

# AIXPAC 2023 - Preface to the 1<sup>st</sup> Workshop on Artificial Intelligence for Perception and Artificial Consciousness

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## Abstract

The AIXPAC workshop aims to bring together researchers from academia and industry to discuss the latest advancements in AI for perception and consciousness. The workshop features presentations from experts on the physicalist ontology of consciousness, artificial consciousness, colour perception, and computer vision. Some research questions are addressed in AIXPAC: Can a visual perception system be embedded into machines? How accurately does AI tackle visual attention processes? What is the relation between attention and consciousness? Can AI architectures and approaches be used to design Artificial Consciousness? What are the pros and cons of Large Language Models? The given research questions foster multidisciplinary contributions and several critical readings for the given topics.

## 1. Background and Motivations

The remarkable progress achieved by Artificial intelligence (AI) over the last few years has produced a critical impact on the areas of perception and consciousness. These advancements have opened up new avenues for understanding the human mind and developing innovative technologies to enhance human capabilities. These developments have spurred the organisation of a workshop on Artificial Intelligence for Perception and Artificial Consciousness.

AIXPAC aimed to bring together researchers from academia and industry to exchange knowledge and expertise, foster collaboration, identify new research directions and accelerate the development of AI technologies that can benefit society.

The study of HVS (Human Vision System) has undoubtedly brought up some elements to build autonomous Computer Vision methods to catch the most critical regions in visual scenes from a perceptual viewpoint. At the same time, the latest LLMs (Large Language Models) developments exhibited outstanding previously unseen Natural Language Processing task performances. Moreover, biologically inspired principles helped put increasingly reliable face-detection techniques in place. Ostensibly unrelated concepts and research fields can be conceived as jigsaw tiles to figure out the whole picture.

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The aforementioned considerations lead us to the question, “Can Consciousness be represented and interpreted using an internalist or externalist approach?”

Getting deeper into AlxPAC, the workshop highlights the latest novelties in AI, including the advancements in Large Language Models (LLMs), Visual Perception, and Transformers. GPT-based virtual chatbot agents have demonstrated remarkable capabilities in natural language processing tasks, including text generation, question answering, language translation, and writing creative content. Visual Perception models, such as CLIP and ViT, have achieved state-of-the-art performance in image recognition tasks, enabling AI systems to perceive and understand the visual world more accurately. Transformers, a novel neural network architecture, have revolutionised natural language processing and machine translation, leading to significant improvements in performance.

These advancements in AI are rapidly transforming various industries and aspects of human life. LLMs are used to develop intelligent chatbots, generate personalised marketing content, and assist in creative writing tasks. Visual Perception models power autonomous vehicles, enabling them to navigate roads and perceive their surroundings more precisely. Transformers power real-time machine translation tools, bridging communication gaps between different languages.

Hence, the workshop on Artificial Intelligence for Perception and Artificial Consciousness provides a critical platform for researchers to discuss these latest advancements and explore their potential impact on society.

## 2. Accepted Papers

The contributions tackled several hot topics intertwined with Artificial Intelligence, Consciousness and Perception. In particular, the addressed topics spanned LLMs (Large Language Models), robots’ awareness, active inference, metaverse, transformer attention, and face detection. The total number of received contributions is fifteen. Seven out of them have been accepted.

The complete list of accepted articles and contributing authors is reported below.

- Seeing in the Dark: A Different Approach to Night Vision Face Detection with Thermal IR Images. Kinshuk Gaurav Singh, Charulkumar Chodvadiya, Chintan Bhatt, Pooja Shah, Alessandro Bruno
- Taking Robots Beyond the Threshold of Awareness: Scientifically Founded Conditions for Artificial Consciousness. Joachim Keppler
- Active Inference for AI. Maria Raffa
- Moral Mediators in the Metaverse: Exploring Artificial Morality through a Talking Cricket Paradigm. Giuseppe Fulvio Gaglio, Agnese Augello, Arianna Pipitone, Luigi Gallo, Rosario Sorbello, Antonio Chella
- Visualization and Analysis of Transformer Attention. Salvatore Calderaro, Giosué Lo Bosco, Riccardo Rizzo, Filippo Vella
- Insights into Classifying and Mitigating LLMs’ Hallucinations. Alessandro Bruno, Pier Luigi Mazzeo, Aladine Chetouani, Marouane Tliba, Mohamed Amine Kerkouri
- Testing spatial reasoning of Large Language Models: the case of tic-tac-toe. Davide Liga, Luca Pasetto

## 3. Invited Talks

AlxPAC is enriched by two invited talks, respectively, by Riccardo Manzotti from IULM and Antonio Lieto from the University of Salerno. Riccardo Manzotti is a philosopher, psychologist, and AI expert

and the author of *The Spread Mind: Why Consciousness and the World Are One* (ORBooks, NewYork, 2018) and of *Dialogues on Consciousness* (NY, 2018). He is a Full Professor of theoretical philosophy at the IULM University (Milan). He has been a Fulbright Visiting Scholar at the Department of Philosophy at the Massachusetts Institute of Technology, MIT (Boston).

He is executive editor of the *Journal of Artificial Intelligence and Consciousness*, and has published several books and many papers on consciousness, machine consciousness, perception, philosophy of mind, aesthetics, media, and philosophy of art.

His current research focuses on the issue of consciousness and the structure of reality: What is consciousness? Is there a separation between our experience of the world and the world? Does the present have a fixed time span? Can we design and build a conscious machine? What ethical questions do consciousness and technology raise in the 21st century? Riccardo Manzotti's talk at AIXPAC is titled "Perception is nothing but identity with external objects".

Antonio Lieto is an Associate Professor in Computer Science at the University of Salerno (Italy), DSPC, and associate researcher at the ICAR-CNR Institute in Palermo (Italy). His main research topics include commonsense reasoning, language and knowledge technologies, and cognitive architectures for intelligent interactive agents (embodied and not). He has been Vice-President of the Italian Association of Cognitive Sciences (AISC, 2017-2022), the recipient of the "Outstanding BICA Research Award" from the Biologically Inspired Cognitive Architecture Society (USA), and is an ACM Distinguished Speaker on the topics of cognitively inspired AI. He has authored the book "Cognitive Design for Artificial Minds" (Routledge/Taylor & Francis, 2021).

Previously (2012-2023), he was a post-doc, junior researcher and tenure-track Researcher/Assistant Professor in Computer Science at the Department of Computer Science of the University of Turin (Italy). He was also (2016-2017) Research Associate and Scientific Consultant at the MEPhi (National Research Nuclear University, Moscow, Russia) and has been a Visiting Researcher at the University of Haifa (Israel), Carnegie Mellon University (USA) and Lund University (Sweden).

Antonio Lieto's invited talk at AIXPAC is titled "Avoiding the behaviouristic trap with the Minimal Cognitive Grid".

#### **4. Programme Committee**

As a final remark, all co-chairs want to thank all the programme committee members listed below and the organisers of AIXIA 2023.

- Anuja Arora, Jaypee Institute of Information Technology, Noida, India
- Pradeep N Bapuji Institute of Engineering and Technology, Davanagere, India
- Chintan M Bhatt, Pandit Deendayal Energy University, India
- Giuseppe Caggianese, ICAR CNR, Italy
- Aladine Chetouani, University of Orleans, France
- Arzu Çöltekin, FHNW University of Applied Sciences and Arts Northwestern Switzerland
- Sophia Corvaia, University of Palermo, Italy
- Vassilios Krassanakis, University of West Attica, Greece
- Fulvio Gaglio, University of Palermo, Italy
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- Ignazio Infantino, ICAR CNR, Italy
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- Jana Sedlakova, University of Zurich, Switzerland

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