Insights from AI-Driven Architectural Design Competition

Challenging conventional paradigms

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The rapid advancements in artificial intelligence (AI) are fundamentally transforming the design landscape, prompting a critical reflection: how might architectural design competitions adapt to leverage AI's potential as a collaborative design assistant, challenging conventional paradigms and fostering broader awareness of technological advancements within the architectural profession? Addressing this inquiry, a pioneering competition was organized by a Non-Governmental Organization (NGO) to explore new trajectories in integrating AI into architectural design practices. The competition engaged participants in proposing innovative architectural interventions for a historically and industrially significant urban site. Its central aim was to encourage the development of AI-assisted workflows tailored to each participant's unique design methodologies, reframing architectural design as an iterative process of thinking, seeing, and making, rather than a static outcome. This paper examines the competition's methodology, detailing stages such as the preparation of specifications that emphasized AI workflow customization, and the evaluation framework of the jury, which prioritized originality, contextual relevance, and the depth of AI integration. Particular attention is given to how participants utilized AI to document and enhance their creative processes, fostering dynamic and personalized approaches to design. The findings underscore the potential of AI to redefine architectural workflows, offering insights into how computational tools can augment design thinking and practice. By reframing the role of AI in architectural design competitions, this study proposes a transformative model for integrating emerging technologies into the profession, emphasizing the importance of process-driven innovation to inspire broader engagement and understanding within the architectural community.

Keywords: *Artificial Intelligence, Architectural Design Competitions, AI-Assisted Workflows, Computational Tools, Professional Organizations (NGOs), Architectural Innovation*

INTRODUCTION

The growing presence of artificial intelligence (AI) in architectural design has sparked significant discussions about its role, potential, and implications for the profession (Leach, 2021). While AI has begun to reshape creative workflows, decision-making mechanisms, and generative design methodologies, its adoption across different professional spheres remains uneven capacity (Salem et al., 2024). Particularly, architects outside academic or research-driven creative environments often engage with AI tools in a limited, lacking direct experience of incorporating these technologies into their design workflows.

To explore AI's potential within architectural design practice, a pioneering competition was organized, providing a structured platform for architects to experiment with AI tools in their design processes. Initiated by Izmir Chamber of Architects that supports architectural practice, the competition aimed to facilitate hands-on engagement with AI, encouraging participants to critically integrate it into their workflows rather than merely viewing it as an external technological force (URL-1,2024). Beyond representing architects in professional matters, the organization actively promotes continuous learning and technological adaptation within the field, positioning competitions as a means to foster experimental approaches to emerging tools. By structuring the competition as an opportunity for direct engagement, the initiative sought to bridge the gap between technological advancements and professional practice, allowing architects to gain insights into AI's affordances and limitations through firsthand experience.

Rather than perceiving AI as a distant, abstract force—often portrayed in speculative fiction as either a utopian enabler or an existential threat—this initiative framed AI as a tangible, interactive tool within design processes. The competition encouraged participants to move beyond a passive engagement with AI and instead integrate it as an active collaborator within architectural thinking, seeing, and moving (Schön and Wiggins, 1992).

Unlike many other creative disciplines, architecture extends beyond the generation of visual outputs; it necessitates a comprehensive synthesis of spatial, environmental, socio-economic, and contextual considerations (Feria and Amado, 2019). Architectural design is not merely about producing aesthetically compelling images but about constructing a process that accounts for the intricate layers of urban dynamics, climate responsiveness, and socio-spatial interactions. While AI's ability to generate near-instantaneous visual outputs challenges traditional modes of production, architecture presents a distinct set of complexities that resist such immediate automation (Enjellina et al., 2023). Rather than reducing the design process to a prompt-based, one-click mechanism, architects must engage AI critically, leveraging its capabilities while maintaining an iterative, problem-solving approach that acknowledges the discipline's inherently ill-defined nature.

By reflecting on this recently held competition, this study examines its organization, execution, and evaluation, drawing on the authors' direct involvement in shaping its framework, engaging participants, and assessing outcomes. Through this lens, it explores how AI can be integrated into architectural workflows and reinterprets the role of competitions as experimental platforms for emerging technologies.

The following sections systematically deliver this process, first outlining the conceptual and methodological foundations of the competition, including the formulation of objectives, the development of guidelines, and the introduction of AI methodologies to participants. This is followed by a discussion of the competition's outcomes, analyzing how AI was incorporated into design workflows, the diverse strategies employed by participants, and the broader implications for architectural practice. The paper concludes by positioning AI-driven competitions as critical spaces for testing new design methodologies, discussing their potential to challenge conventional authorship, and highlighting the need for a reflective approach to AI integration in architecture.

AI-Aided design challenges

Through the recent explosion of research in AI-aided design domain, architects are gaining a new awareness of data-driven design. This aligns with earlier speculations on how AI apprentices may begin to claim architectural expertise once reserved for human designers (Başarır, 2020). While computational design methods have been integrated into competitions for decades, often through parametric modeling, generative algorithms, or performance-based optimization, the exploration of AI as an active design partner within competition settings remains relatively nascent. Despite this limited research base, there have been notable precedents where computational models—if not explicitly AI-driven—have influenced competition entries.

More recently, AI-specific competitions have emerged, albeit with a predominant focus on image-based outputs rather than workflow-driven design strategies. PA Academy's AI Creative Challenges exemplify this trend by offering a global platform to explore how text-to-image generative models such as MidJourney and Stable Diffusion, can be leveraged for architectural concept development (Mesk, 2024). The AI Creative Challenge 4.0, for instance, tasks participants with producing a series of AI-generated images that convey an architectural vision. Participants are asked to share their designs by submitting three images in the required format: a bird's-eye or drone view, which presents the design's context and overall spatial organization, and two perspective images, which illustrate the human-scale experience and design interventions. Additionally, each project is accompanied by a short description (up to 100 words), summarizing the conceptual framework and motivation behind the design. Another example is Non Architecture's AI-Generated Column Competition, which challenges participants to reimagine one of architecture's most fundamental elements—the column—entirely through AI-generated processes (Non Architecture, 2023). Unlike traditional design competitions, this initiative eliminates human intervention entirely, restricted participants to generate forms solely through AI, particularly leveraging Generative Adversarial Networks (GANs).

While these competitions emphasize the role of human prompting and curatorial decision-making, they remain largely constrained to the perceptive and representational aspects of design rather than exploring AI's potential in structuring architectural workflows. Besides, those approaches might provoke critical discussions on architectural authorship, it remains focused on formal exploration rather than process innovation, further reinforcing the current tendency of AI-driven competitions to prioritize end-products over design methodologies.

ANATOMY OF THE AI-AIDED ARCHITECTURAL COMPETITION

This section outlines the key phases of the competition, detailing its conceptual foundation, the structuring of its guidelines, the jury evaluation criteria and the educational components that supported participants in adopting AI-driven design strategies.

Conceptual background of the competition

Recent AI-focused panels, discussions, and events organized by the Izmir Chamber of Architects revealed a growing curiosity among practicing architects regarding AI's potential in design processes (Başarır, 2024). However, despite this interest, AI remained largely unexplored in professional workflows due to limited direct experience and insufficient time to engage with emerging tools. As a result, architects exhibited a general unfamiliarity with AI applications, often perceiving these technologies as opaque and unpredictable systems rather than as active design collaborators.

Discussions during these events also revealed widespread concerns regarding AI's role in architectural practice. Some participants expressed apprehension that AI-driven tools could lead to a fundamental restructuring of the profession, with automation potentially replacing human designers. Others advocated for regulations or restrictions on AI's integration into design workflows, citing risks related to over-reliance on automated decision-making. While such concerns are valid within a broader discourse on AI's societal and professional implications, the prevailing skepticism appeared to stem largely from a lack of direct engagement and understanding of AI's potential applications.

Given AI's increasing influence on design methodologies, addressing this knowledge gap became essential to ensuring architects remain actively engaged with emerging technologies. AI, like any computational tool, does not inherently dictate design but rather introduces new modes of interaction that can either complement or challenge existing workflows. Recognizing this, the NGO initiated the competition as a structured platform for architects to experiment with AI tools, allowing participants to move beyond speculative discourse and actively test AI's role within their design processes.

Unlike existing AI-aided competitions, which predominantly focus on final visual outputs, this competition was structured around process-driven experimentation. The primary objective was not merely to generate AI-assisted architectural forms but to encourage participants to design their own AI-integrated workflows—leveraging AI at various stages, including conceptual development, spatial analysis, and representational strategies. As discussed in the previous section, this transition from AI as an image-generation tool to AI as an iterative design collaborator was central to the competition's methodology.

Defining the methodological framework: Competition brief

The AI-aided architectural design competition was structured to move beyond conventional AI-assisted design challenges, where AI is often treated solely as a form-generation tool. Instead, the competition aimed to explore AI's role in shaping the entire design workflow, positioning it as an integrated collaborator rather than a passive rendering engine. The competition brief was carefully designed to ensure that AI was strategically embedded into multiple phases of architectural design, encouraging participants to critically engage with AI tools rather than merely using them for visual representation.

The competition was framed around World Architecture Day 2024's theme, "Empowering the Next Generation in Participatory Urban Design" emphasizing the need for sustainable and forward-thinking urban strategies (International Union of Architects, 2024). The chosen site, İzmir/Alsancak harbor district, represents a historically and industrially significant waterfront area. The Silos and Dock Area stand as key architectural remnants of İzmir's maritime trade heritage, reflecting the evolving relationship between industrial infrastructure and contemporary urban life.

As harbor area continues to undergo rapid urban transformation, the site presented a critical design challenge: How can its industrial and historical fabric be reinterpreted using AI-assisted methodologies while addressing future urban needs?

The competition allowed participants to formulate their architectural programs in response to the site's existing conditions and future potential. While open-ended, proposals were expected to engage with themes such as adaptive reuse of industrial structures, AI-assisted material and structural analysis, and public and cultural space development. The integration of AI in these processes was not limited to visualization but extended to data-informed decision-making, environmental analysis, and performance-based design methodologies, emphasizing AI's potential as a computational design partner.

To ensure transparency in AI utilization, competition brief (URL-2,2024) asked participants to submit a set of documents, which included:

- **Project Report**: A textual explanation detailing how AI was used at different stages of the design process, including the rationale behind AI choices and its impact on design decisions.
- **Analysis Board(s)**: Graphical representations analyzing the urban, historical, and environmental conditions of the competition site, illustrating how AI-assisted analytical tools contributed to contextual understanding.
- **Concept Board(s)**: A visual synthesis of the design concept, demonstrating how AI-supported ideation, materiality exploration, or spatial strategies were integrated.
- **Workflow Diagram**: A flowchart-based representation mapping the AI integration process. Participants were encouraged to incorporate traditional architectural methodologies—such as hand sketching, physical and digital modeling, and parametric design workflows—to generate original design inputs while engaging AI tools.The competition brief also encouraged participants to explore other computational methodologies such as algorithmic modeling, generative parametric strategies, and performance-driven optimization techniques, further expanding AI's role within hybrid workflows. (Figure 1) A flowchart-based template was workflows including:

- **Specific AI tools used** (e.g., generative models, performance simulation software, image-to-geometry pipelines).
- **Prompt Engineering Strategies** (illustrating iterations and refinements).
- **Data Integration Methods** (highlighting any site-specific datasets used in AI processes).

- **Final Design Solution** – A visual representation of the proposed architectural intervention.

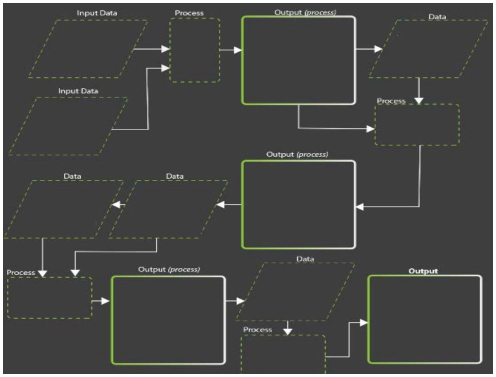

Figure 1
Adjustable template of workflow given to the participants.

Jury evaluation criteria and scoring framework

To evaluate submissions, a jury comprising architects, AI researchers, and urban designers assessed entries based on both methodological transparency and design innovation, using the following criteria (URL-3,2024):

Relevance to the competition theme (1-10 points). Evaluates how well the project aligns with the architectural theme and objectives outlined in the competition brief.

Conceptual approach (1-15 points). Assessed based on the clarity and depth of the design process, considering site analysis and contextual integration, effectiveness in visually conveying the design concept.

AI utilization and integration strategies (1-30 points). Evaluates how AI tools were incorporated into the workflow; including:

A. Prompt Optimization (1-6 points) – Precision and effectiveness of AI-generated outputs.
B. Multi-Modal AI Use (1-6 points) – Efficiency in combining different AI tools for a single objective.
C. Model Originality (1-6 points) – Customization and adaptation of AI-generated content rather than reliance on generic outputs.
D. Process Optimization (1-6 points) – Iterative refinement and intelligent use of AI for enhancing design outcomes.
E. Dataset Utilization (1-6 points) – Integration of site-specific, environmental, or user-driven data into AI workflows.

Relationship with the surrounding urban context (1-15 points). Assesses whether the design proposal demonstrates environmental sensitivity and offers sustainable solutions.

Creativity and Innovation (1-20 points). Evaluates how original and inventive the design approach is, measured through:

- Process (1-10 points) – Uniqueness of AI-assisted workflows.
- Final Design (1-10 points) – Innovation and architectural expression in the final outcome.

Presentation and Clarity (1-10 points). Assesses the coherence, legibility, and overall quality of the submission, including the clarity of visuals, diagrams, and explanatory texts.

Figure 2
The workshop session 1 held by the NGO.

Reinforcing AI literacy: Workshops

To increase participation in the competition and provide architects with practical experience in AI-assisted design, a series of workshops were organized by the NGO in collaboration with an AI-driven research lab. These sessions were designed to introduce participants to multi-modal AI tools and their applications at various stages of the architectural design process.

The first workshop, "Design Production with Diffusion Coding from Scratch," which was attended by 28 participants, focused on providing a foundational understanding of neural networks and diffusion models.

Participants engaged in hands-on exercises, including dataset creation, algorithm development, and inpainting techniques applied to underutilized urban spaces. (Figure 2) However, initial observations revealed that starting the process with coding proved challenging, highlighting the need for a more accessible approach to AI integration, as most participants lacked prior coding experience.

In response, a follow-up online training session was conducted, shifting the focus to pre-trained multi-modal AI models, allowing participants to explore AI's role in architectural workflows more intuitively. Owing to its online format and more accessible content, participation increased from 28 to 40 attendees in this second session. The workshop was structured around a case study modeled after an architectural competition setting, demonstrating how AI-assisted workflows could be developed using flowchart-based design strategies commonly employed in professional practice.

While most workshop participants were generally familiar with GPT-based tools, none had previously integrated such tools into their architectural design processes. Throughout the session, participants engaged with various AI tools across different design stages. text-to image diffusion model interfaces such as Midjourney was utilized for concept generation, while Leonardo AI facilitated ideation medium with its real time text and image prompting interface. Analytical tools such as AINO supported evidence based urban design decisions, and LookX, with its SketchUp and Rhino integration, enabled real-time visualization and refinement for rendering. Prome AI introduced erase-and-replace (inpainting), region rendering, and outpainting techniques, demonstrating AI's role particularly in architectural design domain in adaptive design modifications. Additional tools, including Viscom AI, was employed for layer-based explorations, further expanding participants' understanding of AI-driven workflows. A key outcome of the workshops was that participants not only became familiar with AI tools but also gained firsthand experience in determining where and how to integrate AI into their own design workflows. By engaging with multiple AI-driven tools, architects had the opportunity to experiment with different stages of AI adoption, identifying the most effective ways to align these technologies with their existing design methodologies. This direct engagement with AI tools significantly increased competition participation, as initial skepticism and uncertainty were replaced with confidence in AI as a complementary design resource rather than a disruptive force. While only three participants had registered prior to the workshop phase, the total number of entries rose to nineteen following the sessions, indicating a tangible shift in engagement prompted by the hands-on experience.

Assessing AI-DrIven desIgn workflows: Participant intents and jury insights

The evaluation of competition entries through a structured categorization highlights the varying degrees of AI integration, multimodal engagement, and analytical depth across different submissions. The projects demonstrated a spectrum of AI adoption, ranging from highly structured workflows leveraging multiple AI models to more constrained approaches with limited data integration. Table 1 displays the AI-integration strategies of awarded projects according to defined scoring framework of the jury report (URL-3,2024).

Table 1
AI utilization and integration strategies of the award winning projects.
(A: Prompt Optimization;
B: Multi-Modal AI Use;
C: Model Originality;
D: Process Optimization;
E: Dataset Utilization)

	1st Place	2nd Place	3rd Place	Jury Special Award
A	**Strong** (*LLM + historical data integration, but some missing analyses*)	**Moderate** (*Text and image-based, but low readability*)	**Basic** (*Inpainting method used, lacks detailed AI refinement*)	**Effective** (*Alternative design generation, but weak analysis integration*)
B	**High** (*Video, text, historical data integration*)	**Medium** (*Images and text used, but limited multimodal depth*)	**Low** (*Only inpainting, lacks multimodal analysis*)	**High** (*Well-applied multimodal analysis, but limited impact on the final design*)
C	**High** (*Custom AI models + research-based integration*)	**Moderate** (*Functional AI models but not unique*)	**Low** (*AI used mainly for modification, no generative modeling*)	**High** (*Creative AI applications, but lacks contextual consistency*)
D	**Strong** (*Well-documented methodology, but some missing analysis steps*)	**Strong** (*Consistent and structured workflow*)	**Weak** (*Incomplete workflow, poor documentation*)	**Moderate** (*AI-focused process, but limited impact on final product*)
E	**Strong** (*Historical data, academic research, and energy-based analysis integrated into AI*)	**Moderate** (*Good site data usage, but lacks deep analysis*)	**Minimal** (*Relies mainly on visual modifications rather than analytical data*)	**Moderate** (*Uses various data sources, but weak sustainability and contextual connections*)

The competition's jury evaluation data provides valuable insights into how participants engaged with AI in their design processes. By analyzing key assessment criteria—including AI integration, conceptual depth, creativity, contextual relevance, and presentation clarity—it is possible to identify patterns in AI-aided design strategies and their effectiveness. The results reveal that while AI integration played a significant role in evaluation, it was not the sole determinant of success, as other qualitative aspects such as contextual adaptation and conceptual innovation also influenced final rankings.

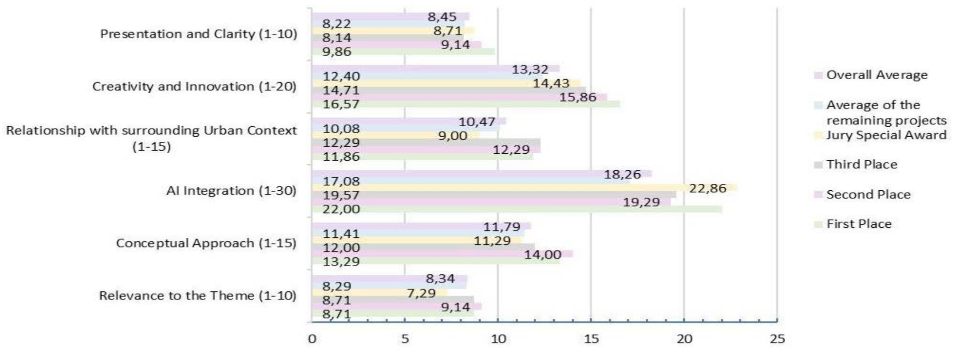

Figure 3
Bar graph representing the performance of the competition entries under the jury evaluation criteria.

AI integration: A high-impact but non-decisive factor

The highest AI integration score (22.86/30) was achieved by the Jury Special Award recipient, rather than the first-place entry (22.00/30). This suggests that while AI engagement was a crucial evaluation criterion, it did not singularly dictate the competition's outcome. The second-place (19.29/30) and third-place (19.57/30) entries also demonstrated strong AI integration, reinforcing the idea that AI was widely used across top submissions, but the way it was incorporated into workflows varied significantly.

Projects that scored highest in AI integration tended to exhibit:

- Multi-modal AI engagement, where tools such as language models, image-based generation, and analytical AI models were combined for more comprehensive design methodologies.
- Iterative design refinement, demonstrating how AI tools contributed beyond mere visualization and were actively integrated into conceptualization, spatial organization, and material exploration.
- Strategic use of AI across multiple phases, ensuring that AI was not just an aesthetic enhancer but a tool for deeper design inquiry and site adaptation.

However, despite excelling in AI integration, these projects did not necessarily achieve the highest rankings in other key evaluation areas, such as conceptual approach or urban contextual relevance, indicating that AI alone was insufficient to define design success.

Creativity, conceptual depth, and the designer-AI dialogue

While AI-powered workflows introduced novel design methodologies, jury evaluations suggest that the most successful projects were those that balanced AI-generated content with strong conceptual and contextual grounding.

- The first-place project (13.29/15 in conceptual approach and 16.57/20 in creativity) demonstrated a clear synergy between AI-driven exploration and human design agency, using AI-generated insights as inputs rather than final solutions.
- The second-place entry (14.00/15 in conceptual approach and 15.86/20 in creativity) slightly outperformed the first-place project in these areas, indicating a strong conceptual foundation alongside AI integration.
- Lower-scoring projects often exhibited over-reliance on AI outputs without substantial manual refinement or design interpretation, which resulted in lower scores in conceptual strength.

This indicates that while AI enhanced creativity, human curation, selection, and interpretation remained key in distinguishing conceptually strong projects from those that were merely AI-generated.

One of the most critical takeaways from the evaluation data is the comparatively lower performance of projects in the "Relationship with the Surrounding Urban Context" criterion.

- The first-place project scored 11.86/15, demonstrating a moderate engagement with site-specific considerations.
- The second and third-place projects (both scoring 12.29/15) marginally outperformed the winner in this category.
- The Jury Special Award entry (9.00/15)—despite achieving the highest AI integration—scored the lowest in urban contextual relevance, suggesting a possible trade-off between AI complexity and contextual sensitivity.

This finding aligns with broader concerns about AI's limitations in context-aware design thinking. While AI models excel at generative exploration, they struggle to interpret site constraints, socio-economic factors, or environmental nuances without deliberate human input. The evaluation data suggests that AI tools were more successfully used for form-generation rather than site-specific adaptation, highlighting an area for further development in AI-assisted architectural workflows.

CONCLUSION

The integration of artificial intelligence (AI) into architectural design competitions invites a critical reassessment of design processes, authorship, and professional agency. This study presented a competition model that foregrounded process-driven engagement with AI, moving beyond the common emphasis on final visual outputs. Participants were encouraged to construct AI-assisted workflows tailored to their own methodologies, integrating tools at various design stages—from conceptual development to performance analysis. The workshops played a key role in lowering the threshold for participation, especially among those previously unfamiliar with AI in architectural contexts. Rather than presenting a statistically framed study, this paper reflects on the organization and outcomes of the competition as an observational lens into how architects currently experiment with computational tools.

The evaluation of submissions revealed a wide spectrum of AI integration strategies. While some participants employed multi-modal approaches using large language models, generative tools, and analytical simulations, others relied more narrowly on image generation. Jury assessments showed that AI complexity alone did not lead to higher scores; instead, success was more strongly associated with conceptual clarity, contextual sensitivity, and transparent articulation of process. These findings reaffirm the importance of positioning AI not as a one-click generator, but as a collaborative partner embedded within the iterative dynamics of design. As such, AI-aided competitions hold significant potential as experimental grounds for advancing methodological innovation, fostering AI literacy, and cultivating a more critical, reflective integration of emerging technologies into architectural education and practice.

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