

Architectural Expression Systems and Iranian Architecture

Solmaz Khoshnava Foumani
University of Guilan , University Campus 2.

Email: solmazkhf@yahoo.com

Abstract

As a cultural event and a product of humans ,biological process, architecture indicates subjective ideas and thoughts which are realized in a practical, physical and tangible framework. Also it can be said that architecture is a subjective phenomenon which means that it originates from mind and thought and it is not the representation of a specified or past event; that is why it has an abstract and incorporeal nature and its roots and the themes of its formation are in the mind of the creator of the work. On the other hand, it is an objective phenomenon which means that architectural products should be livable, tangible and objective in order for them to be responsive to humans' physical existence.

Ultimately, the architectural product results from a passage from this subjective environment to the physical environment. The process of changing the mind and thought into a physical product requires methods and systems that can accomplish such a render. The quality of this render should be in a way that the ideas and thoughts of the architect can be identified, reviewed, produced and recognized.

In the trend of the architecture history, in order to implement the construction components, the architecture had always been in need of a system that can provide the planning and monitoring of the two dimensions of mental – hypotheses, purposes and interests – and of physical – components, elements and structural form. This system (called *nezam* in Persian) of architecture should provide the ability to regularize together the two aspects of mental and physical in a way that the architect desires. Although the methods of architectural construction have changed in the historical passage, an architectural system has always been and is necessary. The architectural system can be considered as an instrument by which the architect can take the main steps towards creating his intended work, without any ambiguity and with full knowledge of his subject.

The decisive and essential issue in the expression systems is that the ability and capability of each architectural system – in the two dimensions of visual and instrumental – is in the presentation and representation of quantitative and qualitative areas. Although these capabilities develop over time and reach to their climax, they often encompass a limited scope, do not exceed their boundary, and provide a framework that while being used, the user does not usually go beyond a specified area and therefore, the system's abilities limit the architect's abilities to its own capabilities. The purpose of the architectural system is to regularize the architectural elements and components in two dimensions of subjective and objective. The order that is used in the architectural system is a method that can organize a set of events, things, and the relationship between them. The architectural system provides a context for the interaction of architectural components. The interaction between the components of each thing [system] establishes a type or degree of continuity; some ways for gathering together, relating or leaving the distinction (otherness) in a situation which still has continuity with something analogous or even with a difference which may lead to contradiction.

The approach which is focused on in an architectural system is how the architecture is changed into the components of this system and its expressible features and how the relation between these components and architectural system is established. Relation is firstly for recognizing the specifications of elements that are recognized through this method, which do or do not belong to a family of elements, and is secondly for determining the distance between elements – a distance which is abstract, conceptual, mathematical, semantic or physical. Another essential factor in architectural system is to pay attention to measurement and attempt to have tangible measurements for components which form architecture. Measurement in architectural system is more indicated by measurement systems, geometry, scale, number and proportions.

Keywords: Systems , Architecture , Expression , Process

1. Introduction

As an instrument and insight into presenting architectural products whose historical trend is as long as the history of architecture itself, architectural systems have undergone changes over time. The study of this historical trend and its different methods reveals their quality, circumstantiality, abilities and defects.

2. The first period: based on experimental systems

The trend of architecture formation from the period of the construction of pyramids to the end of the Middle Ages was so that the architect did not need to transfer the data of environment construction in order to form ideas with which he should have supported his architecture since he himself had the responsibility of construction without any

mediation. Colton [1] states that they do not need to draw maps. As soon as the agenda was issued, they knew what they had to do. Each temple had an amending relationship with the past. In case it seemed a bit smaller, the pillars were built longer and if its tip was a little heavy, the stucco of the capital was built lighter and it was decorated with inscriptions (Bradent, 2000, 31).

In an accurate series of studies in a temple of Turkey [2], during the 300 B.C., Haslinger reached to spots which were drawn on the walls one by one. In more accurate inspections, he found an orthogonal network with accuracy of 1 mm. The buildings of Egyptians, Greeks, Romans and Iranians were all built in such method (Bradent, 2000, 31).

From the Middle Ages, some pieces of information and maps were obtained which critics consider them verifiable and prove that they have relationship with geometry and applied mathematics. In Romanesque architecture, using one spatial unit organized the whole composition of the architectural system and the internal and external proportions of the building were measured based on this unit. Also, the Gothic architecture organized its architecture by systematic and ordered use of construction elements.

3. The second period: based on geometrical systems

In Renaissance, paying attention to Romans' architecture requires recognition, interpretation and duplication for the sake of maintaining and modeling them. Also, beside the people who codified the architectural products based on the applied geometry, people such as Leon Battista Alberti, some literature (the year 1450) has been provided about the ancient Roman works and some maps with accurate draws and measurements. This trend which was against industrial craftsmen was formed and continued focusing on architectural draw (Bradent, 2000, 31).

Focusing on logic, the Renaissance architecture traced new qualities in expressing the architectural product; the first was focusing on regularizing architecture based on codified principles; and the second was focusing on codifying architectural space through a visual method (perspectivity) for its visual planning.

In the 15th century, perspective principles wholly changed the spatial imagination of the Middle Ages and its artistic expression which showed images flat and depthless (Gideon, 1995, 48). Perspectivity provided a system by which the space could be studied and planned before being built. If most of the architect's studies on his architectural products

were two-dimensional until the 15th century, the emergence of perspectivity was promising for three-dimensional monitoring of this product. Presenting depth through drawing, i.e. height, depth and length, could make the artists of the 15th century believe that the dimensions and manner of presentation of architecture have been finally given to the architect (Zoy, 1997/ p. 17). This perspective has a conical feature which means that all images that are planned for being seen, are placed in a cone whose position of the base depends on the fixed point representing the observer, from the two directions of sight height and distance from the object with sight plane, and its tip is on the farthest point – the infinite point or the centrifugal point.

Getting use of geometry for developing the construction and achieving a method for monitoring the organization of the secondary spaces were based on dimensions, sizes and balances and generally changed experimental thoughts to logical and argumentative thoughts. On the other hand in this period, the architect used to choose his assistants based on his own thoughts in his general management so that they can shoulder different parts of his work and assist him in his role. This was the first time when the process of forming architecture was developed and new architects were entering into this job; therefore, this cooperation requires new systems of transferring thoughts of the architect.

In 1762, Gaspard Monge[3] invented the drawing geometry. He stated that I am able to show every spot by drawing every spot on space above a vertical page and a horizontal one (Aras, 1961, 401).

The rules of descriptive geometry of Monge equalized the methods which were created during the Renaissance by the building builders and gave an especial form to all drawing systems of three-dimensional objects on two-dimensional papers which led to this issue that drawers had a global tool for the sake of determining features of the building elements. (Batul, 1999, 39)

Some events took place during the end of the 19th century and beginning of the 20th century which deeply altered product expression system and its space. If during the primitive periods the horizontal drawings were two-dimensional one by one and experimental construction was the basis of creation of architectural space and during the Renaissance the drawings of conical three-dimensional perspectives on two-dimensional paper became the planner of the architectural space, in the next period, the warp and woof of the perspective was ruptured. The usage of perspective and the image of objects in three dimensions which

were common in the Renaissance period and lasted for 400 years, have affected the humans' mind in a way that it seems that no other spatial imagination can be made. It is interesting that before Renaissance, according to the evidence that has remained from the painting of the artists of different cultures, images were drawn only in two dimensions (Gideon, 1995, 362). The emergence of a new geometry, whose spatial image was based on insight from three dimensions, changed the insight of thinkers and artists. This geometry was proposed by the German mathematician Riemann in 1854 and changed the Euclidean foundation of spatial imagination. His geometry was related to bent surfaces particularly the spaces having more than three dimensions, which is called meta-space (Naseri, 2000, 117). This new geometry smashed the foundation of Euclidean geometry and Newtonian physics and created new concepts which were radically revolutionary in art and architecture. In the new physics, the occurrence of events depends on the position of the observer; therefore, it has relative concepts; so imagination and conical perspective image could not account for this new spatial insight and imagination. As the new science cleaves the inside of the material for the sake of understanding and describing it, the Cubism-style painter attempts by drawing the interior components of objects to expand the vastness of interpretations in the world of feelings (Gideon, 1995, 363). The expression of the fourth dimension in these paintings and the recall of this fact that each phenomenon needs to be seen and considered from different points of view so that it perceives it, the image of different objects from multiple points of view simultaneous with each other is the main manifestation which has direct ties with today's life and it is called the art of simultaneousness (Gideon, 1995, 363)

This new science and insight was the cause of production of four other methods and trends which affected the architectural product expression; first, the representation of collage in cubist paintings; second, the visual representation of motion and time in Futurism movement; third, the representation of architect-constructed in Constructivism movement; and fourth, the representation of three-dimensional images with parallel surfaces in Neoplasticism movement.

Collage or paper-sticking is the process of sticking some elements in cubist pictures which was first introduced by Picasso in 1908 and was based on two main axes. The first was that these pictures were indicative of the three-dimensional view to the painting space – a phenomenon that was illustrated as a two-dimensional foundation. The second was an instrument that could share the sense of touch

for perceiving the work. These two factors should be illustrative of the fact that for expressing the architectural products, only the aesthetics of two-dimensional paper – whether areal two-dimensional monitor or a virtual three-dimensional one – is not enough and the need to expressing the space with its multidimensional quality is felt. Moreover, it is needed to change the sensory and perceptual features of optical arts to visual arts so that they are perceived using the maximum sensory reception since the multiplicity of these receptions leads to a deep perception.

The image of motion-time: by focusing on the categories of motion and time which are its inseparable principles, the Futurism movement attempted to visually realize these principles. Presentation of their two-dimensional and three-dimensional models promises for the prediction of a kind of animation which could make the fourth dimension interfere in its perception.

Architect-constructed: in Constructivism, it was believed that visual aspects which were a kind of imitative expression of a reality should not be presented; rather we should use the feature that the construction of the phenomenon originates from it and present the real nature of objects and matters, and the culture of material is talked about in this respect. In this artistic orientation, Kazimir Malevich constructed three-dimensional architect-constructed models which were suitable for studying the surfaces, form and dimension. Although modeling has a long history as architecture, this type of expression was accompanied by the feature of the construction material and its construction method.

Three-dimensional images with parallel surfaces: in Neoplasticism movement, a system of expression is founded which is based on parallel perspective. In this type of perspective, the perpendicular Cartesian axes were the base of the work and the surfaces of the volumes were placed parallel to each other in this system. In this case, the conical perspective concentrated quality of one view, size changes, shading, its immeasurability and finally its relativity are omitted and the architectural volume is equally observable from all aspects

4. Economic Insight into Architecture Systems

In historical reviews presented in order to express the common systems in introducing architecture, some elements were specified through which some aspects of architecture were determined; Investigation of these elements shows abilities, disabilities and properties of them.

1. Experimental space design and construction system: Synchronization in expansion of initial design and its construction makes an experimental space. Experiments, errors and corrections of the past are inseparable parts of this space. Although time-economic cost effectiveness of that is discussable, the space is formed by constant presence of architect, designer and constructor and mental ideas can change into tangible and concrete spaces.
2. Geometry system of Monge: In this system, thoughts and mental ideas of architect are formed in a two-dimensional visual platform containing vertical, horizontal or angled signs and slides. In this method, the idea of architectural multidimensional space (at least 4-dimensional) changes into a two-dimensional space on a paper; after that it loses real values of length, width, depth or height, time, sizes and non-visual contexts of space recognition and at last, it presents a relegated context of the architectural space. Understanding and studying follow the features of central form which encompass an individual, unrealistic and abiotic mode of expression. Accuracy of dimension recognition reduces as the scale shrinks; perception of space is done by the viewer, a viewer who belongs to a different mental-individual space. Therefore, another process apart from mental imagination of the architect creates a space.
3. Construction sample system: creation of sample (model, replica, etc.) has a long tradition and it might be a reliable tool for monitoring the form; but scale differentiation in the samples leads into two fundamental problems: first, basic differentiations occur in scale changing and dimension transformation from design to construct; and the second one is about non concurrence between human ratio of sample to reality.
4. Perspective system: perspectives are visual tools which plan and edit the architecture space in parallel or conical styles.

Although, conical perspective proposes space plans with 3dimensions, its dependence on special position of viewer and phenomenon leads into creation of one of myriad images which are perceived by pupil of the eye, immediately. Attending and focusing on a single view in

perspectives with one vanishing point or attending and focusing on three views in perspectives with two vanishing points create some limitations in designing and editing the three-dimensional space. Lack of the fourth dimension prevents perception through motion and passage of time.

Invention of cameras could only improve accuracy and speed of this spatial impression in line with creation of conical perspectives out of constructed spaces, not the spaces which are in the pre-construction stage. Cameras could give scales of human vision to the photographs taken from construction samples, but they could not bring motion-time dimension into the photographs. Each photograph shows the construction from a separate point of view and statically, so that the musical trend and sequential continuing of the points and the viewer's vision moving inside and around the space did not exist. Finally, accessories allows the photographer to record each photograph he/her desires on the sensitive screen of the film, even if human is not able to perceive that in normal situations.

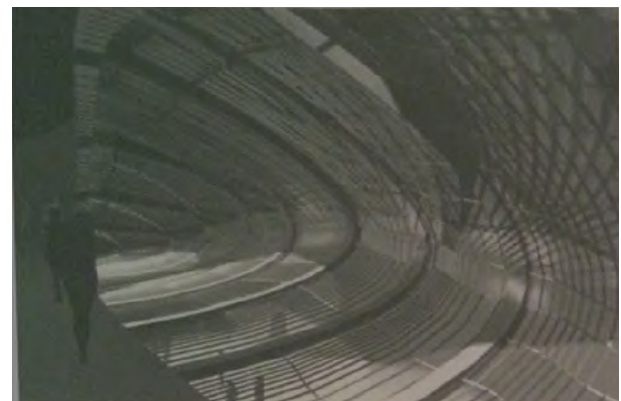


Figure 1: Different visual dimentions of a view point

Perspectives with parallel axis and plates could decrease dependence on special views and provide the setting for form monitoring in other aspects of architecture for the architect, but they could not solve the problems with which the construction samples are faced.

5. Moving pictures system: Cinematograph can play an important role in introduction of architectural spaces and solve all the problems related to the fourth dimension, if it is used properly.

Possibly each kind of moving pictures (whether to reproduce the constructed space of an architecture or to produce a non-constructed space) can give time to photographs, but this is not the real time and it is depended on motion and exploration of another person in the space; architecture have some

dimensions which are beyond four dimensions. In the best situation, moving picture can reproduce four dimensions of this meta-space, but it removes emotional and perceptual features beyond the visual and acoustic contexts. Moving picture presents a part of cognitive space to the viewer or listener.

These expression modes define some variables of cognitive space and physical behavior space for an individual. They submit the task of space reproduction to mental spaces of the person and leave him/her in insouciant image and imagination. Mere presentation and introduction of the space is not adequate; we must go there and stay there and become a part of that place. Although expression systems are necessary and unavoidable for expressing the measurable and visual quantities, they are elementary. Recognition and expression of the architecture space is accomplished once we experience the space physically and mentally with whole essence of our humanity and complete and alive participation.

Apart from experimental system of design and construction in methods and order mentioned in advance, the user of these orders can address visual and formal aspects of architecture process, investigate and control them. Sense of sight is one of the dominants among all senses of human. The multiplicity of the senses in this receiver system proves our claim. Human have been concentrated on manufacture of products in this regard, widely and profoundly; he/she has limited all emotional and perceptual aspects to this sense. Today, all the things are observed as forms and emotional-perceptual aspects are marginalized.

The problem of architecture systems arise in two conditions: first, when the art is only present inside of the creator's mind and needs a process to be materialized; second, when the art is materialized and changes real living space into a virtual one to recognize, investigate and criticize this instrument. The second condition which can encompass our theme of study on Iranian architecture has some defects that prevents human from perception, recognition, criticizing and manufacture of such products.

5. Iranian Architecture

Iranian architecture had been the result of thoughts which were narrated orally based on human experiences, since its birth until it was merged by western issues and concepts. These human experiences appeared coherently in the form of mythical insights, gradually and slowly. This experimental and mythical method followed an

intuitive trend which was different from the western logic.

Iranian architecture had an internal trend; it means that most qualities of the architecture were perceived inside the space of architecture and the external visual representation of it had a weak effect. Unlike western architecture which had a visual and external nature most of the time, Iranian architecture possessed an internal modality. In Iranian architecture, internal goings-on were emphasized and external atmosphere- a weightless contractible and expandable issue filling space- was considered as a physical nature. In this kind of architecture, creation of local space included different emotional, visual, acoustic, olfactory, tactility and taste approaches. The yards of Iranian houses represent and evidence of human feelings accumulation; the form of the yard, goings-on of semi-open and close spaces of surrounding are observed in this kind of architecture; sound of moving water in central pool and sound of wind through the leaves of trees are heard; water and soil blend on the floor and walls and scents of the herbs are smelt; shadow and lights inside of the home and semi-open spaces around the yard create thermal boundaries; sometimes, the fruits of trees are tasted. This instance shows that Iranian architecture is shaped based on different approaches of emotion and perception, and accumulation of these emotional-perceptual cases give a local feeling to the architecture. This space is only perceived experimentally and only visual, formal and geometrical approaches of it can be investigated by other expression modes.

Like causality and time, place is also qualitative-mythical. Mythical place is inductive, while functional congruent geometric location – points gathered in this area- are considered as further determinants. They have no content other than the relationship acquired from the positions of these points relative to each other. Unlike geometrical location, different parts of mythical places are not congruent and three major directions of them (front and back, up and down, right and left) are not identical. In mythical places, content is not impartible from location, and we cannot ignore the relationship between the nature of an object in a place and quality of the place.

Evaluation of Iranian architecture with common expression systems investigates, identifies and recognizes only numerical and dimensional relationships in an abstract and single space in which all elements possess same values. It removes local quality from the architecture, immediately and destructively. Locations and places are qualitative phenomena which cannot be reduced to

their segments such as a spatial relationship in a way that coherent nature is not vanished away.

As mentioned before, Iranian architectural area is based on two classes of data: qualitative and quantitative data. The first class, quantitative data are data whose identification depends on pre-stated systems which presents visual characteristics of architectural spatial form in three-dimensional dimensions of length, width depth or height and spatial system of point-visual element, line and surface relations which are almost intuitively unvalued; and second class of data is visualizing and characterizing properties of phenomenon which has lively identity and dependent on spatial and temporal area; and qualitative data are data which actualize abstract and intangible space of geometrical relation and characterize non-visual aspects of architectural space by emotion and understanding of the place through senses (at least five senses) and bring being alive or dependency on understanding of spatial-temporal space to architectural arena and also provide compliance of different cognition spaces for simultaneous recognition.

6. Architecture and information technology

Scientific examination of biologic and genetic structure of human and advances in genetic code recognition during past twenty years reveals that each complicated structure-such as human as the most developed creature of the world- is recognized by re-identifying cods. This advance can promise that all physical (tangible) and mental (intangible) can be converted to informative data and can be stated by information system; this property enable architect to express both side of her or his properties.

Systems used in this literature often have only the ability of expressing and presenting qualitative properties and characteristics of architecture and no capacity for accepting qualitative aspect of space. This property is borne due to logical thinking which originates from scientific recognition and was as base and generator of west thinking and for making (complex) phenomena recognizable it analyses phenomenon and naturally this analysis leads to phenomenon nonexistence and in rebuilding its foundation and elements, characteristics of the phenomena dependent on tangible or non-transferable human experiences with split systems are removed and logical and non-empirical entity of that is rebuilt.

Information technology could add several aspects to the architecture and creates new sight and tool by mutual interaction. Day by day, architecture

faces wider magnitude of data for producing its product; this increase of data reduces her or his ability for monitoring and controlling gradually; emergence of software and expressive data and information system and organizing and monitoring them in architecture is based on the foundation and abilities of the previous systems but according to digital systems there is some sort of spatial-temporal economy and facilitation for architect compared to past tools. This software can almost substitute vast bulk of previous systems and carry logical load of architectural space.

7. Architecture and virtual reality

Other critical factor which has revolutionized architecture expressing system is the understanding which information technology returned in rebuilding what previous technology subtracted from architectural expressing space. Virtual reality (13) can be seen as evolution of tools and thought of architectural expressing arena.

Information technology trend (in architecture) was first generally headed toward digitizing all phenomena and presenting an "abstract and intangible system" of data and space of all abstract relation. On one hand, architecture also (should) heads toward an empirical space; these two were on two opposite extreme previously till virtual reality was borne, afterwards architecture and information technology approached each other and they will progress so they could comply with each other and human will live in a virtual environment which is converted from real and biologic place by gathering of architecture and information technology.

Architecture space experience is kind of co-temporal accordance of set of variables and its empirical nature is a factor which should be predicted in tools and sight of information technology and would present new system so previous system characteristics (which were often qualitative) would be coordinated with reality and event characteristics. This sight is a new tool based on virtual reality; the definition of term 'virtual reality' in Oxford English Dictionary (14) is as follows: (something) non-forming, impractical but (something which) has real existence (and being) or is practical'. And Sherman (15) and Judkinz (16) presented characteristics (17) of this technology in five lines; focusing (18) (information), interaction (19) (user and computer), inclusiveness (20) (user), clarifying (21) (information), direct understanding (22) (instantaneous and physical), 'virtual reality' system compared to 'agreed calculation' system (23), which have principal and main differences; there is dependence on human communication intuitively and emotionally for behaviors based on

human private spaces. This principal difference can provide an especial condition for building communicative base between human and information technology (computer). This system provides the capability of considering and focusing on issues from different and even numerous aspects and provides 'multi view' (24) and it changes the states of previous systems having 'single view' function (25) (MacMillan, 1994). This 'multi view' of virtual reality can overcome deficiencies of previous systems and transform architectural space variable to virtual reality by virtualization (26).

'Virtual reality' can match two pre-mentioned spatial types with individual experience; first, recognition space which includes existence, emotion and instantaneous understanding and scientific recognition and recognizing abstract relations; and second, human behavior space.

Architecture formation is started with a mental reality and essentially is abstract. It is sometimes studied with abstract tools but as soon as it finds a human dimension, recognition and codifying it needs experience dependent on time, place and human sensual inception. In pre-mentioned expressive systems, abstract and intangible relations between form, dimensions and finally quantitative characteristics are studied and a space is created according to their logic and it cannot be responsive and expressive in relation to qualitative characteristics and aspects. Virtual reality system enables the companionship of these two aspects. Virtual reality system introduces super human precision architecture expressive by relying on 'agreed calculations' and enables conformity of vast amount of information for monitoring.

Expressive system of architecture is a system relying on communications; these communications with two aspects of architectural occupation and instruction include widespread relation of architecture with himself or herself, with colleagues and experts and lecturers and finally with employer which non-empirical systems previously led to lack of real qualities but in this system the previous lack of occurring architectural event and being non-empirical is removed. Stagnation of pre-mentioned systems based on logic they followed leads to stagnant quality formation in designs but dynamic and flexible capability of virtual reality gives architecture express dynamic quality and enables studying changes of each situation- from different approaches. Virtual reality system presents new and fresh base, whether by tools or sights, to architectures (of course recognizing its depth emerges during the time) and reduces difficulties and impossibilities greatly. Geometry, concepts, logic, techniques and new tools are ground makers

of new architecture. In addition to visual sense, other senses are also emphasized in this system and also can put the burden of other intuitive aspects of architectural space on other senses. Many faults and mistakes which waste funds are banned in this system.

Here, we return to characteristics were presented for virtual reality by Sherman and Jedkinz and we generalize it in architectural system; first, this system has the ability of matching and focusing all information related to architecture realm; second, it provides a situation in which system user can interact with smart entity and work context become more accurate in communication approach; third, can include all imaginable aspects for system user and affects them; fourth, has the ability of displaying all information and complexities each human product may have; and fifth, creates instantaneous and direct and unmediated sensing and understanding space which are components of architectural space.

In this expressive system, the same event needed for architectural space understanding is occurring and it grants presence, instantaneousness and unmediation to new expressive system of architecture which guarantee empirical space. Emotion and understanding are not only natural in virtual reality but they can metaphysically intensify and smooth human inabilities and lack of abilities.

Virtualization in architecture is placed between transforming mentality to reality for construction and once again with low temporal-economic cost, changeable and virtual entity is created and reaches from practical entity for recognition and criticizing to virtual entity.

Non-locality is another property of virtual reality which at first glance may seem in opposition with architecture but in fact this non-locality is headed toward making designing of architectural system and followed by that architecture possible in every place. In fact, non-locality is converted to multi-locality and multitudinous locality and adds flexibility capability to spatial dimension of architectural system, an aspect which all previous architectural systems left it behind expect for simultaneous designing and building.

Virtualization provides conversion and revolution and situation variation and has originating and other-genesis nature; this quality enables architectural system to create different qualities in different situations.

8. Conclusion

Although some aspects of architecture can be expressed by previous typical systems, its nature is expressed only by simultaneous presence and understanding of information layers which leads to

emotion and understanding. Virtual reality system provides this capability so generator foundations of Iranian architecture and local space can be recognized in temporal space form. This recognition can clarify approaches led to creating these spaces previously and make us closer to its nature in forming our future architecture.

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