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Perspectives in Philosophy of Artificial Intelligence, Robotics and Cognition

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Abstract

This feature reports on the Philosophical Perspectives on Artificial Intelligence (AI), Robotics and Cognition session of the first Milan Logic and Philosophy of Science Network workshop (12th March 2025). Giuseppe Primiero introduced PhilTech's agenda. Giacomo Zanotti presented the multidisciplinary approach to AI adopted by philosophers at Politecnico di Milano; Silvia Larghi discussed research on mental states attribution to robots conducted at the RobotiCSS Lab, University of Milano-Bicocca; and Ilaria Alfieri presented IULM's lines on synthetic modeling, the sustainability of social robotics, and the robosphere.

Keywords
Philosophy of Artificial Intelligence; Philosophy of Social Robotics; Philosophy of Cognition

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Recent advancements in robotics and AI are reshaping the way we conceive, interpret and interact with artificial agents. Interdisciplinary research in AI, robotics and cognition, encompasses both the design and development of artificial agents capable of learning, perceiving and acting in the world, as well as the cognitive and philosophical implications of replicating or emulating mind and intelligence. Emerging technologies are opening up new perspectives in understanding cognition and in the development of increasingly adaptive, responsive and collaborative intelligent systems. At the inaugural meeting of Milan Logic and Philosophy of Science Network, scholars working on these issues presented their research reflecting on crucial challenges, recent developments, future potential and related ethical and epistemological issues.

Giuseppe Primiero (Università degli Studi di Milano) presented the work of the Research Centre for the Philosophy of Technology (PhilTech). This is a leading interdisciplinary hub committed to the philosophical investigation of technology and its multifaceted impacts on knowledge, society, and

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human agency. Hosted within the Department of Philosophy "Piero Martinetti" and supported by the 2023-2028 Excellence Project *Techne*, PhilTech brings together expertise in logic, epistemology, ethics, political philosophy, media theory, and education. The Centre's research is structured around three thematic areas: Knowledge and Language, Society and Values, and Interaction and Education, reflecting a comprehensive approach to the philosophical study of technological systems and their environments.

PhilTech serves as the coordinating entity for major research projects such as BRIO – Bias, Risk and Opacity in AI, SMARTEST, and ISL360 – Immersive Synchronous Learning (philtech.unimi.it/projects), as well as for politically engaged initiatives like *Towards a Decolonized Artificial Intelligence Seminar Series*. The Centre addresses pressing issues like algorithmic opacity, formal logic and AI, normative machine learning, temporal perception, digital responsibility, language usage on technological platforms and the post-colonial imagination to name a few. PhilTech also partners with academic and industry institutions including IDSIA, Fondazione Bassetti, META, the CSS Lab, and the International Commission on the Philosophy of Technology and Engineering Sciences, the Commission for the History and Philosophy of Computing.

Giacomo Zanotti's presentation outlined the main features of the research in the philosophy of AI that is pursued at Politecnico di Milano. Here, philosophical issues revolv-

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ing around AI are tackled from a multi-disciplinary perspective that combines the philosophy of science and technology with conceptual and methodological tools from ethics, logic, and social sciences. Different philosophers from Politecnico are involved, including Stefano Canali, Daniele Chiffi, Fabio Fossa, Camilla Quaresmini, and Viola Schiaffonati. While they have different areas of specialization, a common denominator of their research is an understanding of AI systems as socio-technical ones, encompassing AI technologies but also the involved human actors and institutions.

Philosophers working on AI at Politecnico are active on multiple fronts. The relevant research topics include (but are not limited to) risk and uncertainty in AI, trust and trustworthiness in AI, medical AI and personalization, AI and the ethics of transportation, as well as algorithmic fairness. As an example, Giacomo Zanotti presented the work titled "AI-Related Risk: An Epistemological Approach" (10.1007/s13347-024-00755-7) that he has been doing with Daniele Chiffi and Viola Schiaffonati on AI-related risk, showing how a multi-component analysis of risk can fruitfully be applied to risk stemming from the use of AI systems.

Silvia Larghi (University of Milano-Bicocca) explored the epistemology of the attribution of mental states to robots, based on research conducted at the RobotiCSS Lab (Laboratory of Robotics for the Cognitive and Social Sciences, University of Milano-Bicocca). Under the scientific direction of Edoardo Datteri, the RobotiCSS Lab brings together

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multidisciplinary expertise from philosophy of science, psychology, education, computer science and engineering, anthropology, encompassing research on the role of robots in understanding cognition and on how cognition can be enhanced by using robots. The RobotiCSS Lab is actively involved in several research projects in the field of human-robot interaction and the understanding of robots, particularly in relation to the attribution of mental states to artificial systems. Larghi concluded the presentation with insights from a philosophical analysis of possible styles people may adopt to model the minds of robots, supported by findings from an exploratory empirical study on how children involved in roboethological activities explain robotic behavior.

Ilaria Alfieri (IULM University, Milan) presented the research work developed with Luisa Damiano, Antonio Fleres, Hagen Lehmann, Rebecca Mannocci, and Maria Raffa. Their work applies the synthetic method in scientific modeling of biological and cognitive processes and related technological developments.

Adopting a transdisciplinary approach that combines philosophical reflection, theoretical modeling, and ethical analysis, the main research lines developed at IULM are: 1) The epistemology of synthetic modeling, defining criteria and taxonomies for biological and cognitive models; 2) Software and wetware synthetic modeling of minimal cognition, addressing the thresholds between life, cognition, and sense-

making with applications in healthcare, environmental care and related ethical issues; 3) Social robotics, focusing on the social and environmental sustainability of social robots, robot ethics, social robots in education, applications of the synthetic method in social robotics, and novel dimensions of social presence and sensory interaction (e.g., olfactory social robotics); 4) Modeling of the robosphere, studying the self-organization of robotic ecosystems and their sustainable integration with human and natural systems.

Their research group actively collaborates with academic partners (e.g., Leticia Dubouq, Paul Dumouchel, Raquel Ros) and industrial ones such as Pal Robotics and Oversonic Robotics. Their research activities are part of two major projects: IULM's departmental project *Third-Order Cybernetics: Towards a Systemic Vision of Sustainability* and PRIN 2022 titled "An organizational approach to the synthetic modeling of cognition based on synthetic biology and Embodied AI Org (SB-AI)".

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