

## Transhuman Expression

# Human-Machine Interaction as a Neutral Base for a New Artistic and Creative Practice

**Interdisciplinary research in painting and robotic between the artist Liat Grayver and the e-David Project (University of Konstanz)**

The painting robot developed at the University of Konstanz in southwestern Germany is a pioneer project in this field and is presently the only one with a *visual feedback system*. Much more than just a printer capable of reproducing a flat image, the e-David creates unique works through the application of paint strokes that are irreproducible in terms of their colour blend and the materiality of their layering. The possibility of visual feedback brings up many questions within the contemporary discourse on deep learning, artificial intelligence and robotic creativity.

The Collaborating explored further possibilities to exploit the painting robot creatively, and reflected on ideas about the ways in which these could be implemented in the form of software and hardware. A number of questions of wider impact arose as the result of our collaboration: When and why would a semantic method of defining the object in the image be used? Is it an advantage or a disadvantage to paint semantic objects without having a pre-existing cognitive understanding of them? How could I use abstract forms, grammatical structures or mathematic models to achieve more complex surfaces? How would computer language be used to express the intentions of a composition? When and why would different painting styles be used?

Constructing e-David has provided many challenges in the realms of engineering, robotics, computer graphics and computer vision. We discuss how we arrived at our current painting set up and highlight the strengths and weaknesses found so far, as well as plans for future extensions. On the robotics side, the main issue is working with machines designed for repetitive, precise tasks and applying them for approximate and dynamic processes. Supervision of a painting process using vision or other sensors is challenging, as well as finding methods to process the data in a meaningful way. Seemingly simple tools like brushes are highly complex in their behaviour and using them precisely is difficult. In the talk, we elaborate on current problems and what future plans are to deal with these issues.

Further, on a technical level, we had to take into consideration how different materials would react with one another. For example, how could different colours be mixed on the canvas or on the palette? How should the size of the brush be set, and when is it necessary to add glaze? We would have to develop a range of distinct, individual brushstrokes (controlling the velocity and the *z*-axis) whose characteristics are analogous to those made by human painters in the “real world”, in order to be able to pre-define when, in which order and for which tasks each stroke is to be used. In doing so, we are basically defining and categorizing singular parameters within a library of painterly “acts” and “perceptions”, in order to create a grammatical structure for the “language” of robotic painting.

The meeting point of art and science as a place of inspiration, exchange of knowledge and creation is the main focal point of the talk. Together with Prof. Oliver Deussen, the PhD candidate Marvin Guelzow, we will discuss both the technical challenges and innovation aspects in the development of the e-David robot, alongside the social and artistic practice it offers. topics as such “paradigms of creativity” under the title “New Materialism / Anthropocentrism / Posthumanism” will be presented with the goal to position and understand

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Oliver Deussen, Liat Grayver and Marvin Guelzow

machine-assisted creative interfaces within the broader field of media art and painting traditions.

Order in painting is traditionally achieved through the self-regulation of the painter and by external intervention. It is necessary to distinguish between— and balance— those characteristics relevant to the realm of individual artistic perception and that which is external to the artist's motives, intentions and preferences.

The brushstroke— in its various manifestations— is the singular tool of communication that is encountered in paintings and drawings throughout all epochs. It is in Liat Graver's primordial personal and artistic practice to delve into the study and exploration of the act of creating a painting, from the perspective of this most essential act — the process of making of a line — as opposed to the study of the painting itself— the artistic object.

Saving, translating and manipulating information in the painting process are features explored in Grayver's computer- and robotic-based paintings: to what extent are we able to recognize brushstrokes done by a robot in more complex, generated works? In doing so, she generates strokes that appear organic but are executed in a manner that only a machine is capable of; the robot makes it possible for her to explore a realm of creative practice that extends beyond the physical and perceptual limitations of the human body.

Stimulated by the experience and by the exchange between informatics and the robotic world, Grayver found herself somewhat compelled to challenge and attempt to reconceptualize the very foundations of the painterly practice, starting with the bodily movement of the single brushstroke all the way to questions concerning control and loss of control in the creative process.