

The Impact of Augmented Reality in Architectural Design Using Combined Method of Data Aggregation and Segregation

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Abstract: Augmented Reality (AR) enables digital information to be superimposed and integrated into our physical environment. With many of us now at home during a global pandemic, AR is a tool that can help us transform our immediate surroundings into learning, work, and entertainment spaces. AR can help to bring the outside world in a form of a virtual view with 3D objects in your living room or residential area using headsets that are capable of giving such experience. There are three things AR does very well: visualization, annotation, and storytelling. There are examples in each of these areas that are both timely in the current reality and which can be built upon once cultural institutions, schools and workplaces reopen their doors and bring them into one new mixed world of opportunities. Research documents of the evolutionary processes of buildings can illustrate the changes needed for the spatial environment, advances in civil engineering technology, the transformation of social norms, and adaptive standards for the new civil building policies. Augmented reality has built a platform that allows brands to offer unique and more accessible digital experiences, providing memorable moments for consumers. One of the main reasons that retail brands invest in the development of this technology lies in the idea of enabling consumers to make better and more informative product decisions. The merging of these interoperability structures between technology on the one hand and architecture on the other hand provides a systematic pre-solution for making the right decision when designing and investing in capital and socially useful buildings.

I. INTRODUCTION

Civil engineering is a professional engineering discipline that deals with the design, construction, and maintenance of the physical and naturally built environment, including public works such as roads, bridges, canals, dams, airports, sewage systems, pipelines, structural components of buildings, and railways. Civil engineering is traditionally broken into a number of sub-disciplines. It is considered the second-oldest engineering discipline after military engineering, and it is defined to distinguish non-military engineering from military engineering. Civil engineering can take place in the public sector from municipal public works departments through

to federal government agencies, and in the private sector from locally based firms to global companies.

The long cycle of design and construction is often overtaken by the rapid cycle of innovation in civil engineering and the new IT technology. As a result, some buildings are partially obsolete when they open, and almost every facility will be obsolete in some way before it reaches the end of its life. Flexibility design is a way to reduce the inconvenience and cost of these inevitable disruptions. Every design should have planned zones for future growth. When building and planning buildings and houses, the architectural environment that includes investors, clients, families, and staff should support treatment and views of the building concept in a friendly setting. However, the majority of our current buildings are built on a different foundation and are often seen as a direct cause of inadequate facilities in the eye of a modern architect and investors in today's civil engineering. The building and house design and design strategy, following the open theory of building separation, needs to be analyzed and evaluated to see if the design methods and principles are sufficient to support the customer needs to make the necessary changes. The research represents the importance of the separation of the system used in the design for house and building flexibility, as it allows for a significant change in all phases of the project (design, construction, and utilization) and points to the lack of a system that occurs when adopting design decisions based on which the right changes are made to the design for future development. For a better insight and presentation of what an architect has conceived as a conceptual solution, it is best to present it with the help of computer vision, i.e., through computer visualization before it is built. [1,2]

Augmented reality is a combination of digital interactive visual elements and sensory projections

translated into the real world. In this way, through the use of images, graphics, sounds and text, the digital world is combined with reality and creates a unique user experience. This technology allows us to create content that incorporates new patterns of context, meaning, and emotion. Such experiences create a bridge to present the authenticity, innovation, and creative vision of companies. As consumers, we share different parts of life with others every day. What we choose to express can take many forms, but the basic desire to share and show how we perceive ourselves and the world around us is strong, and the augmentative reality further elevates and enriches this sharing experience. From the prism of marketing, augmented reality has built a platform that allows brands to offer unique and more accessible digital experiences, providing memorable moments for consumers. One of the main reasons that retail brands invest in the development of this technology lies in the idea of enabling consumers to make better and more informative product decisions. The merging of these interoperability structures between technology on the one hand and architecture on the other hand provides a systematic pre-solution for making the right decision when designing and investing in capital and socially useful buildings. [3,4]

II. RESEARCH METHODOLOGY

This paper describes concept of system that can systematically "extract" key data from 2D and 3D models from CAD / CAM software such as - AutoCAD, ArchiCAD, Google Sketchup, and similar ready-made software used in design bureaus, primarily for architects and construction engineers who process a variety of calculations such as statics, dynamics, design, and measurements for different types of objects. The idea is not only to extract the data but also to insert it with software that should make calculations defined according to norms and regulations that use them. The goal is to simplify and speed up the work in terms of quick calculations - bills, offers that are a crucial part of the daily work of an engineer in this field. According to the initial talks, the goal is to calculate the basic elements such as area and volume from which according to the established formulation will be given appropriate offers or suggestions to the engineer on what type of raw material to use in construction and what it would mean for the quality of construction from functional and economic character for the investor. Based on the work done so far and in a short time, the completion of the primary software for 3D visualization (augmented reality) is seen as a

perspective to upgrade that view with the possibility as a functional calculation of all elements that will be defined by both sides of the system performance team. software, but also to be able to connect to the software developed part if there is potential in that direction to improve the overall system for an architect / civil engineer who would work both in the office and in the field with his client.

The two system structures can interact from both engineering sides in the development of a software product that together with the existing hardware technology can help in presenting a conceptual solution and how it will be justified, but also how it will have as an environmental impact. This shows all the effects from an architectural point of view in the part of structural elements, and they are placed with appropriate descriptions from a technological and economic point of view in a given database. The same base provides an opportunity in such a projection - augmented reality review to see what the advantages of the given architectural solution are and how it will affect the investor.



Figure 1. AR Concept in Reality

In essence, the architect prepares the entire project in terms of design and converts it into an appropriate 3D model that is placed on a specific location that is provided for the construction of that building in this case it is a house for better showroom experience). In this model not only, the 3D model that is showed in mixed reality but also the data that comes with the 3D model such as length, width, material (price-based information) can be stored in a system data base to be used for further calculations when we change the material or the length of the building for example. This can provide us insight for the final pre-signed submission paper for the client or investor for a economical point of view.

III. TECHNOLOGY USED TO DEVELOP THIS CONCEPT MODEL OF LEARNING AND COGNITION

This paper uses CAD / CAM technology to develop the conceptual design in this case AutoCAD and Google SketchUp which later with all its development stages is easily converted into a suitable 3D model (.fbx, .obj).

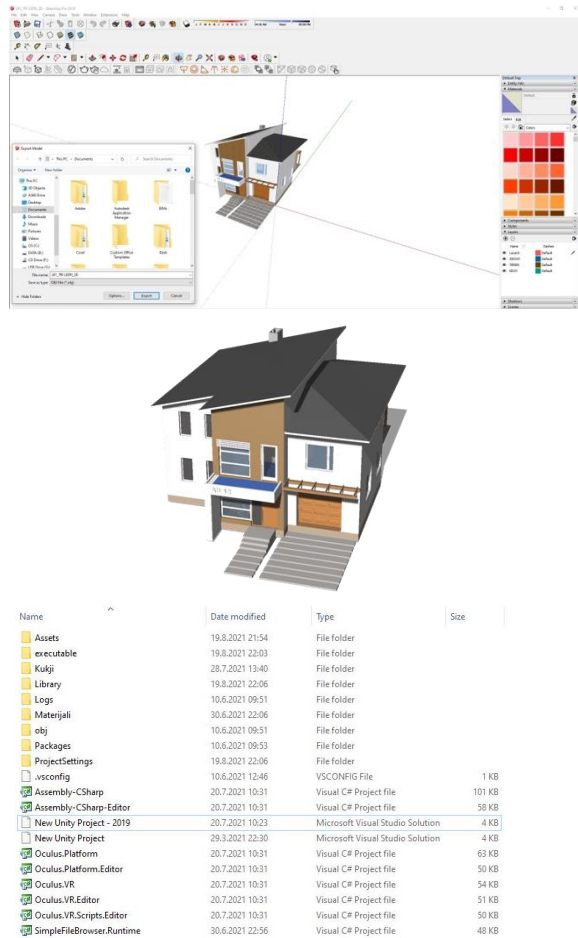


Figure 2. Architectural Concept and Design

From the software part, the combined development technology of C # and Unity3D was used to make a software segment-software that shows the 3D models or in this case there is a projected 3D object in a real position with appropriate coordinates (this is enabled by build in GPS developed module mounted on the laptop) in a scale of 1: 1.

C # - a programming language created by Microsoft at the initiative of Microsoft. NET and then approved as standard by Ecma (ECMA-344) and ISO (ISO / IEC 23270). C # is one of the programming languages designed for Common Language Infrastructure. C # is a simple, modern, multi-purpose programming language.

C # is a simple, modern, multi-purpose and object-oriented programming language.

- The language is intended for use in the development of software components suitable for use in distributed environments.
- Source code for portability is very important, as is program portability, especially for developers who know the C and C ++ programming languages.

- Support for internationalization is very important.
- C # is designed to be suitable for writing applications for both home and embedded systems
- C # applications are memory and energy efficient in their processing, the language is not designed to compete in performance and size with the C programming language or assembly language.

Unity is a cross-platform game engine developed by Unity Technologies, first announced and released in June 2005 at Apple Inc.'s The engine has since been gradually extended to support a variety of desktop, mobile, console and virtual reality platforms. It is particularly popular for iOS and Android mobile game development and used for games. It is cited to be easy to use for beginner developers and is popular for indie game development. The engine can be used to create three-dimensional (3D) and two-dimensional (2D) games, as well as interactive simulations and other experiences. The engine has been adopted by industries outside video gaming, such as film, automotive, architecture, engineering, construction, and the etc.

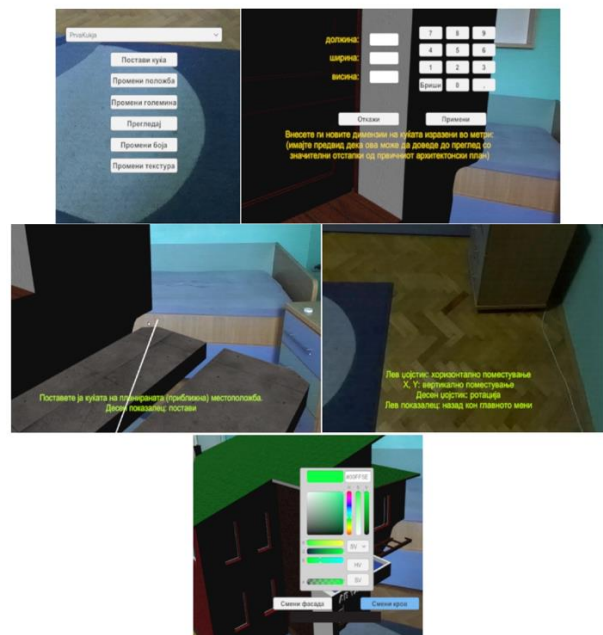


Figure 3. Developed AR Application

From the hardware part to fully experience this tool for real-time design and display of an already designed 3D object, a combination of virtual reality glasses and cameras from a suitable manufacturer that have appropriate hardware performance is used. In our case it is a combination of Oculus Rift S and ZED mini from Stereolabs.



Figure 4. Headset for augmented reality

IV. CONCLUSION

The main goal of this paper was to understand the future of health architecture, i.e., to understand the guiding principles that contribute to the future development of hospitals and to recognize the importance of the implication of patients in the design process, i.e. to see the positive results of their interaction. and support in the design and design of clinical hospitals.

Through the phase of preliminary analysis, the needs and views of the patient, the focused care and the basic human need for social assistance and support indicate a number of positive results that have an impact on the whole society and its sectors.

The paper fully strives to improve the current state of such facilities and their role in society. It is clear that this architectural design solution cannot fully determine and anticipate all the needs, because the design of clinical hospitals is updated daily, but

still according to full research are aware of the main principles for future development that should be applied from the very beginning. design and which will contribute a huge number of positives not only to make a building look modern and beautiful, but above all to be fully functional and useful for those who use it, and additionally a huge positive side is that such a building will have contributions for the whole society and the environment in general. Therefore, with the help of this type of so-called new technology that offers an alternative reality, we can see all the disadvantages and advantages of building such facilities. At the same time, the development environment itself allows a lot of possibilities that with appropriate upgrades would allow an architect to even design in real time in augmented reality.

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