lecture to 80+ students on mobile development and supervised 13 final thesis projects

### Microsoft, Software Engineer Intern

*Prague, CZ*

- gathered cross-team requirements and built a telemetry library used by services across Skype *Oct. - Dec. '16*
- contributed to a new auth-token service and took responsibility for getting the service into production

### encourage-now.com, Co-Founder

*Karlsruhe, GER*

- took responsibility for developing the enCourage cross-platform emergency app (5.000+ downloads) *Oct. '14 - Oct. '17*
- app was covered in major German news outlets (Die Welt, WiWo, Süddeutsche, Pro7, RTL II, SWR3, etc.)

## Education

### Karlsruhe Institute of Technology, M.Sc. Informatics

*Karlsruhe, GER*

- special interest in machine learning, medical informatics and design thinking *Oct. '17 - Oct. '19*
- best master thesis award 2020 "Exploring the Wearability and Design of a Fully-Integrated Sleep Tracker"

### SUGAR-network.org

*Multiple Locations*

*Design thinking project with BASF and workshops at Stanford University.*

*Sep. '17 - Jun. '18*

- developed augmented reality app for smartphones which resulted in a meeting with the BASF CEO
- HPC cluster application with 200 nodes which reduced concept video rendering from 30 days to 30 minutes

### Lancaster University, Interactive Systems, Visiting Bachelor Thesis Student

*Lancaster, UK*

- developed novel notification user interaction technique based on gaze (optokinetic response) *Apr. - Sep. '17*

### Karlsruhe Institute of Technology, B.Sc. Informatics

*Karlsruhe, GER*

- special interest in ubiquitous and mobile computing, software design, and finance *Oct. '13 - Oct. '17*

### Hector Seminar, part-time student

*Mannheim, GER*

*By Hans-Werner Hector (Co-Founder SAP) to offer selected students weekly advanced lessons.*

*'06 - '13*

- project at age 16 with University of Mannheim "Artificial intelligence for the board game Cluedo"

## Selected Projects

### edge-ml.org, Project Lead and Software Developer

- low-code web framework that supports the complete life cycle of tinyML models (data collection to deployment)
- implemented first version, now responsible for the vision of the open-source tool and for prioritizing new features

### open-earable.teco.edu, Project Lead and Hardware Developer

- world's first open-source hardware platform for hearable research, integrates various sensors for novel applications
- designed custom PCBs of the fully-integrated hearable platform which fits behind the ear of the wearer

### coronazaehler.de, Project Lead and Software Developer

- first German website to scrape COVID-19 cases from public sources, 5+ million unique visitors, 100+ million sessions
- lead programmer, ramped up and rolled out the website within one week, supports thousands of concurrent users

## Skills

**Soft Skills:** work in fast-paced environments and quickly grasp new concepts (participated 30+ hackathons); excellent team player with the ability to lead a group to joint success; ability to prioritize tasks in complex environments while keeping the right amount of attention to critical details;

**Programming:** hands-on project experience in C#, Python, Java, JavaScript, C, C++, HTML, CSS

**Open-Source:** edge-ml.org end-to-end tinyML (project lead, 25 ★ on GitHub); GazePointHeatMap (84 ★ on GitHub)

**Hardware:** hearables, PCB design, embedded systems, edge machine learning / tinyML

**Languages:** English (fluent), German (native), French (basic)

## Awards

- SICK best master thesis at KIT 2020 (“Exploring the Wearability and Design of a Fully-Integrated Sleep Tracker”)
- participated in over 30 hackathons around the globe and won 16 awards at different events
- Microsoft Imagine Cup overall winner Germany '15 and world finalist at the Microsoft HQ with Satya Nadella (CEO)
- invited student at Xamarin Evolve '16 with Nat Friedman, Xamarin Student Partner from '16 to '17
- two awards for outstanding review ACM Interactive, Mobile, Wearable and Ubiquitous Technologies Journal (IMWUT)

## Scholarships

- “KIT Research Travel Grant”, awarded for research activities at Massachusetts Institute of Technology
- “DAAD IFI - International research stays for computer scientists”, resigned after acceptance

## Patents

**Hearables / Embedded Machine Learning (*confidential*)**

*Tobias Röddiger, Michael Beigl, Victor Pankratius*

2021 (pending)

**Discreet Hands- and Eyes-Free Input by Voluntary Tensor Tympani Muscle Contraction**

*Tobias Röddiger, Christopher Clarke, Michael Beigl*

2021 (pending)

**Sensor system, evaluation device, method and computer program product for recording a subject's sleeping behavior**

*Tobias Röddiger, Matthias Budde, Marcel Köpke, Michael Beigl*

2018 (pending)

## Selected Papers

**Sensing with Earables: A Systematic Literature Review and Taxonomy of Phenomena**

*Tobias Röddiger et al., Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) 2022.*

**OpenEarable: Open Hardware Earable Sensing Platform**

*Tobias Röddiger et al., Proceedings of the 3rd International Workshop on Earable Computing 2022.*

**Best paper award: Towards Respiration Rate Monitoring Using an In-Ear Headphone Inertial Measurement Unit**

*Tobias Röddiger et al., Proceedings of the 1st International Workshop on Earable Computing 2019.*

**Detecting Episodes of Increased Cough Using Kinetic Earables.**

*Tobias Röddiger et al., Proceedings of the ACM Augmented Humans International Conference 2021.*

**Cardiopulmonary Resuscitation Support: Comparison of Wrist-, Chest-, & Ear-Worn Devices and Estimation Algorithms**

*S. Herrmann; P. Breitling, Tobias Röddiger et al., Proceedings of the International Symposium on Wearable Computers 2021*

**EarRumble: Discreet Hands- and Eyes-Free Input by Voluntary Tensor Tympani Muscle Contraction**

*Tobias Röddiger et al., Proceedings of the CHI Conference on Human Factors in Computing Systems 2021.*

**Best paper award: 3D-Printable Soft Actuators for Wearable Computing**

*L. Fang; Tobias Röddiger et al., Proceedings of the International Symposium on Wearable Computers 2020.*