AI-Powered Home Design and Material Intelligence System Using Conversational Multi-Model Architecture

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Abstract: Expertise in cost analysis, durability analysis, spatial optimization, and climate adaptation is necessary for residential planning and material selection. However, organized and sophisticated decision-support tools are frequently unavailable to homeowners and small-scale developers. In order to guarantee dependability and continuous service, this article introduces an AI-powered conversational home design and material intelligence platform that combines multi-model Large Language Models (LLMs) with an autonomous failover architecture. A Material Consultant Agent and a House Layout Planning Agent are the two specialized agents that make up the suggested system. While the Layout Planning Agent creates structured floor plans, room positioning strategies, ventilation logic, and sunlight optimization based on user requirements, the Material Consultant Agent offers climate-aware, ranked material recommendations along with useful sourcing and maintenance checklists. To lessen service disruptions brought on by rate limitations or network outages, the system uses prioritized API routing across several LLM providers. Secure environment-based key management, encrypted persistence, and step-by-step interaction are all made possible by a Streamlitbased user interface. When compared to single-model conversational systems, experimental evaluation across various simulated climate and residential contexts shows enhanced reliability, organized reasoning, and user-guided decision support. The suggested approach demonstrates how ensemble-based conversational AI systems can be used to promote climate-responsive material selection and democratize intelligent residential planning.

Keywords: Climate-responsive materials, conversational agents, multi-model routing, large language models (LLMs), automated home design, and ensemble artificial intelligence systems.

A Distributed Ledger–Based Secure Electronic Voting Framework Powered by Blockchain Technology

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Abstract: Electronic voting systems require high levels of security, transparency, and integrity to ensure trustworthy election processes. Traditional centralized voting platforms are vulnerable to tampering, data breaches, and single-point failures. The proposed system integrates blockchain technology with a FastAPI backend and MySQL database to provide secure authentication, authorization, and immutable vote storage. Each vote is recorded as a blockchain transaction, ensuring tamper-proof and transparent vote tallying. Role-based access control, digital identity certificates, and cryptographic hashing enhance system security. The system demonstrates a reliable and scalable framework suitable for institutional and governmental elections.

Keywords: Blockchain, Hyperledger Fabric, E-Voting, Distributed Ledger, Smart Contracts, Security, Decentralized Systems.