

***is a rose* – A Performative Installation in the Context of Art and Technology**

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Abstract

The advancing technology allows new forms of contemporary art expressions which, however, require a large set of skills to be developed and therefore involve a team with diverse backgrounds. In this paper, we present implementation details and the artistic background of the art piece *is a rose* that was developed and exhibited in 2019. Based on this example and our previous experience of work on different art applications, we provide an insight into the interdisciplinary work between artists and developers.

1 Introduction

The diversity of new technologies and their possible applications have considerably expanded the creative possibilities and the scope of artistic practices. Artists that are using technology as a medium are continually testing the boundaries of what is conventionally considered *art*, simultaneously developing a new notion of aesthetics.

Ever since the paradigm shift from modernism to postmodernism in the 1960ies, art has been increasingly changing its form from a fixed, distant and observable object (material piece of artwork or a performative work) to an *immersive experience* created at the moment of interaction between the audience and the artwork. In the field of contemporary art this led to a development

of new genres like *live art* and *performance art*¹, which are often based in their non-repeatability, and thus named as *ephemeral art* [Coog11]. This period was generally marked by an advancement of interdisciplinarity and questioning of the long indisputable notions of artwork, author, necessity of a medium and the artistic market itself. The institutions that have long been considered as the gatekeepers of the exclusive art – museums, galleries, theatres, etc. – have, since then, been gradually embracing the idea of the permeability of their structures and processes through participatory approaches and flexible curatorial concepts [see Smith12].

A few decades later, towards the end of the 20th century, the development of ubiquitous technology takes place, imbuing almost all human activities with some of its forms. This phenomenon is widely known as democratization of technology [Frie99] and is in the HCI context closely related to another type of paradigm shift, namely the one from second to third wave of HCI [HaST07, Bøde15]. Stating several *intellectual commitments* of the third wave HCI, Harrison et al. emphasize the notion that “meaning is constructed on the fly, often collaboratively, by people in specific contexts and situations”, and position “*interaction* itself (...) [as] an essential element in meaning construction” [HaST07]. Open for this kind of considerations, the third wave of HCI reveals a potential common ground with contemporary art. The latest interactive tech products, especially those in the field of Mixed Reality, can be evaluated concerning the impression of *immersion*, additionally expanding the artistic playground. Whether and to what extent the topics democratization of technology, the third wave of HCI and new tendencies in art have been interrelated exceeds the subject of this paper. However, the potential for interdisciplinary collaboration between art and interactive technology, anchored in their essentially very similar motivations for interactivity and immersivity, can be defined as its backbone.

Although it has been gaining a considerable public visibility only in the last decades, the collaboration between art, science and technology (AST) is not as novel as it might seem.

¹ The *performance art* owes a lot to dance as one of the art forms it originated from [Gold11], which is important in the context of the paper later on.

Already in 1967, more than half a century ago, one of the most known AST programs was initiated in the USA by artist Robert Rauschenberg and engineer Billy Klüver under the name “Experiments in Art and Technology” (EAT) [Shan05]. The EAT was a platform that was connecting 2000 artists and an equal number of engineers and had set a ground-breaking foundation for similar endeavors. One of the leading interdisciplinary hubs in the world today is the MIT Media Lab. Professor Neri Oxman, the founder and director of the Mediated Matter, one of the Lab’s research groups, presented the *Krebs Cycle of Creativity* [Oxma16] – an antidisciplinary hypothesis and the attempt to work regardless of disciplinary boundaries towards a more interdisciplinary, entangled approach of research. Institutions such as Zentrum für Kunst und Medientechnologie (ZKM) in Karlsruhe or the Ars Electronica Center in Linz are still among the best examples of European AST programs [Shan05]. There is a growing number of AST programmes funded by local governments and the EU. Both art and technology have been contributing to their encounters in their own way. By using technology as its new medium, art witnesses not only the prospects of technological accessibility but also reconfirms its postmodern tendency to subsume and refer to everything that surrounds it. Contemporary art both intuitively appropriates technology as a medium of its expression, at the same time wittingly commenting it and reflecting on its role as such.

In the rest of the paper we will touch upon related work on interdisciplinary collaborations in art and technology and offer a terminology for differentiation between various types of application of interactive technology in the field of art in order to delineate the specific nature of the artist-technologist collaboration. As our best practice example, we will bring closer the conceptual and technical aspects of the artwork *is a rose*, open a discussion about the experience of the interdisciplinary collaboration on this specific project through own participant observations and offer some conclusions.

2 Related Work

There is a wide range of works that offer a comprehensive overview on the achievements in the field of art and technology, like the encyclopedic work “Information Arts: Intersections of Art,

Science, and Technology” by Wilson [Wils02] and the thought provoking collection of essays “Art@Science” edited by Sommerer and Mignonneau [SoMi98]. The practical side of artistic applications of technology has been also widely reported. However, there are not many works that discuss the actual experience of collaboration between the artists and technology experts. An interdisciplinary view on the challenges and potentials that partnerships in dance and technology open, is given by Whatley and Sabiescu, who describe the “tight interplay between theory and practice, research and arts making” as a “gradual configuration of intertwined and mutually influencing *interdisciplinary artscapes* and (...) *knowledgescapes*” [WhSa16]. How the process of collaboration and implementation in art, design and technology works out in practice, with a number of illustrative case studies, is also reported by Earnshaw [Earn17]. From an HCI design perspective, a recent work by Pender and Lamas presents three case studies, one of which is related to physiological computing for performing arts, that demonstrates various challenges specifically in the exploratory front end of a design process in the transdisciplinary creative collaboration [PeLa20]. As an AR developer, Portalés gives an interesting personal insight and reports on lessons learned from her own experience in collaboration with artists [Port18].

3 Collaboration between Art and Technology

The application of interactive technology in the field of art and culture has been one of the main research interests of our interdisciplinary team during the last five years. Through different national and international projects, we collaborate both with traditional cultural institutions and the independent cultural scene, create synergies with private companies in the field of creative industries and venture into experimental projects that support individual artistic concepts through artistic residencies. The developers in our team work side by side with artists, cultural anthropologists, exhibition and communication designers, bringing different perspectives inherited from diverse disciplinary backgrounds into discussions. On the one hand, our work in the field of art focuses on the use of interactive technologies for conveying, interpreting and curating already existing artistic or cultural content. This kind of projects are usually conducted together with institutions that need expert support in using new technological tools. User experience design approaches that are important in these cases are here coupled by audience

studies that are of central importance for such actors. On the other hand, we offer a space for collaboration and creation of new artistic content, supporting artists with technology tools and expertise throughout their creative process. In this case, the artwork is not (necessarily) created with a user/visitor in mind but designed according to the artistic concept of its author. This kind of interdisciplinary collaboration highly relies on the mutual professional respect and trust in the choices and visions of the artist, which we will further touch upon in the discussion part of the paper.

When trying to define the role of interactive technology in relation to an artistic content, a taxonomy can be offered where the interactive technology is seen as a tool for: experiencing art (A), augmenting art (B), creating art (C), as well as an art form in itself (D). While *experiencing art* (A) can be exemplified with various forms of virtual museums and exhibitions which use technology for transferring artistic content across space and time and is often used as a sort of documentation or archival, *augmenting art* (B) usually extends the basic artistic content with additional information or effects and is thus often related to AR technologies. Both are mostly, but not strictly, developed in collaborations with institutions. The role of interactive technologies in *creating art* (C) in the artistic field is one that marks the transformation between an auxiliary tool towards a creative, authoring tool. Depending on their level of accessibility and usability, they can be used by amateurs and/or artists. Finally, the fourth type of technology application, the *interactive technologies as an artform in itself* (D), is almost always related to a particular artistic appropriation. It is not necessarily following any rules derived from HCI design approaches, but is rather characterized by an idiosyncratic logic created by the artist, mastering of which is inseparable from the artistic meaning attached to it.

The suggested interrelations between the types of technology application (A-D) and their contexts are used here as a simplified depiction of art and technology relations and a clear demarcation of our field of interest in this paper. In the following pages we will be focused precisely on the last category (D), exemplified by an interactive performative installation emerged from an interdisciplinary collaboration.

4 The Performative Installation *is a rose*

4.1 Description

The interactive performative art installation *is a rose* (2019) created by artist Charlotte Triebus and an interdisciplinary team is aiming at the question of agency from an artistic point of view, focusing on the interaction of different agents and exploring the intersection of art, dance and science. Moreover, the work is inspired by nature's strategies where communication between species is driven by subtle expression abilities [RoFi99], hardly visible to the human perception apparatus.

The mixed media installation is composed of a set up circle of nine hanging plants, the roots of which grow in a ball of moss, a low-resolution LED screen, a tracking system (with an Azure Kinect) and a computer with a small form factor. The computer runs the tracking software which detects movements and imprints of the visitors through the impact the same produces in the leaves of the hanging plants. *Asparagus plumosus* was chosen as the preferred plant to exhibit up to the tiniest movements. The plants hang from the ceiling on three thin nylon cords each to bring back the plant to its initial position as quickly as possible after moving it. The mounting, featuring 27 transparent cords appears very light, however small light reflections are visible when moving around the installation. The interaction with the plants, caused either by direct touch or indirect breeze of air, is captured as a seismographic impression of the plants and is displayed on an 1.5mx1.5m² low resolution LED-screen. The screen is showing an interactive, computer generated modulation of a three dimensional, red sphere, designed as a raster graphic, which is rotating around its own axis.

The animation shows each impact in real-time, using different means of deformation (such as growing, notching, tilting). The intensity of the impact corresponds to the interaction caused by breeze or touch, however the exact location of the transformation is rather not selectable. All impressions received by the plants add up over a day as a unified interaction and manifest themselves in the shape of a unique daily object shown on the screen. In this way the resulting graphics show the interaction of both intended and unintended interactions of the visitors and

thus represent a temporal-spatial, living representation of a non-repeatable constellation of movements in the exhibition space.

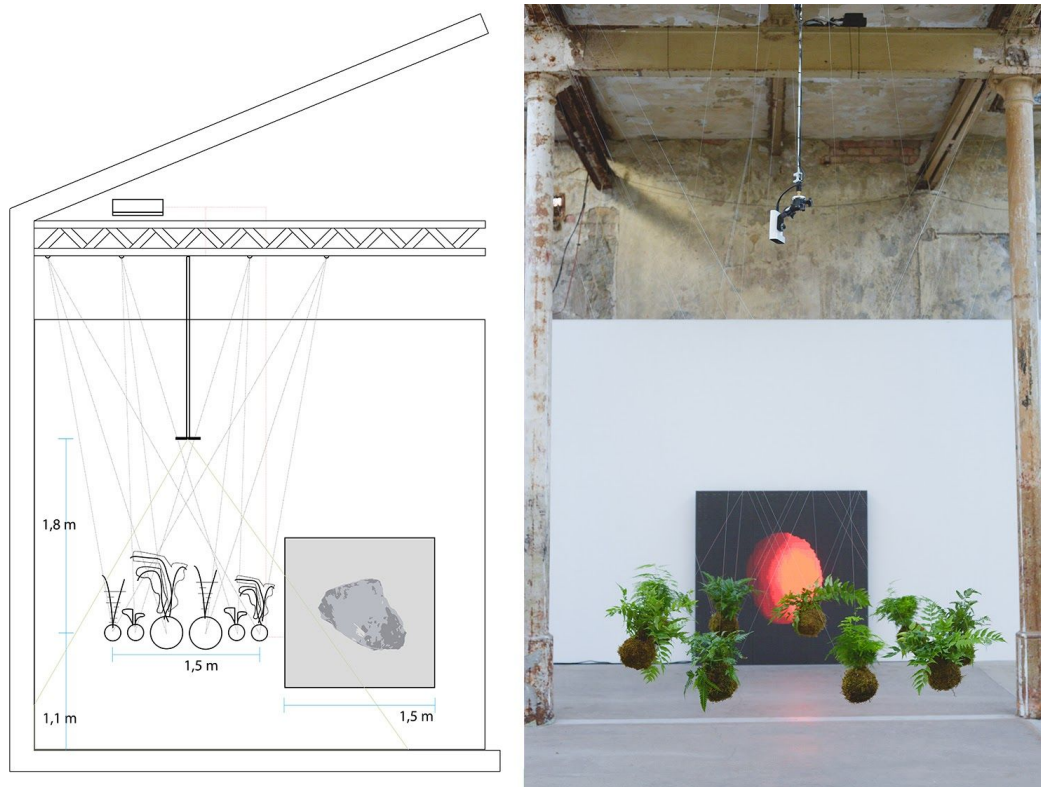


Fig. 1: *is a rose* set-up at Baumwollspinnerei Leipzig 2019/2020

The title *is a rose* relates to the quotation *Rose is a rose is a rose is a rose* by Gertrude Stein, that refers to different layers of possible interpretations and (visual or verbal) metaphors, one expression may bear. It is a conceptual quotation taken from literature studies and philosophy, stating the possibility of various potential connotations of the same modes of presentation and representation. In general, the metaphor of a rose in reference to the described artwork (which in this case despite its colours is obviously no rose) convey the doubting of reality and its derived implied qualities. Comparing *asparagus* plants to roses underlines a discrepancy of expectation and reality as it shows parallels towards the dichotomy of the “romantic, innocent” plant and its surveilling function towards the movement of the visitors.

The work *is a rose* was realized in 2019 and premiered at *Baumwollspinnerei Leipzig* in November. It was also shown at *tanzhaus nrw* in Düsseldorf and the gallery *Priska Pasquer* in Cologne from January till April 2020.

4.2 Artistic Background

The theoretical background of *is a rose* targets two main aspects: The question of agency (the competence to act) of animate and inanimate objects such as the questioning of the traditional dichotomy of nature and culture.

is a rose is categorized as a *performative* installation, alluding to being set at the intersection between contemporary art and contemporary dance. Understanding *is a rose* as a piece of performance draws attention to the fact that it places its focus on the body as a legitimate material, the body and its movement being seen as a potential that enables to act and engage with the other. This ability to act relates to the term of *agency* in sociology [EmMi98] and performance [Böhm16] studies. Whoever is able to act and is enabled to take part in the formation of the piece transforms into an active or passive agent (see also [Witz16]) of the same. Agency means the capacity of an individual to act independently. Questioning humans to be the only agents within a performative arrangement to own agency, the discussion is open towards not only the audience but also other types of objects as agents within this structure. Given that individuals of other forms (such as living plants [Bara12]) have their own agency, the artwork *is a rose* creates a link between the formally unequal interacting parties.

Taking into account the definition of agents and agency mentioned earlier, we are able to define two different types of agents in this case – the visitor, being able to detect one's ability to interact and modify the installation, and the plants, serving as the transforming agent from touch to visual. Perceiving an own modus of communication between the visitor and the plants, the impression of a mimetic [Dörr16], reciprocal observation is created. Plants and humans are forming a network where each part is owning a sensory system. The perception of the visitors' own body forms part of the work of art and transforms the visitor in this moment into an active part of the performative, yet mimetic work.

Plants are widely considered passive, almost like they would not be living organisms. A reason could be that their own growth and movement is normally not perceivable by the human eye. On the other hand, the term nature has its own strong connotation in different epochs, religion and traditional symbolism. Research of sociology and philosophy reveals a common understanding of nature as a moral, historically-romantic construct [Bara12]. The 20th century develops a definition of nature way more abstract and more active – scientists do not only observe nature as given but reflect on it as being an active stakeholder of the ecosystem [see also Reck00]. With *a rose* the artist is insinuating the analogy between artificial functions and natural capabilities in plants and intends to open the discussion for breaking the dichotomy between the traditionally connoted term of nature and contemporary technology (standing for the term *culture*).

Recent biological research has shown that plants are responding way more to their environment than commonly expected. Apart from well known functions of response to sunlight and humidity, biological organisms are able to actuate or react to events or messages sent by other organisms close by. It is a communication [RoFi99] established due to sensing the environment around. To draw a direct connection between natural and technological resources, the artist decided to use plants as natural interfaces for an interdependent interaction between the visitors and the exhibited plants, in order to open up a discussion to consider plants as an equitable actor. There are two present forms of equitability present: the plant being equitable towards the visitor in terms of agency as well as the surveillant plant being equitable to a technological device. Other than projects using biological sensors [for example SaMa19], the movement of the plant is tracked visually (passively) only illustrating the possible biological process for interactive use.

5 Technical Implementation

The software implementation was carried out in an iterative and agile development process that was aimed at being very responsive to changing demands of the artist. Compared to other development of standalone computer systems, it was challenging to specify what kind of system had to be created since the artist's vision of the installation was still in development as the initial resource planning and decision for an approach had to be made. The development consists of two

main aspects: the detection of movement of plants and the deformation of the computer generated sphere.

The **detection of movement** was the most experimental part of the development. Different approaches were considered, e.g. using diverse microelectronics or camera images. By testing different approaches and considering advantages and disadvantages from technical, pragmatic and artistic perspective, it was decided to use an Azure Kinect IR-Depth-sensor to detect movement of plants and using basic image processing operations of the depth image such as thresholding and calculating difference between two images, as most reliable and most promising. The system is designed in a semi-autonomous manner: After the initial setup, a supervising operator marks the position of each plant in the depth image and defines clipping planes. During startup, the system automatically gathers noise data for each plant to determine threshold values for each plant. If during the runtime the determined noise threshold for a specific plant is exceeded, that plant is moving. **The deformation** is done in the 3D-realtime-engine Unity3D 2019. The three-dimensional sphere is procedurally generated by subdividing a icosahedron multiple times to create a three dimensional sphere with 40962 vertices and rendering it with a resolution of 180x180 pixels and a custom shader that creates the impression of red LEDs with 5 discrete levels of light emission. Multiple invisible deformer move on the sphere's surface and deform the sphere's mesh with a distance dependent smoothstep modulated multi-octave perlin noise with individual parameters for each deformer that were designed to produce shapes of natural stones. The strength of deformation of each point is controlled by the strength of detected movement of a manually assigned plant.

As is a rose is intended to be exhibited at different locations, one challenge was to make it possible to remotely monitor and maintain the application. This is done using a remote desktop software and plain- text configuration files that allow to examine the system status at any time.

6 Discussion and Conclusion

Using interactive technology in the field of art remains a challenge for all stakeholders. In contrast to its the different uses from category A to C, as introduced in chapter 3, which are

either transmitting existing artistic content (A), augmenting existing art (B), or using interactive technology as an amalgam of auxiliary and creative tool (C), projects belonging to category D, where technology is used as an artform itself, do need a different approach in the process of creation.

Art projects cannot be characterized as homogeneous because they usually aim for uniqueness. This often involves more human resources, as each art piece that incorporates technology requires individual development and a diverse team that provides backgrounds in various fields of engineering and science to support the creation of the artist's vision. As interdisciplinary collaboration implies using different approaches and expectations, challenges arise in regards to differing *vocabularies*, *norms*, *working practices* and *paradigms* that allow the evaluation of the project outcome [Earn17]. Furthermore, the object of the evaluation itself is subject to discussion: while the developer evaluates the understanding and usability of the work from the perspective of the users/ visitors, the artist evaluates the extent to which the outcome manifests the intended artistic vision. For example, art pieces do not necessarily have to be task-oriented or user-centered from the HCI point of view and could still function properly from the artist's point of view. This is comparable to the difficulty of evaluating non-task-oriented systems, that need their own methods and techniques for evaluation [HaST07].

A big challenge for the supporting team seems to be the discrepancy of, on the one hand, assisting and consulting the artist in creating an art piece that utilizes state-of-the-art technology by providing expert insight into a field of engineering, and on the other hand, accepting that some rules from the very same field do not apply for art.

In the case of *is a rose* we experienced the discussion where HCI developers wanted to make sure that the usage of the plants as a natural interface is obvious to each visitor – the artist nevertheless was very pleased by visitors being puzzled and insecure whether to interact with the installation or not. The purpose set by the artist was rather the exploration of the possibility of interaction than the successful communication of the task. The same applies to the deformation of the visual that was impacted by visitors' interactions – the HCI developer intended to show a

strong and clear impact of each interaction, the artist however decided for a subtle and not assessable impact to underline the perception of exploration for the visitor.

From our point of view, each constellation of the stakeholders brings divergent starting points and goals to an art project and they have to be considered individually. A proposed way in order to develop a good work environment is a clear decision structure and the open and respectful communication between each stakeholder. In order to target a common vocabulary it is necessary to clarify milestones and common wording. Currently, we are working on deriving guidelines that emerged from reflecting on the challenges, obstacles and successes encountered during the process, and which might be reconsidered by other similar projects and simplify the development process by providing best-practise structures and communication strategies.

The plants incorporate the concept of *tangibles* human-computer interaction by not only adding a way of manipulating data by interacting but also

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