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# Francesco Chiossi



## PhD Researcher

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Francesco Chiossi is an HCI researcher at the LMU Munich with a background in applied cognitive science and ergonomics. He focuses on implicit measures of human behavior, i.e., electrodermal activity (EDA) and electroencephalography (EEG), as an input to design physiologically adaptive systems and improve UX in Mixed Reality.

## ACADEMIC POSITIONS

### **LMU Munich** – *Research Associate*

HCUM Group | Munich, DE

October 2019 - Present

- Postgraduate research on physiologically adaptive (EDA and EEG) user interfaces in Mixed Reality, evaluation of VR training experiences via physiological measures, physiological correlates of balance, development, and user testing of embedded physiological sensing devices.
- Teaching classes and supervising more than 40 theses & seminar students (200+ attendants) with high grades
- Organization and Social Media coverage of lab events, international conferences, and workshops (e.g., Open Lab Day, Internal Doctoral Colloquium)

### **IRCCS San Camillo & Padua Neuroscience Center** – *Research Fellow*

Neurophysiology Lab | Venice, IT

February 2019 – September 2019

- Experiment design and implementation for investigation of neural correlates of Prospective Memory exploiting Magnetoencephalography (MEG) and Functional Magnetic Resonance Imaging (fMRI).
- Time Frequency and Phase Locking Value Estimation of MEG
- Evaluation of functional connectivity measures between brain regions and cross-coupling mechanisms
- Teaching MSc courses

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## **TU Berlin** – *Visiting Research Fellow*

Neurotechnology Lab | Berlin, DE

March 2017 – October 2017

- Design and Implementation of offline classification for Event-Related Potentials related to semantic classifications (N400).
- Conducting practical workshops on the Brain-Computer Interfaces development

## **University of Padua** – *MSc Research Assistant*

HIT Lab | Padua, IT

March 2017 – October 2017

- Evaluation of symbiotic interfaces based on peripheral physiological sensors (EDA, fEMG, eye gaze, and pupillometry) and UX
- Participation and organization of international conferences
- Planning and drafting of reports and deliverables for European project "MINDSEE, Symbiotic Mind Computer Interaction for Information Seeking" (<http://mindsee.eu/>).

## **University of Padua, Padua Neuroscience Center** – *BsC Research Assistant*

Executive Functions Lab | Padua, IT

March 2017 – October 2017

- Experiment design and implementation for the investigation of ERPs correlates of attentional and monitoring across spatial and verbal cognitive domains
- Data analysis for study on ERP correlates executive functions (Matlab and EEGLab)

## **EDUCATION**

### **LMU Munich** – *PhD in Computer Science*

HCUM Group | Munich, DE

October 2019 - Present

- PhD Topic: Physiologically-adaptive system, attention reallocation, working memory
- Supervisors: Albrecht Schmidt & Sven Mayer
- Expected graduation date: Summer 2024

### **University of Padua** – *Msc in Applied Cognitive Psychology*

October 2015 – November 2017 | **Grade 110\110**

- Focus: BCI, Semantic integration, HCI, Ergonomics, Behavioral Neuroscience

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- Thesis: Developing a N400 Brain Computer Interface based on semantic expectancy | Supervisors : Benjamin Blankertz & Patrizia Bisiacchi

### **University of Padua** – *BsC in Cognitive Science and Psychobiology*

October 2012 – September 2015 | **Grade 105\110**

- Focus: Experimental Psychology, Neuroscience of Perceptual Processes, Cognitive Neuroscience, Cognitive Ergonomics
- Thesis: Monitoring in verbal and spatial tasks: Electroencephalographic evidences | Supervisors : Antonino Vallesi & Ettore Ambrosini

### **King's College London** – *BsC in Neuroscience*

January 2014 – July 2014 | **Exchange Program**

- Focus: Behavioral Neuroscience, Affective Neuroscience, Neurophysiology.

### **University of Padua** – *Advanced seminars in Cognitive Neuroscience*

October 2016 – February 2017

- Implementation and Analysis of Behavioral Data: Matlab fundamentals & Matlab Psychtoolbox
- Pre-processing, registration and analysis of EEG signal and ERPs.
- Recording and analysis of neurophysiological data through electroencephalography high-density (HD-EEG) technique.
- Transcranial Magnetic Stimulation and Neuronavigation Software.
- Recording and analysis of eye movements for psychological research and ergonomic evaluation

## **RESEARCH COMMUNITY**

### **Organisation**

- Publication Chair (Neuroergonomics 2021)
- Social Media Chair (Neuroergonomics 2021)
- Program Committee (CHI '23 LBW, CHI '24 LBW, ICMI '23, '24, Ubicomp/ISWC '23, '24)
- Late Breaking Work Chair CHI Work '25
- Publicity Chair Mobile HCI '25

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## Peer Reviewer

- Conferences: CHI '21, '22, '23, '24, ICMI '23, '24, UbiComp/ISWC '23, UbiComp/ISWC '24, MobileHCI '24, CHI Play '24, IEEE VR '22, '23, '24, ISMAR '23, '24, ISS '24, INTERACT '23, IUI '23, VRST '23, AutomotiveUI '20, MUC '21, '22, '23, '24, Augmented Humans '22
- Journals: Transactions on Human-Computer Interaction (TOCHI), Transactions and Visualization in Computer Graphics, International Journal of Human-Computer Studies, International Journal of Human-Computer Interaction, Social Science Computer Review, Virtual Reality

## SCHOLARSHIPS & GRANTS

**Erasmus+ Traineeship for Academic Merit | January 2017**

**Erasmus Scholarship for Academic Merit | March 2013**

## TEACHING EXPERIENCE

### 2024

Tutorial for "Game Development" (Master) | LMU Munich

Tutorial for "User Interface Design" (Master) | LMU Munich

Tutorial for "Learning for Computer Science" (Master) | LMU Munich

Seminar "Media Informatics" (Bachelor) | LMU Munich

### 2023

Tutorial for "User Interface Design" (Master) | LMU Munich

Tutorial for "Learning for Computer Science" (Master) | LMU Munich

Seminar "Media Informatics" (Master) | LMU Munich

Seminar "Media Informatics" (Bachelor) | LMU Munich

### 2022

Tutorial for "Engineering for Human Factors" (Master) | LMU Munich

Seminar "Media Informatics" (Master) | LMU Munich

Seminar "Media Informatics" (Bachelor) | LMU Munich

### 2021

Seminar "Media Informatics" (Master) | LMU Munich

Seminar "Media Informatics" (Bachelor) | LMU Munich

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## 2020

Tutorial for "Physiological Computing & Neuroergonomics" (Master) | LMU Munich

Guest lecture "Human Machine Interaction 2" (Master) | LMU Munich

## 2019

Tutorial for "Human Machine Interaction 2" (Master) | LMU Munich

Tutorial for "Engineering for Human Factors" (Master) | LMU Munich

Guest lecture "Advanced Topics in HCI" (Master) | LMU Munich

Seminar "Media Informatics" (Master) | LMU Munich

Seminar "Cognitive Electrophysiology" (Master) | University of Padua

## SELECTED SUPERVISED THESES

Moric, L. (2024). *Investigation Cognitive-Motor Interference in an dual task AR paradigm*. LMU Munich, Germany.

Herbig, S. (2024). *Designing and Evaluating a Transitional Mixed Reality System using Eye-Tracking Features in a Visual Search Task*. LMU Munich, Germany.

Buui, T. (2023). *Effect of Short-Form Video Exposure on Affective States*. LMU Munich, Germany.

Long, X. (2023). *Multimodal Detection of External and Internal Attention in Virtual Reality using EEG and Eye Tracking*. LMU Munich, Germany.

El Khahoudi, Y. (2023). *Typing Along the Mixed Reality Continuum: Towards Physiologically-Adaptive Mixed Reality*. LMU Munich, Germany.

Mading, E. (2023). *To the Virtuality and Back: Investigating the Effect of Transitions across the Virtuality Continuum on Attention Orienting*. LMU Munich, Germany.

Varma, T. (2023). *Dynamic Attentional Guidance Using Haptic and Auditory Feedback For Visual Search Task in VR*. LMU Munich, Germany.

Liao, R. (2023). *Measuring Visual Search and Distraction Across the MR Continuum: Insights from EEG and Eye Tracking*. LMU Munich, Germany.

Trauttmansheimer, I. (2023). *Searching Across Realities: Investigating ERPs correlates of Visual Search in Augmented Reality and Augmented Virtuality*. LMU Munich, Germany.

Oller, V. (2023). *AR on the Go : Investigating interference in an Working Memory AR task while Walking*. LMU Munich, Germany.

Benga, T. (2022). *Tracking Spatial Activities in Virtual Reality*. LMU Munich, Germany.

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Borisova, Y. (2022). *Investigating a Stress-Adaptive Task Management System for Wellbeing and Productivity*. LMU Munich, Germany.

Goldas, A. (2022). *Target enhancement or distractor suppression? Alpha oscillations as an input for a passive BCI*. LMU Munich, Germany.

Gerhardt, C (2022). *A biocybernetic loop based on theta EEG frequency oscillation to support sustained attention*. LMU Munich, Germany

Gluderer, F. (2022). *The effects of video-focused social media on Prospective Memory*. LMU Munich, Germany.

Pangratz, E. (2022). *ERPs of auditory expectancy violations in pianists: Comparison of piano performance and perception*. LMU Munich, Germany.

Trauttmansheimer, I. (2022). *Evaluation of distractibility under different auditory conditions: an ERP oddball study*. LMU Munich, Germany.

Turgut, Y. (2022). *Evaluating Visual Complexity in a Physiologically-Adaptive VR System*. LMU Munich, Germany.

Luu, Y. (2022) *Effects of Perceptual Load in a VR Adaptive System Using Electrodermal Activity to Support User Experience*. LMU Munich, Germany

Arpat, G. (2021) *Modulating shopping experience in VR: an EEG study*. LMU Munich, Germany.

Yang, C. (2020). *Evaluation of Task Engagement in VR: an ERP Study*. LMU Munich, Germany & Brown University, USA.

Hauser, M. (2020) *Assisting Urgent TORs in Highly Automated Vehicles*. LMU Munich, Germany.

## SKILLS

### **Programming (paradigms for psychological experiments)**

Matlab for EEG experiments (BBCI Toolbox, EEGLab, and Brainstorm)

Psychopy2 software.

E-Prime 2 software

Python (MNE Lab, Neurokit, Scipy)

C# (Unity)

### **Statistical analyses**

SPSS, JASP, Python, R and RStudio (linear and generalized mixed models).

### **Electroencephalography (EEG) & Magnetoencephalography (MEG)**

Good competence in operating an MEG system including system tuning, protocol design, setting up experiments and stimulations, and data acquisition

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Excellent competence level on the EEG headcaps installation (Brain Vision, ActiCap, TMSi Porti and Mobita systems)

Excellent competence on the monitoring phase during signal's recording. Brain Vision Analyzer and ERSS software.

## PUBLICATIONS

### Journals

1. **Chiossi, F.**, Zagermann, J., Karolus, J., Rodrigues, N., Balestrucci, P., Weiskopf, D., Ehinger, B., Feuchtner, T., Reiterer, H., Chuang, L., Ernst, M., Bulling, A., Mayer, S. & Schmidt, A. (2022). Adapting visualizations and interfaces to the user. *it - Information Technology*.
2. **Chiossi F.**, Welsch R., Villa S., Chuang L., Mayer S. Virtual Reality Adaptation Using Electrodermal Activity to Support the User Experience. *Big Data and Cognitive Computing*. 2022; 6(2):55.
3. Sarto, F., Pizzichemi, M., **Chiossi, F.**, Bisiacchi, P. S., Franchi, M. V., Narici, M. V., ... & Marcolin, G. (2022). Physical active lifestyle promotes static and dynamic balance performance in young and older adults. *Frontiers in Physiology*.
4. Sarto, F., Cona, G., **Chiossi, F.**, Paoli, A., Bisiacchi, P., Patron, E., & Marcolin, G. (2020). Dual-tasking effects on static and dynamic postural balance performance: a comparison between endurance and team sport athletes. *PeerJ*, 8, e9765.
5. Cona, G., **Chiossi, F.**, Di Tomasso, S., Pellegrino, G., Piccione, F., Bisiacchi, P., & Arcara, G. (2020). Theta and alpha oscillations as signatures of internal and external attention to delayed intentions: A magnetoencephalography (MEG) study. *NeuroImage*, 205, 116295.
6. **Chiossi, F.**, Ou, C., Gerhardt, C., Putze, F., & Mayer, S. (2023). Designing and Evaluating an Adaptive Virtual Reality System using EEG Frequencies to Balance Internal and External Attention States. *arXiv preprint arXiv:2311.10447*.
7. Hirsch, L., Müller, F., **Chiossi, F.**, Benga, T., & Butz, A. M. (2023). My Heart Will Go On: Implicitly Increasing Social Connectedness by Visualizing Asynchronous Players' Heartbeats in VR Games. *Proceedings of the ACM on Human-Computer Interaction*, 7(CHI PLAY), 976-1001.
8. **Chiossi, F.**, Kosch, T., Menghini, L., Villa, S., & Mayer, S. (2023). SensCon: Embedding Physiological Sensing into Virtual Reality Controllers. *Proceedings of the ACM on Human-Computer Interaction*, 7(MHCI), 1-32.
9. **Chiossi, F.**, Turgut, Y., Welsch, R., & Mayer, S. (2023). Adapting visual complexity based on electrodermal activity improves working

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memory performance in virtual reality. *Proceedings of the ACM on Human-Computer Interaction*, 7(MHCI), 1-26.

10. **Chiossi, F.**, Gruenefeld, U., Hou, B. J., Newn, J., Ou, C., Liao, R., ... & Mayer, S. (2024). Understanding the impact of the reality-virtuality continuum on visual search using fixation-related potentials and eye tracking features. *Proceedings of the ACM on Human-Computer Interaction*, 8(MHCI), 1-33.
11. **Chiossi, F.**, El Khaoudi, Y., Ou, C., Sidenmark, L., Zaky, A., Feuchtner, T., & Mayer, S. (2024). Evaluating Typing Performance in Different Mixed Reality Manifestations using Physiological Features. *Proceedings of the ACM on Human-Computer Interaction*, 8(ISS), 377-406.
12. Schneegass, C., Wilson, M. L., Shaban, J., Niess, J., **Chiossi, F.**, Mitrevska, T., & Woźniak, P. W. (2024). Broadening the mind: how emerging neurotechnology is reshaping HCI and interactive system design. *i-com*, (0).
13. **Chiossi, F.**, Trautmannsheimer, I., Ou, C., Gruenefeld, U., & Mayer, S. (2024). Searching Across Realities: Investigating ERPs and Eye-Tracking Correlates of Visual Search in Mixed Reality. *IEEE Transactions on Visualization and Computer Graphics*.

## Conferences

1. **Chiossi F.**, Villa S., Hauser M., Welsch R., Chuang L. (June, 2022). Design of On-body Tactile Displays to Enhance Situation Awareness in Automated Vehicles. In 2022 IEEE International Conference on Computational Intelligence and Virtual Environments for Measurement Systems and Applications (CIVEMSA).
2. Huang, A., Knierim, P., **Chiossi, F.**, Chuang, L. L., & Welsch, R. (2022, April). Proxemics for Human-Agent Interaction in Augmented Reality. In CHI Conference on Human Factors in Computing Systems (pp. 1-13).
3. **Chiossi, F.**, Stepanova, E. R., Tag, B., Perusquia-Hernandez, M., Kitson, A., Dey, A., ... & El Ali, A. (2023). PhysioCHI: Towards Best Practices for Integrating Physiological Signals in HCI. arXiv e-prints, arXiv-2312.
4. Schneegass, C., Wilson, M. L., Maior, H. A., **Chiossi, F.**, Cox, A. L., & Wiese, J. (2023, September). The Future of Cognitive Personal Informatics. In Proceedings of the 25th International Conference on Mobile Human-Computer Interaction (pp. 1-5).
5. Pangratz, E., **Chiossi, F.**, Villa, S., Gramann, K., & Gehrke, L. (2023, June). Towards an implicit metric of Sensory-Motor accuracy: Brain responses to auditory prediction errors in pianists. In Proceedings of the 15th Conference on Creativity and Cognition (pp. 129-138).



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6. **Chiossi, F.**, Ou, C., & Mayer, S. (2023, April). Exploring physiological correlates of visual complexity adaptation: Insights from EDA, ECG, and EEG data for adaptation evaluation in vr adaptive systems. In *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems* (pp. 1-7).
  7. **Chiossi, F.**, Haliburton, L., Ou, C., Butz, A. M., & Schmidt, A. (2023, April). Short-Form Videos Degrade Our Capacity to Retain Intentions: Effect of Context Switching On Prospective Memory. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (pp. 1-15).
  8. **Chiossi, F.**, & Mayer, S. (2023). How Can Mixed Reality Benefit From Physiologically-Adaptive Systems? Challenges and Opportunities for Human Factors Applications. *arXiv preprint arXiv:2303.17978*.
  9. Dietz, D., Oechsner, C., Ou, C., **Chiossi, F.**, Sarto, F., Mayer, S., & Butz, A. (2022, November). Walk This Beam: Impact of Different Balance Assistance Strategies and Height Exposure on Performance and Physiological Arousal in VR. In *Proceedings of the 28th ACM Symposium on Virtual Reality Software and Technology* (pp. 1-12).
  10. **Chiossi, F.**, Ou, C., & Mayer, S. (2024, June). Optimizing Visual Complexity for Physiologically-Adaptive VR Systems: Evaluating a Multimodal Dataset using EDA, ECG and EEG Features. In *Proceedings of the 2024 International Conference on Advanced Visual Interfaces* (pp. 1-9).
  11. Long, X., Mayer, S., & **Chiossi, F.** (2024). Multimodal detection of external and internal attention in virtual reality using eeg and eye tracking features. In *Proceedings of Mensch und Computer 2024* (pp. 29-43).
  12. Wang, N., Li, Y., **Chiossi, F.**, Pointecker, F., Zhao, L., & Zielasko, D. (2024). The Second Joint Workshop on Cross Reality. *arXiv preprint arXiv:2407.19843*.
  13. Mayer, E., **Chiossi, F.**, & Mayer, S. (2024). Crossing Mixed Realities: A Review for Transitional Interfaces Design. *Proceedings of Mensch und Computer 2024*, 629-634.
  14. **Chiossi, F.**, Weiss, Y., Steinbrecher, T., Mai, C., & Kosch, T. (2024). Mind the Visual Discomfort: Assessing Event-Related Potentials as Indicators for Visual Strain in Head-Mounted Displays. *arXiv preprint arXiv:2407.18548*. To appear in IEEE ISMAR '24 Proceedings
  15. Dietz, D., Berger, F., Ou, C., **Chiossi, F.**, Graeber, G., Butz, A. M., & Hoppe, M. (2024, October). VReflect: Designing VR-Based Movement Training with Perspectives, Mirrors and Avatars. In *Proceedings of the 30th ACM Symposium on Virtual Reality Software and Technology* (pp. 1-3).