UNIVERSITÀ DI TORINO

SEMINAR CYCLE

of the PhD in Neuroscience of Turin

5th Appointment

Prof. Matej Hoffmann

Faculty of Electrical Engineering, CTU Prague

"Mechanisms of infant body know-how development through baby humanoid robots"

14th May, 2024 h 10:00 AM

The lecture will last 1 hour and it will be followed by discussion

Host: Prof. Francesca Garbarini

Graduation Room, Palazzo Badini
Via Verdi 10, Turin
Link: https://bit.ly/4amwaO6

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PROF. MATEJ HOFFMANN

Prof. Hoffmann currently serves as Associate Professor at the CTU in Prague, coordinating the Humanoid and Cognitive Robotics group. With multiple humanoid robot platforms, including the iCub baby robot, he established Prague as an important center or research in cognitive developmental robotics worldwide. He employs the so-called synthetic methodology, or "understanding by building", with two main goals: to understand cognition and its development and robots that safely and naturally interact with humans. Finally, Prof. Hoffmann and his group specialize in the sense of touch for robots. Prof. Hoffmann's group studies how robots can exploit large area sensitive skin array on their bodies.

Previously, Prof. Hoffmann served as Senior Research Associate at the Artificial Intelligence Laboratory, University of Zurich, Switzerland (Prof. Rolf Pfeifer). In 2013 he joined the iCub Facility of the Italian Institute of Technology (Prof. Giorgio Metta), supported by a Marie Curie Intra-European Fellowship (iCub Body Schema, 2014-2016). In 2017, he joined the Department of Cybernetics, Faculty of Electrical Engineering, Czech Technical University in Prague where he is currently serving as Associate Professor and leading a group focused on cognitive, neuro-, collaborative, and humanoid robotics.

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ABSTRACT

Human newborns are at first virtually helpless, but within a year or two they learn to effectively control their bodies, to reach and to locomote. What brain algorithms are at the basis of this learning? Current knowledge on sensorimotor development is patchy. A common but unverified idea is that learning involves intrinsically motivated exploration of the body and the world, giving rise to coherent internal representations that subsequently allow effective motor control. In this talk, will I question these assumptions. We longitudinally follow infants in three different scenarios - spontaneous behavior, reaching for tactile stimuli on the body, and reaching for objects presented visually - and use behavioral data from these three contexts to: (i) identify signatures of active exploration and goal-orientedness in spontaneous behavior, (ii) compare reaching to somatosensory and visual targets over development to understand the interplay of target localization and motor control. To shed light on the mechanisms of the development of the "sensorimotor self", we instantiate these scenarios in baby humanoid robots. I will also show AI tools that we develop to extract infant 3D pose from videos, reattribute motion data to robots, and replay the motor, proprioceptive, visual, and tactile experience of infants.

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