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# Modelling and Layout of G+2 Villa using 3Ds Max

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**ABSTRACT:** The architectural design and spatial planning of residential buildings have significantly evolved with the advancement of 3D visualization tools. This journal focuses on the modelling and layout of a G+2 villa using Autodesk 3ds Max software. The objective of this project is to develop a realistic and functional 3D model that effectively represents the structural, aesthetic, and spatial features of a modern three-floor villa. The villa design includes essential components such as bedrooms, living areas, kitchen, balconies, staircases, and parking space, arranged to reflect both practical usage and visual appeal. By leveraging the features of 3ds Max, such as modelling, texturing, lighting, and rendering, the project ensures accurate visualization before construction. This approach enhances communication between architects, clients, and engineers while reducing design errors and improving efficiency. The study demonstrates how 3D modelling software can play a crucial role in the planning and presentation of complex residential structures.

**KEYWORDS**: G+2 Villa, 3D Modelling, Autodesk 3ds Max, Residential Design, Layout Planning, Architectural Visualization, Interior Design, Rendering, Floor Plan, Building Structure.

#### **I. INTRODUCTION**

The demand for modern residential buildings with aesthetically pleasing and functionally efficient layouts has significantly increased in recent years. Villas, especially G+2 structures (Ground plus two floors), are gaining popularity due to their spaciousness, privacy, and suitability for joint families or luxury living. Proper planning and visualization play a crucial role in the successful execution of such architectural projects.

With the evolution of digital tools, 3D modelling software like Autodesk 3ds Max has revolutionized the field of architectural design. It enables designers to create detailed and realistic models of buildings before actual construction begins. This not only helps in better spatial understanding but also in identifying design flaws early in the planning stage.

This journal presents the modelling and layout of a G+2 villa using 3ds Max software, focusing on the accurate representation of both exterior and interior components. The project aims to showcase how 3D modelling enhances design precision, communication among stakeholders, and overall project efficiency.

#### **II. LITERATURE SURVEY**

**Reinout Wiltenburg et. Al 2024**: The study identifies four key challenges and solution areas in using Virtual Reality (VR) for spatial planning and emergency situations: user experience, result collection, experience evaluation, and development recommendations (models, game engines, and VR systems). It highlights a research gap between VR use in smart cities and emergency evacuation, suggesting that this study helps bridge that gap. VR is chosen over AR and MR due to its fully immersive nature, though future studies could include those technologies too. The findings show inconsistency in application development and evaluation methods, indicating the need for a standardized evaluation approach. A limitation is the exclusion of grey literature (blogs, tutorials), which could be useful in future research for a more practical development roadmap.





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**Giuseppina De Martino et. al 2023**: This study uses an interdisciplinary approach combining engineering and archaeology to analyze the structural and geometric parameters of various floor and roof types in the Villa of Diomedes at Pompeii. Data from historical analysis, surveys, and inspections helped assess eleven-barrel vaults, three wooden floors, and three sloped roofs, linking structural assumptions with historical records. Key findings include trends in arch ratios and stress levels in wooden beams, showing Roman builders' advanced understanding of structural behavior. The research also produced 3D models of the villa in its ruined state and its original form from 79 A.D. Despite the need for more data, the findings offer valuable guidance for structural analysis, conservation, and restoration of historical architecture.

**Dorina Papa et, al 2024**: This research explores the development of a web-based virtual heritage application, highlighting the key steps and challenges involved. It began with historical research and building surveys, followed by the creation of accurate 3D models to represent the building's transformation over time. The focus then shifted to enhancing user experience in VR, using interactive elements and multimedia. A major challenge was integrating real-time 3D exploration with informational content, which required close collaboration between architects and developers. The study emphasizes the importance of combining historical accuracy, 3D modeling, and user engagement, paving the way for more immersive and educational digital heritage experiences.

**Raffaele Cucuzza et. al 2024**: This paper investigates the dynamic behavior and model updating of two confined masonry (CM) buildings at the University of Messina, built after the 1908 earthquake. The study includes material testing, dynamic identification using the I-AOMA method, and modal analysis, revealing complex structural behavior with significant torsional and translational modes. A 3D finite element model was developed using laser scanning and BIM, and optimized using a genetic algorithm to match experimental results. Notably, the Young's modulus for masonry appeared higher than expected, likely due to complex interactions between masonry and reinforced concrete elements. The paper emphasizes that these are equivalent modelling parameters rather than direct material properties. Future work will involve additional optimization methods and expanded material testing to refine the model and better understand CM structures.

#### **III. METHODOLOGY**

The methodology followed for the modelling and layout of the G+2 villa using Autodesk 3ds Max consists of several systematic stages. These steps ensure the proper planning, accurate modelling, and realistic visualization of the villa structure. The process is outlined below:

#### 1. Requirement Analysis:

The first step involved identifying the functional requirements of the villa, such as the number of rooms, living spaces, kitchen, bathrooms, parking area, staircases, and balconies for each floor (ground, first, and second). Design considerations like ventilation, lighting, circulation space, and aesthetics were also defined.

#### 2. Conceptual Planning and Sketching:

Initial 2D sketches and rough floor plans were prepared to visualize the layout of each floor. These plans included the placement of rooms, walls, doors, and windows. AutoCAD was optionally used for precise 2D drafting.

#### 3. 3D Modelling in Autodesk 3ds Max:

Using 3ds Max, the villa was modelled floor by floor:

- Ground Floor: Modelled with parking area, living room, kitchen, and guest bedroom.
- First Floor: Included family bedrooms, common living area, and balcony.
- Second Floor: Designed with additional rooms, terrace access, and storage.

Each component (walls, floors, slabs, doors, and windows) was created using basic 3ds Max modelling tools such as Box, Extrude, Boolean operations, and Poly Editing.





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#### 4. Material Assignment and Texturing:

After completing the basic structure, appropriate materials were applied to walls, floors, ceilings, and furniture using the Material Editor. Textures were selected to reflect realistic finishes like tiles, wood, glass, and paint.

#### 5. Lighting and Rendering:

Natural and artificial lighting was added to simulate daylight and interior lighting using standard lights and V-Ray lights (if V-Ray plugin was used). Final renders were generated using the rendering engine to create photorealistic images of the villa.

#### 6. Review and Modifications:

The model was reviewed for spatial accuracy and visual appeal. Necessary changes were made to improve the design and correct any dimensional or structural issues.



### **IV. EXPERIMENTAL RESULTS**

Figure 1: Ground Floor Plan





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# 30' WIDE ROAD

Figure 2: First and Second Floor Plan





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**Figure 3:** Final result of g+2 villa

#### V. CONCLUSION

This project successfully demonstrated the complete modelling and layout of a G+2 villa using AutoCAD and Autodesk 3ds Max. AutoCAD was utilized for precise 2D drafting of floor plans, sections, and elevations, while 3ds Max facilitated the development of a realistic 3D model with detailed material application, lighting, and rendering. The methodology followed ensured clarity at each stage—from conceptual planning to visualization. The final output provided both a technical and visual representation of the villa, aiding in better understanding of spatial planning, aesthetics, and structural design. This integrated approach proves highly effective for architectural design, especially in residential projects requiring both accuracy and visual appeal.

#### REFERENCES

[1] Mahesh, N. (n.d.). Modelling and layout of duplex house using AutoCAD and 3DS Max [Unpublished manuscript].

[2] Ganesh, V., Shivaraju, Y., Satheesh, V., & Ranapratap, P. (2024). Modelling and layout of farmhouse using AutoCAD and 3D's Max software. International Journal for Multidisciplinary Research in Science, Engineering and Technology, 7(12), 18367–18373.

[3] Peterson, M. T. (2002). 3D Studio Max 3 Fundamentals. New Riders.

[4] Sahand, J. (2010). 3ds Max tutorial: Modelling & rendering an interior scene using 3ds Max and V-Ray [Workshop handout].

[5] JNCame. (n.d.). 3ds Max handout: Interface, modelling tools, doors, windows, stairs, materials [Educational material].

[6] Editorial Board. (2024). Modelling and layout of independent house by using AutoCAD and 3Ds Max software. European Journal of Emerging Technology and Management Sciences.





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[7] Yadav, A., & Ojha, D. (2021). Architectural drawing of G+10 building by 3ds Max + V-Ray + Lumion. Journal of Mechanical and Construction Engineering, 1(2), 1–11.

[8] ISPRS Working Group. (2007). Application of mixed technique for the 3D modelling of Villa Reale at Monza. XXI International CIPA Symposium Proceedings.

[9] Elizardo, J. M. (2013). Modelling for architecture, engineering and construction: 3ds Max Design [Training material].

[10] Djuric, I., Obradovic, R., & Ralevic, N. M. (2018). A review of augmented reality for architecture and cultural heritage visualization. Boletim da Aproged, 34, 101–108.

[11] Anonymous. (n.d.). 3DS Max plan and syllabus overview [Course outline].

[12] Mould, D. (2014). Architectural modelling and rendering with 3ds Max and V-Ray. Packt Publishing.

[13] Schweikert, R. (2015). The essential guide to 3D modelling and visualization with 3ds Max. CRC Press.

[14] Wilson, J. A. (2020). Architectural rendering with 3ds Max and V-Ray: From model to image. CRC Press.

[15] Salvador, L., Novák, J., Kurilla, L., & Zeman, J. (2012). A framework for integrated design of algorithmic architectural forms. arXiv Preprint, arXiv:1203.2499.









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