HYPERSURFACE ARCHITECTURE:
AN INTERFACE PROPOSAL FOR EPOKA UNIVERSITY CAMPUS GATE-WALL

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ABSTRACT

HYPERSURFACE ARCHITECTURE: AN INTERFACE PROPOSAL FOR EPOKA UNIVERSITY CAMPUS GATE-WALL

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The recent technological and digital developments have opened new opportunities in the exploration of geometry in design. As such, the focus has shifted to the articulation of the boundary as a concept and more specifically to the architectural surface expression. Hypersurface architecture is a new trend in that respect. It is an interactive face of the building, which increases the attention dedicated to the object. Usually categorized as one of the kinds of media facades, the hypersurface is characterized by being reactant under certain conditions. Taking in consideration its properties, this study focuses on the enhancement of an existing boundary, the Epoka University campus gate-wall. The focus is on the communication that arises not only from the digital media and architecture, but on the social communication as well. In line with the initial design concept of Epoka entrance gate, the proposal is designed depending on the perception of two target groups: the high-speed vehicles passing by and the pedestrians of the campus. Based on the surveys and the conducted questionnaires, the proposal consists in a new skin added on the wall. Skin will consist same repeated module, which will transform according to the actions. The proposed hypersurface design becomes an interactive medium of promoting the institution as well as social participation and interaction.

Keywords: Hypersurface architecture; media façade; interactive wall; LED technology; urban screen.

ABSTRAKT

ARKITEKTURA HIPERSIPËRFAQËSORE:
NJË PROPOZIM NDËRFAQËSOR PËR MURIN NE HYRJE TE KAMPUSIT TE UNIVERSITETIT EPOKA

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Zhvillimet e fundit teknologjike dhe dixhitale kanë hapur mundësi të reja në eksplorimin e gjeometrisë së dizajnit. Si e tillë, fokusi është zhvendosur në artikulimin e kufirit të konceptit dhe më specifikisht në shprehjen arkitektonike të sipërfaqes. Arkitektura Hipersipëfaqësore është një prirje e re në këtë drejtim. Ajo është një fytyrë interaktive e ndërtesës, e cila e rrit vëmendjen e dedikuar për objektin. Zakonisht e kategorizuar si një nga llojet e fasadave të mediave, hipersipërfaqa karakterizohet nga reagimi fizik në kushte të caktuara. Duke marrë parasysh vetitë e saj, ky studim fokusohet në rritjen e një kufiri ekzistues, të murë-hyrjes së kampusit të Universitetit Epoka. Fokusi është në komunikimin që rrjedh jo vetëm nga mediat dixhitale dhe arkitekturës, por në komunikimin shoqëror gjithashtu. Në përputhje me konceptin fillestar të projektimit të portës së hyrjes të Universitetit Epoka, propozimi është hartuar në varësi të perceptimit të dy grupeve të synuara: automjetet që kalojnë me shpejtësi të lartë dhe nga këmbësorët e kampusit. Në bazë të studimeve dhe pyetësorëve të kryer, propozimi konsiston në një sipërfaqe të re shtuar në mur. Sipërfaqa do të përbëhet nga i njëjti modul i përsëritur, të cilët do të transformohen në bazë të veprimeve. Dizajni i propozuar hipersipërfaqësorë bëhet një medium interaktiv i promovimit të institucionit, si dhe pjesëmarrjen sociale dhe ndërveprimit.

Fjalët kyçe: Arkitektura hipersiperfaqesore; fasada mediaktike; murë interaktiv; teknologjia LED; ekranet urbane

Dedicated to my brother

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CHAPTER 1

INTRODUCTION

The recent technological and digital developments have opened new opportunities in the exploration of geometry in design. As such, the focus has shifted to the articulation of the boundary as a concept and more specifically to the architectural surface expression. Hypersurface architecture is a new trend in that respect. It is an interactive face of the building, which increases the attention dedicated to the object. Usually categorized as one of the kinds of media facades, the hypersurface is characterized by being reactant under certain conditions. Taking in consideration its properties, this study focuses on the enhancement of an existing boundary, the Epoka University campus gate-wall. The focus is on the communication that arises not only from the digital media and architecture, but on the social communication as well. In line with the initial design concept of Epoka entrance gate, the proposal is designed depending on the perception of two target groups: the high-speed vehicles passing by and the pedestrians of the campus. Based on the surveys and the conducted questionnaires, the proposal consists in a new skin added on the wall. Skin will consist same repeated module, which will transform according to the actions. The proposed hypersurface design becomes an interactive medium of promoting the institution as well as social participation and interaction.

A motivation for this thesis have been the communicative facades with its subdivisions. Their presence on the everyday life and in the dialogue between the building and people is crucial. A general and specific analysis made for the communicative facades in Albania and around the world. As a result, the technological communicative facades are not developed and present in Albania. Differently colored facades, led screens and billboards are the typologies that can be found in Albania, most of them only in Tirana, which is the

capital city. In the following chapters will be shown that these types of facades ensure only the first part of the communication. The interactivity of the façade is the answer for a completed dialogue.
In this chapter is described the problem statement and the aim of the study.

1.1. Problem Statement

In this century, the information is in the center focus. There are made many inventions just to accelerate the information transport. This big change in every field of life of course had its effect in architecture too. A different medium of architecture is present today and the way in which we think before we design has changed. The city nodes, streets, facades are now serving information in different ways as they never did before. Billboards, digital screens, posters and so many different types of advertisement are now identity of main buildings. This places the building in an important attention and to achieve that level of importance does not help only the colorful advertising. Therefore, “kinetic architecture” is combined with “advertising architecture” and the result is an interactive façade, face, skin.

The technology has now been part of identity in many buildings. The development of this type of architecture (media architecture) in the last years has taken place in many countries and many buildings projects. In Albania, the chance to experience such facades or urban screens happens to be only in Tirana, which is the capital city of Albania. It is very rare to find “media architecture” in other cities, only in the touristic ones we can find some advertising typologies.

The information’s density in media façade is at the highest level all the time, it considers the focus of user as it is present on each visual information. Differently from the classic façades, it has an interfiling directly with the virtual user. The dynamism of colors, shapes,

volumes and other dimensions of “media façade” satisfies the user and makes this type of building interactive. Of course, there are different values off appreciation, but generally, it is a preferred solution in the high-populated nodes.

Media façade is a representor of the buildings different characters. It shows the harmony between the inner and outer space. Considering the use of inner plan, it can be reflected in the outer skin of the building. Therefore, an office building, housing block or any type of building can be differently known from the media façade integrated or attached on the façade. Beside the inner usage of the building, the façade shows from the cultural identity of it too. With this potential of the media façade, the architects introduced into architecture a new branch of “media façade”, “hypersurface architecture”. As we can understand from the name, hypersurface, it has a texture that changes continuously. The change is not made by itself, of course, it may be programmed and it is, but the aim of this type of façade is to involve the citizens in its display program. An interactive face like this typology, becomes a solution for many boundaries, which are meant to be a melting point for the spaces separated.

In the specific case, the front wall of the campus is thought to be an edge that as much as it separates the spaces, that much it connects them. A fragmental wall with a dynamic height. The aim of the build concept would be completed with the interactivity proposed by this study. The first impression is expected to be in a higher level as the wall involves the visual users in its program. This proposal in a cooperation with the main concept of the gate-wall will serve a memorable experience.

For a place where we learn about technology and with a great attention in a rural location as our campus is located, this is an inordinate way for a university’s first impression to be present in students and road users mind, an enhancement for the face of campus (*Figure 1)*.

Figure 1. Gate of Epoka University Campus [Corda, 2015].

1.2. Aim

By testing the outlook of a specific case, as the entrance of the campus is, with a technological installation, the amount of attention concentrated on the wall is expected to rise. This proposal simulates the change that can happen to a façade when interactive factor is added. The involvement of the user in the walls physical change is an example for a facades enhancement process. The treatment of the façade shows also the varieties of ways a façade can be considered. When a specific analysis is made the advantages and disadvantages of "hypersurface façade" are investigated deeply. This study not only tries to make a better look for the main façade but also is an analyze for this type of façade treatment in an Albanian case. How will the façade be considered and will it be welcomed from the users. This is answered by a questionnaire made after the proposal is presented to the campus users that mainly are students.

The aim is to serve a different experience for the users as the entrance in a university is in itself. This would rise the attention on this specific site firstly and then this type of façade would have a different consideration from the users.

CHAPTER 2

COMMUNICATIVE FAÇADES

In this section, the thesis gives an overview of the communicative character of facades, from the classic plaster colored type to high-digitalized type. First, to understand the content the title should be understood. “Façade” as a word comes from the Latin language and it means “face”, like “the front of a building; also any face of a building given special architectural treatment” [Merriam-Webster, 2016]. To communicate, according to the same source, is also a Latin word and it means “to convey knowledge of or information about; to make known”. As it is seen from the words, this chapter will speak about the visual communication of the buildings or any objects façade to the public space and buildings environmental location.

A façade is not just a skin for the inhabitants but it also communicate information to the public environment. It is a communication element between the private and the public space.

2.1. Media façade

According to dictionary media is the plural of medium. Its origin is nearly 70 years ago and it was first used in the field of advertising [Merriam-Webster, 2016]. The first meaning is “a condition” or “a surrounding” and the second one is when medium becomes media it becomes also a communication channel.

In this section, we will find the theoretical information for media façade. In a reference to Venturi, Manovich says, “An electronic display is not an optional addition but the very center of architecture in the information age.” [Manovich, 2002]. By this statement, he wanted to say that the new step of architecture is the technology. In the past was the industry, which influenced the architectural inventions and now the technology, is the “center”. The new texture of the urban façade is the technology with its signs, billboards, posters and screens. Now intelligent devices are found integrated on the facades structures differently from before when architects had to design lighting systems and moving imagery. Paul Virilio calls the new trend of covering the facades with technology as “Electronic Gothic” [Virilio, 1994]. He makes a comparison between a church and a cityscape where both of them are mass media, which means both of them indicate the viewer with the information spreading. By the word gothic, he wants to remind that the integration of this technology in the facades project will be its ornamentation identity.

Moreover, Ranaulo refers to Virilio when he talks about “Light Architecture” and “Media building”. Virilio was a famous urbanist and criticist. Both of the terms Ranaulo wrote about are present nowadays and Virilio saw this when it was in the beginning. In this “Electronic Gothic” World, Paul Virilio discusses the contemporary relation of architecture and new media under the term “Media Building”. He sets the “media building” as “a building that preferably houses information rather than habitation, no matter what the type”. The development of the light architecture was obvious that it would affect architecture with its presence.

Joachim Sauter (2004) thinks that due to the similarity in their context, display technology and façade, they are a network of the information from a new urban language *(Figure 2).*

Figure 2. LED (light emitting diode) screen in “Sheshi Rilindja” [Tafa, 2016].

Above somehow is described the development in the terminology of the media façade and in the next sections is treated the dialogue which is the most important properties of media façade. Considering the user in the center of the design makes the designs efficiency higher in terms of value. As Rama called the users in the colored facades and as many other designer calls them the “interactors”, the users are the focus of every design [Rama, 2004]. Facades are an interface between the building and the user but media façade bring the dialogue in another medium. Media façade changes its look and its information continuously and in the late designs, it also changes them according to some actions of the user or other conditions. This process of interaction between them is considered a communication.

2.1.1. Coloring of facades as a political action

Lately in Albania is being evident a new trend of coloring the facades in the main cities. This is somehow a derivation of "Rebirth of the City" a project applied some years before in the Capital. Then the mayor of Tirana and now the Prime minister of Albania, Edi Rama is influencing the character of each city. The intervention is made under the reason of rehabilitation of facades and the national program is called "Rebirth of cities". His profession is painter and that indicates the vision he has for the urban skin of a city. He talks about feelings when he explains the projects concept and feelings are changeable not only with luxury projects.

"I wanted to show images from a place where speaking of utopia is actually impossible, and therefore utopian. I chose the notion of hope instead of utopia. I focused on the idea of bringing hope in a place where there is no hope ... It is about dealing with the reality where the luxury of time and money is missing. This was the first political action, to communicate with people, to set up a bridge between the people and the local authority." [Rama, 2004]

That was a good move to accomplish the aim, to make impression in a non-political way to the elector. The problem is that each city is having a new atmosphere around these blocks, and that is made according to an art point of view, so the impact will be artistic too. Urban planners were not part of this projects realization and that makes the difference from an art gallery showroom to an urban environment.

In the capital, buildings that were part of the project are mainly the apartment blocks built in social-communist period and those buildings which have architectural value. The intervention started with the buildings of ministries around the city center and then with architecturally valuable ones. The main core of colored facades is "city Ring". On the sides of most frequented road are applied the most of previously mentioned artistic patterns.

After 13 years, the city holds still the same project as a skin and it has become the city's identity for the tourists. From the communicative point of view, the project has done its job because Tirana now is known for the colorful urban skin but the citizens are not really feeling the change of hope positively as it was said the project was done for. Rama treats the citizen as an actor and this makes the project important from the communication of the façade to the public environment.

"I think that in choosing art (Public Art) and culture as an engine for regeneration and gentrification of urban spaces it is necessary to not consider the public space as an empty space to be filled with whatever work of art, and to consider citizenship as an active part of the aesthetic processes. In this way, the spectator becomes "spect-actor" and the artist becomes "spect-author"". [Palermo, 2014]

There are no rules how a façade should be painted, but the effect of choice is crucial. Rama invited his artist friends to design patterns for some facades. The patterns are different but in the same language. To design patterns were involved many international urban artists such as Olafur Eliasson, Liam Gillick and Dominique Gonzalez-Foerster to contribute designs and turn residential blocks into unique works of art *(Figure 3)*. These works of art were represented in biennales several times with little changes and the explanation given to users cannot be compared with the importance given to publicizing the done work [Gjergji, 2009].

Figure 3. Housing block in “Unaza”, Tirana [Tirana Biennale; 2009]

The project applied in Tirana was an inspiration for mayors of different cities around the world. For example some cities in Netherland and China *(Figure 4).*

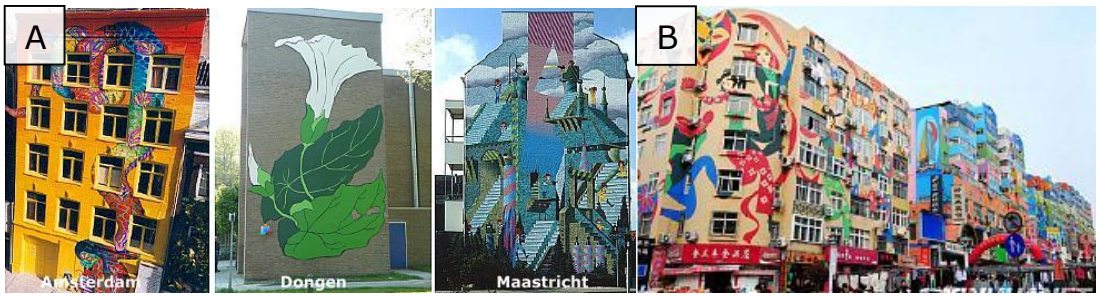

Figure 4. (A), Mural painting in Amsterdam [CITE creation; 2008] and (B), Mural painting in Shanghai [CITE creation; 2008].

Rama was taken as an example, for the solution he applied on the facades, in China before the Olympic Games. This new face of the cities, made tourists rise the interest and visited them. This was another example that shows how a city face can change and be improved just by adding color. [CITE creation, 2008]

The solution that he proposes is similar to those applied in favelas and illegal hoods. Two artists from Amsterdam couple of years later the project, they applied the same strategy in Brazil *(Figure 5)*.

Figure 5. Panoramic view of small playground in Favelas, Brazil [Haas & Hahn; 2008].

According to the concept, which was applied in Favela, is similar to Tirana case. They wanted to give to that place live and an identity. Making the illegal hood have some architectural value. Rising the user's voice can make improvement in the future interventions and can somehow evaluate the artistic state of our population's spirit. *(Figure 6)*

Figure 6. (A) Geometric patterns, (B) giant trees, (C) polka dots [Tema; 2010].

For this type of regeneration, that mayor applied to the cities façade Tirana became part of the words most colorful cities by "The Guardian" in 2016.

There have been filled many questionaries' and I used it too as way to approach the users idea. If we put the user in center of the process, the process itself will be easier and more efficient. Changes are being applied under the same idea to the same facades.

The artist that contributed with designs for the project, Gentian Shkurti, made a video with a color-blind women who tells the colors of new painted facades even that she sees them in black and white. The video is also shown in black and white and it becomes emotional while she talks about colors when there is not any of it shown.

As he did to understand the capacity of an ill person to differentiate the colors, the study will centralize the satisfaction of the citizens and the improvement of actual facades *(Figure 7)*.

The definition of the color vocabulary is: "color: color percept, color perception, color sensation; that which the human being in any given situation sees as color and which makes it possible to, primarily, distinguish objects and fields using their color differences (color discrimination) and, secondly, to characterize objects and fields with the help of e.g. color names (color identification); the color percepts can have different modes of appearance." [Hård & Svedmyr, 1995]

Figure 7. Colors effect [Perique, 2006].

Colors effect is important as an information to brain and its importance to the first impression, but it depends to the condition it is observed.

“It can be taken so far as to mean that no object or surface has any color until it is seen by somebody who can perceive color. When we experience that the surface has a certain color, this is the result of a complicated chain of factors where our own visual sense is a necessary ultimate link. The color of a specific color object, e.g. a façade, is not constant but varies with the viewing conditions.” [Hård & Svedmyr, 1995]

A communicative facade. This is the point of this section. A color can make the difference even if it is not perceived from good conditions and even for the ill people as it was shown in the case of Gentian Shkurti. Color is a very important factor in the dialogue between the façade and the “spect-actor”, as Rama refers to the users of facades. The differentiation made in this dialogue from the color makes the user interact with his emotional state.

2.1.2. Advertising architecture

In this section, the advertising architecture is compared to media façade in terms of similarities and differences referring to the late changes made in these fields.

Advertising architecture as a term was first coined by Cunningham [Cunningham, 2007]. Accordingly, when you show items in shop during night and you use the light contrast to show them it becomes advertising architecture. Before this term, there were some similar terms with different materials and ways. Sign value is a concept, which was mentioned in 80’. This means that the facades had some years that they were used as a background until the neon lights were introduced in the advertising technology. Signs and big billboards were sometimes bigger then the background itself and they were colorful too. This was the start where the architects had difficulties in the projection of public environment. The

developers used this change and they combined the colorful neon lights with the previous signs and made the façade a big TV where a lot of information could be spread.

Media used architecture's physical potential to inform people in different scales: eye level, car level and to be seen from the highway. Architecture used media as its outer skin to acquire a different character in urban space. Rosemarie Haag Bletter mentioned in the introduction part of The Modern Functional Building (1996): "Cultural, social and economic forms of advertising express themselves within architecture as "advertising architecture" [Cunningham, 2007].

As we see from the above paragraph, both the media and architecture are integrated. However, the change is that media façade differently from the advertising architecture is integrated on the façade and not attached; this is the Edler's thought in 2007. He points this out to say that there is a difference between them because an attached advertising cannot be as integrated in the buildings language as an integrated one. The media façade can be easily changed and influenced from new ideas and this makes it more flexible. In some analysis made by him the media façade is stronger in the advantages then the advertising architecture but the important thing is that now both of them are part of our facades and we have to find the way how to reconsider the urban space. Both of them has a strong indication in the identity of the urban environment and if the amount of signs is not controlled, they can destroy the cultural values and architectural identity of the buildings.

This study brings up arguments and properties from each type and makes awareness for the indication and the effect of communicative platforms to a public space. I think that the façade typology that interacts with the user can be more enjoyable and it is more welcomed. However still the facades which are blind or which have small openings and can be used by the media facades does not have to be time consumer for the citizens or visual polluter. Therefore, the mass of usage should have a point.

Nevertheless, the development out of control is a damage for the citizen's life and the spaces values. A race between platforms, how to be brighter and bigger does not mean value. People generally are in contact with the dimensions of media everywhere and everyday so a pollution like this does not have place in the facades if it is not controlled or filtered for information it spreads.

Beside the visual pollution and the identity indication, on blind facades we can have also technical problems as damage of the plaster or even to the wall from the weight of the tools installed. Moisture and lack of ventilation are present in the massive billboards. A physical damage is considerable when there is an alternative that can be applied instead.

2.1.3. Urban Screens

In the last years, big billboards and posters are replaced from the technology with a multimodal and multi-contextual object, which is called screen. LED (Light Emitting Diode) screens, which are in different sizes and different resolution pixelated. Its difference compared to the previous methodology of approaching with the information to the citizen is that it can display also images and videos. They can be controlled by a server, a simple computer or by network. "They are easy to view day and night, easy to create content for and messages can be quickly reprogrammed." [Brill, 2006]

Every development in this field serves to the advertising and marketing and this also makes the interaction between the user and the building healthier. These screens can be easily modified in the information they display, so they are flexible and this makes the advertisers to sell more products and service to customers. Digital billboards, which are, comprised RGB (Red, Green and Blue) color choices, LED technologies, and computer

control systems, are an effective means to advertise with dynamic displays [Aydogan, 2009] .

The biggest screen is the installation of “GreenPix” which works with solar energy and it covers the whole façade on the side that the building faces the street. *(Figure 8)*

Figure 8. GreenPix, the largest screen in the world [Jones, 2008].

They can also be used for different community needs, for example if the police chases somebody, his photo can be shown on these screens and everybody would notice him. When big events are organized in the city they can be synchronized and function for the same purpose. They can help for holiday greetings. They can be used for public announcements. Their help to the community is considerable.

2.1.4. Communication: Interactor with interactive objects

The key node in this whole study is the communication between the interactor and the interactive objects. This is a dialogue that has been used form the advertisers and designers

from the beginning. Interactor is the human being who most of the time does it as an instinct of the curiosity. The time consumed with the interactive object will make this event important to his brain and this is what the advertisers want, to win a small place in his memory. The most of the time it is for advertising, but it can be also made from the architects who want their building's façade to be present in every moment in the everyday life of the urban environment. As we derived from the previous type of communicative facades to the digitalized ones that shows the potential that have been used differently in different periods. "The urban environment has long been used as a versatile instrument of communication" [Tscherteu, 2008]. Generally, the façade shows the function of the inner part of a building in an architectural way. "An architectural element capable of communicating the function and significance of a building." [Krier, 1992]. Between these two spaces, inner part of the building and the outer urban space can be developed a dialogue, which can change the quality of life.

"Architecture as we know it combines two (inside and outside) not easily reconciled tasks. On the one hand, it has to provide a shelter that protects its inhabitants against unwelcome outside forces and offers them a congenial internal environment. On the other hand, it must create an exterior physically adapted to its functions and visually impressive, inviting or deterring, informative etc." [Arnheim, 1977]

2.1.5. Interactive screens

"Interactive" is called something, which is designed to respond to an action, command, etc., of user. This is the next level of the communication between interactor and building. A physical relation, which rises the architectural value of a skin, which now defines the outer space too. Interactive screens are expensive and their high technology makes them hard to be used. Still big businesses or different type of institutions can attract the mass with a higher level of screen. Around the world there have been years that they are present

in the urban life. Showrooms, showcases, blind façades, bridges, floors, ceilings etc., are the places that it can be installed. It is very adaptable with the development of the LED technology which now can be also waterproof.

Meanwhile around the world interactive screens are popular and welcomed from the mass. They have time now that they have been introduced in urban facades. Many big marketing brands use it to attract the flow of humans in very populated cities. “Nike” used this type of screen in the opening of the season. They made eight type of window showcases for example. Each of them were interactive to the movement in front of the window. In an alignment with the person moving, the lights react by turning on and off, perpendicular to the body moving *(Figure 9).*

Figure 9. Interactive showcase on the window of “Nike” [Selfridges “Nike”, 2013].

Many similar projects are made generally to advertise something but still it can be used as people want to use it because it is interactive to them. It is like a personalized mirror for everybody who want to use it for message spreading.

Another example is given for another typology of movement cycling. In Auckland of New Zealand there is designed a bicycle lane parallel the road. It is called Cycleway Street and they have applied an interactive installation on the sides of the lane. The designer wanted to rise the safety during night and he added those interactive lights on the sides of the lane.

It changes the colors according to the movement between the lights. Sensors catches the movement perpendicular to the lights so the reaction is easily noticeable. *(Figure 10).*

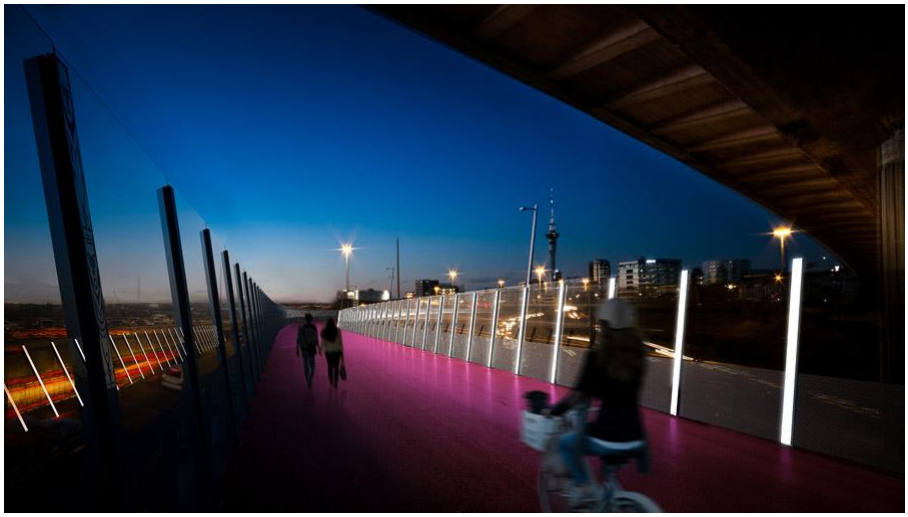

Figure 10. Nelson street cycleway during night [Brett, 2010].

In Albania there have been seen some interactive mapping projection, but interactive screens not yet. LED screens are located in the important nodes in Tirana and in some other cities. Their interactive is similar to the previous descriptions in the media façade part. Real time interactive screens have not been installed in Albania and this will make the proposal unique in its field. One example of interactive screens in Albania is a typology of it, which is called mapping. It is a projection of a software on a wall or a façade and it interacts according to a command that is known for the user. In the holidays of the new year the Prime Ministry made something special for the citizens who passed by the building. They organized a mapping where everybody could send real time messages from their mobile phone to a fix number. The messages mainly were wishes for the holidays. This was a new way that some companies could profit from the architectural façade and a good way too for new elected Prime Minister to bring something new *(Figure 11).*

Figure 11. Interactive mapping on the wall of "Prime Ministry" [Press "Tema", 2013].

In this kind of interactivity still, the user is a spectator. There is only one interactor and the communication is compelling to the others who are watching. This design was very welcomed and joyful but it can be better. In the proposal the interaction is physical and it makes the interactivity personalized which makes the dialogue with emotional values.

In the field of interactive screens, Albania can plan much before the screens enter massively.

2.2. Hypersurface façade

Technology is now more than part of architectural design. It contributes with new materials, devices and mediums of representations in buildings skins in this case. Hypersurface architecture is a new trend in architectural urban skin, a topographical

surface that changes its outlook continuously depending on external factors. The surface is interactive physically.

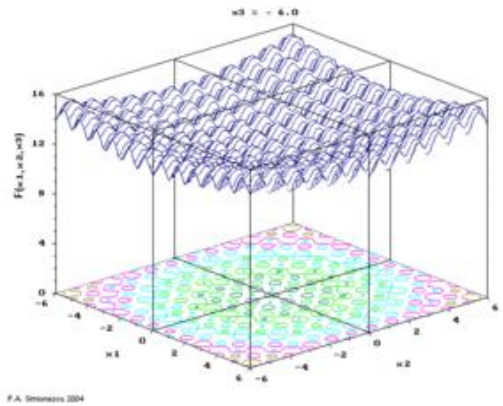

Figure 12. Hypersurface concept diagram [Kluwer, 1987].

Hypersurface is “a figure that is the analogue of a 2D (two dimensional) surface in three dimensional space” [Merriam-Webster, 2016]. Hypersurface means a surface with n + one dimension in the third axes, which is a space that defines spaces. As it is shown in the *(Figure 12)*, the pattern, which is flat, represents the consequent form in the third axes of itself. The difference with the extrusion of a normal pattern is that the dimension in third axes is not static. It becomes an interactive face. It interacts to every act detectable by digital sensors and deforms itself according to the algorithm that is given to it. An interactive wall, screen, façade attracts not only the eye of urban user but it includes him in the visual and textural dynamism by providing different experiences to the interactor. These properties of the term hypersurface with all its effects is involved in architecture to provide different experiences. When is said hypersurface architecture, it means that the architecture used in that particular design is interactive in its stativity and dynamic in its texture.

2.2.1. Case studies for hypersurface façades

This section describes the applied examples of hypersurface facades. Around the world are three typologies of facades according to their implementation during the design process; integrated in the concept design before the building is built, attached on the façade and detached façades. The case studies are found to be in different scales and technologies showing the various possibilities this kind of façade offers.

2.2.1.1. Hypersurface as integrated implementation in concept design

Integrated projects of hypersurface facades are a sign that architecture is making place for this kind of technology from the time when the building is designed. Being part of the building identity helps the new suggestions to stay meaningful and acceptable along the urban skin. Generally, these type of facades are double skin facades but not always.

- **Al Bahar Towers, Abu Dhabi/ Aedas Architects with Arup**

The Al Bahar Towers use a double façade system that wraps around approximately three-quarters of the building. The exterior layer is a responsive façade as it is programmed to open and close according to the daily movement of the sun. The north façade of the building has been designed without shading because there is no need for this orientation and the view to the city have been preserved. As these towers have inside it a UAE bank, a traditional Islamic motif was used to provide the basis of this innovative and visually interesting external automated shading system. The dynamic façade was conceived as a contemporary interpretation of the traditional Islamic “mashrabiya”, which is a vernacular form of wooden frame screen used as a device for achieving privacy while reducing glare and solar gain. The “mashrabiya” at Al Bahar Towers is comprised of a series of semi-

transparent umbrella-like components that open and close in response to the sun's path. Each of the two towers includes over 1,000 individual shading devices, which are controlled by the building management system to create an intelligent second façade. According to the designing team, each unit is comprised of a series of stretched PTFE (polytetrafluoroethylene) panels *(Figure 13)*. The entire installation is protected by a variety of sensors that will open the units in the event of overcast conditions or high winds. The benefits of this system include: reduced glare, improved daylight penetration, less support on artificial lighting and over 50% reduction in solar gain [Nouvel, 2012].

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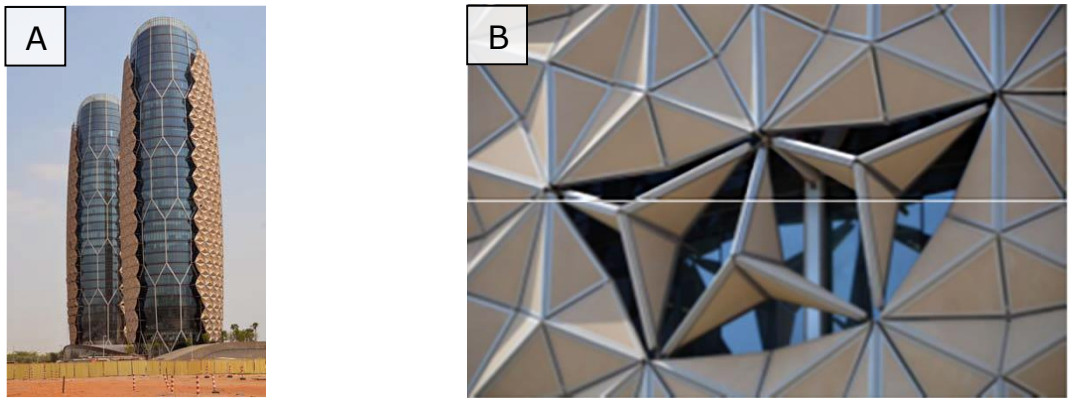

Figure 13. (A) Al Bahar Towers façade from a large scale, (B) Façade in detail [Nouvel, 2012].

- **Doha Tower, Qatar/ Ateliers Jean Nouvel**

The Doha Tower uses a double façade; also as the previous case, that employs a fixed screen element as the outer layer of the system *(Figure 14)*.

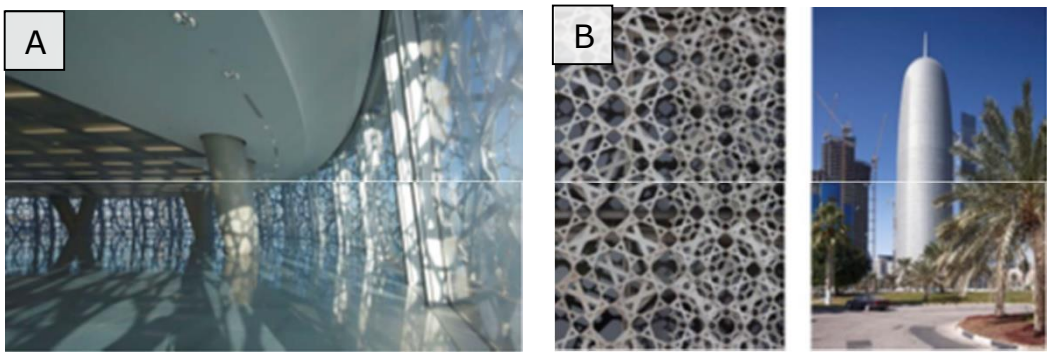

Figure 14. (A) Façade from inside, (B) Façade in detail & façade from a bigger scale [Nouvel, 2012].

The exterior skin of the Doha Tower is composed of four "butterfly" aluminum elements of different scales to evoke the geometric complexity of the Islamic "mashrabiya" while serving as protection from the sun. The pattern varies according to the orientation and respective needs for solar protection: 25% towards the north, 40% towards the south, 60% on the east and west. The variation in opacity of the aluminum screen addresses the variation in solar avoidance required on the façade orientations. Due to the round shape of the tower, some shading is required on the "north" façade, as it will receive sunlight in the early morning and late afternoon hours. So the benefit from a façade like this is directly reflected in the electricity consumption for the cooling process of towers inner ambient. [Cilento, 2012]

2.2.1.2. Detached implementation of hypersurface façade

The detached implementations are a type of hypersurface façade. Differently from the first type that is present from the start in the design process, this type is independent from the building and functions as a boundary or a face for a space.

- **“Halo lights” and “Euphonious Mobius”**

In the same topic hypersurface architecture two projects, of students of second year in Computational architecture from the “University of New South Wales”, were build and then placed in the environment of Customs House in Sydney. “Euphonious Mobius” and “Halo Lights” were the names of projects chosen from the class competition. The class was divided in two teams to bring into reality these projects. Then the reaction of each user passing by would be analyzed from these teams.

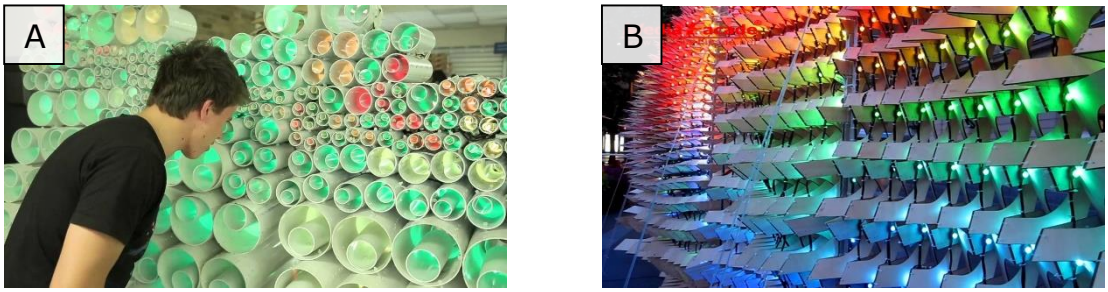

Figure 15. (A) Halo lights, (B) Euphonious Mobius [UNSW, 2012].

In the *Figure 15 (A)* is shown the reaction of the wall to the voice by changing the colors. In the *Figure 15 (B)* wall also reacts by changing the colors but not according to the voice, this one according to the movement in front of it. The precision of both of them is not in a high level because devices used are simple a microphone and a hand camera but even though they work well. [UNSW, 2012]

- **“Aegis Hyposurface”**

Continuing with the detached type of hypersurface walls in 2001 was build a “Hyposurface” wall in a competition for interactive art peace in UK [Burry, 2001].

This term is different from the hypersurface and the difference is made in math terminology. Suppose an enveloping manifold M has n dimensions, then any sub-manifold of M of n − one dimensions is a hypersurface. Hyper- is the prefix of "over" hypo- is the prefix of "under" if we move form n to n-one should not it be called Hyposurface.

The team of designers was combined from persons qualified in different fields and from different countries of the world. Even though the budget of this project was not very high, the precision of it was great *(Figure 16)*. The physical device consists of a modular frame, a matrix of pneumatic pistons, a series of rubber 'squids', and a surface of bi-polar metallic facets [Burry, 2001].

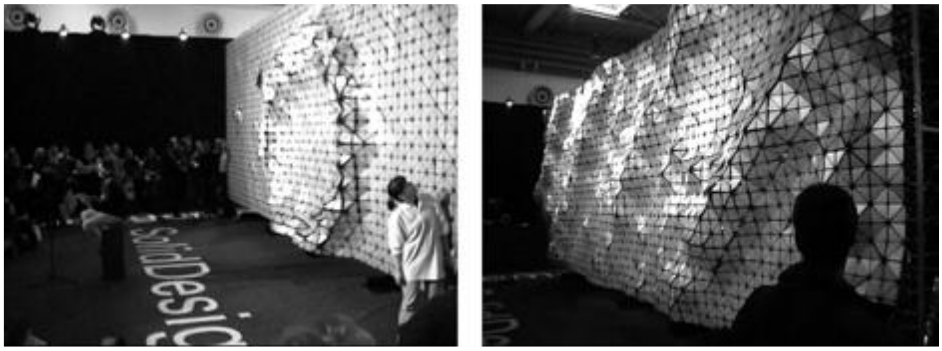

Figure 16. Aegis Hyposurface [ACADIA, 2001].

This project was the first prototype of this category in the world and its name is Aegis hyposurface. This wall responds to the environment in real time and this made the calculations and realization of materials difficult. The team made so many experiments with materialization and the help of specialists of that field was efficient. They made the final layer of the wall divided in triangular shapes, which were metallic. It was connected in spherical joint so it could be rotated in axes. The spherical joint was connected in the head of the piston. These pistons, which are very fast in their open/close process, are connected with as they call it "Central nervous system". Team head also a programmer who programmed the pistons movement into a wave or letters or something spontaneous

as the reaction were programmed to be. The result was very satisfactory. People enjoy touching and standing next to the wall so that it can push them away.

2.2.1.3. Attached implementation of hypersurface facade

This category is when the installation is installed on the façade and this is called attached skin. This type of installation is added after the building is build and that is why is called attached because it is added and not planned to be there. This typology is generally a temporarily façade because it can be removed and replaced by another one which can be different in shape and dimension.

- **BIX installation, Austria**

BIX Installation is a communicative display skin, a very large low resolution light & media façade for the Kunsthaus Art Gallery. The images and graphics shown on this facades are decided and in the same context with the current exhibition of the museum. The interactivity of the façade is connected with the inner usage of the museum and the façade changes according to the mass movement inside it. “The sleek blue shimmering façade” made of opaque plastic tiles is the outstanding characteristic of the building [Aydogan, 2009]. In this façade are installed 930 ring-shaped fluorescent lamps, which are controlled by computers. The light rings are not new but the idea to create a digital display with conventional fluorescent lamps is the innovative approach. Each lamp acts individually as an independent pixel. Because of this big pixilation, the façade displays very low-resolution graphics. Because of the low resolution, the images can be read only from a long distance *(Figure 17)*.

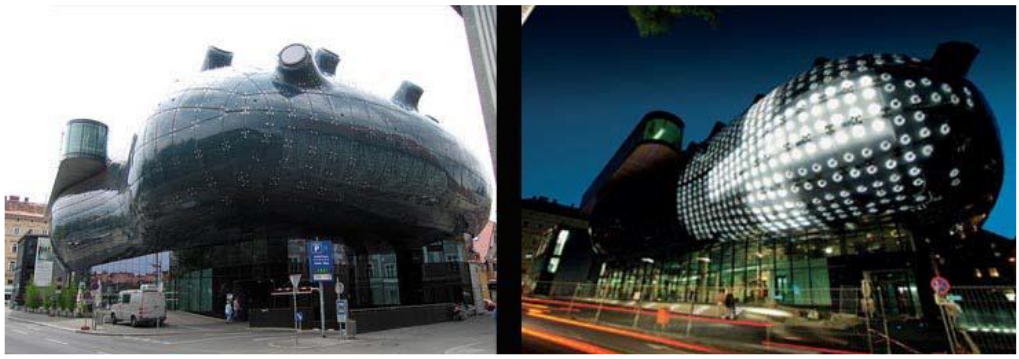

Figure 17. BIX installation during day and night [MoMA, 2003]

- **Moodwall Amsterdam**

Moodwall is placed in a tunnel in the city of Amsterdam in 2009. The Moodwall is 24 meters long and consists of 2500 LED lights, a ribbed semi-transparent wall. This was a part of the project of municipality to make those spaces safer. The wall reacts on anyone who passes by with changes of the colors and/or moving of the images. This distracts people and makes the scene different every time. The curves in the wall make it less suitable for graffiti. The resolution is horizontally stretched so the images of the screen are better visible from outside the tunnel. Even though the angle of curves does not lose the screens readability. The rules and limits on this tunnel project mainly come from its environment context and the infrastructure of the tunnel itself. Many dimensions and characteristics of the tunnel are already set, and this forces the design. The tunnel is designed for pedestrians and cyclists only. Since it is built underneath the station, the noise from the train is unavoidable. As the tunnel is situated in the city center, it is assumed that the tunnel is highly used by pedestrians as well as cyclists, with different ages, abilities, gender etc. In addition, the environment around the tunnel contains a lot of traffic, with cars, busses, cyclists and pedestrians. The design inside and outside the tunnel is also constrained by the budgets and investment of the local authorities. It will be difficult for the users to accept this project with that budget but the municipality will built them *(Figure 18)*.

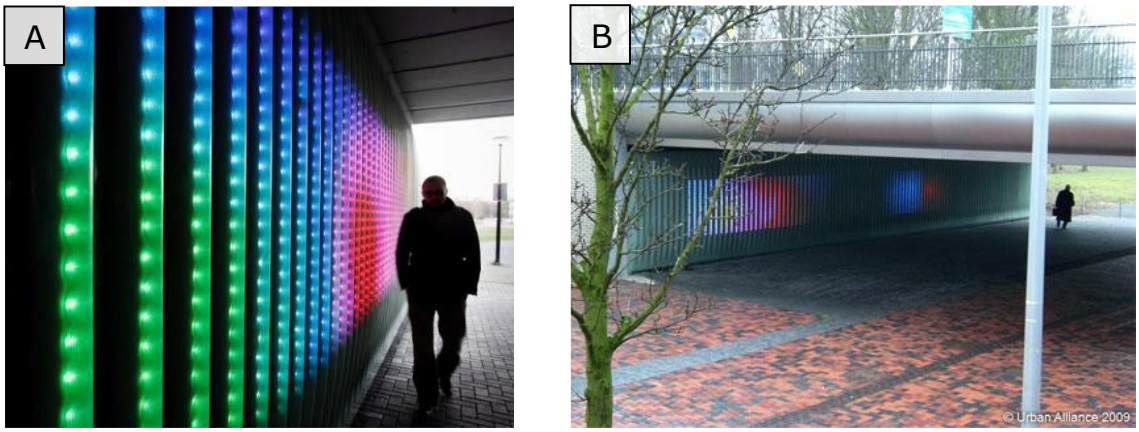

Figure 18. (A) Moodwall in detail, (B) Moodwall from outside the tunnel [Municipality of Amsterdam, 2009]

Some television interviews show that there were no broken lights in one year, and users apparently like the ambiance. However, users do not think it improves the safety perception.[Saieh, 2009]

- **"Sonic facade, creating a sounding architecture" by Alina Granville**

The results of this thesis explore the creation of sound in a tube in relation to architecture. The sonic facade is likely to only be applied to certain typologies of buildings, such as buildings in the public territory, educational institutions, and museums. In fact, this type of façade cannot be attached in every type of building. It would be annoying if it were put onto a house and an office building, as the users will be annoyed. Only if there would be a development in the part of a tube cap that would be able to be attached onto the tubes to turn their sounds off. The sonic facade grammar is capable of generating a wide range of possibilities. The designer has shown the verity of shape grammar that could be applied onto this façade. The grammar is flexible enough to allow for openings and different designs based on user preference [Granville, 2012]. The visual appearance of the facade

is much unlimited and is free to be as complicated or simple, or as ugly or as beautiful as the user chooses it to be. The designer limits the grammar to only have two or three types of tubes depending on the set length, to control the amount of variation in the design. The result of this façade is very interesting because this is how we can hear architecture but this façade is in the stage of a proposal and not applied yet *(Figure 19).*

Figure 19. Render of Sonic Façade [Granville, 2012]

2.2.2. Discussion of the benefit from these case studies

Around the world, hypersurface architecture has been present for a while and learning from them is the best way to approach the design of the proposal. In Albania, there are no examples of such facades therefore the case studies are all from other countries. From the case studies above have been pointed some properties of hypersurface façade and they are integrated in the proposal design. Cultural value that the façade exposes to the outer viewers is one property that has been extracted from the case studies. In some other cases safety of the site is in the focus. As the light gives safety in the road, the technology contributes in the first impression with the attention that it takes. Always a new design or technology is welcomed in the society because of the experience it guarantees.

CHAPTER 3

RESEARCH METHODS

In this section, it is described the process evolution of analysis and design proposal. The research methods consist on conducted questionnaires with the students of the case study, Epoka University and on a survey done on the pedestrian/ car movement in front of the wall.

3.1. Methodology

As every study needs a background on its thoughts and ideas the concept and the suggestion in this case specifically is based on different projects which are similar in problematic. An enhancement of the main façade of the campus is proposed. This is based also in the original concept of the wall before it would be built. The reason why it is fragmentized and each module rotated, according to the walls linearity, is to provide a longer view time for the "full" wall. This is based on the original proposal plan of the built wall. Materials that were used for the development of the study were generally virtual and based on the published papers. For the site, analysis and concept ideas were used some drawings, which were ready from the built project. "Corda" is the studio who designed the wall and the 2D drawings are borrowed from that studio. After the preparation for the 3D virtual model of the actual condition, the analysis of the proposal began and a similar case was found as a case study. The Light-form project is designed in Rome and it is designed for kids. It is manually interactive which means it is not commanded by any

technology to turn the lights on or off but simply the user open and closes the wooden caps. This helped in development of the way the proposal was going to be.

The methodology of this study followed to collect data for the approaching way to the design. It is determined according to the target groups, which are considered as interactors with the proposal. First target group is high-speed vehicles passing at a distance from the wall and the second one are the pedestrians, which most of them are students and in this case, they are closer interactors. The method used to analyze the vehicle flux is a survey at the site proposal in different hours in one day. The number of vehicles, which pass by in fifteen minutes, is counted and it is compared between one-day periods. At the same time from the same survey is counted the number of pedestrians too. Below in the charts are shown the values for each case. For the pedestrians, which are, the closer user were asked with some questions, because they are the everyday users and they will contact the wall physically. The answers helped in the decision of the senses that the wall would be reactant and the design changes.

3.1.1. Questionnaires

The questionnaire was conducted with campus users, students, because the students will be everyday users of the installation and those passing by car were not possible to be asked. In this questionnaire were asked also professors, as they would be users of the wall too. Presence of the professors opinions were very helpful. An e-mail was sent to everyone who is actually studying in Epoka University to fill a questionnaire in digital form. The email had a brief explanation for the “Hypersurface architecture”. The questionnaire had twelve questions between them some .gif-formatted illustrations. Below in the appendix will be shown from the *Figure 32* to *Figure 43* the questionnaires answers in percentage for each alternative. Questions are formulated according to other designs that are similar.

The questions for the senses and the pixel modules form are referred to other installations design procedure.

The second questionnaire is made after the design proposal has been finished. The questionnaire contains in a full explanation how the module and the wall made of modules will work. It is simulated also in some .gif-formatted views, which show the form that the module will open and close its caps. In the end of the questionnaire there were only two questions; would you use the interactive wall and how do they find the design. The chart for this questionnaire are also shown in appendix in *Figure 44* and *Figure 45* for each question.

3.1.1.1. Discussion on the questionnaires results

After collecting the questionnaires answers, the analysis is done. Four hundred answerers were registered and some of them are professors. A few of the answerers suggested something different in the "other" option. This questionnaire was prepared to make clear the state of the actual design and what would like the most of the answerers the design proposal to be. Of course, this is not the only source that helped on the decisions but it helped to understand how the proposal would be expected.

The students were asked at the first question for their field of study. Most of the answerers were from the "Faculty of Economics and Administrative Science". Fifty five percent were from this faculty and this indicated the optional suggestions that they have gave. The information that this faculty has for this kind of technology is not in the same level with the "Faculty of Architecture and Engineering". In the second question is asked the year of study. This helps to figure out how years of study indicate in the experience of the wall differently. The next question asks about the change they would like to apply and the alternatives are according to the actual use or to actual thoughts that are said for the condition of the wall *(Figure 20).* The most of the answerers thought that the wall should

be lightened and second group thinks that it should be completed because it looks unfinished.

Figure 20. The actual use of the wall, advertisement attached [Tafa, 2016]

After showing two pictures for the urban screens, they were asked if they had noticed them before and if yes did they like them. Most of them did notice the urban screens and most of them liked urban screens and so is the answer to the question if they would like them more if the screens or facades would be interactive. In the questionnaire were included some .gif pictures which illustrated the movement of different typologies of the interactive facades.

The answers were generally positive to the change and to the typology that have been chosen to make the difference with. This is shown also in the last question where they were asked for the built permission if their thought would will be considered. The percentage of “yes” answer is 96%.

Valuable information is collected from this questionnaire and it helps in the decision of the sense selected for the design proposal, in the interaction way the wall would transform. The wish of them to have such an installation in the campus is understood.

3.1.2. Vehicle flux analysis

As it is said in the previous sections, the senses of the proposal design are movement and touching. This analyze of the movement flux will back up and help the arguing part for the decision to select these two senses.

These numbers are the average of three different day's survey. For fifteen minutes were count how many pedestrians and cars passed in the front of the wall. The counting's were made in three different periods in a day, in the morning at eight o'clock, in the noon at twelve o'clock and afternoon at eight o'clock (*Figure 21, 22)*.

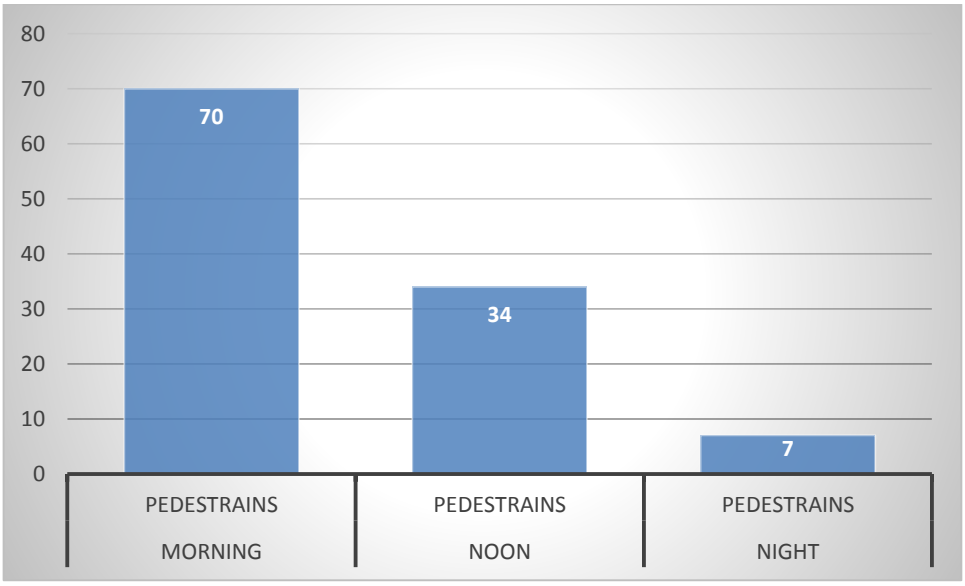

Figure 21. The flux of the cars and pedestrians passing in the front of the wall

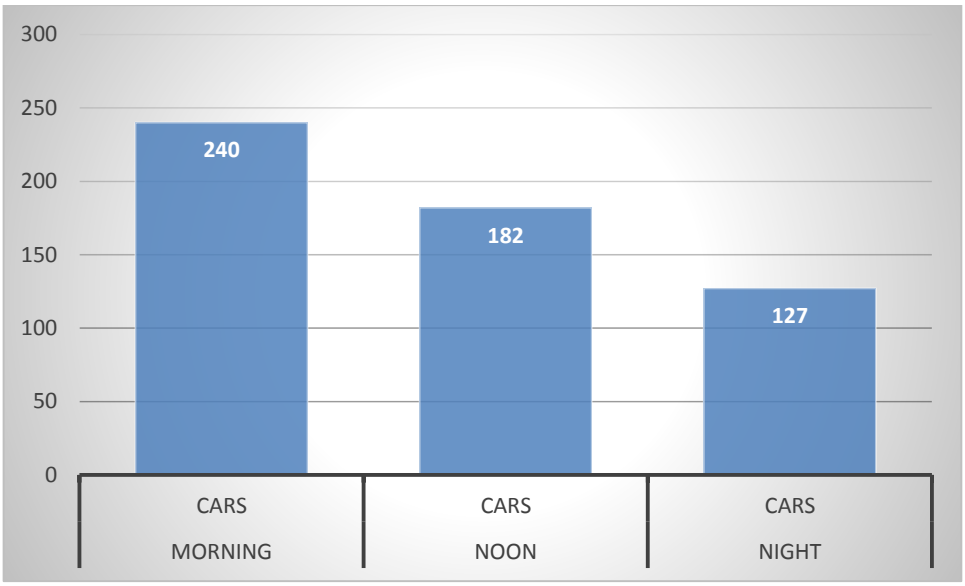

Figure 22. The flux of the cars and pedestrians passing in the front of the wall

The answers tell that the traffic of circulation goes down as the night comes. Still the number of vehicles is considerable in the night period but it is the lowest in comparison with the other period of a day. The pedestrians counted in the night column are those who live in the campus and those, which are the students of the Master degree. They may be the only users of the closer part of the design during night.

CHAPTER 4

THE CONTEXT OF THE PROPOSAL

After the brief analysis of examples of interactive designs, in a specific case is proposed a design for the entrance of the "Epoka University" campus. In the following part are explained the reasons behind selecting the campus entrance, what is the visual value of that, what influenced to select this specific topic for this specific site and what is proposed to do with the actual state of the wall.

4.1. Location and importance

The site is located on the side of the national road to airport "Nene Tereza" in Tirana. The flowed of cars and the diversity of public makes the location placed in a valuable attention. The road, which connects airport with the national road, is a slow road where you cannot go with a higher speed then 50 km/h. This provides a long eye contact for the passengers to see the campus *(Figure 23)*. This location is not in an urban environment but the flux of pedestrian circulation can be compared to an urban space because of the function of the building. The students are the citizens, which will pass by and will interact with the wall. The vehicles are limited in the speed, they are somehow forced to experience the road slower, and this gives an opportunity to the walls installation to catch the eye of the drivers or passengers. The wall will not be dangerous with the installation for the drivers because, the wall is located according to the standards of billboards and advertisements that are set

by the municipality, which is more than 25m away from the road. The level of the wall is lower according to the road and this makes the wall, as it is a scene for the passers.

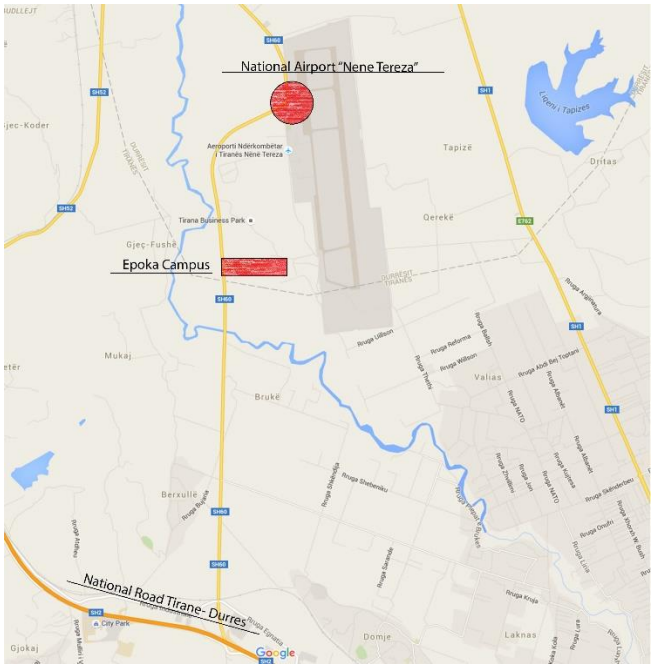

Figure 23. Location of Epoka Campus in Relation with National Road and National Airport [Google map, 2016]

The terrain of the campus is flat and the fields around it are used for agriculture. There are some buildings as neighbors to the campus but they are located in a considerable long radius from the campus. These two factors make the view from the road to the university even easier. No buildings and no high-rise industry are present to block the view. The eye contact with the wall, which encircles the entrance part only of the campus, is available from a long distance. This wall is the main object of this study and the focus of the proposal. It is in a contact with the students who pass by it in the morning when they first come to the university and it is a first impression for the public, which generally passes by with vehicles. With this key location and attention on this wall, is decided based on the previous examples and case studies that the contact and the visual dialogue between the façade and the public can go in another level.

The location and distance from the observer of a media façade plays a critical role in the perception of animated image and the reception of communicated message. Some façades work at different levels of perception that give an experience at every distance –from very far to close. There is a direct relation between visibility and the situation of the building. Designing for the highway is different from the design for pedestrian that defines the display size, pixel numbers, light brightness etc. The bigger the pixels, the further the man can perceive the picture and brighter light effects make display more visible at nighttime. On the other hand, question of local issue opens new intentions for designers to take existing space, its culture, and architectural style into consideration.

4.1.1. Concept influence

The concept of the actual status of the wall is thought as such: Epoka Gate is the spatial situation of the edge condition between Epoka Campus and the National Road Tirana-Rinas. [Hajro, 2013]. This spatial situation is the interpretation of the dualistic characteristics between the high-speed vehicular linearity of the road, and the pedestrian stilly nature of the campus. It is the synoptically space of movement. The Epoka Gate's robust/vigorous structure is the result of this dual mood. Being the first visual contact, and creating a tangential form of communication with the eye, has called for the expressive need of the Gate. In this context, the approach is between the rapid nature of the road and the static position of the Gate. The major approach from the two sides rather than from the front, invites the Gate to create perspective visual communication rather than frontal. Thus, its geometrical development is composed towards the longest viewpoints, defining the transitional space to the campus. The whole spatial situation of the edge is composed of the entering point, the Gate, and the linear walls. The Gate consists of the shelter like structure and the security unit. The raised planar surface of the shelter embraces the space to the ground. While the security unit acts as a cubicle to control/divide the entrance and the exit. The walls define the edge of the campus creating visual porosity between two

situations. Their angular setting allows a vision of the other situation on one side, while it becomes a surface for the lettering on the other *(Figure 24)*. Their waving height emphasizes the density of space required at the entrance and exit point. The pavement and greenery pattern follows the flow of the people movement through these two different situations"

Figure 24. A view from the front of the wall, showing the fragmentation of the wall [Corda, 2013].

This design considers the user in many dimensions. The proposal in this case a hypersurface installation on the columns makes them an interface of the campus with the users.

4.1.2. Proposal

The proposal as a process has made many changes from the beginning to the result. The indications have been many similar cases, which were produced before around the world and in the same field.

The proposal in the entrance of the university is that the wall can be physically accessed, touched, and interactive from the pedestrians and from the movement of the cars on the road parallel to it. In the *Figure 25* is shown a proposal project done in Italy. It is called Light-form. It is called like that because you can form shapes by opening and closing manually only the caps of the lights installed under those caps. It is a design for a kindergarten.

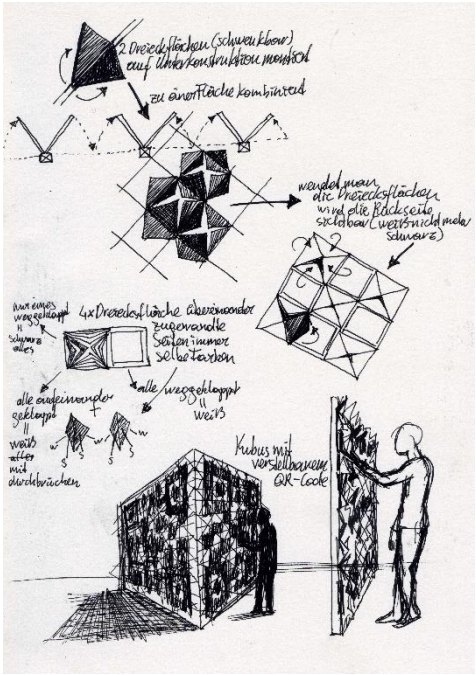

Figure 25. Light-Form. [Rogers, 2010].

This project has been an inspiration for the proposals shape and concept. The light-form has no sensors and it is commanded only manually. The proposal will be a design for two scales, vehicles and pedestrians. It will be accessible for both of them and interactive to both of them. The movement sensors will detect the vehicles movement, their speed and their direction, according to that will be played the animations or signs on the pixel modules *(Figure 26)*.

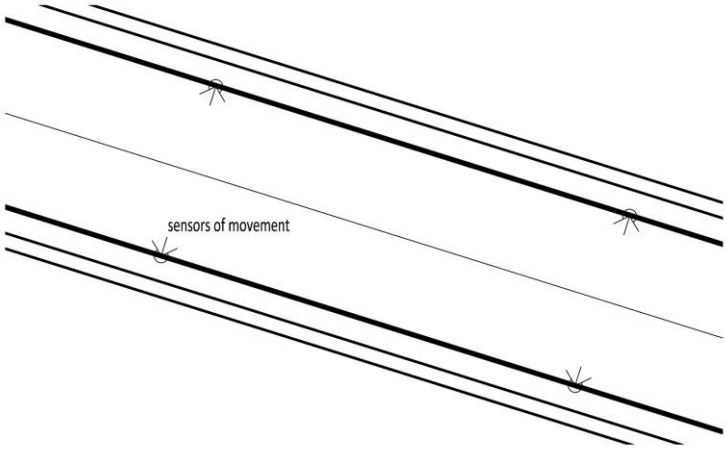

Figure 26. Sensors location [Tafa, 2016].

The pedestrians, which are the close users will physically access the wall and will modularly divide the wall by their interactivity. They can turn on only a module by pushing the button in the center of it and it will open its caps automatically the four of them in the same time. They can play also with the force they push the button. The game minesweeper, which is the concept of this part. If the force applied in the buttons changes so will change the opening of the modules. So with one push can be opened more than one pixel module as in the game the numbers are unpredictable.

They will open and close manually and automatically depending the density of the usage in each mode. If there are passing pedestrians the priority will be theirs and if they do not interact with the wall then the priority will pass to the car movement.

Most of the students selected to lighten the wall, sun effect, touching and pedestrian circulation. The sun effect would make them as in the other typologies of interactive screens only spectators, but in the hypersurface architecture, they are inter-actors.

4.2. Modelling and illustrations

In this section, we will see the software's that will help for the preparation of the drawings and virtual modellings. The real materials of the proposal are not decided yet but there will be some suggestions. There must be some tests for the materials to be decided clearly.

4.2.1. AutoCAD drawings, plans and views

Modelling starts by drawing the 2D drawings. Sections and plan are drawn in the AutoCAD software. The drawings of the actual design of the wall are drawn from Corda studio and they are borrowed for this proposal. In this software are drawn only the detailed drawings to make the explanation with dimensions and details if this project will ever be built. In the *Figure 27* is shown the right side of the gate-wall of Epoka campus. The angle of the rotation of the columns is noticeable. A module of the wall is taken as an example, a column, because the others are just the same for the building process. The horizontal section, the plan, is taken in the height of 90cm from the ground and it shows the repetition of the module.

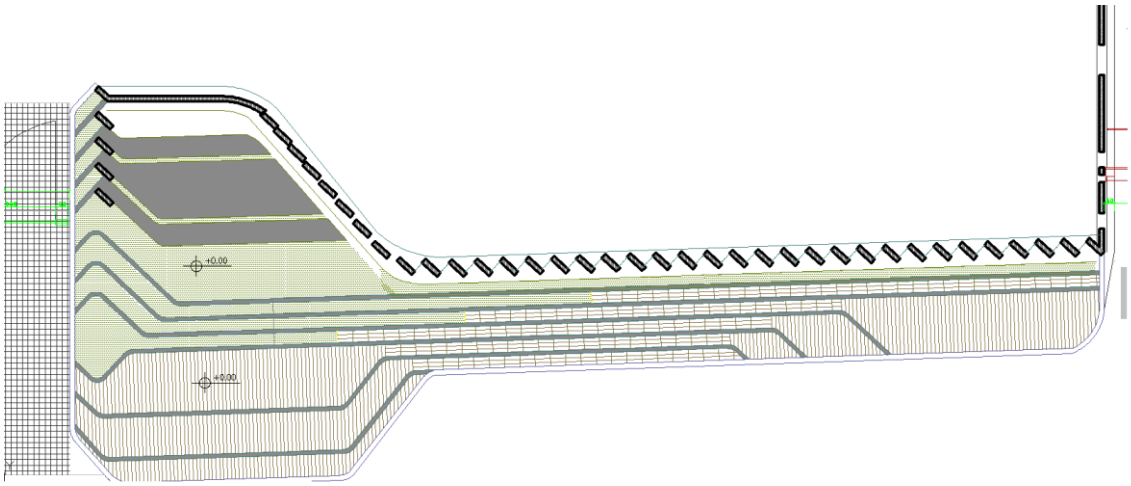

Figure 27. The right part of the wall in plan [AutoCAD, 2016].

In the *Figure 28* is shown the plan and the front view of the façade. The designs geometry is simple, squares are the main geometry shape used as the game of Minesweeper but the difference is made from the light effects. The column is divided in 4 pixel modules in horizontal and 10 pixel modules in vertical. The division of each pixel module in a short distance gives the idea of another pixelated ration and that is two times higher in each direction, 8 x 20. In the center is located the square button. It will not change the color.

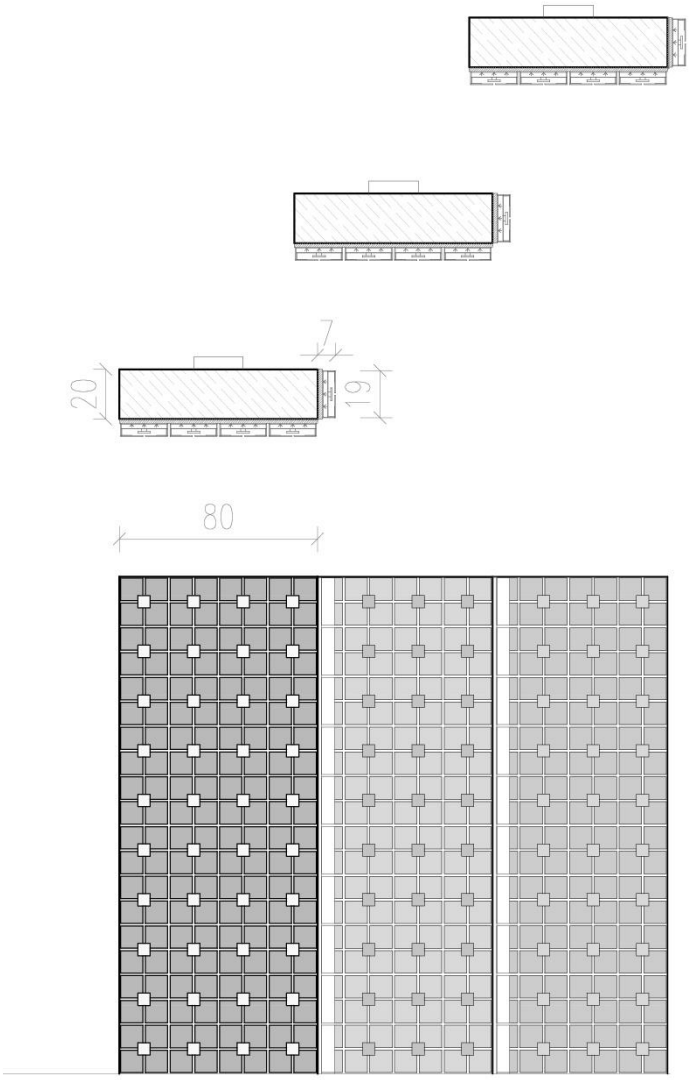

Figure 28. The front view of the wall and the plan [Tafa, 2016].

In the *Figure 29* is shown the pixel module in a closer look and the dimensions.

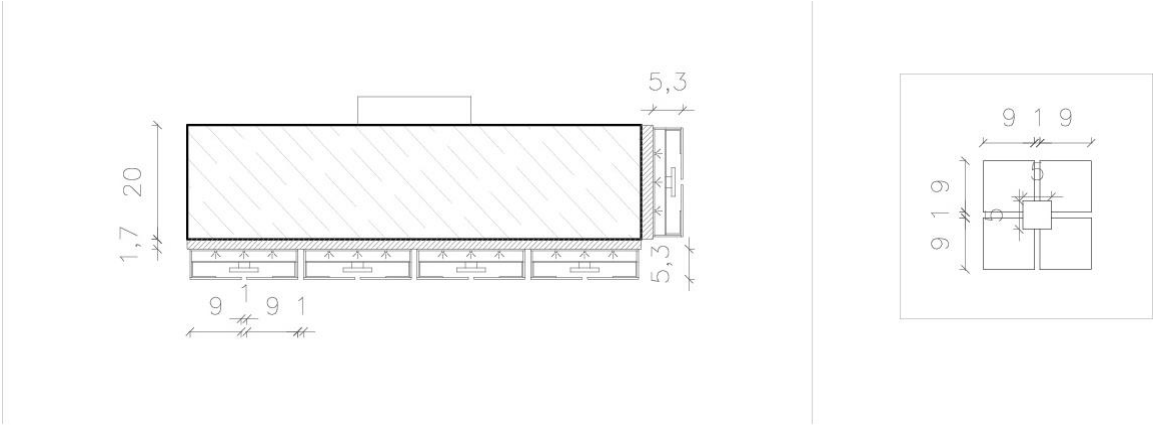

Figure 29. The plan and a view of a pixel module [Tafa, 2016].

In the *Figure 30* is shown the side façade of three modules of columns and their plan. A repetitive design is proposed in order to preserve it from the complexity of the shape and to utilize that field with the effects of light and caps movement.

AutoCAD helped in the 2D drawings and then the other software's are involved for the rest of the project.

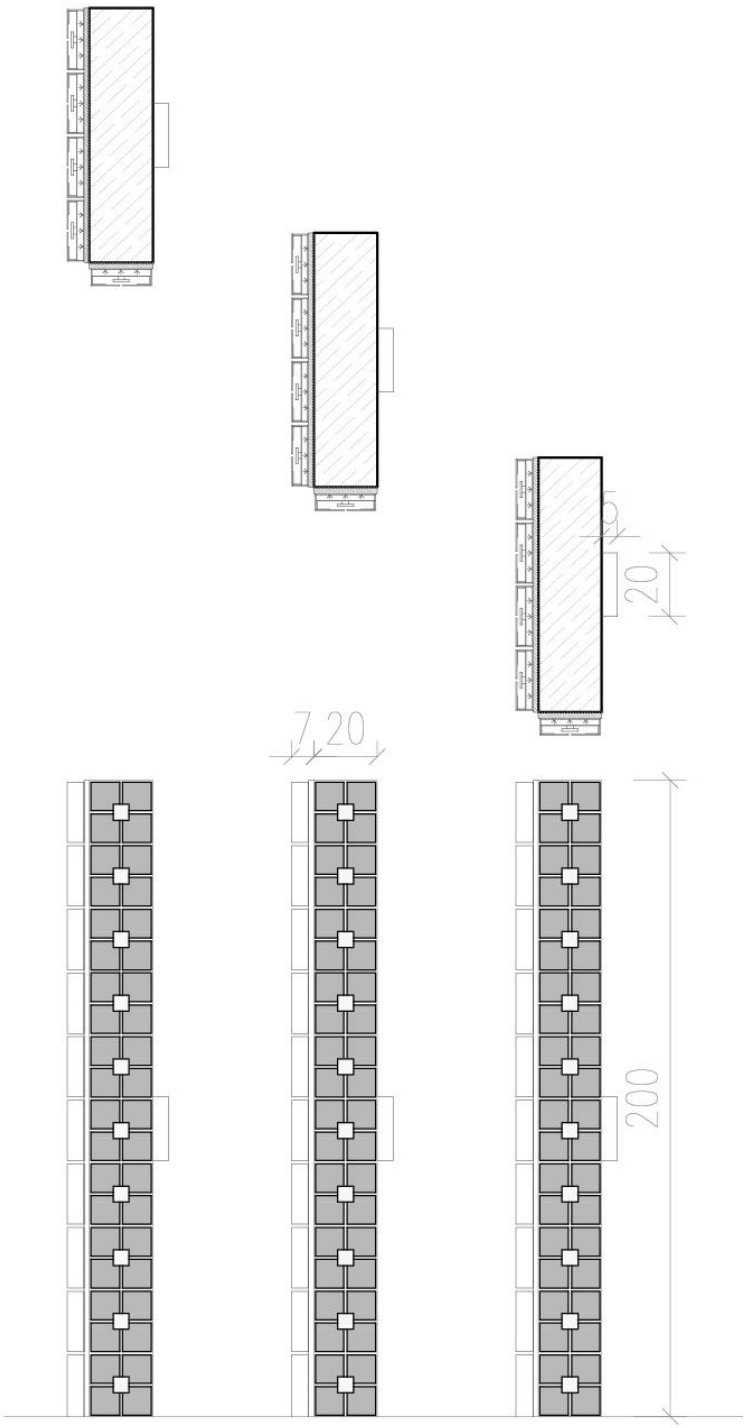

Figure 30. The side view of the wall and the plan [Tafa, 2016].

4.2.2. Model of the concept proposal

The physical model of the design proposal is made in order to see the final view of a module and to experience the reactions of the sensors. Building it make the struggles be evident and plan according to them for the real project. The materials of the model are wood and glue. It was not expensive from the building part. The ‘expensive’ word is heard generally in interactive projects and it is an attribute of them. The sensor of the movement and the motors, which in this case are servo, work depending to the micro-controller. In the *Figure 31* is shown the module and the micro-controller which are being installed. The idea to have a micro-controller came from the need to have the wall interacting. This is used to control the module independent from a computer device. On the back flat face of the module, inside is installed also the LED which in this case is only in one color. In the middle of the module stays, a simple button taken from a mouse and it will be covered by the central part of the module.

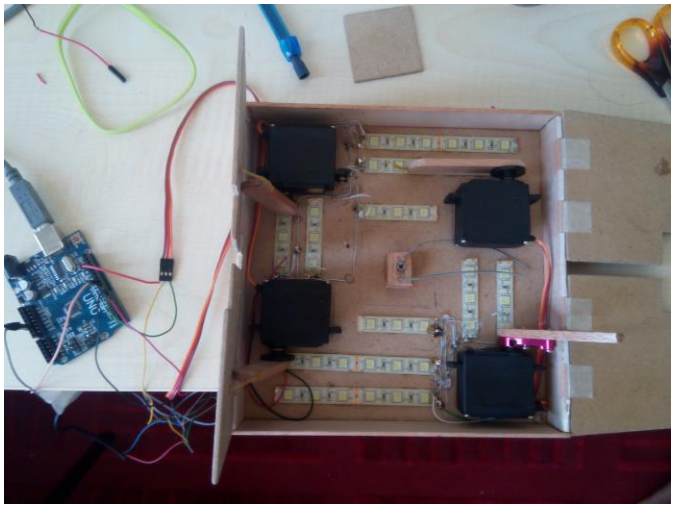

Figure 31. The micro-controller and the model under work

These parts are controlled by a micro-controller called “Arduino”. It is like a small computer, which supplies signal control for any device. If the code is uploaded on the

device, it can work with a 12v charger without connection to any other device. It converts the 12v to 3.7v. It works with 3.7v and it can afford 5v energy for some types of motors but the ideal circuit is to have only the signals taken out from the Arduino. It remembers the code and runs it repeatedly. It has a reset button on board which can reset the code running and run it from the beginning. The signal given from the micro-controller is programmed in a programing language, which is similar to “Java”. The code is programmed firstly according to the needs of the project, as the animations or warnings are. In addition, there are programmed the reactions of the wall for each interactor. In the *Figure 32* is shown a view from the code of a random move of the motors.

File Edit Sketch Tools Help

BTAFArandom1

```
//this variable will hold a random number generated by the random() function
long randomNumber;
#include <Servo.h>
Servo servo10g;
Servo servo11g;
Servo servo12g;
Servo servo13g;

int pos = 15;

//Set up - this is where you get things "set-up". It will only run once
void setup() {

servo10g.attach(10);
servo11g.attach(11);
servo12g.attach(12);
servo13g.attach(13);

  //setup serial communications through the USB
  Serial.begin(9600);

  //Let's make it more random
  randomSeed(10);

}//close setup

void loop() {

  //generate a random number
  randomNumber = random(2,6); delay (500);

  //display the random number on the serial monitor
  Serial.print("The Random Number is = ");
  Serial.println(randomNumber);
 if (randomNumber == 2)
{
servo10g.write(100);  delay(1);
servo11g.write(15);  delay(1);
servo12g.write(15 );  delay(1);
servo13g.write(15);  delay(1);

 }

  if (randomNumber == 3)
{
servo10g.write(15);  delay(1);
```

12

Figure 32. The proposal of the writings on the wall [Corda, 2014].

In the appendix is shown the code used for the random reaction to the pushbutton, which in this case is pushed three times.

The modules installed on the column are planned to be of the dimensions 20cm x 20cm and each of them is separated in parts, which are the elements that will open and close. There are 40 pixel modules in the front side of the column (4 x 10) and 10 pixel modules in the thin side of the column (1 x 10). The density of the pixels is considerable for the vehicle eye level and pedestrian approach.

CHAPTER 5

CONCLUSION AND DISCUSSION

The study aims to enhance the actual view of the wall, which is an edge condition between the campus and the road. This is done by an architectural way and it melts the edge and makes it a tool of communication, a smooth passage from the outer part to the inside of the campus. For similar cases, other studies show different results and different designs but important is that the suggested design is in a dimension that the users can approach physically and virtually. This will give to them a new level of consideration for the institution. According to the project of Tirana with the colorful facades or for the applied projects mentioned in the case studies, the atmosphere around in the city has been changed from such projects. The users who pass by with car will have also a better experience as a first impression for the university.

The aim of the proposal is to set a dialogue between the user and architecture more flexible and valuable. When the user is in the center of the buildings focus the interfering of the user in the state of the outlook of the building makes the function of the façade stay at its highest ideal level. As it was said before, façade is a communicative tool for the urban environment. Interactivity as in the other mentioned cases rises the attention and involves the interactor into the facades composition. This is a factor which is present in other cases too, so the familiarity of the users with interactive objects is in a rising slope.

While focusing in the proposal and the specific case the study has pointed out some differences which are present between each applied case. Every case is unique according to the language used in the design of this kind of facades.

This is not the only way a façade can be enhanced but according to the sources this is one with many advantages and it has its disadvantages too as the expensiveness, weather duration but with the time these problems are becoming lighter and lighter. To test this study out a prototype was build and the weather duration stays as a problem as the materials used are not waterproof but with the expensiveness can be worked on. The experience of each student with the prototype was differently interesting and students were ready to see such a design in our campus. Only a few of the students, eight from sixty-eight who were asked in the second questionnaire, think that the proposal is not satisfactory and they would not use it. So most of them liked the animated atmosphere of the proposal prototype and they would enjoy the usage if it would be applied as a project. A column covered with these type of prototypes would be a real test for the students. The result would be more noticeable there as with the prototype. The sensitiveness of the module can be wider. It can be sensitive to more than two senses. These changes would make the proposal an interactive medium for everybody, reminding the aim of this kind of façade design. This study could have been developed further by including the user not only as an interactor but also as an active agent even in the design phase.

REFERENCES

Aydogan, E. "From “Advertising Architecture” to “Media Façade”: Communication Through Digital Display Skin". (2009).

Cunningham, D. "Advertising Architecture". Media Architecture Conference. London. (2007).

Gjergji, H. "Tirana Interantional Contemporary Art Biannual" . Institute of Biennale Tirana. (2009).

Palermo, L. "The colored democracy of Edi Rama: Art and Beauty as Forms of political action. Napoli: Second University of Naples (2014).

Rama, E. "Edi Rama replies to questions from an international audience". (W. Mayor, Interviewer) (2004).

Brill, L. M. "Electronic LED billboards: The New Voice of Business". Sign Industry: http://www.signindustry.com/led/articles/2006-09-01-LBLED_Billboards2.php3 (2006, January) (Lastly visited in 14 may 2016).

Burry, M. "Aegis Hyposurface©: The Bordering of University". http://cumincad.architexturez.net/system/files/pdf/811d.content.pdf (2001) (Lastly visited in 08 may 2016).

Cilento, K. "Al Bahar Towers Responsive Facade / Aedas". Archidayliy: http://www.archdaily.com/270592/al-bahar-towers-responsive-facade-aedas (2012) (Lastly visited in 16 may 2016).

"CITE creation". http://cite-creation.com/eng/ (2008) (Lastly visited in 21 may 2016).

Granville, A. "Sonic facade, creating a sounding architecture". DSpace@MIT: https://dspace.mit.edu/handle/1721.1/72642 (2012) (Lastly visited in 02 may 2016).

Hajro, J. "Epoka Entrance Gate". http://corda.epoka.edu.al/ (2013) (Lastly visited in 15 may 2016).

Manovich, L. "The Poetics of Augmented Space". http://firstmonday.org/issues/special11_2/manovich/index.html (2002) (Lastly visited april 2016).

Merriam-Webster :http://www.merriam-webster.com/ (2016) (Lastly visited in 30 may 2016).

Saieh, N. Moodwall / Studio Klink and Urban Alliance. Archdaily: http://www.archdaily.com/23239/moodwall-studio-klink-and-urban-alliance (2009) (Lastly visited in 27 may 2016).

Tscherteu, G. Media Architecture Conference. London: http://www.mediaarchitecture.org/conf/about/2007/07. (2008) (Lastly visited in 2 june 2016).

UNSW. "Students light up the customs house". https://www.youtube.com/watch?v=HEVUK9j3WiA (2012) (Lastly visited in 22 may 2016).

Arnheim, R. "Solids and Hollows" The Dynamics of Architectural Form. London: University of California Press Ltd. (1977).

Hård & Svedmyr. "Colour and varying external conditions" Stockholm: SCI colour report F19. (1995).

Krier, R. ""Facades" Elements of Architecture". London: Academy Group Ltd. (1992).

Virilio, P. "The Vision Machine" . London: J. Rose. (1994).

APPENDIX A

QUESTIONNAIRE

1. **Your Faculty** (400 responses)

   a) Faculty of Architecture and Engineering 181
   b) Faculty of Economics and Administrative Sciences 219

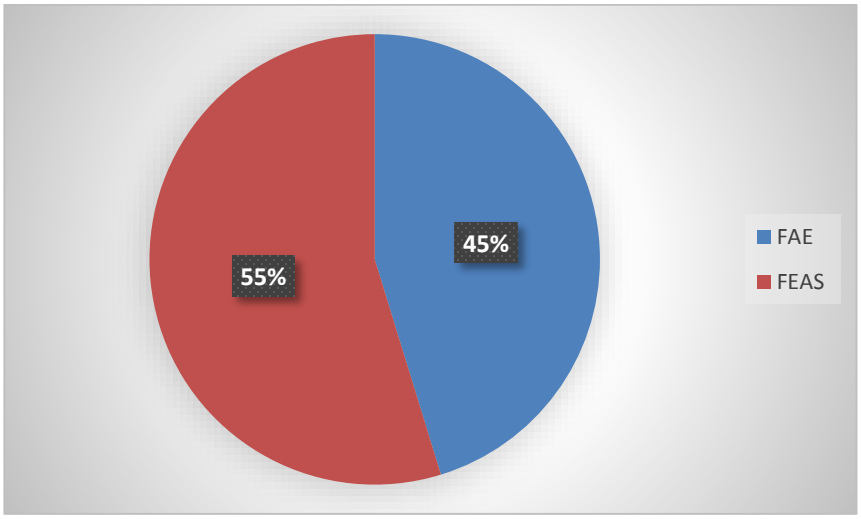

Figure 33. The faculty division

2. **Year of study** (381 responses)

   a) First year bachelor 108
   b) Second year bachelor 93
   c) Third year bachelor 73
   d) Fourth year 40
   e) Fifth year 67

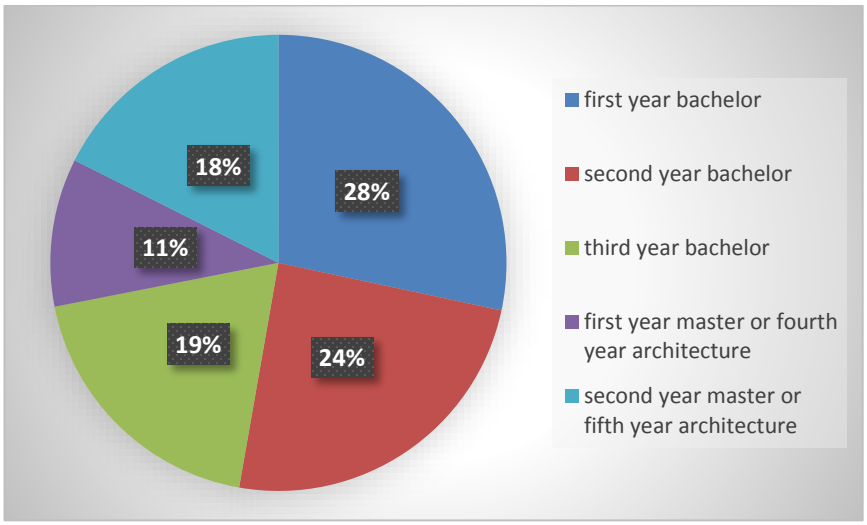

Figure 34. The percentage for each year of study

3. **How do you find the design of the wall with columns in the entrance of Epoka Campus?** (400 responses)

   a) Poor 35
   b) Fair 70
   c) Satisfactory 182
   d) Very good 96
   e) Excellent 17

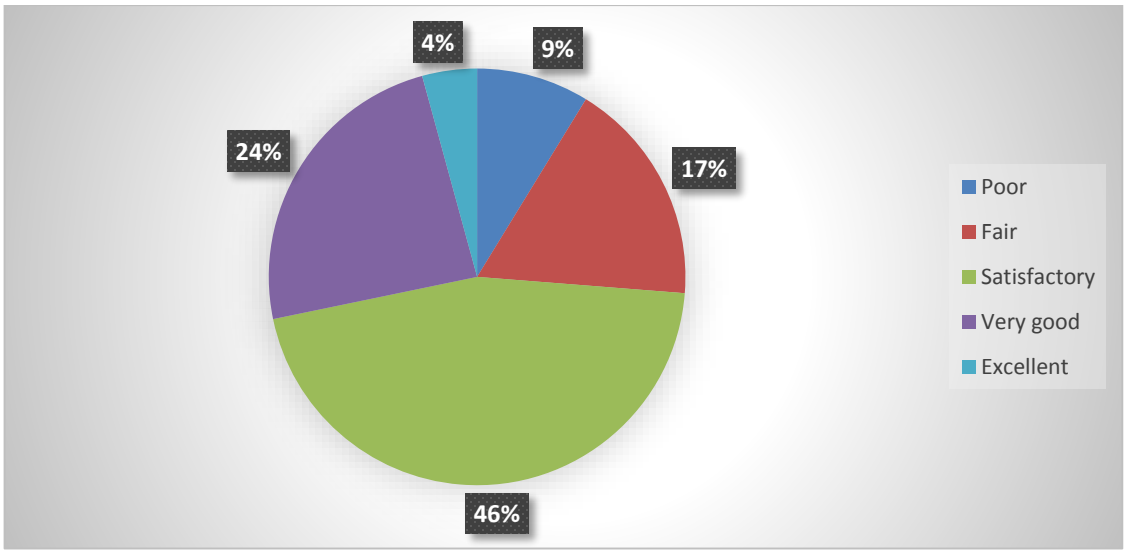

Figure 35. The answers for the actual design state of the wall

4. **What would you like to change if you could?** (400 responses)

a)	Paint it	80
b)	Complete it (it looks unfinished)	119
c)	Lighten it	142
d)	Attach some advertisements	29
e)	Drastic design change	56
f)	Nothing	54
g)	Other	16

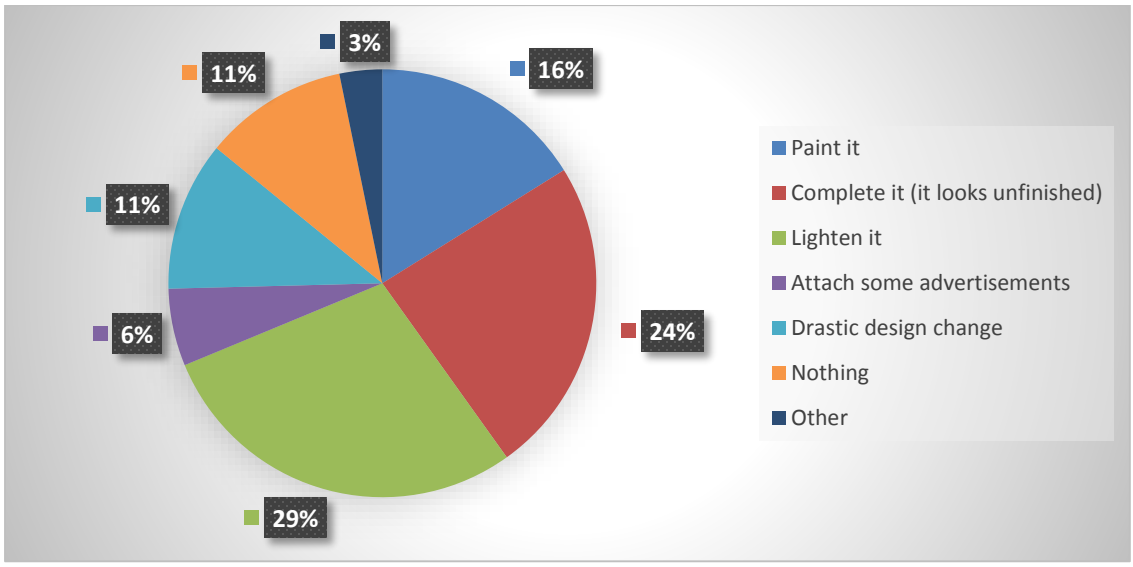

Figure 36. The alternatives selected for the way the walls design can change

5. **How familiar are you with urban led screens?** (400 responses)

   a) I noticed them before 384

   b) I didn't notice them 16

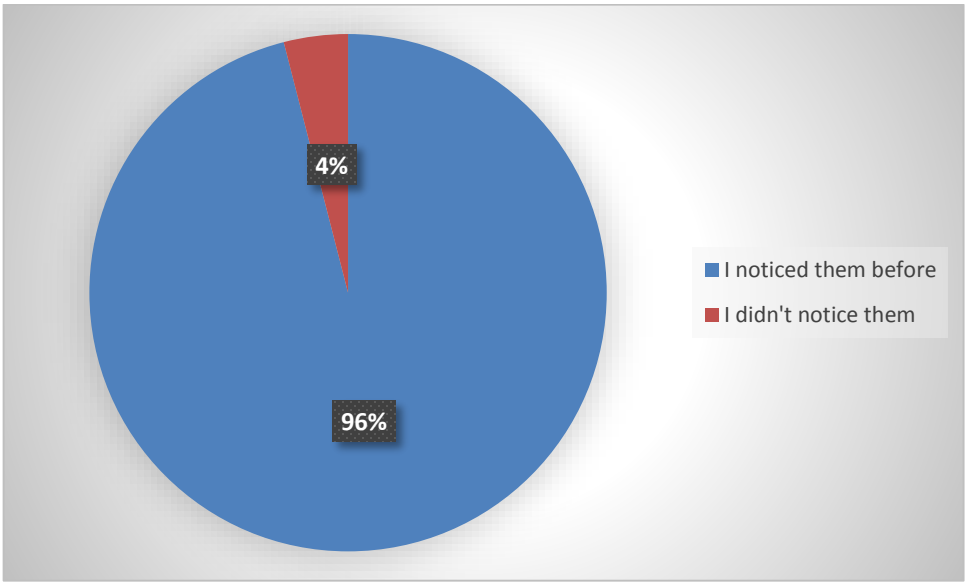

Figure 37. The answers for the notice of the urban screens

6. **Do you like them?** (400 responses)

   a) Yes 227
   b) No 42
   c) Somehow 131

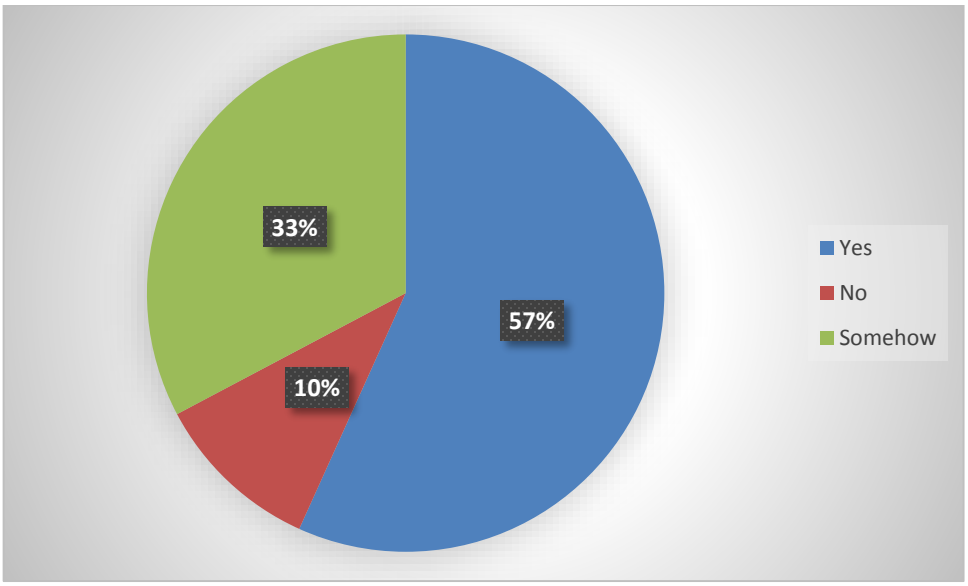

Figure 38. The state of answers if they like or not normal urban screens

7. **If they were interactive (so that your action will affect their program), would you like them more?** (400 responses)

   a) Yes 297
   b) No 24
   c) Somehow 79

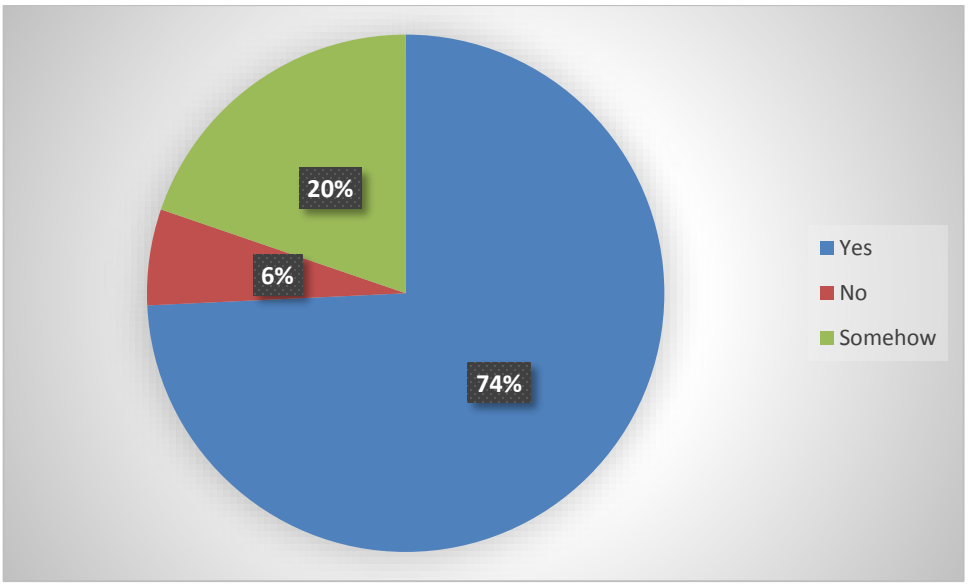

Figure 39. The state of likeability for the interactive screens

8. **How would you find an interactive screen on the entrance wall?** (400 responses)

   a) Poor 18
   b) Fair 28
   c) Satisfactory 103
   d) Very good 132
   e) Exellent 119

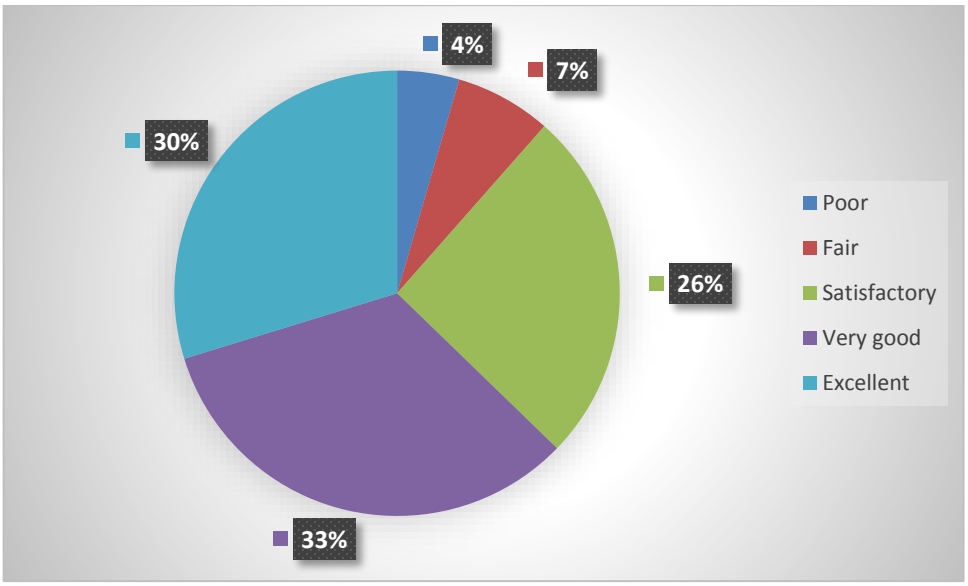

Figure 40. The state for the wish of presence of interactive wall

9. **What would you like it to be responsive to?** (400 responses)

a)	Wind	107
b)	Temperature	100
c)	Sun light	144
d)	Sound	93
e)	Touching	131
f)	Car traffic circulation	61
g)	Pedestrian circulation	111
h)	Air pollution	58
i)	Other	10

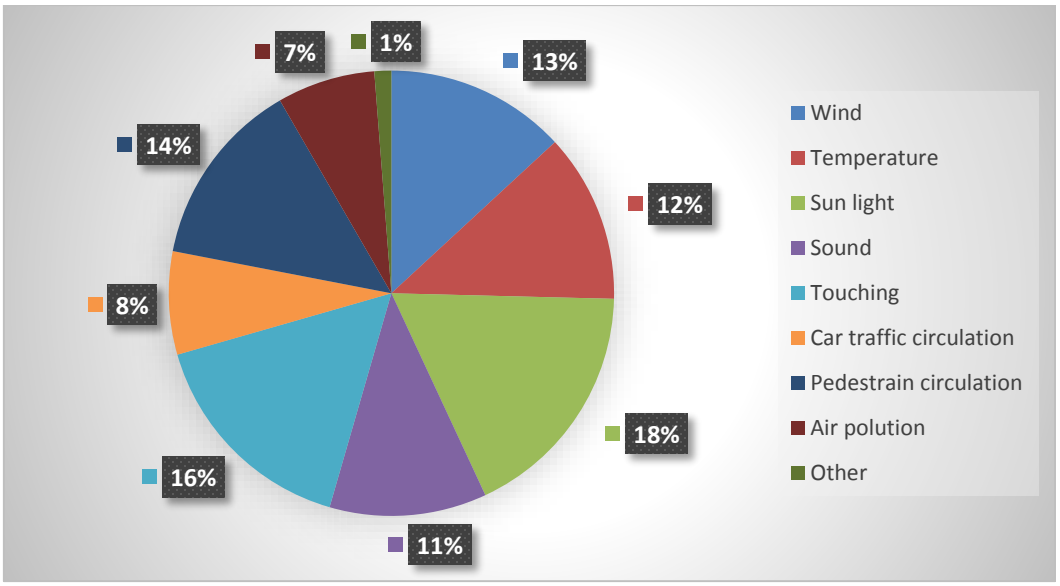

Figure 41. The rapport of the selected sensors that can be applied on the wall

10. **How would you like the reaction to be?** (391 responses)

a)	Lights turning on/ off	98
b)	Colour change	220
c)	Pixel module pops up	148
d)	Pixel module rotates	78
e)	Pixel module opens/ closes	93
f)	Other	11

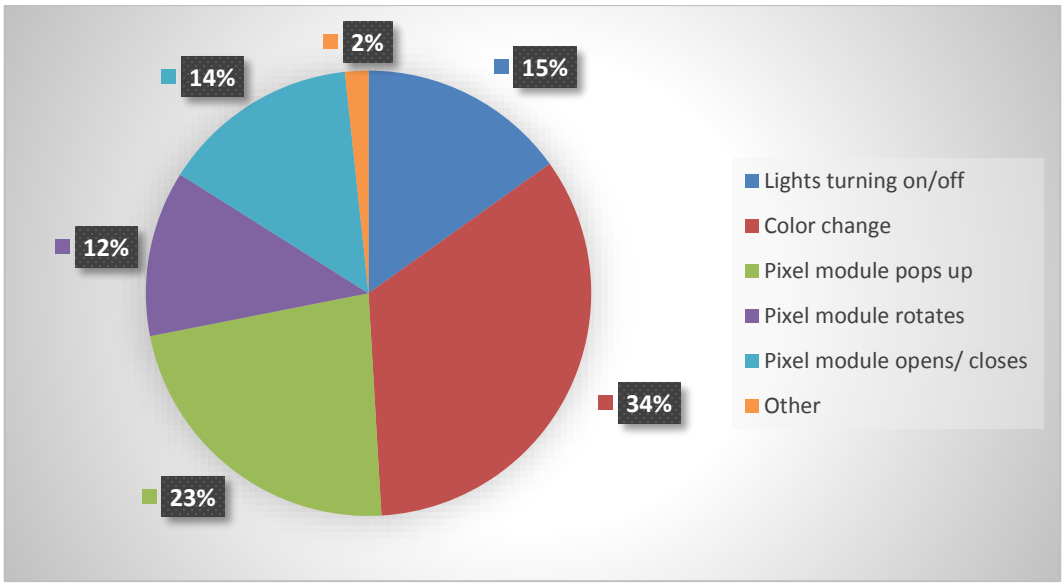

Figure 42. The rapport for the proposal design

11. **What would you like to see on it from a bigger scale?** (397 responses)

a)	Animations	145
b)	Real pictures	128
c)	News	91
d)	Writings of main Epoka events	165
e)	Myself	31
f)	Nothing, just want to play with it	56
g)	Other	13

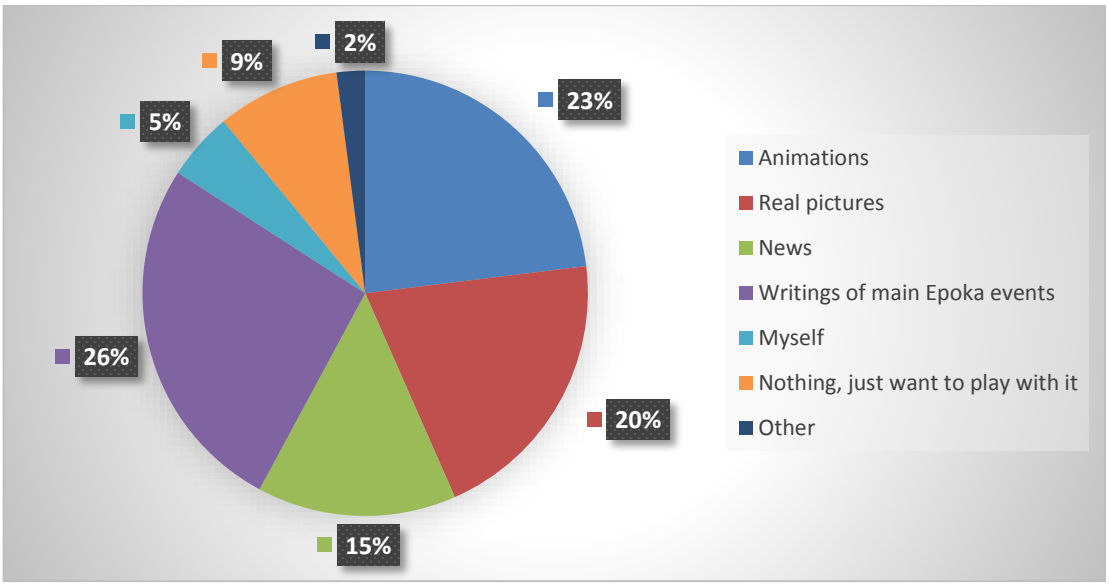

Figure 43. Percentage of the selected alternatives for the large scale view of the wall

12. **Would you give permission to a project like this to be built on our campus if you were asked?** (400 responses)

    a) Yes 382

    b) No 18

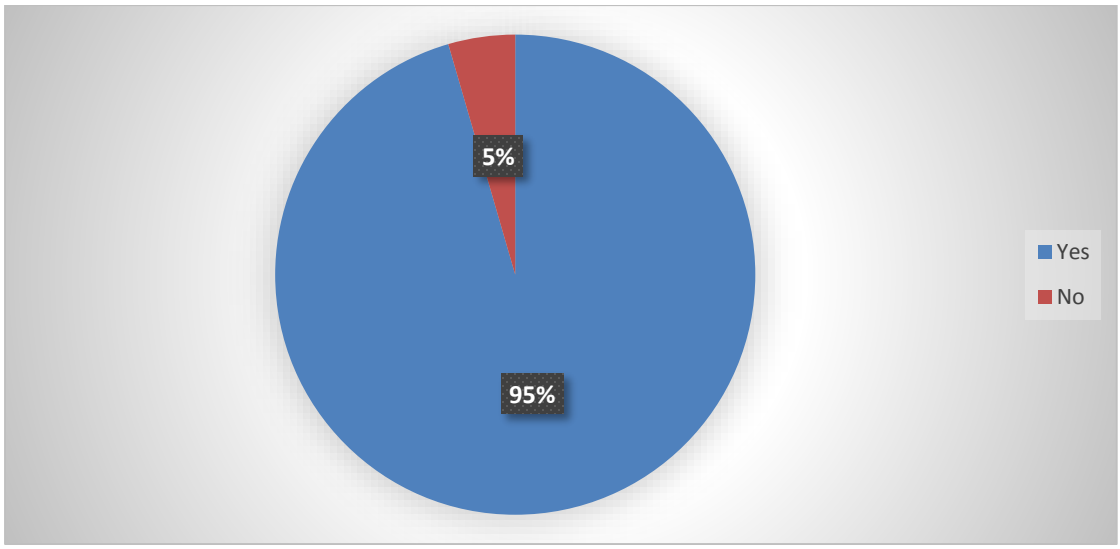

Figure 44. The rapport of the one who said yes and those who said no in the building permission

13. **Would you use it?** (68 responses)

a)	Yes	47
b)	No	4
c)	Somehow	17

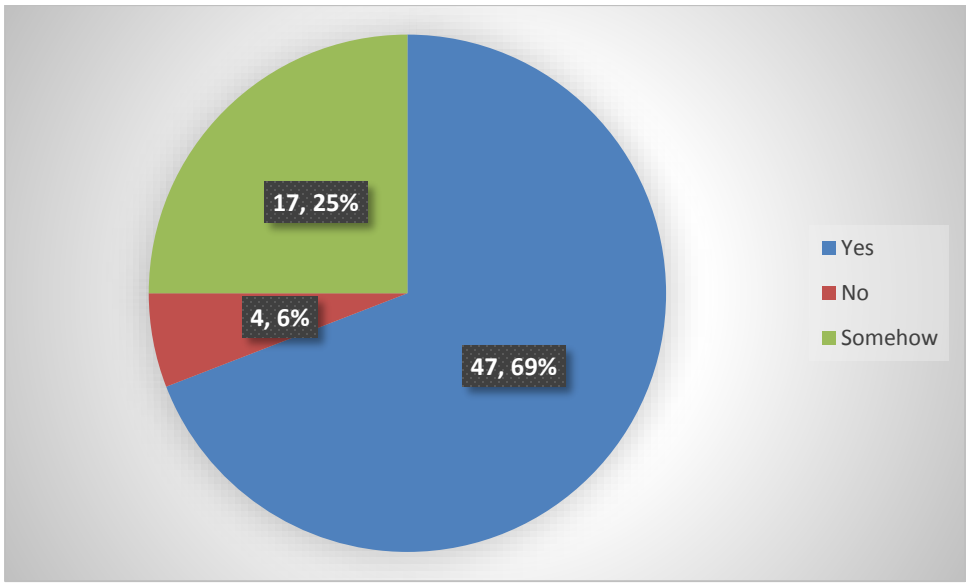

Figure 45. The percentage and the values for the question would they use it or not.

14. **How would you find the design of the proposal shown previously if it would be applied?** (68 responses)

a)	Poor	1
b)	Fair	7
c)	Satisfactory	32
d)	Very good	17
e)	Excellent	11

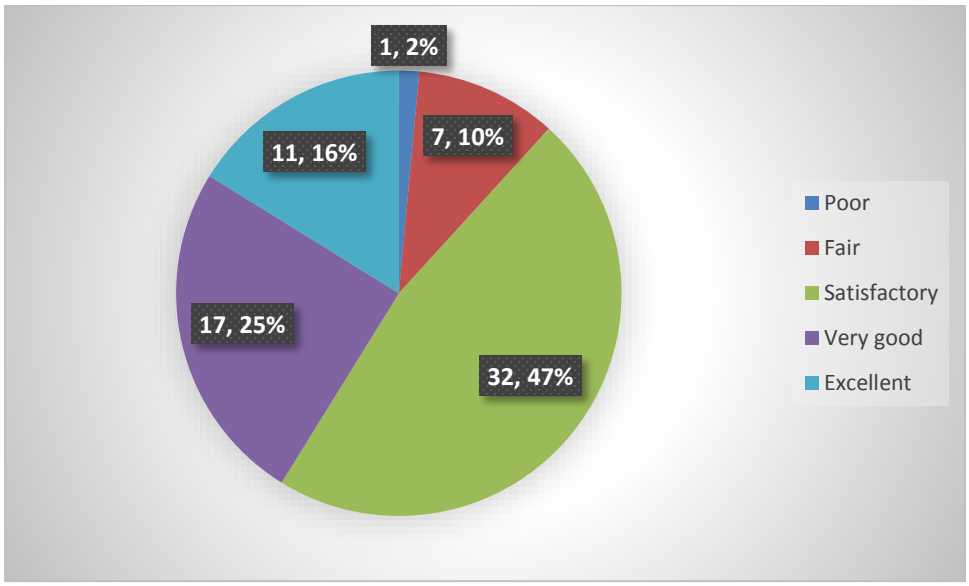

Figure 46. The percentage and the value of the satisfaction that the proposal gives.

ARDUINO CODE OF A RANDOM REACTION

```
//this variable will hold a random number generated by the random() function

long randomNumber;

#include <Servo.h>

Servo servo10g;

Servo servo11g;

Servo servo12g;

Servo servo13g;

int pos = 15;

//Set up - this is where you get things "set-up". It will only run once

void setup() {

servo10g.attach(10);

servo11g.attach(11);

servo12g.attach(12);

servo13g.attach(13);

  //setup serial communications through the USB

  Serial.begin(9600);
```

```
  //Let's make it more random
  randomSeed(10);
}//close setup
void loop() {
    //generate a random number
  randomNumber = random(2,6); delay (500);
    //display the random number on the serial monitor
  Serial.print("The Random Number is = ");
  Serial.println(randomNumber);
 if (randomNumber == 2)
{
servo10g.write(100);  delay(1);
servo11g.write(15);  delay(1);
servo12g.write(15 );  delay(1);
servo13g.write(15);  delay(1);
    }
  if (randomNumber == 3)
{
servo10g.write(15);  delay(1);
servo11g.write(100);  delay(1);
```

```
servo12g.write(15);  delay(1);

servo13g.write(15);  delay(1);

   }

  if (randomNumber == 4)

{

servo10g.write(15);  delay(1);

servo11g.write(15);  delay(1);

servo12g.write(100);  delay(1);

servo13g.write(15);  delay(1);

   }

 if (randomNumber == 5)

{

servo10g.write(15);  delay(1);

servo11g.write(15);  delay(1);

servo12g.write(15);  delay(1);

servo13g.write(100);  delay(1);

   }

}
```