

Interactive Architecture: The Case Studies on Designing Media Façades

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Abstract

Today, the façade of a building is considered to be more than an envelope that separates the interior and exterior and component that protects the building. The facade is more than a statically existing envelope outside the building; it is the building element that determines the cultural role of the building and how it is perceived by the community through its communication with them. This role of the façade has enabled it to be used as an interactive communication tool through technology. Art, communication, advertising or transmission of a message is possible with the media front. The media facade demonstrates the idea of transforming the facade into a public display with the aim of interacting with the community through the use of technology, movement, color, and light on the surface of the building. It is defining a new relationship between media and architecture, where digital media becomes a contemporary interface in architectural design. It differs from advertising architecture in its multidisciplinary aspect, giving a broad perspective to urban

design. Text, graphics, or video animations are controllable light layers added to or embedded on the outer surface of the building as a tool for transmitting. It can be summarized as a type of urban computation that integrates digital indicators into buildings. Integrated into the building concept and planning process, it is guided by narrative content, which provides an identity for the structure and the environment in which it resides. At the same time, it can interact with the environment in which it is integrated not only to the building façade but also to the street furniture. Media façade is associated with interactive architecture, influenced by the fields of technology, art, advertising, and marketing, as well as architectural and urban design. Media surfaces are classified according to how they display their content, or how they are technically created, due to a variety of attributes and features. In the design phase of the façade; urban space, society, the message to be given, the stability of the system and the facade, weather conditions, light conditions, visual pollution, and psychological effects are some of the issues to be considered. This

study will focus on the purpose and scope of the media façade and to clarify the differences between the concepts of advertising architecture and media surface. The relations of the media façade with society and its environment will be examined through case studies in relation to many different fields and disciplines. At the same time, challenges such as integration, content, robustness, visual pollution, advantages and disadvantages of the media surface will be examined through examples. In this paper, the design, application, and experience of urban interaction will be examined in three phases. Thus, the facade will be studied to the stage where it is designed, implemented and experienced. In this study, it is aimed to shed light on the challenges facing the media surface for future studies by examining the applied and experienced media fronts through examples. It is thought that the facade, which is a permanent part of the urban space, will help expand the scope of design by using it as a media facade, increasing the interaction with the community, providing an identity to the place where it exists, and creating a basis for artistic works. In this way, it is aimed to expand the application area of interactive architecture.

1. Introduction

The architecture was created to meet the need for housing and was in an order that was inward-looking, in which society was in limited communication with the environment and each other. Today, however, it has become a discipline that is shaped according to the demands and needs of society and aims to interact with it.

Architecture, as we know, must combine two uncompromising easy tasks, inside and out. On the one hand, it has to provide a shelter that protects its inhabitants against unwanted influences; on the other, it must be a place that is

physically adapted to their function and visually expressive, inviting or deterring, informative, interacting. [1]

With the inclusion of technology in design, the physical and digital environments have been blurred and become an evolving and changing spaces. Computer and architectural elements began to identify and respond to each other. Thus, approaches were formed in which architecture became more prominent, responsive, and actively interacted with its surroundings. Interactive architecture is one of these approaches. It provides the basis for the design of spaces and buildings that respond, adapt and manipulate the physical and digital environment at the same time, based on the interaction between the environment and people. The method of architectural design has become not to create the one that exists statically, but to design the one that interacts with its environment and gives it an identity.

The façade is beyond being a statically existing shell outside the building; it is where the city first communicated with people. Emotional and rational communication with society is first established through it. It plays an important role in interacting with the public through dynamics such as its size, visibility, the urban environment in which it is located. This communication from the past to the present has been in different ways. However, this role of the façade has been neglected in this process.

Before the digital age, within the framework of advertising architecture, the facade's communication with the environment was provided with signs, signboards, and billboards attached to it. This way of communication is a functionality-oriented approach that does not relate to the city and its surroundings. It only engages in visual communication with the user and does not include it in design because of its dominant way. Urban design has progressed parallel to the development of building technologies by focusing on interactivity rather than

functionality since the process in which technology is incorporated into the design. With the inclusion of media in architectural design, a media architecture approach has been formed and a new form of urban design has been defined in which information flows. This approach represented means of communication such as the internet, computers, and mobile phones. Thus, the shapes and dynamics of cities have changed through the effects of digital technologies. McLuhan said, *"Since ancient times, architecture has been used as a means of adapting ourselves to nature. In contemporary architecture, we now need to adapt to function and context as well as to the information environment. Architecture should be a layer of both nature and knowledge at the same time. So today's architecture should be a media suite."* [2].

Thus, beyond the media dimension of architecture, the media façade approach has emerged where context is not ignored, added on or improved. Today, with the integration of digital technologies into design, communication has started to exist where the media façade has been designed, the interaction and building become stronger and dynamic. With media façade, while communication with the society was established only through advertising, it has started to established through disciplines such as art, urban design, architectural design, marketing, technology or communicating the messages determined to the society. For instance, lighting is no longer just functional; It is designed to make a city interactive and invite even after dark [3]. Therefore, exterior façade lighting has a vital role in urban spaces and predominantly influences the environment and memories of a city at night. The possibility of programming the new lighting technology would consider the potential for architecture to go beyond the stasis of a frozen process or repetitive script [4]. In this way, architecture is not invariant and static, but dynamic and

shaped according to change. Interaction design can be done in a way that maintains and emphasizes function and identity; It can also change the perception of urban space by defining a new function and identity to the building and its environment. In this context, designs have begun to emerge in which new functions are added to the existing functionality within the framework of interaction. Media façade illustrates the idea of turning buildings into large-scale interactive surfaces. It is aimed to improve the urban experience by providing interdisciplinary information flow, bringing society from the role of spectator to the role of interactor.

In this study, within the framework of interaction, the use of architecture as a communication tool in the historical process will be examined through advertising & media architecture and media façade approaches. Specifications of media façades will be examined with current buildings under the headings of; the role of media façades in urban space, digital appearance, technical, social and technological content, communicative and technological roles. In this way, in the context of interactive architecture, the transformation of the user from the audience to the participant will be observed.

Thus, the future aspects of the media façade approach will be examined. Interactive media façades will be examined and classified under the titles of feature, technical installation, interaction, communication tool, light source, display time, sustainability, image integration, function and transparency/opacity in terms of the use of digital technologies. The study aims to examine and classify the characteristics, urban value and technical structure of facade designs with new media technologies. At the same time, by examining different approaches and interaction designs; to identify deficiencies or possible potentials in the development of architecture and media architecture. By determining these potentials, it is thought that the urban and spatial experiences will

improve and interactions will increase.

2. Architecture as a Communication Tool: Advertising and Media Architecture

"The urban environment has long been used as a multifaceted communication tool" [5].

For a long time, streets, facades, squares, public spaces have been converted for communication purposes. The building facade has been a communication tool that reflects the identity, culture, and message of the environment in which it is located, although information, methods, and tools have changed throughout history when we consider the process from the Middle Ages to the present. First, with Gothic and Baroque architecture, this communication was authority-oriented and symbolically established.

In the renaissance, this communication has shown examples mainly in civic architecture. It represented institutional or individual power by showing a dominant feature in the urban environment with structural ornamentation. With the Industrial Revolution, factors such as mechanization, mass production, rapid construction caused machine-inspired designs. This caused the information to become temporary, accelerating and simplifying the building's method of communicating. So, the period of communicating the message through graphic design has begun. In the Postmodern period, the first steps of advertising architecture were taken and information became even more temporary. Paintings, sculptures, and graphics have been replaced by temporary billboards. As Larson said, the only thing that didn't change in the historical process was that words and drawings came before buildings and the urban environment. [6].

In all periods, architecture was used

symbolically. But the information is still not used and has not been interacted with the community. Ranaulo says: When we think of a cathedral as one of the mass media; information is transmitted through stained glass windows, sculptures, tapestries, mosaics. However, this information is constant and static. Today, space is considered as where information is active and interactive. In other words, it is no longer just frescoes, sculptures, niches or stained glass windows on the walls; it is concerned with the design of the space which is the place of movement and interaction. Therefore, the architect must apply himself to this third dimension [7].

In the continuation of the process in which the façade is a means of communication as a symbol that expresses authority and individual power; it has become a means of communication with advertising-oriented symbols through traditional methods. Then, digital technologies started to be used on facades. The change in the needs and wishes of the postmodern society has prepared the ground for this situation. Thus, the first steps of advertising architecture were taken. In advertising architecture, advertisements, messages or graphics are added to the building with a screen or signboard. This causes it to ignore the added building, the urban environment, and the community.

One of the first examples of advertising architecture is Adolf Behne's Schocken Department Store and Warehouse 1927. In this building, to direct the people to shop, the lights in the store are integrated into the building. It was the first example of advertising architecture, with street-level storefronts, movable staircases, and illuminated signs. This building has an important place in advertising architecture because of creating a corporate identity for the brand [Fig.1].



Figure 1: Shcken Department Store [8].

While the media used architecture to manifest itself, architecture used media to acquire character. So media tools have become more important than society, the building and its urban area. This has caused people to be separated from the environment and each other within the context of consumption. As Venturi said, the advertisements establish verbal and symbolic relationships in the space. They convey complex meanings and messages in a matter of seconds. The symbol, therefore, governs the space and the architecture remains inadequate. Because spatial relationships are made not by form but by symbols. As a result, it becomes a symbol, not an architectural space in its surrounding area [9]. With the advancement of advertising architecture, billboards, signs and digital screens along with the digital age have found their place in every part of the city. Digital screens have been added to the buildings, identifying the façades as electronic screens and making them a means of information on the building. Consequently, the transformation of advertising architecture into media architecture began. Urban space has become a place of interdisciplinary interaction. Apart from the purpose of advertising, it has enabled events, shows or exhibitions to be held in public spaces. The term *Media Architecture* was first used for Oscar Nitzchke's *Maison de la publicité* 1936.

“Although this project did not build, it is one of the first statements of the twentieth century that New Media Architecture was associated with culture, advertising and media. Eighteen feet wide, a steel cage was fitted. A facade capable of bearing images, icons and neon writings was produced in one-tenth of the building. In the Modern city of Paris, the ever-changing facade surface is leased by advertising agencies.” [10]. This approach was started to call *“mediatecture”*, a combination of media and architecture. The use of a digital display of media architecture is divided into led billboards and interactive billboards. The interactive billboard, conversely to led billboard, invites people to exchange information. It receives information from the environment, not from the computer. Due to this, for the first time, an approach that interacts more with the environment and society is formed.

From another perspective, screens have become a dominant character in public spaces, ignoring the building and the environment. Media is not adapted to the urban area; it makes it a complex and image-polluting environment. In this way, the building no longer represents its own identity or a new identity, but only to showcase the billboard.

In the media facade approach, situations that are intended to be conveyed to the environment by façade, such as advertising, art, messages, are applied to the building, environment and society in a way that adapts them. In other words, disciplines are not added to the building and the city, they are integrated into them. In media architecture, advertising architecture and media façade approaches have the same purpose as each other under the media title but differ in their application methods. At the Media Architecture Conference, David Cunningham said: *“All architectures involving media and media issues are Media Architecture.”* [11]. Tim Edler also says: *“The screens added to the facade are not architectural because they reject*

architecture.” [12].

The biggest difference between advertising architecture and media facade is that media facade incorporates the relationship between media and architecture into the building planning and design process. In contrast to advertising architecture, advertising or other disciplines ignore architecture; in the media facade approach, the facade is designed by integrating disciplines into architecture. As Edler says, there is spatial, structural and environmental integration of digital tools into the building's concept, as opposed to the addition of a screen above the facade. The screens added to the architecture completely or partially close the facade and attract all attention by acting individually. But the integrated media becomes part of the facade, having spatial influence in architecture and public space [12].

The individual who experiences the media façade perceives the building as a whole with the media, context, function, and form integrated into it. This media integration can change the whole meaning and character of the building. Integration is the most important point that determines whether a surface is a media façade. Without integration, the added element becomes that has its own meaning and no relation to the building. If it is well integrated into the facade, these two elements define something new in what we call “*Media Architecture*”. [13]. When such integration is possible, it finds its place in the city as “*media façade*”.

3. Media Façade

Urban spaces offer extensive possibilities for information systems. Therefore, in the context of interactive architecture, the environment provides the basis for interactive designs. Media facade is an interface between the physical and digital spaces, a method of contemporary facade design that aims to establish connections

with urban space and collective users through technology. By interacting with the surroundings, building skin acts as an interface or media façade [14]. Joachim Sauter describes the facade as interactive as a “*fourth format*”. The facade is the membrane between architecture and public space. Integrating media into a built-in form allows the facade to transform into the building's digital display skin by defining a new urban language. It moves the programmed content of the building into the environment while making its prominence more visible [15]. It aims to combine digital media tools and electronic indicators with the body and content of the building. It signifies the connection between technology, architectural design, innovation and substance, both aesthetically and functionally, and communication with new media introductions of modern art [16].

In this study, in the context of interactive architecture, digital imaging technologies were examined as integral parts of a building.

Lev Manovich calls for a vision of “*augmented space*” rather than filling the city with new techno-objects. According to him, thinking of the surface as an electronic display paradigm allows architects to consider both material and intangible architecture (streams of information) as a physical whole. He suggests that the design of electronically augmented space can be approached as an architectural problem. In other words, Architects along with artists may have the next logical step to accept the “*invisible*” space of electronic data streams as matter rather than as space. To him, this is something that requires structure, politics, and poetry [17].

3.1 Image Integration on Media Façades

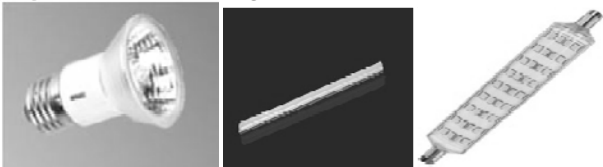
Digital Media tools are included in the process from the design phase of the building. It gives identity to the building and the environment for the way and purpose of its application. Their goal is to transform the outer surface into an

architectural communication element with flexibility and depth, differentiating spatial perception. Combined with light and image indicators, it creates depth and spatial meaning that differs from a billboard. It also manipulates the planar space restricted by a panel with different methods, giving it volume. Screen integration is the most important point of whether a façade is a media façade [13]. On media façades, the image is integrated into the facade in three ways. These can be summarized as light, image, and water as the current method. Facades with light integration are formed by two light sources, direct and indirect. Direct light sources include lighting devices such as simple, halogen, fluorescent lamps and high-tech LEDs. Indirect sources use natural factors using the reflection of sunlight. Image displays are created by these light sources. Size, resolution, pixelation give depth to the image.

3.1.1 Direct Light Sources

Halogen lamps are the simplest lamps used to illuminate interiors. It is produced by different chemical methods to ensure that the bulb does not burn even when operating at full voltage. The bulbs are small and are made of quartz. Its small size is advantageous for the creation of light and graphic displays on the surface [Fig 2.,a].

Figure 2: Direct light sources



a. Halogen [18] **b. Fluorescent** [19] **c. Led** [20] Fluorescent lamps contribute RGB and white colors with low energy costs. Because it creates large pixels, the resolution and sharpness of the image are reduced. It uses less power for the same amount of light than halogen lamps. It usually lasts longer but is more complex and more expensive [Fig 2.,b].

LED systems are emerging as light-emitting diodes in the category of small light sources. LEDs provide new

possibilities for displaying large media content on the façade. The new LED-based setup is used to enhance the visual effect and reduces energy based on its multiple advantages, such as dynamic color switching. It also provides flexibility in effects, lighting, image and video impressions by improving resolution and clarity, as well as long-term use. Therefore, it is the type of lighting most commonly used on media façades [Fig 2.,c].

3.1.2 Image Sources

Resolution is the number of pixels that make up the image. As the number of pixels increases, the sharpness and detail of the image improve. The size of the pixels and their distance from the observer is an important factor. At the same time, the brightness of the painting supports long distances.

Color depth allows the lighting element to create spaces with color and spatial depth. LED light sources are the type of lighting that allows maximum color depth.

3.2 Media Façade Design Elements

Integration defines the function, identity, and environment of the building by transferring information to the façade. The relationship between the content, form, structure, and environment of the media and the building, or the new content and identity is related to integration. Thus, while depth is given to space through disciplines, interaction is designed.

Location is an important element in interaction. Conditions such as distance, movement, perception, visibility of the observer/participant play an important role in building-environment-society interaction. Therefore, for interaction to be achieved, the participant's experience must be designed to be perceived from every distance. This affects pixel counts and the brightness of the light. The larger the number of pixels, the greater the perceived value. Media because the content of the facade is not temporary in some cases, is an issue that is one-to-one related to the function, environment, identity, and culture of the building

through integration. It can relate to these features of the building and the environment, as well as add new features to them.

The way the media façade communicates makes people from the audience to participate by integrating media technologies into the façade. In advertising architecture, signs, advertisements or art establish a relationship with people only while the media façade approach interacts with disciplines. It creates a local culture by interacting with the identity of the environment in which it is located or with the identity that it has just defined. Thus, the city becomes a place where society is interactive.

The dynamism of the facade makes it a dynamic surface that can be changed from a static facade to its context. At the same time, the facade can be summarized as allowing the same material or lighting to be used for multiple activities during day and night use.

The size of the media front is the most important point after image integration. This is effective in differentiating the media façade from flat, rectangular and 2D advertising boards. It provides spatial differentiation and depth of the façade. According to Tscherteu, *“2,5D projections mean that media façades are not limited to a single surface, flow around the boundaries of the building or extend to spherical surfaces. In this way, it is possible to create striking spatial effects with projection.”* [5].

Because of the façade is a surface separating the interior and exterior of the building, the transparency, translucency,

and opacity of the facade become important. In this context, the media façade also affects the interior space. Beyond the outside and the environment, it plays a role in the experience and perception of the interior.

Sustainability is the most challenging point in media façade design. Energy consumption control is required because of the large number of lighting or digital elements. Therefore, the use of energy-saving materials when designing the media facade is important for sustainability. Another issue that relates to sustainability is the display time of the display screen. Lighting creates a perception of space especially at night and it allows transmit the content. The lights used to transmit the daytime image are too bright and negatively affect energy consumption. Consequently, the transmission of the image by taking advantage of the natural environment during the day and night transitions can help to contribute to sustainability.

3.3 Classification of Media Façades

In this section, media façades will be classified with integration, communication tool, experience, interaction, sustainability, function, location, dynamism, dimensionality, transparency, display time and algorithm characteristics. Examples are to examine the range of use of the media façade and its relationship with disciplines; it will be selected from temporary and permanent projects where different approaches are applied for the first time, technical setup and communication tools are differentiated [Table 1,2].

Table 1: *The Case studies*

Feature	Haus des Lehrers	Kunsthhaus Graz	Iluma Shopping Center	Galleria Centercity
Software	Interfaces program-med by Blinkelights: Playpong, Blinkenpaint, Loveletters.	BIX	1,900 special software	DMX control system. Animations on the front with individual programming of LED spots.
Technical installation	A low resolution screen of 144 pixels was created with each window defining 1 pixel.	Digital creation with fluorescent lamps behind the facade. Each lamp acts as an independent pixel.	Crystal Mesh	High resolution is used in the corners of the building, low resolutions are used on the flat surfaces of the building.
Interaction	It is an interactive download and the content was created by users.	Invitation to artistic events.	Referring the user to entertainment / shopping.	The interaction of the current behavioral rends with the observation of light arrays that act as waves.
Communication tool	Message, art	Art	Art	Marketing, fashion, art
Source of light	Halogen lamp	930 ring-shaped, black and be-summer fluorescent lamps	Fluorescent Lamp	LED
Display time	Connected to the user.	Used both day and night.	Night illumination when using daylight reflection	During the day the building is reflective and indeterminate. It turns into a variable urban sign with illumination at night.
Sustainability	Temporary	Fluorescent lamps for technological sustain-ability, low cost, less energy.	Energy-saving fluorescent	Energy-saving with high-efficiency lighting.
Integration	It is a temporary presentation and installation	Conceptual phase and content matches the function and form of the museum technically successfully	The irregular arrangement of the crystal lattices divides the façade into areas with different resolutions, becomes the main component of media architecture.	The LED spots are invisibly integrated into the façade.
Function	Integrated on the traditional façade.	Membrane panels providing water protection behind fluorescent lamps.	It is aimed to change the character of the building's skin and to obtain a dynamic expression of the whole architecture.	A dynamic double-layered façade aimed at reviving the experience of use.
Transparency	Opaque	Opaque-translucent	Opaque, translucent	Translucent-opaque

Feature	Flare	Daisy World	Pixel Cloud	Digital Water Pavillion
Software	Pneumatic piston with computer control. The system is controlled by a computer to generate any surface abrasion.	Illuminating pneumatic actuator system. Size + shape control with air pressure, color + light control with DMX data network	Each world can be controlled individually with specially developed software.	Motion Sensor Technology (camera, radar or laser)
Technical installation	The Flare system consists of a series of tiltable metal washer bodies supported by individually controllable pneumatic cylinders.	An artificial self-defining ecosis-supply simulation built on the structure. The size and shape of the colored illuminating flower heads can be controlled by air pressure.	The formation of a three-dimensional network of 624 white polycarbonate spheres. Eight parallel polished stainless steel sections each support three arms carrying 26 spheres.	LED lighting wires cover the plastic pipes of the water curtain. The wall consists of a close-range solenoid array. In computer control, valves can be opened and closed. This forms the water curtain that falls with the cavities in certain places.
Interaction	Reflecting environmental factors	Kinetic, spatial perception-altering, in-therapeutic performance	Office workers and the environment	Sensor technology
Communication tool	Open to different disciplines.	Artistic performance	Information flow	Information and technology
Source of light	Sunlight, natural environment	Colorful, bright, moving flowers, 3D pixels,	LED	LED
Display time	Every hour	Every hour	Every hour	Night
Sustainability	It takes completely from the environment and transmits it to the environment. In this way, sustainability is ensured.	Next-generation visible environments with 3-D pixels, compatibility with changing external conditions	Energy-saving with LED light.	Most of the energy required for recycling
Integration	The flake is integrated into the building to be controlled by the pneumatic piston. Reflects and shines using sunlight.	Large actuator network covering the building facade, integrated façade system, visibility effect from a distance	The interior glass façade is transformed by changes in color and light	It is collected by photovoltaic cells from sunlight with a movable roof.
Function	Acting as a live skin, the building expresses itself, communicates with its environment and interacts with it.	Large actuator network covering the building facade, integrated façade system, visibility effect from a distance	To transfer the data flow in the environment to be observed inside and outside the building.	Integration of digital technology over water.
Transparency	Opaque openable membranes.	Opaque	Opaque, translucent	Texts and patterns appearing on the water. The dynamism of water.

Table 2: The case studies

3.3.1 Haus des Lehrers

The temporary installation at Berlin's Alexanderplatz was done by Blinkenlights.

This study is one of the first examples of the media façade; is considered one of its pioneers. The most important point is that

it succeeds in interacting through the facade. It made the society turn into a participant. It is an interactive download and the content was created by users. The entire community was controlled remotely with the help of a computer. In the installations realized within the framework of 3 interfaces (Playpong, Blinkenpaint, Loveletters), the messages sent by the users from the games were found on the front. The windows are painted white to achieve an illuminated effect. Interaction (control, ringing, telephone interaction) occurs through development and operation network protocols [Fig 3].



Figure 3: *Blinkenlights*, 2001 [21]

3.3.2 Kunsthaus Art Museum

The building was built by Peter Cook, Colin Fournier, Niels Jonkhaus, Mathis Osterhagen, and Marco Cruz in Graz, Austria. The media façade was incorporated into the existing building, designed by Jan & Tim Edler. The building is located in the city, overlooking the river and the city. These factors played a role in the idea of transforming the facade into an urban screen. The importance of this structure among the media façades is the use of BIX for the first time. BIX is a communicative organic facade that creates a new type of language and allows different artworks. The aim of BIX is that the façade acts as the “*information face*” of the building on the street and the other side of the river. It does not give the impression of a digital display, however, it transforms the entire building into a communicative device. While creating low-resolution graphics by creating double walls on the frontage, large pixels allow reading and viewing of images over long distances. By using fluorescent lamps, it

promotes affordability and sustainability. It provides both a cheap modular structure and a large installation [Fig 4].

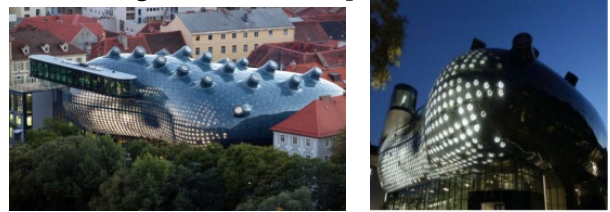


Figure 4: *Kunsthaus Graz - BIX Façade* [22]

3.3.3 Iluma Shopping Center

Iluma is an entertainment and retail building designed by WOHA in the art, education and entertainment district of Bugis Street in Singapore. The main idea of the design is not a monitor, but a facade with a changeable expression. It is a digital facade made with the mosaic pattern of 3,000 polycarbonate modules. It combines the aspects of a traditional curtain facade with a light installation or monitor facade. 1,900 illuminated abstract digital patterns are generated, controlled by special software.

The crystal lattice forms the visual body of the building; The physical functions are performed by a deeper outer wall. In digital staging, it is aimed to change the facade character of the building, not an individual motif, and thus to obtain a dynamic expression of the whole architecture [Fig 5].



Figure 5: *Iluma Shopping Center* [23]

3.3.4 Galleria Centercity

The project was designed by UNStudio in

Seoul Korea. The project demonstrates the functional aspect of the commercial store and emphasizes the sense of public space for social and cultural aspects. Establishing “social and semi-cultural meeting places” tries to redefine the traditional typology of the place. The strategy for building preservation consists of creating an optical illusion. It is aimed to shape the urban landscape and urban spaces with light. Illusions were made on the façade with dynamic light shows and fluctuations that emphasized the transience of the image and were intended to be accessible/visible from a distance. The asymmetrically constructed double-sided façade overlaps and vertically arranged aluminum sections, creating a moire effect. The light is mounted invisibly is reflected on it. Glass discs contain special dichroic foils that produce pearlescent effects throughout the day, while during the night each glass disc is lit with programmable LED lights to create a multitude of effects. Computer-based animations developed by UNStudio are also included in the lighting design. The installed DMX control system has individual programming of individual LED spots and animations on the building surface. All led spotlights interact to produce dynamic images and transmit messages on the surface. [Fig 6].

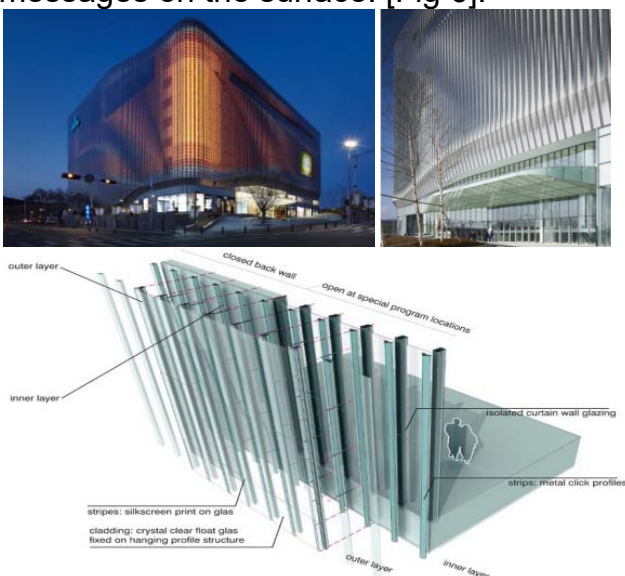


Figure 6: Galleria Centercity [24]

3.3.5 Flare-Kinetic Membrane Façade

The facade is a modular system to create a dynamic body for the wall surface of the facade designed by WHITEvoid. Acting like a living skin, it allows the building to communicate and interact with its surroundings. The Flare breaks as a static skin that transforms the building facade into a permeable kinetic membrane. The system consists of a series of tiltable metal flake bodies supported by individually controllable pneumatic cylinders. Because of the pattern developed, an infinite series of stamps can be mounted on any building or wall surface in a modular system of multiplied flare units. Each metal flake reflects bright sky or sunlight. When the Flake is tilted downwards by a computer-controlled pneumatic piston, its face is shaded by Sky Light and thus appears as a dark Pixel. By reflecting ambient or direct sunlight, the individual flakes of the flare system act as pixels formed by natural light. The system is controlled by a computer to create any kind of surface animation. Sensor systems inside and outside the building transmit the activities of buildings directly to the flare system, which acts as a lateral line of buildings [Fig 7].





Figure 7: Flare [25]

3.3.6 Daisy World

Daisy World, by Thomas Nicolai, is a simulation of an artificial self-policing ecosystem built on an urban structure. The concept of an artistic performance front concerns the scientific experiment, a computer simulation made by James Lovelock, creator of the GAIA theory. Compared to the rules in nature, computer simulation calculates the dynamic growth behavior of two artificial flower populations. Undulating through the branching of organic structures, corals, anemones, mosses create new architecture algae, creating micro-cosmic life forms. The 2-dimensional illusion is replaced by 3-dimensional elements that can be touched. The size and shape of the colorful illuminating flower heads can be controlled by air pressure upon request. Robustness of building reliability by making changes in outdoor weather and altitude sustainability conditions a network of actuators is installed covering the facade of the building with a visibility effect from a distance. Subsequently, a kinetic media system was formed. [Fig 8].

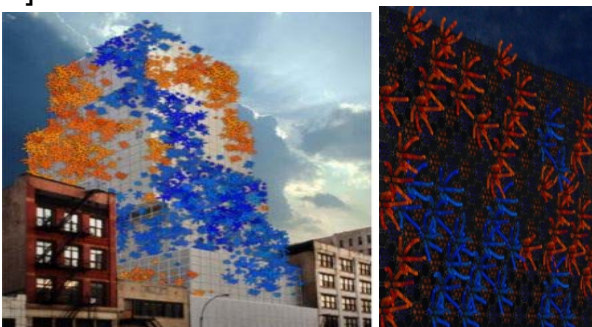


Figure 8: Daisy World [25]

3.3.7 Pixel Cloud

The project is a lighting scenario in the atrium of Allen & Overy's office building in Bishops Square, designed by Foster and Partners in London. "*Pixel Cloud*" concept and design was developed and produced

by Jason Bruges Studio in London in association with Zumtobel, Ledon Lighting, which provided the LED fixtures. The LED light sculpture is hung from the ceiling of the 10-story atrium, like an oversized chandelier; it undergoes dynamic changes in color and light-controlled at intervals. The sphere is equipped with 24 LEDs and can be controlled separately. Inside the sphere, a dodecahedron (12-sided solid) shaped flexible circuit board allows each sphere to be illuminated in the same way. The system provides an 8-bit resolution in the main colors red, green and blue. Real-time color and Light updates constantly change the appearance of the three-dimensional LED lighting installation. The server creates a wide variety of modes. A sky tracking camera installed on the roof is used to transfer images of passing clouds to the Pixel cloud. This ever-changing LED app includes films or sequences of prepared individual images, and even supports the interactive engagement of web communities. Colorful animations and playback of local weather events provide ever-evolving simulations in the atrium space. The designers adjusted the range of the Ledon matrix to fit the grille of the facade. The interior glass facade is transformed by changes in color and light. One bar burns at a time, bringing the outdoor lighting air inside, from top to bottom, so that it shares it with employees in offices [Fig 9].

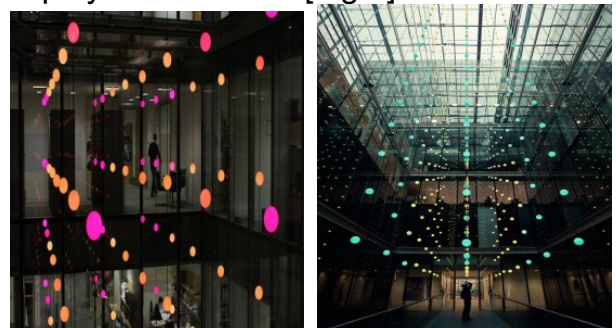


Figure 9: Pixel Cloud [25]

3.3.8 Digital Water Pavillion

The pavilion was designed in Zaragoza by Walter Nicolino, Carlo Ratti and Claudio Bonico. The interaction design was done by the MIT Media Lab. The pavilion

reflected digital media using the dynamism of water. Visitors can perceive the content as visual, aural and tactile [Fig 10]. Thus, the contents of both the pavilion and the expo were combined under Architecture, Science, Water, and technology. The wall of water has been the “information face” of texts, letters, and Expo. Sensor technology allows oncoming visitors to interact by changing the facade. Thus, technology can adapt the building itself to the visitor (flow, time of day, weather conditions and schedule needs). The contents of the structure represent the function of the texts and patterns revealed in the water curtain. Mitchell says: *“With the search for different fluidities from other projects; in the case of the DWP, the building itself becomes fluid. Water is dynamic and this dynamism is used with the help of digital technology.”* [26].



Figure 10: Digital Water Pavillion [25]

4. Conclusion

In the relationship between media and architecture; communication has been established in many different ways in history. Although the tools changed from the early ages to the information age, the aim remained the same. In the communicative role of the façade; The process of evolution from symbolic representations to advertising architecture, from advertising architecture to media architecture was examined. Accordingly, it was concluded that the main purpose of the media façade approach is the effort to interact with the

environment in which the building is located. Subsequently, with the digital age, these signboards and signs are represented by digital technologies. However, the main problem with these approaches is that advertising, representation, building and urban environment are prevented and interaction remains secondary. Digital technologies and interdisciplinary information flow were integrated into the surface with the media facade. Thus, the integrated discipline is no longer considered independent of the architectural environment and society. Along with the media front approach, the concept of interaction has been incorporated into the design. With this concept, it is aimed to create an interaction between society and front. Technology has been a qualified tool for creating interaction. Yet, these interactions cannot be used as effectively as intended.

According to the content of a media façade, it is the layer that shows the various contents of the disciplines such as art, advertising, marketing and messaging. Moreover, an inward-looking building structure is included in information flow to interact with the environment. These situations can be done temporarily or permanently, although the media façade's relationship with technology and its flexible structure, changing conditions and activities can be realized. Thus, the content of the facade is in a dynamic structure which can be reconstructed

according to the disciplines and conditions in which the activities are related. These facades can produce different spatial constructions and contents, even in a day and night differences. According to the interaction to be established, it can be perceived at distant points to the building. Interactive façades aim to attract the community and involve them in the building and urban space experience.

With its variable nature, it bears resemblance to the ever-changing billboards and rented building surfaces in

advertising architecture. Despite this, it continues to adapt to its environment. Besides, the interaction of the front with its environment and society should be increased. This requires treating the building, not as its facade. The building must interact with its surroundings in its entirety. The building must interact with its surroundings altogether; it should not only interact with the facade. Interaction, movement, and flexibility are not only in the design of the facade and lighting; they must be handled throughout the building. In this respect, Digital Media Pavillion has been a successful example. The facade renews itself from its data as it interacts with the user. At the same time, it can be reconstructed flexibly according to user needs and desires.

In addition to this, while the media represents the features such as advertising, propaganda and branding while designing the facade, it is another challenge for the building to protect its own identity. Even though the integrated features will transform the identity of the building, it must still look after its environment and society before it becomes the element itself.

On the other hand, avoiding image pollution when using Lighting is a challenging condition for the designer. The design should also benefit from its natural environment without departing from its nature. It is thought that this will help to optimize image pollution and sustainability conditions in future media facade designs.

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