

# Fragments of The Tempest

A Prototype development of hair, make-up and prosthetics artistry for gaming and digital experiences



Funded by

xR NetwOrk+

Ben Turnbull  
16/04/2025

ual: london college  
of fashion



# What is the Project?

- Hair, Makeup and Prosthetics students at London College of Fashion are working with our industry partners, Copper Candle and IJAD Dance, MUA and digital fashion designer Yilin Du and digital artist Imogen Fox to create a new prototype for performance.
- We are designing and realizing 4 characters from William Shakespeare's *The Tempest* for an in-game dance performance narrative experienced in *Fortnite*.

Ariana Grande and Travis Scott Live Events in Fortnite



- The video game industry is larger than the music and film industries combined. It's also a major industry in the UK, where it accounts for more than half of the entertainment market.
- There is a need in this industry to develop engaging, rich and complex characters with speed. We are proposing with this project that people in crafts based industries (such as hair and makeup and/ or prosthetics design) have the skills to do this, we just need to develop the pipeline and practices for them to transfer the skills.

- *Are Video Games a revolutionary force for good? Very rarely. Is gaming a legitimate source of joy for millions of people, from all social and economic backgrounds, in an increasingly fragmented world? [Everything to play for : how videogames are changing the world / Marijam Did.](#)*

- Prosthetics and special effects such as bald caps are not yet replaceable with eco-friendly materials; this is an area that is transitioning towards digital making practices that can contribute towards the transformation of how work is made. It is important that WHAM colleagues are given access and support in being at the forefront of digital innovations, as it is not always part of our core skillsets. *Anette Ollerearnshaw*

Theatre Green Book

- Fortnite has over 650 million registered players.
- It has over 110 million monthly active(MAU) players.
- Fortnite has generated a revenue of over \$40 billion to date.





# coppercandle.

Fortnite Concerts with Copper House



Confidential and Proprietary, Not for Distribution



## Problem

# Why do we need metaverse events?



### Access

Physical, mental, financial and regional impediments for audiences to go to concerts.



### Reach

Major artists outgrow the physical limitations of traditional venues.



### Opportunity

Young and emerging artists can't break into the music industry without being "found".



### Ticket Recession

Globally, live music is seeing a decline in ticket sales



### Audience 2024

GenZ Players are online and demanding content from their computers.

# FORTNITE



## Why Fortnite?

- 850m registered players
- \$20m/yr - independent creators top earners
- 11.2Bn hours of play in creator made islands
- Available on any device or browser for free

our launch platform: **Fortnite**

followed by; Roblox, Minecraft and other game platforms

# The Market

awesome facts

metaverse market

## \$3.4 Tn

▲ \$234bn in 2022 - 2030

metaverse entertainment

## \$1.5 Tn

▲ 23.7% CAGR by 2030 (pwc)

Brands in the metaverse

- Nike
- Coca Cola
- Gucci

Gen Z audience who prefer  
digital experience

## 52%

Target users in the UK

## 10m

with disabilities that  
prevents access to events

Marshmello Fortnite Gig

- 2,000% increase on twitter
- 24,000% increase on YouTube views
- 20,000% increase in Spotify streams
- 10.7m concurrent players watching live



From Home Studios



# What Is It?

Our Tech Stack makes it happen

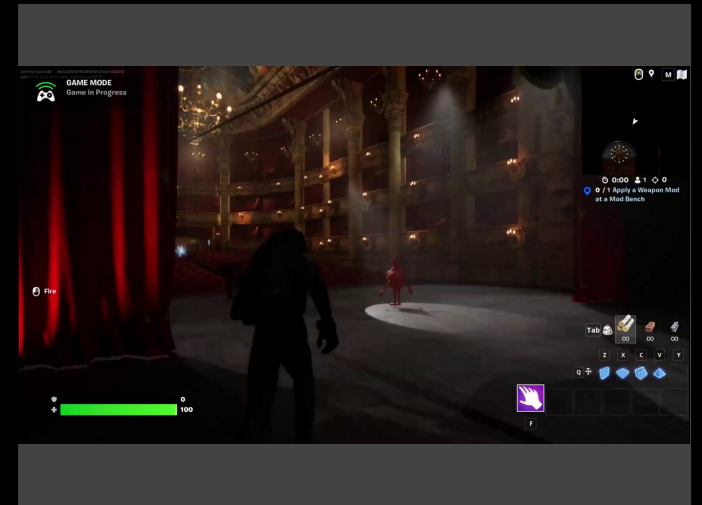
Patented Tech Stack

Copper  
Stream

Cue29

Bone  
Stream

Pro Delivery





# The Process

Bringing musicians to a global audience

Publish to Copper House for free.

Copper Candle processes the performance at a cost of £80/song

Rights are cleared with Epic Games/Fortnite and music is published into Copper House

Players attend the concert for free, from any device.

Distribution in legacy media.

Sponsors and advertisers  
Fortnite pays Copper Candle featured in our events.  
per view

## Musicians

From home  
During a gig



## Copper Candle

Production



## Fortnite



## Audience

Fortnite Players



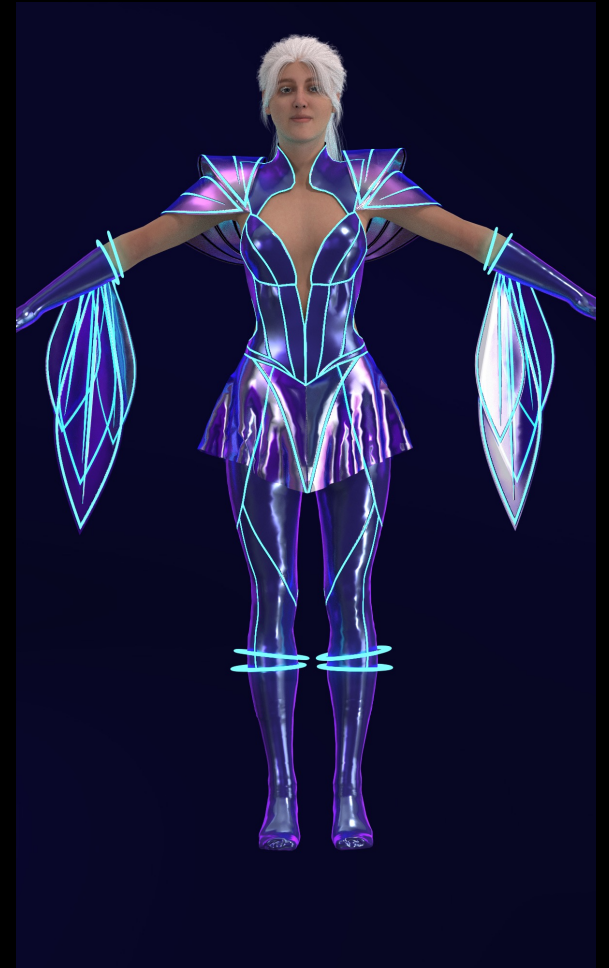
## Long Tail

Musicians  
Growth  
Legacy Media

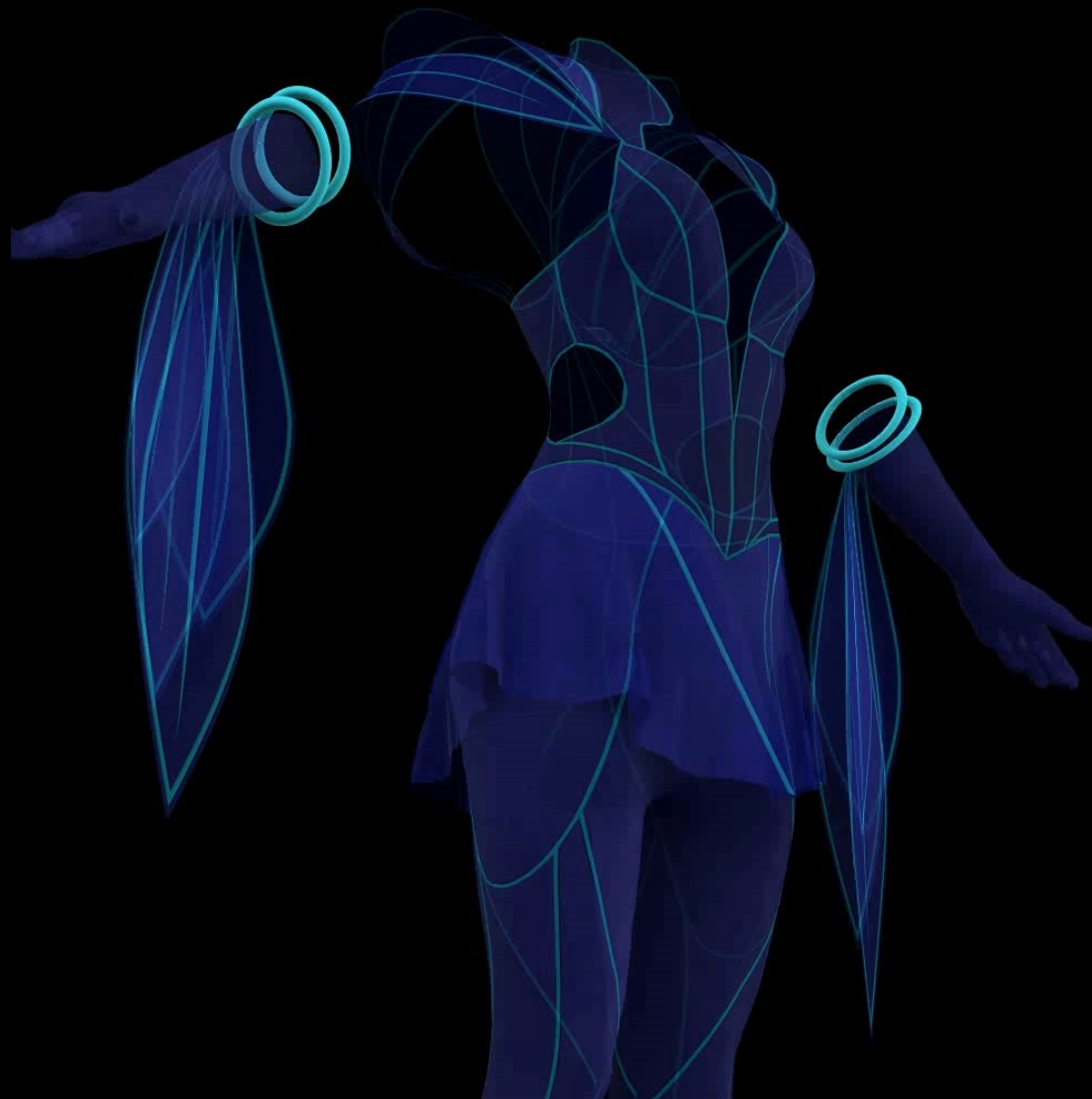


# Professional Skills

“phygital”





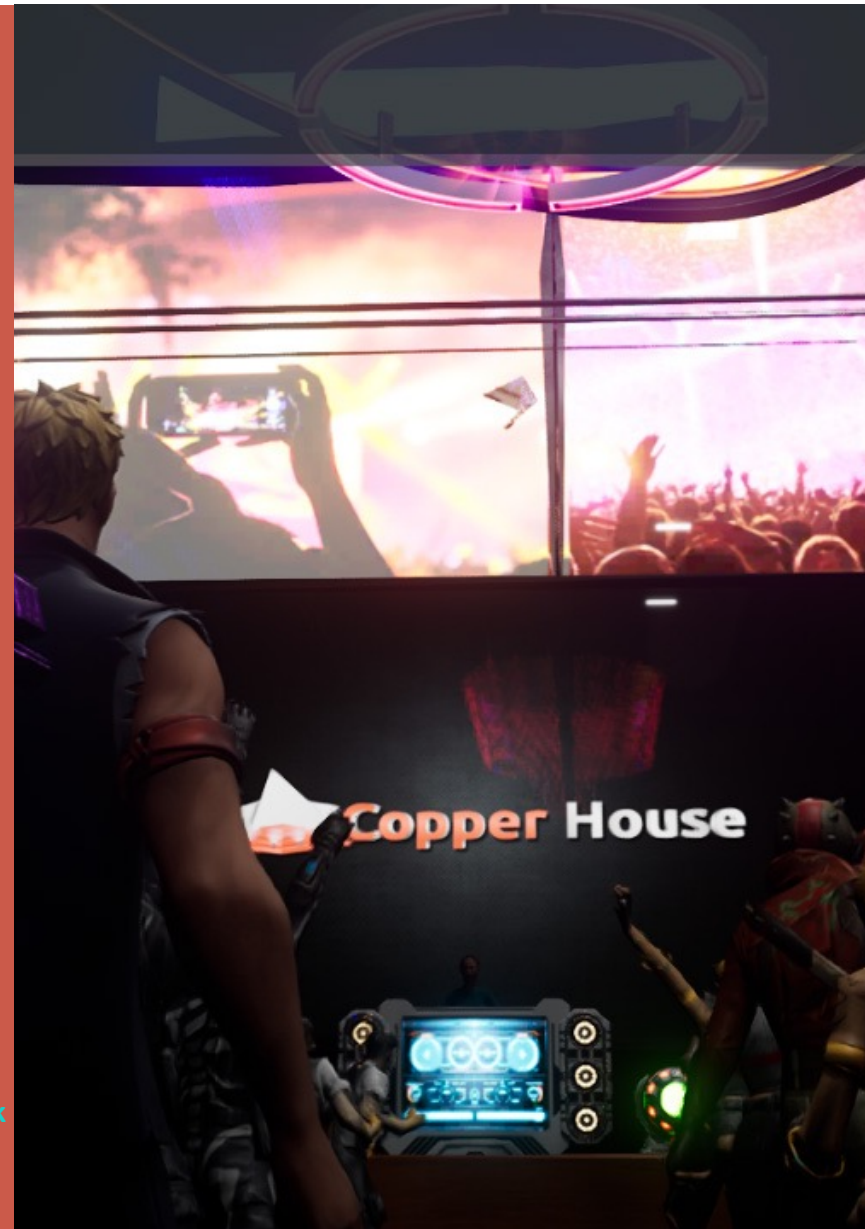


## Reference Links

1. [Copper House in Fortnite](#)
2. [Copper House UGC app \(MVP\)](#)
3. [Copper House Product Trailer](#)
4. [Copper House Product Demo](#)
5. [Copper House Creative Direction Deck](#)
6. [Live Fortnite Creator Earnings](#)
7. [Travis Scott Fortnite Concert](#)
8. [Travis Scott's Concert Review](#)
9. [Fortnite Payout Calculator](#)
10. [Fortnite Market Intelligence](#)
11. [PWC Global Media Outlook 2023](#)

[www.coppercandle.co.uk](http://www.coppercandle.co.uk)

[james@coppercandle.co.uk](mailto:james@coppercandle.co.uk)



# The Team

## The Team

**Copper Candle** Industry Partner  
**Imogen Fox** Digital artist/ environment design  
**Yilin Du** Digital Hair and MUA/ workshop lead  
**Joumana Mourad** Choreographer/Sensographer/  
performer  
**Antoine Marc** Performer  
**Nadine Elise Munce** Performer  
**Leah Hoy** Substance Painter  
**James Russell** Unreal Engine/ Zbrush/ Meshmorpher  
**Elliot Denman** Blender and Photogrammetry  
**Anette Ollerearnshaw** WHAM Industry consultant  
**Daisy Mattocks** Industry Placement  
**Hannah Banfield** Industry Placement  
**Rosa Waters** Industry Placement  
**Zheren Zhang** Industry Placement  
**Ben Turnbull** Primary Investigator  
**Mollie Gibb** Co-Investigator



*Fragments of Tempest team in UAL's XR Research Lab at London College of Fashion*

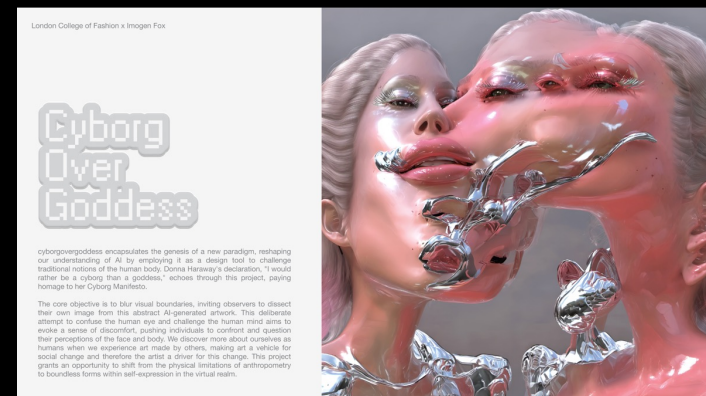
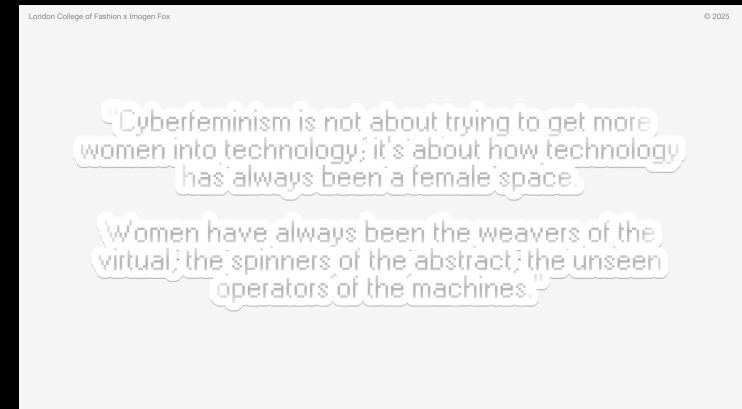


# Imogen Fox

## Digital Artist and Playing Technology Evangelist



Unreal Engine environment designed and realised by Imogen Fox with direction and concept art from BA Hair, Make-up and Prosthetics students at London College of Fashion



# Yilin Du

## MUA and Digital Fashion Designer



### Yilin Du

Makeup | Digital Fashion

Digital Fashion Designer and Makeup Artist whose work explores identity and storytelling through the fusion of traditional craftsmanship and digital innovation.

With work experience contributing to SHOWstudio by Nick Knight and showcasing at platforms like Dazed, MoMu Antwerp and London Fashion Week, Yilin's work pushes the boundaries of digital fashion and beauty.

<https://yilinducrate.cargo.site>



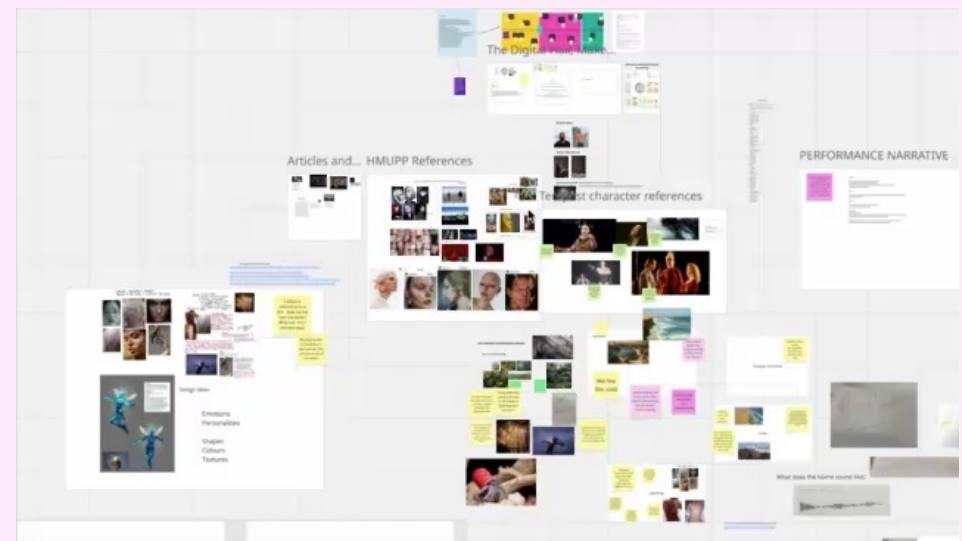
# HMUPP Character Creation Pipeline



# 1. Design Workshop Phase

## Platform: Miro

- Gather environmental references
- Collect character design references
- Cast real-life performers
- Explore performance practice references
  - Game characters
  - Film characters
  - Theatre characters
- Establish character world and aesthetic foundations



## 2. Photogrammetry Scanning

Photogrammetry is our bridge between physical and digital practices

### Scanning Process:

- Perform two 3D scans of performers
  1. Scan without makeup and hair
  2. Scan with physical hair and makeup applied

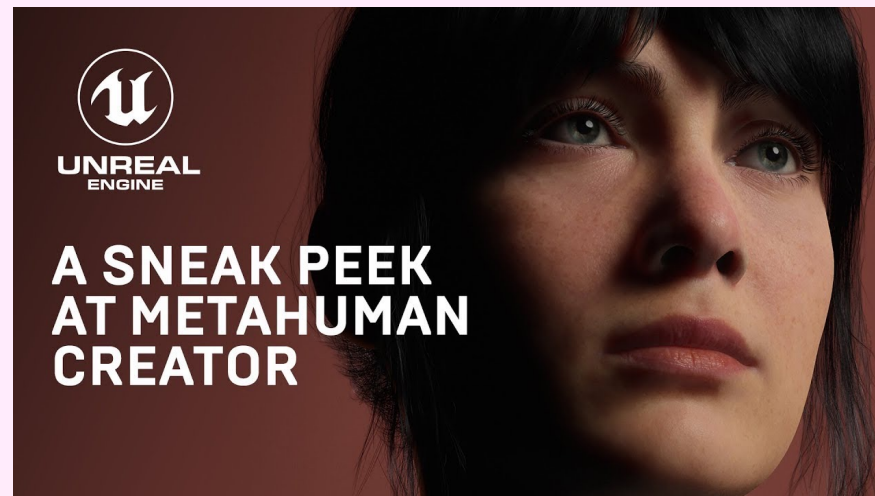


# 3. Metahuman Character Base

**Platform:** Mesh to Metahuman

**Platform: Mesh to Metahuman**

- Import clean face and head scans
- Apply scans to Metahuman body
- Customize 3D models using real-world performer likenesses
- Note: Limited body type options available (now customisable and run locally in Unreal Engine 5.7) Uncanny Valley





### 3. Metahuman Character Base

**Trinculo:** Nadine Elise Munce



### 3. Metahuman Character Base

**Caliban:** Antoine Marc



### 3. Metahuman Character Base

**Ariel:** Joumana Mourad





# 3. Metahuman Character Base

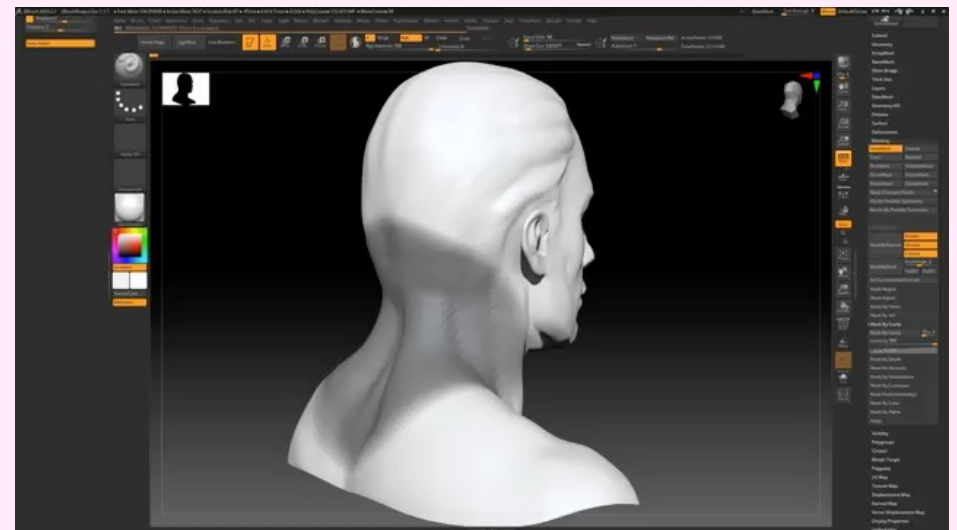
**Prospero**



## 4. Digital Sculpting

### Platform: ZBrush

- Import customized 3D models
- Create digital prosthetics
- Export sculpted models as .obj files



# 4. Digital Sculpting

Platform: ZBrush

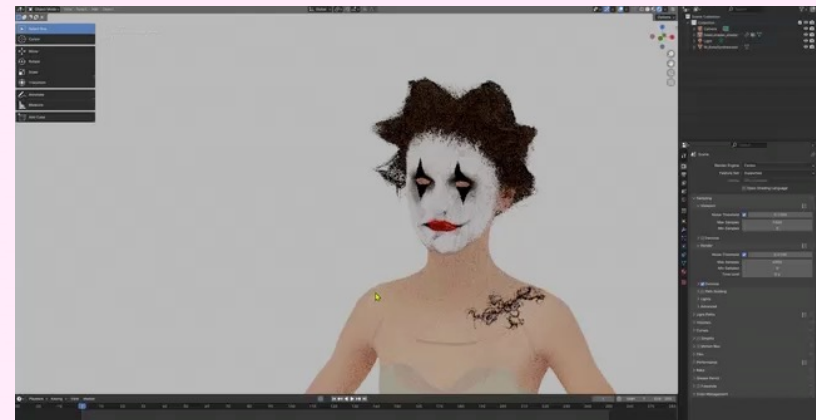




# 5. Digital Hair Creation

## Platform: Blender

- Import head models
- Use particle systems and grooming tools
- Create digital hair
- Export hair as alembic (.abc) files



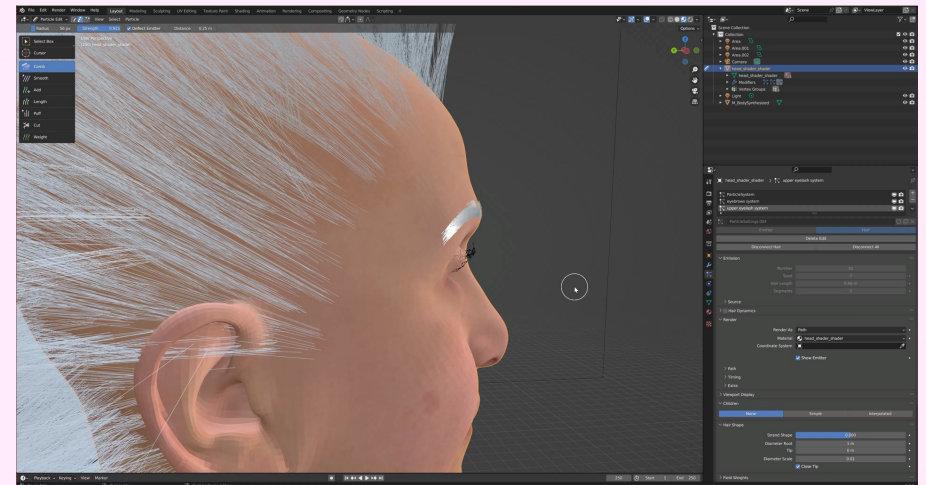
Daisy Mattocks: *Creating Hair for Trinculo*

# 5. Digital Hair Creation

Platform: Blender



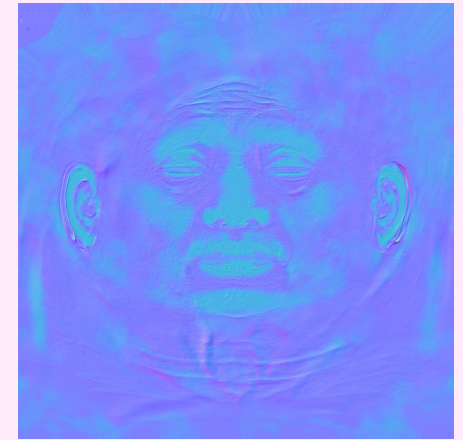
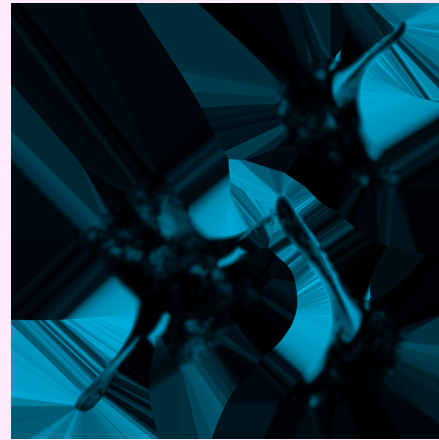
Rosa Waters: *Beard Design for Caliban*



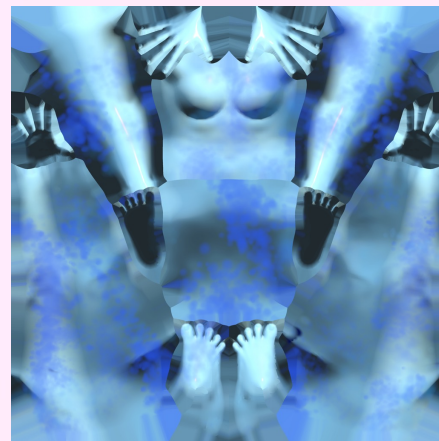
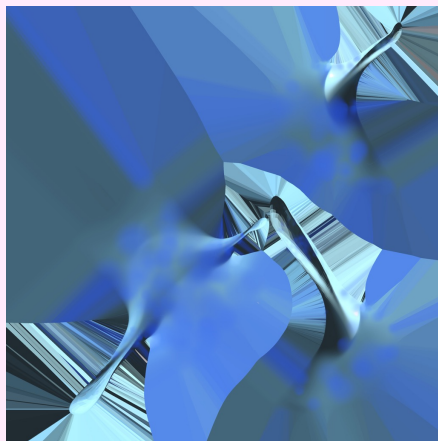
Hannah Banfield: *Eyelash Grooming*

# 6. Digital Makeup and Body Paint

Platform: Substance Painter



*Unwrapped Texture maps for Ariel*





# 6. Digital Makeup and Body Paint

**Platform: Substance Painter**

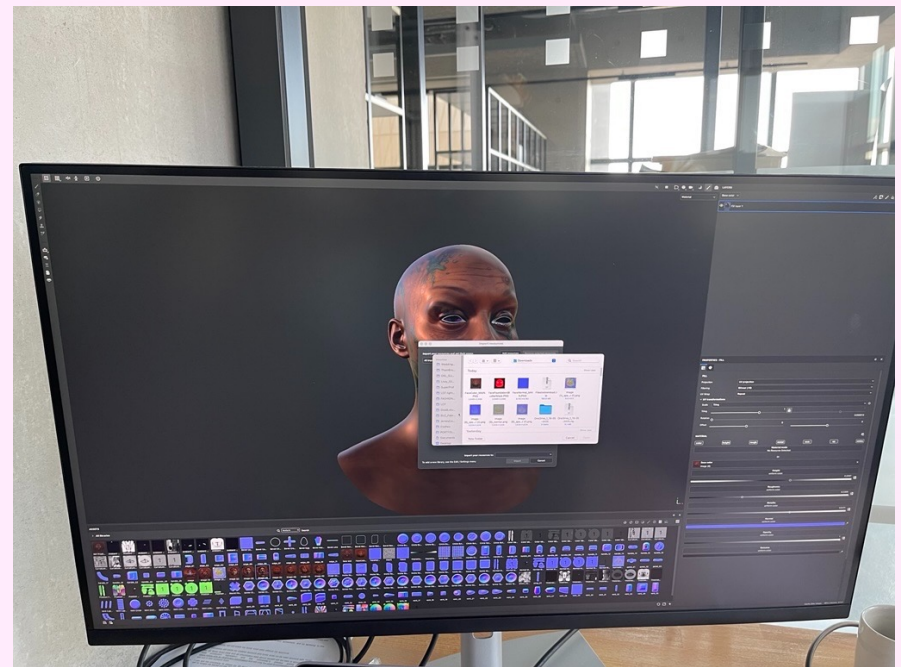
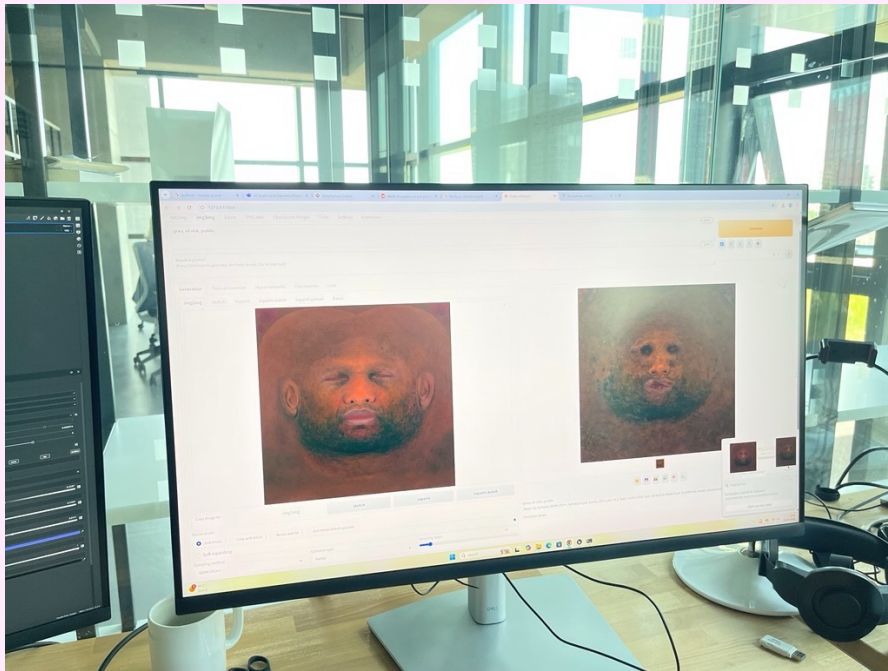


Rosa Waters: *Makeup Materials created in Substance*



# 7. AI and Iterative Design Practice

**Platform: Stable Diffusion and Substance Painter**



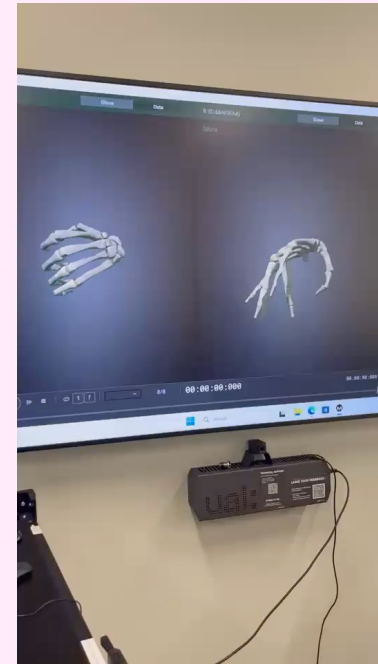
# 7. Motion Capture

## Equipment: X-Sens Suits, Motion Capture Studio and Unreal Engine

- Performer motion capture
  - Body animation
  - Hand animation
- Retarget X-Sens animations to Metahuman
- Process face animation using Metahuman Animator
- Combine and bake final character animation sequences



Meet Mike used the latest techniques in advanced motion capture to drive complex facial rigs to enable detailed interaction in VR

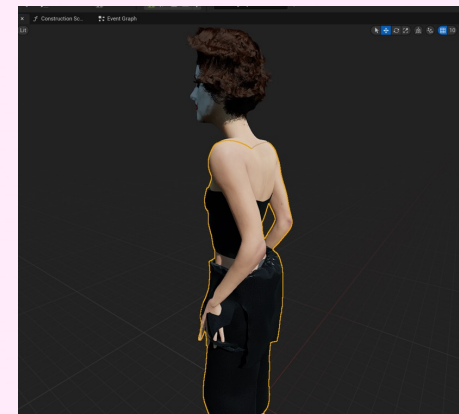
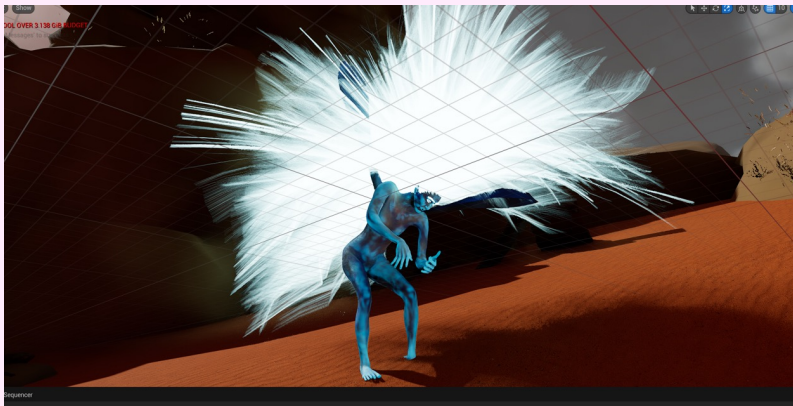




# 8. Final Assembly

## Platform: Unreal Engine

- Import all character assets
- Assemble characters
- Place within built environment
- Prepare for Virtual Production Shoot

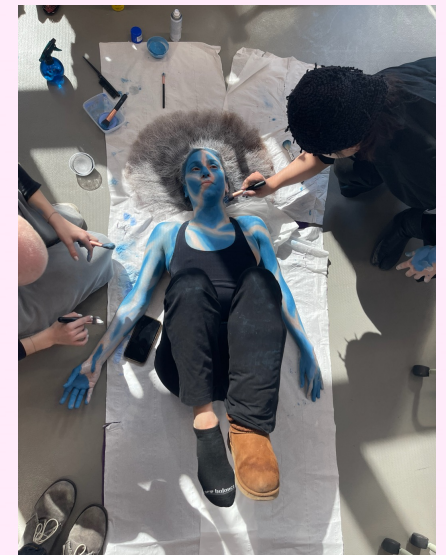
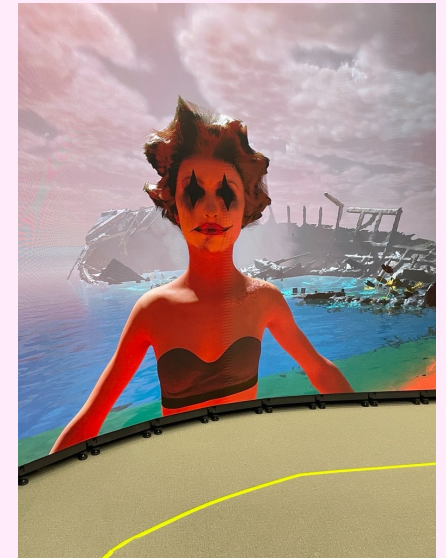
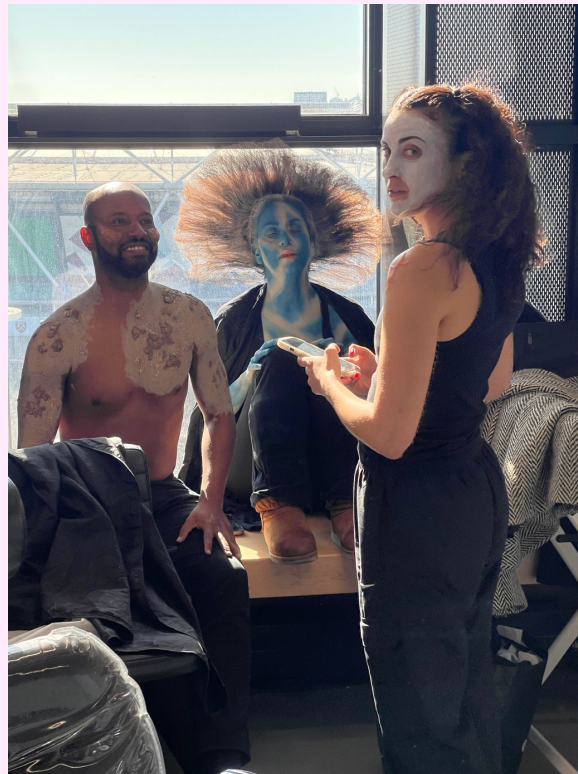
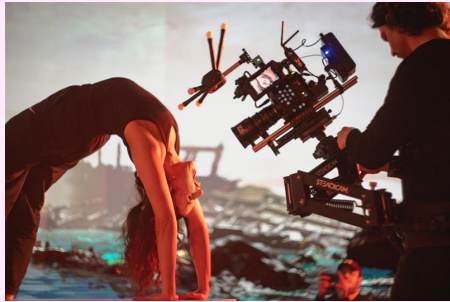




# 8. Virtual Production Shoot

## Venue: UAL XR Research Lab

- Using Virtual Production to showcase digital and physical practices



*Virtual Production Shoot to test and showcase physical and digital make-up practices*

# 9. Production Ethics

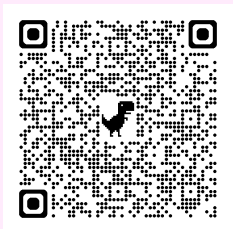
- Performer Consent and Agency
- Likeness Rights and Ownership
- Digital alteration of identity characteristics
- Body diversity limitations
- Long term data management
- Reducing human identity to data
- UEFN End User Agreement

# Contact Details/ Socials

**Ben Turnbull, Senior Lecturer in Performance Technology and Design, London College of Fashion**



**Mollie Gibb, Lecturer in Hair, Makeup and Prosthetics for Performance, London College of Fashion**



- **Copper Candle: Metaverse Theatre: <https://www.coppercandle.co.uk/>**



# Image Credits

## Slide 1

Banfield, H (2025) *Character of Ariel rendered from Substance Painter* [Screenshot]

## Slide 2

Scott, T (2020) *Travis Scott and Fortnite Present: Astronomical (Full Event Video)* [online video]. Available at: <https://www.youtube.com/watch?v=wYeFAIVC8qU>

Gamespot (2021) *Fortnite X Ariana Grande Rift Tour Concert Gameplay*. [online video]. Available at: <https://www.youtube.com/watch?v=k5EAPwXxcng>

## Slide 3

Fox, I (2025) *World Building for the Tempest* [Offline Video].

## Slide 4

Fragments of Tempest team in UAL's XR Research Lab at London College of Fashion, 2025

## Slide 7

Fox, I (2025) *Excerpts from Imogen's presentation on her practice*. [ Presentation]

## Slide 8

Du, Y. (2025) *Yilin Du Create* [Screenshot] Available at: <https://yilinducargo.create.site/>

## Slide 9

Turnbull, B (2025) *IJAD Cast Having Hair and Makeup Applied for Photogrammetry Shoot*. [4 x photographs]

## Slide 10

Metahuman Creator (2025). *Metahuman Creator Web Page*. [Screenshot]. Available at: <https://metahuman.unrealengine.com/>

# Image Credits

## Slide 11

Turnbull, B (2025). *Trinculo Metahuman*. [Screenshot]

*Profile image for performer Nadine Elise Munce*, n.d.

## Slide 12

Turnbull, B (2025). *Caliban Metahuman*. [Screenshot]

*Profile Image for Performer Antoine Marc* n.d.

## Slide 13

Turnbull, B (2025). *Ariel Metahuman*. [Screenshot]

*Profile Image for Performer and choreographer Joumana Mourad*, n.d.

## Slide 14

Turnbull, B. (2025) *Prospero Metahuman* [Screenshot]

## Slide 15

Zhang, Z. (2025). *Popo Sculpting Work-in-progress video*. [Offline Video]

## Slide 16

Banfield, H. (2025). *Ariel Wings Sculpting Work-in-Progress*. [Offline Video]

Zhang, Z. (2025). *Popo Sculpting Work-in-Progress*. [Offline Video].

# Image Credits

Slide 18

Mattocks, D (2025). *Trinculo Hair Creation*. [offline video]

Slide 19

Waters, R. (2025). *Beard Design for Caliban*. [Screenshot]

Banfield, H (2025). *Eyelash Grooming Work-in Progress* [offline video]

Slide 21

Banfield, H (2025). *Unwrapped Texture Maps for the character of Ariel* [texture images]

Slide 22

Waters, R (2025). *Screen Recordings of Processes in Substance Painter* [offline video]

Slide 25

Turnbull, B (2025). *Motion Capture Recordings with IJAD Dance* [offline video]

Slide 26

Turnbull, B (2025). *In Game Screenshots of characters from Fragments of the Tempest* [Screenshots]

# Bibliography

Bartneck, C., et al. (2020). Human-Robot Interaction: An Introduction. Singapore: Cambridge University Press.

Beeler, T. Et al (2010). High-quality single-shot capture of facial geometry. ACM Transactions on Graphics (TOG) volume 29, issue 4. Available at: <https://dl.acm.org/doi/10.1145/1778765.1778777>

Did, M. (2024). Everything to Play For: An Insider's Guide to How Videogames are Changing Our World. United Kingdom: Verso Books.

Gerlich, Michael. (2024). Societal Perceptions and Acceptance of Virtual Humans: Trust and Ethics across Different Contexts. Social Sciences. 13. 516. 10.3390/socsci13100516.

Haraway, D. (1991) A Cyborg Manifesto: Science, Technology and Socialist Feminism in the Late Twentieth Century. Simians, Cyborgs and Women. The Reinvention of Nature, Routledge, New York, 149-181

Ma, X. Et al (2021) Deep learning method for makeup style transfer: A survey. Cognitive Robotics 1. Available at:

[https://www.researchgate.net/publication/355294725\\_Deep\\_learning\\_method\\_for\\_makeup\\_style\\_transfer\\_A\\_survey](https://www.researchgate.net/publication/355294725_Deep_learning_method_for_makeup_style_transfer_A_survey)

Ollerearnshaw, A. Theatre Green Book PRODUCTIONS Toolkit – Wigs, Hair and Make-up. Available at: <https://theatregreenbook.com/sustainableproductions-toolkit/wigshairandmakeup/>. Accessed 15th May 2025

Seymour, Mike & Evans, Chris & Libreri, Kim. (2017). Meet Mike: epic avatars. 1-2. 10.1145/3089269.3089276.

Statham, N. (2018). Use of Photogrammetry in Video Games: A Historical Overview. Games and Culture. 15

Warby, N. (2020). Why Fortnite's Live Events Are Good For Gaming. Available at: <https://www.independent.co.uk/why-fornites-live-events-are-good-for-gaming/>. Accessed 3rd May 2025

"What is Virtual Production?"(n.d.). Available at: <https://www.unrealengine.com/en-US/explainers/virtual-production/what-is-virtual-production>. Accessed: 5th May 2025