Blurring Boundaries Between the Real and the Virtual — About the Synthesis of Digital Image and Physical Surface

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The subject of this paper emerges from my ongoing experimental work and research as a textile designer working with digital media. My investigation focuses on conditions that lead to the synthesis of digital imagery and physical surface, to the fusion of digital display and materiality. I am interested in visual ambiguities and illusions resulting from this synthesis. I explore how such phenomena can be used to create visual experiences playing with our perception and evoking the confusion and interference of the real and the virtual.

The paper explains the progress of my research and its outcomes against the contextual background of recent developments in digital display technology and of the renaissance of materiality and ornament in Western aesthetic. It discusses the method of applying projections onto printed surfaces and materials to generate overlapping realities and hybrid environments. The text concludes with a perspective on further research.

Context

After a period in the '90s, where we seemed to marginalise the physical in favour of the digital, interest has returned to materiality as a tangible and bodily encounter. This is most apparent in the visualisation of digital images and data, where the quest of introducing tactility and multi-sensory experiences is rising. Innovative concepts and schemes for alternative forms of digital displays are constantly evolving combining technology with various materials and surfaces. Due to these innovations the digital image becomes seamlessly interwoven in our environment — an omnipresence of multiple realities we are less and less aware of.

This development is strongly influenced and driven by a changed attitude towards the aesthetic in Western culture. Today we can observe an increasing desire for enhancing the seductive, the playful, the ornamental and the illusionary in our environment, provoked by the progress of globalisation and digitisation. Boundaries are blurred and distinctions obscured. With the words of architect Robert Venturi, there are "elements which are hybrid rather than 'pure', compromising rather than 'clean', distorted rather than 'straightforward', ambiguous rather than 'articulated', … inconsistent and equivocal rather than 'direct and clear'". [1]

The trend of emphasising the seductive and the decorative reflects particularly in architecture and interior design. Converging more and more with clothing and fashion, architecture today addresses our emotions through aspects such as softness and fast-changing looks. Materiality and visual appearance have become crucial. Through the use of digital media physical edges become softened, surfaces become mutable and hybrid influencing the shape of buildings — to the extent of visual disintegration of spaces and walls.

Examples of realised projects present solutions that not solely function as a display of information, rather serve as a decorative element addressing our senses and imagination. Thereby the character of the display is mainly defined by the interplay between light and material, as digital data and images are usually visualised through light. Light reveals a material's optical qualities and can make a surface appear seductive and appealing, whereas the nature of the surface can significantly determine the displayed image.
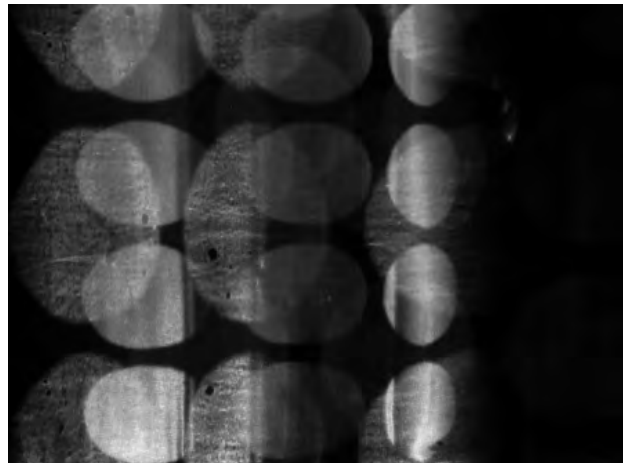
Research

Against this background, my own creative practise and research develops as part of the process. Applying digital media technology within the context of surface design, spatial design and performing arts, I appreciate the endless possibilities for visual experimentation. At the same time, I miss sensory and tangible experiences within the digital and therefore have been aiming to combine both worlds ever since — an aim that led me to work with light and projections. Images composed by light such as projections, reflections or shadows — although they are a physical fact — are of an ephemeral and elusive existence, an existence between real and virtual. They imply ambiguity and illusion, an aspect I found increasingly interesting.

I started to experiment with projections by superimposing patterns and images onto the human body, exploring the impact of the projection onto the appearance of the human figure. The result was as intriguing as the method was simple, and it was captivating to observe the fusion of the two visual entities. The projected image created something like a virtual imprint on the skin — looking deceivingly real, but existing only temporary, leaving no trace.

the layers catches the projected image separately. The surface expands into space. Thereby the intensity of the illusion depends on the superimposed image as well as on the surface quality; for example with mirroring material the deception is amplified.

On surfaces modified through screen-printing, the light interacts differently with the material and the pigment, as they are of visually contrasting qualities such as reflective/non-reflecting or transparent/opaque

Overlapping realities — experimenting with projections onto printed foils and fabrics

In the process of my research into the fusion of the digital and the physical, my investigation focused more and more on exploring visual ambiguities that result from the interference of the real and the virtual. I became interested in how the overlap of realities influences our visual perception of space and can deceive our vision. In this context, projection became a method of exploration for me.

In my most recent series of experiments, I projected sequences of digitally animated patterns onto surfaces of varying optical qualities, modified through layering and printing. Multiple layers of transparent or semi-transparent material instantly generate an effect of three-dimensionality, when projecting onto, as each of

— resulting in intriguing illusionary effects. The printed areas change the display of the projected image alternating between visible and non-visible sections — 'cutting' it in several parts. As a result, the projected and the printed image merge in such a way that it becomes difficult to distinguish between the print and the projection, between the real and the virtual.

As an outcome of my ongoing research, a spatial installation titled *Blurred Boundaries* was developed and recently exhibited in my university. The installation consisted of a multilayered composition of differing surfaces, partly printed, and multiple projections. The viewer was invited to move around and observe the play of light and colour on the surface, unveiling a series of

visual surprises created by the interaction and synthesis between projection and material. With this installation, an ambiguous, mutable and hybrid environment was generated, where physical and illusionary space was experienced as an entity. The digital image was transformed into a tangible and tactile experience.

Resulting from my investigation into the real and the virtual, a collaborative project with choreographers and dancers emerged, where projections were applied on the performers and sheer textile panels.[2] During this experimental workshop, we explored the relationship between body, digital image and space looking into the construction of space and the illusion of movement and stillness. The performers moved in and out of the projected pattern playing with the different worlds — becoming an element of the technology or staying separate from it.

Perspectives

Within my extended research, I continue to elaborate and develop the relationship between surface and digital display/image in conjunction with light as the mediator between the both. This involves looking into emerging display technologies such as Organic Light Emitting Diode/Display (OLED — made of organic polymer substance), as well as into methods of further manipulating the projection surfaces. The later includes the use of light-responsive substances, for example phosphorescent or photochromic pigments, to increase the mutability of the material itself.

I am highly interested in OLEDs because of their printability via inkjet or screen-printing technology onto flexible surfaces such as thin foils. This versatility offers a great potential for applying the technology to a wide range of materials.[3] Digital displays made from textiles might become possible — introducing tactility and materiality to the digital image. Embedding such displays into clothing, interior spaces and architecture, the transition between the digital and the physical becomes seamless and the overlap of the real and the virtual almost unnoticeable.

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1   R. Venturi. 1977. *Complexity and Contradiction in Architecture*, p. 16.

2   Collaboration with choreographer and researcher Chrissie Harrington, who at the time was Head of Dance at Bath Spa University, and graduate students from the same department.

3   http://www.it-strategies.com/Spectrum/2004/12.htm

    http://en.wikipedia.org/wiki/Organic_light-emitting_diode, on 30 April 2008

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