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REVIEWER'S REPORT

Manuscript No.: IJAR-59762

Title: EcoNest: A Deterministic, Provenance-Aware Computational Framework for Climate-Responsive Sustainable Residential Design in India

Recommendation:
Accept

Rating	Excel.	Good	Fair	Poor
Originality	Yes			
Techn. Quality		Yes		
Clarity	Yes			
Significance		Yes		

Reviewer's ID: JPR- 015

Detailed Reviewer's Report

Reviewer's Comment for Publication.

Acceptance Comment are mentioned below suitable for the paper titled "**EcoNest: A Deterministic, Provenance-Aware Computational Framework for Climate-Responsive Sustainable Residential Design in India "**

Reviewer Comments: Accept

Reviewer Comments –

1. Introduction

The paper addresses an important and contemporary research area concerning sustainable residential design through computational technologies. The proposed EcoNest framework focuses on integrating climate-responsive architecture, energy efficiency, water conservation, construction cost estimation, and indoor environmental quality within a unified design platform. The study is particularly relevant to the Indian residential context, where climatic diversity, resource constraints, and affordability are important considerations. The introduction establishes the need for an integrated computational framework that can support informed residential design decisions. Overall, the research problem is relevant and has considerable practical significance for sustainable housing development.

2. Literature Review

The study draws upon important concepts related to sustainable architecture, climate-responsive building design, computational design systems, renewable energy integration, and water management. The consideration of local climatic conditions and appropriate building materials reflects established principles of sustainable construction. The discussion of botanical biofiltration is particularly relevant, as it recognizes the distinction between passive and active systems for improving indoor air quality. The integration of Vastu Purusha Mandala analysis with computational residential planning also introduces an

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interesting dimension within the Indian architectural context. The literature-based positioning provides a suitable foundation for developing an integrated and context-specific residential design framework.

3. Solution Approach

The proposed EcoNest framework presents a comprehensive computational approach that converts residential requirements into a standardized HouseDesign representation. It integrates location-specific climate identification, material selection, climate-responsive design strategies, floor-plan generation, photovoltaic capacity estimation, and rainwater harvesting calculations. The automatic generation of Bills of Quantities and indicative construction cost estimates further strengthens its practical relevance. Additionally, the framework incorporates sustainability scoring, Vastu analysis, and multiple visualization options, including 3D views and SVG floor plans. The provenance-aware and deterministic design philosophy is a notable feature that enhances the traceability and consistency of computational design outputs.

4. Results and Discussion

The illustrative case study of a two-floor, three-bedroom residential building in Jaipur demonstrates the practical capabilities of the proposed framework. The generated outputs, including a 7.2 kWp photovoltaic system, 7,600 L rainwater storage capacity, indicative construction cost of ₹29.96 lakh, and sustainability score of 76/100, provide a useful demonstration of the system's functionality. The Vastu score of 78/100 further illustrates the integration of traditional architectural considerations into computational design. Importantly, the authors appropriately distinguish conceptual estimates from experimentally validated building performance, thereby maintaining transparency regarding the framework's current capabilities. The proposed future integration of multi-objective optimization and physics-based simulations offers promising opportunities for further research and development.

5. Conclusion

The paper presents an innovative and comprehensive computational framework for supporting climate-responsive and sustainable residential design in India. The integration of architectural planning, renewable energy assessment, rainwater harvesting, cost estimation, sustainability evaluation, and visualization within a unified platform represents a valuable contribution. The provenance-aware approach and the consideration of both contemporary sustainability principles and traditional architectural practices enhance the originality of the proposed system. Although the current outputs are conceptual, the framework establishes a useful foundation for more advanced simulation-based residential design tools. Overall, the research has significant practical relevance and promising potential for application in sustainable housing development.