Research on Generative AI-based Reconstruction of Cinematic Images Guided by 3D Spatial Information in Unreal Engine

A case study of Spider-Man: Brand New Day

Zhang Yuxin
Dongseo University
Dept. Visual Contents

Why use UE to guide AI?

AI images can look good,
but still miss the space and camera view we want.

People and buildings

Their positions, distance and depth

Camera placement

Camera direction, angle and framing

Research question and scope

Can a UE 3D scene help AI match the space in a film frame?

Study material
Four high-rise shots from the trailer

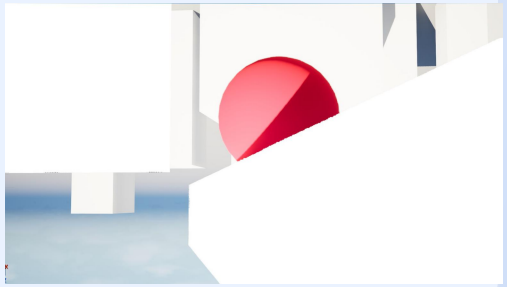
Experimental scope
Still-image generation and visual comparison

Experimental comparison

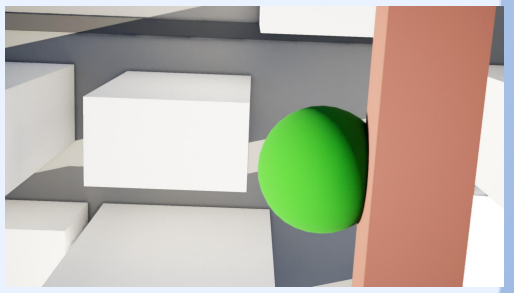
A	UE-guided	UE reference + text prompt → Generate → Compare with target
B	AI-only	Text prompt only → Same model → Compare with target

Building the shot in UE

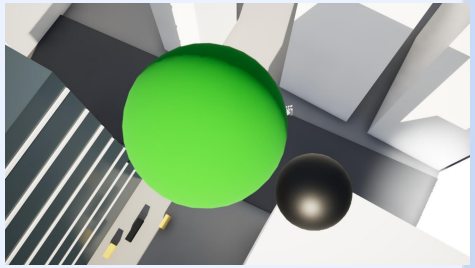
Shot 1 Target → UE proxy



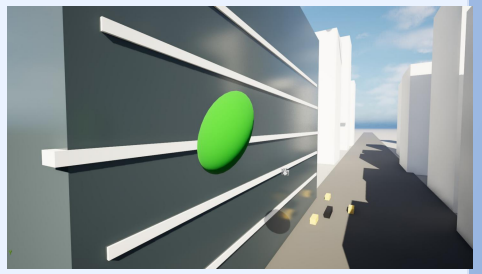
Shot 2 Target → UE proxy



Shot 3 Target → UE proxy



Shot 4 Target → UE proxy



Reconstruction workflow

01

Analyze the frame

Subject, buildings, depth

02

Build the UE scene

Simple shapes + camera

03

Generate images

UE reference + shared prompt

04

Compare outputs

Against the original frame

What do we compare?

Spatial relationships

Where subject and buildings sit

Composition

Subject position and size

Perspective

Depth and building-line direction

Camera angle

View direction and height

Shot 1: a stronger result

Target frame

AI-only

UE-guided

UE-guided: Closer layout and composition

Both Perspective and camera angle already match

Shot 2: a more difficult view

Target frame

AI-only

UE-guided

UE-guided: Better subject–building positions

Both Perspective and camera angle still hard to match

Shots 3 and 4: two more examples

	Target	AI-only	UE-guided	Improved
Shot 3				Spatial relations + Perspective
Shot 4				Composition + Camera angle

What did we learn?

Main finding

UE helps with spatial layout and composition.

Still difficult

Extreme camera views can still cause errors

Current scope

Four still-image cases, compared visually

Next step

Try more shots and check results across repeated runs

Conclusion and future work

UE 3D scene construction can help AI follow the spatial layout we want.

Next steps

Use UE images to guide image-to-video generation

Use UE videos to guide video-to-video generation

Check spatial layout and motion over time

Thank you. Questions?