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My SPACE: Your Vision Our Creation

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Abstract - *By embracing cultural diversity and traditional aesthetics, which are aspects that are sometimes overlooked by popular tools that emphasize modern minimalism, the My SPACE platform presents a novel take on home design. Through an easy-to-use, AI-powered interface, it enables people to showcase their cultural heritage and personal beliefs in their homes. In order to facilitate flexible creative input, users can start their design journey by contributing written prompts, sketches, or inspiration photos. To create customized visual concepts, the platform uses sophisticated generative models, such as ControlNet and Kandinsky-2.2-Prior, which are implemented with the help of the Diffusers library. These models adjust elements such as overall composition, lighting ambiance, and material texture to match the user's desired aesthetic. To guarantee data security and performance dependability, rendering operations are carried out safely through the Hugging Face API. My SPACE develops an inclusive atmosphere where history and modern design coexist effortlessly, making personalized and culturally relevant interiors available to everyone.*

Key Words: **Interior Design, Image Generation, Cultural Aesthetics, AI-Based Design, Visualization, 3D Rendering.**

1. INTRODUCTION

With cultural variety on the rise around the world, more people are looking for interior design solutions that reflect their unique origin and personality. Many people are looking beyond the mainstream attraction of minimalist and modern styles to find living spaces that reflect their cultural values and regional aesthetics. However, despite this rising need, much of the interior design business remains focused onWestern-centric, contemporary themes, frequently neglecting the special needs and nuances of culturally influenced design choices. [1][6].

Consider a homeowner who wants to design their home with traditional Indian features, including elaborate wooden carvings, colourful fabrics, or temple-inspired architecture. The majority of popular design apps, which usually make use of augmented reality and modular templates, find it difficult to successfully include such intricate cultural elements [14]. It may seem like a good alternative to hire an interior designer with cultural knowledge, but this option is sometimes unavailable or monetarily unfeasible, particularly in rural or lower-income communities. My SPACE is an AI-driven platform designed for culturally aware design in order to address these issues. It streamlines the procedure and makes customized interior design more accessible to a larger audience by taking input in the form of textual descriptions, hand-drawn illustrations, or picture references.

The My SPACE platform relies heavily on powerful generative AI technology. ControlNet [2], a critical component, maintains the maintenance of spatial structure by following user inputs such as drawings or edge outlines—an essential element in design processes where layout precision is important. Stable Diffusion [3] is the core picture production engine, converting text-based suggestions into detailed, high-resolution graphics with precise semantic alignment. To efficiently adjust styles, the platform uses LoRA (Low-Rank Adaptation) [4], which allows for fine-tuning for various cultural aesthetics without the need for full-scale retraining. Unlike previous systems, which focused only on structural layout [5] or visual style [4], My SPACE incorporates several input modes—text, drawings, and images into a cohesive generating framework. This technique gives users more freedom and creative power, allowing them to construct interior settings that are both realistic and culturally expressive.

Finally, My SPACE covers a fundamental gap in popular design tools: the absence of support for traditional and culturally rooted design themes. By combining cultural sensitivity with strong AI-based visualization, the platform enables users to create interiors that reflect their identity while being cost-effective and accessible. It enables individualized interior design for people who do not have access to expert design services or large resources.

2. OBJECTIVE

My SPACE is intended to fulfill the growing need for interior design solutions that value cultural variety and personal individuality in today's linked world. As more people attempt to incorporate aspects of their ancestry and personal beliefs into their houses, they frequently meet constraints in traditional design tools, which lack the suppleness to accommodate such diverse tastes [10][11]. In response, MySpace provides a more inclusive and dynamic platform that accommodates a wide range of design styles, breaking free from the confines of homogeneous, contemporary templates.

The platform generates high-quality, culturally relevant interior pictures using sophisticated technologies such as ControlNet [2] and Stable Diffusion [3]. Users may supply inputs such as drawings, reference photographs, or extensive descriptions, allowing the system to generate personalized and visually appealing designs. This model-driven technique not only encourages greater customization, but it also reduces the need for costly design consultants, making professional-grade visualization more accessible and affordable [4][5]. Finally, MySpace aligns with contemporary design preferences that value self-expression, cultural authenticity, and creative autonomy [11][12].

3. LITERATURE REVIEW

AI-driven interior design combines several disciplines, most notably computer vision (for image generation and scene reconstruction), natural language processing (to interpret user prompts, and human-computer interaction (to provide a more accessible and intuitive user experience). With the introduction of generative models, the area has advanced rapidly, these technologies can now convert both visual and linguistic inputs into cohesive, photorealistic interior conceptions that correspond to human intent.

One of the most important advances is the progress of text-to-image generating methods. While early models relied on Generative Adversarial Networks (GANs), the focus has switched to diffusion models. Attn. GAN, for example, developed attention-based approaches that enabled better alignment of text descriptions and picture attributes [7]. Xu et al. extended this technique by introducing a multi-stage attention pipeline to create pictures with better clarity and semantic alignment [8]. Stable Diffusion made a significant leap by combining latent autoencoding architecture with text-conditioned diffusion, allowing for high-resolution outputs while preserving computational efficiency, an important aspect for design applications [3].

However, spatial awareness and control remain difficult problems for many generative algorithms, particularly in layout-sensitive applications such as interior design. ControlNet addresses this by using auxiliary inputs such as edge maps, position data, or segmentation masks, allowing the produced outputs to adhere to user-defined structural cues [2]. This makes it ideal for situations in which users provide drawings or other organized layout guidance. Similarly, systems such as InstructPix2Pix enable users to improve drawings interactively by delivering natural language commands to change things like item location, lighting, or color palette [8].

Alexakis and Armenakis proved that U-Net++ outperforms its predecessor in collecting fine spatial components, which is a critical need in layout-intensive settings [1]. On the optimization front, Hu et al. presented LoRA (Low-Rank Adaptation), a lightweight and efficient fine-tuning tool. It allows for domain-specific customization of big models without having to retrain them from the start, which is useful for platforms like MySpace that want to efficiently represent region-specific design aesthetics [4].

While previous models investigated either layout generation or stylistic control, few have merged these concepts in a multi-modal framework. Chen et al., for example, employed diffusion-based models to focus on style conditioning [4], whereas Wu et al. created strategies for generating layouts from geographical information [5]. Nonetheless, these attempts are frequently limited in scope, allowing only one type of input and missing the dynamic flexibility necessary for real-world applications. Even commercial interior technologies typically depend on AR-based previews that lack creative powers or cultural significance [14].

My SPACE takes a huge step forward by combining a variety of input types—text prompts, hand-drawn drawings, and picture references into a single generating system. It combines the capabilities of models like Kandinsky 2.2, ControlNet, and LoRA-enhanced diffusion architectures to produce designs that represent cultural subtlety and individual preference. Although it uses 3D rendering with Three.js for immersive visualization, its main strength is in creating individualized, culturally expressive rooms that capture the user's vision. Currently, no other platform provides such a complete, multi-modal, and culturally

4. SCOPE

Many people who want to personalize their living environments confront limits because available design tools are mostly focused on modern and minimalist aesthetics. These platforms typically disregard traditional and culturally distinct styles, posing challenges for consumers seeking to incorporate their background into home design. Furthermore, the cost of engaging expert designers limits access, especially for individuals who want to incorporate personal narratives into their houses. According to research, widely used design tools seldom include regional or traditional visual characteristics, leaving little room for substantial customization [10][11]. My SPACE addresses this gap by providing a low-cost, AI-powered platform that allows users to view and integrate cultural aspects into interior spaces via an easy-to-use digital interface.

At the heart of MySpace is a dedication to diversity and adaptation. The platform is designed to accommodate users from a wide range of geographical and cultural origins, as well as distinct design sensibilities, whether urban modernism or classical tradition. It provides several methods to engage, such as uploading images of existing interiors, creating freehand drawings, and providing descriptive prose. This input flexibility not only fosters creative inquiry but also accommodates users with varying degrees of technological skill and distinct design concepts. [3][4].

My SPACE makes use of powerful AI technologies like ControlNet [3] and Kandinsky-2.2-Prior [15] to transform these diverse inputs into lifelike, culturally rich depictions. These models are fine-tuned using interior design databases, allowing them to retain structural precision and visual harmony, particularly when replicating historic forms. The system also includes live feedback systems, which allow users to continually improve factors like as lighting, materials, and spatial layout during the design process [8][12].

My SPACE, which is web-based and device-independent, eliminates many of the limitations associated with traditional design tools. Its rich 360-degree visualization, driven by Three.js [16], allows users to examine spatial arrangements interactively and make educated aesthetic choices. By combining accessible technology and cultural expression, My SPACE transforms the design process into an inclusive, empowering experience in which individuals from all over the world can build spaces that genuinely reflect their identities [12][14].

5. METHODOLOGY

The My SPACE platform is built on a strong, AI-powered architecture that accepts multi-modal inputs and uses deep learning techniques to create individualized interior design renderings in both 2D and 3D forms. Its end-to-end system can handle a variety of input sources and turn them into custom visual outputs. Figure 1 depicts a schematic illustration of this process, beginning with input and ending with final output.

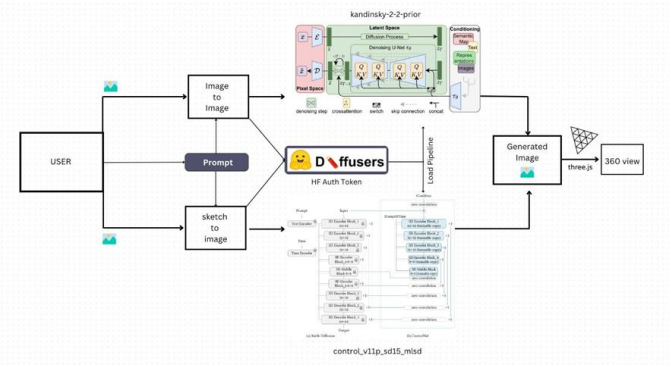

Fig -1: System Design

The platform's Multi-Modal Input Module offers customers three alternative methods to start the creative process. One option allows users to type a textual prompt that reflects the intended tone and design of a room. For example, a user may describe "a cozy Scandinavian living room with tribal African decor, neutral tones, and soft natural light." This description is analyzed to extract important semantic features, including stylistic direction, atmosphere, and featured components [6][15]. Another option allows the user to submit hand-drawn sketches or floor plans that depict room layouts or furniture placement. Submitting a reference image, such as a home or specific artifacts like a Moroccan pendant lamp or a Japanese shōji screen, can help inspire culturally unique design generation (3).

The Hugging Face Diffusers framework [17] serves as the foundation of the picture production pipeline, allowing for the incorporation of complex generative models designed specifically for interior design. This contains Kandinsky 2.2-Prior and ControlNet. Kandinsky 2.2 is a latent diffusion model that uses CLIP-based priors to align verbal prompts with visual outputs [15], assuring appropriate translation of color themes, regional décor, and cultural motifs into produced graphics. ControlNet enhances this by preserving structural accuracy, especially when users provide layout-based inputs such as drawings or guidelines [3]. The implementation employs a fine-tuned version of ControlNet (control_v11p_sd15_mlsd), which has been trained on layout-specific data from the elljoy/interior-design dataset [19], enabling it to properly capture spatial signals such as furniture alignment and architectural details.

The platform is built on the Stable Diffusion engine, which uses the v1.5 checkpoint and is known for producing visually pleasing and coherent outputs [2]. This model starts with random noise and then refines the image using denoising, which is directed by the user's textual and structural inputs. Low-Rank Adaptation (LoRA) is used to fine-tune adaptation across many cultural aesthetics [4]. LoRA allows the model to rapidly adapt to new visual themes or regional styles without retraining the entire architecture. For example, if a user wants a seldom represented ethnic style, LoRA can execute lightweight training on a tiny dataset to meet the request.

The Hugging Face Accelerate framework [18] effectively manages all training procedures and model updates, including deployment logistics, GPU resource management, and scalability in cloud-based applications. When producing photos, the platform uses the Hugging Face API to get the most recent model weights, ensuring fast and safe model access. The resource-intensive operations are delegated to GPU-powered servers, allowing users to engage with a fluid, responsive interface while high-quality graphics are generated seamlessly in the background.

6. DATASET AND TRAINING

Access to well-annotated, diversified datasets reflecting a wide range of interior design styles and cultural influences was critical in training the generative models powering My SPACE. To achieve these requirements, two datasets from the Hugging Face Hub were chosen— Ellijay/interior-design and hammer888/interior_ style_ dataset to cover both visual aesthetics and structural layout objectives [19][20].

The ell joy/interior-design dataset contains high-resolution photos of living rooms, each with a caption like "a living room with a fireplace and a view of the ocean." This resource was useful in the early stages of development, assisting the model in associating natural language descriptions with appropriate visual outputs. However, its relatively small size limited its ability to represent a wider range of global design styles.

The hammer888/interior_ style_ dataset [20] was used to help the model grasp different aesthetic themes. This bigger dataset has about 7,230 annotated photos in many styles, including modern, Japanese, Nordic, industrial, luxury, and country. Each image is labeled with descriptions like "A photo of modern-style interior design," giving the model a rich semantic framework to learn from. The data is saved in Parquet format, which allows for efficient processing with tools such as Hugging Face Datasets and Dusk.

The combination of the two datasets enabled My SPACE to get a balanced understanding of structural consistency and cultural variance. In particular, the ControlNet model was fine-tuned on the ell joy dataset to improve spatial awareness of typical living room features such as sofas, windows, entertainment systems, and so on. To avoid overfitting, an 85/15 training-validation split was used, and LoRA-based fine-tuning was constantly monitored throughout the process [4].

Models were trained using Hugging Face's Diffusers and Accelerate libraries [17][18], with pre-trained Stable Diffusion and ControlNet models serving as basic structures. More refinement was accomplished by training a lightweight adaptor based on Kandinsky's earlier [15], built to handle culturally particular cues such as "Mughal-style" or "Aztec motif." Synthetic image-caption pairings were generated using techniques similar to textual inversion and prompt tweaking, which allowed new cultural notions to be implanted in the model's latent space [21].

Although these databases provided extensive coverage of living room designs, areas such as kitchens and bathrooms were underrepresented. To address this, a textual augmentation method was implemented, which involved adding specified terms and phrases into training prompts to increase the model's knowledge of these underrepresented regions. Expanding dataset variety across different room types is a top priority for future MySpace upgrades.

7. RESULTS AND ANALYSIS

This section evaluates the My SPACE platform based on important performance parameters such as visual output quality, quick interpretation accuracy (training), model reactivity, and overall user experience. Each criterion is shown with output examples from the platform's interface that demonstrate both functionality and efficacy in real-world circumstances.

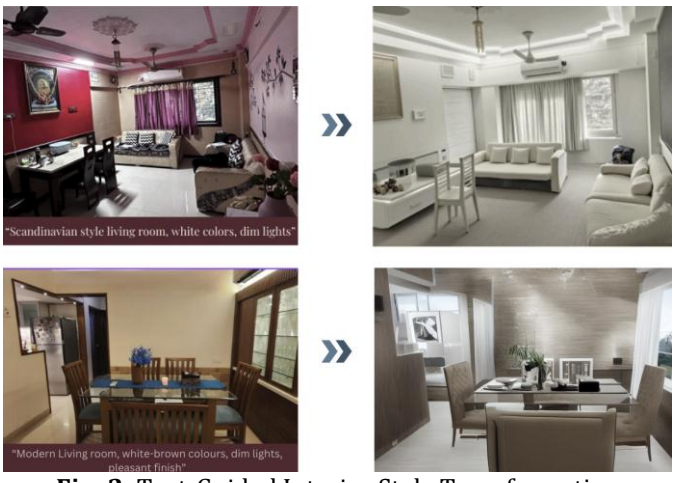

Fig -2: Text-Guided Interior Style Transformation

The software demonstrates a remarkable capacity to create rooms that match the user's styles and preferences. For example, the prompt "Scandinavian style living room, white colors, dim lights" produced a minimalist design with light tones, clear furniture lines, and muted lighting, proving the

compatibility of Kandinsky's previous model [15] with ControlNet [3]. Similarly, a suggestion like "Modern living room, white-brown colors, dim lights, pleasant finish" resulted in a rendering with soft wood textures and ambient lighting that was in keeping with current aesthetics. These examples demonstrate the models' semantic comprehension and ability to create artistically consistent environments [15].

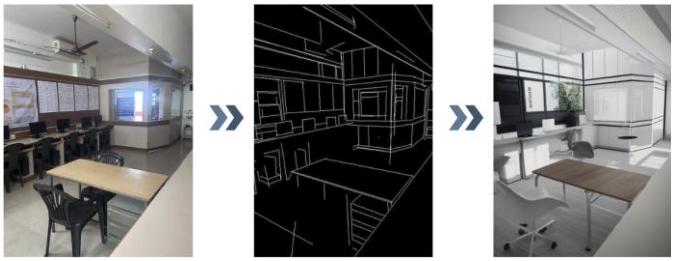

Fig -3: Showing how control Net works

Using sketch-based inputs, such as a simple computer lab architecture (Figure 3), My SPACE effectively conserved spatial arrangements. ControlNet's edge-conditioning technology kept desks and equipment in their original positions, but stylistic upgrades gave the space a more polished and modern appearance. This performance demonstrates the model's capacity to balance structural guidelines with imaginative visual design [3].

The NVIDIA V100 GPU was used to measure inference performance. Optimized with FP16 accuracy, formers, and Hugging Face Accelerate [18], each 512×512 picture took an average of 12.5 seconds to render. On the accuracy front, the Structural Similarity Index (SSIM) returned an average of 0.78, indicating a high degree of spatial alignment with the sketch inputs. The average prompt-image consistency, as judged by CLIP cosine similarity, was 0.85 [15]. The object rendering accuracy was measured at 88%, indicating high fidelity to user-defined components.

User surveys with ten participants provided more insights. Participants gave an average score of 4.6 for visual appeal, 4.8 for cultural significance, and 4.4 for usability. Furthermore, the Fréchet Inception Distance (FID) of 18.4 indicated the outstanding quality of produced pictures when compared to real-world interior designs.

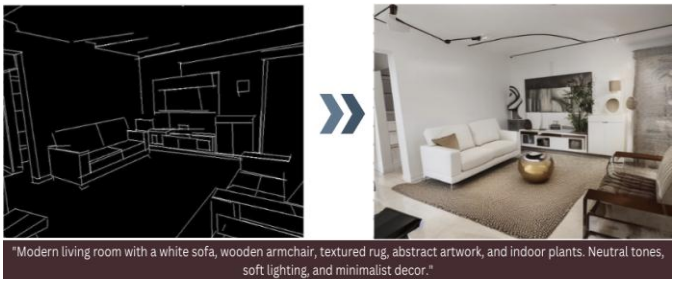

Fig -4: Showing how control point helps in preserving structural fidelity

When given abstract edge maps with no precise characteristics, MyS PACE was able to retain room organization and object arrangement while producing ornamental and artistic aspects depending on the prompt (Figure 4). Even with simple inputs, the ControlNet + Kandinsky-2.2 combination proved excellent at inferring spatial structure, finding a compromise between layout correctness and beautiful depiction [3][15]. There were no conflicts between structural preservation and creative interpretation; therefore, the result is appropriate for use in design planning or virtual staging applications.

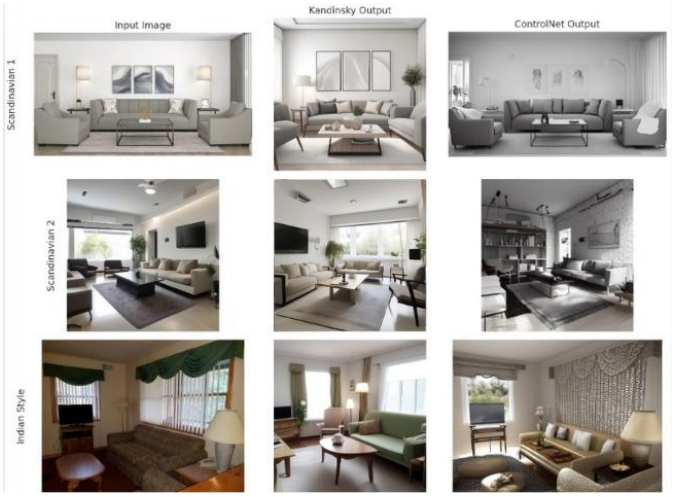

Fig -5: Comparative Analysis of Kandinsky and ControlNet

A comparison of Kandinsky and ControlNet was made utilizing various stylistic themes, such as Scandinavian and Indian interiors (Figure 5). Both models fared well in terms of visual quality and comprehension of prompt context. Kandinsky produced comprehensive artistic outputs, encapsulating cultural themes, lighting subtleties, and color tones with remarkable precision [15]. However, in other cases—such as the Scandinavian 2 scene—it resulted in structural irregularities such as inverted furniture positions. This suggests limitations in Kandinsky's approach to geometry-sensitive activities. On the other hand, ControlNet reliably maintained spatial layout integrity [2][3]. It precisely placed objects, such as sofas and windows, and retained architectural structure throughout the drawings. Although ControlNet's stylistic spectrum was slightly less than Kandinsky's, its structural stability made it more appropriate for scenarios needing exact layout control, such as architectural visualization or practical design procedures. Its capacity to mix artistic inventiveness and spatial precision distinguishes it as a more reliable tool for real-world applications [2][3].

8. CONCLUSIONS

This paper introduces My SPACE: Your Vision, Our Creation, an innovative AI-powered platform that reinvents the interior design experience by emphasizing both individuality and cultural representation via flexible, multi-modal inputs. MySpace caters to a wide range of users, from casual users to skilled designers, by producing outputs that are both visually consistent and culturally relevant.

One of the primary challenges with current design tools is their inability to support culturally expressive or highly individualized settings [10][11]. My SPACE overcomes this limitation by combining a fine-tuned ControlNet architecture with an optimized diffusion pipeline, which enables it to interpret hand-drawn layouts, visual references, and descriptive language to generate environments that reflect users' cultural sensibilities and spatial preferences. This combination of AI and traditional design ideals creates a unique bridge between heritage-inspired creativity and modern life.

Our findings show that AI, when used with intent and accuracy, can produce complicated creative outputs while retaining a high degree of user pleasure. The system's capacity to adapt to diverse input sources and the continually favorable reaction from users highlight its usefulness in real-world design situations. [4][15][18]. MySpace is a source of inspiration and iteration for expert designers, while it serves as a virtual environment for daily users to test and visualize ideas before implementation.

Finally, My SPACE demonstrates the ability of AI to increase access to creative design, making it more inclusive and user-centric. As technologies like Stable Diffusion [2] and LoRA-enhanced fine-tuning [4] advance, platforms like My SPACE are poised to become key co-creators in the future of interior design, transforming varied ideas into appealing and culturally rich visual solutions for consumers all around the globe.

9. FUTURE WORK

While My SPACE now provides a solid framework for AI-driven interior design, there is still room to increase its functionality, usability, and creative frontiers. Several advances might assist in increasing its technological complexity and make it more flexible to a wide range of user requirements.

One appealing approach is to incorporate 2D-to-3D transformation, which would allow the system to turn flat drawings or photos into immersive, interactive three-dimensional settings. This functionality might allow users to visually walk around their created areas, rearrange components, and evaluate room layouts from various perspectives. To improve this experience even further, technologies such as virtual reality (VR) and augmented reality (AR) might be integrated whether via smartphones or specialist AR headsets, allowing users to evaluate their ideas in real time within their actual surroundings. Such immersive technologies would assist in closing the gap between conceptual design and real-world execution, giving users a better grasp of how their ideas transfer into actual space.

A potential expansion might include text-based 3D object production, which would allow users to build specific design components such as furniture, lighting, or ornamental items by just describing them. These unique pieces could then be moved around the virtual area, transforming the platform into a highly dynamic design playground. To preserve aesthetic consistency, neural rendering and mesh synthesis techniques, such as those employed in Dream Fusion and Shape-E, might be used to ensure that created elements match in size, texture, and visual theme. In practical applications, interior design frequently entails real-world restrictions such as space limits, material availability, and budget. To address these realities, My SPACE might grow to allow constraint-aware design creation, where users can define particular criteria (e.g., room size "10×12 ft" or budget constraints "under $500"). By incorporating optimization techniques into the generative process, the platform might generate designs that are both visually appealing and viable under certain limits.

Dynamic lighting simulation is another remarkable feature. Users may obtain a better understanding of how a room feels at different times of day by customizing design outputs to represent varied lighting situations, such as early brightness, warm evening tones, or the delicate flicker of candlelight. Animated visualizations might also be used to demonstrate how lighting changes over time, allowing users to judge mood and functioning under changing settings. Finally, increasing the platform's accessibility with a more intuitive design has the potential to greatly increase user engagement. Replacing difficult prompts with simple visual tools such as drag-and-drop textures, click-to-replace choices, color palette selections, and style symbols like "Rustic" or "Victorian" would make the platform more approachable, particularly for individuals who are not comfortable with word input. These user-focused changes would streamline the design process while retaining the versatility required for creative customization, ensuring that My SPACE continues to empower both new and seasoned designers.

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