Amir Goli

Lawrence, KS, USA
amirgoli@ku.edu | +1 (785) 423-7698
LinkedIn | Google Scholar | amirgoli.com

About Me

PhD student in Architectural Technology at the University of Kansas. My thesis, *Human-AI Co-Intelligence in VR for Design Comprehension*, examines how a conversational AI Co-designer's embodiment and dialogue style influence design reasoning, user understanding, and decision-making during creative tasks. I develop Unity-based VR co-design and learning environments and evaluate interaction effects through experimental user studies, with a focus on reliable human-centered AI support rather than overreliance. I also developed StandardScout, a fine-tuned, LLM-powered building-code assistant that supports configurable retrieval via local RAG, session-based PDF upload, and optional web search.

Education

PhD, Architectural Technology, University of Kansas | 2023-Present (Expected May 2028)
- Thesis: Human-AI Co-Intelligence in VR for Design Comprehension: Effects of a Conversational AI Agent's Embodiment and Dialogue Style

MSc, Architectural Technology, Pars University | 2018-2022

BSc, Architectural Engineering, Shahid Chamran University of Ahvaz | 2013-2018

Selected Projects

Thesis Project | Human-AI Co-Intelligence in VR for Design Comprehension
- Investigates how a conversational AI agent's embodiment and dialogue style influence design reasoning, user understanding, and decision-making during creative tasks.
- Develops Unity-based VR co-design and learning environments to study spatial reasoning and design comprehension in immersive settings.
- Develops and iterates AI co-designer behaviors by fine-tuning multiple communication styles and studying how different response styles affect user trust calibration and learning.
- Translates 3D spatial conditions and user actions into structured contextual inputs for the AI, enabling context-aware dialogue grounded in the current VR scene.
- Evaluates interaction and dialogue effects through experimental user studies, with an emphasis on reliable human-centered AI support rather than overreliance.

StandardScout | RAG-Based Building Code Assistant
- Built a building-code assistant with a local RAG knowledge base for ADA, ABA, and GSA P-100, plus session-only PDF upload for user-provided documents and optional web search to supplement local sources when appropriate. [Demo]
- Implemented source-routing logic so users can enable local RAG, session PDFs, web search, or combinations, with citations attached to each claim.
- Created a small evaluation set of questions and used it to test citation correctness and consistency across UI modes.
- Two UI modes: Text-based and Conversational. The backend retrieval and answer logic are identical; only the UI differs.

- Generates a blueprint-style technical diagram for each question and answer (simple architectural/engineering manual linework; always on).

- Fine-tuned both frontier and open-source models for a friendly, structured response style.
- Reliability focus: supports understanding and productive cognitive extension while reducing overreliance and overtrust through source transparency and consistent answer formatting.

ARTH | Unity VR Co-Design and Learning Environments for Adaptive Reuse
- Developed Unity (C#) VR learning environments for adaptive reuse scenarios and design decision exercises.
- Instrumented prototypes for usability and performance measurement and analyzed participant behavior to examine how immersive interaction affects learning outcomes.
- Provides a practical foundation for studying AI-supported design workflows, including future integration of embodiment and dialogue-style manipulations.

GaoDe | Multimodal Architectural Design Serious Game
- Designed an open-ended educational serious game that supports early architectural design learning through iterative practice inside a familiar parametric CAD workflow.
- Implemented a multimodal natural user interface that combines hand-gesture interaction (Leap Motion), machine-vision finger-count actions (webcam + OpenCV), and offline keyword speech commands to remove keyboard/mouse dependence while keeping input intentional and low-error.
- Integrated the multimodal inputs into Rhino/Grasshopper-based modeling to enable direct manipulation, camera/navigation control, and guided task progression within the design environment.
- Developed five "iconic-building" game modes with distinct rules and interaction mappings to sustain engagement and target different design cognition skills.

Human Brain Cutting Matrix | KU Medical Center Collaboration (Patent Pending)
- Collaborated with the KU Medical Center to develop a Human Brain Cutting Matrix using advanced digital fabrication and 3D scanning for research workflows.
- Translated clinical and lab requirements into iterative, manufacturable designs by leveraging computational design and rapid prototyping.
- Produced multiple refined prototype generations and delivered documentation and build files to support consistent replication and safe lab use.
- Presented outcomes across multiple venues and advanced the invention through the U.S. patenting process via the KU Center for Technology Commercialization (patent submitted).
- Additional digital fabrication projects: [[Link](#)]

Research and Work Experience

Research Assistant, University of Kansas | 2023-Present
- Conduct research at the intersection of HCI, immersive visualization, and AI-supported design workflows for architectural education and decision-making.
- Design research questions, develop study protocols, and run experimental user studies; analyze quantitative and qualitative data to evaluate interaction effects and learning outcomes.
- Build Unity-based VR prototypes (C#), instrument interactions, and develop iterative versions based on findings and stakeholder feedback.
- Prototype LLM-enabled design support tools, including early-stage frameworks for architecture-specific knowledge bases such as RAG pipelines for retrofitting and code-informed design tasks.
- Developed a Rhino/Grasshopper pipeline to support digital fabrication workflows, enabling iterative computational design and manufacturable outputs.
- Contribute to scholarly dissemination by drafting and revising research materials for conference and journal submissions, and preparing presentations for academic venues.

R&D Team Lead, Rangin Profile Kavir Company | 2019
- Developed a Rhino/Grasshopper pipeline (Python) for rule-based curtain wall geometry and automated shop drawings and material takeoffs.

Selected Publications

- Goli, A., and Dastmalchi, M. R. Virtual Reality for Adaptive Reuse Thinking in Architecture Education. ACADIA 2025 (in press).
- Goli, A., and Dastmalchi, M. R. *Virtual Reality for Tacit Knowledge in Design Education: The Role of Social Interactions.* In The Routledge Handbook of Interior Architecture Research, 2026. doi: 10.4324/9781003475057-35.
- Ossen, D., and Goli, A. AI as a Generative and Dialogue Tool: Exploring Text-to-Image Generation in Interior Architecture Education. In The Routledge Handbook of Interior Architecture Research, 2026. doi: 10.4324/9781003475057-32.
- Dastmalchi, M., Goli, A., & Haeri, M. Development of a human brain matrix through advanced digital fabrication and 3D scanning. Journal of Neuropathology & Experimental Neurology, 84(6), 546. Abstract presented at the 101st Annual Meeting of the American Association of Neuropathologists (AANP), 2025. doi: 10.1093/jnen/nlaf040
- Goli, A., and Dastmalchi, M. R. Enhancing Tacit Knowledge Construction in Architectural Engineering Education Through 4E Cognition and Virtual Reality. IEEE Frontiers in Education (FIE) 2024. doi: 10.1109/FIE61694.2024.10893406.
- Dastmalchi, M. R., and Goli, A. Embodied Learning in Virtual Reality: Comparing Direct and Indirect Interaction Effects on Learning Outcomes. IEEE Frontiers in Education (FIE) 2024. doi: 10.1109/FIE61694.2024.10892964.
- Goli, A., Teymournia, F., Nanebmadi, M., and Andaji, A. Architectural Design Game: A Serious Game Approach to Promote Teaching and Learning Using Multimodal Interfaces. Education and Information Technologies, 2022. doi: 10.1007/s10639-022-11062-z.
- Goli, A., Alaghmandan, M., and Barazandeh, F. Parametric Structural Topology Optimization of High-Rise Buildings Considering Wind and Gravity Loads. Journal of Architectural Engineering, 2021. doi: 10.1061/(asce)ae.1943-5568.0000511.

Technical Skills

AI and LLM Engineering

- Retrieval-augmented generation (RAG): document chunking, embeddings, vector retrieval, citation-based answer assembly.
- Fine-tuning familiarity: LoRA/QLoRA concepts, supervised fine-tuning workflows, and prompt-style control for consistent responses.
- Conversational UX: UI design for text and voice-style interactions; structured response formatting and follow-up question design.
- Familiarity with agentic patterns through training and prototyping: tool calling, multi-step routing, and reliability-oriented evaluation concepts.

Programming and Tools

- Python; C#; Unity XR development; Gradio-based web UI prototyping.
- Rhinoceros and Grasshopper; parametric design; simulation-driven workflows; digital fabrication pipelines.

Training and Service

- Udemy: AI Engineer Core Track (LLM Engineering, RAG, QLoRA, Agents) completed (2025-2026).
- Student Volunteer: IEEE VR 2024 and ISMAR 2024.
- Peer reviewer for venues including IEEE ISMAR, IEEE FIE, CAADRIA, The Journal of Multimedia Tools and Applications, and Frontiers in Virtual Reality journals (2024-2026).
- Nominee, Graduate Student Award for Distinguished Service, University of Kansas (2025).
- Phi Kappa Phi Honor Society member, University of Kansas (2025).
- Awarded University Graduate Fellowship, University of Kansas (2023).