

## **AI Mini Project**

**AI POWERED ARCHITECTURAL-FLOORPLAN DESIGNER  
AND GENERATOR-USED FOR CREATIVE THINKING AND  
GIVES BASIC VIEW OF OUR PREDICTED OUTCOME**

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## Abstract:

With the speedy progress of machine learning and artificial intelligence, the practice of architecture is undergoing revolutionary transformations, especially with the automation of design workflows. This article introduces Architectural AI, a new AI-based framework to produce optimized floor plans for residential and commercial structures. By taking advantage of deep learning algorithms trained on large databases of architectural plans, the system semantically understands user specifications—e.g., room sizes, functions, and spatial arrangements—to generate functional, attractive, and code-conforming floor plans. The model has both generative and evaluation elements: a generative neural network to suggest floor plan layouts and a constraint-checking module to validate structural and usability requirements. This method greatly cuts down the effort and time involved in early-stage design refinement and aids architects with creative solutions and layout optimizations. Results from experiments validate the effectiveness of the system in producing feasible designs in different use cases, and they show the power of AI to complement human creativity in architecture.

## Introduction:

Imagine an AI which helps you to construct a house with lots of creative ideas and latest technology. The main concept of this AI is to generate a applicable floor model for the user's preference and dedicate its mind to your current need. We can always edit the following plans given to us by the AI generator.

## Objectives:

1. Automate floor plan design based on user inputs and requirements.
2. Optimize layouts for space, function, and aesthetics.
3. Ensure compliance with building codes and standards.
4. Enable user customization for tailored design outputs.
5. Speed up design iterations and early-stage prototyping.
6. Integrate with BIM/CAD tools for seamless workflow.
7. Learn from feedback to improve future designs.
8. Support sustainability through energy-efficient planning.

## System Overview:

The Architectural AI system generates floor plans based on user inputs using AI models trained on architectural layouts. It includes:

1. Input Module: Gathers user requirements (rooms, sizes, preferences).
2. AI Design Generator: Creates layout options using deep learning.
3. Constraint Checker: Ensures code compliance and design feasibility.
4. Optimizer: Enhances space usage, lighting, and flow.
5. Feedback System: Learns from user edits to improve future results.
6. Export Tools: Outputs plans for use in CAD/BIM software.

## Tools & Technologies (Short):

- Languages: Python, JavaScript
- AI Frameworks: Tensor Flow, PyTorch
- Models: GANs, Transformers, GNNs
- Data Tools: OpenCV, Pandas, NumPy
- CAD Integration: AutoCAD, Revit, IFC/DXF formats
- UI/UX: React, Three.js
- Deployment: AWS, Docker, Kubernetes

## Methodology (Short):

1. Data Collection:  
Gather and preprocess a large dataset of annotated architectural floor plans.
2. Requirement Input:  
Accept user-defined parameters like room types, sizes, relationships, and site constraints.
3. Model Training:  
Train deep learning models (e.g., GANs or Transformers) to learn spatial patterns and design logic.
4. Floor plan Generation:  
Generate layout options using the trained AI model based on input criteria.
5. Constraint Validation:  
Check for compliance with architectural standards and building codes.
6. Optimization:  
Refine layouts for better space efficiency, lighting, and circulation.

7. Feedback Loop:  
Incorporate user feedback or edits to improve future outputs.
8. Export:  
Provide output in CAD/BIM-compatible formats for further architectural work.

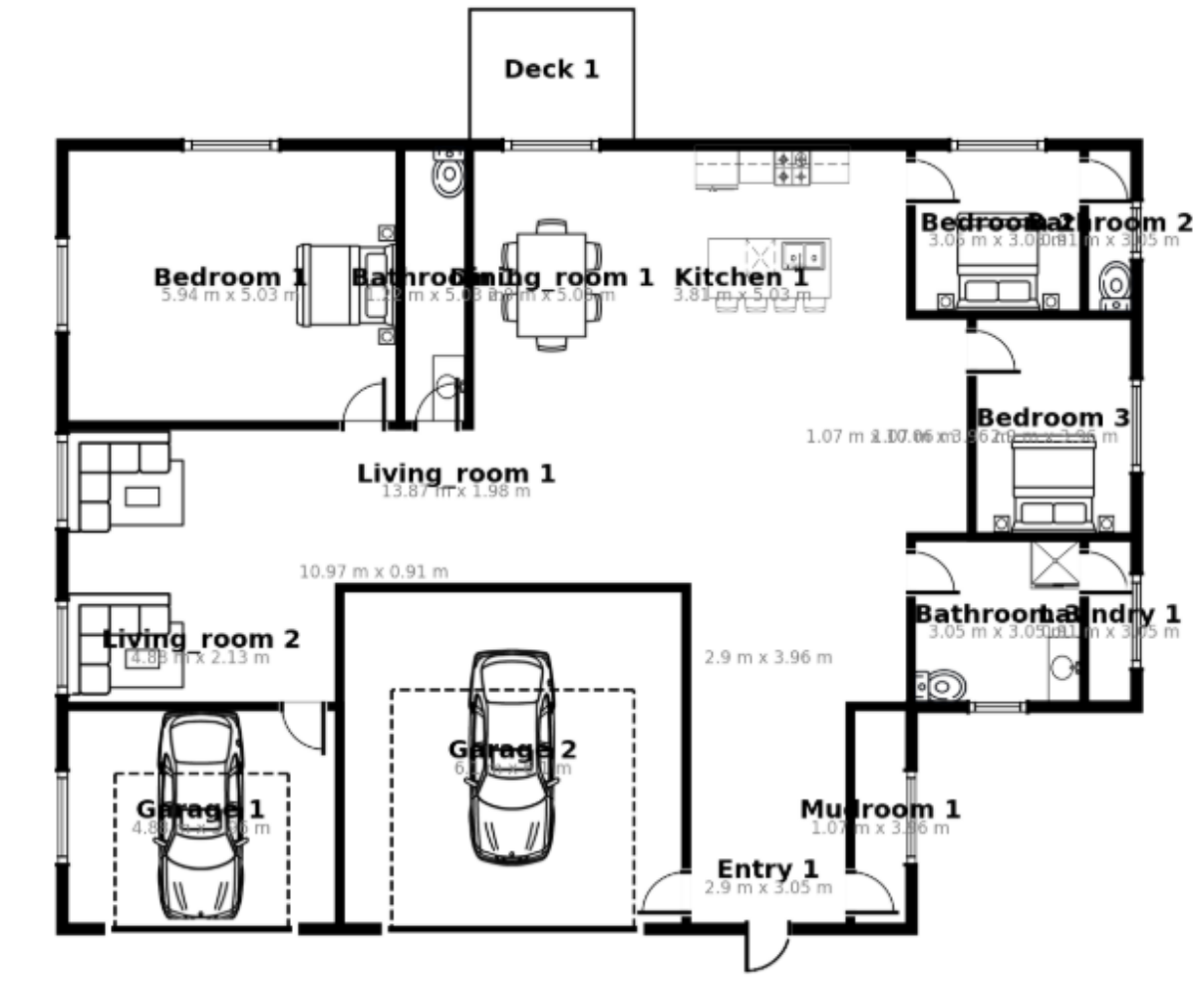
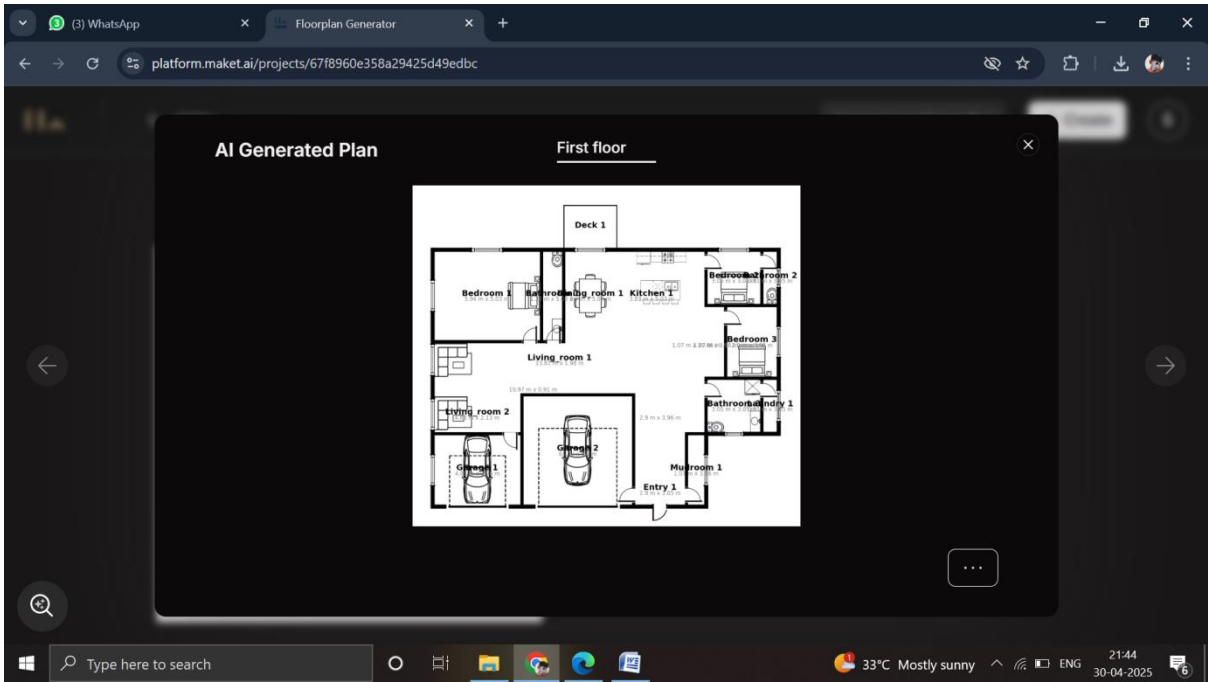
## Disadvantages:

- Lacks human creativity and intuition for unique or artistic designs.
- Heavily depends on quality data—bad input leads to flawed output.
- May overlook complex building codes or regional regulations.
- Limited flexibility in handling highly customized client needs.

## Future of Architectural AI:

- Creative Design Innovation: Merging AI with human imagination for creative, tailored designs.
- High-Tech Integration: AI will collaborate with VR, AR, and smart city technology for live design and modification.
- Sustainability: AI will emphasize green, energy-efficient designs.
- Self-Constructions: AI-designed constructions will complement 3D printing and automatic building methods.
- Interactive Platforms: AI will enable enhanced coordination between architects, engineers, and clients through interactive, dynamic floor plans.

Example for architectural floor plan generating AI:



## Conclusion:

In conclusion, AI in architecture is not just a trend but a catalyst for a smarter, more sustainable built environment. Embracing its potential will require continuous adaptation, but the possibilities are boundless in shaping the future of our cities and spaces.