

# "Choreographing Intelligence: A Pedagogical Model on Successful AI-Driven Workflows"

Dr. Shermeen Yousif

Director: Performative AI Lab

School of Architecture | University of Texas, Arlington

Director: Deep-Eco Design Studio

[shermeen.yousif@uta.edu](mailto:shermeen.yousif@uta.edu) | [shermeenyousif.com](http://shermeenyousif.com)

Presentation for the CRTLE AI Course Redesign Institute at UTA  
10.31.2025

## Self-Introduction

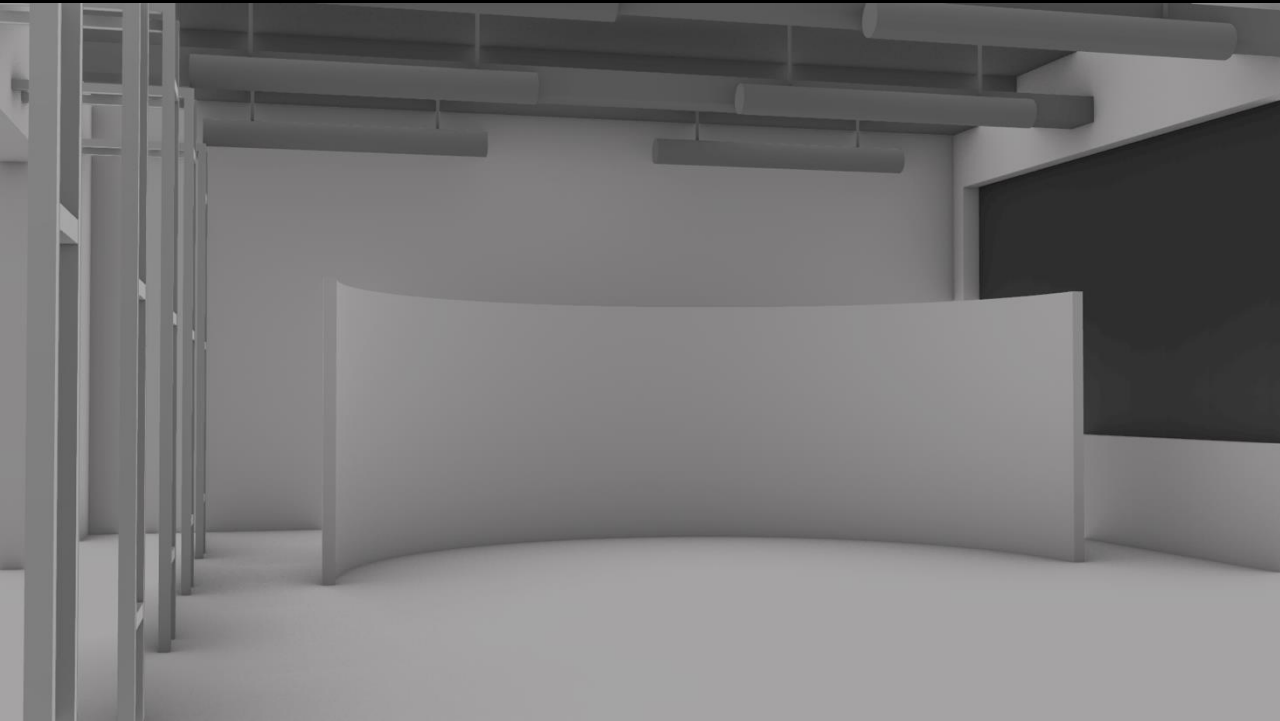


Dr. Shermeen Yousif  
School of Architecture | University of Texas, Arlington  
Director: *Performative AI Lab*  
Director and Founder of *Deep-Ecology Design Studio*

PhD. in Architecture, Texas A&M University  
M.Arch. Dessau Institute of Architecture, at the Bauhaus  
B.Sc. in Architectural Engineering, University of Baghdad



# Performative AI Research Lab at the School of Architecture, CAPPA, University of Texas, Arlington



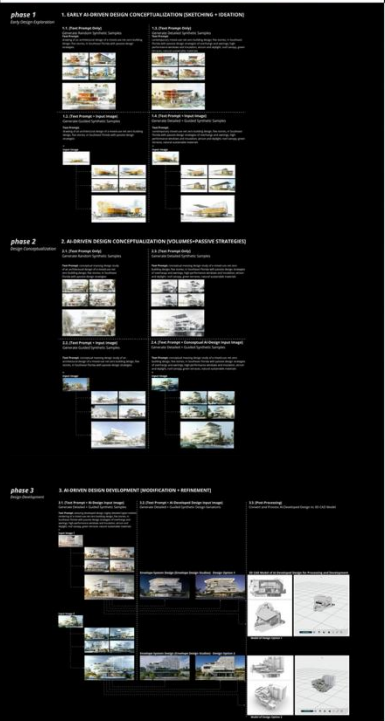
PROFESSIONAL WORK | SELECTED PROJECTS (2019-2025)

AIA FLORIDA AWARD 2025 | Deep Ecological Design: A Method Framework for Leveraging AI to Learn Ecological Design Principles



**AIA Florida**  
**2025 AIA Theoretical Research Award Winner**  
**Dr. Shermeen Yousif**, Assoc. AIA  
Assistant Professor and Director of Environmental Design & Natural Materials Lab, FAU  
Currently: Associate Professor and Director of Performative AI Lab, University of Texas  
Research Project: **Deep Ecological Design: A Method Framework for Leveraging AI to Learn Ecological Design Principles**

**Project Overview:** This project critically explores the intersection of generative artificial intelligence (AI) and ecologically resilient architectural design, positioning AI as a tool for decoding and advancing ecological principles in architecture. Through theoretical analysis and applied computational strategies, it examines epistemological and algorithmic biases in AI, particularly diffusion models, challenging dominant paradigms that replicate certain representational modes. The work advocates for integrating passive design strategies—often ignored from AI training—to redefine architectural innovation and expand computational design's epistemic foundations. By focusing on passive environmental strategies embedded in traditional architectures, the study highlights AI's potential beyond formal representation, exploring novel, sustainable design solutions. Leveraging ecological design strategies and concept-specific queries into AI models, the work reimagines AI as a transformative force in addressing challenges of climate change and resource scarcity, ultimately reshaping computational design to support an ecologically responsive architectural future. The methodological framework follows a systematically connected workflow: leveraging AI—particularly diffusion models like Midjourney AI—across multiple design tasks and phases. The process begins with (1) analysis and representation, progresses to (2) early design exploration and ideation, advances to (3) design conceptualization and refining models, and culminates in (4) design development and refinement, including the translation of AI-generated outputs into 3D CAD models. While the workflow could extend to detailed design documentation, this aspect falls beyond the scope of this work.





PROFESSIONAL WORK | SELECTED PROJECTS (2019-2025)

AIA FLORIDA AWARD 2024 | Towards Greening Housing Projects in Florida: A Case Study of Integrating Daylight Design, Vernacular Principles and Energy Efficiency in Designing a Net Zero Apartment Building in Fort Lauderdale



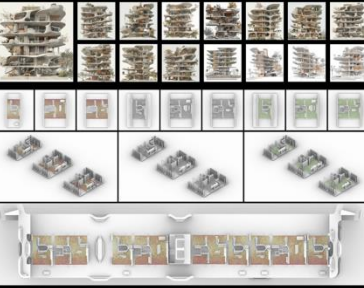
2024 AIA Merit Theoretical and Research Award Winner

Dr. Shermeen Yousif, Assoc. AIA, Assistant Professor, Florida Atlantic University

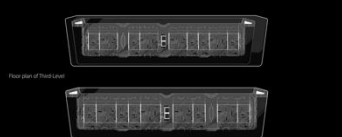
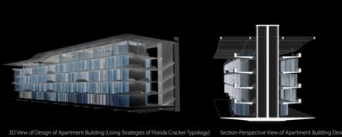
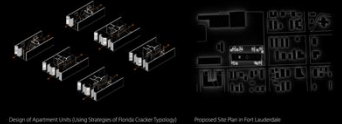
Director: Environmental Design and Natural Materials Lab,

Assisting Students: Adam LeBlanc and Xena Rodriguez

Research Project: "Towards Greening Housing Projects in Florida: A Case Study of Integrating Daylight Design, Vernacular Principles and Energy Efficiency in Designing a Net Zero Apartment Building in Fort Lauderdale"



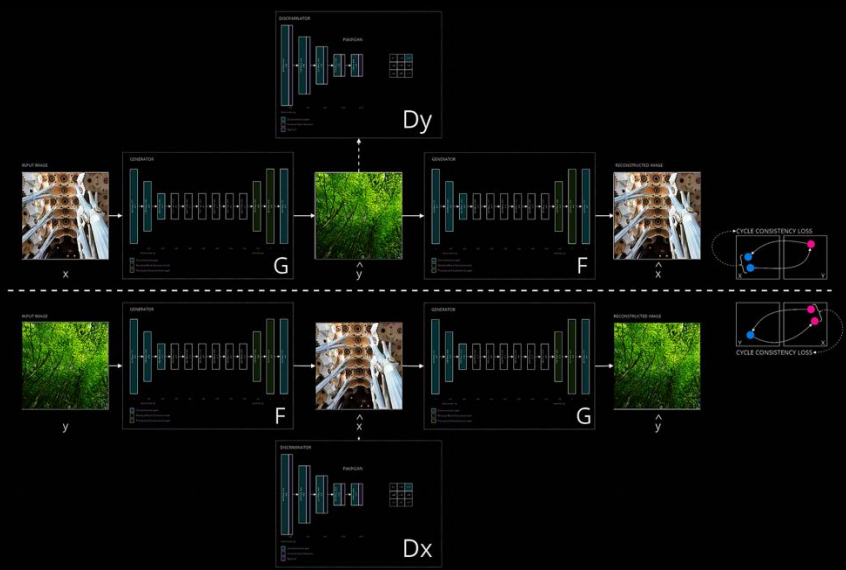
**Project Overview:**  
"In an era of high-tech and climate extremes, we are drowning in information while starving for wisdom" (Nelson, 2016). Architecture has often been associated with advanced, high-tech solutions that increase the carbon footprint and deplete natural resources. Meanwhile, there has been a growing research interest in reexamining "low-tech" solutions found in indigenous design and vernacular architecture strategies. Recently, this research project endeavored to delve deeper into the intricacies of Florida's vernacular architecture and its array of passive design strategies, with the ultimate objective of applying this nuanced understanding within a comprehensive design case study. Importantly, the research project approaches a design workflow of employing advanced technologies of machine learning, building performance simulation methods (including daylight analysis and thermal simulations) to drive the design process. Florida's vernacular architecture is distinguished by high ceilings and expansive windows, strategically designed to encourage the upward movement of heat, thereby fostering a natural ventilation system within the living environment. Complementing this, external features such as shaded porches and screened roof overhangs serve not only to shield occupants from the intense summer sun but also to provide enhanced opportunities for rethinking balconies to permeate the building's interior. Therefore, in this project, decisions pertaining to optimum building envelope behavior and spatial configuration were inspired by Florida vernacular architecture principles, to achieve sustainable and ecologically-conscious design grounded in precise environmental simulation data. This project contributes to the iterative rethinking of design processes, advocating for the integration of building environmental performance considerations during the early stages of design to guide decision-making. The project advances the discourse surrounding the attainment of climate-specific design objectives and Net-Zero housing project design in Florida, presenting yet another avenue for exploration into the articulation of architectural components and spatial configurations. Emphasizing the notion that "Daylight is a form giver" the project elucidates a design methodology whereby the attainment of exemplary daylight performance, characterized by well-lit spaces, and the realization of net-zero energy principles within an apartment building are proven to be attainable goals. The case study represents a theoretical architectural exploration focusing on the conceptualization of an apartment building complex within the climatic context of subtropical Fort Lauderdale, Florida. The project is aimed at sheltering from the heat, protecting from storms, and configuring the interior spatial layout with adequate daylight and energy efficiency (immersion cooling loads).



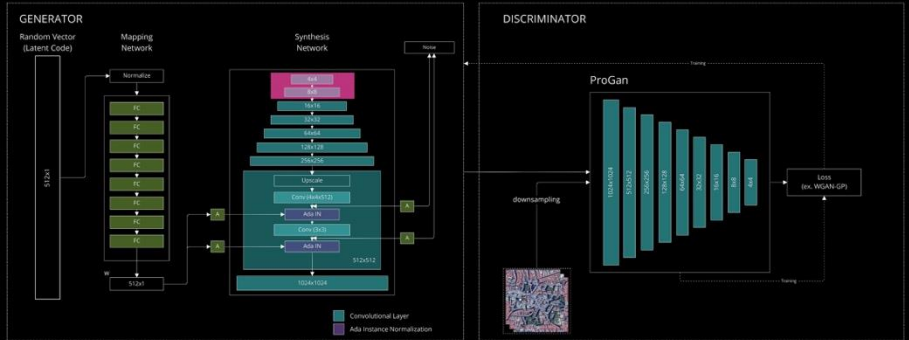
On Artificial Intelligence (AI) and Creativity: How can AI augment creativity in the design process?  
On AI and Agency: How to address and augment design agency?  
How to evaluate AI-Driven design systems?



CycleGAN



StyleGAN





CycleGAN Zhu et al., 2017

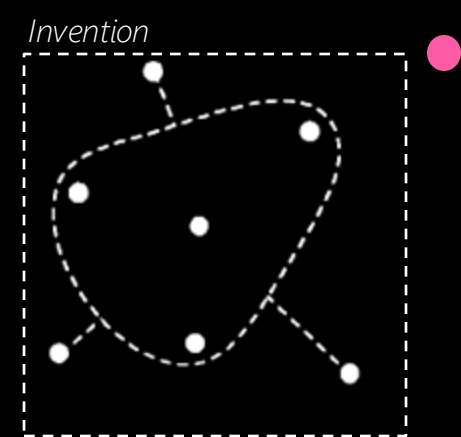
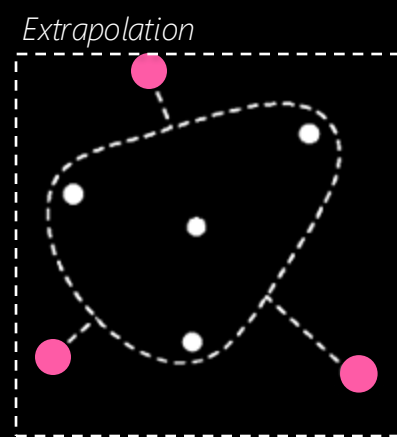
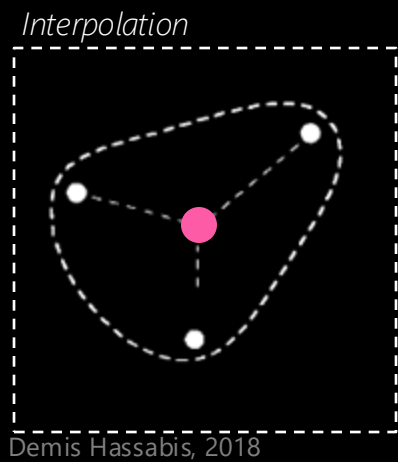


## AI + CREATIVITY | GENERATIVE ADVERSARIAL NETWORKS



StyleGAN 2 NVIDIA, 2019

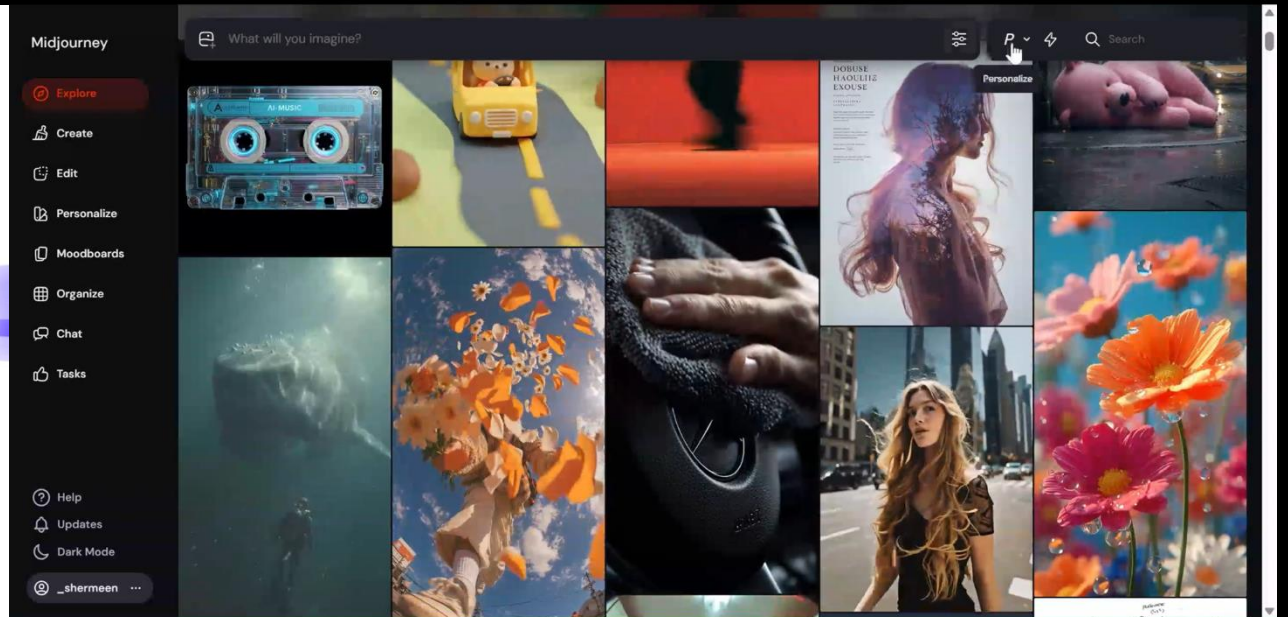
Presentation: Choreographing Intelligence: A Pedagogical Model on Successful AI-Driven Workflows  
Shermeen Yousif, Ph.D. | [shermeenyousif.com](http://shermeenyousif.com) | [deepecodesign-studio.com](http://deepecodesign-studio.com)







xFigura ai by George Guida and his team. 2025.

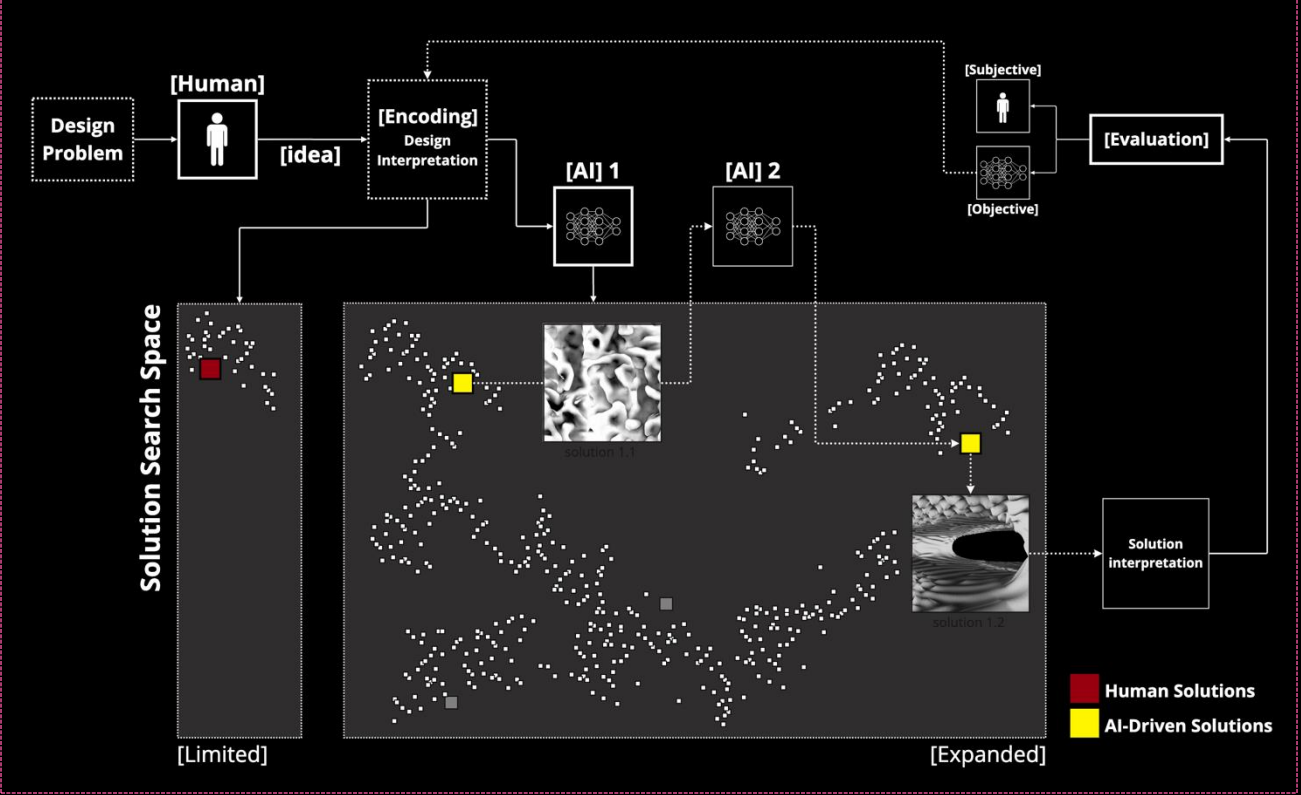
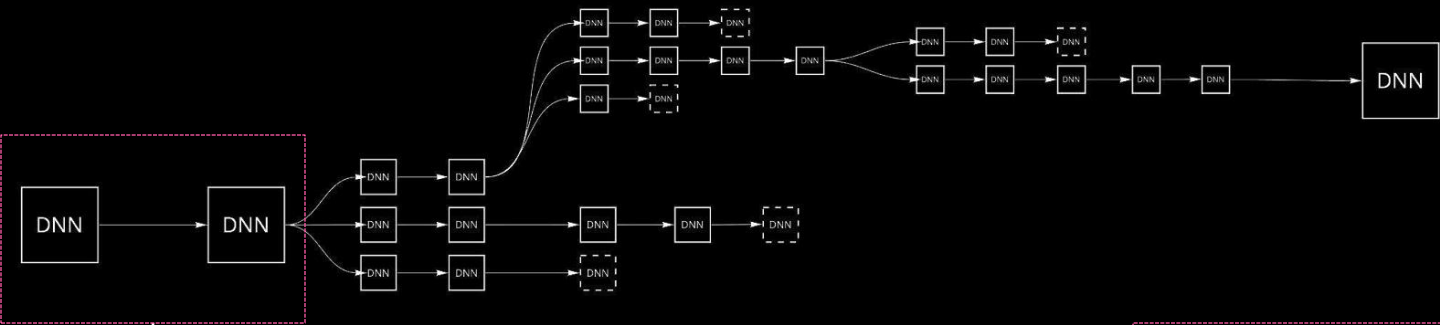


Midjourney ai. 2022.

On Artificial Intelligence (AI) and Creativity: How can AI augment creativity in the design process?  
>>How to develop a design workflow with multiple interconnected AI models?



AI + CREATIVITY | INTERCONNECTING AI MODELS IN DESIGN SYSTEMS



# AI + CREATIVITY | INTERCONNECTING AI MODELS IN DESIGN SYSTEMS

Research Project: CREATIVE AI  
Spring 2020 – Present  
Collaborators:  
Daniel Bolojan and Emmanouil Vermisso

## Awards

STUDENTS' DESIGN-RESEARCH AWARDS  
Editor's Choice award – Design Competition Award for supervising thesis project of: Cesarina Candelier and Tiffany Taylor, 2021  
New Den-cities, post pandemic township design competition by UNI XYZ

## Workshops

Co-leader. The ACADIA 2021 Workshop: " Latent Morphologies: Disentangling Design Spaces."  
ACADIA Conference 2021.  
ACADIA, REALIGNMENTS – TOWARDS CRITICAL COMPUTATION, 2021 (Online Conference)  
Period: 09.11-09.12.21

Co-leader. The International Workshop: "Creative AI Ecologies.", June 2021  
Inclusive Futures International Conference 2021.  
DigitalFUTURES InclusiveFUTURES, Tongji University, Shanghai, China  
Period: 06.26.21-07.02.21

Co-leader. The International Workshop: "Creative AI Ecologies-Augmenting Architectural Agency.", June 2020  
DigitalFUTURES WORLD: ARCHITECTS UNITE, Tongji University, Shanghai, China  
Workshop Title: Creative AI Ecologies-Augmenting Architectural Agency  
Period: 06.26.20-07.02.20

## Peer-Reviewed Articles

Bolojan, Daniel, Shermeen Yousif, and Emmanouil Vermisso. 2023. "Latent Design Spaces: Interconnected Deep Learning Models for Expanding the Architectural Search Space." In *Architecture and Design for Industry 4.0: Theory and Practice*, edited by Maurizio Barberio, Micaela Colella, Angelo Figliola and Alessandra Battisti. Springer. (Book chapter accepted).

Yousif, Shermeen, and Emmanouil Vermisso. 2022. "Towards AI-Assisted Design Workflows for an Expanded Design Space." POST-CARBON - Proceedings of the 27th CAADRIA Conference, Sydney, 9-15 April 2022.  
[http://papers.cumincad.org/cgi-bin/works/paper/caadria2022\\_503](http://papers.cumincad.org/cgi-bin/works/paper/caadria2022_503)

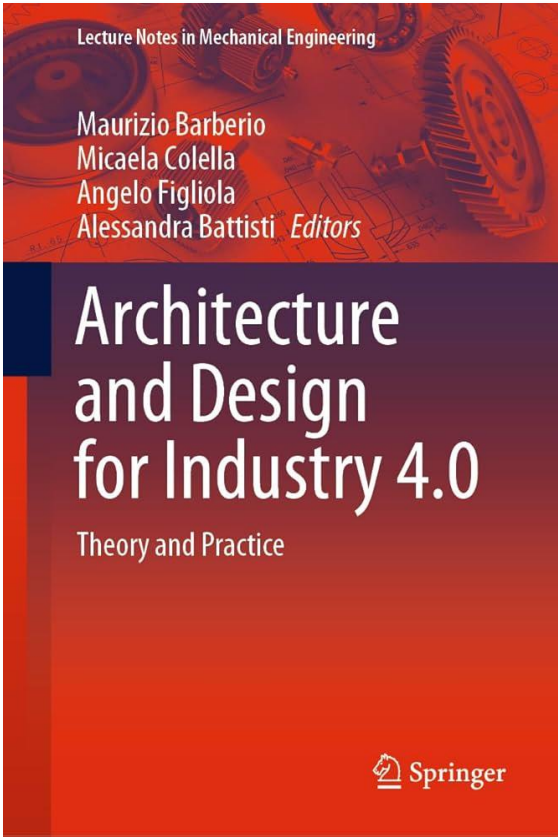
Bolojan, Daniel, Emmanouil Vermisso, and Shermeen Yousif. 2022. "Is Language All We Need? A Query Into Architectural Semantics Using a Multimodal Generative Workflow." POST-CARBON - Proceedings of the 27th CAADRIA Conference, Sydney, 9-15 April 2022.  
[http://papers.cumincad.org/cgi-bin/works/paper/caadria2022\\_507](http://papers.cumincad.org/cgi-bin/works/paper/caadria2022_507).

Yousif, Shermeen. 2022. "Using Language-Based and Generative Deep Learning Models for Encoding Design Intentions and Modifying Architectural Design." Proceedings of the ACSA 110th Annual Meeting EMPOWER, Los Angeles, CA  
<https://www.acsa-arch.org/conference/110th-annual-meeting/friday-schedule/#toggle-id-20>.

Yousif, Shermeen, and Daniel Bolojan. 2022. " Interconnectivity of Deep Learning Models in AI-Driven Design Systems." Design Computation Input / Output 2022, London, UK. <https://www.designcomputation.org/programme>.

Yousif, Shermeen, Yagmur Akuyz, and Luisa Giffoni. 2023. "Encoding Intentions into an Interconnected AI-Driven Design Framework." Human-Centric, the 28th International Conference of the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA), Navrangpura, Ahmedabad. (Paper accepted).

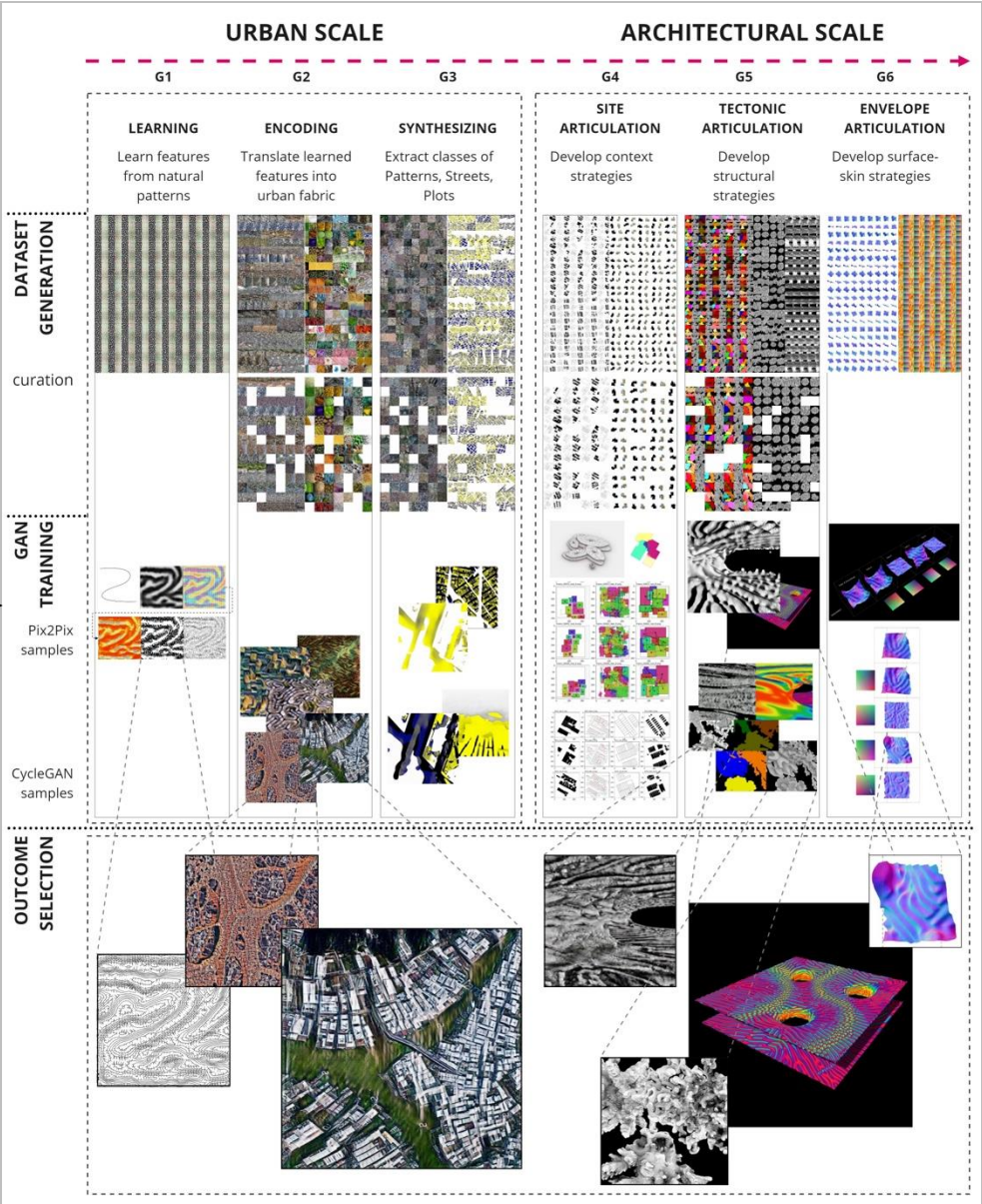
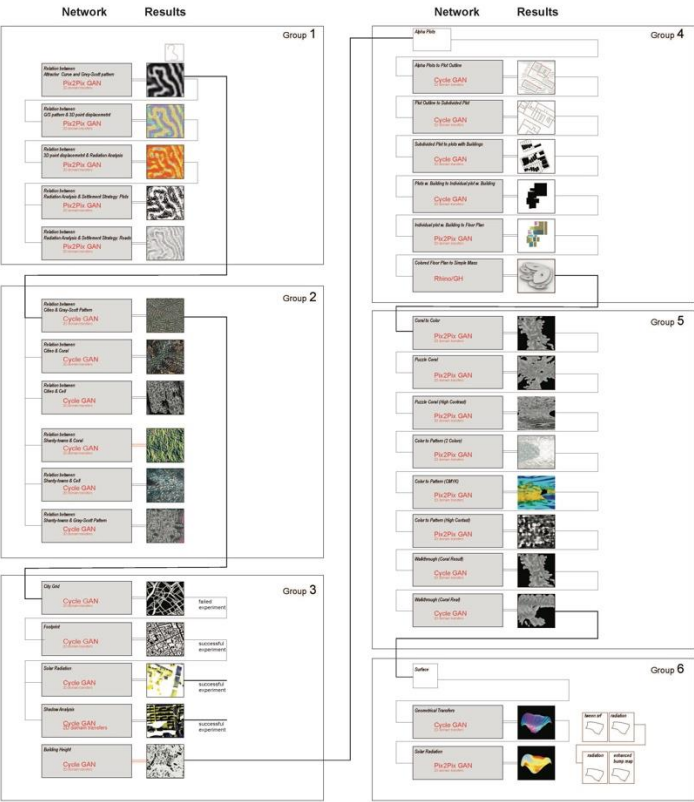
Bolojan, Daniel, Shermeen Yousif, and Emmanouil Vermisso. 2023. "Latent Design Spaces: Interconnected Deep Learning Models for Expanding the Architectural Search Space." In *Architecture and Design for Industry 4.0: Theory and Practice*, edited by Maurizio Barberio, Micaela Colella, Angelo Figliola and Alessandra Battisti. Springer.





AI + CREATIVITY | INTERCONNECTING AI MODELS IN DESIGN SYSTEMS

Co-leader. The ACADIA 2021 Workshop: " Latent Morphologies: Disentangling Design Spaces." ACADIA Conference 2021.



## 3D-Interpolation



CycleGAN

2D (AME) heat maps of the urban fabric for 3D interpolation by Blender - Greenfappel



Greenfappel - Blender

3D interpolation of the heat maps for 100 samples placed in stacked manner

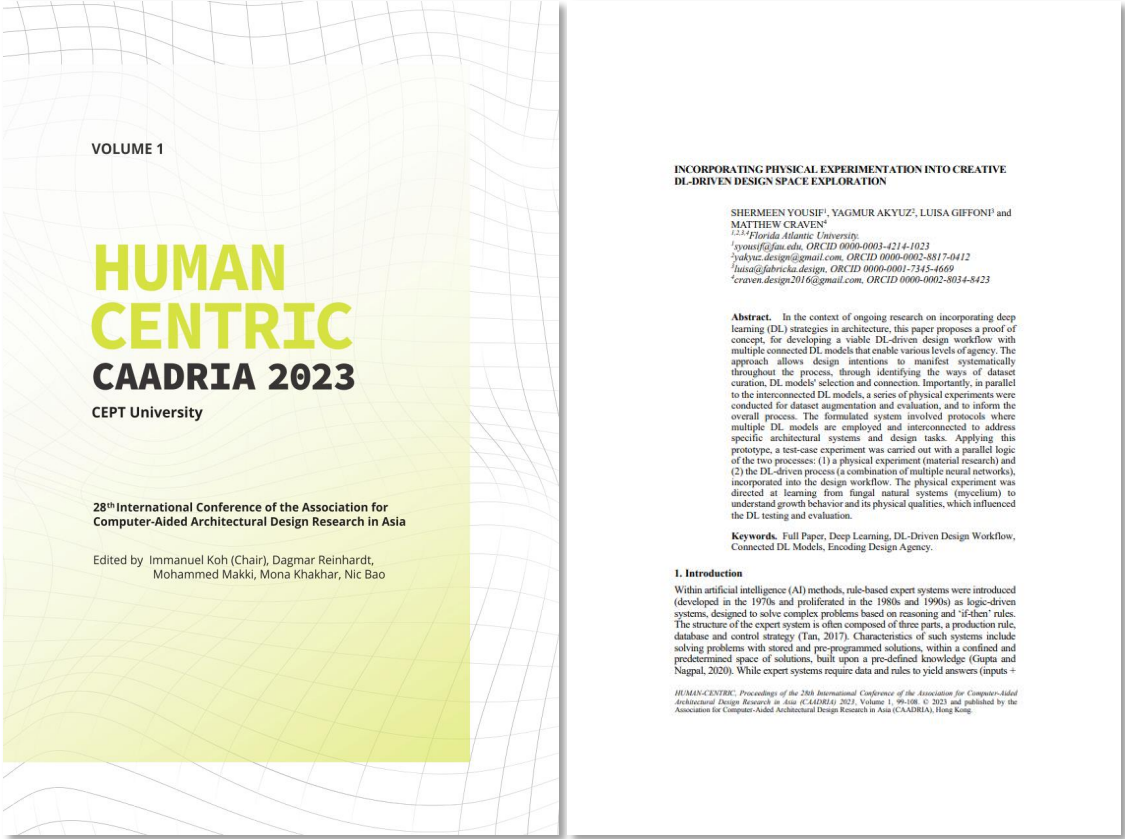
How to test and evaluate AI-driven systems in teaching?  
Implementing Interconnectivity of AI Models in Prototyping New Design Workflow Strategies



IS LANGUAGE ALL WE NEED? A QUERY INTO ARCHITECTURAL SEMANTICS USING A MULTIMODAL GENERATIVE WORKFLOW

Presentation for the CRTLE AI Course Redesign Institute at UTA | 10.31.2025

Yousif, Shermeen, Yagmur Akuyz, Luisa Giffoni, and Matthew Craven. 2023. "Incorporating Physical Experimentation into Creative DL-Driven Design Space Exploration." Human-Centric, Proceedings of the 28th International Conference of the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA), Navrangpura, Ahmedabad, 18-24 March 2023, 99–108. doi: <https://doi.org/10.52842/conf.caadria.2023.1.099>



TEACHING: TEST-CASE APPLICATION 1

# Incorporating Physical Experimentation into Creative AI-Driven Design Space Exploration

Parallel AI-Driven Workflow Strategy

Students:

Yagmur Akyuz

Luisa Giffoni

Matthew Craven

School of Architecture | Florida Atlantic University

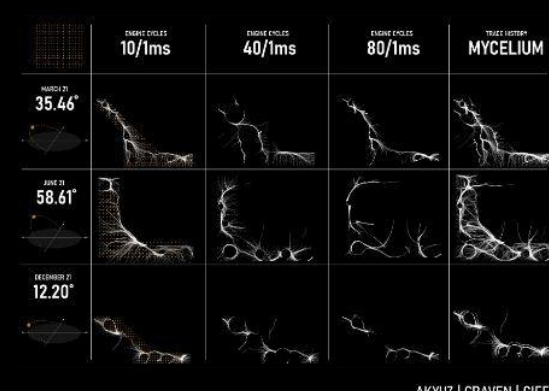
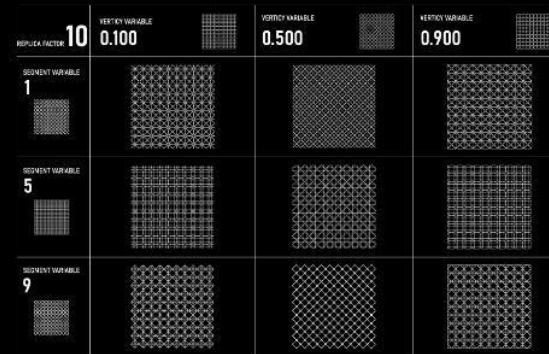
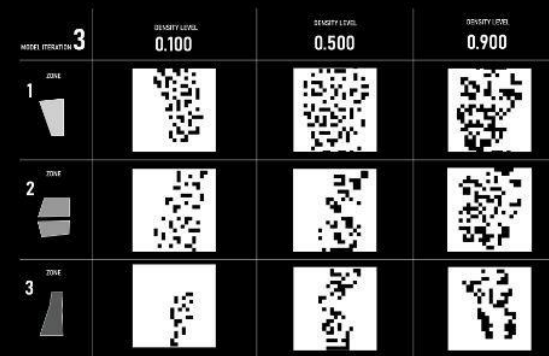
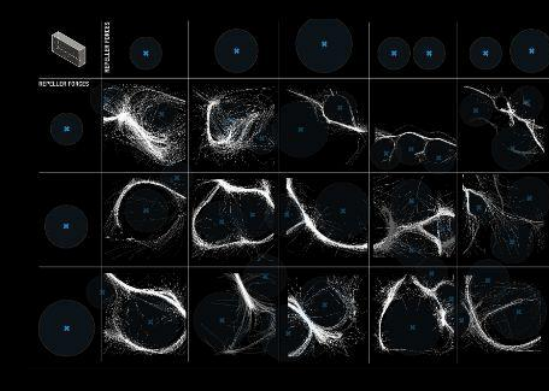
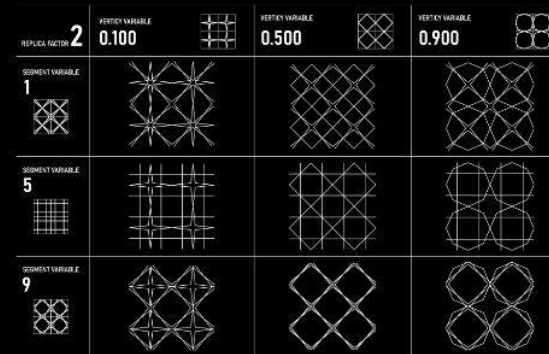
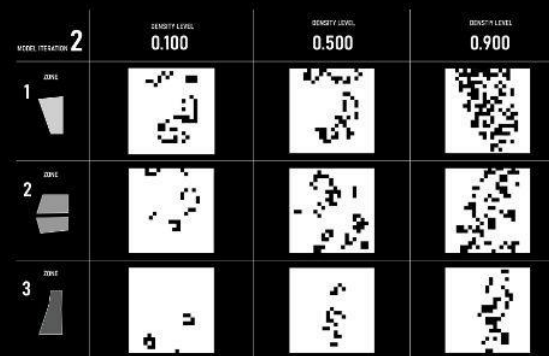
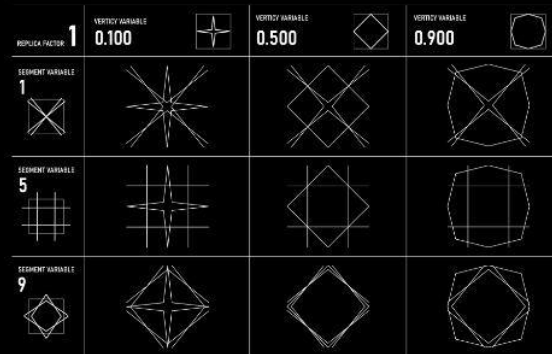
## Presentation for the CRTLE AI Course Redesign Institute at UTA | 10.31.2025

The diagram illustrates a generative model for urban form, structured as follows:

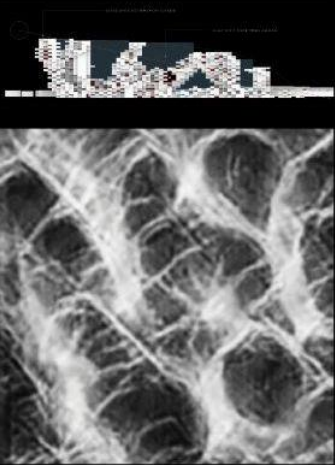
- REFERENCE**: MYCELIUM
- SYSTEM**: GRID MORPHOLOGY, CELLULAR AUTOMATA, STIGMERGY
- STYLEGAN TRAINING AUGMENTATION**: TRAIN + TEST
- CYCLEGAN TRAINING ENCODING MYCELIUM**: MOORISH PLANNAMTERIC, SITE-RELEVANT SPATIAL
- CYCLEGAN TRAINING**: ENCODING MYCELIUM: XY PLANE
- Bazaar**: PROGRAM ASSIGNMENT: COMMERCIAL
- GH: PUFFERFISHxCHROMODORIS**: CLUSTER DEVELOPMENT
- GH: WEAVERBIRD**: CLEAN-UP
- HABITAT CELL PROTOTYPE LIBRARY**: OVERALL DEVELOPMENT
- CA ITERATIONS**: STRATEGIC GROWTH
- SELF-ORGANIZED MAPPING**: DATA AUGMENTATION
- STYLEGAN-3D**: INTERPOLATION
- CA ITERATIONS**: VOXEL MASSING
- GH: COCOONxCHROMODORIS**: OVERALL DEVELOPMENT
- STIGMERGY PARAMETERS**: MYCELIUM GROTH APPROXIMATION



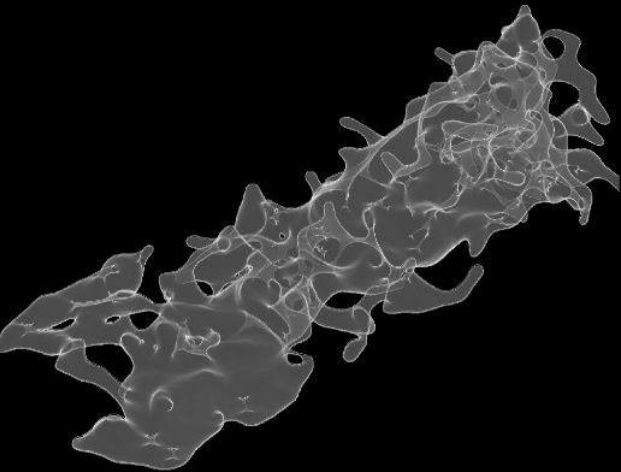
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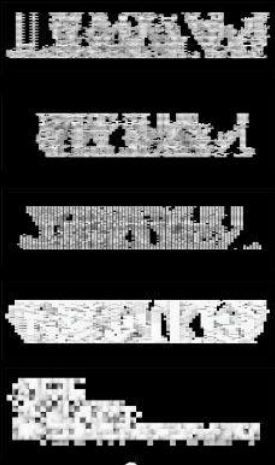
# INCORPORATING PHYSICAL EXPERIMENTATION INTO CREATIVE AI-DRIVEN DESIGN SPACE EXPLORATION



CELLULAR AUTOMATA GENERATION RULES



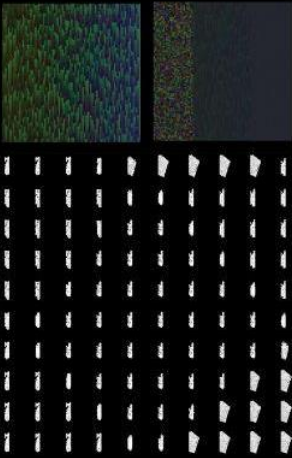
COCOON



4 GENERAL CONDITIONS + SITE MASSING



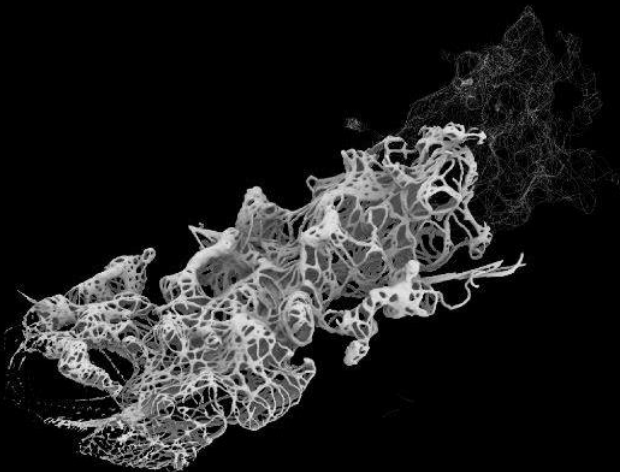
STIGMERGY



INTERPOLATIONS

SOM (SELF ORGANIZING MAPS)  
USED IN THIS WORKFLOW TO AUGMENT THE PRELIMINARY MASSING DATA FOR STYLEGAN-3D TRAINING.

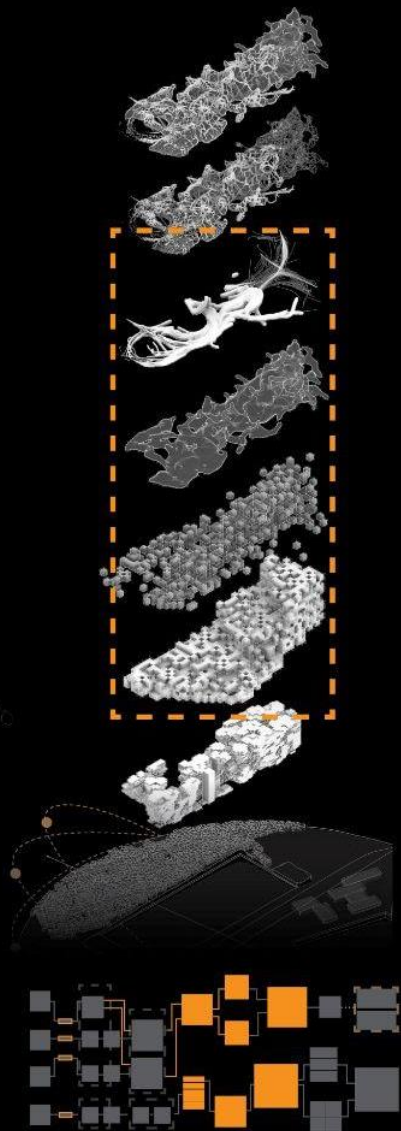
STYLEGAN-3D  
A GENERATIVE ADVERSARIAL NETWORK WHICH CONVERTS MESH VERTEX LOCATIONS TO 2-DIMENSIONAL REFERENCE IMAGES. THESE IMAGES ARE TRAINED IN A REGULAR STYLEGAN, AND CONVERTED BACK TO LOCATION DATA. THE RESULT OF THIS TRAINING CREATES AN ITERATION LIBRARY FROM THE INTERPOLATION OF ENCODED MASSINGS.



MESH CRAWL



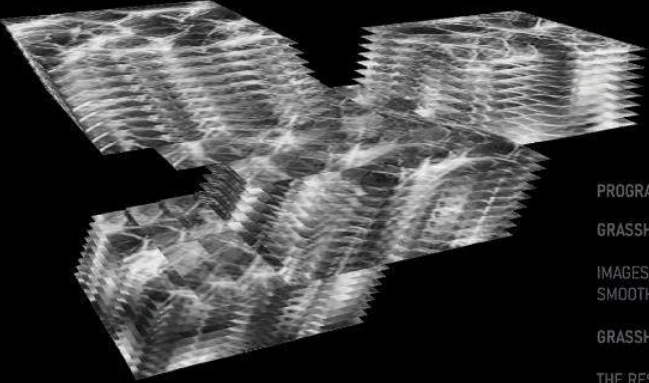
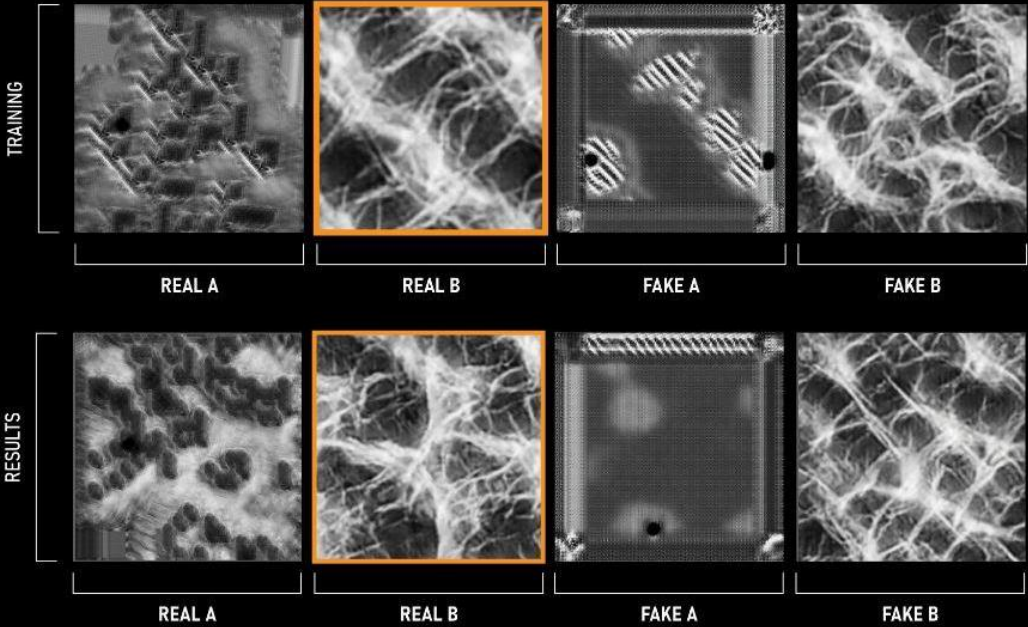
ITERATION LIBRARY



AKYUZ | CRAVEN | GIFFONI



INCORPORATING PHYSICAL EXPERIMENTATION INTO CREATIVE AI-DRIVEN DESIGN SPACE EXPLORATION



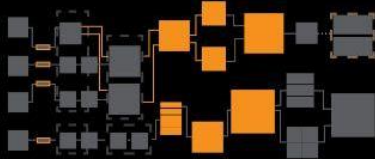
PROGRAMMATIC LIBRARY

GRASSHOPPER: PUFFERFISH

IMAGES ARE EVALUATED BY VERTICES, INFLUENCED BY COLOR VALUES. LATER, THEY ARE TWEENED TO CREATE A SMOOTH TRANSITION AMONG THE LAYERS.

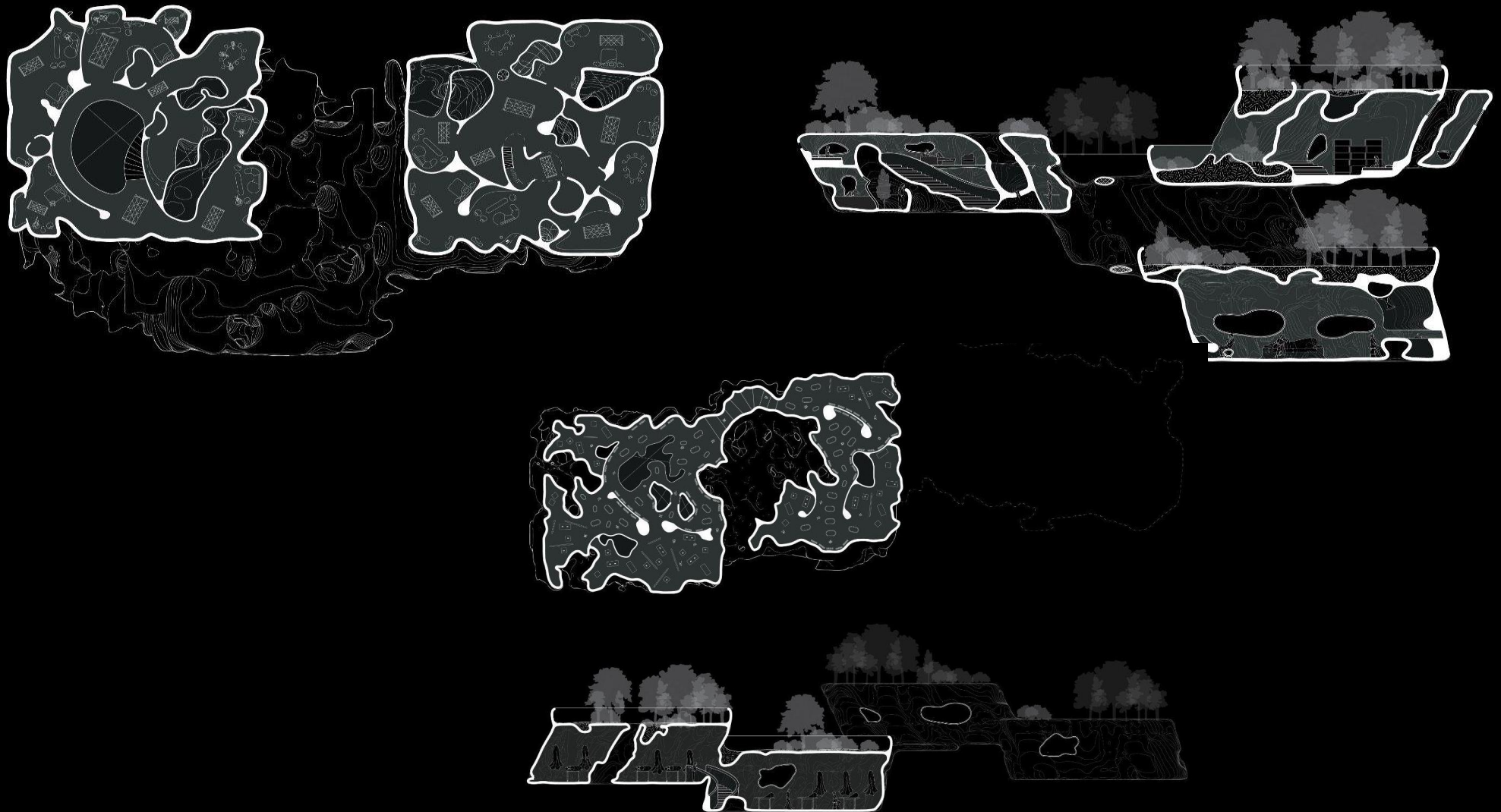
GRASSHOPPER: CHROMODORIS

THE RESULTING POINT CLOUD IS USED TO INFORM AN ISOSURFACE WITH RANGES AND CHARGES DETERMINED BY THE DESIGNER.

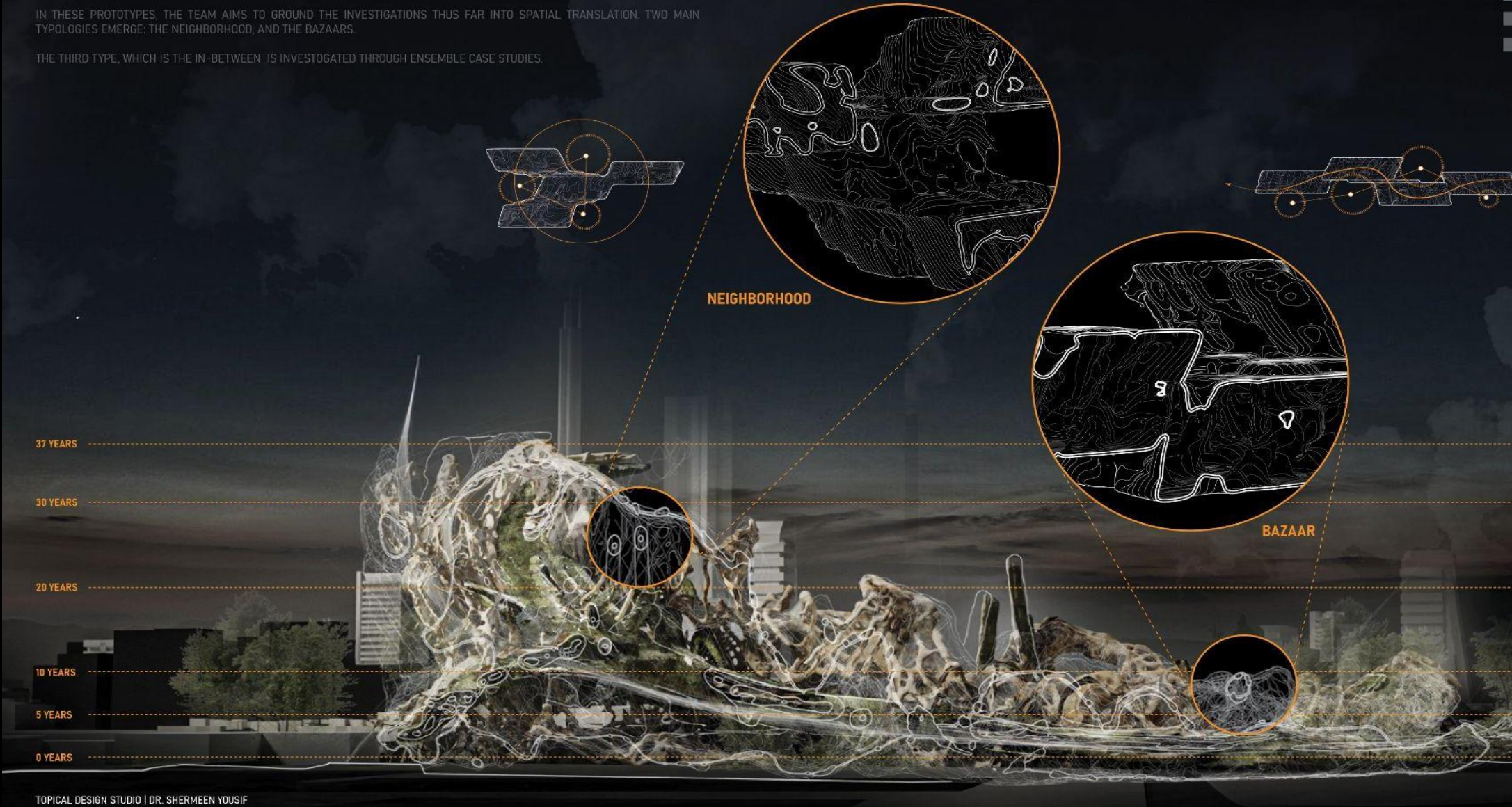




# INCORPORATING PHYSICAL EXPERIMENTATION INTO CREATIVE AI-DRIVEN DESIGN SPACE EXPLORATION



# INCORPORATING PHYSICAL EXPERIMENTATION INTO CREATIVE AI-DRIVEN DESIGN SPACE EXPLORATION



Topical Design Studio Spring 2022, Students: Yagmur Akyuz | Luisa Giffoni | Matthew Craven

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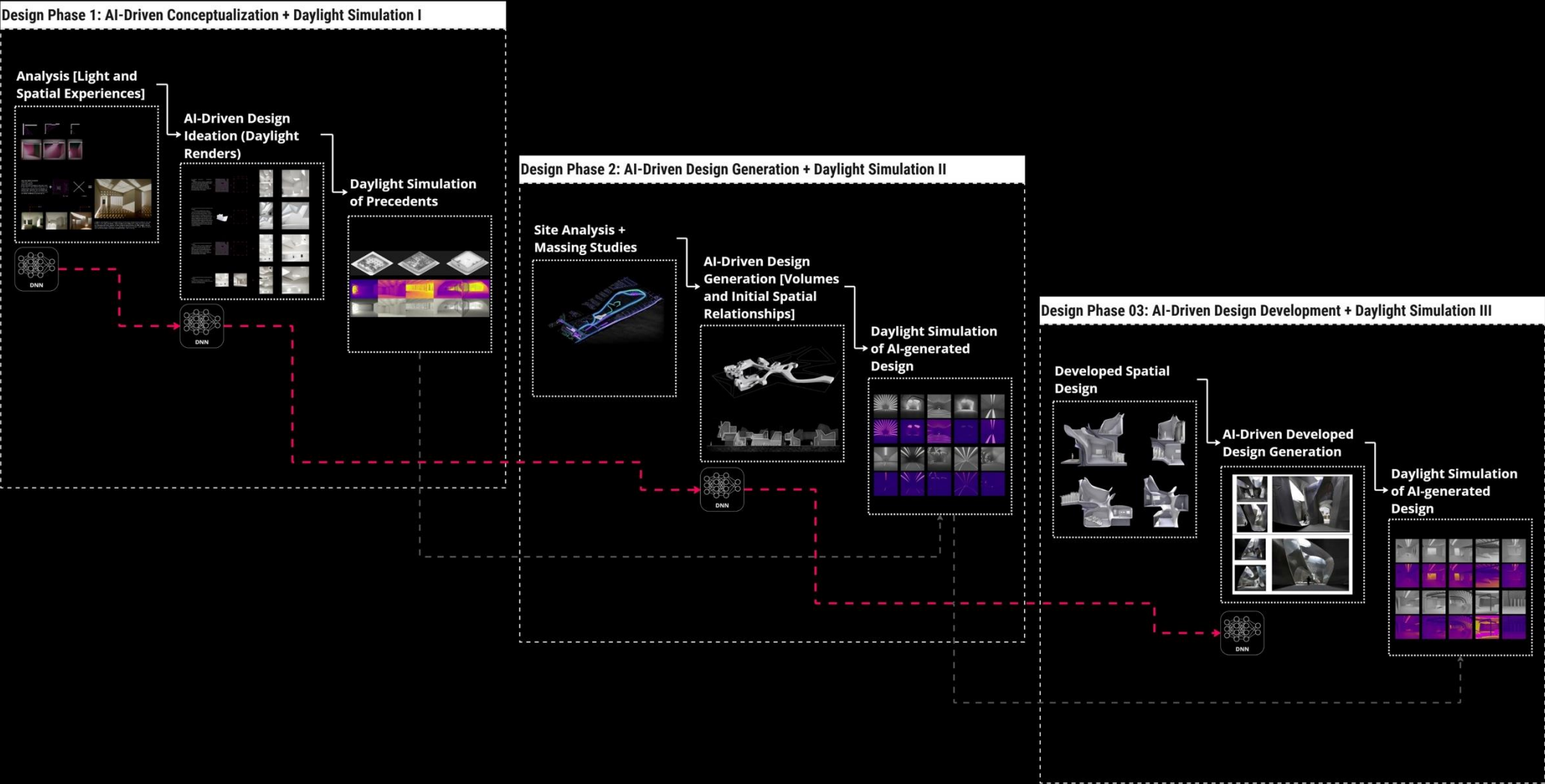
## TEACHING: TEST-CASE APPLICATION II

Design Studio 6  
School of Architecture | Florida Atlantic University  
Spring 2025

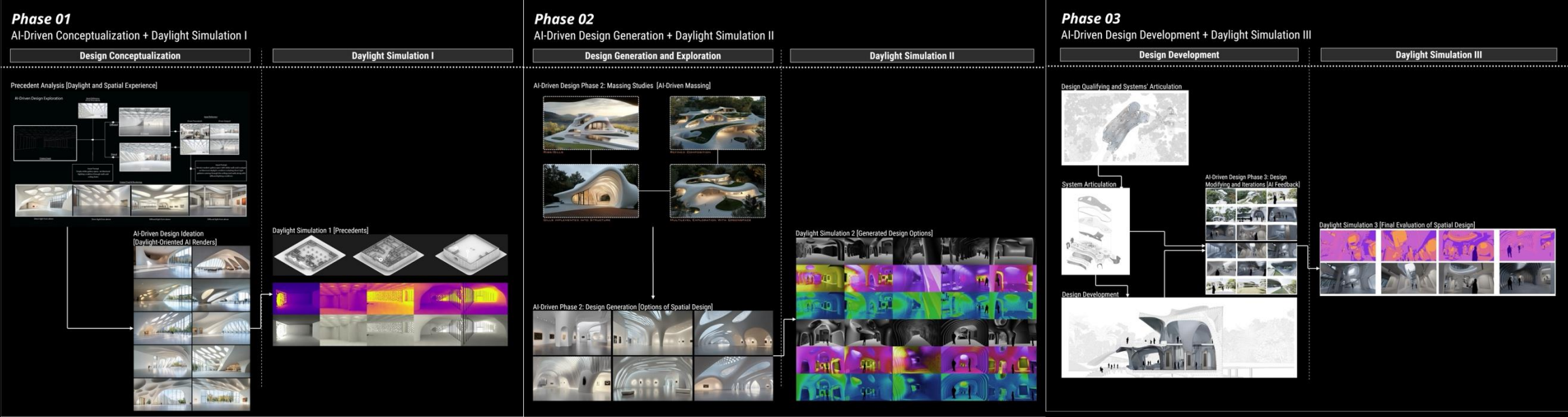
Students:

Eileen Abigado  
Alice Kovalesvsky  
Anthony Callahan  
Jianna DiPisa  
Giulia Griesi  
Ayriel Italia  
Laci Kinder  
Angelina Mandolfo  
Maula Mercy  
Bnjamin Nguyen

APPLYING A NEW METHOD WORKFLOW TO TEAHCHING





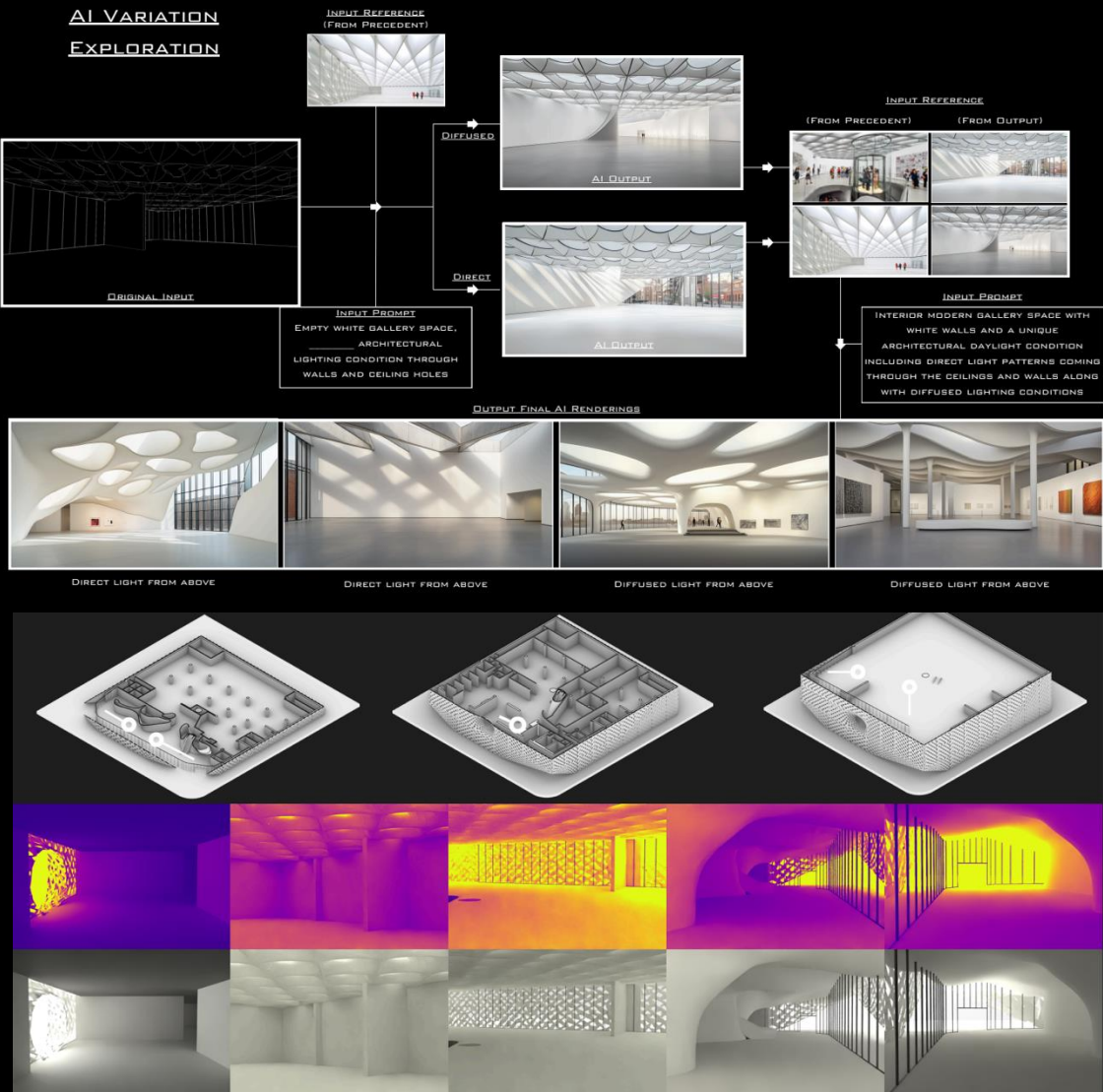
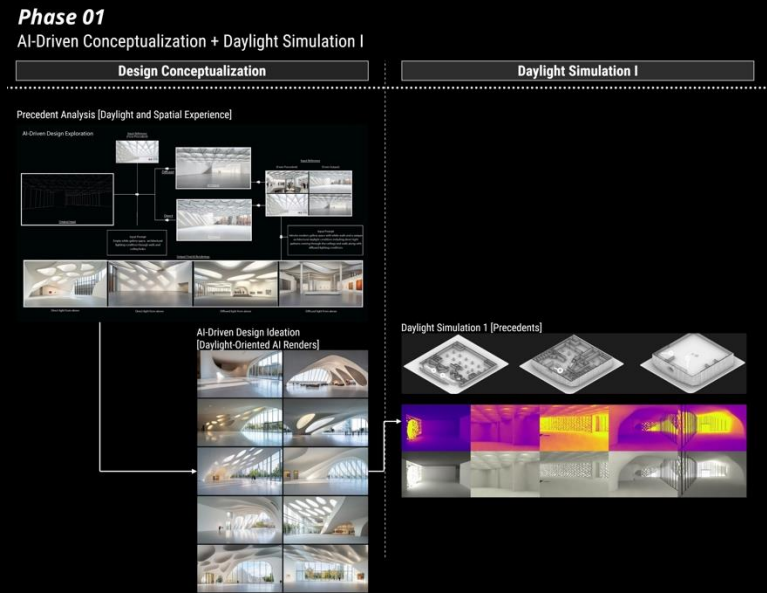




TEST-CASE APPLICATION II  
Spring 2025 | FAU School of Architecture

Phase 01 | AI-Driven Design Conceptualization+ Daylight Simulation I

Presentation for the CRTLE AI Course Redesign Institute at UTA | 10.31.2025

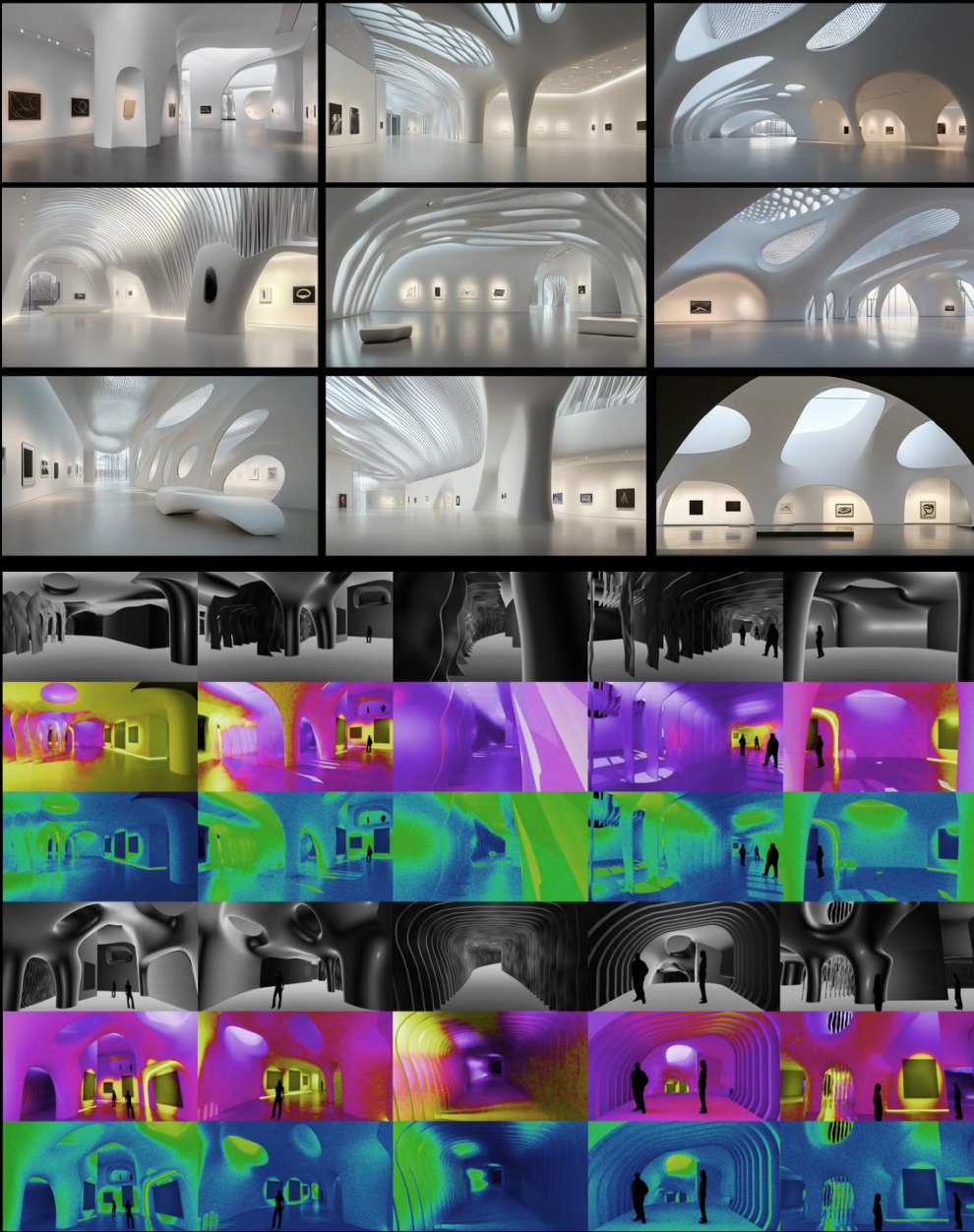
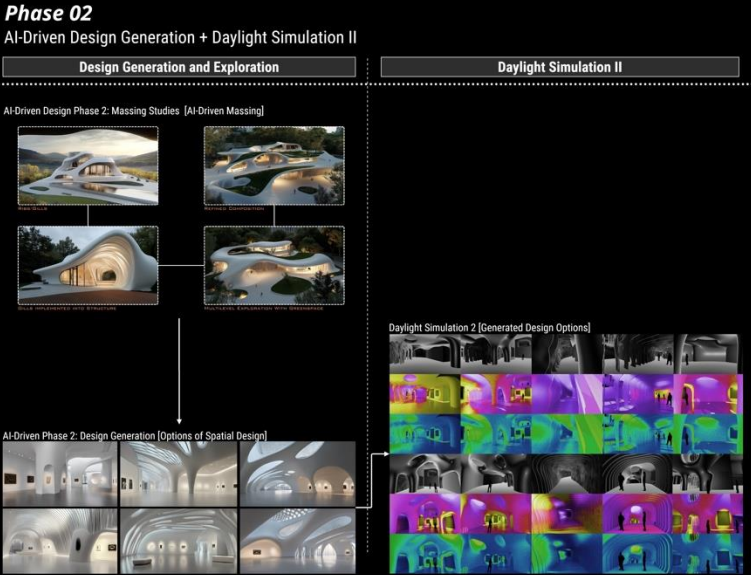


Daylight Simulation Renders (Point-in-Time) | Metrics: Luminance in HDR and False-Color

TEST-CASE APPLICATION II

Spring 2025 | FAU School of Architecture

Phase 02 | AI-Driven Design Generation and Exploration + Daylight Simulation II





TEST-CASE APPLICATION II

Spring 2025 | FAU School of Architecture

Phase 02 | AI-Driven Design Generation and Exploration + Daylight Simulation II



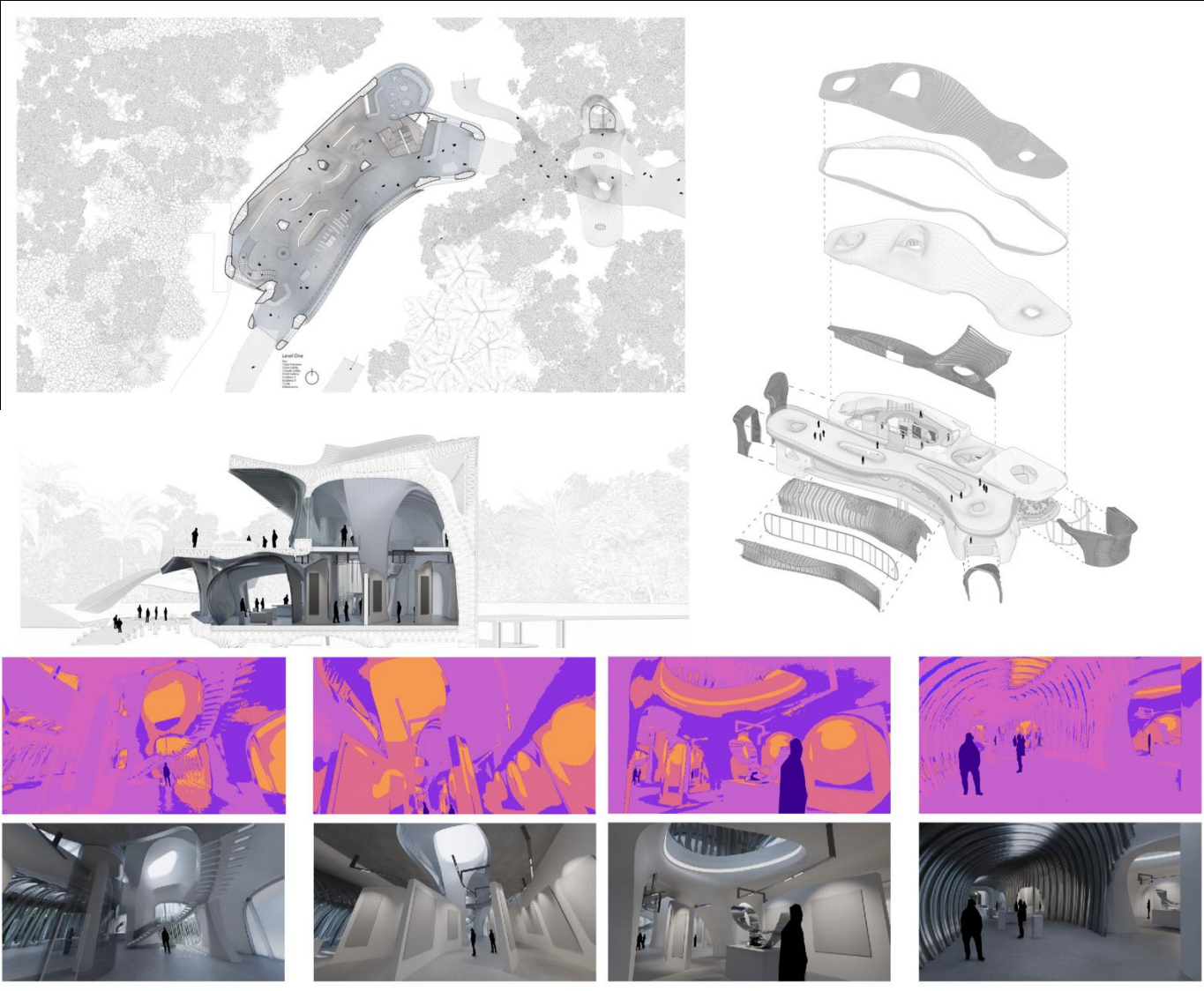
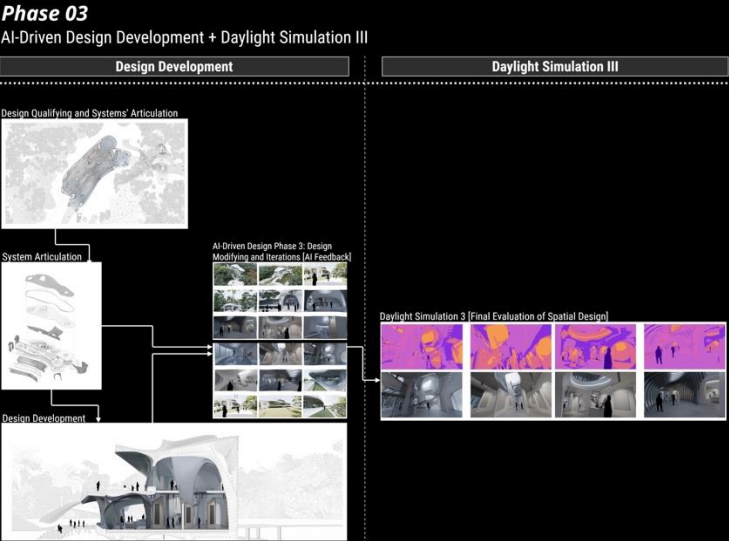
Presentation for the CRTLE AI Course Redesign Institute at UTA | 10.31.2025



TEST-CASE APPLICATION II

Spring 2025 | FAU School of Architecture

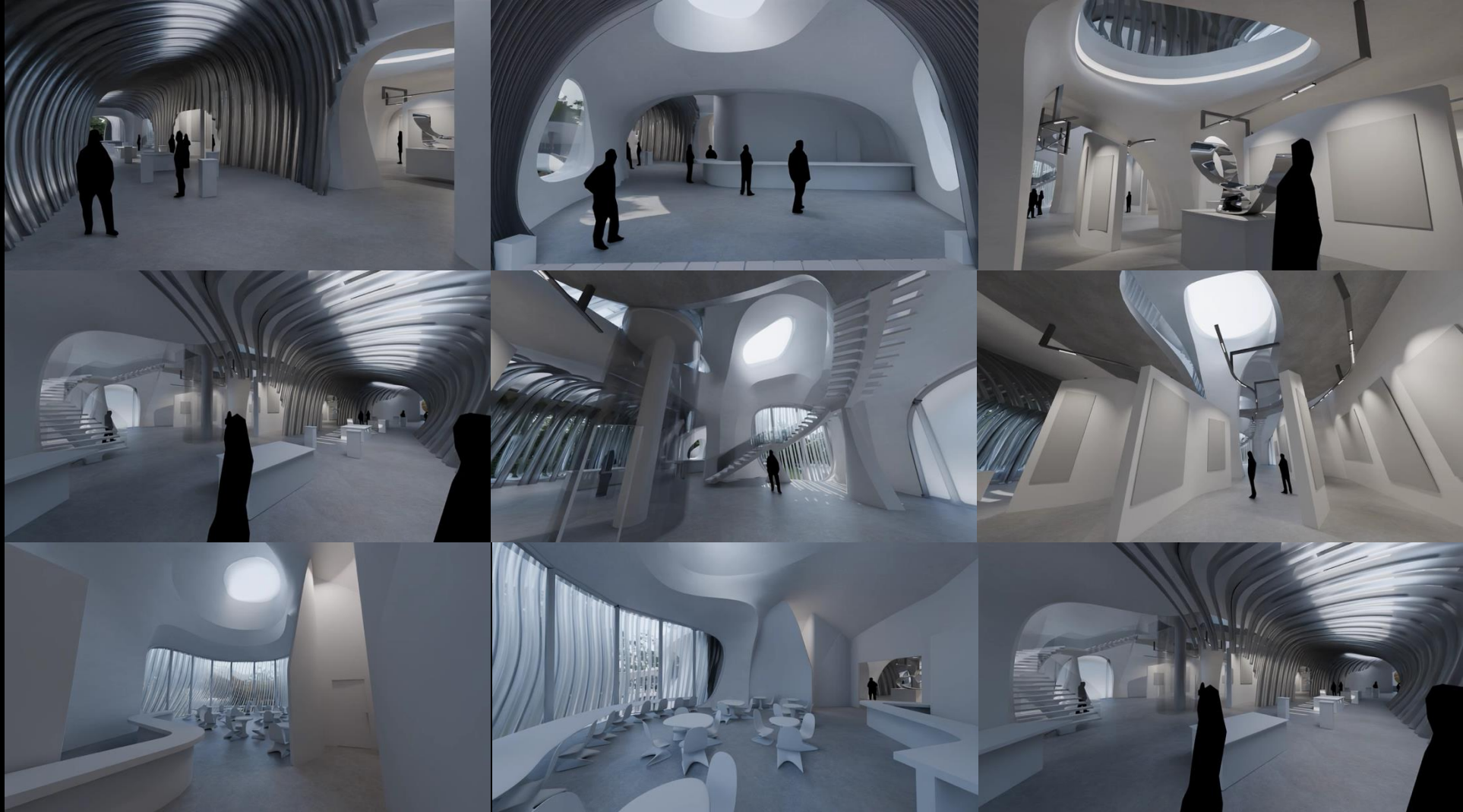
Phase 03 | AI-Driven Design Development + Daylight Simulation III



# TEST-CASE APPLICATION II

Spring 2025 | FAU School of Architecture

Phase 03 | AI-Driven Design Development + Daylight Simulation III



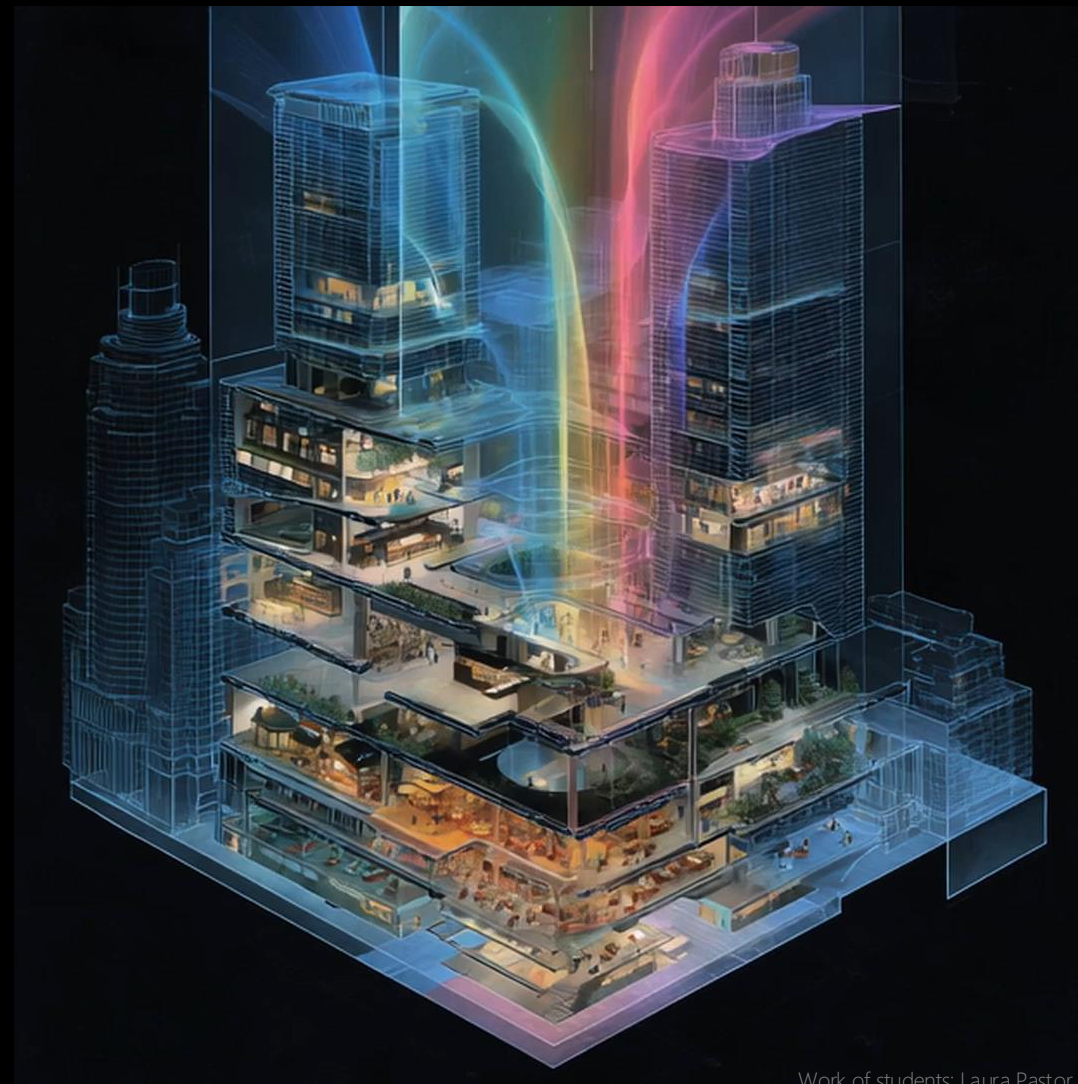


## TEACHING: TEST-CASE APPLICATION III

M.Arch. Design Studio  
School of Architecture | University of Texas, Arlington  
Fall 2025

### Students:

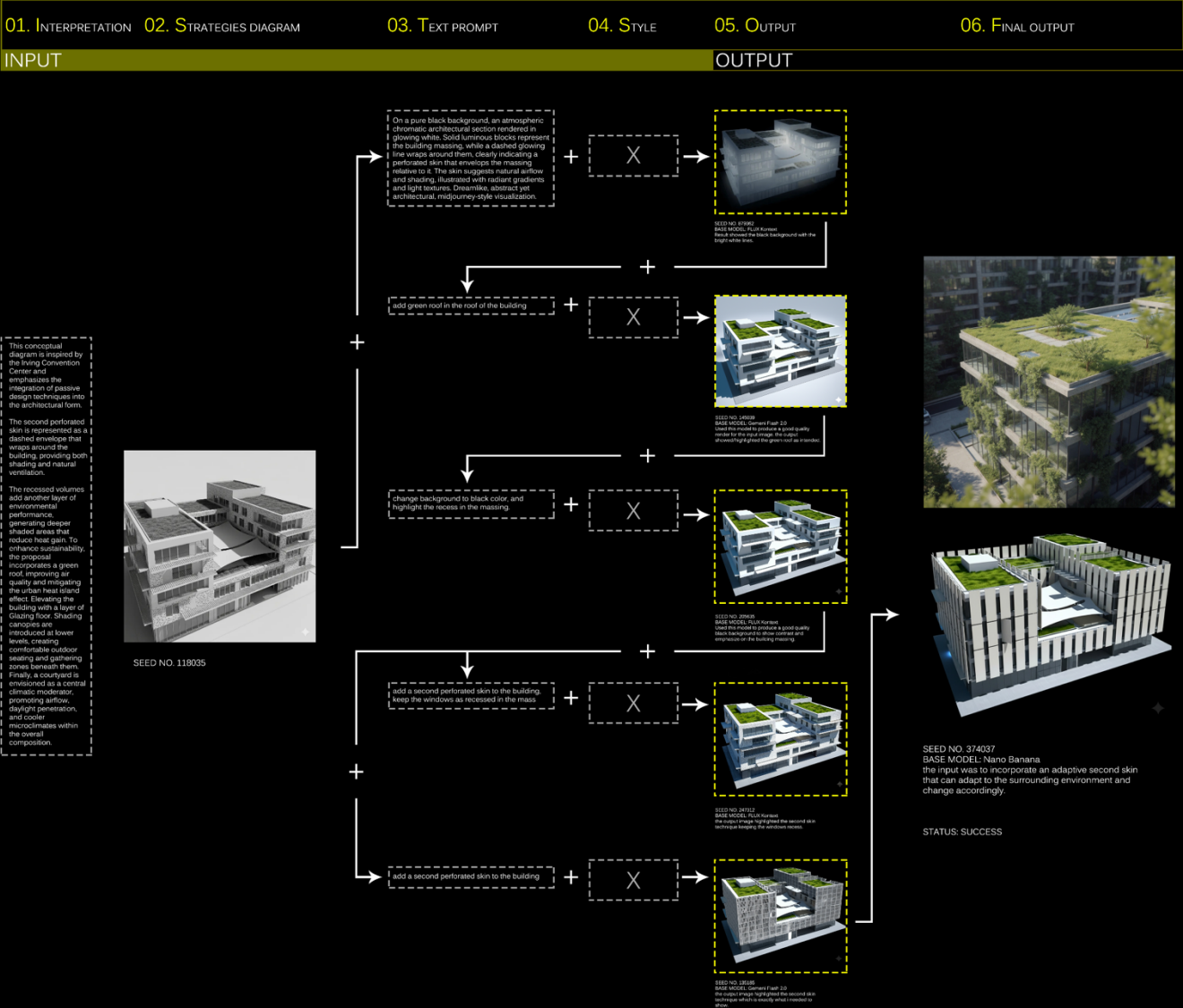
Mustapha Hassan + Manal Hassan  
Areej Damra + Mario Belt  
Riya Modi + Mona Hassan  
Laura Pastor + Emily Cossio  
Monica Griego + Steven Flores  
Chazney Markle + Morgan Cleveland  
Swati Hannikeri + Maryna Ayupova  
Jamie Chavez + Tyler Doyle



Work of students: Laura Pastor + Emily Cossio



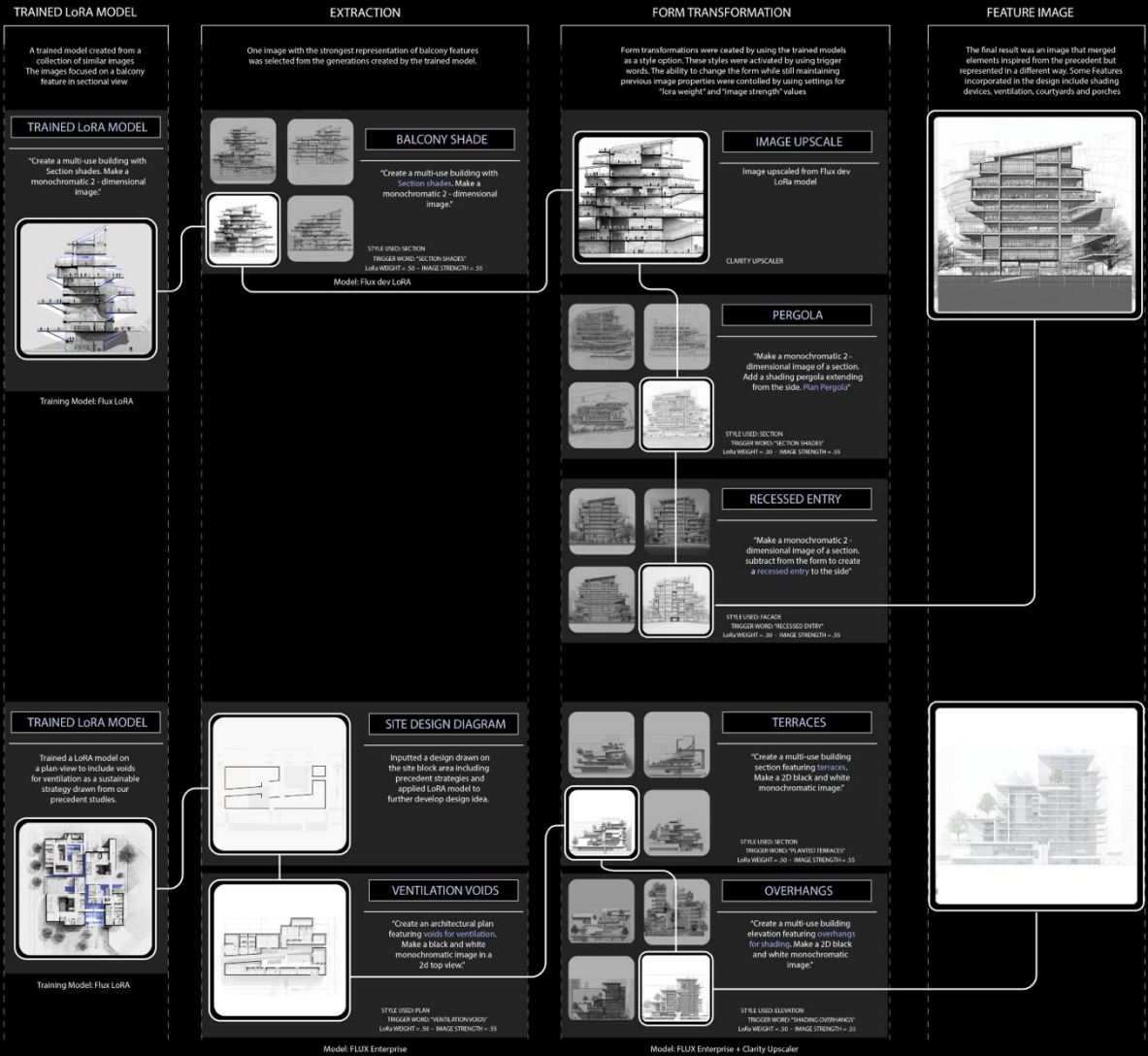
TEST-CASE APPLICATION III  
Fall 2025 | UTA School of Architecture





# TEST-CASE APPLICATION 3

Fall 2025 | UTA School of Architecture

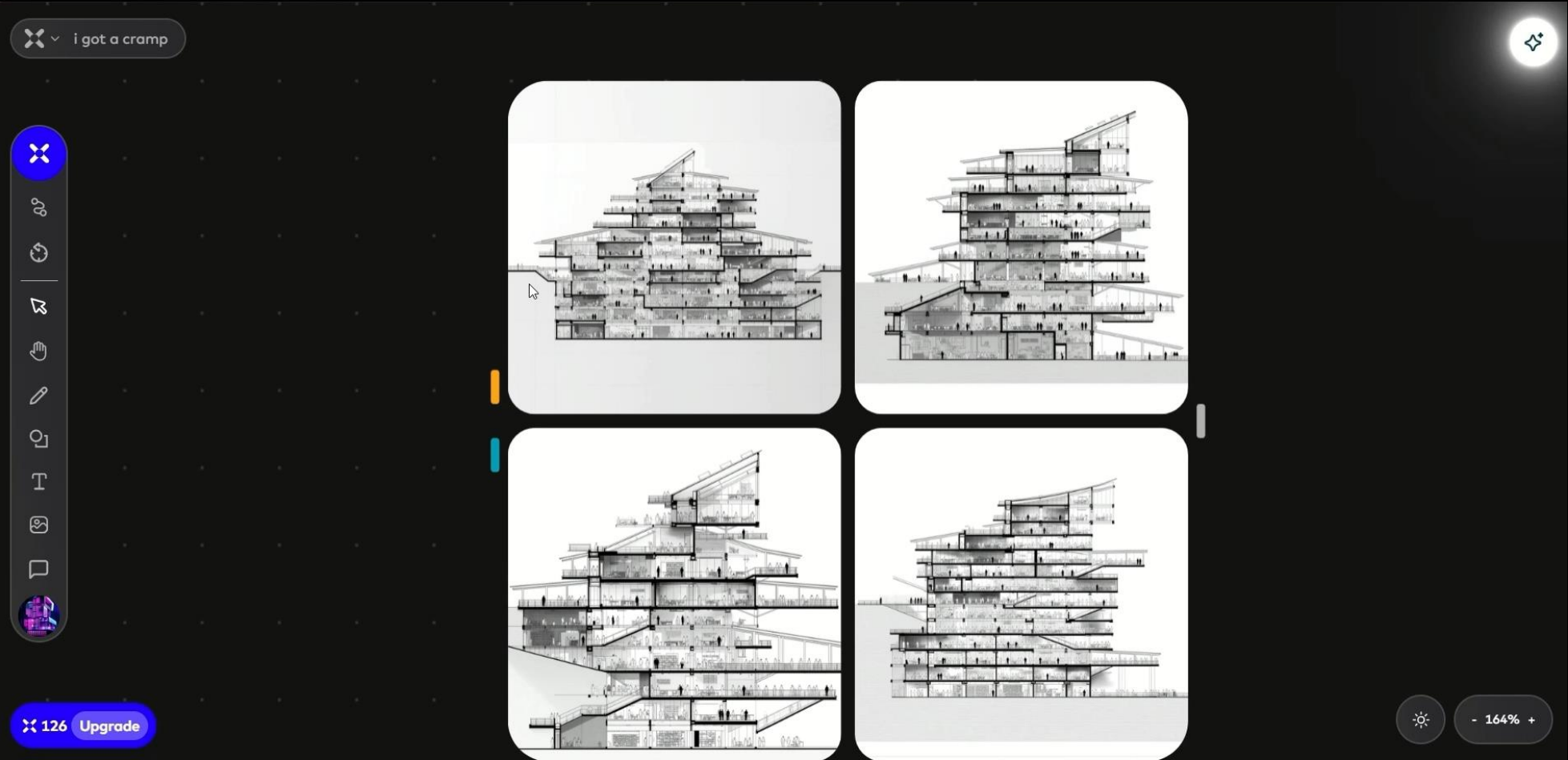




# TEST-CASE APPLICATION 3

Fall 2025 | UTA School of Architecture







Thank you

# "Choreographing Intelligence: A Pedagogical Model on Successful AI-Driven Workflows"

Dr. Shermeen Yousif

Director: Performative AI Lab

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Director: Deep-Eco Design Studio

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Presentation for the CRTLE AI Course Redesign Institute at UTA  
10.31.2025

Presentation: Choreographing Intelligence: A Pedagogical Model on Successful AI-Driven Workflows  
Shermeen Yousif, Ph.D. | [shermeenyousif.com](http://shermeenyousif.com) | [deepecodesign-studio.com](http://deepecodesign-studio.com)