



## AUGMENTATION OF DIGITAL ARCHITECTURE WITH THE GROWTH OF TECHNOLOGY

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**ABSTRACT** Digitizing building information is reshaping the relationships that users have with the built environment, as well as the roles and responsibilities of the professionals, who operate, maintain, design and deliver buildings and cities. In today's economy, technology is part of every single aspect of our life. Digital architecture uses computer aided design, programming, simulation and images to create virtual forms and physical structures. The same can be said to refer to other aspects of architecture that are defined by digital technologies. Today's technological advancements have even brought Virtual Reality and Augmented Reality to the use in architecture. This move is to regain control of both the creative and the constructive process effectively assisted through the use of advanced design tools meant for non-architectural applications.

**KEYWORDS :** Digitalization, Computer aided, Virtual Reality, Augmented, Algorithm

### INTRODUCTION-

The term 'digital architecture' has been coined by William Gibson in 1984. The world of digital architecture is largely a visual statement. 'Cyber' means 'computer processed', conjoins the suffix 'space'. Digital architecture uses computer modeling, programming, simulation and imaging to create both virtual forms and physical structures. The terminology has also been used to refer to other aspects of architecture that feature digital technologies. Architecture created digitally might not involve the use of actual materials. Digital architecture allows complex calculations that delimit architects and allow a diverse range of complex forms to be created. Digital architecture has reinitiated a debate regarding curvilinearity, expressionism and role of technology in society leading to new forms of non- standard architecture.

### VIRTUAL SPACES-

Digital architecture is not limited to concepts and ideas, but also represents spaces that require human interaction, like the virtual environments created in games. During the recent years, the term virtual and virtual space, has become a central part of our culture. These terms have different meanings depending on the context, from the imaginary aspect to metaphysics and high-tech. Virtual Spaces Digital Architecture.

Architecture is an important part of video games and together they formed simulated spaces. Architecture in video games, like in real-life, is always present and plays an important role. In video games there are different categories though: architecture with realistic background (cities in Assassin's Creed, environments in GTA 5, etc.), maze architecture, architecture that tells a story and surreal architecture (architecture beyond earth).

### Virtual Architecture as Digital Architecture.

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### No Limits Digital Architecture -

Digital Architecture removes the possible limitations an architect might have when creating complex forms through computer algorithms. This new field also enhances the possible outcomes in terms of design, sparking debates about the role of technology in our society and also creating non-standard forms that have come to life from architects like Zaha Hadid or UN Studio.

### Virtual Reality in Architecture-

Virtual Reality is a computer-generated simulation of a three dimensional image or environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment, such as a helmet with a screen inside or gloves fitted with sensors. In the recent years, VR has started to make it's way to architecture as well and is bringing a whole new level of customer interaction. With VR there's no need even for 3D printing, as the experience for the customer gets immersive, powerful and on a scale from 1:1.

### Need for Digitization-

Today's customers want to know more about their building. They want to have automated thermostats that learn their behaviors and connect with them, they want doors and windows that can be opened with mobile apps, they want automated safety systems, they want to know how much power is their house consuming on their smartphone, etc. Having these many internet connected devices in mind, it's important to emphasize that buildings built today are more quality and performance oriented and way more innovative than those built in the past. And you cannot simply build them anymore just like that. IOT Digital Architecture.

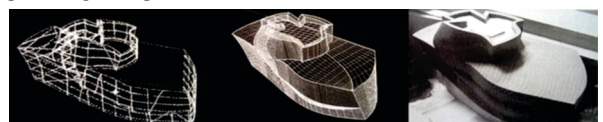
Digital Application in ARCHITECTURE for Digital architecture uses computer modeling, programming, simulation and imaging to create both virtual forms and physical structures. The terminology has also been used to refer to other aspects of architecture that feature digital technologies. Digital architecture allows complex calculations that delimit architects and allow a diverse range of complex forms to be created with great ease using computer algorithms.

### Technology for Digitization -

Virtual Reality is a computer-generated simulation of a three dimensional image or environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment, such as a helmet with a screen inside or gloves fitted with sensors. In the recent years, VR has started to make it's way to architecture as well and is bringing a whole new level of customer interaction. With VR there's no need even for 3D printing, as the experience for the customer gets immersive, powerful and on a scale from 1:1. Today, there are over 50,000,000,000 devices that are connected... and the number is growing every day! Digital Architecture. Some of the ways how IOT Devices can be used: - Monitoring - Inspection - Energy saving - Security - Automatization - Remote Control IOT Digital Architecture.

### Augmented Reality in Architecture -

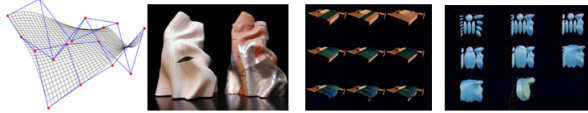
Microsoft has developed this new technology called Hololens, which is an even more immersive environment than VR. It's even newer as a technology, but through it, the architect works together with the virtual environment and real environment. AR also has found applicability in smartphone apps and other mobile softwares that engage planning, designing and construction in a whole new level. Even interior design has become more engaging. The customer now plans ahead how their favorite sofa will look like through the IKEA Catalog app or see how their sound system fits with the Bang and Olufsen AR app. Augmented Reality in Architecture Augmented reality "will change the way architects work" says Greg Lynn. A technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view.



Understanding the challenges of interaction between architectural design process and ICT (Information and Communication Technology)

|   | Macro – level   | Meso- level  | Micro- level   |
|---|---|--|--|
| <p>Generation of the design solution</p> <p>Examples ICT: CAD, VR, seeking programs, design-agents etc.</p> | <p><b>Benefits:</b></p> <ul style="list-style-type: none"> <li>Advanced visualization tools as VR a possible trigger of innovation and “evolutionary” architecture.</li> </ul> <p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li>Computer as design solution generator without human interaction until now not possible.</li> <li>Standardization of design elements leading to creativity barriers?</li> <li>New methods of designing-difficulty of adopting new ways of work.</li> </ul> | <p><b>Benefits:</b></p> <ul style="list-style-type: none"> <li>Supporting the development of collaborative design.</li> <li>Advanced visualization of design idea possible.</li> </ul> <p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li>Interaction between individual and group design generation-cybernetic architecture.</li> </ul> | <p><b>Benefits:</b></p> <ul style="list-style-type: none"> <li>Development from design tool to design partner.</li> <li>Handling and combining of amounts of parameters and constraints in short time.</li> <li>Advanced visualization of design idea possible.</li> </ul> <p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li>Computer systems requiring too much precision.</li> <li>Complicated user surfaces can disturb the mediation of creative processes.</li> <li>ICT should support step by- step precision.</li> </ul> |

“The computer demystifies the building to such a degree of accuracy that builders know exactly what they’re building...It leads to fewer mistakes and a better-organized process.”



**Minecraft Architecture: What Architects Can Learn From a Video Game is Algorithm for Design process -**

Since it burst onto the gaming scene in 2009, Minecraft has become one of the world's most popular video games. For those who aren't familiar with the architectural game (or who don't have school-age children), Minecraft allows users to build houses, cities, underground bunkers, and whole virtual worlds using 3D textured cubes that represent different materials. The crude, cubist platform creates a pixelated landscape that looks like a rustic version of a LEGO set. In addition to their own free-form fantasy worlds, Minecraft users have replicated nearly every famous building in existence, including the Taj Mahal, the White House, and the Burj Khalifa.

**Use of Algorithms for Design Process in Architecture-**

Algorithmic design allows architects to explore the complex geometric designs and space to develop solutions to complex geometric and architectural space. Algorithms whose computing agent is computer can computationally generate and manipulate design entities such as geometric form. Application of algorithms in design processes enables design processes with four fundamental operations - Computation, Sequence, Selection, Iteration. It's advantageous to look at other algorithms or written functions but your ultimate goal is to produce an algorithm that solves problems as efficiently as possible.

**CONCLUSION-**

As technology in this digital age grows at a furious pace, the boundaries between the initially distinct disciplines of Hypermedia and Architecture are blurring. In making sense of the key thoughts of Architectures, new difficulties and confining contemporary research focused on the front line. What has been emphasized is that the Virtual has been the phenomenon that has energized the art and science of Architecture in a way that has never been seen before. Identify a need for increased research in specific fields of interactive Architecture that have been neglected in favor of visual interfaces. Algorithmic architecture induces a new mass movement and seems in near future the value of architects' tend to algorithmic issues which is somehow the end of the transitional phase of uncertainty in architecture during the post-modern, get increased and causes a new intellectual framework and development objectives, and new methods and values. Today, algorithmic design school at all scales should be proposed from architecture to interior design and urban design for the structural issues and various kinds of projects. The theory of smart architecture should be based on the relationship between theoretical and practical implications. Despite the claims of some to this theory, the design theory with architecture theory will be the main factor in the relationship between design theory and architecture theory. Every algorithm needs a process in order to be created and utilized. Described below are the four stages of algorithm analysis and design. Algorithmic design process models with digital architecture

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