

# Metahuman Liveness



Performing Hyper-Reality Illusions  
in a Virtual Production Volume  
by Topher Maraffi, NCSU

**SIGGRAPH 2025: Spatial Storytelling Track**

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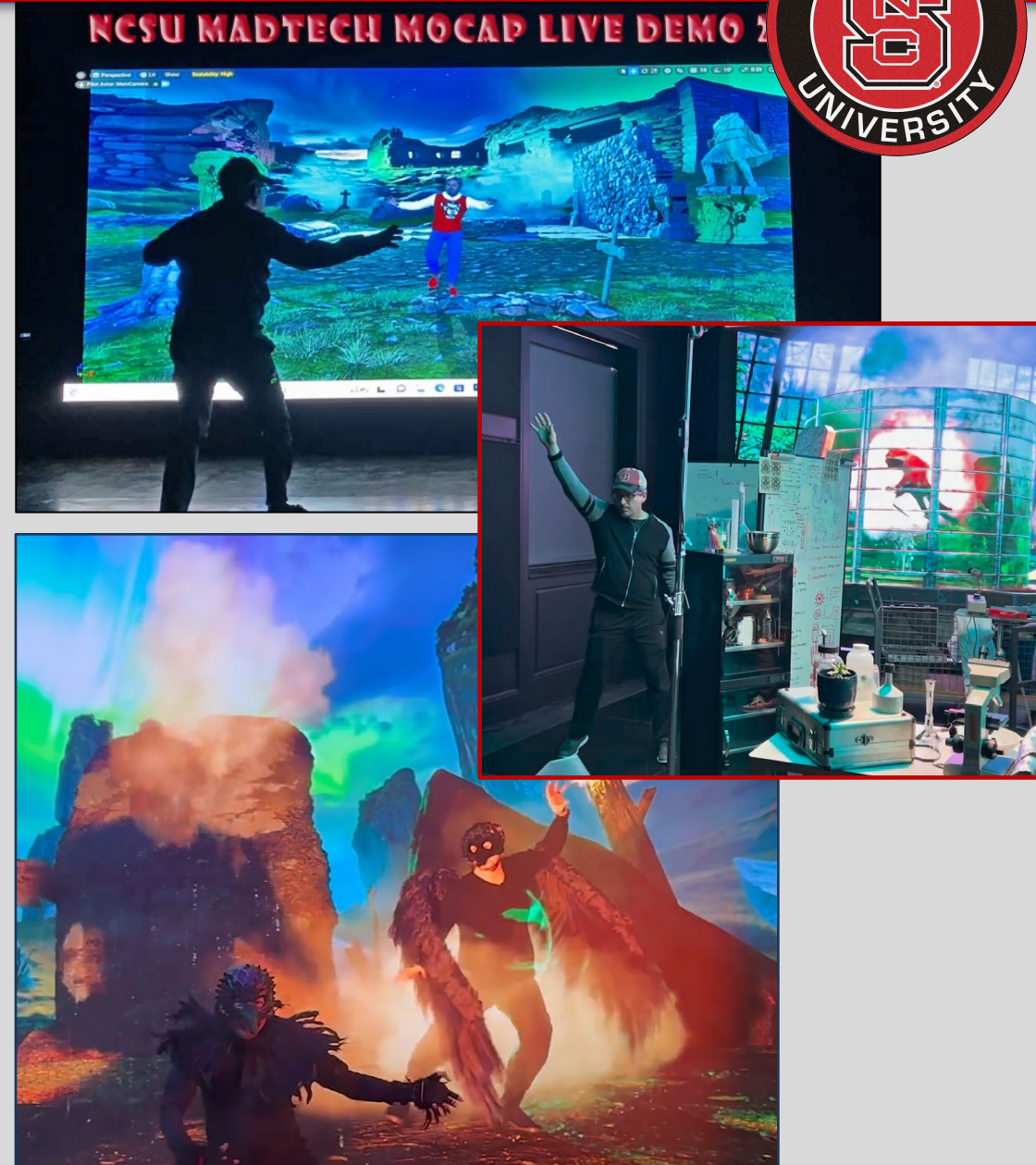
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- I initially experimented with [controlling a visible MetaHuman double](#), drawing from **Bunraku puppetry**, but blocking was difficult, and it did not produce hyper-reality illusions because the **control method was visible**.
- We are integrating **AI tools** into our virtual production pipeline, like [suit-less mocap](#) to control a hidden MetaHuman (**Radical Motion AI**), which has the potential to replace suits if lag can be reduced.
- I presented our first demo of the **Macbeth Metahuman** project at [SIGGRAPH SOIREE 2025](#), which showed the witches' entrance.



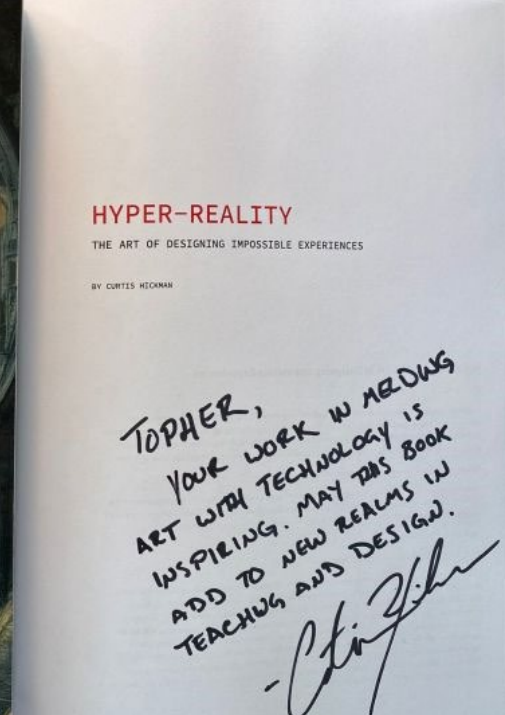
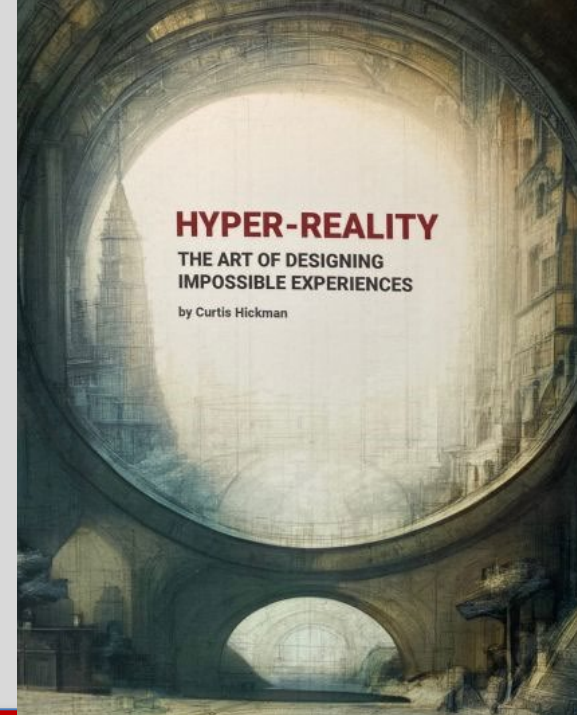


# Exploring Hickman's Hyper-Reality Laws in Virtual Production



**“The practical illusion of an impossible reality so convincing the mind accepts it as reality itself.” - Curtis Hickman, *The VOID* co-founder and author of *Hyper-Reality* (2023)**

- **Hickman's 52 Laws** apply stage magic to immersive design and are platform independent.
- Some key principles: **Misdirection**, **Convincers**, and **Aliefs** (automatic beliefs).
- We apply these design principles in virtual production to **stage illusions** of intelligent interaction with **MetaHumans**.



# Misdirection to Solve a Spatial Design Problem



Can the virtual production volume function like a magic theatre to facilitate interaction illusions that blend real and virtual space?

“Good magicians hide the answers.  
Great magicians have you asking  
the wrong questions.” - *Hickman,  
Hyper-Reality (2023)*



Misdirect away from the method to the effect by...

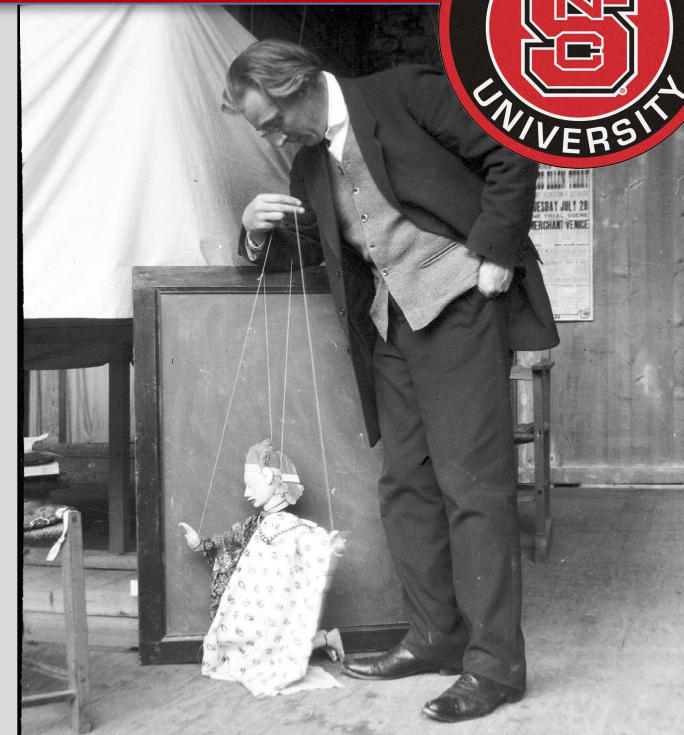
- Using a **hidden MetaHuman** digital double controlled by a live actor on stage.
- LiveLink body data is streamed from an **inertial mocap suit hidden** under the actor's costume.
- Actor's physical presence in the UE5 scene allows **covert puppeteering** of the MetaHumans.
- By **hitting hidden triggers** in the volume while performing, actors can **conceal system controls**.



# Craig's Criteria for Developing Super-Puppets



- **MetaHuman interaction** is designed according to criteria developed from theatre arts practitioner **Edward Craig's 1908 concept of an Über-Marionette or Super-Puppet.**
- The “**wires**” of our MetaHuman super-puppet are the **wireless LiveLink data** that streams into UE5 to allow the actor real-time control of the virtual production system through triggering **state changes using Blueprints.**
- The **illusion of liveness** is created by *how* the actor improvises within their blocking and the timing of **hitting their marks** (trigger boxes) in the volume.



**“What the wires of the Übermarionette shall be and what shall guide him, who can say?” – Edward G. Craig, *The Mask Periodical* (1912)**



# Hyper-Reality Demo with Conditional Logic



A high throw causes the MetaHuman to duck

Our latest demo applies state machine logics for actor improv...

- Afford choices for actors to **improvise** by providing multiple triggers that drive different MetaHuman reactions, creating the **illusion of liveness**.
- The **spatial design** is meant to be intuitive for actors to learn and rehearse, and then to puppeteer the system with creative timing and trigger choices.  
**MetaHuman improv** could be simulated by randomly selecting clip variations.

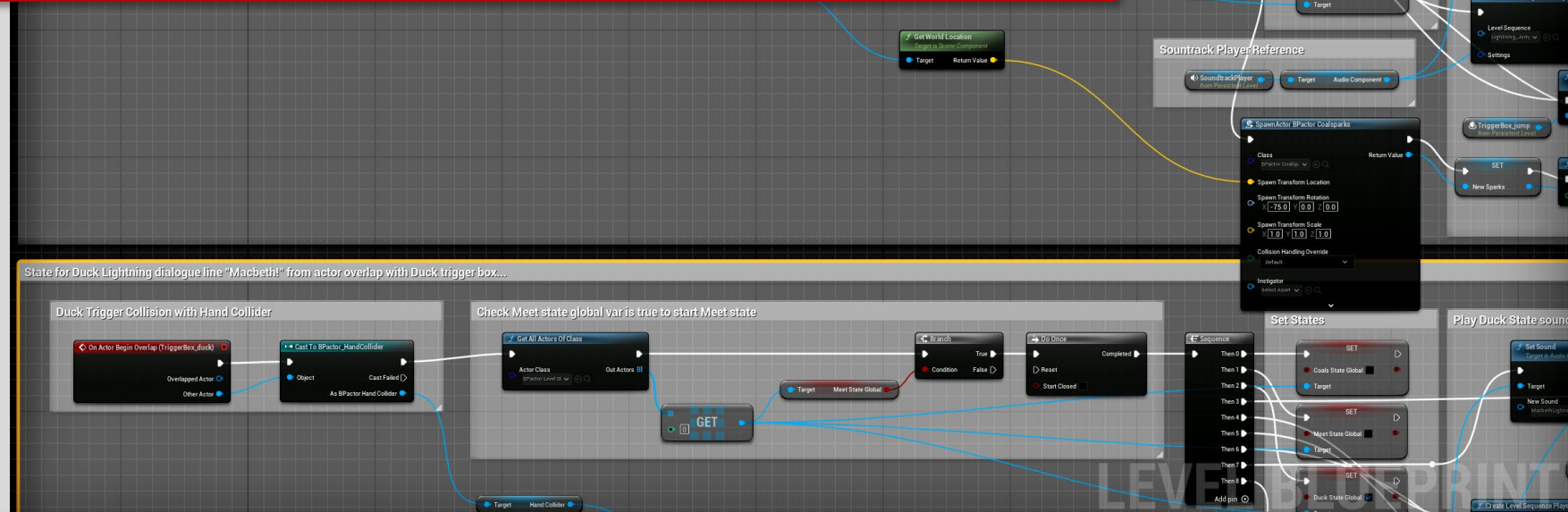


# Conditional Logic Blueprint Setup



...but a low throw makes the MetaHuman jump

It is important to set up **pre-conditions** and **post-conditions** in Blueprints to make sure only one trigger box will fire in any scene run-through...





# UE5.4 Spatial Design



- Inertial suit (Rokoko) **data is streamed** to the hidden MetaHuman Anim Blueprint to create the virtual shadow effect and a **collider on the right hand** is used to activate hidden trigger boxes for changing global states.
- The **Duck or Jump** states will blend MetaHuman animation **montages** and play **sequences** that have sound cues, lighting changes, and VFX where the trigger box was hit.





# Live Demo/Q&A



- Live [demo](#) from the **NCSU College of Design *Virtual Production Lab*** assisted by our lab manager **Ryan Khan** wearing a **Rokoko** suit.

Thanks!

