

## **Representative level as one of the digital modulation entries in the design process**

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### **Abstract:**

The technological leaps we are witnessing now make the future Will Exceed the limits of the incredible; the continuous technological development cannot be overlooked its effect on interior design and contemporary architectural trends, these Digital technologies became an integral part of the tools of the designer to formulate his ideas in the design process. The performance technique in the design process has gone through different stages which the designer use it to bring out his design from idea to project, Where the initial design was done with sketches that depended on free hand drawing with translucent and then modified and developed several times, Until the computer started the design field in Sixth decade of the twentieth century with two-dimensional and three-dimensional CAD drawing, Accurately and save time and effort, Until we design in a virtual environment that simulates the actual environment , As the role of computers in design has shifted, it is no longer specific to showing and imagining, but a real shift has occurred in the traditional standards of the design process, The computer has turned into an assistant in the design process by offering alternatives to design thought, studying the relationship of design to the general site and environmental and lighting studies of design.

The idea of form in the digital age depends on the computer where it converts digital inputs into drawing outputs This is done through three levels, according to the shape formulation function, Where The stage OF Representation & Modeling represent the elements in two and three dimensions.

The problem of research on the possibility of Explain how to benefit from entering the computer field of architectural and interior design and clarify the extent of the influence of the representative level and its tools on the creative thought of the designer.

### **Keywords:**

Virtual and Web Design Tools - Cyberspace Tools - Artificial Intelligent - Multi-curved surfaces (Nurbs) – Smart building.

**Introduction:**

A Form is the base in the design process, as it is the final product of the design process, and the form is affected by many technological factors available in the era, where we now live in an era that differs from the era of using rulers and triangles to shape the design. The formation was based on the use of simple Euclidean geometrical rules laid down by the engineering scientist Euclid, which consists of five principles, which are the known as the geometric shapes (the cube - the pyramid - the prism - the cuboid).

**Research problem:**

This age is witnessing an intellectual shift in the field of design (architectural and interior) affected by the age of technology and the information which imposed itself on the scientific arenas, and the problem of the research is how to take advantage of the computer entering the design field to keep up with the digital development.

**Research objective:**

The research aims to study the Representation Level and explain its impact on the creative thought of the architectural and interior designer.

Study the impact of the use of Artificial Intelligent as an instrument of the representative level and the changes that occurred in the field of architectural and interior design.

**Research Assumptions:**

The research assumes that studying and understanding the use of the representative style helps in producing new and varied design ideas that serve the field of architectural design and the field of interior design and furniture.

**Research importance:**

The importance of the research is due to the necessity of studying the tools of digital technologies because it has a huge role in the design process; it helps the designer to easily design and perform design modification to choose the best.

**Research Methodology:**

The research follows the descriptive analytical method through describing and analyzing the representative level and the tools of the representative level, which helps the designer to embody his ideas, with an analytical study of design models for the tools of the representative level.

**Digital technology:**

Digital design technology depends on taking advantage of computer technologies and software and their applications in the design process, in what is known as Computer Aided Design (CAD) technologies that express the development of design programs, which can deal with a huge amount of data and information and provide a huge amount of vocabulary and design solutions, which help the designer to make decisions, and to switch from the individual case to a system of integrated experiences.

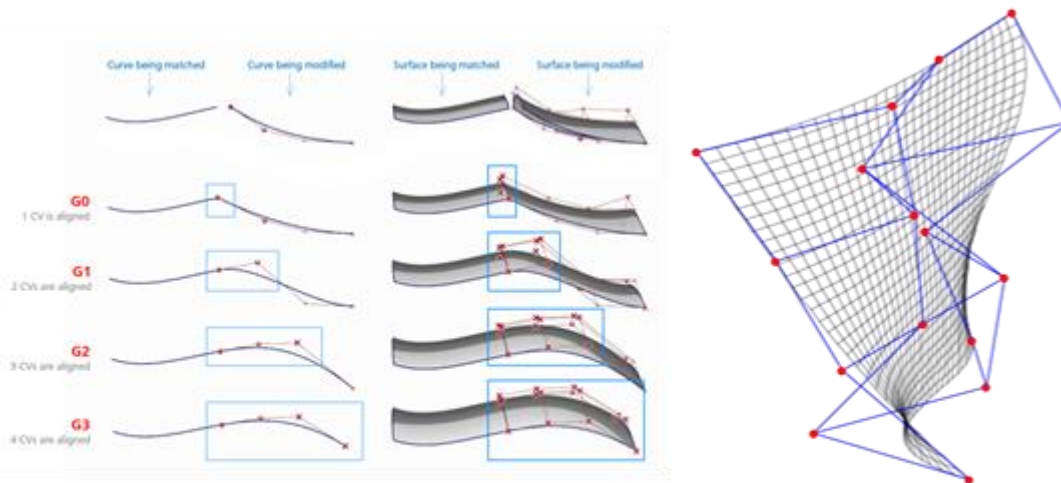
**Digital Design:**

It means the use of computer systems to generate design and digital design helps design visual models in what is called Rapid Prototyping. It refers to the use of virtual reality technology (VR) in simulating the physical model of design work, and the ability to perform some forms

of virtual examination such as ergonomic tests, analysis of the behavior of the materials under working conditions, allowing modifications to be made at an early stage of design.

**The Representational Level:**

It means dealing with digital technology as a drawing tool that produces complex engineering shapes that cannot be produced manually, which helped in the emergence of a new field of formation, and this appears in designs that use the language of curved lines and CAD programs and surfaces of the Nurbs, which are irregular, logical lines with Non Uniform rational B-Spline, which allow smooth curves and surfaces using a small amount of data (as shown in Figure 1).



**Figure No. (1) ... illustrates the capabilities of Nurbs surfaces to represent curved shapes.**

Source : [http://libx3d.sourceforge.net/ISO-IEC-19775-](http://libx3d.sourceforge.net/ISO-IEC-19775-X3DAbstractSpecification/Part01/components/nurbs.html)

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Example: Kunsthaus Graz Museum of Modern Art - by Peter Cook – 2003 -The design dependence of the curve or NURBS surfaces is evidenced by the manipulation of Control points and knots (Knots) through which the exterior curved surface can be produced, which is reflected on the interior design of the museum, where the ceiling and walls are curved.



**Picture No. 1 ... showing the Kunsthaus Graz Museum of Modern Art 2003 - Austria.**

## The Representational Level Tools:

They are tools that help the designer to embody his ideas, whether to show design or to participate effectively in the design process, due to the inability of old tools to meet contemporary needs.

1. CAD tools.
2. Advanced CAD Tools.
3. Virtual and Web Design Tools.
4. Cyberspace Tools.
5. Artificial Intelligent Design Tools.

### 1. Computer Aided Design (CAD) Tools:

It means Computer Aided Design, that is, design is done in traditional ways with the use of a computer.

#### Software used:

- Software for images and how to make wizards for them in appropriate ways such as Photoshop - CorelDraw - Illustrator.
- Software for 3D designs, geometry shaping, and output in digital images, such as Z-3D studio MAX.



Picture No. (3) ... shows the 3D model resulting from the use of a computer.

Source: <https://www.indiamart.com/proddetail/bedroom-interior-designing-9331327248.html>



Picture No. (2) ... shows the initial sketches of the design.

Source: [https://www.123rf.com/photo\\_77663241\\_stock-vector-bedroom-interior-sketch-hand-drawn-furniture.html](https://www.123rf.com/photo_77663241_stock-vector-bedroom-interior-sketch-hand-drawn-furniture.html)

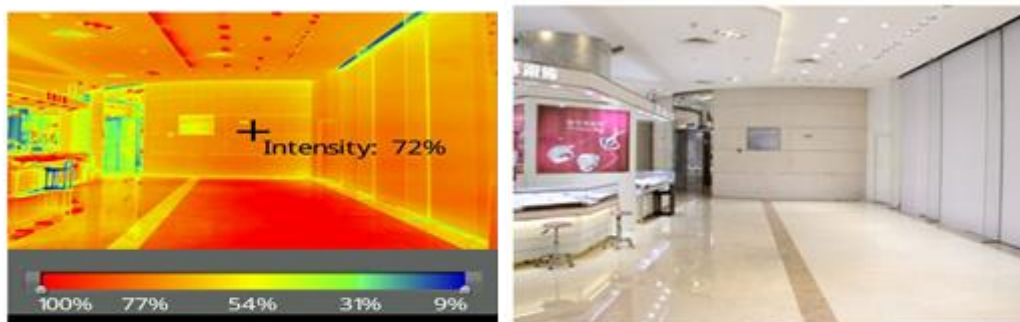
### 2. Advanced Tools for Computer Aided Design (CAD):

Performance: These tools depend on the concept of integration between the various data for building performance that the designer needs and that affects the formation of the internal space of the building such as energy studies, acoustic treatments and wind speed and direction analysis. These tools help the designer to achieve the greatest degree of comfort to the person inside the internal space from using computer technologies to create designs that simulate the processes that take place in nature to conduct experiments on this model in order to understand the behavior of the similar system.

**The used Software:** the software used as a design tool varied, for example:

- Building simulation software for the whole building simulation by simulating the building's energy consumption and the effect of changes on the formation of components of the

architectural space on energy consumption as these components include the building's envelope, natural and industrial lighting, openings and containment.



Picture No. (4) ... illustrates simulating light to determine the position and intensity of lamps, to provide thermal and light comfort for the user.

Source:

<https://www.uprtek.com/en/application/Lighting-Designers/Category-Lighting-Designers.html>

### 3. Design tools for virtual spaces and network design:

Performance: these tools help by providing means that allow cooperation between offices and engineering companies, where all the partners work in one project in different parts of the world in which each of them performs their role very accurately, and these tools work to exchange information accurately without any part of it, by creating a virtual reality, these partners can connect together.

#### The used Software: for example:

- The software mentioned earlier in CAD tools and advanced Cad Tools.
- Networking software such as MS SQL Database.



Picture No. (5) ... contact between the partners to work on one project.

### 4. Cyberspace Tools:

A- Performance: It is a set of tools that helped in transformation of the design space from physical spaces to intangible digital spaces under the concept of “virtual reality” and the “virtual world.

Virtual Reality is a combination of three different technologies: telephony, television, and video games (remote communication, viewing and enjoying, ease of use) to produce technologies that exceed the capabilities of their components.

The "hypothetical interior design" aims to co-exist with the recipient within the imaginary space by walking inside it and treating it as if it were, in fact, present.



Picture No. 7 Using virtual reality in design.

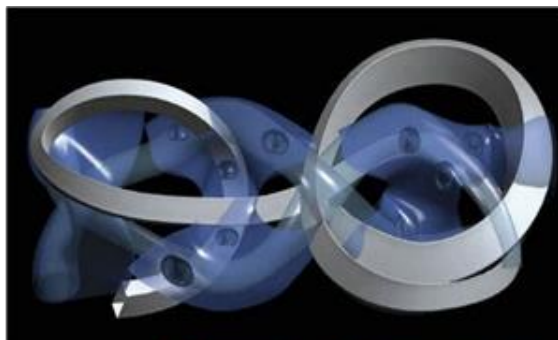


Picture No. (6) ... explaining the "Virtual Reality" tools

Example 1: The Guggenheim Virtual Museum was designed by architects: Hany Rashid and Liz Ann Couture, where he can increase the museum and view the exhibits digitally through its website.



Picture No. (8)... Guggenheim Virtual Museum, where the interior and exterior designs of the museum.



## 5. Artificial Intelligent Design Tools:

A- Performance: It is a set of tools that assisted architects in designing buildings that interact with the human and the factors surrounding it. The interior space is designed by using information technology applications so that the building and the interior space interact with environmental variables.

Artificial intelligence and smart materials: Smart materials are systems that monitor, adjust and repair themselves and learn to do things in an easy way. They contain strength elements (bones), sensitive devices (nerves), mathematical networks (minds), and mechanical triggers (muscles).

### The properties of smart buildings:

- High flexibility in interacting with all surrounding environmental changes.
- The ability to adapt to the surrounding conditions and their changes without negatively affecting the needs of the person or affecting activities and functions within the internal vacuum.

### Smart buildings components:

- Devices that operate as data entry units where they receive this data from the surrounding environment and can be quantum lighting, sunlight, climate or other data, including: Indoor and outdoor sensors, Actuators engines.
- Utilities for controlling and measuring performance rates such as: Sun Device Variable - Speed Drive.
- A system for analyzing data and making the necessary decisions for how the internal space adapts to the circumstances surrounding it to achieve the goals of the designer.
- Languages of communication between devices to be transmitted data and decisions through all the devices used.



Picture No. (46) ... explaining the components of the smart buildings system, which is a dynamic and responsive building that offers its users comfort and performance at a lower cost.

### Results:

- Digital technology helped to create innovative designs where at the beginning the capabilities of the computer were to prepare engineering drawings as an aid tool in drawing for ease of storage and modification, and then it evolved to become an assistant in the design process.
- Smart buildings have contributed to the rationalization of energy consumption and building sustainability.
- There is a strong integration between information technology and design technology that affected the features of architectural and interior design.
- Smart buildings are buildings that integrate communication systems, information technology, comfort and security according to the needs of the user and adapt to external conditions and environmental requirements.
- The most important features of smart buildings are that they save time and effort, and the occupants of the building can control it remotely via a computer.

- Information technology has been able to achieve direct communication via communications and virtual reality systems, which helps to develop service and entertainment systems and contributes to achieving compatibility between the building and its users.

### Recommendations:

- The designer must be aware of all that is new and not separate from modern science, until its designs are characterized by modern contemporary.
- It is necessary to integrate smart solutions in design to rationalize energy consumption.
- It is necessary to continuously develop academic systems for architectural and interior education and encourage students to become familiar with modern design tools and software and how to develop design stages through them.
- It is necessary to follow the development brought about by information technology on the methods of design and digital implementation, while studying how to benefit from them.

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