

## Embodied Agents in Contemporary Visual Art

A project led by teams at Goldsmiths, University of London  
and at Konstanz University

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### **Dr. Yvonne Förster**

Leuphana University Lüneburg

#### Embodiment and Technology: Past, Present and Open Futures

At the dawn of Western Philosophy Plato spoke of the body as a prison of the soul. The body ties humans down and holds their minds prisoners. This idea persists until today. The transhumanist vision of a disembodied existence as uploaded minds is but one of the latest repercussions of this culture of intellectualism and datafication. Most of the current technologies exhibit little or no affordances for bodily engagement. We sit in front of screens, conceive of our bodies in form of measurements and vanish into the metaverse for recreation. Technology however is haunted and haunts embodied existence. This haunting is productive one: It harbors the chance to develop an active engagement and with technology that enables a dynamic understanding of the complex processes at stake in technological environments. I will briefly sketch the history and basic ideas of embodied cognition and explain the coevolution of human cognition and technology. Finally, I will reflect on human-machine collaboration in art as an example of becoming with technology rather than making the body obsolete through advances in technology.

*Yvonne Förster teaches Philosophy at Leuphana University Lüneburg, Germany, where she also held a junior professorship. She earned her PhD in Philosophy from Friedrich-Schiller-University Jena, Germany, with a thesis on the experience and ontology of time. She has taught Aesthetics, Phenomenology and Philosophy of Technology as a visiting professor at several universities, including Bauhaus University Weimar, and the Chinese University of Hong Kong and carried out research as senior research fellow at the MECS Institute of Advanced Studies Leuphana, at the University of Konstanz, and GCAS College Dublin. Her research dives into human-machine relationships, aesthetics and fashion theory and posthumanism.*

### **Dr. Giulia D'Angelo**

The Czech Technical University

#### What's catching your eye? - Bioinspired and neuromorphic algorithms to model visual attention

Vision is an exploratory behaviour that relies heavily on the dynamic relationship between actions and sensory feedback.

For any agent—whether animal or robotic—processing visual sensory input efficiently is crucial for understanding and interacting with its environment. The key challenge lies in selectively filtering relevant information from the constant stream of complex sensory data. This process, known as selective attention, is also driven by the intricate interplay between bottom-up and top-down mechanisms, which together organize and interpret visual scenes.

I will explore how biologically plausible models for visual attention can enhance robotic interaction with the environment trying to understand the role of neuromorphic hardware in facilitating active vision and its limitations.

*Giulia D'Angelo is currently an MSCA Postdoctoral Fellow at the Czech Technical University in Prague, where she focuses on neuromorphic algorithms for active vision. She earned her Bachelor's degree in Biomedical Engineering from the University of Genoa and a Master's degree in Neuroengineering, during which she developed a neuromorphic system for the egocentric representation of peripersonal visual space at King's College London. She completed her PhD in neuromorphic algorithms at the University of Manchester, where she proposed a biologically plausible model for event-driven, saliency-based visual attention and was awarded the President's Doctoral Scholar Award. She continued her postdoctoral research in collaboration with the Event-Driven Perception for Robotics Laboratory at the Italian Institute of Technology. She was later awarded the Marie Skłodowska-Curie Fellowship, through which she explores sensorimotor contingency theories for neuromorphic active vision algorithms.*

**Asst. Prof. Daniela Mitterberger**  
Princeton University

Rethinking Tools in Digital Fabrication: A Dialogue Between the Human Hand and the Robotic Grip

This lecture examines how new digital fabrication technologies are reshaping the tools and methods that mediate between human skill and robotic competence. Focusing on the intersection of craft and computation, it explores how emerging technologies, such as extended reality (XR) and collaborative robotics, enable new forms of interaction between humans and machines. Through research in augmented manual fabrication and human-robot collaboration, the talk considers how these tools can enhance craftsmanship, improving precision and creativity while maintaining the tactile and cultural dimensions of making. Case studies illustrate how rethinking tools can lead to hybrid design and construction methods, offering a vision for a more collaborative and interactive approach to digital fabrication.

*Daniela Mitterberger is an architect and researcher working at the intersection of new media, human interaction, digital fabrication, and emerging technologies.*

*Mitterberger is an Assistant Professor at Princeton University, where she develops advanced computational methods for enabling human-machine collaboration through adaptive digital fabrication and extended reality. Her lab, XAIA, focuses on extended augmentation in architecture. Mitterberger is the lead developer of COMPAS XR, an open-source computational framework for extended reality and robotics in architecture, engineering and digital fabrication. She received her doctoral degree at ETH Zurich (Dr. sc.) in 2023 on "Adaptive digital fabrication and human-machine collaboration for architecture". In 2023, she worked as a senior scientist at ETH Zurich and within the Design++ initiative. There she was the Co-lead of the Immersive Design Lab, a lab for collaborative research and teaching in the field of extended reality and machine learning in architecture and construction. She has previously been appointed and lectured in several international graduate and postgraduate programs, amongst others, at the MSD in Melbourne, UniSA in Adelaide, the University of Applied Arts and Academy of Fine Arts in Vienna, the University of Innsbruck, ETH Zurich, Tongji University in Shanghai, and IACC in Barcelona.*

*Parallel to her academic career, Daniela Mitterberger also explores the boundaries between science and art with her multidisciplinary architecture office "MAEID [Büro für Architektur und Transmediale Kunst]", which she co-founded in 2015. MAEID's work interweaves computation, living systems and machines and challenges the relationship between humans, space and performativity. MAEID's work has been awarded numerous international prizes and exhibited in renowned galleries, institutions and events, including the Venice Biennale 2021, Princess of Asturias Awards 2021, Seoul Biennale 2020, Ars Electronica Linz, MAK Vienna, Melbourne Triennial, Academy of Fine Arts Vienna and HdA Graz.*

## **Dr. Baruch Gotlieb**

UdK Berlin and West Den Haag

### The work of artists in the age of their technological reproducibility

A functioning robot which follows commands represents an immense cooperation and collaboration of humans participating in the realization of its material construction and programming. According to Marshall McLuhan, artists are particularly sensitive to the transformative effects of new technologies. By observing what artists are doing, McLuhan proposes, people can become aware of imminent changes in the social and cultural fabric which, because they are so new and unfamiliar, remain otherwise imperceptible. As part of this oracular function, artists are early adopters of new technologies, often using them in unorthodox ways in order to reveal something about their unfamiliar essence. Through a focus on the question of labour and work in the art work, this presentation will explore how the modernist understanding of artists' work is being profoundly changed.

*Dr. phil. Baruch Gottlieb, trained as a filmmaker at Concordia University Montreal, has a doctorate in digital aesthetics from the University of Arts Berlin. Author of "Gratitude for Technology" (ATROPOS 2009), "A Political Economy of the Smallest Things" (ATROPOS 2016), and Digital Materialism (Emerald 2018), he is currently lecturer in digital aesthetics at UdK Berlin and curator at West Den Haag. He is a practicing transdisciplinary artist specializing in kunst am bau, digital art for public space, interactive and generative art, sound art and single channel video. He is the founder with Ji Yoon Yang of Sound Effects Seoul Sound Art Festival, and founder with Steffi Winkler of Flusser.Club an association dedicated to the thinking of philosopher of communication Vilém Flusser. He is a core member of the arts-science collective disnovation.org. He writes extensively on digital media, digital archiving, generative and interactive processes, digital media for public space and on social and political and ethical aspects of networked media.*

## **Dr. Sylvain Calinon**

The Idiap Research Institute and a Lecturer at the Ecole Polytechnique Fédérale de Lausanne (EPFL)

### Drawing with Robots

Despite significant advances in artificial intelligence to solve logic-based problems, robots still struggle with tasks involving physical interaction, which humans perform subconsciously. This brings a big bias in AI research: robots can beat humans at games such as chess or go but are incapable of skillfully moving the game pieces by themselves. What makes research in robotics both hard and fascinating is that movement skills are tightly connected to our physical world and to embodied forms of intelligence.

In this presentation, I will show how our research in human-robot collaboration, movement skills acquisition and optimal control can contribute to robot drawing applications. Recent advances in generative AI and robotics have revolutionized the connection that people have with creativity and art. The installations developed in our projects aim to shed light on the roles of AI and robotics in creative endeavors. On the one hand, with new AI tools, anyone can quickly create visual artistic renderings with just a few words. On the other hand, robot manipulators are becoming increasingly accessible to non-specialized users, with user-friendly programming interfaces (no-code training of robots). These revolutions raise questions on the roles of AI and robotics in artistic and creative applications. Still, although AI and robotics are often presented jointly, the underlying challenges remain very different, where real robots come with the additional challenges to control the robot to move in a physical world. These projects aim to initiate a discussion between scientists and the public about the role of science in the arts, and what AI and robotics technologies can bring to different forms of arts, either digital or physical.

*Dr Sylvain Calinon is a Senior Research Scientist at the Idiap Research Institute and a Lecturer at the Ecole Polytechnique Fédérale de Lausanne (EPFL). He heads the Robot Learning & Interaction group at Idiap, with expertise in human-robot collaboration, robot learning from demonstration, geometric representations and optimal control. The approaches developed in his group can be applied to a wide range of applications requiring manipulation skills, with robots that are either close to us (assistive and industrial robots), parts of us (prosthetics and exoskeletons), or far away from us (shared control and teleoperation). Website: <https://calinon.ch>*

**Daniel Berio**

Goldsmiths, University of London

**Michael Stroh**

The University of Konstanz

Robotic drawing and painting methods within EACVA, an overview

Creating robotic painting systems inspired by human artists presents challenges at the intersection of art and computer science. Physical inaccuracies and material properties require robotic systems to adapt to varying conditions, making generalization difficult. Additionally, drawing and painting rely on skilful gestures that define an artist's unique style. In this talk, Michael will discuss the approaches and progress at the Konstanz University robot lab in generating abstract oil paintings from arbitrary input images. Daniel will share work from the Goldsmiths College robot lab on reproducing stylized strokes that emulate gestural and calligraphic styles. The talk will provide an overview of the progress, applications, and key technologies developed in both labs.

*Daniel Berio is a lecturer at computing department in Goldsmiths, University of London. He is also a computational artist and does research at the intersection between computer graphics, robotics and graffiti art. He completed his PhD in computing at Goldsmiths, where he researched methods for the computer aided design and procedural generation of (synthetic) graffiti art and calligraphy. Previously, Daniel specialized in multimedia software development, especially applications involving real-time hardware accelerated rendering and vector graphics techniques. Artistically, Daniel comes from a graffiti writing background and he explores this same aesthetic in algorithmically generated forms.*

*Michael Stroh (1999, Friedrichshafen, Germany) is a Ph.D. candidate at the University of Konstanz after completing his master's in computer and information science in 2023. His main research topic is about interactive robotic painting with AI support. He has been working at the Chair of Visual Computing in Konstanz since 2021 and focuses on applying image processing methods and machine learning to computer graphics and robotic painting frameworks.*

**Dr. Tomoko Tamari**

Goldsmiths, University of London

Digital Aesthetics and Human Perception: Affect in Hand-drawn Animation and Computer-generated Imagery

The talk explores the differences between digital aesthetics created by computer animation and analogue aesthetics in hand-drawn animation.

While computer-generated imagery (CGI) refers to the process that involves mathematical cal-

culations within computers to create verisimilar naturalistic images, the traditional hand-drawn animation method involves symbolic expressive forms created by the animator's spatiotemporal sensitivities. Drawing on Hayles's discussion of the 'cognitive nonconscious', Simondon's notion of 'technical mentality', and biosemiotics, the paper argues that there might be an inevitable incompatibility in the image-formation process between human perception and algorithm-based CGI. To explore this assumption, the paper focuses on the questions of 'selectivity' and 'abstraction' in both the neuronal and the technical, and emphasizes the significance of 'noise' (incompleteness and ambiguity) and 'time' (speed, duration, and delay) for human perception by exploring the nature of cognitive systems.

*Dr. Tomoko Tamari is a Reader in the Institute of Creative and Cultural Entrepreneurship, Goldsmiths, University of London. She is managing editor of Body & Society (SAGE). Most recent interests are discussed in her edited collection Human Perception and Digital Information Technologies to be published in February 2024 (Bristol University Press). She is currently working on the following areas: Body Image and Technology; Human Perception and the Moving Image; AI and Contemporary Visual Art; AI and Human Knowledge Formation.*

## **Artist Talk - Labor**

Liat Grayver is a Berlin-based cross-disciplinary painter and media artist exploring how painting can be redefined in the technology-driven era. Since 2016, she has been collaborating with the University of Konstanz on the development of the e-David painting robot, focusing on integrating robotics and computational processes into creative image-making. Currently, she is the Artistic Director and Artistic Researcher for the EACVA – Embodied Agents in Contemporary Visual Art project. Grayver holds a Master's degree from HGB Leipzig, She also studied at the Accademia di Belle Arti in Naples, and the New York Art Students League. Her work has been exhibited internationally in numerous solo and group shows, and she is frequently invited to participate in artist talks and public lectures. Publications about her work have appeared in both popular media and peer-reviewed journals. Grayver is a member of SALOON Berlin – a network for women in the art scene – and an associate artist researcher in the Epistemologies of Aesthetic Practices program at ZHdK and ETH Zurich.

Inge Herrmann, an ETH Zurich engineer, is a Professor of Medical Technology Innovation at the University of Zurich, Balgrist University Hospital, and Swiss Federal Labs. Her lab focuses on developing the tools and technologies shaping the future of medicine. These innovations advance diagnostics and therapy, translating into clinical applications and successful ventures. Her achievements include the Eccellenza Professorial Award, Latsis Prize, the Global Women's Impact Award and Largiader Award.

Adrian Christopher Notz (\*1977, Zurich) is an independent curator and lecturer based in Zurich. He studied time-based media and Fine Arts at the University of the Arts Bremen and Theory of Art and Design at the Zurich University of the Arts. In 2024, he co-curated the AAA Experiments in Kunsthalle Zurich and in 2023 the Art Encounters Biennial in Timi oara. He is currently lecturer at ETH Zurich, where he led the AI+Art Program at the ETH AI Center from 2021 to 2024. From 2020 to 2022, Notz served as curator at the Tichy Ocean Foundation in Zurich. Previously, he was the artistic director of Cabaret Voltaire in Zurich (2012–2019), following roles as co-director (2006–2012) and curatorial assistant (2004–2006). From 2010 to 2015, he also headed the Department of Fine Arts at the School of Design in St. Gallen. Throughout his career, Notz has organized and curated numerous exhibitions, events, conferences, and interventions, collaborating with international artists, scientists, activists, and thinkers both at Cabaret Voltaire and globally.

## Panel discussion - The Art of Automation: From Digital Imagery to a New Form of Painting

Peter Beyls is an interdisciplinary artist, his educational background includes engineering and music, he holds a PhD in Computer Science from the University of Plymouth, UK. He was a professor of digital culture at LUCA Brussels and The School of Arts, University College Ghent, Belgium and visiting professor at various institutions in the US, Canada and Japan. Beyls pioneered early research on AI and the arts (1985-1990) at the VUB Artificial Intelligence Lab, Brussels and later at CITAR (Centre for Research in Art and Technology), UC Porto, Portugal. Currently, he is a researcher at FormLab, UC Ghent. His interests include machine learning in interactive music systems, generative autonomy in machines, cognitive issues in software art and human-robot interaction. Beyls published extensively on various aspects of computational art. Two monographs document his work; *Simple Thoughts* (MER Publishing, 2014) and *Coming Full Circle* (Verbeke Foundation, 2019). My current research project, entitled *Material Matters*, focusses on human-machine co-creation in a shared physical environment building on the notion of embodied cognition; viewing creative processes as situated bodily activity in physical materiality rather than designing abstract representations and reasoning. It discards the mind-body, software-hardware and analog-digital dichotomies, it looks for materials and machines to respond and behave not by explicit programming but by the nature of their physical structure. Experiments engage humans and machines considering notions of identity, creative autonomy, co-operation, motivated action, adaption and freedom. Initial experiments explore drawing by human hand and mechanical hands at equal levels of authority using computer-vision and machine learning to coordinate interaction.  
<https://www.peterbeyls.net>

Mario Klingemann is a pioneering artist working at the intersection of art, technology, and artificial intelligence. His conceptual practice explores how technological advancements reshape our cultural landscape through generative art, information theory, robotics, deep learning, and cultural data analysis. A key figure in the "AI Art" movement, Klingemann's acclaimed projects like "Memories of Passersby I," "Appropriate Response," "A.I.C.C.A." and "Botto" push technological boundaries while provoking critical reflection on AI's cultural implications. His work often anticipates and manifests future technological realities, examining the evolving relationship between human and machine intelligence. His innovative approach has earned him the Lumen Prize Gold (2018), an honorary mention at Prix Ars Electronica (2020), and the British Library Labs Creative Award (2015). His work has been exhibited globally at prestigious institutions including the Centre Pompidou, ZKM, the Barbican, the Ermitage, and MoMA.

Wolf Lieser started his first gallery in Wiesbaden in 1993, after working as an art consultant for several years. His first contact with Digital Art goes back to 1987. Lieser developed DAM in 1998, consisting of the DAM online museum ([dam.org](http://dam.org)), DAM Projects, as the commercial part ([damprojects.org](http://damprojects.org)) and the DAM DIGITAL ART AWARD |DDAA|([ddaaward.org](http://ddaaward.org)). Before moving to Berlin in 2003 he was partner in the first gallery for digital media in London from 1999 – 2002. The focus is on the application of digital media in fine art, from the pioneering 1960s to the present. In 2009 publication of the introductory book *Digital Art*, translated in 6 languages. Several essays in other publications. Regular international talks, symposia and jury participation.