iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** II **Month of publication:** February 2026

DOI: https://doi.org/10.22214/ijraset.2026.77321

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue II Feb 2026- Available at www.ijraset.com

Aesthetix - AI Powered Interior Design Application

Ms. Uma R[1], Kishanth A[2], Naren Karthick M[3], Nithin Kumar R[4], Shai Shmithesh M R[5]
[1]*Lecturer, Department of Computer Engineering, PSG Polytechnic College, Coimbatore, Tamil Nadu, India*
[2, 3, 4, 5]*Final Year Diploma Student, Department of Computer Engineering, PSG Polytechnic College, Coimbatore, Tamil Nadu, India*

Abstract: ***Interior design is instrumental to producing an area that is functional, beautiful, and psychologically comfortable, both for residential and professional purposes. The conventional process of interior design relies heavily on expert knowledge, repeated interactions between clients and designers, and manual visualization techniques, which are usually accompanied by inefficiencies and limited accessibility for non-professional users. Moreover, users often face significant problems during the early stage of planning in expressing their design ideas and visualizing concepts.***
Recent progress in AI, especially within LLMs and computer vision, has empowered systems to reason effectively over and integrate textual and visual information. This opens up new possibilities in automating challenging design reasoning tasks and supplying intelligent personal recommendations.
This paper introduces Aesthetix, a multimodal web application utilizing AI assistance for improving and automating interior design planning. The designed solution enables users to upload images of a room and describe their design requirements using natural language input capabilities. Through the utilization of interior design features using multimodal interaction and cloud-based data synchronization, Aesthetix facilitates a complete solution for interior design, which encompasses room designs, color combinations, furniture selection, and purchase assistance. Experimental testing of the solution verifies that Aesthetix possesses faster response rates, improved usability, and support for higher levels of personalization in contrast to digital interior design software.

I. INTRODUCTION

Interior design is an area of multiple disciplines that combines creativity, ergonomics, architecture, and psychology in a manner that aims at the creation of spaces capable of improving comfort, efficiency, and general wellbeing through a functionality that goes beyond aesthetics.
Despite its significance, high-quality professional interior design expertise is too expensive and out of reach of a significant number of individuals, especially for small-scale purposes. Therefore, many users of these technologies are left with limited options, either choosing not to consult professional experts or finding ways to interpret their design.
Traditionally, interior design requires several steps, such as requirement analysis, drafting, iterative modification, and final implementation. All these steps necessitate a broad communication between designers and clients to ensure that the outcome meets user preferences. However, the main challenge to the workflow is that clients have difficulty imagining what the outcome of this process will look like from the technical drawings or mood boards provided or through a verbal explanation. This usually creates a gap in understanding that leads to dissatisfaction, repeated revisions, and inefficiency in the design process.

II. RELATED WORK

Chaillou et al., *"ArchiGAN: Artificial Intelligence X Architecture"* explored the early integration of artificial intelligence into architectural design by leveraging generative adversarial networks for automated floor-plan generation. Their work demonstrated how data-driven generative models can assist architects during the conceptual design phase by producing diverse and constraint-aware architectural layouts. This research laid foundational groundwork for AI-assisted design systems by showing that algorithmic and generative approaches can meaningfully support spatial planning and architectural creativity, rather than merely serving as visualization tools.
Huang et al., *"Plan2Scene: Converting Floorplans to 3D Scenes"* focused on advancing indoor space understanding using deep learning and computer vision techniques. Their research proposed a pipeline capable of identifying room structures, furniture elements, and spatial relationships from 2D floor plans and converting them into structured 3D indoor scenes. This work highlighted the effectiveness of deep neural networks in interpreting indoor environments and extracting semantic information such as object placement and room layout, which is critical for intelligent interior design systems.

©IJRASET: All Rights are Reserved

III. PROBLEM STATEMENT

Despite the remarkable development and improvement in digital tools for interior design, some of the basic challenges have not yet been overcome:

1) Highly dependent on professional designers, most of the existing options require a massive engagement of professional designers to provide customized and end-to-end design services, which are expensive and hence out of reach for most users.
2) Limited understanding of user intent: The capability of the current systems to interpret user preferences represented through natural language is poor, which generates very generic design recommendations, or, in fact, misaligned ones.
3) Inadequate real-world image interpretation: Most of the tools fall short in their capability to gain meaningful insights into the real-world images of rooms to identify spatial constraints, object placement, and other environmental contexts.
4) Basic level of automation: Fully fledged interior design solution generation—ranging from layout planning to color schemes, furniture selection, and purchasing advice—is still very manual and fragmented.
5) Not enough iteration and revision support: The current support for iterative refinement in existing platforms is minimal. This limits the extent to which users can dynamically revise a design in the light of feedback or changing preference.

IV. EXISTING SYSTEM

The existing software is comprised mainly of logical ruling, fixed templates, which do not facilitate flexibility as well as creativity. The user is left with no choice but to select their layout designs, furniture, as well as designs, through logical choice made by the user, but are not offered intelligent options. It is also hard to implement their designs through text by integrating picture representations for their room with their personal preferences.

V. PROPOSED SYSTEM

Aesthetix is a multimodal web application, which uses AI technology. This application integrates the strengths of image analysis, Natural Language Processing, and design interactivity into a stand-alone system. This proposed design will be of great use in serving both new and experienced designers.

Table 5.1 Proposed System modules

Module / Stage	Description
User Input	The user uploads an image of the room to be designed.
Design Preferences Input	The user provides design preferences in natural language (text input).
Multimodal Processing	The system processes both vision (image) and text inputs simultaneously.
AI Design Analysis	The AI analyzes user inputs and generates initial design recommendations.
AI-S Module	The AI-S module creates a detailed design description, furnishing ideas, color schemes, and shopping suggestions using a Groq-based large language model.
Design Canvas Module	An interactive canvas allows the user to refine the layout using drag-and-drop features.
User Refinement	The user customizes and adjusts the generated layout according to his/her preferences.
Cloud Synchronization Module	Firebase Firestore synchronizes design data, preferences, and version history in real time.
Scalability & Integration	Cloud-based architecture ensures scalability and seamless integration with other system components.

VI. SYSTEM ARCHITECTURE

Aesthetix uses a client–server architecture that allows high responsiveness, scalability, and efficient resource utilization.

A. *Frontend*

The front-end is created using HTML, CSS, and Vanilla JavaScript, keeping the implementation lightweight and the compatibility wide across different web browsers. Consequently, the user interface should be simple and intuitive, ensuring that a non-professional user can interact with the system with ease.

B. *Back-end*

Node.js is utilized as the backbone for backend implementation, coupled with the Express framework. It shall handle API requests, user inputs and commands, image uploads, and coordination concerning AI models. This layer acts as a processor and serves to ensure secure and effective communication between the front tier and the AI services.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue II Feb 2026- Available at www.ijraset.com

C. Database

Firebase Firestore is used as a NoSQL database in the cloud to store users' data, preferences of designs, and interaction history. It enables real-time data synchronization, fast retrieval, and secure storage for constant access or up-to-date access throughout sessions.

VII. MULTIMODAL DESIGN GENERATION

Multimodal design generation is one of the innovations brought by the Aesthetix system. The system combines visual inputs in terms of room pictures with textual input preferences to generate a structured query in Artificial Intelligence. This multimodal input is then further processed by the large language model that possesses the capability to reason in context. Thus, interior design suggestions can be generated in response to the characteristics of the space. Through the joint analysis of visual characteristics like the layout of a room, object positioning, and constraints on the one hand, and the specified requirements on the other, the designs are produced. This approach makes the generated designs much more relevant and useful. Unlike conventional design systems based on rules, the reasoning module based on prompts in the Aesthetix system is more flexible and adaptive. The adaptive reasoning capability of the AI system accommodates different designs and preferences without additional learning or rules being programmed manually in the system. This makes the system useful in various applications where scalable, personalized, and context-aware interior design generation is needed.

VIII. INTERACTIVE DESIGN CANVAS

The interactive design canvas enables users to actively participate in the interior design process through direct manipulation of design elements. Users can add, remove, reposition, rotate, and resize furniture items using an intuitive drag-and-drop interface. Each interaction is automatically recorded and synchronized with the cloud database, ensuring real-time updates and persistent design states across user sessions. This integrated approach combines animation, automation, and user control, enhances creativity while minimizing the effort required to perform complex design tasks. By allowing immediate visual feedback, the canvas helps users experiment with multiple layout configurations and design alternatives efficiently.

A. Class Diagram

The class diagram for the Aesthetix – AI powered Interior Design Application is shown in Fig 8.1 which includes classes such as: User, Design Project, Wall Texture, Furniture, FurnitureItem, Floor Material, LightingFixture, AI RecommendationService, Community Post and AuthService.

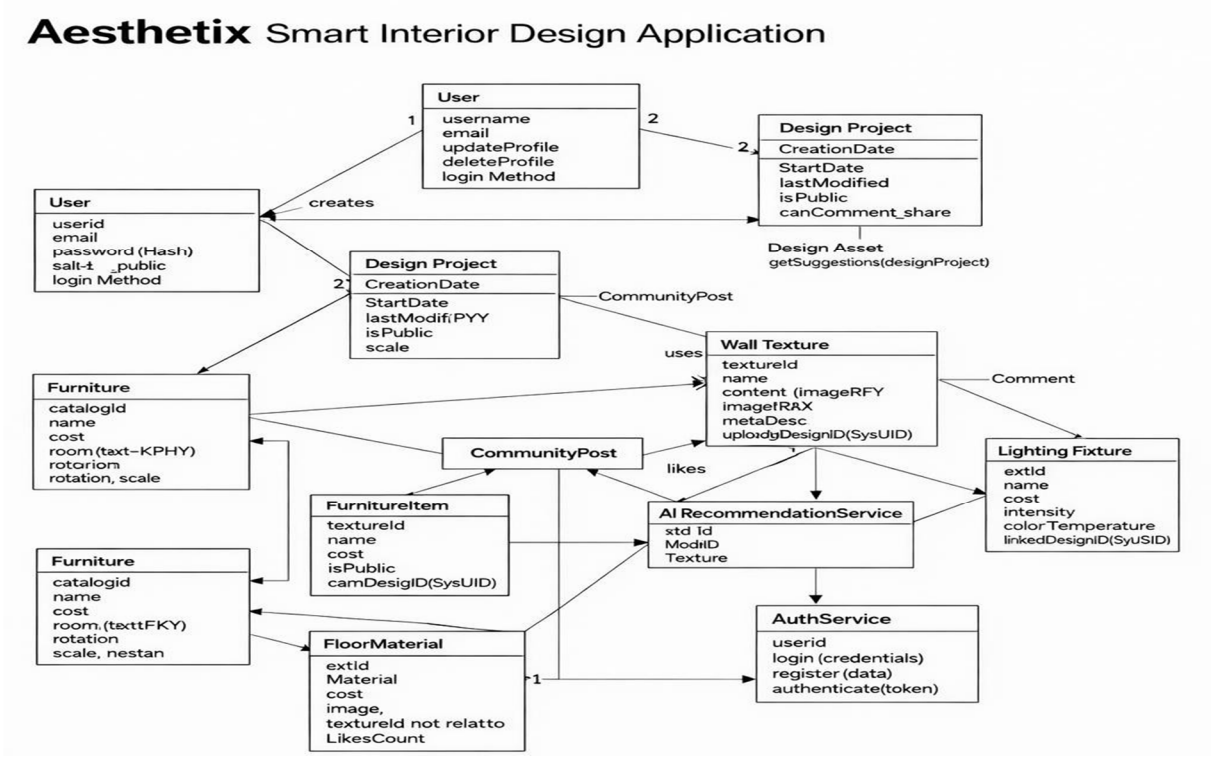


Fig 8.1: Class Diagram

IX. PROJECT MODULES

A. User Management and Authentication

The User Authentication and Profile Management Module (Fig 9.1) ensure secure user access to the Aesthetix platform through Firebase Authentication, supporting email/password and Google sign-in with encrypted communication. It also manages user profiles and preferences, enabling real-time synchronization and personalized AI-driven interior design recommendations.

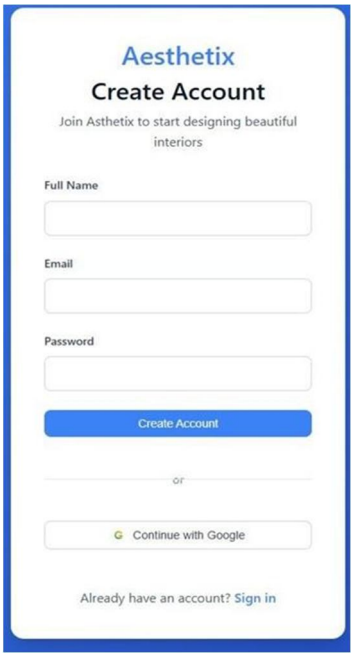


Fig 9.1 Registration Page

The Dashboard Page (Fig 9.2) pops up after the successful login/registration of the user. This page serves as a home page of the website, as all the pages can be accessed through this Dashboard. It also presents with the recent activities of the user.

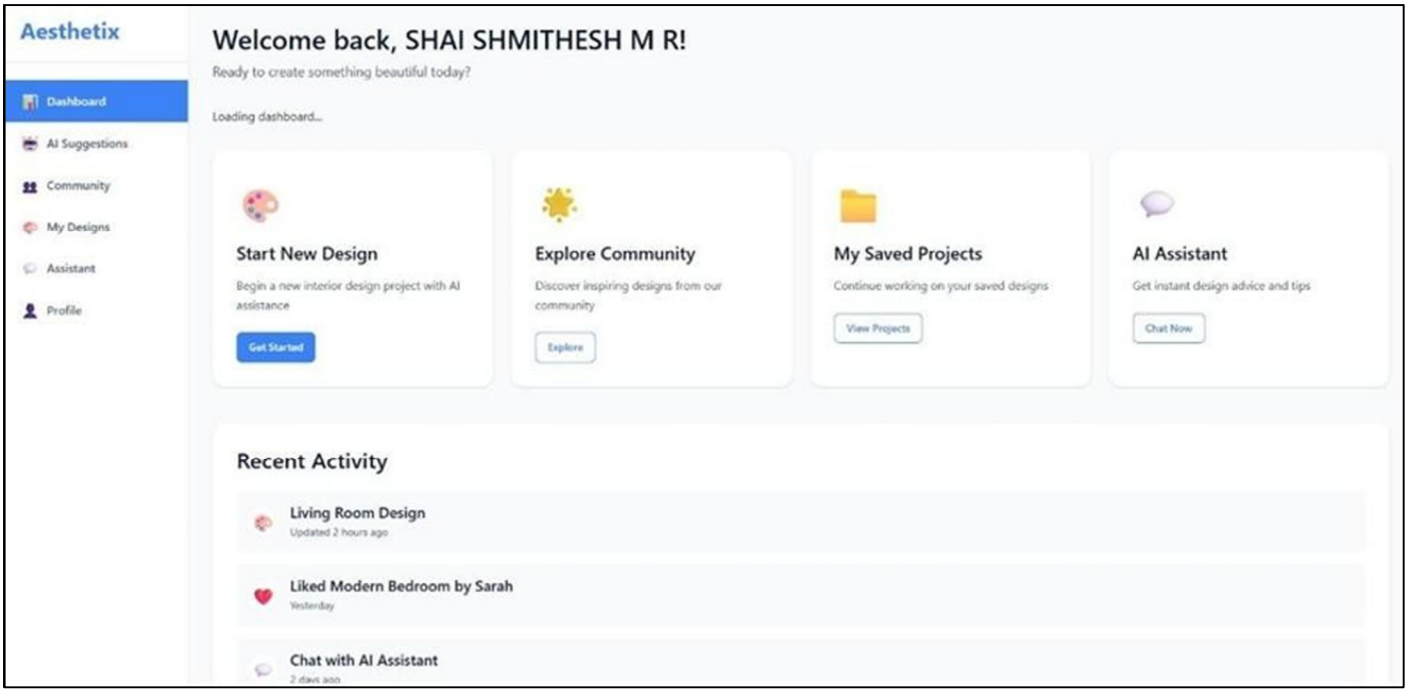


Fig 9.2 Dashboard

B. AI-Based Personalized Suggestions

The AI-Based Personalized Suggestions (Fig 9.3) module analyzes uploaded room images using computer vision and deep learning, combining visual features with user preferences to generate customized interior design recommendations (Fig 9.4). It forms the intelligent core of Aesthetix, enabling efficient, personalized, and scalable design insights with scope for advanced future enhancements.

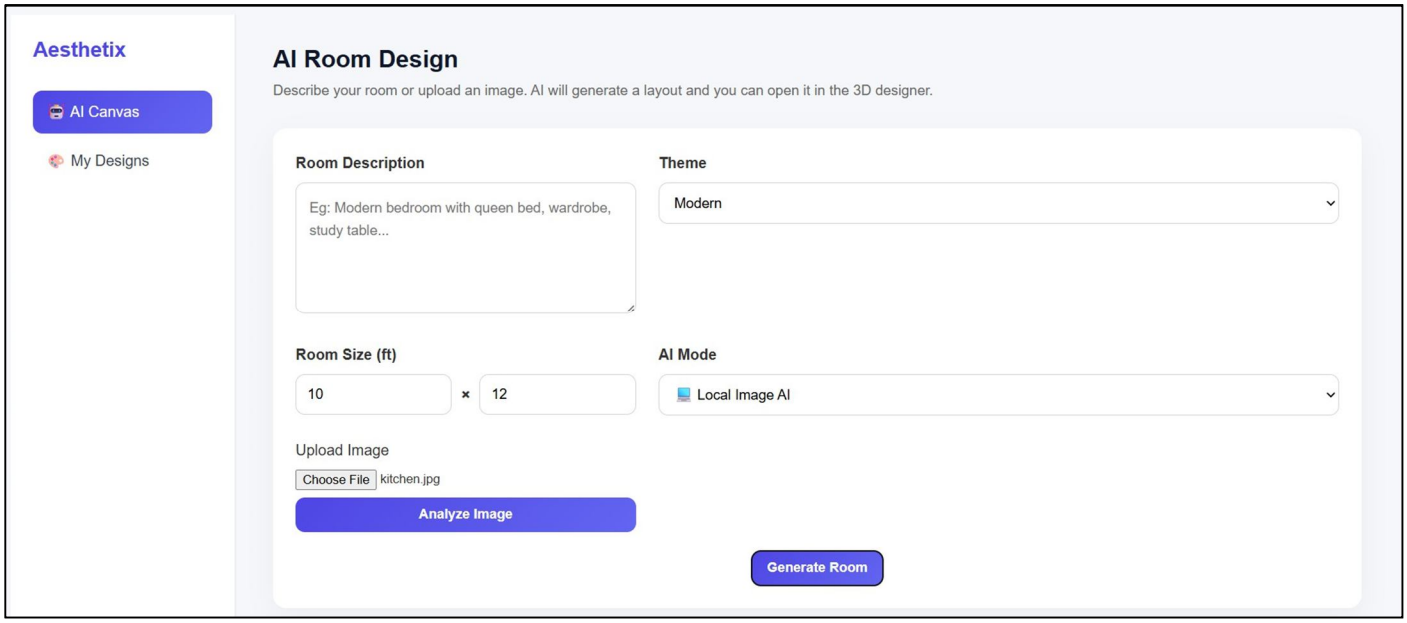


Fig 9.3 AI Suggestions

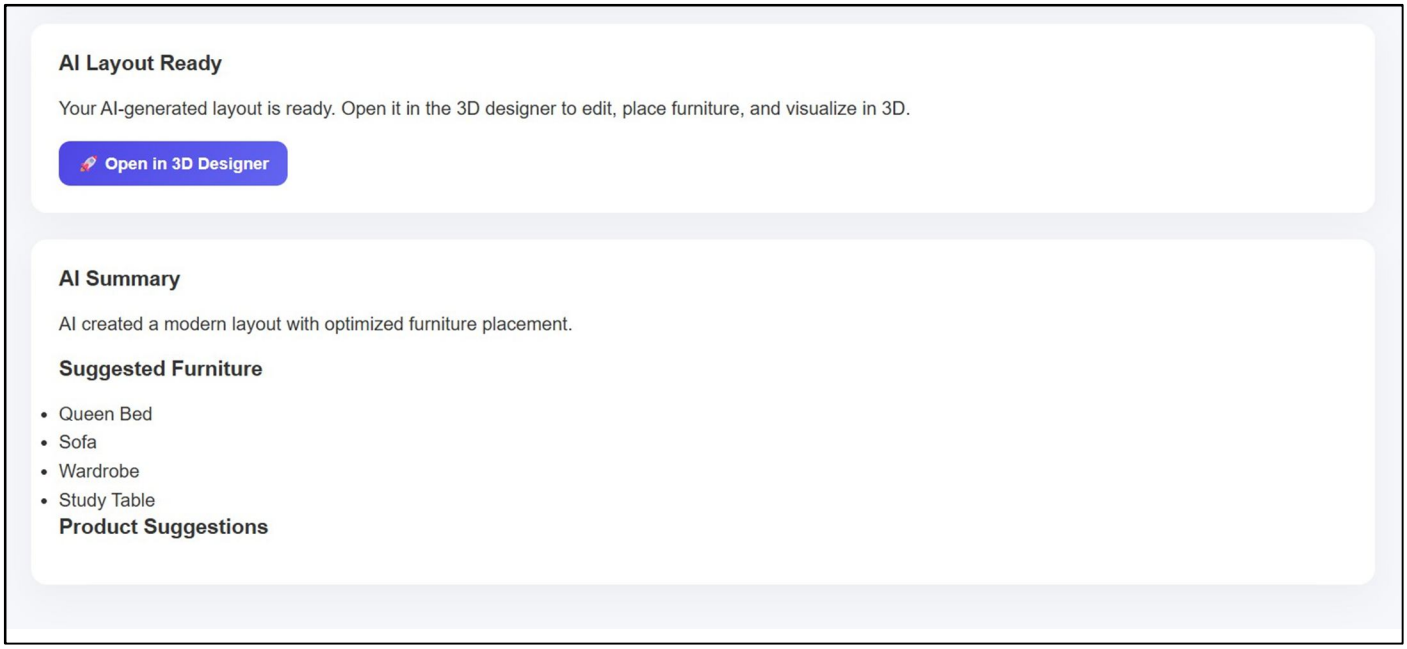


Fig 9.4 AI Response

C. Creator Community Hub

The Community Hub and Social Interaction (Fig 9.5) Module enables users to share interior designs, interact through likes, comments, and saves, and explores a diverse gallery of user-generated inspirations. Its "Try in My Room" feature allows users to apply admired designs to their own spaces, fostering collaboration, creativity, and experiential learning within the Aesthetix community.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue II Feb 2026- Available at www.ijraset.com

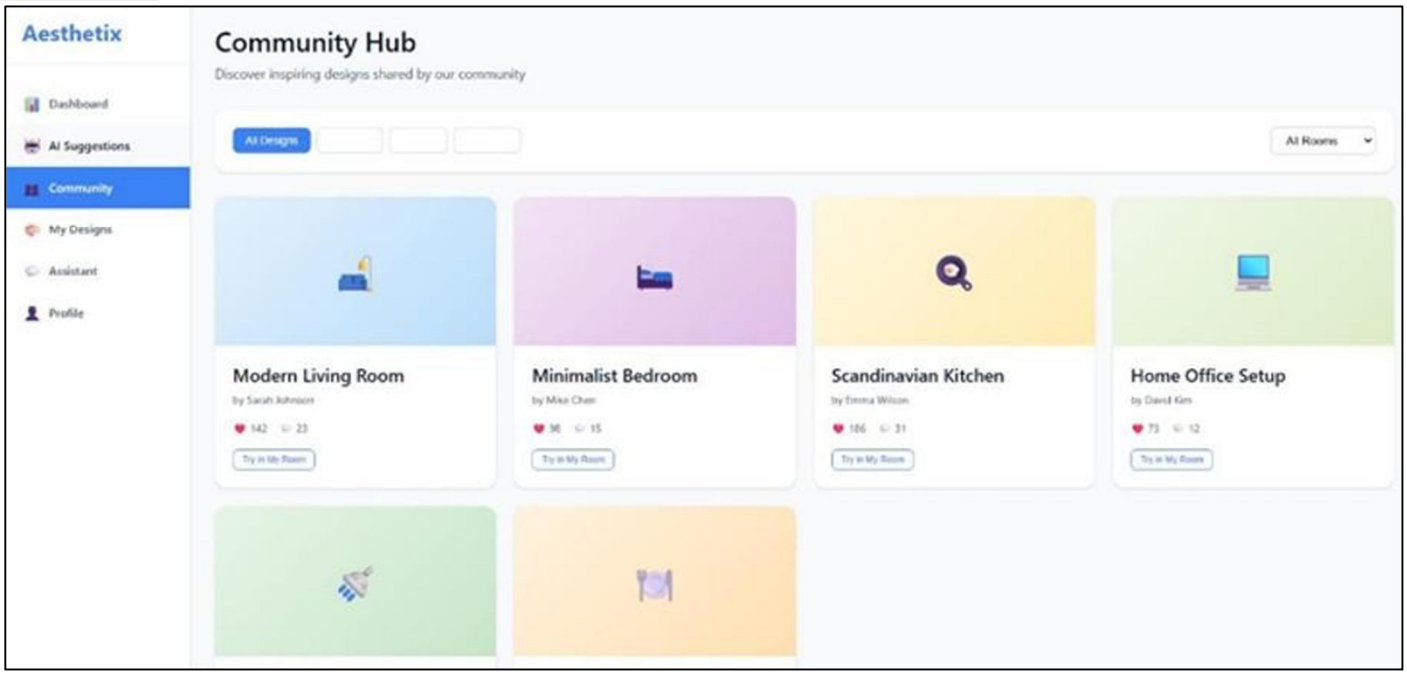


Fig 9.5 Creator community hub

D. AI Interior Assistant

The AI Interior Assistant acts as a virtual design consultant, using NLP to understand user queries and provide intelligent, design-focused guidance. By leveraging user preferences and interaction history, it delivers personalized, educational, and confidence-building interior design recommendations.

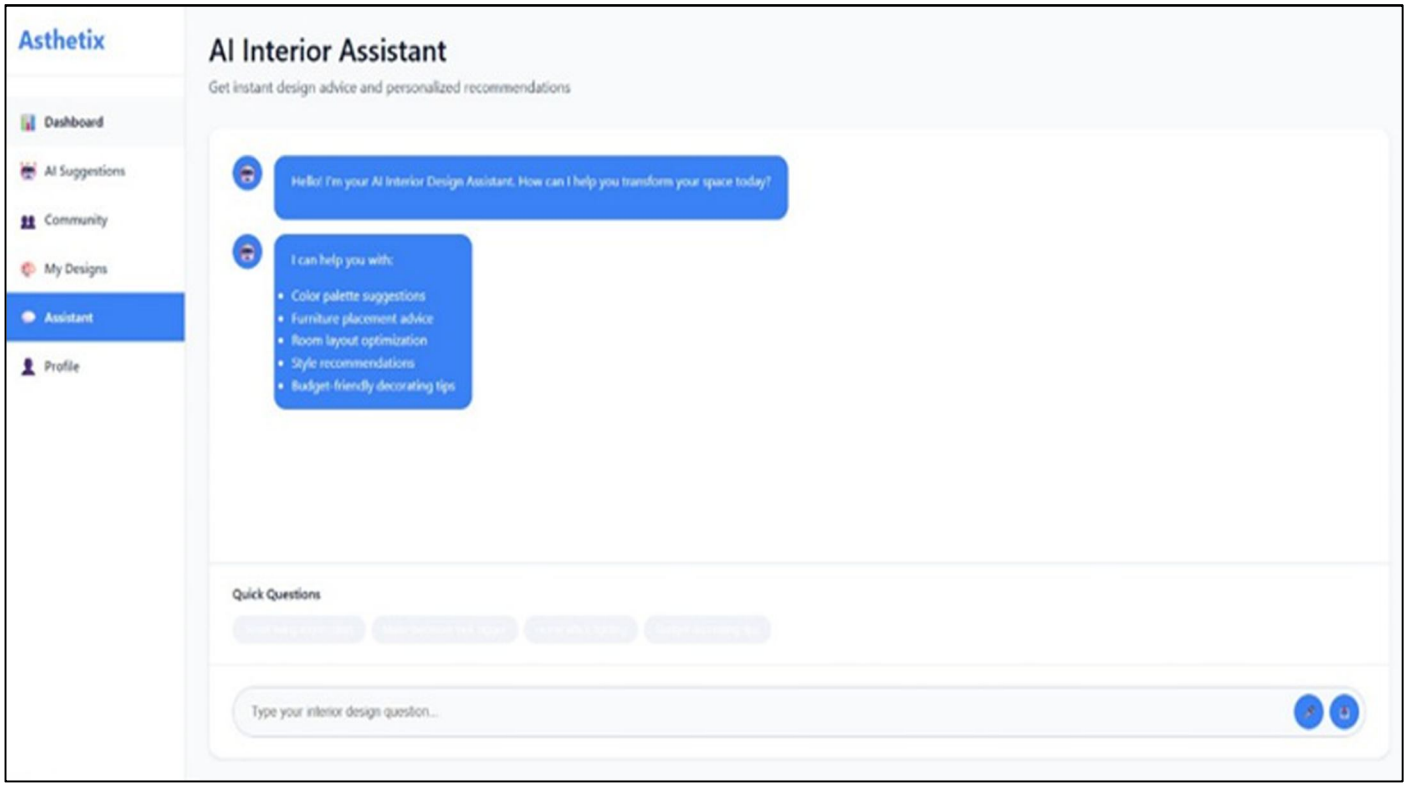


Fig 9.6 AI Interior Assistant

©IJRASET: All Rights are Reserved

E. Design Canvas

The Design Canvas (Fig 9.7) provides an interactive workspace where users can create and refine interior layouts using a drag-and-drop 2D interface with optional 3D previews and future AR visualization. It serves as the creative core of Aesthetix, enabling realistic, user-friendly, and immersive design experimentation.

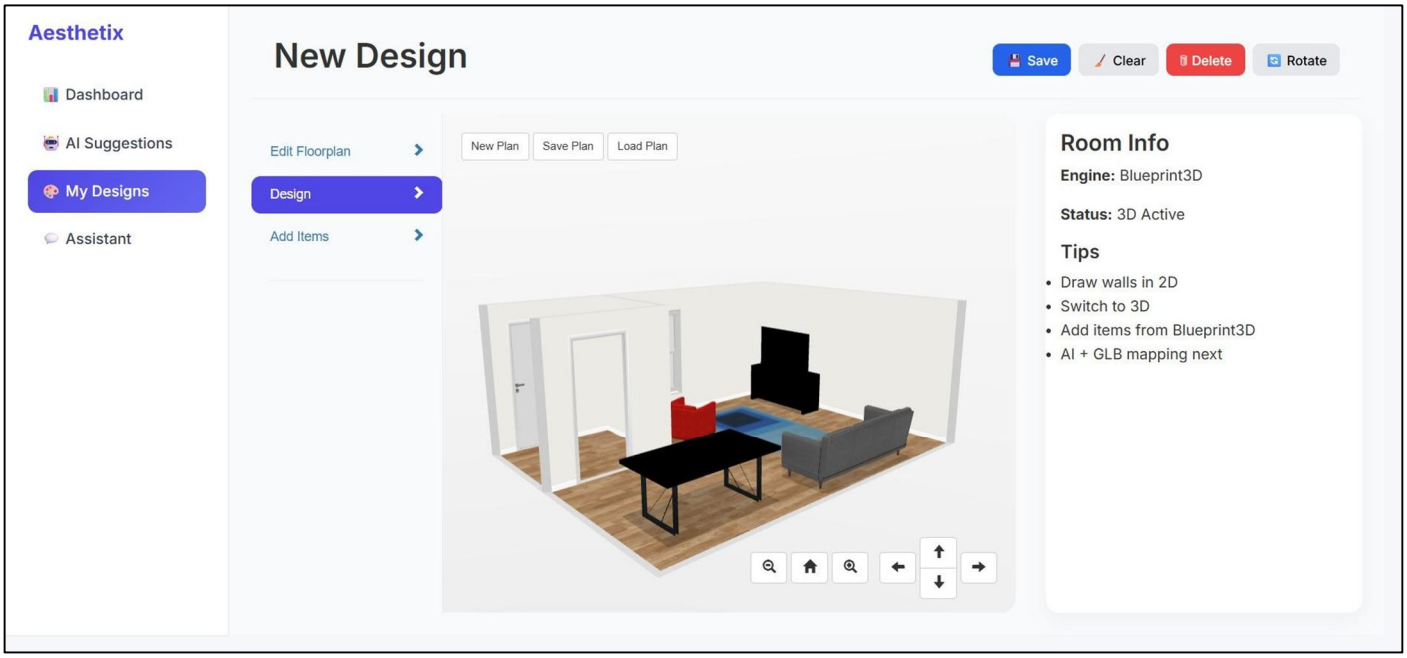


Fig 9.7 Design canvas

X. RESULTS AND DISCUSSION

Experimental analysis of the Aesthetix system shows its effectiveness in providing fast and user-centric interior design solutions. Results show that the system could provide design solutions in a matter of seconds, and there was no delay in the design process because of the system. The design obtained had proper coherency and was in line with the design preferences of the user. When compared to the conventional static interior design systems available, Aesthetix depicted considerable reductions in the time needed for design modification tasks. This is because the interactive canvas and the multimodal interface facilitated better visualization in the early stages, enabling users to assess the concepts without the need for professional help.

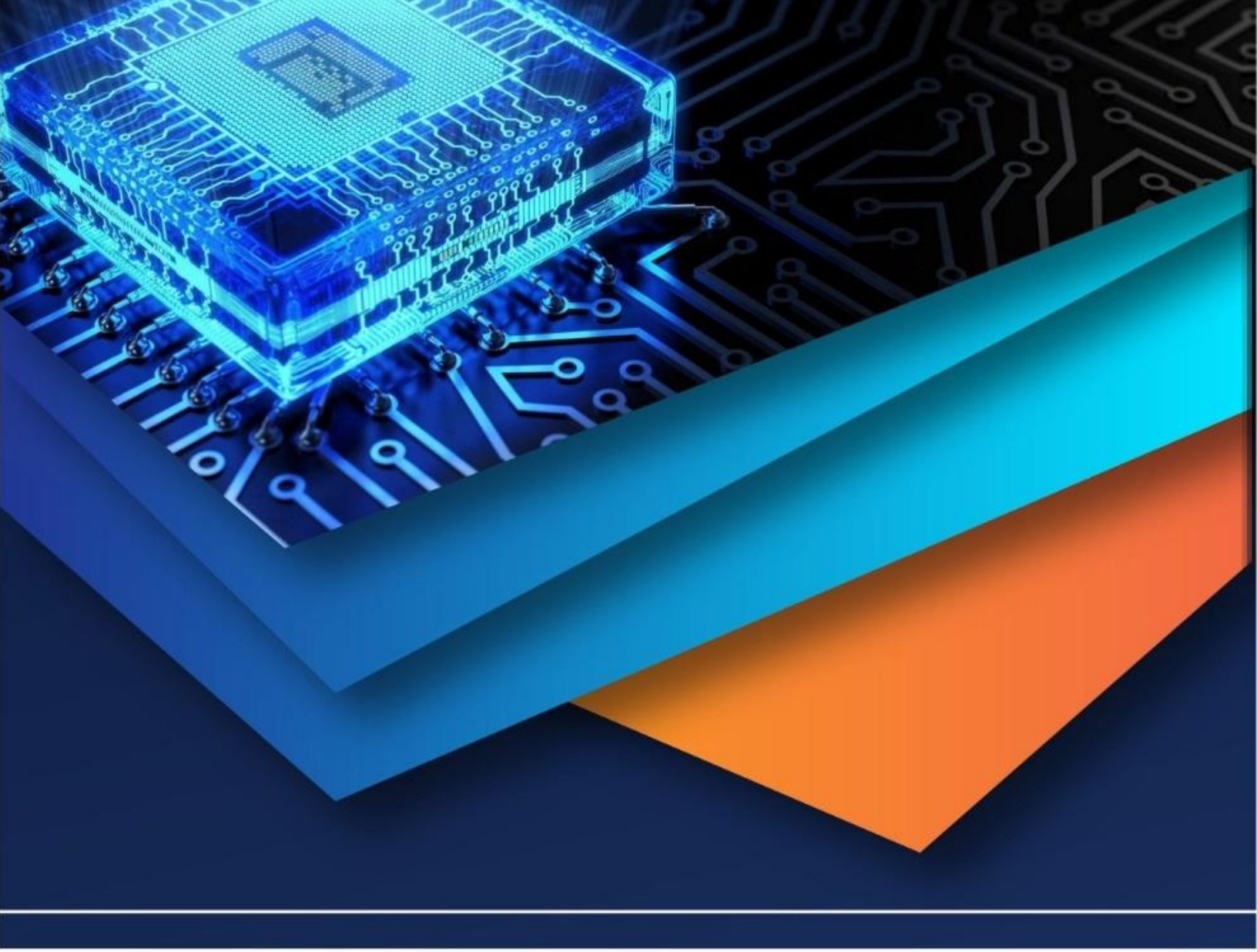
The quality of produced designs is directly linked to the quality of text descriptions provided by the user. There are times when some latency occurs while processing high-resolution images of the room. In conclusion, the outcomes have validated the practicability and efficiency of Aesthetix as an AI-based interior design assistance tool and its potential use as a complement or alternative to traditional design methods for small and medium projects.

XI. CONCLUSION

Aesthetix is a multimodal AI-based interior design system that automates and personalizes the design process. By combining AI-driven reasoning, cloud synchronization, and an interactive interface, the system reduces time, cost, and dependence on professional designers. Experimental results demonstrate improved usability, faster early-stage design, and enhanced user satisfaction, highlighting Aesthetix as a promising solution for accessible and user-centric interior design.

REFERENCES

[1] S. Chaillou, AI & Architecture: Towards a New Approach, 2020.
[2] T. Brown et al., “Language Models Are Few-Shot Learners,” in Proceedings of the 34th International Conference on Neural Information Processing Systems (NeurIPS), 2020.
[3] Y. Huang et al., “Indoor Scene Understanding Using Computer Vision,” IEEE Access, vol. 7, pp. 150326–150337, 2019.
[4] J. Li et al., “Deep Learning for Aesthetic Evaluation,” Computer Vision and Image Understanding (CVIU), vol. 206, 2021.
[5] Google, “Firebase Documentation.” [Online]. Available: Google Firebase Official Documentation.
[6] Groq, “Groq API Documentation.” [Online]. Available: Groq Official API Documentation.
[7] D. A. Norman, The Design of Everyday Things, Revised and Expanded ed., New York, NY, USA: Basic Books, 2013.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)