

# HIBACHI

## “HIBACHI”

Project Report

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Project 2  
November 2022

# Approval Sheet

The Design Project 2 Titled “ Hibachi - Animated Short” by **Mohamed Raya** , **Roll Number 216340013**, is approved in partial fulfillment of the requirement for the ‘Master of Design’ in the Animation and Film Design at Industrial Design Center, Indian Institute of Technology, Bombay.

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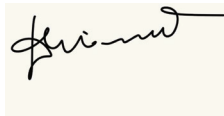
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Dhimant Vyas

Date : 06-07-2023

## Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources.

I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission.

I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

A handwritten signature in black ink, appearing to read 'Mohamed Raya', followed by a period.

Mohamed Raya  
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IDC School of Design  
IIT Bombay  
November 2022

## Acknowledgements

I would like to thank my guide, Prof. Sumant Rao, for nudging me in the right direction at each stage of my project. I would also like to extend my gratitude to my co-guide, Prof. Swati Agarwal, for always keeping a check on how I was doing and if I was able to make progress regularly and motivating me nevertheless and quite importantly Prof. Jayesh Pillai for guiding me through the entire real time production pipeline and for providing me with the necessary tools for the same.

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## Abstract

The aim of this project is to make a 'One Minute' short animated film on the topic intrusive thoughts and day dreaming. I would like to experiment with and make use of several AI powered animation tools and Virtual Production engines that I believe would make the future of the animation pipeline more dynamic and robust. Through the course of this project I would see the entire length of the animation pipeline for a 3d animated film from start to finish. For the final output I intend to have a film that conveys the narrative to its full potential while being done entirely using Real Time production tools.





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# 1. Introduction

## 1.1. Concept

‘Intrusive thoughts’ are the subconscious thoughts one has that are often uncomfortable and not something one would act on. With the onset of the current media influence, a growing number of people are facing an issue of increasing intrusive thoughts that cause several issues that deeply affect their personal as well as work life. An intrusive thought often occurs due to a lack of concentration especially with the people who follow a habit of multitasking in everything that they do. Personally I myself often seem to have intrusive thoughts that are deeply influenced by the media that I frequently consume. While the very word itself is almost always associated with dark and disturbing scenarios, It is also quite commonly harmless, varying from individual to individual. It was this side of this issue that I wished to highlight when I started to narrow down topics for this project film.

Upon taking interviews of people within the age range of 20-30 I was able to learn that more often than not an individual tends to hold on to an intrusive thought and voluntarily imagine themselves in said scenarios. Almost all of the people interviewed had put themselves in a hero position wherein their kith and kin are put in danger and they rise to the occasion saving the day. This fine line between daydreaming and intrusive thoughts led me to my final story.

In the making of this film I have made use of several experimental technologies that have aided me at every step of the animation pipeline. I chose to use this project as a learning opportunity to explore and understand what the future of the animation and film making industry would be like and try to contribute to the development through my learnings and shortcomings.

## 1.2. Process Overview

The process followed in the making of this film is divided into the following three sections

1. Research and Ideation
2. Pre-Production
3. Production
4. Post Processing

The first stage involved extensively studying about the causes and roots of intrusive thoughts and the effects of multitasking in order to develop a story revolving around the same. I also spent time looking at different softwares and AI powered tools that would enable me to fulfil my film the best way possible. The pre-production stage consisted of storyboarding, making the characters and set design, which was followed by production and post processing which followed a general 3d animation pipeline using real time production using Unreal Engine.

## 2. Stage 1: Research and Ideation

### 2.1. Secondary Research

The initial study started with secondary research on the topics of Multitasking and Intrusive thoughts. A general consensus from the study of multitasking behaviour is that it eventually leads to a lack of focus and inability to truly do a task to the full potential of the person. Tasks that require cognitive focus generally tend to be the ones where multitasking fails to help as opposed to automatic tasks which are normally done with muscle memory and force of habit.

#### Focussed Tasks

- Conversations
- Writing
- Reading

#### Automatic Tasks

- Driving
- Playing an instrument
- Folding laundry

Several studies done on intrusive thoughts have shown that the thoughts tend to fall into a certain set of categories.

- Germs, infections, or other kinds of contamination.
- Violent acts, aggression, or causing harm to other people.

- Doubts about doing tasks wrong or leaving tasks unfinished.
- Religion, blasphemy, or being an immoral person.
- Sexual acts or situations.
- Acting out or saying the wrong thing in public.

The psychological effects of constantly having intrusive thoughts also tends to vary with each individual's daily routine as well as medical reasons.

#### Reasons (Non Medical)

- Tiredness
- Too much going on
- Lack of interest in current task
- Substance use

#### Reasons (Medical)

- ADHD
- Concussion
- Insomnia
- Anxiety

### 2.2. Primary Research

The secondary research was followed by primary research which was a set of personal interviews on what people generally tend to have

intrusive thoughts about and how they reacted to certain thoughts. The names of the interviewees have been redacted for confidentiality.

#### Person A

- Death of a family member
- Travel Destinations

#### Person B

- Death of a family member
- Death of self
- Imagines self as a celebrity

#### Person C

- Think about pending work especially creative work
- Violent deeds triggered by anger issues'
- Death of a family member
- Usually based on games played or tv shows watched

#### Person D

- School under attack - saves everyone
- Celebrity encounter scenario
- Violent intrusive thoughts
- Death of a family member
- Usually based on games played or tv shows watched

#### Person E

- Death of a family member
- Violent intrusive thoughts
- Usually based on games played or tv shows watched

#### Person F

- Multiple intrusive thoughts
- Exclusively self harm
- Immoral acts

#### Person G

- Scenarios during driving due to PTSD
- Violent intrusive thoughts
- Buildings collapsing
- Parkour
- Death of a family member

#### Person H

- Vandalism
- School under attack - saves everyone
- Usually based on games played or tv shows watched
- Constant internal voice to jump when in higher altitudes
- Visualised and planned a jump when intoxicated
- Death of a family member

#### Person I

- School under attack - saves everyone
- Violent intrusive thoughts
- Death of a family member
- Sibling Rivalry
- Violence towards fictional characters

### 2.3. Story Ideation

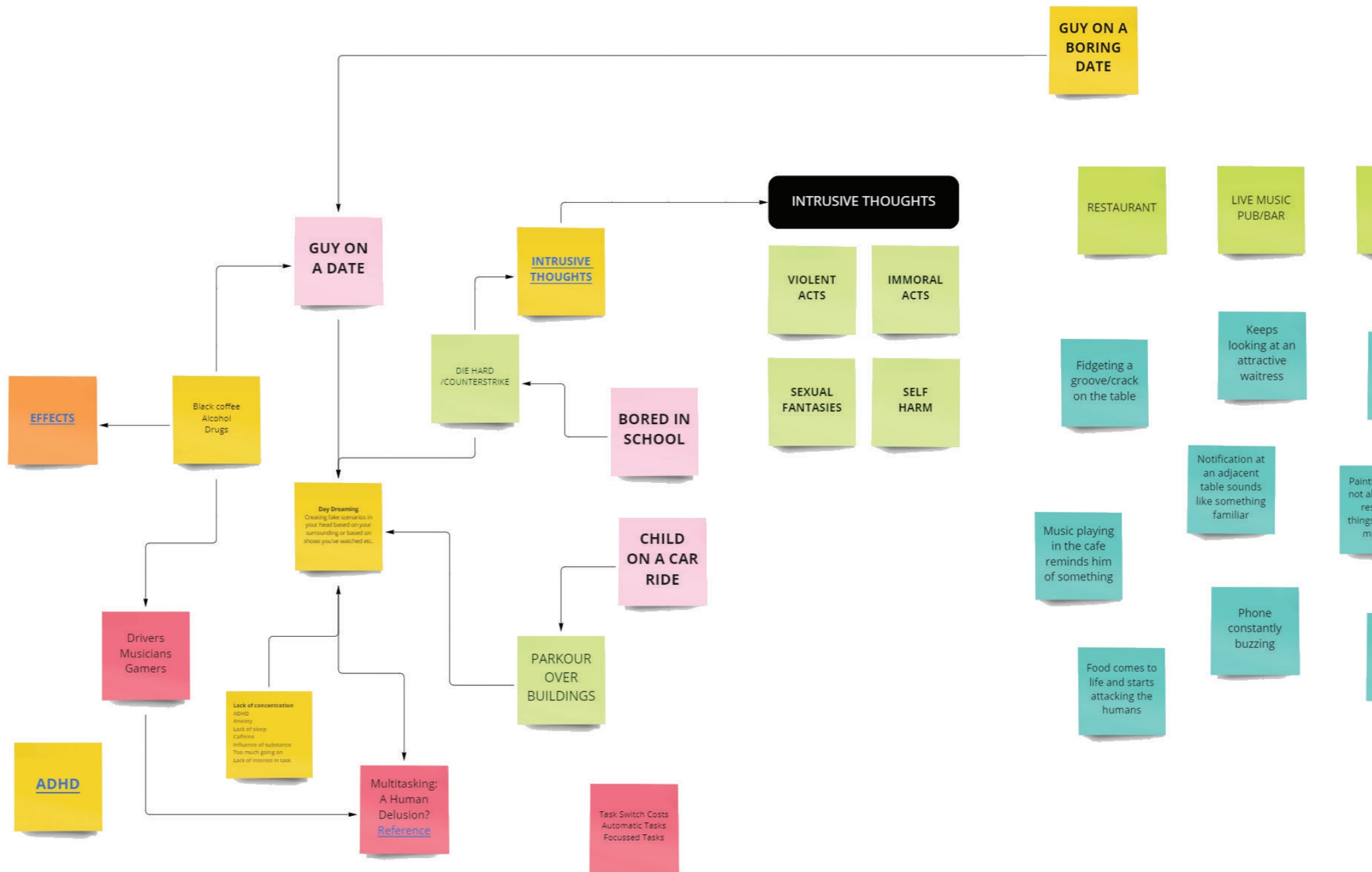
In order to come up with a story for the film I started with compiling all the data collected through the research and mapping them out in a mind map. Taking key points from the different areas and anecdotes from the research I was able to come up with multiple story ideas.

- Caffeine drinking anxious boy goes on date with an annoyingly talkative girl - girl asks him a question which leads him into a spiralling thought process of all the ways he can get out of the date with an excuse - He finally comes up with the answer to her question towards the end.
- Girl with OCD attends an interview with lack of sleep and loaded with caffeine - Gets distracted mid interview with the number of questions being asked and the different things placed in the room all the while still answering the questions - snaps back to reality and asks the interviewers a question.

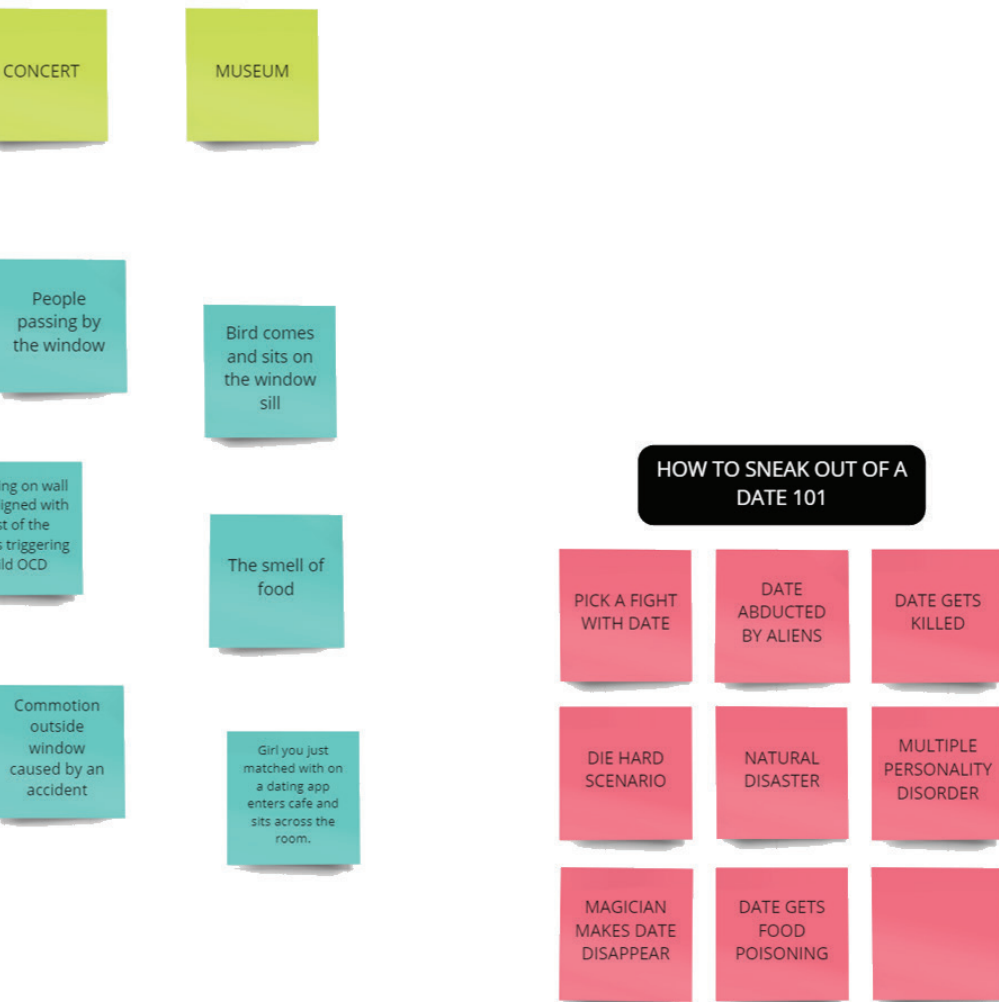
- Sleepy student is bored and distracted in class - Imagine a “Die Hard” type scenario in the school where he saves his classmates, all based on movies and games he has seen or played - Brought back to focus by the school bell or chalk being thrown to forehead.
- Child on a long car ride is being asked questions by the mother about a report card while looking out the window - Child starts visualising characters from the different academic subjects doing parkour and fighting over the cityscape - Report card shows good grades in art and average grades in the technical subjects.
- Younger sibling is being bullied and mocked by older sibling during a game of football - younger sibling starts imagining 5 scenarios in which he can kill his brother - Breaks out of the thought process as ball hits his face and brother comes to help him up and pats him on the head.

### 2.4. Final Story

- Protagonist is an animator and an anime/comic enthusiast.
- Goes on a date with his girlfriend to a fancy restaurant.
- Girl talks about how she can’t believe they came to this place as opposed to always going to hibachi or sushi restaurants because of how much the guy loves Japanese food just because he watches anime and makes all his animated films revolve around the same
- The environment turns into a hibachi restaurant.







- She goes on to tell him about how his obsession with anime, movies and games is getting quite frustrating.
- The fact that he is always looking for stories and characters everywhere they go, either location scouting or making up animated scenarios gets on her nerves.
- With every instance she mentions, the guy visualises different characters walking into or popping up in the sushi restaurant environment.
- At one point the girl says animated films/anime are for children.
- All the characters turn to look at her.
- They try to attack the girlfriend seeking vengeance for what she said so the guy jumps in and tries to protect her by fighting.
- Despite his multiple defence tactics the girl gets shot in the stomach and coughs up blood.
- She calls out his name repeatedly coughing blood.
- He snaps out of his imagination and realises that it was all in his head and the blood in her mouth was actually marinara sauce.

1

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2



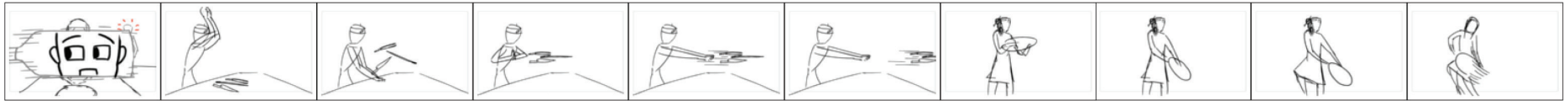
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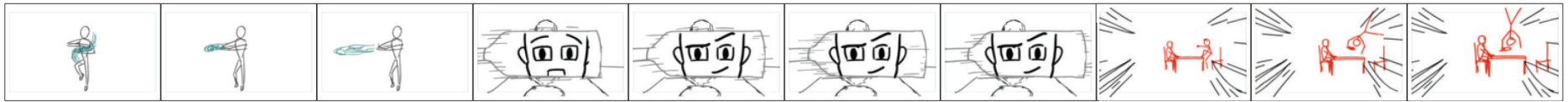


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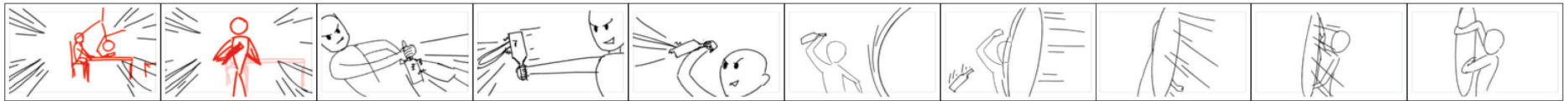


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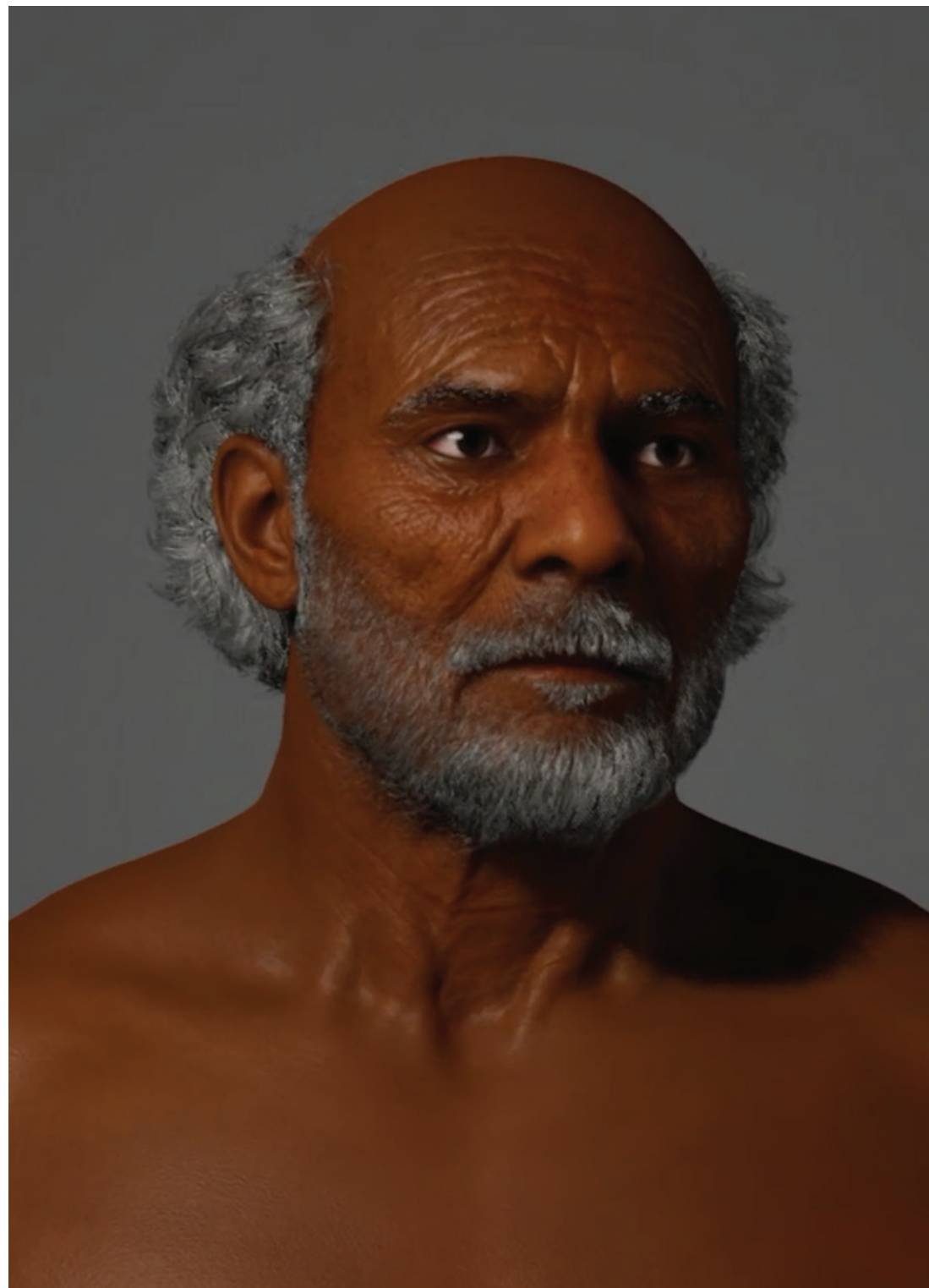
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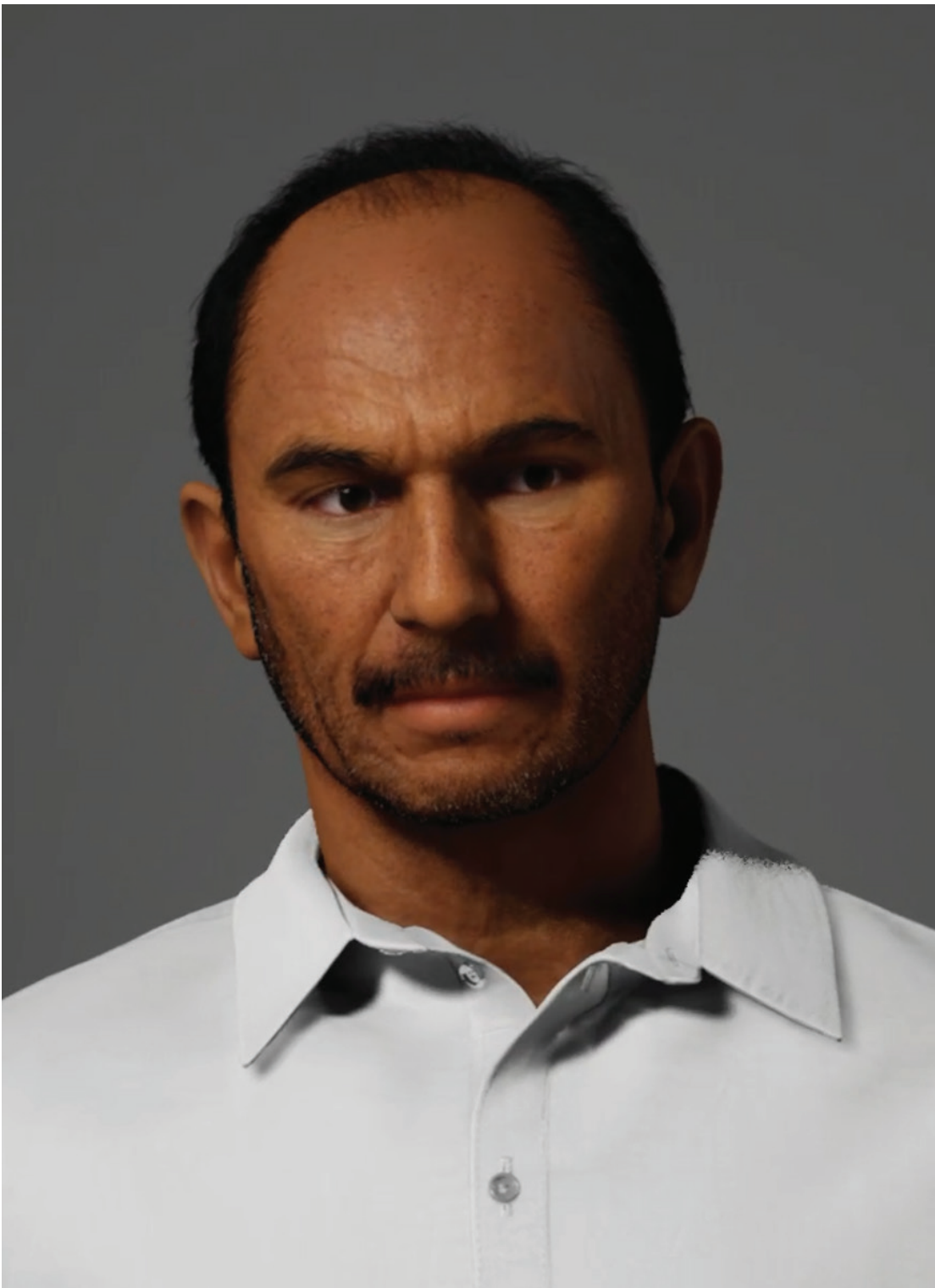
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### **3. Stage 2: Pre-Production**

The pre-production stage started with the making of the storyboarding/animatic of the film. This was entirely done on 'ToonBoom Storyboard Pro' which is a software dedicated to storyboarding.

#### **3.1. MetaHuman Creator**

MetaHuman is a character creation framework developed by 'Epic Games' to be used in integration with 'Unreal Engine'. MetaHuman Creator is a free cloud based application which I used to create the characters for the film. The characters are fully rigged for body and facial animation and have textures that are highly photorealistic.

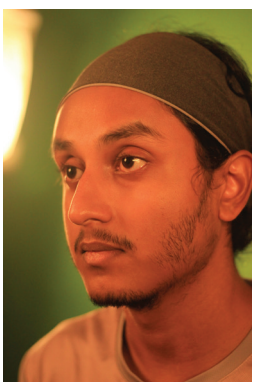
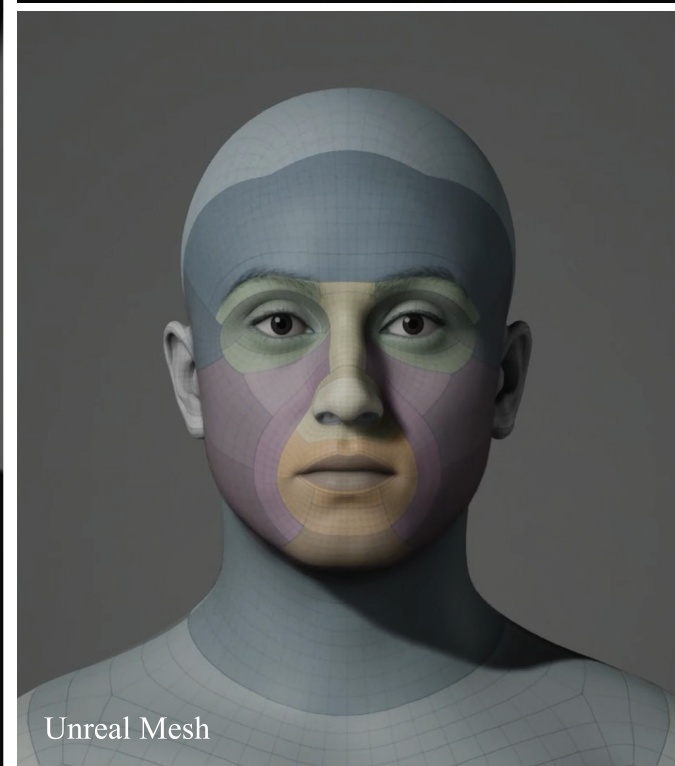
#### **3.2. Mesh to Metahuman**

Two out of the Five characters were created using a feature called 'Mesh to MetaHuman' in Unreal Engine which is a plugin which allows for custom meshes to be converted into MetaHumans. Over 200 photos of the subjects face were captured and a 3d model was generated using 'Reality Capture', a photogrammetry application that uses image processing to generate 3d models from an image library. This 3D model along with its texture map was imported into Unreal Engine to generate an animatable mesh which was then plugged into MetaHuman Creator to convert it into a MetaHuman.

















### 3.3. Concept Art

Concept art for this film was generated using ‘Dall.E 2’, which is an AI model that generates art using prompts given as text input. This was an experimental process I wished to carry out to see the extent to which I can get concept art that would not be confined to the imagination of my lone self. These paintings were loosely used as reference material upon building the set and deciding the visual look of the film.





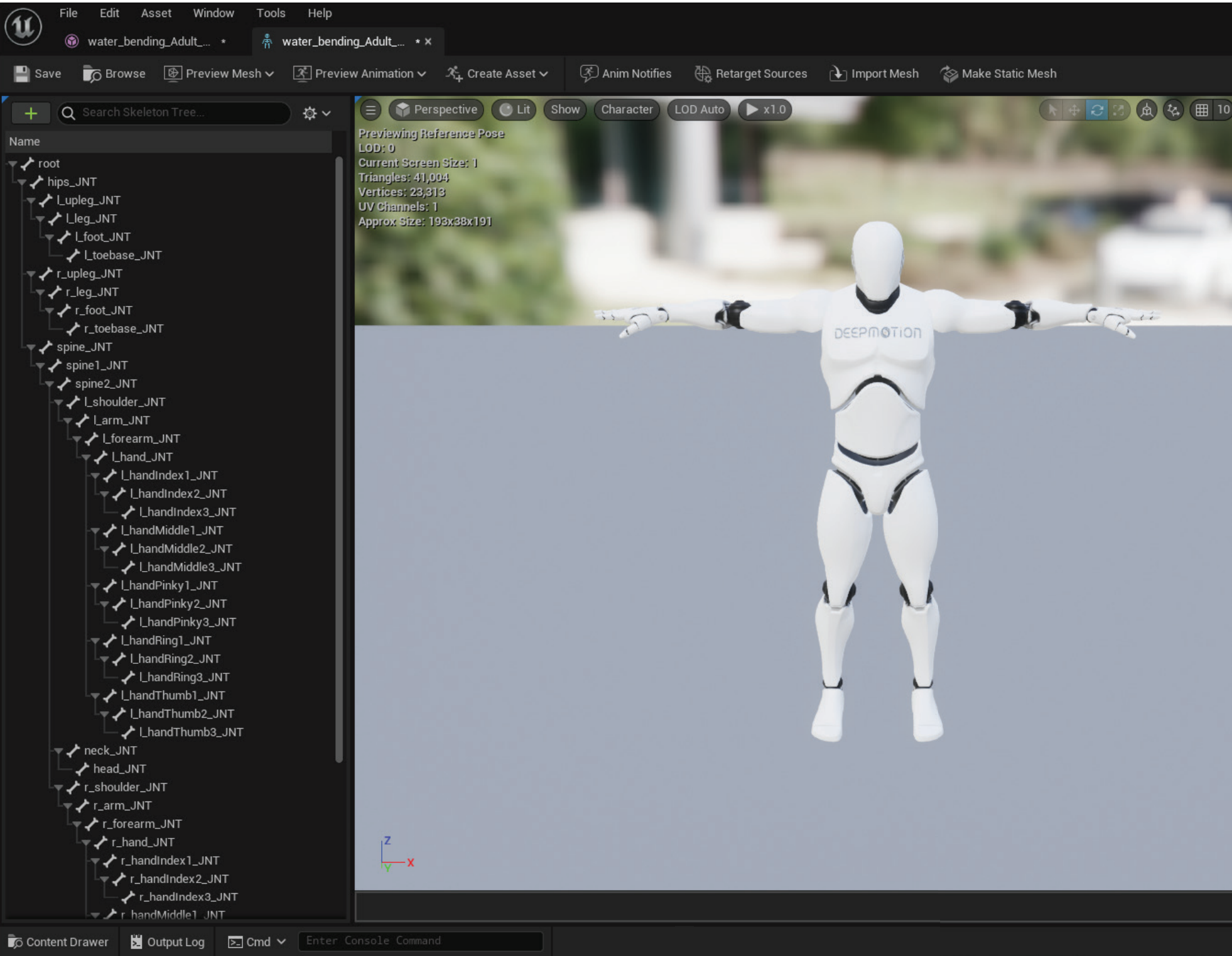


## 4. Stage 3: Production

The production process was entirely done on ‘Unreal Engine 5’ using the virtual production process built by epic games. When I first started production I had intended to do the film entirely in motion capture and then clean up the Mocap data. In this section I will breakdown the different challenges I faced in each stage of the production and the way it changed my pipeline accordingly.

### 4.1. Live Link Face for Unreal Engine

All of the facial acting for this film was captured in real time using an iOS app by Unreal Engine called ‘Live Link Face’ . The app’s tracking leverages Apple’s ARKit and the iPhone’s TrueDepth front-facing camera to interactively track a performer’s face, transmitting this data directly to Unreal Engine via Live Link over a network. This captured data was available in both the raw blendshape data (CSV) and a front-facing video (MOV) which helped further tweak the acting using keyframe correction in engine.








#### **4.2. Animate 3D by DeepMotion**


Animate 3D is a cloud based AI powered motion tracking application developed by DeepMotion. It implements Image Processing using AI to give high fidelity motion capture data retrieved from videos. This process enabled me to achieve motion capture without the requirement of expensive motion tracking hardware. I was able to just upload a reference video of the required action and obtain the corresponding animation. But there were several challenges as the model is still in its beta testing stages. I was able to observe a lot of jitter and offset in the skeleton applied with the Mocap data. While this required only a simple process of cleaning up the keyframes, given my time frame and schedule I decided to use this only for one shot which I had tested it on and do keyframe animation by hand for the remainder of the film in unison with the facial capture data that I had previously recorded.



File Edit Window Tools Build Select Actor Help

 Restaurant





 Select Mode ▾



Platforms ▾



 Perspective


 Detail Lighting


Show

Scalability: Cinematic

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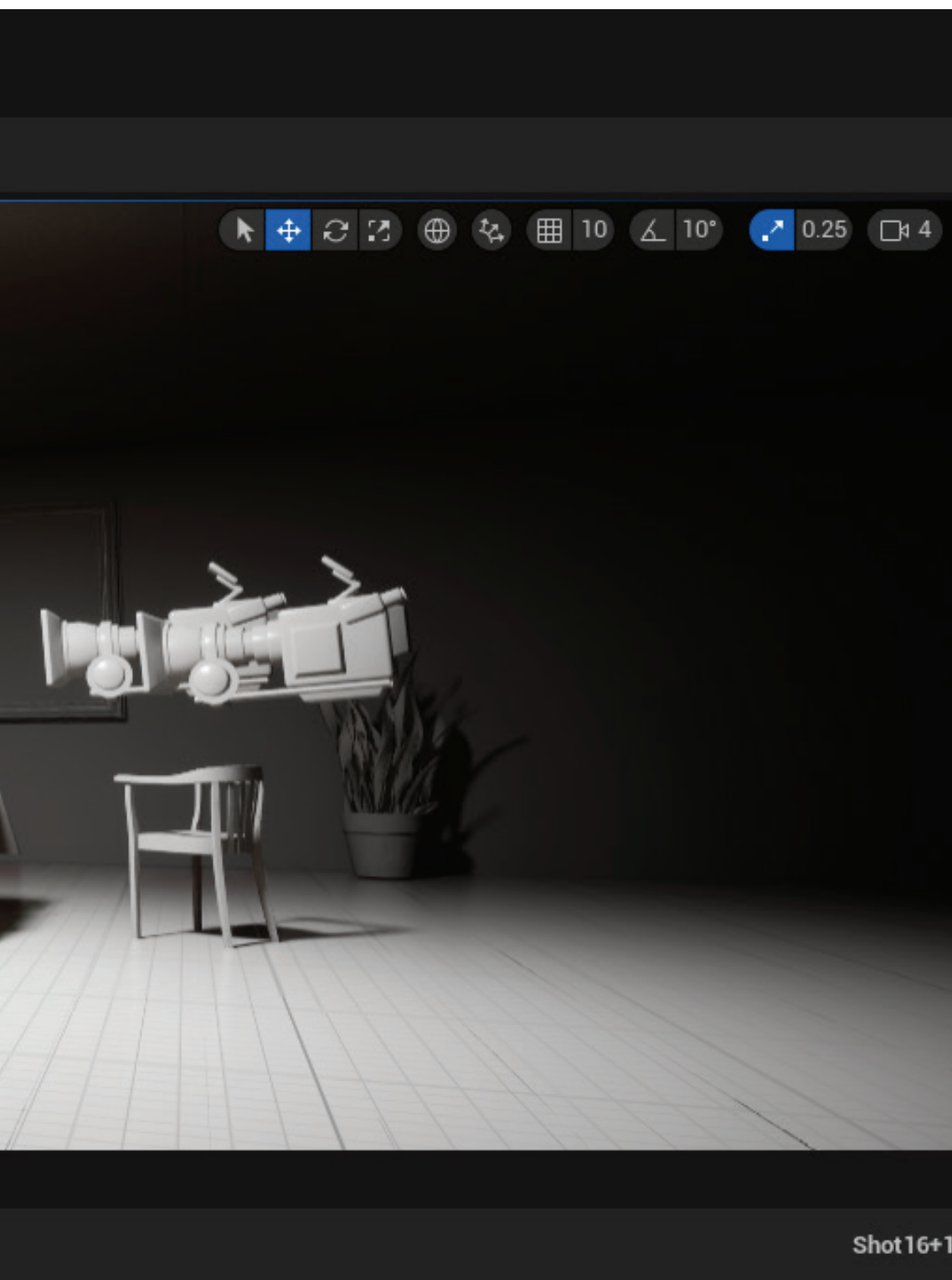
 Content Browser

 Sequencer



30 fps ▾





### 4.3. Unreal Engine 5

The animation production was done entirely on Unreal Engine 5. This software was entirely new to me as I had only ever worked on blender and Unity prior to this project so this film was a great opportunity for me to dive deep into understanding how I could use the virtual real time production pipeline established by the engine. I was able to achieve photorealistic renders in real time with little to no crashes in the system or noise in the rendered output. The fully textured and rigged MetaHuman models allowed me to skip the texturing and rigging process and get to the animation stage directly. The engine's Lumen lighting system also enabled dynamic lighting and reflections within each scene. While almost all of the work was done within the engine I also modelled assets in 'Blender' and imported them into the engine and textured them. I was also able to make use of the sequencer inside the engine which provides real time editing using camera cuts switching between different shots within the scene to render out a rough cut of my film in 3D before final rendering.W





File Edit Window Tools Build Select Actor Help

hibachi\_rest



Animation Mode



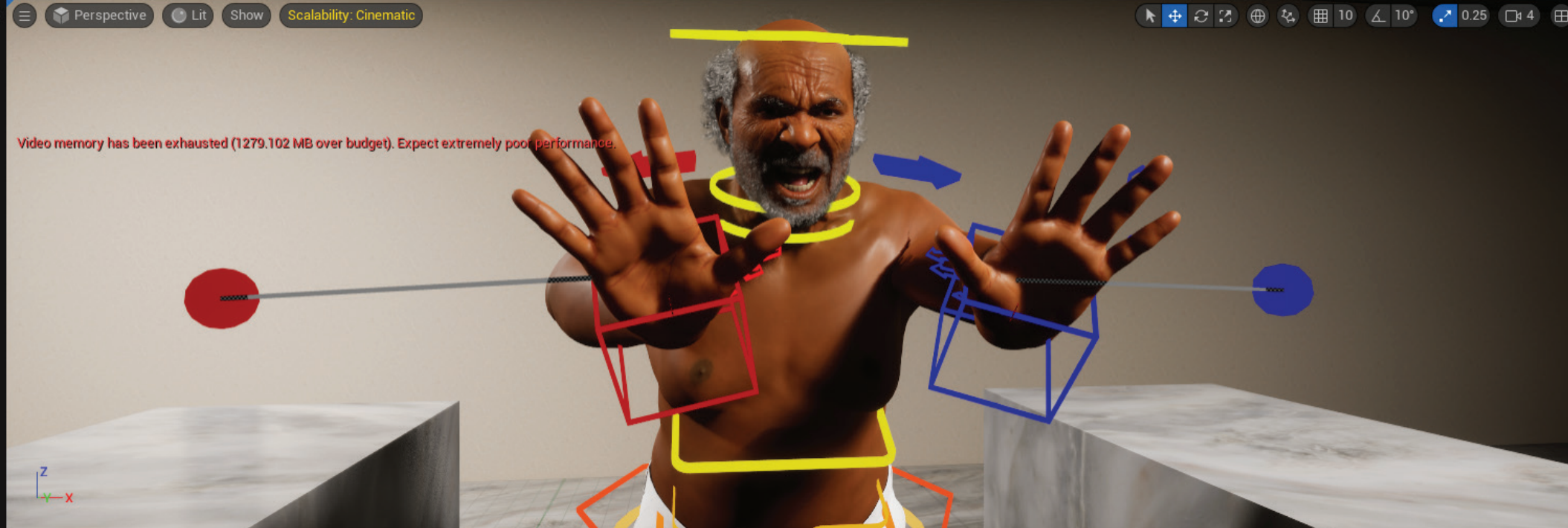
Platforms

Animation

Perspective Lit Show Scalability: Cinematic

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Content Browser

Sequencer

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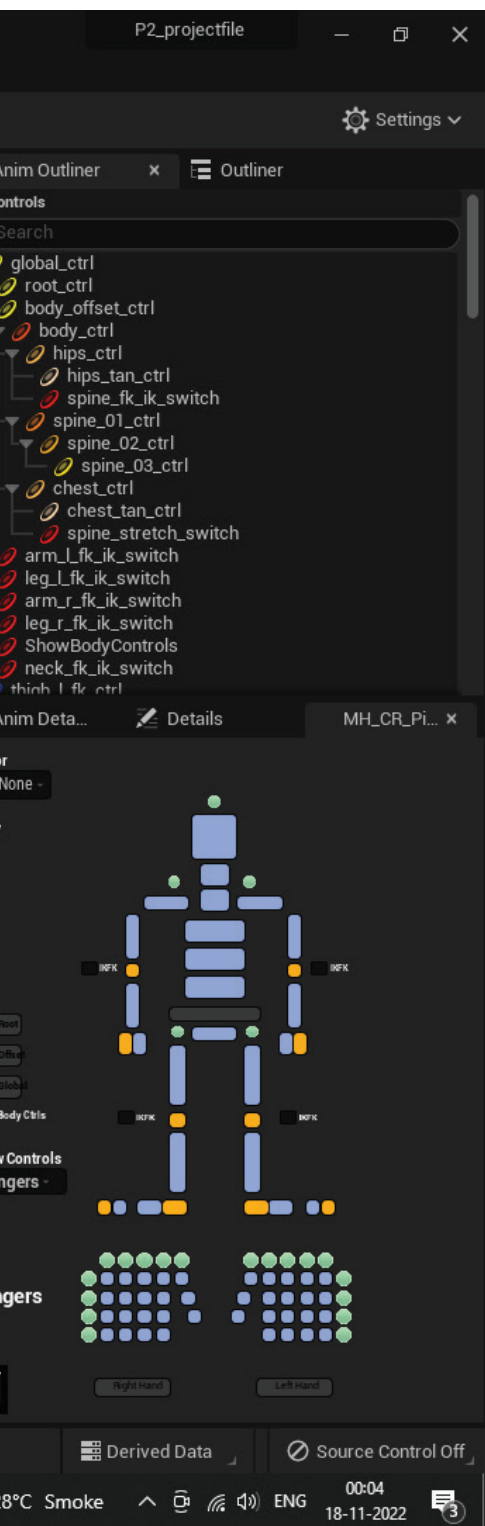
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## 5. Conclusion

What started out as a learning opportunity for me to explore the different methods I can implement and the different software that I can put to use turned out to be very fruitful in also helping me understand the entire pipeline of 'Real Time 3D Production'. I was able to save a lot of time by using AI integrated systems for the different stages of the production which would have otherwise taken me hours and hours of manual labour. The project was made as a personal reminder of the thoughts within myself and that was what led me to cast myself in the film as well. This being my first ever fully produced animation short film I was able to achieve what I had intended to do in the best ways within my capabilities while also pushing the limits of my knowledge and skills.

## 6. References

- <https://www.brightside.com/blog/reasons-you-may-have-trouble-concentrating/>
- <https://www.npr.org/2008/10/02/95256794/think-youre-multitasking-think-again>
- <https://www.healthline.com/health/mental-health/intrusive-thoughts#conditions>
- <https://www.unrealengine.com/en-US/metahuman>
- <https://docs.unrealengine.com/5.0/en-US/recording-face-animation-on-ios-device-in-unreal-engine/>
- <https://arxiv.org/abs/2204.06125>
- <https://openai.com/dall-e-2/>
- <https://www.deepmotion.com/Animate-3D>
- <https://www.youtube.com/watch?v=b8e5dT7-q-Q>
- <https://www.youtube.com/watch?v=ehlyI6d7TkQ>
- <https://www.youtube.com/watch?v=DJ86QWzI2Wo>