

CURRICULUM VITAE

Thomas Kosch

Human-Centered Ubiquitous Media

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Research Interests

Thomas Kosch studied Software Engineering at the University of Stuttgart in Germany with a focus on signal processing algorithm design, analysis of physiological sensory data, and implementation of context-aware computing systems. He is currently a PhD student at the Ludwig-Maximilian University of Munich under the supervision of Albrecht Schmidt. His research primarily encompasses the analysis and interpretation of physiological sensory data to explore its use in adaptive computer environments, influence on self-awareness through understandable visualizations, and the creation of new methods to objectively quantify cognitive states. While he is generally interested in physiological sensing, his focus lies on the combination of eye tracking and electroencephalography with recent advancements in artificial intelligence to understand the individual's cognition during interaction.

Education

October 2017 - present	<i>PhD student at the Ludwig-Maximilians-Universität München (LMU Munich)</i>
January 2016 - October 2017	<i>PhD student at the University of Stuttgart, hciLab Stuttgart</i>
December 2015	<i>Master of Science (M.Sc.) in Computer Science at the University of Stuttgart</i> Master's thesis title: Real-time Brain Mapping for Treating Substance Abuse using Neurofeedback
September 2015 - November 2015	<i>Visiting researcher at the University of Miami Life Science and Technology Park</i>
April 2014	<i>Bachelor of Science (B.Sc.) in Computer Science at the University of Stuttgart</i> Bachelor's thesis title: Development of an Audio Toolkit for Multiple Input Sources

Employment

April 2012 –
August 2014

Software developer at the Heilmann Software LLC

Development and maintenance of an end user management software.

April 2015 –
December 2015

Intern at Neuromore LLC

My work at Neuromore comprised the conception and development of electrical source localization from cortical activity. My tasks included the conception of electrical signal capturing through brain activity and real-time processing of these signals for source detection.

September 2015 –
November 2015

Visiting researcher at the University of Miami, FL, USA

I visited the “Life Science and Technology” Park at the University of Miami, FL, USA, to scientifically investigate and evaluate the implementation of different brain source visualizations for end users. I worked together with neuroscientists, created simulations of brain source activations, and conducted an experiment to verify my implementation using a neurofeedback loop.

October 2013 –
December 2015

Student research assistant at the University of Stuttgart

My work as a student research assistant encompassed the research of memory augmentation techniques, development of interactive assistive systems providing support during manual haptic assembly (www.motioneap.de), and the feasibility of using physiological data as an additional component for context-aware computing systems. At the University of Stuttgart, I developed a projection-based assistive system, which provides support by displaying in-situ instructions for workers and students in their learning stage to enhance the overall learning experience and alleviate cognitive workload. I have focused on the use of electroencephalography and eye tracking to provide adaptive instructions based on physiological parameters.

January 2016 –
Present

PhD student at the University of Stuttgart / Ludwig-Maximilian University of Munich

Based on the research conducted during my time as a student assistant, I continued to work on understanding mental processes when users interact with computer interfaces. This comprises the evaluation of physiological sensing as tool to assess mental workload. This is complemented by evaluating the complexity and operation of user interfaces on an objective level. I focused on how such workload-aware systems can support users to optimize the overall user experience. This includes research in the area of adaptive user interfaces and how user interfaces can be changed during runtime to avoid frustration and boredom to the user.

Projects

August 2016 -
Present

KoBeLU: Kontextbewusste Lernumgebung (KoBeLU: Context-Aware Learning Environment)
www.kobelu.de

August 2014 -
December 2016

motionEAP: System zur Effizienzsteigerung und Assistenz bei Produktionsprozessen in Unternehmen auf Basis von Bewegungserkennung und Projektion (motionEAP: System for efficiency enhancement and assistance in production processes in companies based on motion recognition and projection)

www.motioneap.de

October 2013 - *RECALL: Re-thinking and re-defining memory augmentation*
April 2014 www.recall-fet.eu

Committees

CHI'21	Assistant to the General Chairs <i>ACM Conference on Human Factors in Computing Systems (CHI)</i>
CHI'20	Late Breaking Work Associate Chair <i>ACM Conference on Human Factors in Computing Systems (CHI)</i>
AHs'20	Program Chair <i>Augmented Humans Conference (AH2020)</i>
IDC'19	Organizer of the Internal Doctoral Colloquium for Media Informatics <i>Internal Doctoral Colloquium (IDC)</i>
MuC'19	Co-Workshop Organizer "VR and AR in Everyday Context" (VARECo) <i>Mensch und Computer 2019 (MuC)</i>
MuC'19	Program Committee Member <i>Mensch und Computer 2019 (MuC)</i>
MUM'19	Demo and Video Chair <i>International Conference on Mobile and Ubiquitous Multimedia (MUM)</i>
CHI'19	Late Breaking Work Associate Chair <i>ACM Conference on Human Factors in Computing Systems (CHI)</i>
PETRA'19	Workshop Organizer "Designing Assistive Environments for Manufacturing 3 (DAEM 3)" <i>International Conference on Pervasive Technologies Related to Assistive Environments (PETRA)</i>
PETRA'18	Workshop Organizer "Designing Assistive Environments for Manufacturing 2 (DAEM 2)" <i>International Conference on Pervasive Technologies Related to Assistive Environments (PETRA)</i>
MUM'17	Tutorial Organizer "Reading the Mobile Brain" from Laboratory to Real-World Electroencephalography" <i>International Conference on Mobile and Ubiquitous Multimedia (MUM)</i>
IoT'17	Workshop Organizer "Handling the Internet of Things: Human-Computer Interaction Perspectives on IoT (HCIIoT)" <i>International Conference on the Internet of Things (IoT)</i>
PETRA'17	Workshop Organizer "Designing Assistive Environments for Manufacturing (DAEM)" <i>International Conference on Pervasive Technologies Related to Assistive Environments (PETRA)</i>

Invited Talks

Federal Institute for Occupational Safety and Health (BAuA)
Title: AI-based Detection and Augmentation of Cognitive Workload in Human-Computer Interaction

University of Essen, Institute for Computer Science
Title: Brain-Computer Interfaces

Technical University Darmstadt, Telecooperation Lab
Title: AI-based Augmentation of Human Senses, Cognition, and Performance

Useware
Title: Augmented Reality in the Era of Industry 4.0

Reviewing Activities

IJHCS'20	International Journal of Human-Computer Studies (January/February 2020)
IMX'20	International Conference on Interactive Media Experiences
ToCHI'20	Transactions on Computer-Human Interaction
MobileHCI'20	International Conference on Human-Computer Interaction with Mobile Devices and Services
IEEE VR'20	International Conference on Virtual Reality and 3D User Interfaces
CHI'20	Conference on Human Factors in Computing Systems
CSCW'19	Conference on Computer-Supported Cooperative Work and Social Computing
ISMAR'19	International Symposium on Mixed and Augmented Reality
PETRA'19	Proceedings of the 12th PErvasive Technologies Related to Assistive Environments Conference
ISS'19	International Conference on Interactive Surfaces and Spaces
IJHCS'19	International Journal of Human-Computer Studies (July/August 2019)
ToCHI'19	Transactions on Computer-Human Interaction
IMWUT'19	International Joint Conference on Pervasive and Ubiquitous Computing
ETRA'19	Symposium on Eye Tracking Research and Applications
IEEE VR'19	International Conference on Virtual Reality and 3D User Interfaces
IEEE PerCom	IEEE Pervasive Computing (Jan/Feb 2019)
CHI'19	Conference on Human Factors in Computing Systems
ISS'18	International Conference on Interactive Surfaces and Spaces
VRST'18	Symposium on Virtual Reality Software and Technology
MUM'18	17th International Conference on Mobile and Ubiquitous Multimedia
EICS'18	Symposium on Engineering Interactive Computing Systems
ISMAR'18	International Symposium on Mixed and Augmented Reality
IEEE PerCom	Special Issue – IoT Deployments (Oct/Dec 2018)
PETRA'18	Proceedings of the 11th PErvasive Technologies Related to Assistive Environments Conference
IEEE VR'18	International Conference on Virtual Reality and 3D User Interfaces
CHI'18	Conference on Human Factors in Computing Systems
TEI'18	Tangible Embedded, and Embodied Interactions
UbiComp'17	International Joint Conference on Pervasive and Ubiquitous Computing
VRST'17	Symposium on Virtual Reality Software and Technology
MobileHCI'17	International Conference on Human-Computer Interaction with Mobile Devices and Services
ACMM'17	ACM Annual Conference on Multimedia
CHI'17	Conference on Human Factors in Computing Systems
IoT'16	International Conference on Internet of Things
Mindtrek'16	Academic Mindtrek Conference

Teaching

2020	<i>Sketching with Hardware</i> with Prof. Dr. Albrecht Schmidt
2020	Practical Course: <i>Developing Interactive Social Watches</i> with Prof. Dr. Albrecht Schmidt and Florian Lang
2019	<i>Practical Course: Developing a Smart Radio Alarm</i> with Prof. Dr. Albrecht Schmidt and Pascal Knierim
2019	<i>Physiological Computing and Neuroergonomics</i> with Dr. Chuang
2019	<i>Sketching with Hardware</i> with Prof. Dr. Albrecht Schmidt
2019	<i>Practical Course: Web Programming</i> with Prof. Dr. Albrecht Schmidt
2018	<i>Sketching with Hardware</i> with Prof. Dr. Andreas Butz
2018	<i>Practical Course: Web Programming</i> with Prof. Dr. Albrecht Schmidt
2018	<i>Seminar on Human-Computer Interaction with Ubiquitous Computing Systems</i> with Prof. Dr. Albrecht Schmidt
2018	<i>Human-Computer Interaction 1</i> with Prof. Dr. Albrecht Schmidt
2017	<i>Seminar on Human-Computer Interaction with Ubiquitous Computing Systems</i> with Prof. Dr. Albrecht Schmidt
2017	<i>Practical Course: Developing Interactive Capture Devices</i> with Prof. Dr. Albrecht Schmidt
2017	<i>Introduction to Human-Computer Interaction</i> with Prof. Dr. Albrecht Schmidt and Dr. Tonja Machulla
2016	<i>Empirical Methods for Media Informatics</i> with Dr. Lewis Chuang and Pascal Knierim

Publications

Journal Publications

T. Kosch, M. Funk, A. Schmidt, and L. Chuang, "Identifying cognitive assistance with mobile electroencephalography: a case study with in-situ projections for manual assembly," in *Proceedings of the 10th acm sigchi symposium on engineering interactive computing systems*, 2018.

Conference Publications

T. Kosch, A. Schmidt, S. Thanheiser, and L. L. Chuang, "One Does not Simply RSVP: Mental Workload to Select Speed Reading Parameters using Electroencephalography," In *Proceedings of the 2020 CHI Conference On Human Factors in Computing Systems*, New York, NY, USA, 2020.

C. Schneegass, T. Kosch, A. Baumann, M. Rusu, M. Hassib, and H. Hussmann, "BrainCoDe: Electroencephalography-based Comprehension Detection during Reading and Listening," In *Proceedings of the 2020 CHI Conference On Human Factors in Computing Systems*, New York, NY, USA, 2020.

M. Hoppe, M. Burger, A. Schmidt, and T. Kosch, "Dronos: a flexible open-source prototyping framework for interactive drone routines," in *Proceedings of the 18th international conference on mobile and ubiquitous multimedia*, 2019.

K. Marky, A. Weiß, and T. Kosch, "Supporting musical practice sessions through hmd-based augmented reality," in *Mensch und computer 2019 – workshopband*, Bonn, 2019.

C. Schneegass, T. Kosch, A. Schmidt, and H. Hussmann, "Investigating the potential of eeg for implicit detection of unknown words for foreign language learning," in *Human-computer interaction – interact 2019*, Cham, 2019, p. 293–313.

T. Kosch and L. Chuang, "Investigating the influence of rsvp display parameters on working memory load using electroencephalography," in *2nd international conference on neuroadaptive technology*, 2019.

- T. Kosch, J. Karolus, H. Ha, and A. Schmidt, "Your skin resists: exploring electrodermal activity as workload indicator during manual assembly," in *Proceedings of the acm sigchi symposium on engineering interactive computing systems*, New York, NY, USA, 2019, p. 8:1–8:5.
- T. Kosch, K. Wennrich, D. Topp, M. Muntzinger, and A. Schmidt, "The digital cooking coach: using visual and auditory in-situ instructions to assist cognitively impaired during cooking," in *Proceedings of the 12th acm international conference on pervasive technologies related to assistive environments*, New York, NY, USA, 2019, p. 156–163.
- M. Hoppe, T. Kosch, P. Knierim, M. Funk, and A. Schmidt, "Are drones ready for takeoff? reflecting on challenges and opportunities in human-drone interfaces," in *International workshop on human-drone interaction at the chi conference on human factors in computing systems*, 2019.
- T. Kosch and P. W. Woźniak, "Keep assembling and carry on: a satirical view on solving the workforce problem through cognitively impaired labor," 2019.
- M. Hoppe, P. Knierim, T. Kosch, M. Funk, L. Futami, S. Schneegass, N. Henze, A. Schmidt, and T. Machulla, "Vrhapticdrones: providing haptics in virtual reality through quadcopters," in *Proceedings of the 17th international conference on mobile and ubiquitous multimedia*, New York, NY, USA, 2018.
- T. Kosch, M. Funk, D. Vietz, M. Weise, T. Müller, and A. Schmidt, "Dronectrl: a tangible remote input control for quadcopters," *Proceedings of the 31th annual acm symposium on user interface software and technology*, 2018.
- H. V. Le, T. Kosch, S. Mayer, and N. Henze, "Demonstrating palm touch: the palm as an additional input modality on commodity smartphones," in *Proceedings of the 20th international conference on human-computer interaction with mobile devices and services adjunct*, New York, NY, USA, 2018, p. 353–358.
- P. Knierim, T. Kosch, M. Hoppe, and A. Schmidt, "Challenges and opportunities of mixed reality systems in education," *Mensch und computer 2018—proceedings*, 2018.
- T. Kosch and L. Chuang, *Investigating the Impact of Assistive Technologies on Working Memory Load in Manual Assembly through Electroencephalography*, 2018.
- C. Liang, J. Karolus, T. Kosch, and A. Schmidt, "On the suitability of real-time assessment of programming proficiency using gaze properties," in *Proceedings of the 7th acm international symposium on pervasive displays*, New York, NY, USA, 2018.
- J. Karolus, H. Schuff, T. Kosch, P. Wozniak, and A. Schmidt, "Emguitar: assisting guitar playing with electromyography," in *Proceedings of the 2018 conference on designing interactive systems*, New York, NY, USA, 2018.
- K. Hyunyoung, M. Avila, T. Kosch, C. Coutrix, and A. Roudaut, "Using shape-changing interfaces to foster inclusive education for visually impaired people," in *Chi workshop on inclusive educational technologies: emerging opportunities for people with visual impairments*, 2018.
- T. Kosch, M. Hassib, D. Buschek, and A. Schmidt, "Look into my eyes: using pupil dilation to estimate mental workload for task complexity adaptation," in *Proceedings of the 2018 chi conference extended abstracts on human factors in computing systems*, New York, NY, USA, 2018.
- H. Le, T. Kosch, P. Bader, S. Mayer, and N. Henze, "Palmtouch: using the palm as an additional input modality on commodity smartphones," in *Proceedings of the 2018 chi conference on human factors in computing systems*, New York, NY, USA, 2018.
- T. Kosch, P. Wozniak, E. Brady, and A. Schmidt, "Smart kitchens for people with cognitive impairments: a qualitative study of design requirements," in *Proceedings of the 2018 chi conference on human factors in computing systems*, New York, NY, USA, 2018.
- T. Kosch, M. Hassib, P. Wozniak, D. Buschek, and F. Alt, "Your eyes tell: leveraging smooth pursuit for assessing cognitive workload," in *Proceedings of the 2018 chi conference on human factors in computing systems*, New York, NY, USA, 2018.
- P. Knierim, T. Kosch, A. Achberger, and M. Funk, "Flyables: exploring 3d interaction spaces for levitating tangibles," in *Proceedings of the twelfth international conference on tangible, embedded, and embodied interaction*, New York, NY, USA, 2018.
- C. Glatz, T. Kosch, L. Marie, J. Ditz, A. Schmidt, and L. Chuang, "Reading the mobile brain: from laboratory to real-world electroencephalography," in *Proceedings of the 16th international conference on mobile and ubiquitous multimedia*, New York, NY, USA, 2017.
- T. Kosch, Y. Abdelrahman, M. Funk, and A. Schmidt, "One Size Does Not Fit All – Challenges of Providing Interactive Worker Assistance in Industrial Settings," *Proceedings of the 2017 ACM International Joint Conference on Pervasive and Ubiquitous Computing*, 2017.
- T. Kosch, P. Knierim, P. Wozniak, and A. Schmidt, "Chances and Challenges of using Assistive Systems in Education," *Mensch und Computer 2017—Proceedings*, 2017.

R. Kettner, P. Bader, T. Kosch, S. Schneegass, and A. Schmidt, "Towards Pressure-based Feedback for Non-stressful Tactile Notifications," in *Proceedings of the 19th International Conference on Human-Computer Interaction with Mobile Devices and Services, New York, NY, USA, 2017*.

S. Büttner, H. Mucha, M. Funk, T. Kosch, M. Aehnelt, S. Robert, and C. Röcker, "The Design Space of Augmented and Virtual Reality Applications for Assistive Environments in Manufacturing: A Visual Approach," in *Proceedings of the 10th ACM International Conference on Pervasive Technologies Related to Assistive Environments, New York, NY, USA, 2017*.

M. Funk, A. Bächler, L. Bächler, T. Kosch, T. Heidenreich, and A. Schmidt, "Working with Augmented Reality? A Long-term Analysis of In-situ Instructions at the Assembly Workplace," in *Proceedings of the 10th ACM International Conference on Pervasive Technologies Related to Assistive Environments, New York, NY, USA, 2017*.

P. Knierim, T. Kosch, V. Schwind, M. Funk, F. Kiss, S. Schneegass, and N. Henze, "Tactile Drones – Providing Immersive Tactile Feedback in Virtual Reality Through Quadcopters," in *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems, New York, NY, USA, 2017*.

M. Funk, T. Kosch, R. Kettner, O. Korn, and A. Schmidt, "MotionEAP: An Overview of 4 Years of Combining Industrial Assembly with Augmented Reality for Industry 4.0," in *Proceedings of the 16th International Conference on Knowledge Technologies and Data-driven Business, New York, NY, USA, 2016*.

P. Knierim, M. Funk, T. Kosch, A. Fedosov, Müller Tamara, B. Schopf, M. Weise, and A. Schmidt, "Ubibeam++: Augmenting Interactive Projection with Head-mounted Displays," in *Proceedings of the 9th Nordic Conference on Human-Computer Interaction: Game-changing Design, 2016*.

H. Le, P. Bader, T. Kosch, and N. Henze, "Investigating Screen Shifting Techniques to Improve One-handed Smartphone Usage," in *Proceedings of the 9th Nordic Conference on Human-Computer Interaction: Game-Changing Design, 2016*.

T. Kosch, R. Kettner, M. Funk, and A. Schmidt, "Comparing Tactile, Auditory, and Visual Assembly Error-feedback for Workers with Cognitive Impairments," in *Proceedings of the 18th International ACM Sigaccess Conference on Computers & Accessibility, 2016*.

M. Funk, T. Kosch, and A. Schmidt, "Interactive Worker Assistance: Comparing the Effects of In-situ Projection, Head-mounted Displays, Tablet, and Paper Instructions," *Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing, pp. 934-939, 2016*.

T. Kosch, R. Kettner, M. Funk, and A. Schmidt, "MotionEAP – Ein System zur Effizienzsteigerung und Assistenz bei Produktionsprozessen in Unternehmen auf Basis von Bewegungserkennung und Projektion," in *Ueware '16, 2016*.

M. Funk, T. Kosch, K. Wolf, P. Knierim, S. Mayer, and A. Schmidt, "Automatic Projection Positioning Based on Surface Suitability," in *Proceedings of the 5th ACM International Symposium on Pervasive Displays, New York, NY, USA, 2016, pp. 75-79*.

T. Kosch, R. Boldt, M. Hoppe, P. Knierim, and M. Funk, "Exploring the Optimal Point of View in Third Person Out-of-body Experiences," in *Proceedings of the 9th ACM International Conference on Pervasive Technologies Related to Assistive Environments, New York, NY, USA, 2016*.

T. Kosch, M. Hassib, and A. Schmidt, "The Brain Matters: a 3D Real-time Visualization to Examine Brain Source Activation Leveraging Neurofeedback," in *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems, New York, NY, USA, 2016, pp. 1570-1576*.

M. Funk, T. Kosch, S. W. Greenwald, and A. Schmidt, "A Benchmark for Interactive Augmented Reality Instructions for Assembly Tasks," in *Proceedings of the 14th International Conference on Mobile and Ubiquitous Multimedia, New York, NY, USA, 2015, pp. 253-257*.

R. Boldt, M. Hoppe, T. Kosch, M. Funk, P. Knierim, B. Pfleging, and N. Henze, "Towards an Optimal Viewpoint in Third-Person Out-of-body Experiences," *Mensch und Computer 2015–Proceedings, 2015*.

Theses

T. Kosch, "Real-time Brain Mapping for Treating Substance Abuse using Neurofeedback." 2015.

T. Kosch, "Development of an Audio Input Toolkit for Multiple Sources." 2013.