

Bridging AI and Game Engines Toward an Immersive Digital Workflow for Interior Design Visualization

CONFERENCE PAPER · DONGSEO UNIVERSITY

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Three challenges in interior design practice

1

Fragmented workflows

AI and game engines are studied separately. Designers either generate ideas or test them in real time, never both. [2]–[4]

2

Client communication

1,752 interior design complaints in Korea (2018–2021), largely about materials and finishing. Static renders fall short. [15]

3

Cultural specificity

Full automation risks generic outputs. The designer must keep directing and refining the AI. [17]

Research gap and question

THE GAP

- AI in interior design is studied as isolated features [2]–[4]
- Game engines are studied separately, for real-time visualization
- No dedicated academic study treats them as one connected pipeline

RESEARCH QUESTION

How can generative AI and a real-time game engine be integrated into one interior design visualization workflow, and what are the affordances, compatibilities and practical implications of that pipeline?

Proposed workflow: ComfyUI meets Unreal Engine

1 **Model**

SketchUp mockup

Untextured form
exploration

2 **Migrate**

Datasmith

Geometry and hierarchy
into the engine

3 **Model**

ComfyUI

Node-based AI textures
and variations

4 **Model**

Unreal Engine

Real-time, interactive
review

Objective: produce AI textures, materials and variations and apply them directly in a real-time environment, aiming to improve efficiency and clarify design intent (to be tested).

Method: Research through Design

1 **Prototype**

**Mockup and AI-to-
engine workflow built**

2 **Test**

**Usability and
efficiency, planned**

3 **Feedback**

**Gather insights,
planned**

4 **Redesign**

**Iterate on findings,
planned**

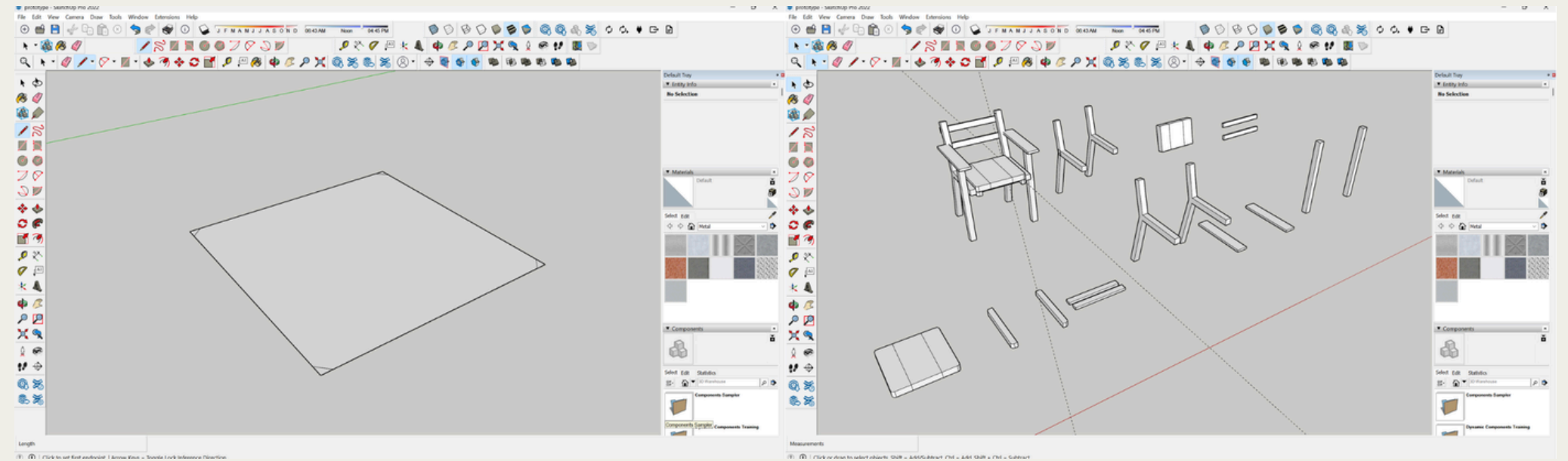
Qualitative methods used so far: **literature-based analysis, affordance analysis of ComfyUI and Unreal Engine, and scenario-based conceptualization.**

Prototype: a chair, from mockup to material

1

Mockup

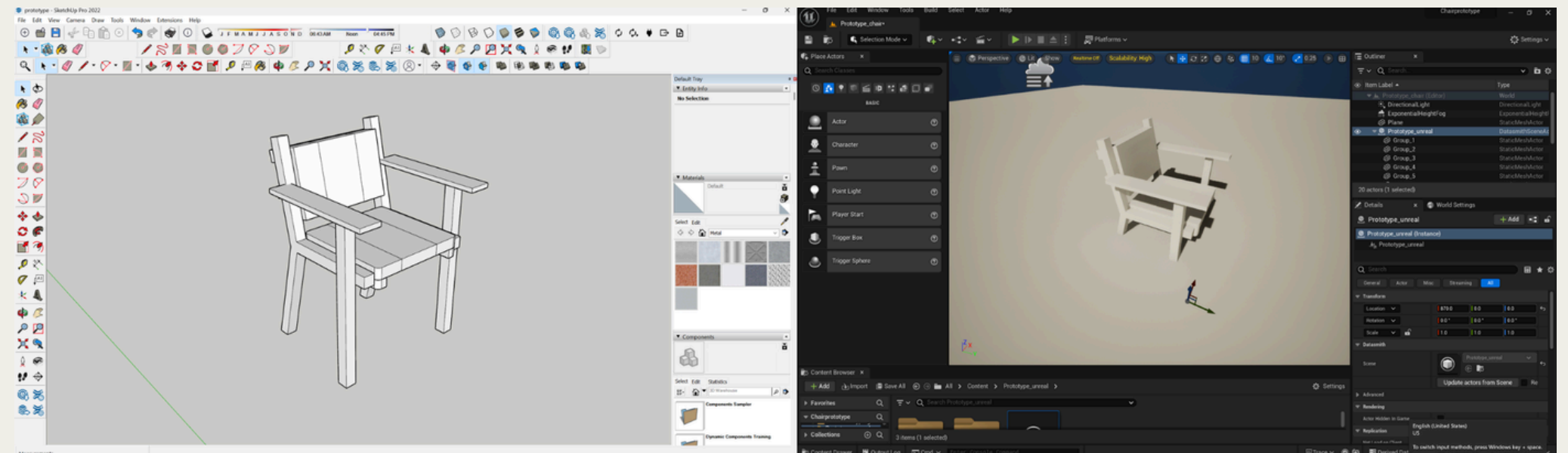
Chair forms explored in SketchUp, left untextured so materiality is defined later in the engine.



2

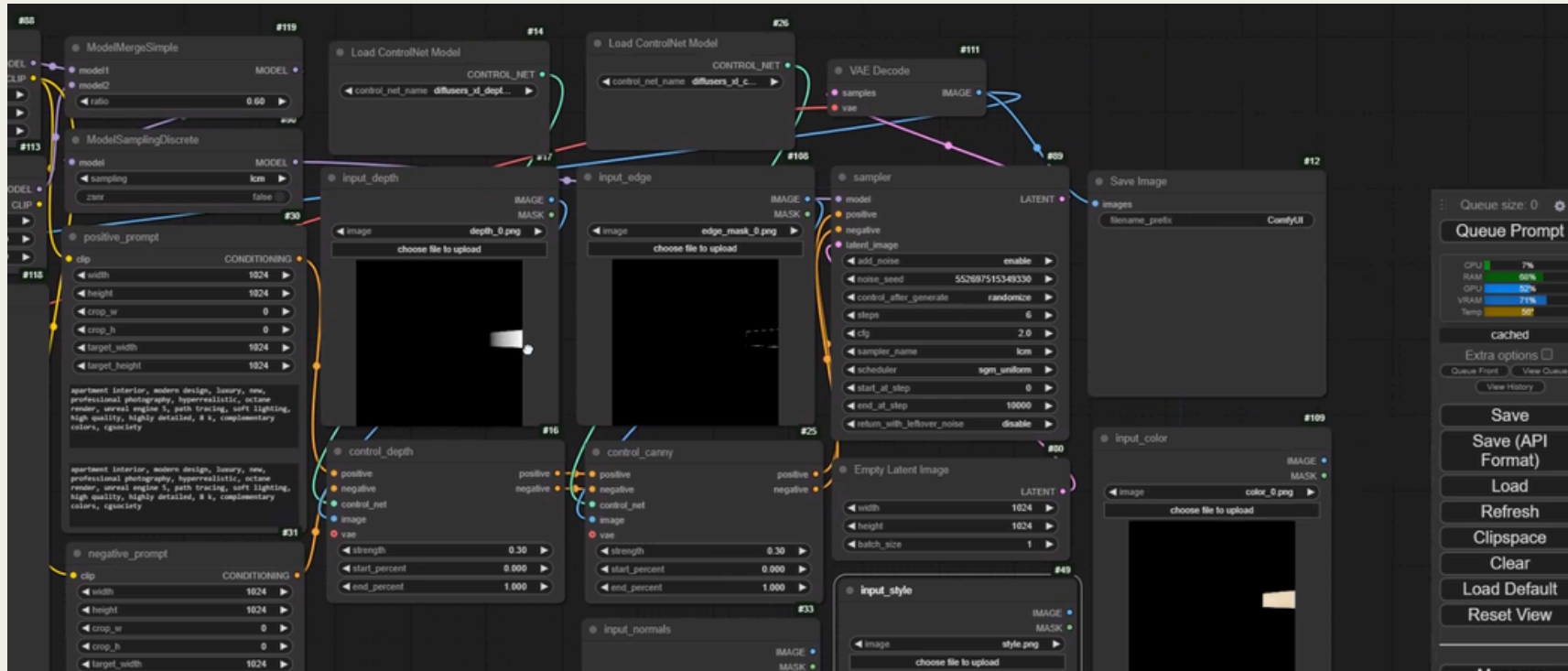
Migration

Imported with Datasmith, then dismantled and reassembled for material assignment. OBJ and FBX also work.

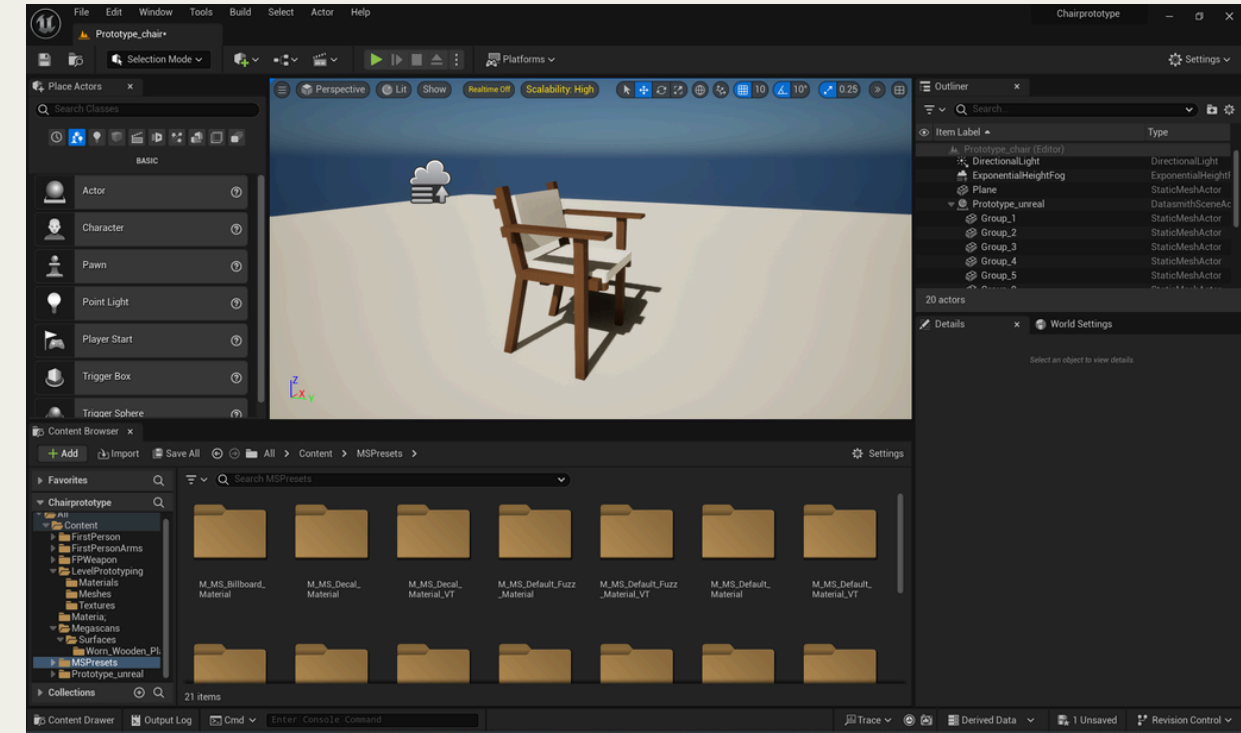


Tool-agnostic: Blender or 3ds Max can replace SketchUp.

Prototype: a chair, from mockup to material



ComfyUI: node-based workflow with ControlNet depth and edge inputs (separate system)



Unreal Engine: the migrated chair, with materials assigned in the engine

3 AI materials

Proposed: a plugin connects ComfyUI to Unreal Engine, so prompts can change textures and colors without rebuilding the model. Integration is still being tested.

Limitations and future work

Limitations

- Depends on GitHub plugins; version mismatches break installs
- Only a single perspective displayed successfully
- Migration errors can cause missing assets

Next steps

- More stable plugins and version compatibility
- Multi-angle evaluation of form, material and light
- Usability testing and iterative redesign with designers and clients

Evaluation plan and next steps

1

HYPOTHESES

- Less task time and software switching
- Fewer iterations to an acceptable finish
- Acceptable usability and usefulness ratings

2

STUDY DESIGN

- Practicing designers and design students
- Within-subjects, counterbalanced
- Conventional vs. proposed workflow on the same material-variation task

3

MEASURES

- Task completion time, iteration count
- Software switches, render wait time
- SUS, UEQ, perceived usefulness

Next: extend from a single chair to a complete interior scene.

Also planned: test materials generated from regional craft references.

AI AS A CREATIVE PARTNER, NOT A REPLACEMENT

- One pipeline links generative AI and real-time visualization
- Real-time review can replace long rendering waits
- A stable, multi-angle system is the next milestone

Findings so far: Datasmith (or OBJ/FBX) moves the mockup into Unreal, the modeling tool can be swapped, and ComfyUI's node-based setup gives close control.

Main limits: plugin and version compatibility, and a single view.

Thank you!

DISCUSSIONS AND QUESTIONS ARE VERY MUCH WELCOME

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