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AI Architecture Application

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ABSTRACT-

AI-ARCHITECTURE APPLICATION is an innovative digital tool Application designed to transform the way architecture and interior design projects are conceived and executed.

By integrating cutting-edge technologies such as AI, 3D visualization, , Real-Time tools to design, and real-time collaboration, also provide many suggestions about the architecture designs, login and sign up, feedback etc is designed to assist architects, students, and professionals, enthusiasts, etc by using artificial intelligence to streamline design processes, generate building models, and provide intelligent suggestions. It enables users to input basic requirements and constraints, and receive optimized architectural layouts using machine learning algorithms.

Key features include a Real-Time Collaboration,

Architecture Tools, user-friendly interface, AI-driven design suggestions, 3D model previews, and cloud storage for projects. The app aims to enhance Enhance Design Accessibility creativity, reduce time consumption, and support sustainable architecture through intelligent recommendations.

Index Terms- user interface, one-stop solution, high-quality, budget-friendly.

I. INTRODUCTION

Modern architectural design demands a balance between creativity, functionality, and compliance with complex building codes. As architectural tasks grow in scale and complexity, professionals require intelligent tools that can assist in ideation, drafting, optimization, and simulation.

The AI Architecture App introduces artificial intelligence as a co-designer in the process, capable of understanding spatial needs, adapting to environmental constraints, and proposing design alternatives based on learned data. It empowers users to visualize designs, receive suggestions on space efficiency, and even test sunlight or airflow simulations..This project aims to redefine the way architecture is taught, conceptualized, and executed.

Revenue Model:
- **Subscriptions.**
- **Freemium..**
- **Add-Ons.**
- **Target Audience:**
- **Architects & Designers.**
- **Homeowners & DIYers.**
- **Real Estate Developers & Construction Firms**

A. Objective

The objective of the AI Architecture App is to:
- Accelerate Design and Planning Processes
- Provide an AI-powered platform for generating
- Promote Sustainability and Inclusivity
- Help users quickly visualize 2D and 3D layouts based on customized inputs.
- Deliver AI-Powered architectural design suggestions.
- Offer intelligent feedback on functionality, spatial optimization, and aesthetics.
- Support Cross-Device Compatibility

B. Motivation

The motivation behind the AI- Architectural application stems from the growing need to modernize and democratize the architecture and interior design process. In an era defined by digital innovation, traditional design methods can be time-intensive, costly, and inaccessible to many users, especially those without formal training or access to professional resources.

Architectural design is often time-consuming and dependent on repeated iterations. This app aims to reduce the designer's workload and provide fresh ideas and suggestions instantly with AI support, making the design process more creative and efficient.

At the same time, today's users, whether professionals or homeowners —are seeking smarter, faster, and more sustainable ways to design their spaces. The rise of artificial intelligence, real-time collaboration tools, and immersive technologies like augmented reality offers unprecedented opportunities to bridge the gap between vision and execution.

C. Scope

The scope includes:
- Auto-generation of 2D layouts and 3D models.
- Integration with existing design tools (AutoCAD, SketchUp).
- Smart recommendations based on lighting, space utilization,
  and material use.- sustainability

II. SYSTEM SPECIFICATION

D. Problem Definition

Architects and students face challenges in exploring diverse design options quickly, maintaining compliance, and ensuring sustainability. The app seeks to solve these problems using AI-powered design generation, validation, and visualization tools.

E. Overview of Project

This app combines design intelligence, AI algorithms, and user-friendly UI to help users create, modify, and evaluate architectural layouts with ease. The project highlights the blend of creativity and technology to improve architectural workflows.

F. Project Impact

It can transform how professionals and students approach design by providing AI as a creative companion. This results in better design decisions, increased productivity, and adherence to sustainability.

G. Project Outcome

The outcome will be a mobile and web application that can intelligently assist in layout planning, suggest improvements, and provide 3D previews – significantly improving the speed and quality of architectural design processes. It will also help people to draw different thing usings the various tools for drawing including the Architectural tools, etc.

A. Hardware requirements

- ✓ ✔ Laptop
- ✓ 3D Graphic Support

B. Software requirement

- ✓ Front end: React Native / Flutter
- ✓ Backend : Node.js, Python, CSS Java
- ✓ Database: Mongodb / Firebase
- ✓ AI Tools: Tensor Flow/ API
- ✓ 3D Rendering: Three.js, WebGL Or Unity.

Features of the e-commerce website

- When customer try to purchase product, then he/she must login to system.
- **AI-Powered Floor Plan Generator**
  Automatically generate smart layouts for residential, commercial, or educational spaces using deep learning models trained on architectural datasets.
- **Real-Time 3D Visualization**

Instantly convert 2D layouts into immersive 3D models. Explore designs through interactive walkthroughs powered by Web GL or Unity.

- **Intelligent Design Feedback**

Get instant suggestions on space efficiency, natural lighting, furniture layout, and sustainability factors to improve your designs..

- **Multi-Modal Input Support**

Input your design requirements via forms, sketches, or even voice commands like "Design a 3BHK with a central courtyard.".

- **Smart Collaboration Tools**

Work with teammates in real time, track changes, and share design iterations easily with built-in version control and cloud sync.

- **Regulation & Compliance Checker**

Validate your designs against national building codes and regional standards for quick approval readiness.

Export-Ready Formats

Save and share your projects in formats like PDF, DWG, IFC, OBJ, or directly to platforms like Google Drive.

III. SYSTEM DESIGN

A. System Architecture
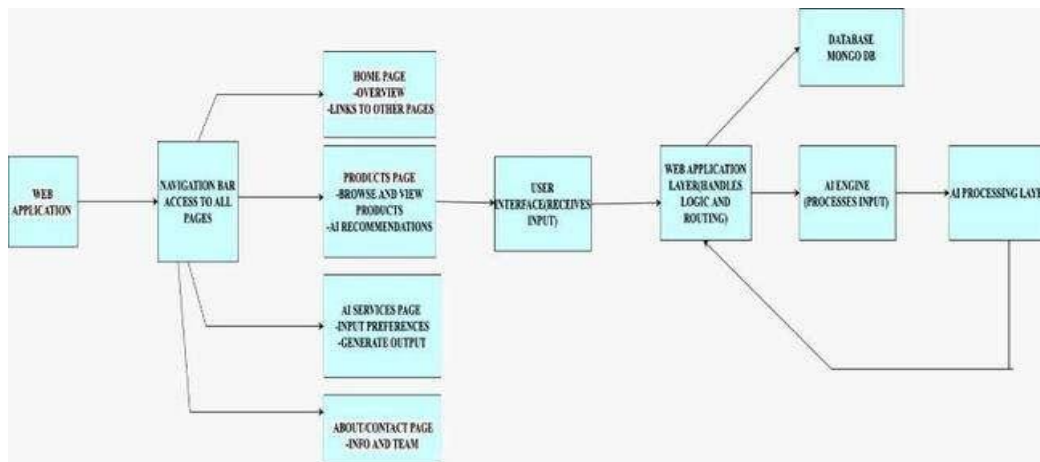
Figure 3.1 architecture

B. Input design

- Login/Signup Page – Secure user authentication.
- New Project Form – Room count, type, orientation, dimensions, design preferences.
- Sketch Input – Option to sketch room layout using touch or mouse.
- Collect feedback from users on the usability, design flexibility, and overall user experience.
- Voice/Chat Input – Ask AI for specific needs (e.g., "Design a 2BHK with open kitchen and balcony").
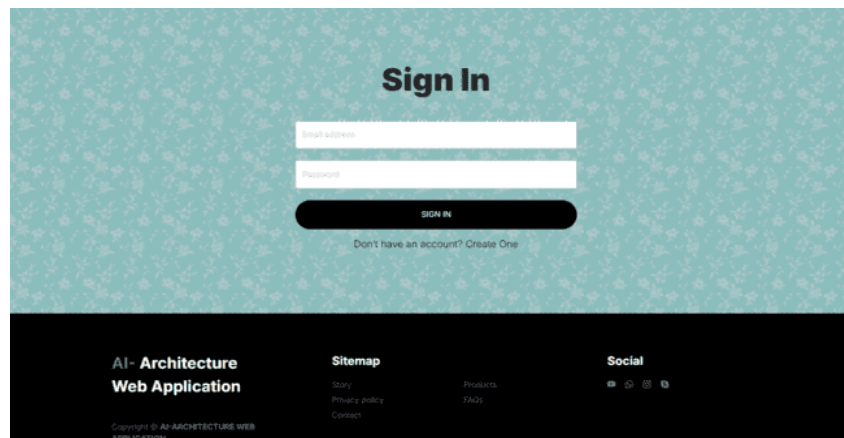
FIG 3.1- LOGIN/ SIGN UP PAGE

C. OUTPUT DESIGN

 The website will be tested on various parameters:

- 2D Layout Plan – Basic floor plan from AI.

-Test rendering of complex 3D models on different devices.

- 3D Visual Preview – Interactive walkthrough using touch or mouse.

- AI-driven Design Suggestions

Input diverse design preferences and assess the accuracy and relevance of AI suggestions.

- Feedback Panel – Suggestions on optimizing natural lighting, space efficiency.

- Download/Export – Formats: JPG, PDF, DWG, IFC.

FIG 3.2 PRODUCTS MENU PAGE

IV. SYSTEM IMPLEMENTATION

- Android Studio Application and Web Application.
- Developed modular components in parallel (UI, AI model, Renderer). Optimize 3D/AR rendering for performance,
- Used Git for version control and team collaboration.
- Deployed backend on Node.js with cloud-based API..

Server Deployment: Set up web and database servers (on-premises MongoDB or cloud-based). Install and configure server operating systems, web servers (e.g., Apache, Nginx), Machine learning for-3D Visualization and for some things and database management systems.

Domain and Hosting: Register a domain name and configure DNS settings to point to the web server. hosting is the service that stores and serves your website or application to users over the internet.

V. SCREEN SHOTS
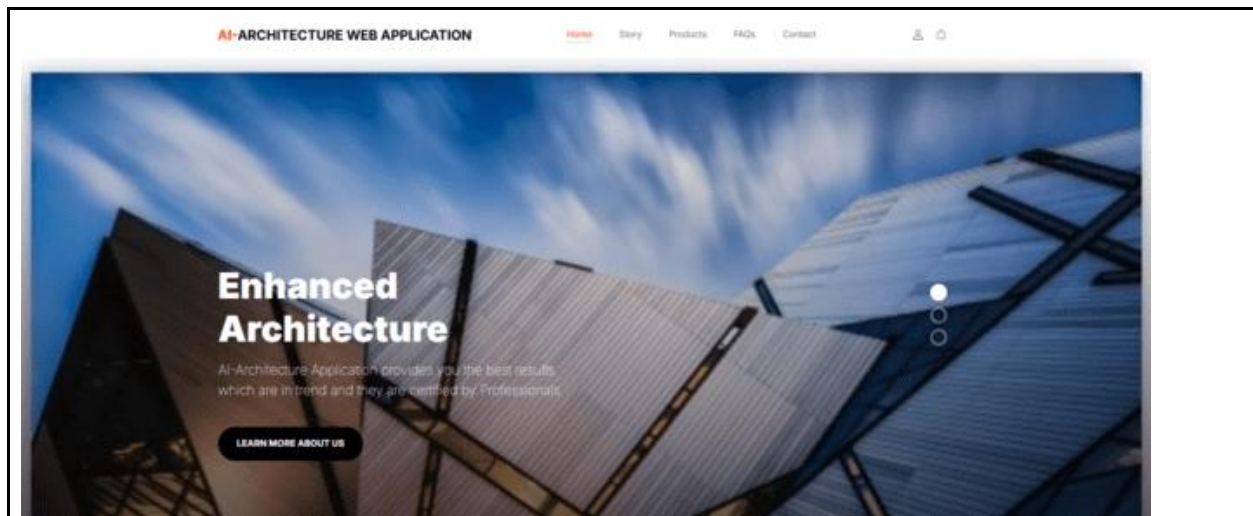
FIG 1 -1 HOME PAGE- Learn more about us.

FIG 2 - HOME PAGE- Talk to us
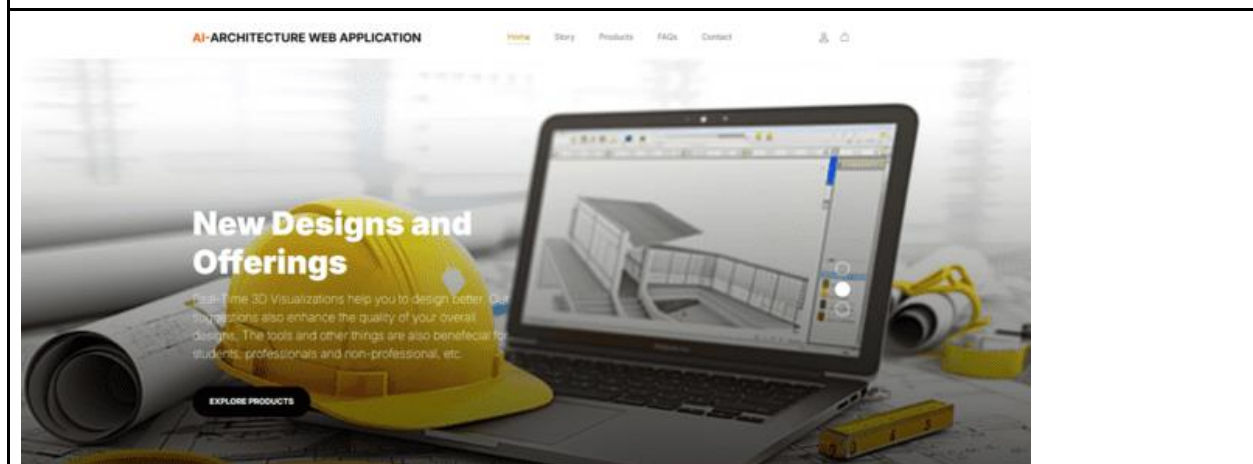
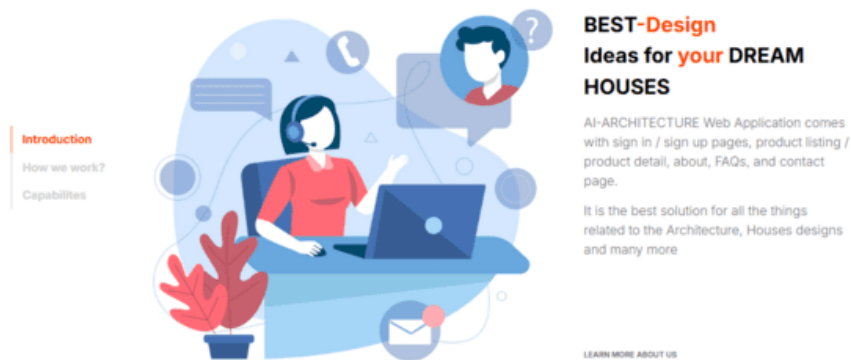**FIG 3 -HOME PAGE - Explore Products**

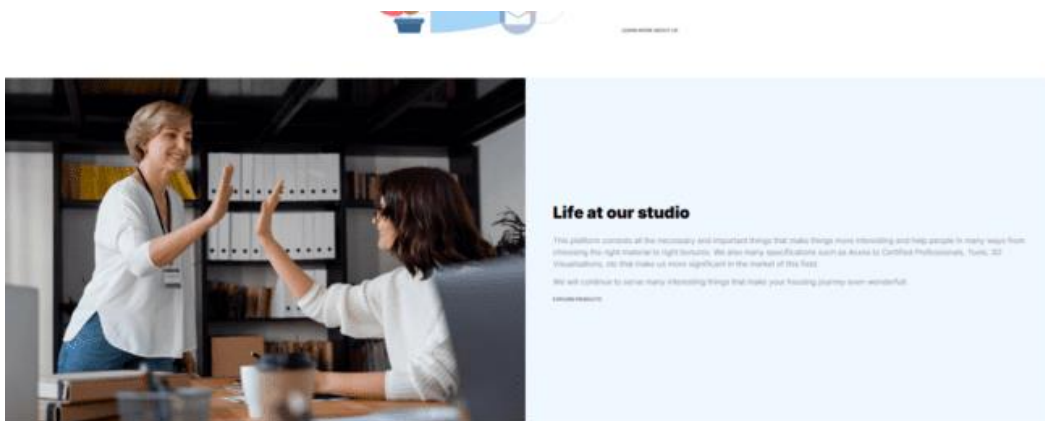**FIG 4 - HOME PAGE- More Information about us**

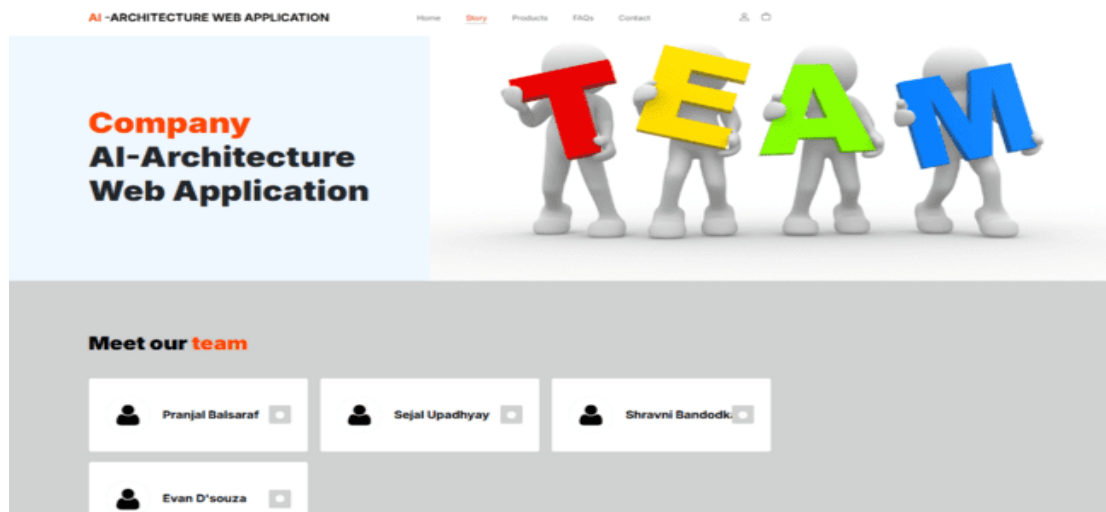**FIG 5- HOME PAGE -Studio Information**

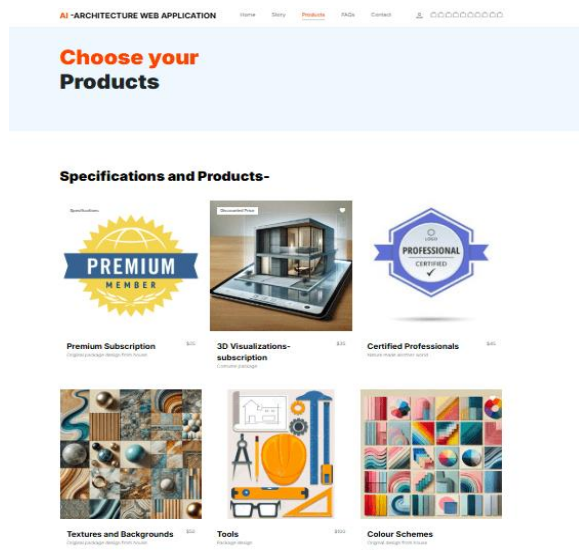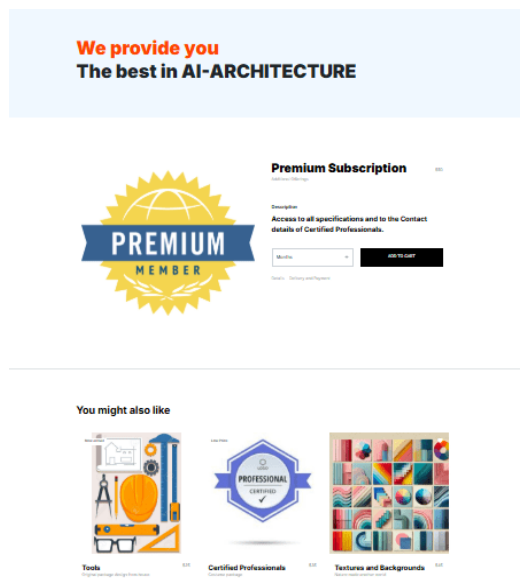**FIG 6 -Story Page- Information about the team and reviews.**

FIG 7 - PRODUCTS MENU PAGE
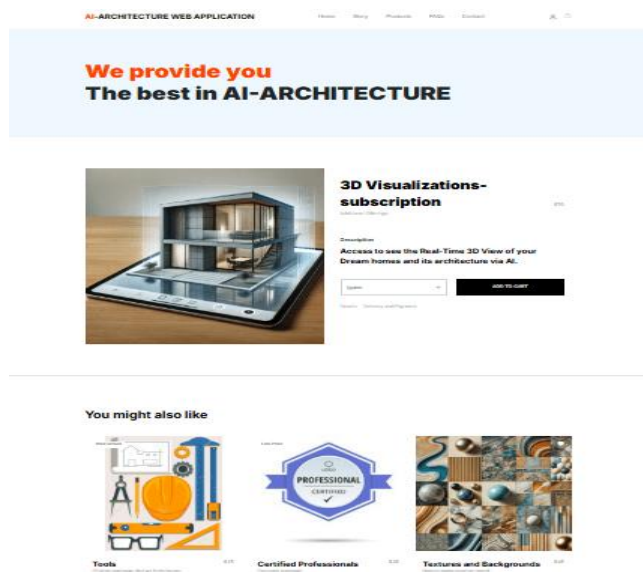
FIG 8 - Product 1 Page- Premium Subscription

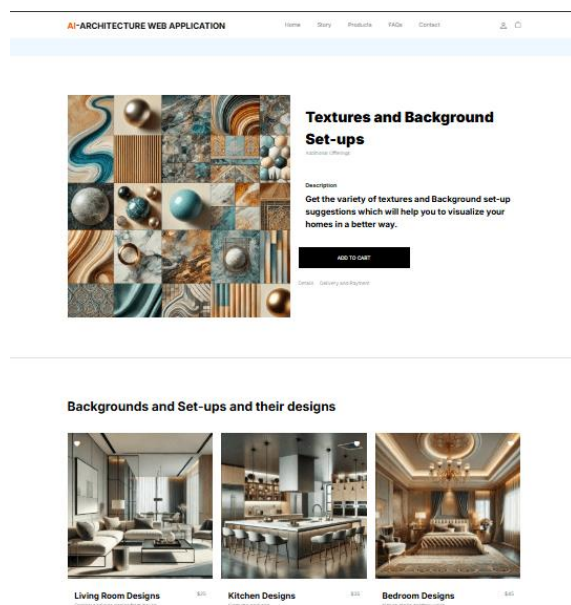**FIG 9 - Product 2 Page- 3D Visualisations Subscription**

FIG 10 - Product 3 Page- Certified Professionals.

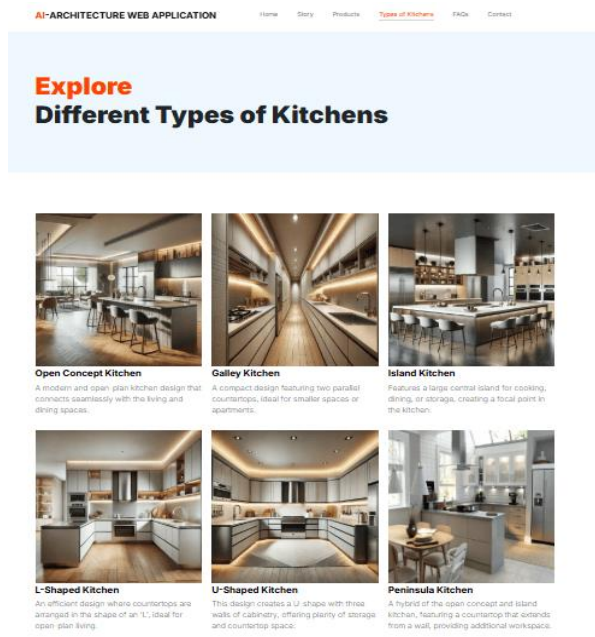**FIG 11- Product 4 Page- Textures and Backgrounds Suggestions**

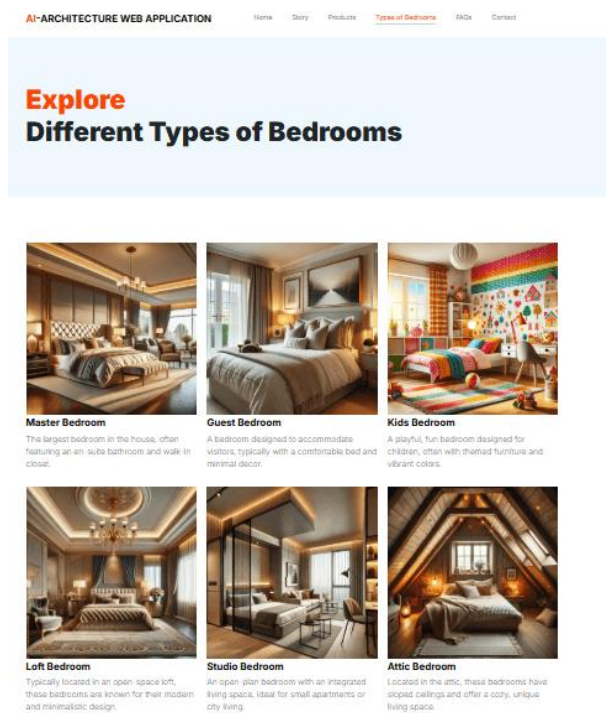**FIG 12 Product 4 Page- Textures and Backgrounds Suggestions**

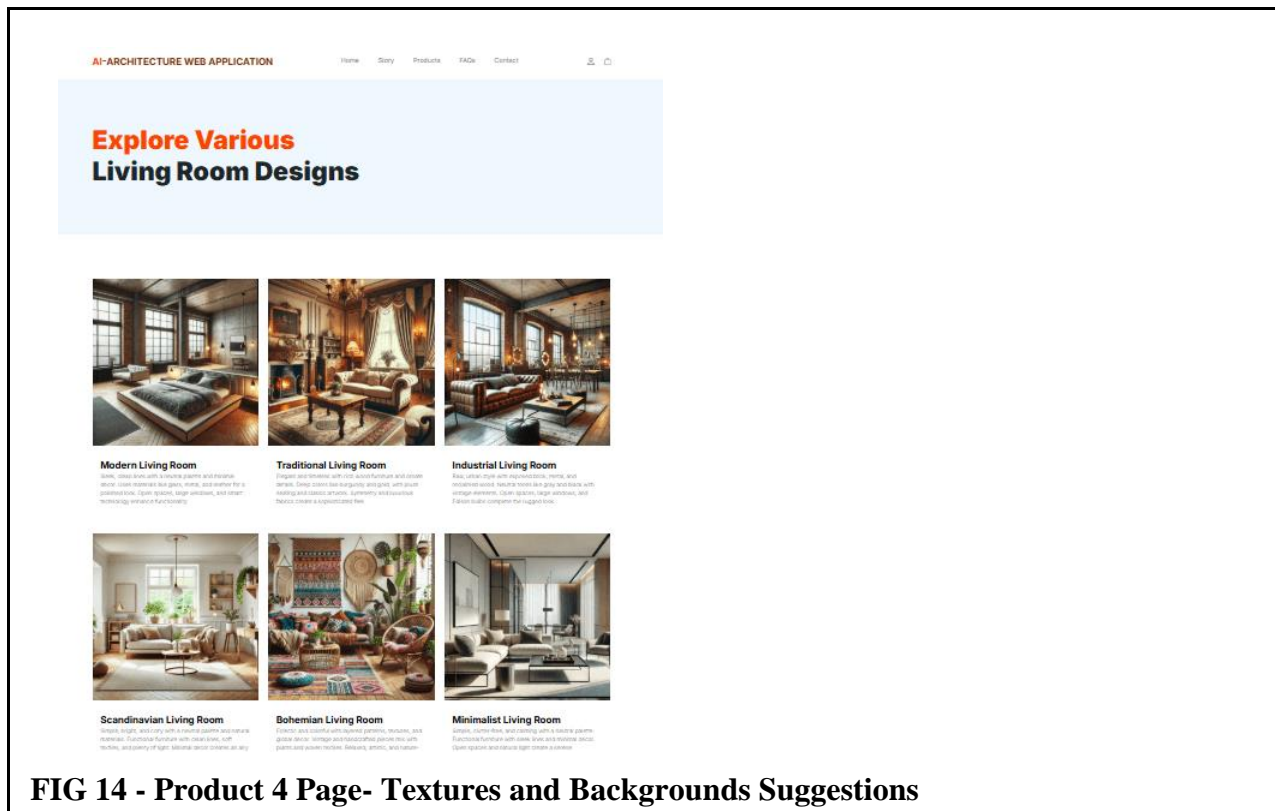**FIG 13 - Product 4 Page- Textures and Backgrounds Suggestions**

FIG 14 - Product 4 Page- Textures and Backgrounds Suggestions
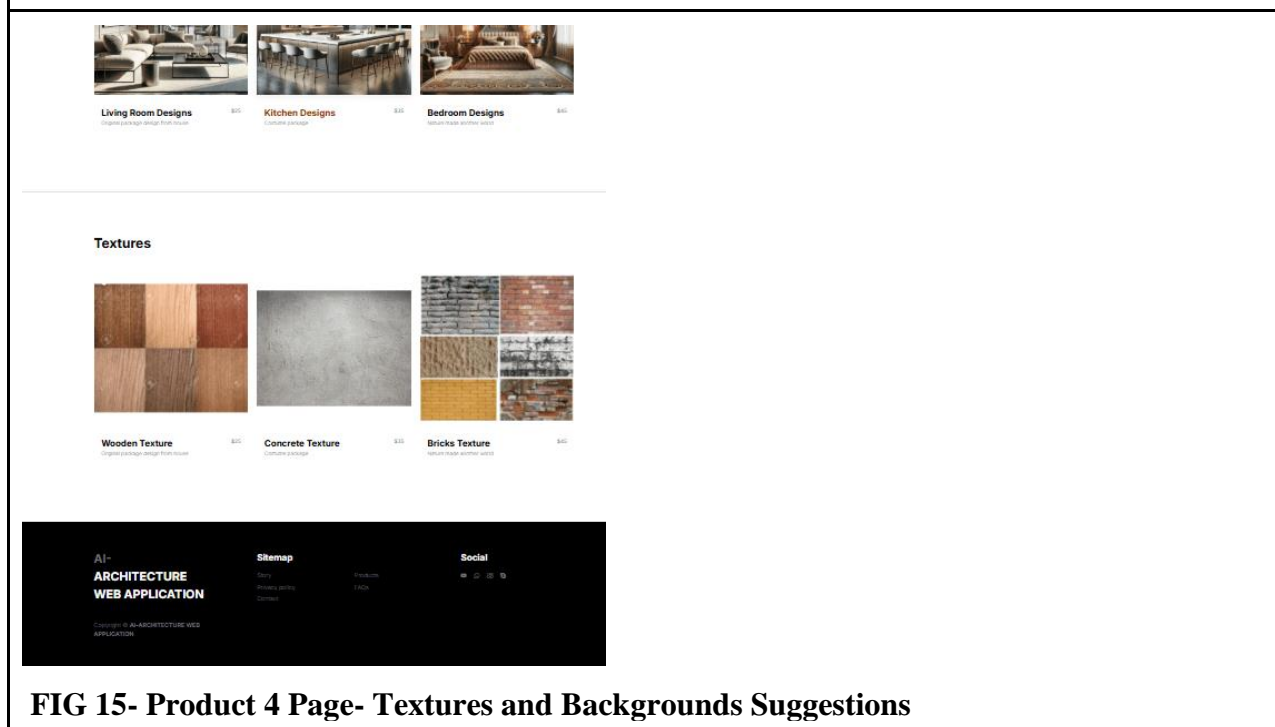

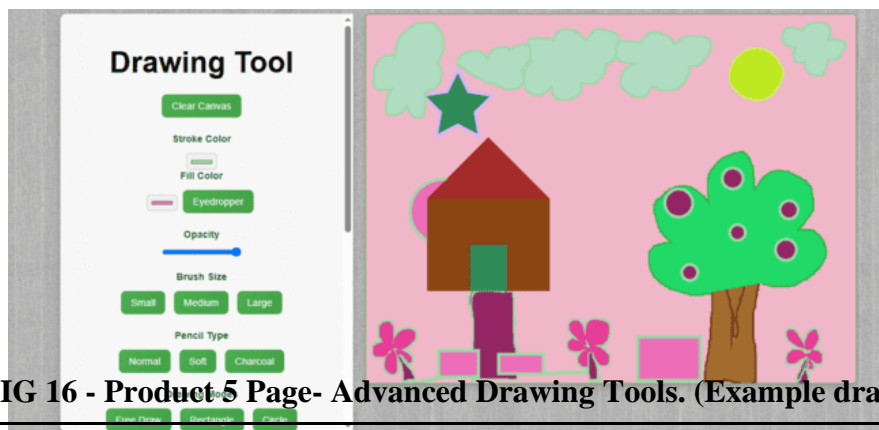**FIG 15- Product 4 Page- Textures and Backgrounds Suggestions**

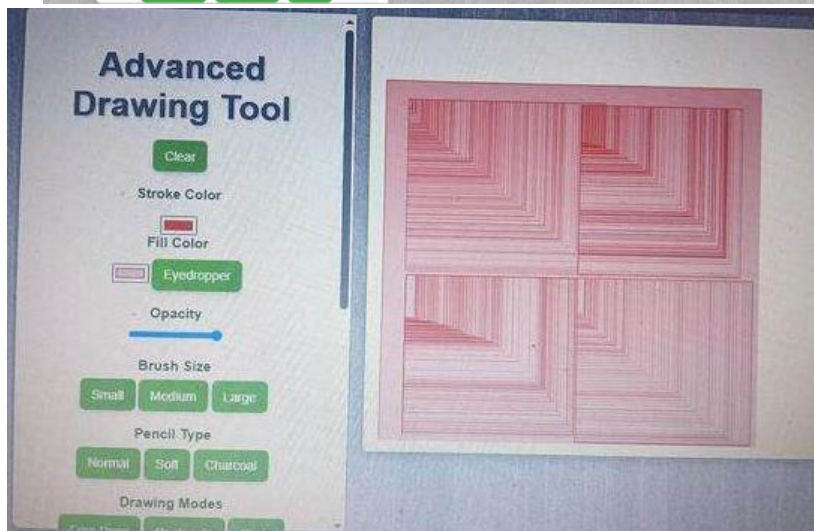**FIG 16 - Product 5 Page- Advanced Drawing Tools. (Example drawings)**

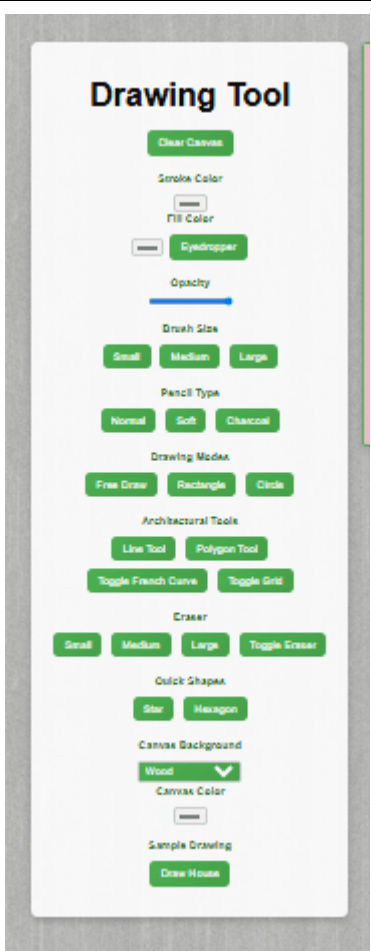**FIG 17- Product 5 Page- Advanced Drawing Tools .(Example designs)**

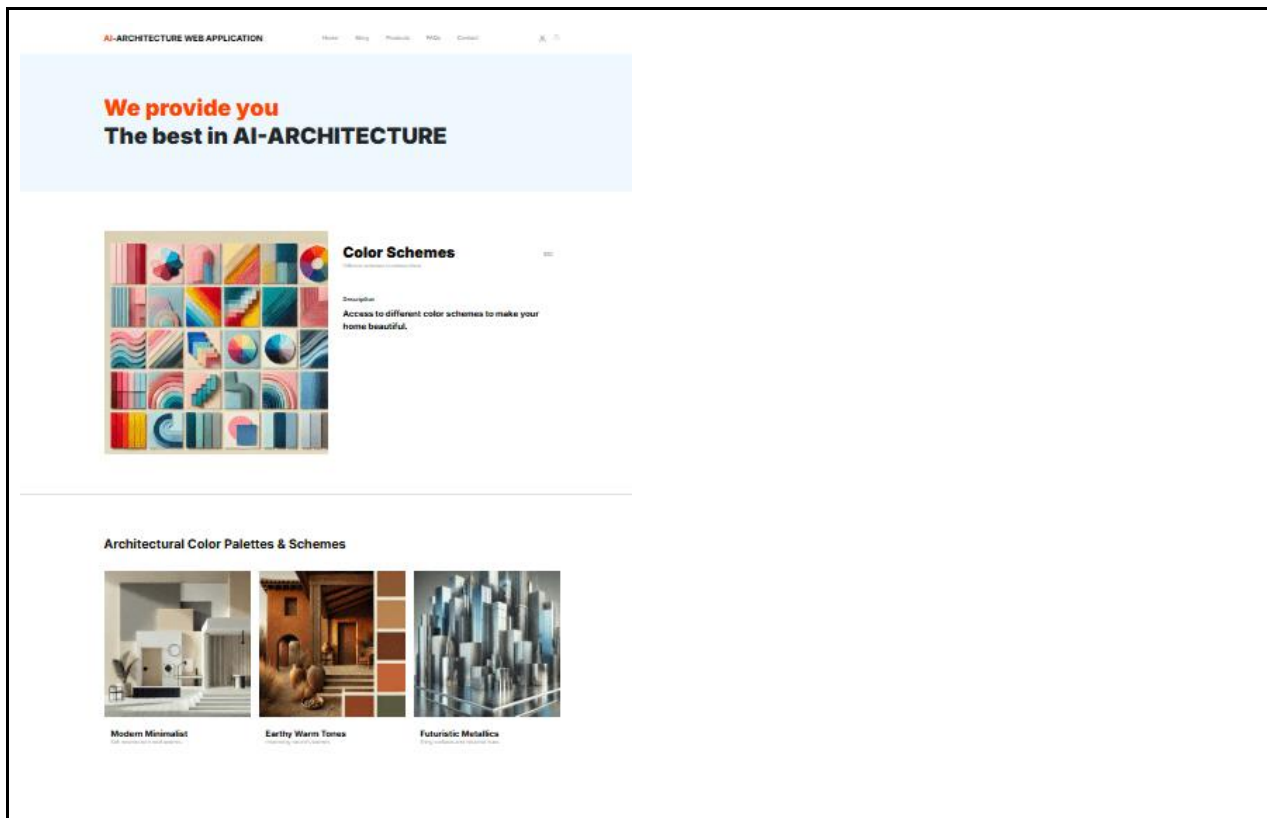**FIG 18- Product 5 Page- Advanced Drawing Tools.**

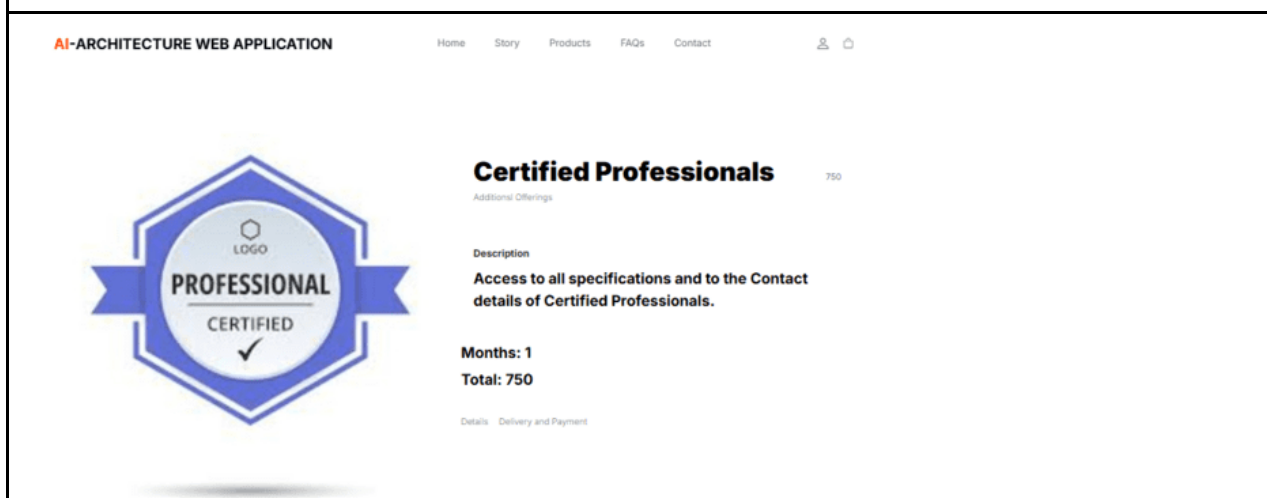**FIG 19- Product 6 Page- Colour Schemes.**

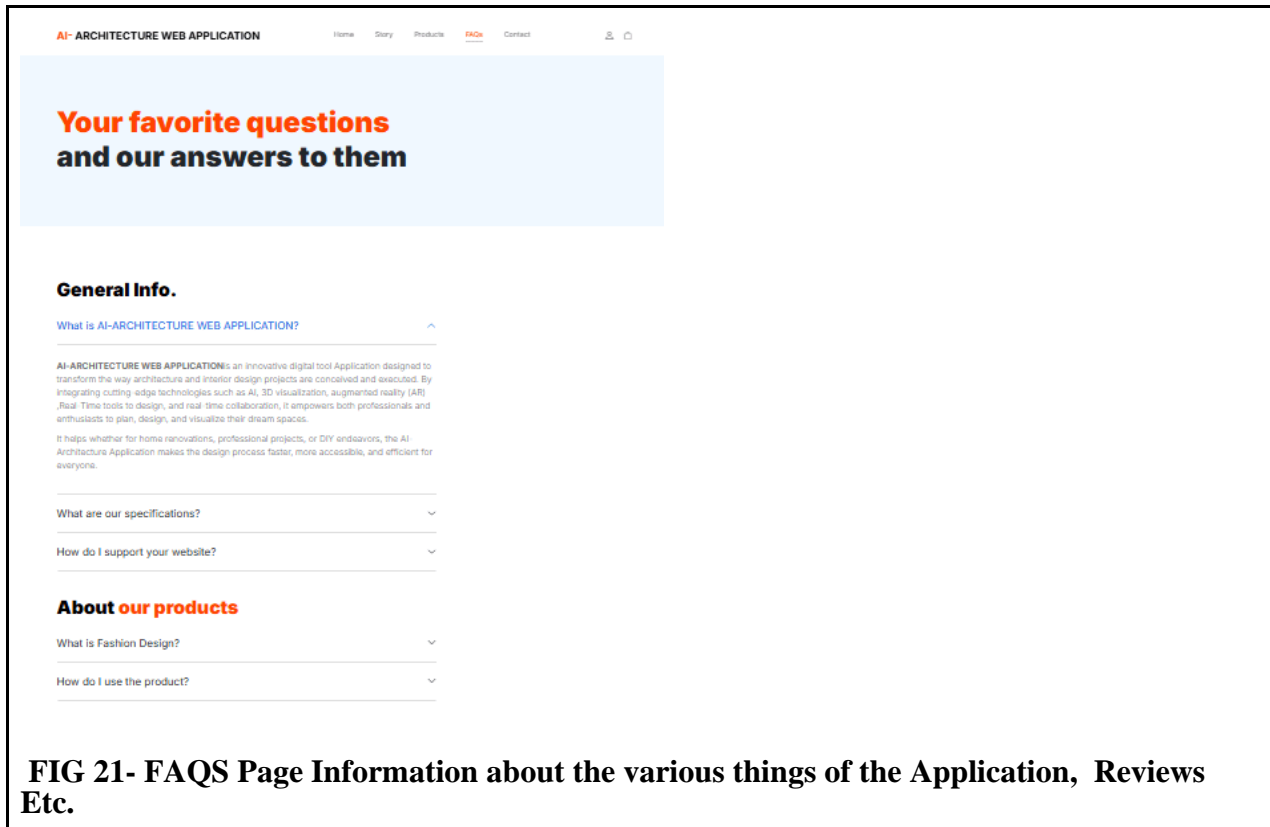**FIG 20- Add To Cart Pages.**

FIG 21- FAQS Page Information about the various things of the Application, Reviews Etc.
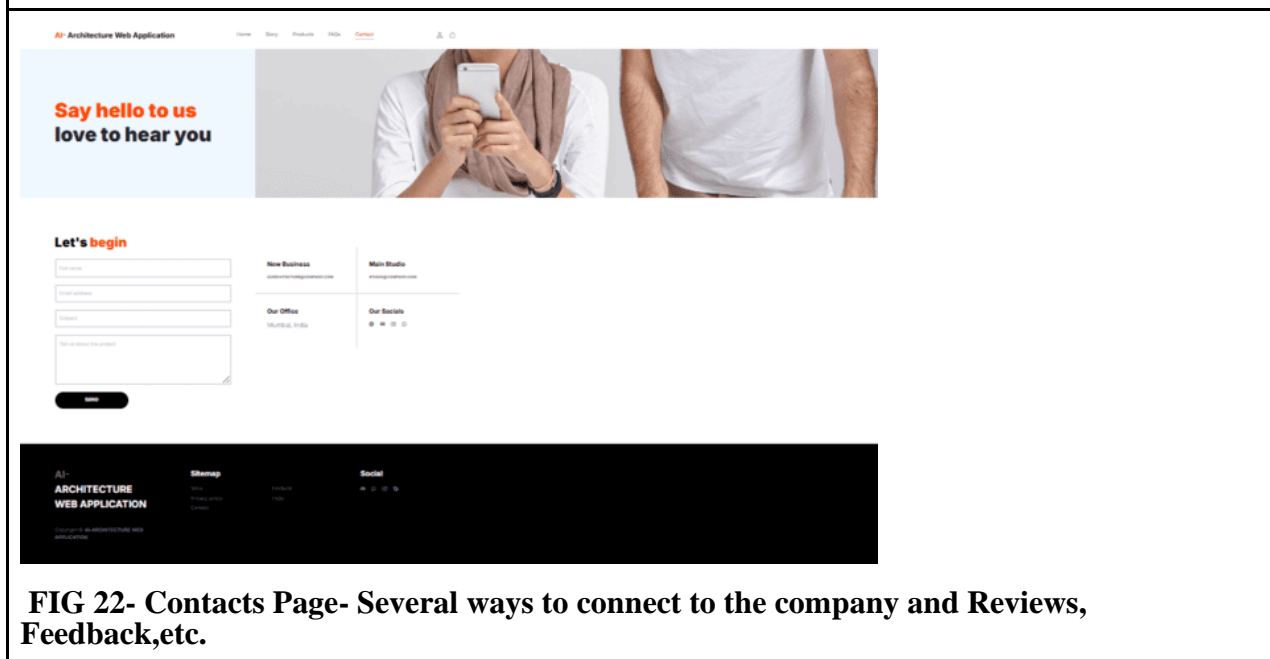

FIG 22- Contacts Page- Several ways to connect to the company and Reviews, Feedback,etc.

VI. CONCLUSION

This AI Architecture Application research project successfully demonstrates the potential of AI in augmenting architectural design. The AI-Architecture Application has successfully integrated cutting-edge technologies such as AI, 3D visualization, augmented reality (AR), and real-time collaboration to provide personalized and efficient design solutions for both professionals and non-professionals. By offering a user-friendly interface, real-time design tools, and cross-device compatibility, the platform stands out as an innovative tool in the architecture and interior design space.

The application addresses key industry challenges, including the need for faster, more accessible design processes, and it fosters collaboration among users with varying levels of expertise. The inclusion of AI-driven suggestions and real-time feedback ensures that users receive tailored solutions that are both efficient and effective. Additionally, the emphasis on sustainability and inclusivity positions the platform as a forward-thinking tool that meets the needs of diverse user groups and promotes environmentally conscious design.

- The AI-Architecture Application demonstrates strong performance across varied hardware configurations, with enhanced performance on higher-end systems.
- Real-time collaboration and AI-driven design suggestions add significant value to the design process, making it accessible for both professionals and DIY users.
- User feedback suggests that the application is useful for both small-scale and large-scale architectural projects, though further optimization for lower-end devices and more user guidance is recommended.

By combining the creative strengths of architects with the computational power of AI, the app marks a new frontier in architecture technology, etc.

VIII. FUTURE ENHANCEMENTS

1. **Enhanced AI Capabilities:** We plan to further improve the AI-driven design suggestions by integrating more advanced machine learning algorithms that can better understand user preferences and offer personalised things.

2. **Live Regulation Checker** – Real-time validation with regional building codes (via API).

3. **Sustainability Features:** As environmental awareness grows, we plan to incorporate more sustainability-focused tools, such as integration with green building certification systems (e.g., LEED) to help users design more eco-friendly spaces.

4. **Collaboration Dashboard and custom AI Suggestions** - Allow multiple users to work and comment on designs live and also let them customize thor things, etc

5. **AR Integration** – View AI-generated designs in real-world space using augmented reality.

6. Extended more Collaboration Features: We will continue to improve the real-time collaboration features by adding support for larger teams, project management tools, and task tracking, etc.

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