

NeuroPhysIIR: International Workshop on NeuroPhysiological Approaches for Interactive Information Retrieval

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Abstract

The International Workshop on NeuroPhysiological Approaches for Interactive Information Retrieval (NeuroPhysIIR'25) aims to bringing together researchers from information science, human-computer interaction, cognitive neuroscience, and related fields, to foster cross-disciplinary collaboration and accelerate progress in neurophysiologically-informed IIR research.

As the third edition following successful workshops at SIGIR'15 [5] and CHIIR'17 [6], we anticipate that the interactive nature of this workshop will not only raise awareness but also lower the entry barriers for engaging with this exciting research area within the wider IIR community.

Workshop website: <https://neurophysiir.github.io/chiir2025/>.

CCS Concepts

• **Information systems** → **Users and interactive retrieval**; • **Hardware** → *Biological-related information processing*.

Keywords

neuroscience, brain activity, physiological signals, wearable devices, interactive information retrieval, cognitive processes

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1 Proposed Title and Format

The title of the proposed workshop is:

NeuroPhysIIR: Third International Workshop on NeuroPhysiological Approaches for Interactive Information Retrieval

We are proposing a **full day workshop**.

2 Significance and Relevance

One of the grand challenges in the field of Interactive Information Retrieval (IIR) is characterization of complex cognitive processes involved in search tasks. What is going on in human brains when an information need arises? How do we create a query for a web search engine, or talk to a virtual agent, or prompt a Large Language Model (LLM)-based conversational assistant? How is the realization of an information need characterized in cognitive and affective phenomena?

The application of neurophysiological methods to interactive information retrieval (IIR) research has grown significantly over the past decade, offering deeper insights into human cognition and behavior during information seeking activities. Building on the success of previous NeuroIR workshops at SIGIR 2015 [5], and at CHIIR 2017 [6], and the special issue at JASIST in 2019 [4] this 2025 workshop aims to further advance this interdisciplinary field by

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addressing key challenges and opportunities that have emerged. However, advancing knowledge in this area is not straightforward, given the multidisciplinary nature of the problem, involving expertise in information science, cognitive science, and multiple fields of computer science (information retrieval, wearable computing, and Human-Computer Interaction (HCI), among others).

Recent advances in portable neuroimaging technologies, such as wearable Electroencephalogram (EEG) and functional Near-Infrared Spectroscopy (fNIRS) devices, have made it increasingly feasible to collect rich neurophysiological data during naturalistic search tasks. At the same time, developments in machine learning and signal processing techniques have enhanced our ability to extract meaningful insights from complex multimodal data streams. These technological advancements, combined with a growing body of theoretical and empirical work connecting brain activity to information behavior, position the IIR community to make significant progress in understanding and modeling the cognitive and affective processes underlying search.

More recently, advancement in wearable physiological sensing technology, such as EEG and Electrodermal Activity (EDA), has made the use of wearable devices more accessible and affordable. This has opened novel approaches to quantify users' physiological responses implicitly [7, 9–11, 15, 16], and has attracted the attention in other communities to work on this problem. This year, the Ubicomp-ISWC 2024 conference hosted a workshop on advancing physiological methods for Human-Information Interaction [2] and the ACM Multimedia conference is hosting a workshop on Brain-Computer Interface (BCI) for Multimedia Understanding¹.

As IIR is becoming more complex – multimodality (text, video, audio) [17], multi-turn (conversational [8]), and more complex tasks (e.g., generative information access [1, 14]), there is a need to bring the community together to facilitate research in the use of neurophysiological signals to better characterize interactive information retrieval and information seeking processes.

By bringing together researchers from information science, human-computer interaction, cognitive neuroscience, and related fields, this workshop aims to foster cross-disciplinary collaboration and accelerate progress in neurophysiologically-informed IIR research.

3 Expected Key Outcomes

The proposed NeuroPhysIIR workshop aims to reactivate the work done by previous workshops at SIGIR and CHIIR [5, 6] by lowering the entry barrier into this promising research area through interactive activities to provide experts and non-experts in this area a platform to share their ideas.

We envisage the following expected outcomes from the workshop:

- Enhanced awareness and adoption of neurophysiological methods among the broader IIR community;
- A roadmap for addressing key methodological challenges in applying neurophysiological methods to IIR research;
- Identification of high-priority research questions and opportunities for funding in the NeuroIR domain;
- Initiation of collaborative projects leveraging complementary expertise across participating researchers;

- Establishment of a working group to develop guidelines for ethical neurophysiological data collection in IIR studies;
- A co-authored report with the participants (similar to the ones produced by previous CHIIR successful workshops [3, 5, 12, 13]), which will be submitted to SIGIR Forum.
- A special journal issue or edited volume, similar to [4].

By advancing our understanding of the neural basis of information seeking and retrieval, this workshop will contribute to the development of more effective and user-centered information systems, ultimately improving how people discover, access, and utilize information in an increasingly complex digital landscape.

4 Organizers

- **Associate Prof. Jacek Gwizdka** co-directs Information eXperience Lab at the School of Information at the University of Texas Austin, USA. He is one of the pioneers of Neuro-Information Science. He studies human information interaction and retrieval and applies cognitive psychology and neuro-physiological methods to understand information searchers and improve search experience. He is particularly interested in creating models that describe and predict cognitive and affective phenomena in human information interaction. Recent projects investigate search as a learning process and employ eye-tracking in assessment of reading, and in inferring information relevance. Jacek co-organized and co-led successful work shops on these topics, including the first International NeuroIR workshop at SIGIR'15 [5] and the second NeuroIIR workshop at CHIIR'17 [6]. E-mail: chiir2025@gwizdka.com; Website: <https://jacekg.ischool.utexas.edu/>
- **Prof. Javed Mostafa** is a Professor and the Dean of the Faculty of Information at the University of Toronto, Canada. His research focuses on multimedia information retrieval, personalization and user modeling as well as cyberinfrastructure for research and learning. With more than 105 peer-reviewed publications of his own, Prof. Mostafa has served in editorial roles for several prestigious journals in the field. He was the editor-in-chief of the Journal of the Association for Information Science and Technology (JASIST), an associate editor for the journal ACM Transactions on Information Systems (TOIS) and currently serves as an associate editor for the journal ACM Transactions on Internet Technology (TIST). Prof. Mostafa is a co-organizer of the NeuroIR workshop at SIGIR'15 [5] and NeuroIIR workshop at CHIIR'17 [6]. E-mail: dr.javedm@utoronto.ca; Website: <https://ischool.utoronto.ca/faculty-profile/javed-mostafa/>.
- **Prof. Min Zhang** is a tenured professor in the Department of Computer Science & Technology (DCST), Tsinghua University, China, and is the vice director of the AI lab, DCST. She specializes in Web search, personalized recommendation, and user modeling. Currently, she serves as the Editor-in-Chief (EiC) of ACM Transaction on Information Systems (TOIS), ACM SIGIR Executive Committee member, and PC chair or Area Chairs of top conferences such as SIGIR, WSDM, theWebConf, etc. E-mail: z-m@tsinghua.edu.cn; Website: <http://www.thuir.cn/group/~mzhang/>

¹<https://hail-au.github.io/>

- **Ms. Kaixin Ji** is a PhD candidate at the School of Computing Technologies, RMIT University, Australia, and a member of the ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S). She is a co-organizer of the Advancing Physiological Methods for Human-Information Interaction at Ubicomp'24 (AphyMeHII'24) [2]. Her research is about quantifying and measuring cognitive bias with multi-modal physiological sensing, including EEG, EDA, PPG, and eye-tracking. She specifically focuses on the occurrences of cognitive bias as a sequence of decisions made during interactive information-seeking processes. E-mail: kaixin.ji@student.rmit.edu.au; Website: <https://ji-kaixin.com/>
- **Associate Prof. Yashar Moshfeghi**, iSchool, University of Strathclyde, UK. Yashar is the founder of the NeuraSearch field, which focuses on identifying, understanding, and modeling brain activities involved in complex information search processes. His innovative research has resulted in around 100 publications in peer-reviewed journals and full conference papers, and awards, establishing him as a leading figure in the field. E-mail: yashar.moshfeghi@strath.ac.uk; Website: <https://academic.yashmosh.com/>
- **Associate Prof. Tuukka Ruotsalo**, University of Copenhagen, Denmark, and LUT University, Finland. Tuukka heads a Cognitive computing research initiative centered on software systems capable of learning and refining their actions through user-derived signals, including seminal work in using EEG, fNIRS and peripheral physiology in information retrieval. His research, marked by its multidisciplinary nature, encompasses various domains, including machine learning, information retrieval, recommender systems, brain-computer interfaces, physiological computing, and human-computer interaction. E-mail: tuukka.ruotsalo@lut.fi; Website: <https://www.lut.fi/fi/profililit/tuukka-ruotsalo>
- **Dr. Damiano Spina** is a Senior Lecturer at the School of Computing Technologies, RMIT University, Australia and an Associate Investigator at the ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S). His research focuses on interactive information retrieval – including the use of wearable devices to characterize information seeking processes with physiological signals. He has co-organized workshops in international conferences – including Future Conversations at CHIIR'21 and APhyMeHII at Ubicomp'24 [2] – and shared tasks for evaluation campaigns at CLEF and IberLEF. E-mail: damiano.spina@rmit.edu.au; Website: <https://www.damianospina.com>

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