

4th International Advanced Course & Symposium on Artificial Intelligence & Neuroscience – ACAIN 2024

<https://acain2024.icas.events>
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September 22 – 25, 2024

Riva del Sole Resort & SPA, Castiglione della Pescaia (Grosseto), Tuscany, Italy

Program Ver. 0.1, August 8th, 5pp – This schedule is tentative and subject to change.

	Sunday, Sept 22	Monday, Sept 23	Tuesday, Sept 24	Wednesday, Sept 25
09:00 – 09:45	LOD Opening & Johannes Schmidt-Hieber Room: Crown	Vivek Natarajan Room: Crown	Sven Giesselbach Room: Crown	Session 4
09:45 – 10:30	Panos Pardalos Room: Crown	Michal Valko Room: Crown	Raniero Romagnoli Room: Crown	
10:30 – 11:15	coffee break	coffee break	coffee break	coffee break
11:15 – 12:00	ACAIN opening & Auke Jan Ijspeert	Alessandro Treves	Session 1	Session 5
12:00 – 12:45	Maria K. Eckstein	Thomas Parr		
12:45 – 14:45	lunch	lunch	Lunch	lunch
14:45 – 15:30	Auke Jan Ijspeert	Melika Payvand	Session 2	Session 6 & Closing
15:30 – 16:15	Thomas Parr	Maria K. Eckstein	free	
16:15 – 17:00	coffee break	coffee break		
17:00 – 17:45	Loic Matthey	Loic Matthey		
17:45 – 18:30	Alessandro Treves	Maria K. Eckstein		
18:30 – 19:15	Thomas Parr	Melika Payvand	Session 3	free
19:15 – 20:00	Alessandro Treves	free		
20:00 – 21:30	dinner	dinner	dinner	social dinner*

Arrival: September 21

Departure: September 26

Registration: September 21 (17:00-19:30)

The registration desk will be located in the conference centre near The Crown conference room. Upon registration at the desk, you will receive your badge and conference program. To facilitate the process please bring with you the *registration confirmation*. You are kindly requested to wear your name badge during all events of the conference.

Conference Room: **Da Vinci** (on the first floor, number 6 on the resort map), **all lessons will be held in the Da Vinci conference room, excluding those indicated in the program which will be held in the Crown conference room** (number 7 on the resort map).

Very Important: during talks and Q&A sessions, absolute silence is recommended, you must not make noise, you must not disturb the Presenter during the talk or while she/he is answering questions posed by the audience.

Inside the Riva del Sole it is mandatory to wear the badge.

Social Dinner: For Extra Gala Dinner Ticket(s) please send an email to acain@icas.cc thanks.

Dress code for the conference gala dinner: to dress formally (you should wear a suit or dress).

Paper/oral presentation: To do the talk, each speaker/presenter must necessarily use their own laptop/tablet.

Each presentation must last a maximum of **11 minutes**, after which there will be **4 minutes** for the Q&A session. The Session Chairs will be very diligent in enforcing these limits!

Certificates will be given out on the last day of the conference.

One last thing do not forget bathing suits, sunscreen, and stay hydrated.

* Please communicate your dietary needs (e.g., gluten-free, celiac, vegetarian, vegan, food allergies, and other dietary needs) asap, thank you. Please send an email to the Hotel, thanks.

“Those who have an eye find what they are looking for even with their eyes closed”.

Italo Calvino

ACAIN 2024 Lecturers

Maria K. Eckstein, Google DeepMind, London, UK

Lecture 1/3 *“Reinforcement Learning 1: Psychology and Artificial Intelligence”*

Lecture 2/3 *“Reinforcement Learning 2: Neuroscience and Cognitive Modeling”*

Lecture 3/3 *“Cognitive Modeling with Neural Networks: Theory Discovery Using Novel Methods”*

Auke Jan Ijspeert, EPFL, Switzerland

Lecture 1/2 *“Exploring locomotion control circuits in the spinal cord using biorobots and simulations. Part 1: lamprey and salamander locomotion”*

Lecture 2/2 *“Exploring locomotion control circuits in the spinal cord using biorobots and simulations. Part 2: mammalian and human locomotion”*

Loic Matthey, Google DeepMind, London, UK

Lecture 1/2 *“Structured Generative Models”*

Lecture 2/2 *“What's so hard about model-based agents?”*

Thomas Parr, Oxford University, UK

Lecture 1/3: *“An overview of active inference”*

Lecture 2/3: *“The dynamics of beliefs”*

Lecture 3/3: *“Message passing in the brain”*

Melika Payvand, Institute of Neuroinformatics, University of Zurich & ETH Zurich, Switzerland

Lecture 1/2 *“Introduction to brain-inspired computing”*

Lecture 2/2 *“Brain-inspired computing: Trends, applications, outlook”*

Alessandro Treves, International School for Advanced Studies, Italy

Lecture 1/3 *“Mind-wandering as a window onto spontaneous cognition and creativity”*

Lecture 2/3 *“Analysing differential cortical contributions to latching dynamics”*

Lecture 3/3 *“Quantifying the subjective, beyond-Wikipedia experience”*

LOD & IMFM 2024 Keynote Speakers

Sven Giesselbach, Fraunhofer Institute – IAIS, Germany

“Data Science in the Era of Foundation Models – Bridging the Gap from Theory to Practice”

Vivek Natarajan, Google Health AI, San Francisco Bay Area, CA, USA

“How LLMs might accelerate biomedical discovery and help scale world class healthcare to everyone”

Panos Pardalos, University of Florida, USA

“AI and Data Sciences for Sleep Disorders”

Raniero Romagnoli, Almwave, Italy

“Challenges, approaches, needs and points of view for industry grade AI”

Johannes Schmidt-Hieber, University of Twente, The Netherlands

“Towards a statistical foundation for machine learning methods”

Michal Valko, Meta Paris, France

“Algorithmic LLM alignment”

Session 1 (Tuesday, Sept 24)

Chair: Alessia Sarica

Room: Da Vinci

Robin Dietrich, Philipp Spilger, Eric Müller, Johannes Schemmel and Alois Knoll. *Sequence Learning with Analog Neuromorphic Multi-Compartment Neurons and On-Chip Structural STDP*

Ander Cejudo, Markel Arrojo Magro, Aitor Almeida and Cristina Martín. *Understanding Sleep Dynamics Gathered from Wearable Devices with Explainable Recurrent Neural Networks*

Hiroyuki Kido. *Inference of Abstraction for Human-like Probabilistic Reasoning*

Zenon Lamprou, Iakovos Tenedios and Yashar Moshfeghi. *On the Role of Activation Functions in EEG-To-Text Decoder*

Sunit Bhattacharya, Vilém Zouhar and Ondej Bojar. *Multimodal Shannon Game with Images*

José Diogo Marques dos Santos and José Paulo Marques dos Santos. *Path-weight-based Pruning and SHAP-based Explanations of an ANN with fMRI Data*

Session 2 (Tuesday, Sept 24)

Chair: Laurits Dixen

Room: Da Vinci

Chiara Camastra, Assunta Pelagi, Andrea Quattrone and Alessia Sarica. *Brain morphometry differences across sexes revealed through Explainable Artificial Intelligence: a Human Connectome Project Young Adult study*

Ninell Oldenburg and Ruchira Dahr. *The Completeness Problem: Beyond Human Metrics in Assessing Abilities of Cognitive Systems*

Assunta Pelagi, Chiara Camastra, Andrea Quattrone and Alessia Sarica. *Predicting Psychological Well-being in HCP Young Adult Cohort using Random Forests Regression and SHAP with NIHTB Emotion Battery*

Session 3 (Tuesday, Sept 24)

Chair: Dario Cazzato

Room: Da Vinci

Marco Bilucaglia, Chiara Casiraghi, Alessandro Bruno, Simone Chiarelli, Alessandro Fici, Vincenzo Russo and Margherita Zito. *Emotional Reactions To AI-generated Images: A Pilot Study Using Neurophysiological Measures*

Davide Borra, Stefano Diciotti and Elisa Magosso. *A compact convolutional neural network for decoding EEG functional connectivity: application to motor imagery*

Laurits Dixen, Stefan Heinrich and Paolo Burelli. *Exploring Deep Learning Models for EEG Neural Decoding*

Alessia Sarica, Chiara Camastra, Assunta Pelagi, Fulvia Arcuri and Andrea Quattrone. *Conformal Prediction for Uncertainty Quantification in Brain Age Estimation using Random Forests Quantile Regression on MRI Features of the HCP Young Adult*

Elisa Magosso, Paolo Bruno and Davide Borra. *Combining EEG oscillation analysis and explainable artificial intelligence for characterizing visuospatial attention (ONLINE)*

Ruben Coen-Cagli, *Perceptual grouping and segmentation of natural stimuli: novel experiments and probabilistic algorithms (ONLINE)*

Session 4 (Wednesday, Sept 25)

Chair: Davide Borra

Room: Da Vinci

Alessia Sarica. *Explainable and Interpretable predictive models: may I trust machine decisions in Neuroscience?*

Dario Cazzato, Flavio Bono and Eugenio Gutiérrez. *INVISIONS: Innovative Neuromorphic Vision Sensors in real-scenarios*

Matteo Ferrante, Tommaso Boccatto and Nicola Toschi. *Towards Neural Foundation Models for Vision: aligning EEG, MEG and FMRI representations to perform decoding, encoding and modality*

Mustafa Burak Gurbuz and Constantine Dovrolis. *NISPA: Neuro-Inspired Stability-Plasticity Adaptation for Continual Learning in Sparse Networks*

Hiroyuki Kido. *Inference of Abstraction for Human-like Logical Reasoning*

Symposium Abstract - Short Talks:

Sruthi Srinivasan, Xinyi Wang, Deepshikha Acharya, Flavia Mancini and Gemma Bale. *Incorporating Qualitative Regressors to Assess Statistical Learning Dynamics: A GLM Methodology for High-Density Diffuse Optical Tomography*

Session 5 Symposium Abstract - Short Talks (Wednesday, Sept 25)

Chair: Sruthi Srinivasan

Room: Da Vinci

Marco Bottino, Natálie Bocková, Nico W. Poller, Michael N. Smolka, Justin Böhmer, Henrik Walter, Michael Marxen, *Relating functional connectivity to alcohol use disorder: derivation of theoretical relevance maps for predictive models*

Linda Karlsson, Jacob Vogel, Olof Strandberg, Ida Arvidsson, Kalle Åström, Jakob Seidlitz, Richard A. I. Bethlehem, Erik Stomrud, Rik Ossenkoppele, Nicholas J. Ashton, Kaj Blennow, Sebastian Palmqvist, Ruben Smith, Shorena Janelidze, Renaud

La Joie, Gil D. Rabinovici, Alexa Pichet Binette, Niklas Mattsson-Carlgrén, and Oskar Hansson, *A Machine Learning-based Prediction of Tau Pathology in Alzheimer's Disease from Plasma, MRI and Clinical Variables*

Marco P. Abrate, Caswell Barry, Thomas J. Wills, *An Artificial Neural Network Model of Cognitive Map Development*

Chandramouli Rajagopalan, David Rawlinson, Elkhonon Goldberg and Gideon Kowadlo. *Deep learning in a bilateral brain with hemispheric specialisation*

Sander Martijn Boelders, Wouter De Baene, Geert-Jan Rutten, Karin Gehring and Lee-Ling Ong. *Fully automatic meningioma segmentation with nnUNet using T1-weighted contrast-enhanced MR images by leveraging publicly available data and different types of annotations*

Session 6 (Wednesday, Sept 25)

Chair: Marco Bottino

Room: Da Vinci

Davy Darankoum, Manon Villalba, Clélia Allieux, Baptiste Caraballo, Carine Dumont, Eloïse Gronlier, Corinne Roucard, Yann Roche, Chloe Habermacher, Julien Volle and Sergei Grudin, *Deep learning-based automatic seizure detection on EEG signals*

Jarrad Rinaldo, Jason Friedman, Levin Kuhlmann and Gideon Kowadlo. *Left/Right brain, human motor control and the implications for robotics*

Course Abstract (Short Talk):

Gabriele Lagani, Fabrizio Falchi, Claudio Gennaro and Giuseppe Amato. *Bio-Inspired Approaches for Deep Learning: Hebbian Plasticity, Spiking Neural Networks, Backprop Alternatives*

Predrag Živadinović, Fabrizio Lombardi, Gašper Tkačik, Jozsef Csicsvari, *Measures of critical dynamics in the hippocampus of freely moving rats*

Sihao Liu, Augustine Mavor-Parker, Edgar Balmier, Caswell Barry, *Attention-Based Models Learn and Generalise Activities in Neural Circuitries*

Joanna Slawinska, Dimitrios Giannakis and Natasza Marrouch. *Koopman Operator Theory And New Data-Driven Approach to Modeling and Signal Processing Of Spatiotemporal Data (ONLINE)*

Akhila Atmakuru, Atta Badii and Giuseppe Di Fatta, *Transfer Learning for the Cognitive Staging Prediction in Alzheimer's Disease (ONLINE)*