International Journal of
AI ELECTRICAL CIVIL AND MECHANICAL ENGINEERING
Peer Reviewed, Referred & Indexed Journal
ISSN: 3070-0434 www.zesterapublications.com Original Research Paper

3D MODELING OF A MULTI-STORY COMMERCIAL BUILDING USING REVIT ARCHITECTURE

[1] G Sai Shruthi, [2] M Naveen Kumar , [3] R Yogesh, [4] D Vaishnavi
[1]AssistantProfessor, [234]Students
Department of CIVIL
Siddhartha Institute of Technology & Sciences, Narapally
saishruthi.civil@siddhartha.co.in, 24TQ5A0107@siddhartha.co.in, 24TQ5A0122@siddhartha.co.in, 24TQ5A0111@siddhartha.co.in,

Abstract

The project "3D Modeling of a Multi-Story Commercial Building Using Revit Architecture" focuses on developing a detailed three-dimensional digital model of a multi-story commercial building using Building Information Modeling (BIM) technology. Commercial buildings require proper planning and coordination of spaces such as offices, retail areas, reception zones, corridors, staircases, elevators, restrooms, parking areas, and service spaces. The main objective of the project is to create an accurate and visually understandable architectural model that represents the proposed building and its major components.

The building is modeled using Autodesk Revit Architecture, where architectural elements such as walls, floors, roofs, doors, windows, stairs, railings, ceilings, furniture, and other components are created with appropriate dimensions and properties. Different floors and functional spaces are developed according to the building requirements. The Revit environment allows the individual building elements to be integrated into a single coordinated BIM model, making it easier to visualize the complete multi-story structure and manage design modifications.

The project also includes the generation of architectural drawings and three-dimensional views from the developed BIM model. Floor plans, elevations, sections, schedules, and rendered views can be produced directly from the model. Materials, colors, lighting, and other visualization settings are applied to improve the presentation of the commercial building. The 3D model helps in understanding the spatial arrangement, building proportions, circulation, and overall architectural appearance.

I. Introduction

A multi-story commercial building is a complex structure designed to accommodate various activities such as offices, retail spaces, business centers, restaurants, and service facilities. Proper architectural planning is essential to ensure efficient utilization of space, comfortable circulation, accessibility, safety, and an attractive appearance. As the number of floors increases, coordinating different spaces and building components becomes more challenging. Therefore, an accurate digital representation of the building is useful for understanding its overall structure and architectural arrangement.

Traditional architectural design mainly relies on two-dimensional drawings such as floor plans, elevations, and sections. Although these drawings provide important

Received: 24-07-2026 | Accepted: 30-08-2026 | Published: 05-09-2026

International Journal of
AI ELECTRICAL CIVIL AND MECHANICAL ENGINEERING
Peer Reviewed, Referred & Indexed Journal
ISSN: 3070-0434 www.zesterapublications.com Original Research Paper

information, it can be difficult to visualize the complete three-dimensional relationship between different building elements. Building Information Modeling (BIM) provides an integrated approach by allowing building components to be represented as a coordinated three-dimensional model. BIM also helps manage building information and supports modifications throughout the design process.

Autodesk Revit Architecture is a BIM-based software used for creating detailed architectural models and documentation. It allows designers to develop walls, floors, roofs, doors, windows, stairs, ceilings, railings, furniture, and other architectural components with appropriate dimensions and properties. Multiple floor levels can be modeled within the same project, while plans, elevations, sections, schedules, and 3D views can be generated from the central model. This improves coordination and reduces repetitive drafting work.

II. Literature Survey

Building Information Modeling (BIM) has become an important technology in the architecture, engineering, and construction industry for creating and managing digital representations of buildings. Previous studies have shown that BIM provides advantages over conventional two-dimensional drafting by integrating building geometry and related information into a coordinated model. BIM-based modeling allows designers to visualize building components, manage design changes, and generate different forms of project documentation from a common digital model. This approach is particularly useful for complex buildings where coordination between multiple floors and building elements is required.

Several studies have investigated the application of BIM in multi-story building design and architectural planning. Research has demonstrated that three-dimensional BIM models can improve the understanding of spatial relationships between rooms, circulation areas, structural elements, and building services. BIM also supports the development of floor plans, elevations, sections, schedules, and three-dimensional views from the same model. This integrated approach can reduce inconsistencies between drawings and improve the efficiency of architectural documentation.

Research on Autodesk Revit Architecture has highlighted its usefulness for parametric building modeling and architectural documentation. Revit allows walls, floors, roofs, doors, windows, stairs, ceilings, railings, furniture, and other building components to be created as intelligent model elements. Changes made to the BIM model can be reflected in associated views and drawings, which reduces repetitive drafting work. Studies have also explored the use of Revit for developing detailed architectural models that can support design visualization and communication with clients and other project participants.

Three-dimensional visualization has also been widely studied as a tool for improving architectural design communication. Compared with conventional two-dimensional drawings, 3D models allow designers and users to examine building form, proportions, interior arrangements, materials, and circulation more clearly. Rendering and walkthrough techniques can further improve understanding of the proposed building by providing realistic visual representations. These capabilities are useful during

International Journal of
AI ELECTRICAL CIVIL AND MECHANICAL ENGINEERING
Peer Reviewed, Referred & Indexed Journal
ISSN: 3070-0434 www.zesterapublications.com Original Research Paper

design review because potential planning and visualization issues can be identified before construction.

Overall, the literature indicates that BIM-based 3D modeling using Revit Architecture can improve architectural visualization, documentation, coordination, and design modification for multi-story buildings. Previous studies have mainly focused on BIM adoption, parametric modeling, architectural documentation, visualization, and coordination. Building on these concepts, the present project develops a detailed three-dimensional model of a multi-story commercial building using Revit Architecture. The study focuses on creating coordinated floor plans, elevations, sections, 3D views, and architectural documentation to provide a clear digital representation of the proposed commercial building.

III. System Analysis

System analysis is an important stage in developing a detailed 3D model of a multi-story commercial building using Revit Architecture. The project focuses on creating an accurate digital representation of the proposed commercial building. Building requirements, floor levels, room arrangements, circulation, accessibility, and space utilization are considered during the planning stage. Functional areas such as offices, retail spaces, reception areas, corridors, staircases, elevators, restrooms, and service spaces are arranged appropriately. A three-dimensional BIM model is developed using Revit Architecture to represent the building and its architectural components. Walls, floors, roofs, doors, windows, stairs, ceilings, railings, furniture, and other elements are incorporated into the model. Suitable dimensions and properties are assigned to the building components. Floor plans, elevations, sections, schedules, and 3D views are generated from the same BIM model. The model helps evaluate the spatial relationships and overall appearance of the commercial building. Design changes can be implemented within the model without recreating the complete building from the beginning. The system also supports visualization and architectural documentation for design presentation. Overall, the system analysis provides a systematic approach for planning, modeling, visualizing, and documenting a multi-story commercial building.

Existing System

The conventional architectural design system mainly depends on two-dimensional drawings and manual drafting techniques for representing multi-story commercial buildings. Architects generally prepare floor plans, elevations, sections, and other drawings separately during the design process. Understanding the complete three-dimensional relationship between different floors and building components can be difficult using these drawings alone. Design modifications may require changes to several individual drawings, which can increase drafting time and the possibility of inconsistencies. Creating a detailed 3D representation may also require separate modeling and visualization software. Traditional methods provide limited integration between architectural drawings and building information. Coordinating multiple floors, rooms, stairs, doors, windows, and other components can become complicated as building complexity increases. Identifying spatial conflicts during the early design stage can also be difficult. Manual preparation of schedules and quantities requires

International Journal of
AI ELECTRICAL CIVIL AND MECHANICAL ENGINEERING
Peer Reviewed, Referred & Indexed Journal
ISSN: 3070-0434 www.zesterapublications.com Original Research Paper

additional effort. Clients may find it difficult to understand the final appearance of a commercial building from technical drawings alone. Repeated drafting is required when dimensions or space arrangements are modified. This can increase the overall design effort and reduce efficiency. Therefore, an integrated BIM-based modeling approach is useful for improving the planning and documentation of multi-story commercial buildings. Revit Architecture provides a suitable environment for combining 3D modeling and architectural documentation.

Disadvantages of Existing System

- Mainly depends on two-dimensional drawings.
- Difficult to visualize the complete building in 3D.
- Design changes require repeated drawing modifications.
- Higher possibility of inconsistencies between drawings.
- Manual drafting can be time-consuming.
- Limited integration of building information.
- Difficult to coordinate multiple floors and components.
- Limited visualization of interior and exterior spaces.
- Manual preparation of schedules requires additional effort.
- Difficult to identify spatial issues at an early stage.
- Separate software may be required for 3D visualization.
- Less efficient for complex multi-story building projects.

Proposed System

The proposed system focuses on developing a detailed three-dimensional BIM model of a multi-story commercial building using Revit Architecture. The project begins with identifying the building requirements, site dimensions, floor levels, functional spaces, and circulation requirements. Areas such as offices, retail spaces, reception, corridors, staircases, elevators, restrooms, and service spaces are planned according to their intended functions. The building is then developed as an integrated 3D BIM model using Revit Architecture. Architectural components such as walls, floors, roofs, doors, windows, stairs, ceilings, railings, and furniture are incorporated into the model. Appropriate dimensions, materials, and properties are assigned to the building elements. Different floor levels are coordinated within the same digital model to maintain consistency. Floor plans, elevations, sections, schedules, and 3D views are generated directly from the BIM model. Materials and finishes can be applied to create realistic architectural visualization. The model can be modified easily when changes are required in the building design. The integrated approach helps improve coordination between different architectural views and building components. The final model provides a clear representation of the commercial building for design review and presentation. Overall, the proposed system improves the efficiency, visualization, coordination, and documentation of multi-story commercial building design.

Advantages of Proposed System

- Provides BIM-based 3D architectural modeling.
- Creates a detailed digital representation of the building.

International Journal of
AI ELECTRICAL CIVIL AND MECHANICAL ENGINEERING
Peer Reviewed, Referred & Indexed Journal
ISSN: 3070-0434 www.zesterapublications.com Original Research Paper

- Improves visualization of multiple floors.
- Generates plans, elevations, and sections from one model.
- Makes design modifications easier.
- Reduces inconsistencies between drawings.
- Supports detailed architectural documentation.
- Improves coordination between building components.
- Allows materials and finishes to be visualized.
- Supports generation of schedules from the BIM model.
- Helps identify spatial and design issues early.
- Improves overall efficiency of architectural design.

IV. Methodology

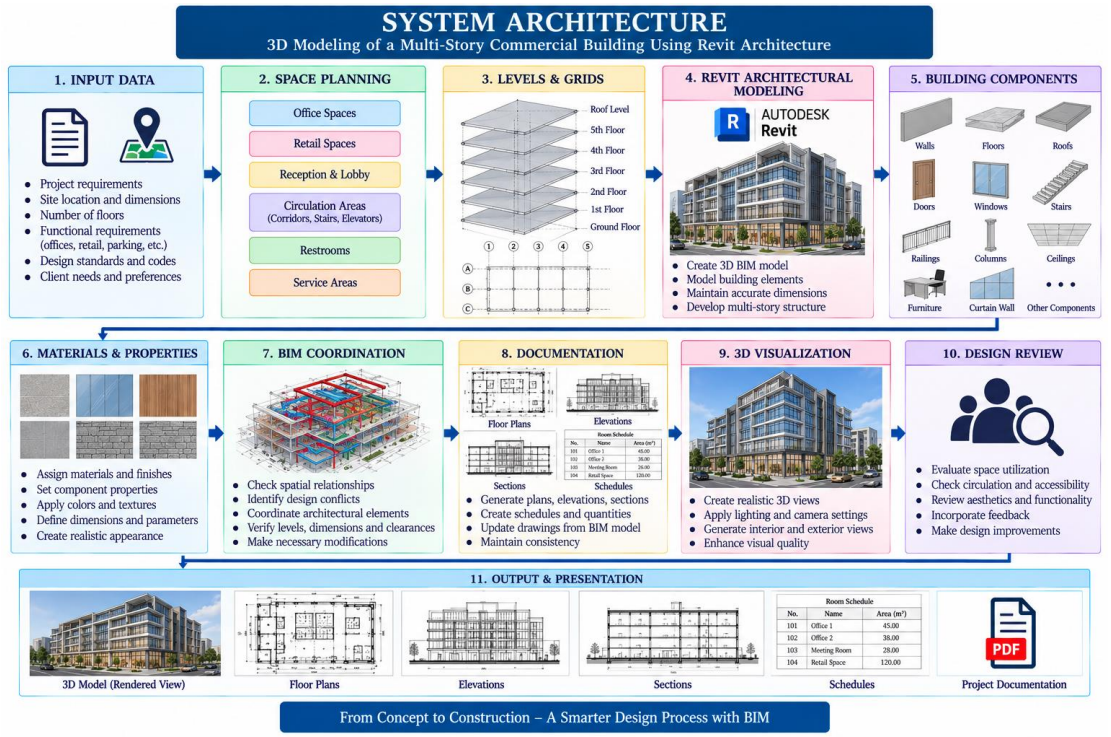
The methodology begins with collecting the required architectural and site information for the proposed multi-story commercial building. The building requirements, site dimensions, number of floors, functional spaces, circulation, and accessibility requirements are identified. A preliminary floor layout is prepared by arranging offices, retail areas, reception, corridors, staircases, elevators, restrooms, and service spaces. The selected layout is then developed as a three-dimensional BIM model using Revit Architecture. Building levels are created according to the required floor heights and architectural components are placed within each level. Walls, floors, roofs, doors, windows, stairs, ceilings, railings, furniture, and other elements are modeled with suitable dimensions and properties. Materials and finishes are assigned to selected components to improve the visual representation. Floor plans, elevations, sections, and 3D views are generated from the completed model. The model is reviewed to check spatial arrangements, circulation, dimensions, and coordination between building elements. Necessary modifications are made within the BIM environment to improve the building design. Schedules and other architectural documentation are generated from the model where required. Finally, the completed BIM model, drawings, 3D views, and documentation are compiled for design evaluation and presentation.

System Architecture

The system architecture represents the complete workflow used for developing the 3D model of a multi-story commercial building using Revit Architecture. The process begins with Project Input Data, including site dimensions, building requirements, floor levels, and functional requirements. The Space Planning Module arranges offices, retail areas, reception, circulation spaces, restrooms, stairs, elevators, and service areas. The Level and Grid Module establishes floor levels, grids, and basic building references. The Revit Architectural Modeling Module develops the three-dimensional BIM model of the building. The Building Components Module adds walls, floors, roofs, doors, windows, stairs, ceilings, railings, and furniture. The Material and Properties Module assigns materials, finishes, dimensions, and component properties. The BIM Coordination Module checks relationships and coordination between different building elements and floors. The Documentation Module generates floor plans, elevations, sections, schedules, and other architectural drawings. The 3D Visualization Module creates realistic views of the interior and exterior spaces. The Design Review Module evaluates space utilization, circulation,

International Journal of
AI ELECTRICAL CIVIL AND MECHANICAL ENGINEERING
Peer Reviewed, Referred & Indexed Journal
ISSN: 3070-0434 www.zesterapublications.com Original Research Paper

dimensions, and overall architectural appearance. Finally, the Output and Presentation Module provides the completed BIM model, drawings, schedules, 3D views, and project documentation. Overall, the architecture follows the workflow **Input Data → Space Planning → Levels & Grids → Revit BIM Modeling → Building Components → Materials & Properties → BIM Coordination → Documentation → 3D Visualization → Design Review → Final Outputs & Presentation**.



V. Result and Output

International Journal of
AI ELECTRICAL CIVIL AND MECHANICAL ENGINEERING
Peer Reviewed, Referred & Indexed Journal
ISSN: 3070-0434 www.zesterapublications.com Original Research Paper



VI. Conclusion

The project successfully demonstrated the 3D modeling of a multi-story commercial building using Revit Architecture. The proposed commercial building was developed as a detailed BIM model by considering different floor levels, functional spaces, circulation areas, and architectural requirements. Major building components such as walls, floors, roofs, doors, windows, stairs, railings, ceilings, furniture, and other elements were incorporated into the model. The use of Revit provided an integrated environment for creating and coordinating the architectural components of the building. Floor plans, elevations, sections, 3D views, and schedules were generated from the same BIM model. The three-dimensional model improved the visualization and understanding of the building's interior and exterior spaces. Materials and finishes were applied to provide a more realistic representation of the proposed design. The BIM-based approach also made design modifications easier and reduced inconsistencies between different architectural drawings. The developed model can be used for design review, architectural presentation, and project documentation. Overall, the project demonstrates that Revit Architecture is an effective tool for accurate 3D modeling, visualization, coordination, and documentation of multi-story commercial buildings.

References

[1] Kumar, R. D., Prudhviraj, G., Vijay, K., Kumar, P. S., & Plugmann, P. (2024). Exploring COVID-19 through intensive investigation with supervised machine learning algorithm. In Handbook of Artificial Intelligence and Wearables (pp. 145-158). CRC Press.

International Journal of
AI ELECTRICAL CIVIL AND MECHANICAL ENGINEERING
Peer Reviewed, Referred & Indexed Journal
ISSN: 3070-0434 www.zesterapublications.com Original Research Paper

[2] Swathi, B., Vijay, K., Sushanth Babu, M., & Dinesh Kumar, R. (2024, November). Machine Learning Techniques in Cloud Based Intrusion Detection. In The International Conference on Artificial Intelligence and Smart Environment (pp. 557-564). Cham: Springer Nature Switzerland.

[3] Sv satyakrishna, shirisha rangu ,bhargavi nalacheruve.(2024) Prospective investigation on colorectal cancer with SMOTE on machine learning Algorithm

[4] Dr.G.Vishnu Murthy, BhargaviNalacheruve 1Professor, Department of computer Science & engineering, Anurag University, TS, India. 2Student, Department of computer Science & engineering, Anurag University, TS, India.

[5] V. N. S. Manaswini, K. K, C. Nigam, S. S. Ali, R. Niranjana, and Suman, "Real-Time Object Detection in Drone Surveillance Using YOLOv5," in Proc. 2025 3rd Int. Conf. IoT, Communication and Automation Technology (ICICAT), Gorakhpur, India, 2025, pp. 1–6, doi: 10.1109/ICICAT68430.2025.11414670.

[6] B. Soundarya, V. N. S. Manaswini, M. Ayyakrishnan, R. D. Kumar, "Contextual Analysis of Big Data Analytics in Intelligent Transportation Frameworks," in Intersection of Artificial Intelligence, Data Science, and Cutting-Edge Technologies: From Concepts to Applications in Smart Environment, Lecture Notes in Networks and Systems, vol. 1353, Cham: Springer, 2025, doi: 10.1007/978-3-031-88304-0_79.

[7] R. D. Kumar, V. N. S.Manaswini, "Applications of blockchain in smart cities: detecting fake documents from land records using blockchain technology," in Blockchain for Smart Cities, Elsevier, 2021, pp. 105–117, doi: 10.1016/B978-0-12-824446-3.00017-X.

[8] Tejavath Veeramma, Badarla Anil, Guguloth Ravinder, "An advanced movie recommender using collaborative filtering and sentiment analysis," International Research Journal of Modernization in Engineering Technology and Science, vol. 7, no. 7, July 2025, doi: 10.56726/IRJMETS81618.

[9] Ravi Kumar Banoth, Ramana Murthy B V, "Automatic crop recommendation system using LightGBM and decision tree machine learning models," Journal of Machine and Computing, vol. 5, no. 1, pp. 343, Jan. 2025, doi: 10.53759/7669/jmc202505026.

[10] Ravi Kumar Banoth, Dr. B.V. Ramana Murthy, "Smart agriculture through IoT and machine learning for analyzing carbon footprints," in Proc. Int. Conf. Computer Science and Communication Engineering (ICCSCE), Apr. 2025.

[11] Ravi Kumar Banoth, B. V. Ramana Murthy, "Soil image classification using transfer learning approach: MobileNetV2 with CNN," SN Computer Science, vol. 5, art. no. 199, 2024, doi: 10.1007/s42979-023-02500-x.