Media objects in architecture and art-design: materials and methods of creation

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Abstract. In this article the authors discuss the ways in which the use of media objects in architecture and art-design allows to easily adjust the space scenario depending on fast changing needs. The researchers consider the materials exploited for creating the media objects as well as present the classification of the media technologies in comparison to their interaction with people.

Introduction
Modern information environment is ubiquitous in all areas of human lives. This is so due to the phenomenon of implementing media (or information) factor in the areas of human lives. Urban spaces as a unique array of opportunities for developing interactive systems and settings [1] are becoming “arenas” for information systems. Since media technologies are integrated in the modern architecture environment, urban space acquires a new function, which is information. One of the most vivid examples of media technologies’ integration into architecture is media facades. This term describes the idea of projecting or modifying building architecture for turning its facade into the giant public screens [2-4].

In total, modern technologies allow people to go far beyond the traditional concepts of architecture and art-design. In the beginning of the 21st century studying the use of media technologies is highly relevant, as implementing information technologies in architecture environment produces objects capable of adjusting to different types of city and people lifestyles. Moreover, these objects are also capable of transforming the environment from the static forms into the dynamic ones, thus creating a live body illusion. Media objects can be used not only in designing the new buildings but in reconstructing the historical venues [5].

In spite of the strong interest, the issue of the media objects usage in architecture and art-design in understudied these days. There is little research dedicated to it abroad and even less in Russia [6-9].

Methods and Materials
Summarizing the world experience in media objects use in architecture and art-design, the following interaction patterns between media technologies used in architecture environment and a person can be singled out: object color scheme (refer with Figure 1); surface relief (refer with Figure 2); form plasticity; art light; video mapping; Mediamesh; LED displays; kinetic objects of architecture
environment; interactive interaction with the audience; non-materialistic things (light, water, sound, heat) [5, 10].

Figure 1. Object colour scheme. The Galleria Department Store Luxury Hall West in Seoul.

Figure 2. Surface relief. Megafon mobile company facade in Sochi.

Concerning the way of conveying information, the media technologies take particular places in architecture environment composition. They are made either as hardly noticeable shade background, or as an emphasized focus, which attracts complete attention of the audience. Such ways are based on physiological peculiarities of people’s concentration on the visual stimulus. They are widely used in architectural designs [11]. Different types of media technologies interact with architecture in different
ways. As well as the choice of interaction way of media objects in architecture and art-design depends on the peculiarities of the venue and the designers’ aims. Therefore, while using media technologies apart from the artistic properties, the five key components should be taken into account: transparency, flexibility, weight, longevity and efficiency.

According to the exploitation methods, media technologies in architecture and art-design can be divided into two big types: static – the ones which do not change the form and dynamic – the ones that change the form. These types are accordingly divided into four groups which can be either combined in one media object or be represented as a group.

1. Light media technologies are used to demonstrate images and depend on the choice of the light source and the way of additional illumination. The most frequently used technologies are LEDs, followed by halogen, luminescent, and other light sources. Digital image can be produced both by direct light from the façade and in a projection way [12, 13].

2. Kinetic media technologies use technologies, allowing the media objects to be transformed and changed. This can be illustrated by architectural buildings equipped with the systems providing climate comfort, which open and close depending on the light and temperature. For example, the southern façade of Institut du Monde Arabe Paris or sun protection system in Al Bahar Towers in Abu Dhabi [14-16].

3. Interactive media technologies: media objects can change light images depending on a particular communication scenario – direct impact (gestures, movements or speech) or indirect (the Internet, social studies, mobile connection). For instance, the surreal project Unnumbered Sparks in Vancouver by Janet Echelman enabled the audience “to draw” their fantasies directing crossing light rays to the installation with the help of their mobile phones [16] (refer with Figure 3):

![Figure 3. Interactive interaction with the audience Unnumbered Sparks by Janet Echelman](image)

4. Mixed media technologies: two or more different groups are present in one media object.

Mediamesh technology. Mediamesh LED technology enables making bright displays which is particularly important for making interactive objects. Mediamesh is a retiform tissue made of stainless steel which features integrated, highly-efficient LED elements, which are run distantly with the help of particular software. As an architectural integrated unit, this system enables people to use the new ways of interaction between the venue and its main function. It is easily installed and adjusted to new or current architecture (refer with Figure 4):
Mediamesh technology realizes a wide range of digital images, high-resolution graphics, video and animated text, corresponding to the venue façade. Architectural LED-based Mediamesh lighting is suitable both for external and internal use. Along with appealing design, stainless net effectively protects the façade from the sun, it is also staining-, vandal-, weather conditions-, fire-proof. It does not require any technical maintenance. Unlike regular billboards, the venue esthetics remains even when it is switched off. Stainless steel and bearing net material are flexible. Their total depth is as little as 25 mm, so tissue panels with the width up to 4 m and length 20 m can be made to hold any image format. While working with high-resolution graphics, live TV broadcasts, videos, the system can demonstrate a good level of quality while transmitting images even at day time.

Mediamesh® systems featuring five highly-efficient L.E.D.s per pixel have proved effective throughout for many years. Systems featuring six L.E.D.s per pixel for particularly high requirements to the brightness are to be developed in the near future. Such an innovative configuration of pixels can even be used under direct sun rays and at a bigger distance.

**Video walls.** Video walls have long existed and have been evolving to compete with big LED screens. Video walls manage to effectively attract people's attention because they put together a big number of screen panels as a single whole, thus making information-loaded and bright video images. At first, there were some difficulties in filling the space with a big image. Projection images did not enough brightness or vividness of the picture, projector rays also took up some space. Attempts at covering the wall with LCD screens and dividing the picture into parts have been used to be impossible for a long time because of the seams dividing the picture. It was not until recently that seamless LFD - panels (Large-Format-Display Panels) appeared. They can be assembled into a single screen with seams between panels as small as 1,8-5,5 mm.

In fact, video walls are assembled nowadays either with LED modules or LCD (Liquid Crystal Display) panels, or with DLP (Data Loss Prevention) cubes. Main video walls consumers are control centers, situation centers, operations control centers, conference rooms, financial institutions, shopping and exhibition malls – all venues which require a detailed picture of a big size or dividing the picture in multi-screen format.

Video screen made by Sansi New York Company covers a sharp angle of the hall and takes both walls of the inner space. Surface-mounted (SMD), screen modules (240 mm x 240 mm) have seam density 5 and 6 mm. In total, this huge video cover is made up of 4 176 LED modules. The screen is 20.5 m long and 11 m high and takes almost 230 m² of the surface.
Software performer of this project is Virtual Depictions company, namely decorative artist Refik Anadol, who specializes in implementing interactive media in the modern architecture. All the promos appearing on this wall are adjusted to the complicated screen configuration. Extraordinary visual images, their unpredictable changing, smooth transition from one into another have led to winning a prize for video content design at the prestigious competition SEGD Global Design Award.

50 Fremont has another video wall, the screen of which is surrounded by three elevator apertures. As a result, extraordinary visual space creates an optical illusion of furthering back hall wall from the street. Concerning the video content concept, the customers have turned down an interactive video wall in favour of extraordinary compositions based on mounting nature sceneries, created by two reputable companies, specializing in video effects - Obscura Digital from San Francisco and Fusion CI Studios from Los Angeles. Entering the hall, one gets into uninhabited jungles, or mind-blowing fireworks of visual sprays and splashes coming from waterfalls cascading from the walls. Video effects are so real that standing in the hall and observing the picture, one can really feel the drops of water splashing in all directions.

Integrating artistic video walls into the halls of venues leads to the merger of media and architecture, transforming halls into dynamic artistic space. Video walls mounting inside venues may well become a new trend among architects to create different digital pictures, having both social, artistic and cultural values.

Discussion
The use of media technologies aimed at educational function is prospective in public spaces: museums, exhibitions, libraries, educational institutions. Gradually, interactive elements will be appearing in the offices. Added to this, media technologies should also be used in bars, clubs, lounges, malls, etc. for entertainment purposes.

Renovating public space and making it more interactive can be enabled by the complex and many-factor analyses of the current situation, needs and perception peculiarities of the prospect visitors, relevancy forecasts of this environment scenarios, its economic viability and attractiveness, equipment and ways of adjusting the environment to the scenarios in study [2].

Summary
Media technologies have transformed architecture, art-design into something which used to be unheard of 50 years ago. These new technologies allow people to make over the architectural surfaces. In the society, ever more heavily dependent on images and information in real time, digital facades of venues make up a unique information environment, wrapped in esthetic design. The combination of transparency and digital technologies allow architects to create the epic buildings, which can get to the audience in a way that “traditional” architecture methods could never do – to harmonize the building’s form and function as well as to create income opportunities for the owners. Digital media technologies help to draw a new facet for architecture.

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