

# Water Mirror

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## ABSTRACT

*Water Mirror* is an aesthetic experiment in perception and interactive art. It is a new development from a series of prior works concerned with light, wind data and place. Comprising synthetic and video imagery viewed through two-way mirrored glass, *Water Mirror* focuses on effecting a distended perception for the viewer to occupy the in-between space of the physically present self, various virtual selves, and a virtual representation of the city. The experience is one of leaning into an organic unfolding, with your image and self being revealed from different angles and times, while ‘submerged’ in ‘virtual waters of Venice’. This draws on the shimmer of light that sparkles on water surfaces as wind disturbs them. Here, this visual language informs a data visualization of weather conditions in the lagoon outside. It is an organic, fluid interaction that moves the viewer into hybrid spaces, where the self is mirrored back to you within an abstract rendering of weather data.

## CCS CONCEPTS

• **Human-centered computing** → Interaction design; Visualization; Ubiquitous and mobile computing; • **Applied computing** → Arts and humanities.

## KEYWORDS

interactive art, hybrid space, digital art, perceptual emergence, perception, data visualization, artistic visualization, water, landscape, surveillance

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## 1 INTRODUCTION

*Water Mirror* is an interactive artwork and artistic data visualization. It builds on previous works with hybrid place, data visualization, and water [1–4]. Aesthetically and as a representational, allegorical poetic, these works are concerned with the effect of light shimmering on moving water. The light shimmer informs visual languages to communicate the live weather data. The live weather visualization within the gallery setting makes explicit the latent data networks that increasingly layer our everyday, and how our spaces have been increasingly changing into hybrid (virtual – physical) spaces [5].

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The virtual space in hybrid space brings new additional associations and possibilities – such as of time and distance. Experiences in hybrid space are also increasingly common during pandemic times as people work from home or in isolation through online meetings. As such, the *nuanced* design of hybrid experiences – as they become the norm to increasingly influence quality of life – becomes increasingly important.

As space has become virtualized and hybridized, so have people: from voiceprint authentication for phone banking through to curated personas on social media, people increasingly have virtual versions of themselves to augment their engagement with the world. *Water Mirror* is concerned with the hybrid digital-physical nature of both the place and person. While interacting with this work, the audience sees different views of themselves and, as they move their body and gaze, actively constructs a multiple, layered, hybrid view of themselves. Integrated into this image is the abstracted, virtual image of the city – via an artistic data visualization of its waters.

The concept of water informs many aspects of the work: content, expression, through to the quality of the interaction as a fluid, organic experience. This fluid interactive gesture is illustrated in the supplementary video material [6]. *Water Mirror* is distinct from prior work through use of new graphics techniques in data visualization and the use of visual textural effects and direct representation of the audience.

## 2 DESCRIPTION OF THE ARTWORK

The art installation comprises a cubic timber frame 420mm high, 420mm wide and 280mm deep, for wall viewing at eye level, in low light conditions. It has a recessed mirror glass front, reflecting the surroundings and gallery audience in front. Behind the mirror front are two more mirrors and an LCD display. The display shows computer-generated imagery created in real time. This is a combination of live depth and video camera streams of audience movement inside the gallery, and a live weather data visualization for outside.

### 2.1 Visualizing the weather data

Live weather data for Venice is sourced via the internet using the OpenWeather API [7]. The installation software calls the API every 15 minutes, approximating sensor update frequency.

Current wind speed and direction are sampled and drive a dynamic 3D computer graphics model of the water conditions in Venice. This is rendered to effect ‘shimmering lights’ visuals. These ‘sparkles’ are geometry objects simulated to have the direction and speed as dictated by the current wind direction and speed in the Venetian lagoon. This imagery is wholly synthetic and generated in real time using 3D procedural graphics techniques.

The work maintains both a representational and a direct relationship between data and visualization. It is illustrating the light on the water outside and it is also a live version of that light on the water

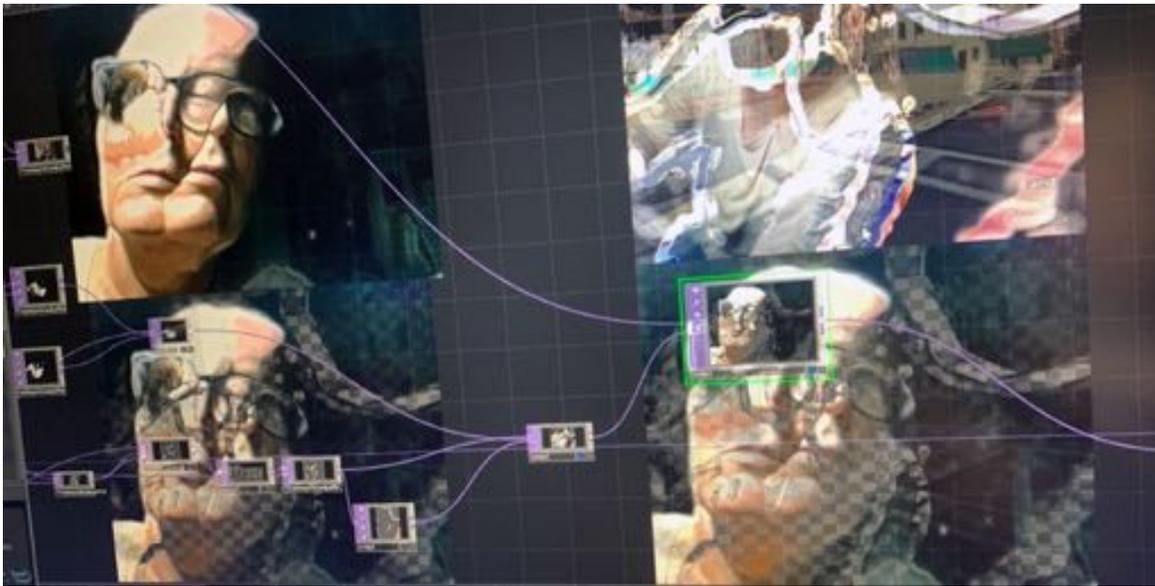


Figure 1: Process image from textural exploration with video and depth information. ©Seevinck 2022.

– creating a presence and opportunity for audience immersion in ‘another’ Venice – the new hybrid space created through layering the data presentation into the real space and capturing the outside and bringing it inside.

## 2.2 Exploring texture in video

The artwork software is designed to cache and manipulate incoming video data, layering images of the viewer from the current time with moments past. Through engagement with the surveillance and selfie imagery that characterize the Western tourist destination, video distortion of such imagery became a focus of the practice. This was found to facilitate a direct engagement with the video and a visual richness in the imagery of the selfie, such as enabling a tracing of the viewers appearance over time (Figure 1). The final video streams are integrated with the synthetic imagery from the weather data visualization (Figure 3).

## 3 INTERACTION WITH THE ARTWORK

As audiences engage with this work and as the weather changes, the front glass surface of Mirror, Water shifts between being a ‘mirror’ and being ‘window to look through’. This front surface is two-way glass, and its transparency changes with the lighting conditions in front and behind: as imagery on the LCD display behind the glass becomes brighter, the mirror reflection of the audience member appears to dim and recede. Conversely, incoming elements can change, and the display darken, rendering the glass surface to act more like a mirror and the audience more likely to perceive their reflections. Further movement – such as approaching the work, or a reduction in wind speed outside – generates a brighter display image and the viewer will see video imagery of them at that moment – as well as cached images captured from moments past alongside the shimmer of the weather visualization (e.g., see Figure 2, Figure 3).

Alongside this shift in movement and brightness in the installation, is the shift of the viewer’s point of focus.

### 3.1 Shifting perception

As the imagery shifts in what is more readily perceivable physiologically – through varying brightness of display and mirror reflections – the viewer’s focal point also moves. They may look at the front outside mirror surface of the artwork, or slide their gaze inside the installation frame to look at the elements within. This shift in the audience’s point of focus is across the real, physical depth of the work. It necessitates an active process of looking, where the viewer contracts their eyes’ ciliary muscle and directs their gaze.

### 3.2 Leaning in

The work reveals the virtual and hybrid nature of people and place. As the viewer leans in towards the work, they see multiple, different views of themselves – snapshots from past moments and at different angles, alongside the shimmering data visualization of the city. This leaning in gesture generates an organic and fluid visual, effected through textural distortion. It is like stretching – metaphorically sliding along water’s surface tension and simultaneously tearing through virtualities.

Moving in front of, and looking at the work, activates the viewers gaze. The ‘perceptual shift’ that it facilitates is similar to when we look at water with reflections: this is also a process of actively looking to either focus on what is under the water or to shift our focus and look through the water surface. Many times we do not even see the reflections and patterns these can create in our eyes – new emergent shapes and compositions! Here too is an opportunity to see symmetries, intersections and relations – across images of the self and the data visualisation. The viewer may respond to what they see to change their movement. This can establish a feedback loop with their hybrid self and the hybrid environment.



**Figure 2: Calm waters in Venice are visualized as shimmering light on the water (left) and, as the audience participates with the work to ‘lean in’ (right) their virtual self is revealed – floating within the virtual waters and city. ©Seevinck 2022.**



**Figure 3: Leaning into Mirror Water submerges the viewer in the virtual – virtual selves, virtual water – and they can move along this in-between space. ©Seevinck 2022.**

The shift in focal attention, along with the leaning in, is an embodied seeing process. It’s a process where the viewer is actively constructing the image, by constructing what is physically and virtually distended. This ‘stretching’ is across different surfaces and reveals snapshots of the viewer from different angles. It occurs as they move in and away from the work. Like the embodiment of the focal shift that happens when you look at a still body of water, this work locates the viewer directly and physically within the process of constructing their perception. In *Water Mirror*, this is the construction of their virtual self in a virtual space.

Virtual experiences can be just as ‘real’ as the experiences we have in the physical world – consider how we interact and present ourselves in social media and online meetings. Interaction with the medium of technology shapes our understanding and experience [8], and explorations into what that interaction might be like are critical as the interaction shapes our lives. In *Water Mirror* an interactive experience that draws on gesture, active engagement with perceptual processes and location data is presented as another possible way to consider the construction of the self and the city.

## ACKNOWLEDGMENTS

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