



International Journal of Innovative Research in Computer and Communication Engineering

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)





International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

AI Interior Design Generator

Divya S Kavale, Eshanya G P, Thejas Gowda B S, Jai Ganesh,

UG Students, Dept. of CS, CMR University, Bengaluru, Karnataka, India

Dr Gyannapa A Waliker

Assistant Professor, Dept. of CS, CMR University, Bengaluru, Karnataka, India

ABSTRACT: interior design, traditionally a manual and time-intensive process, has evolved significantly with the integration of artificial intelligence (ai). with the growing demand for personalized and efficient design solutions, ai technologies are transforming the way designers and homeowners approach space planning, color coordination, and furniture placement. ai-powered tools can analyze spatial elements, suggest aesthetic improvements, and even generate photorealistic visualizations—making interior design more accessible, cost-effective, and scalable.the application allows users to upload images of their rooms and receive intelligent design transformations, including furniture arrangement, decor suggestions, and visual redesigns in various styles. by leveraging models such as controlnet and stable diffusion, the system produces high-quality, context-aware interior designs tailored to user preferences. the integration of replicate simplifies access to these powerful models via api, allowing for real-time design generation without heavy computational requirements on the client side.the result is a smart, interactive tool that redefines the interior design experience empowering both professionals and individuals to visualize and implement creative ideas effortlessly.

KEYWORDS: Artificial Intelligence, Interior Design, Design Creativity,replicate.

I. INTRODUCTION

Artificial intelligence (AI) in interior design represents a groundbreaking shift towards innovation, transforming conventional approaches and presenting unparalleled opportunities for creativity and productivity. The integration of artificial intelligence (AI) in architectural and interior design is becoming more important for keeping competitive in the worldwide market. This is due to fast changing consumer tastes and technical breakthroughs . It marks a profound change in the way interior spaces are conceived, developed, and brought to life. This shift offers customized, environmentally friendly, intelligent solutions.

Artificial Intelligence by its nature will allow a new way of interior designing.The integration of artificial intelligence into interior design is revolutionizing the way spaces are conceptualized and personalized. Leveraging platforms like Replicate, designers and developers can harness powerful machine learning models—such as image-to-image translation, ControlNet, and depth/segmentation networks—to generate highly realistic and customized room designs from simple user inputs. These models, often hosted and run via Replicate’s scalable API infrastructure, allow for the rapid creation of photorealistic visualizations, enabling users to see multiple design possibilities before making physical changes. By automating key aspects of the design process—such as furniture arrangement, color scheme suggestion, and space optimization—AI-driven tools not only enhance creativity but also make interior design more accessible, efficient, and data-informed.Beyond aesthetics, AI is also being used to promote sustainable and cost-efficient design by recommending eco-friendly materials, optimizing resource usage, and calculating budget-friendly renovation plans. As AI continues to evolve, it promises to make interior design more intelligent, inclusive, and innovative—ushering in a new era of design where technology and creativity go hand-in-hand.

II. RELATED WORK

Intelligent design CycleGAN The idea of image-to-image conversion is to pay consistence model for one input and output training image pair. These type of ideas have applied in different errands for producing photographs from sketches, features, or semantic designs also these type of methods need pairing. As a result of the short comings of imageto-image translation, different methods used to tackle the unpaired image-to-image translation[1]. The research design for thus incorporates automatic and human searches with the aim of investigating thoroughly the use of artificial



International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

intelligence within the design and interior decoration sector of the economy, especially within the context of how such AI technologies are integrated into a design process[2]. The systematic literature review technique, becomes central to the study in maintaining the credibility and objectiveness, more so considering that the research was on adoption of artificial intelligence in the scope of interior design. It ensures the elimination of potential biases and prejudgments[3]. One of the reasons for the low design efficiency is the cumbersome and manual drawing-dependent traditional interior design process. Specifically, designers must first plan the design by drawing floor plans and creating corresponding interior 3D models. Then, they must add various texture maps and furniture to present the design style. Finally, they need to configure appropriate lighting for the 3D model and render the effect image[4]. To improve the computational efficiency, the two-dimensional rendered image of the home model is taken as the processing object, the features of the image are extracted by the convolutional neural network, the feature vector library of the image is constructed, and the ideas of the content-based recommendation algorithm are mixed to populate the highly sparse collocation recommendation matrix to realize a new hybrid collocation recommendation model[5]. Designers can work with huge datasets through predictive analysis, automate repetitive operations, and offer new design alternatives [6]. Inclusion of sustainable design, personalization, efficiency, and a systematic literature review of AI in interior designing improves the creativity of designers and increases the productivity of work. The use of artificial intelligence (AI) in design is expected to greatly increase.

III. PROPOSED ALGORITHM

Inputs: It takes image input from user (e.g., a sketch, edge map, or pose diagram). The conditioning image acts as a structural guide for the output.

Guidance: The model uses the conditioning image to shape and control the generated image, ensuring it conforms to the desired structure. For example, if the conditioning image is a stick figure pose, the output will follow that pose while incorporating the prompt details.

Training: ControlNet is trained on top of Stable Diffusion, using conditioning images and text prompts to teach the model how to generate images according to specific conditions. This training involves fine-tuning neural network layers without altering the original model's weights.

Preprocessing: The conditioning image is processed to extract structural features, such as edges, depth maps, or segmentation. These features guide the AI in generating the design.

Model Execution: The Replicate platform runs a model like ControlNet or Stable Diffusion, which uses the conditioning image and text prompt to generate photorealistic interior designs. Parameters such as guidance scale, depth strength, and inference steps are adjusted to refine the output.

Output Generation: The model produces high-resolution images of the interior design, adhering to the structure of the conditioning image and the style described in the text prompt.

Applications: It can handle various conditioning types, such as edge detection, depth maps, segmentation, and more, making it versatile for tasks like interior design, character creation, and artistic rendering.

IV. PSEUDO CODE

Start the app

→ Load the login screen.

User logs in

→ Ask for username and password.

→ If correct, continue. If not, show error.

Ask user for room details

→ Choose room type (e.g., bedroom, kitchen).

→ Choose preferred interior style (modern, vintage, etc.).



International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

→ Optionally choose colors or upload a room photo.

Generate design using AI

→ If a photo is uploaded:

- Analyze the image using AI (like ControlNet).
- Generate a new design version based on the image.

Display the AI-generated room design

→ Show the user the newly designed image.

Suggest furniture and decorations

→ Analyze the design for layout, colors, and space.

→ Recommend matching furniture and decor (e.g., sofa, lights, wall art).

Let the user interact with the design

→ Options to:

- Save or download the design
- Generate a new design
- View recommended products or layout tips

V. SIMULATION RESULTS

The results of an AI Interior Design system are visual and functional outputs that assist users in designing or redesigning their living spaces. The core result is typically a realistic, AI-generated image of a furnished and styled room, tailored to the user's input—such as room type (bedroom, kitchen, etc.), design style (modern, vintage, minimalist), and optional image uploads of their actual space. If a user provides an image, the system uses advanced models like ControlNet to understand the structure and layout of the room and apply a new design style over it. The results are extremely useful for both homeowners and interior designers. They offer fast, affordable design ideas without needing professional help upfront. It's especially helpful for those struggling to visualize how a room might look with new furniture or different styles. For interior designers, it speeds up the design iteration process, letting them show multiple styles to clients in minutes.

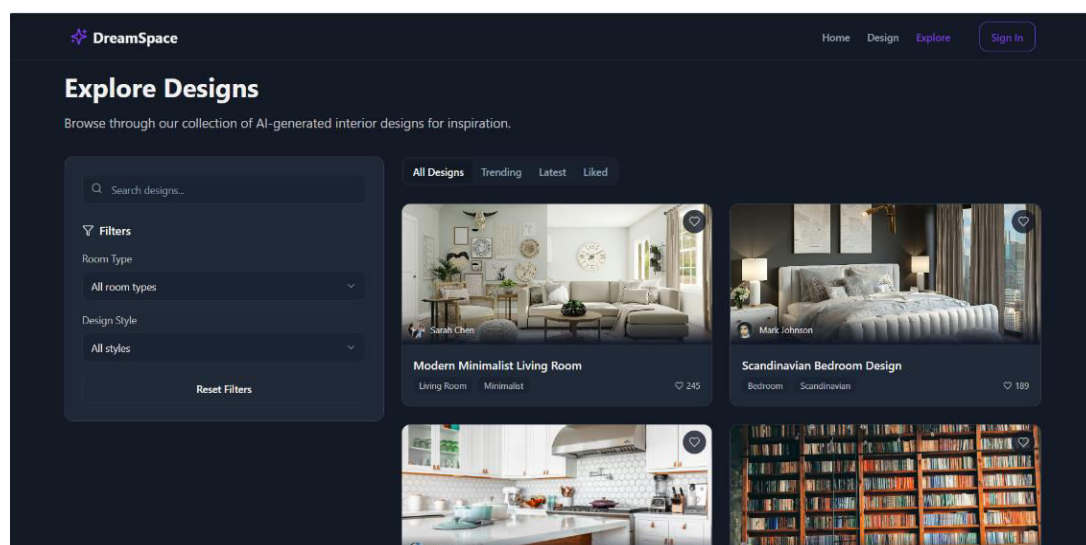


Fig.1. Room designs



International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

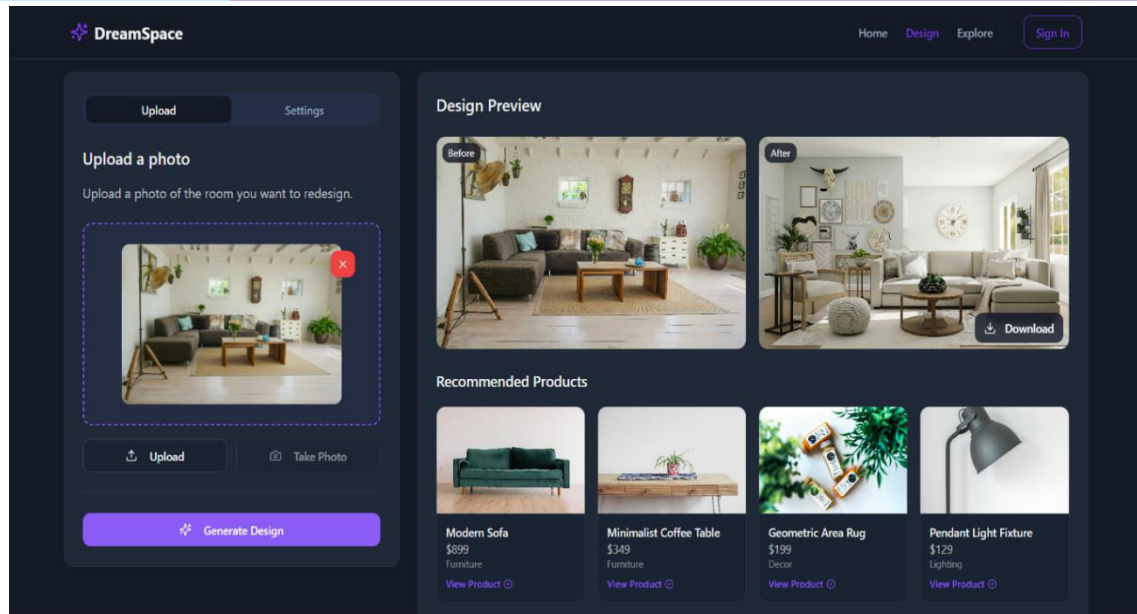


Fig. 2. Generated Room Image

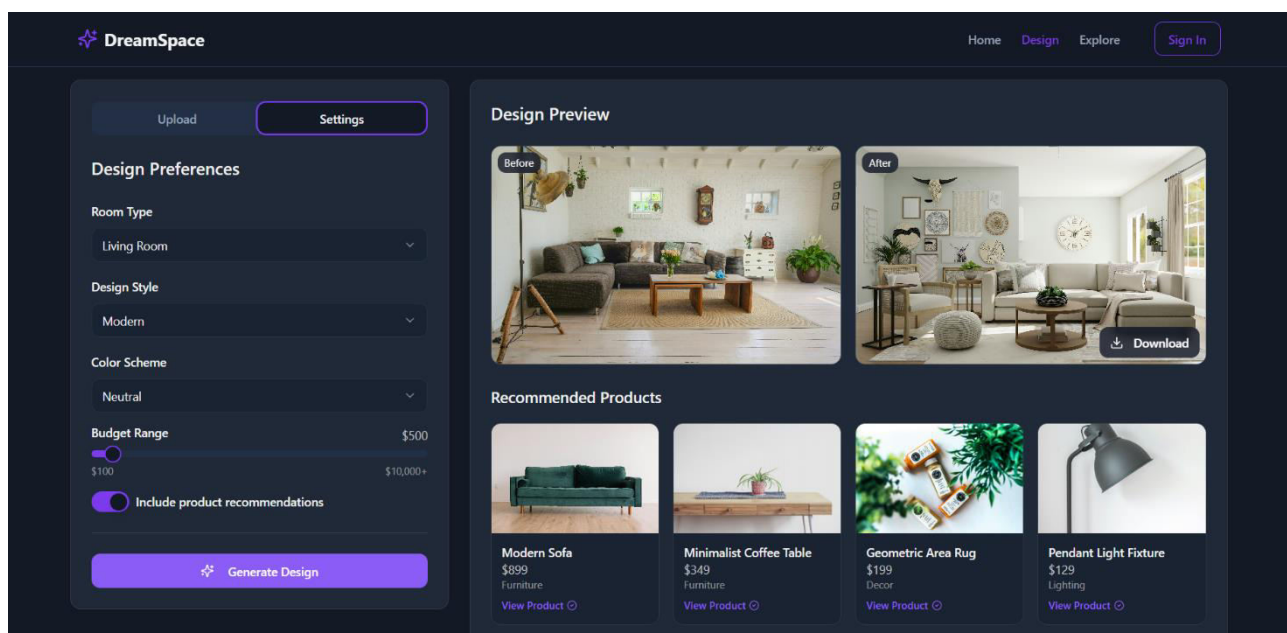


Fig. 3. Interior design web page

VI. CONCLUSION AND FUTURE WORK

AI's integration into interior design practices has transformative potential. The findings indicate that AI can significantly enhance design efficiency, allowing designers to explore a broader range of options quickly. This efficiency does not come at the cost of quality; instead, AI tools often suggest innovative solutions that improve overall design quality. The generative design process and virtual staging tools exemplify how AI can augment traditional design methodologies, pushing the boundaries of creativity and practicality. Personalization is a critical factor in contemporary interior design, and AI excels in this area. By analyzing vast amounts of data, AI can generate design



International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

solutions that are highly tailored to individual client preferences. This capability not only improves client satisfaction but also sets a new standard for personalized design services. The application of artificial intelligence (AI) in interior design marks a significant evolution in the field, offering transformative benefits across various aspects of the design process. This research has explored the multifaceted ways in which AI enhances interior design, from increasing efficiency and fostering innovation to improving client satisfaction and promoting sustainability.

Future research should focus on developing user-friendly AI tools that lower the barrier to entry for designers. Additionally, exploring ways to reduce costs and address data privacy concerns will be crucial for broader adoption. The evolution of AI technologies, such as more sophisticated machine learning algorithms and better natural language processing capabilities, will continue to enhance the capabilities and applications of AI in interior design. The application can focus on providing real-time AR/VR visualization of how a room will look after a redesign. Allow users to walk through a virtual model of their redesigned space using a phone or headset.

REFERENCES

1. Amir Fawzy, Mohab Taher, "The Future Role of Artificial Intelligence (AI) Design's Integration into Architectural and Interior Design Education", ResearchGate 2024.
2. Xia Meng, Saba Ghazanfar Ali, "An Interior Decoration System via Virtual Reality and Artificial Intelligence" IEEE 2018.
3. Omar Adnan, Bilal Zahran, "Implementation of Artificial Intelligence in Interior Design System", Civil Engineering and architecture, 2024.
4. Zixuan Chen¹, Xiang Wang, "Application of AI technology in interior design", EDP sciences, 2020.
5. Liu Yanhua, "Research on the Application of Artificial Intelligence in Interior Design", International journal of science and engineering application, 2024.
6. W. Weihong, T. Jiaoyang, "Research on License Interior Recognition Algorithms Based on Deep Learning in Complex Environment," IEEE Access, 8, 91661–91675, 2020
7. S. Parvin et al. / Advances in Science, Technology and Engineering Systems Journal Vol. 6, No. 2, 423-438 (2021)
8. Guoxing Chen, "A Data-Driven Intelligent System for Assistive Design Of Interior Environments" Hindawi (2022)
9. Zichun Shao, Junming Chen "A New Approach to Interior Design: Generating Creative Interior Design Videos of Various Design Styles from Indoor Texture-Free 3D Models" Building (2024)
10. 1st International Informatics and Software Engineering Conference: Innovative Technologies for Digital Transformation, IISEC 2019 - Proceedings, 2019, doi:10.1109/UBMYK48245.2019.8965512.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

 9940 572 462  6381 907 438  ijircce@gmail.com



www.ijircce.com

Scan to save the contact details