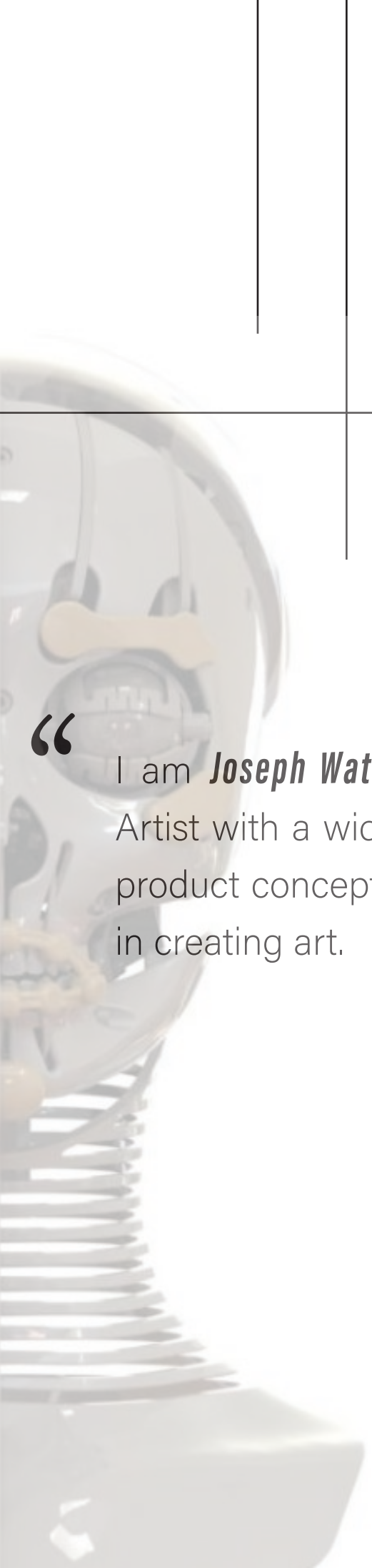
Portfolio

Joseph Watson

Introduction



“I am ***Joseph Watson***, a CAD Designer, 3D modeler, and Artist with a wide range of experience in manufacturing, product concepts and rendering, design, simulation, and in creating art.”

Index

Skills

Design

Mechanical Design
Product Design
Mold Design
Design for Manufacturing
Assembly
Sculpting
Texturing
Rendering

Animation

Rigging
Animating
Retargeting
Cinematics and Camera Control
Facial Mocap
Body Mocap

Software


KeyShot


SOLIDWORKS


PERCEPTION
NEURON


unity

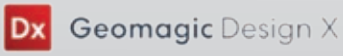

UNREAL
ENGINE


MAYA


ZBRUSH


Houdini


blender


Dx
Geomagic Design X


AUTODESK
FUSION 360


CINEMA 4D


Rhinoceros


RO
KO
KO


Ai


Ps


SUBSTANCE
PAINTER

Section One : Skills

Design

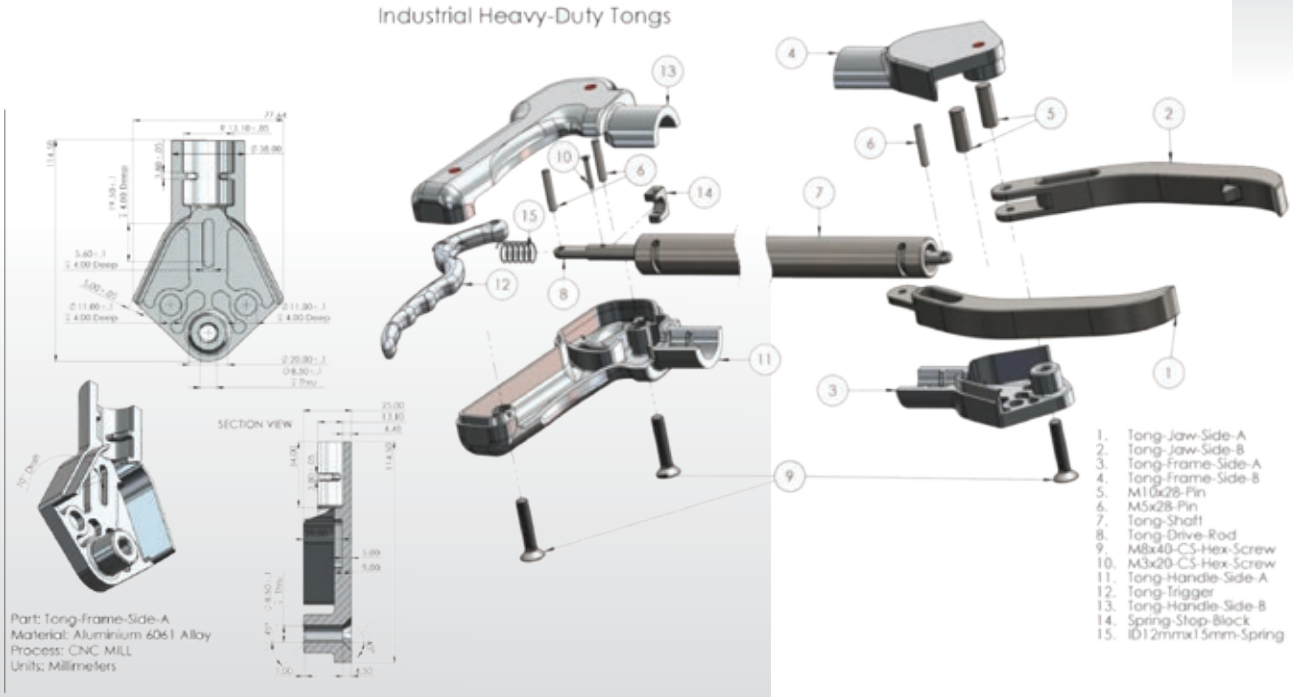
I am a CAD designer with experience in product design and design for manufacturing, including injection molded components, die-cast pieces, vacuum formed packaging, 3D printed and CNC cut parts. My CAD experience also includes mechanical design of robotic assemblies, mold design, and conceptualizing and designing large mechanical assemblies.

Animatronic Head

An animatronic human head with 34 actuators controlling the motions of the face and neck. The surfacing of this model was done using a combination of Zbrush, Geomagic Design X, and Solidworks. The mechanical components were modeled in Solidworks. The rendering was done using Keyshot.

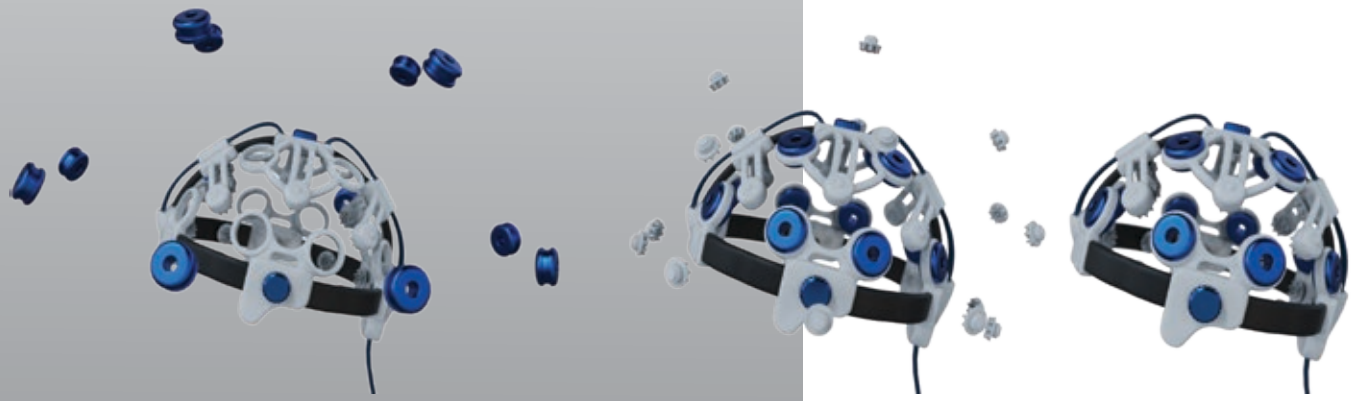
CNC components

Technical drawings of various components designed for manufacturing using CNC cutting. The designs and technical drawings were created using Solidworks.



EEG Cap Concept

A concept rendering of a commercial EEG Cap used to non-invasively monitor brain activity while performing tasks. Designed in Solidworks and rendered in Keyshot.

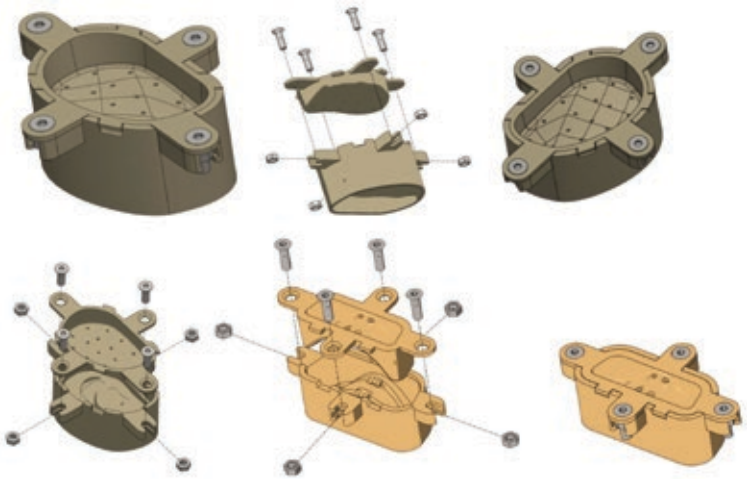


Mechanical Heads

Examples of mechanical head designs for different characters. Mechanical designs created in Solidworks, surfacing and sculpting done in Zbrush, mesh to NURBS operations done using Geomagic Design X, and rendering done using PhotoView 360.

Caspar Mold Version 1

This is the first version of the blanket mold produced for the Caspar project. This design consists of a two-sided shell and base plate made of CNC cut plastic, a polyurethane blanket mold surrounding the entire head, with an opening seam running along the back of the head. A pouring spout is included on the top of the mold used to pour the polyurethane blanket, and to pour the silicone skin after the blanket is cured. The mold core is 3D printed SLS Nylon. The assembly was created using EinScan Pro for 3D scanning, Solidworks for parametric designs, Zbrush for topological and sculptural changes, Geomagic Design X for Mesh to NURBS operations, and rendered in Keyshot.



Various molds

Various compression molds used in small quantity productions. Designed in Solidworks and Geomagic Design X

BCI Product Rendering

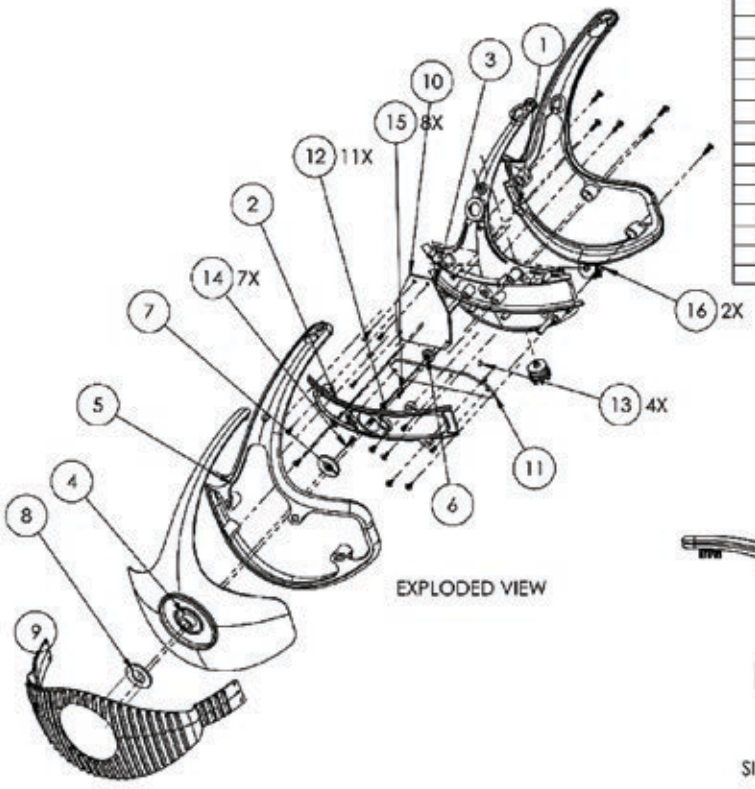
Product renders of a commercial BCI device used to used for neuromodulation taska and Transcranial Direct-Current brain stimulation. Designed in Solidworks and rendered in Blender.

BCI Design and Production Drawings

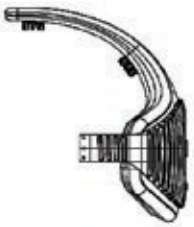
Technical drawings and assembly diagrams of a comerical BCI device. Designed in Solidworks. Drawings drafted in Solidworks.

HOUSING BACK SIDE

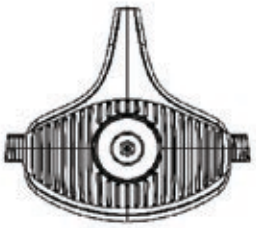
ITEM NO.	PART NUMBER	QTY.
1		1
2		1
3		1
4		1
5		1
6		1
7		1
8		1
9		1
10		1
11		1
12		11
13		4
14		7
15		8
16		2



EXPLODED VIEW



SIDE VIEW



BACK VIEW

HOUSING LEFT SIDE

ITEM NO.	PART NAME	QTY.
1		1
2		1
3		1
4		1
5		1
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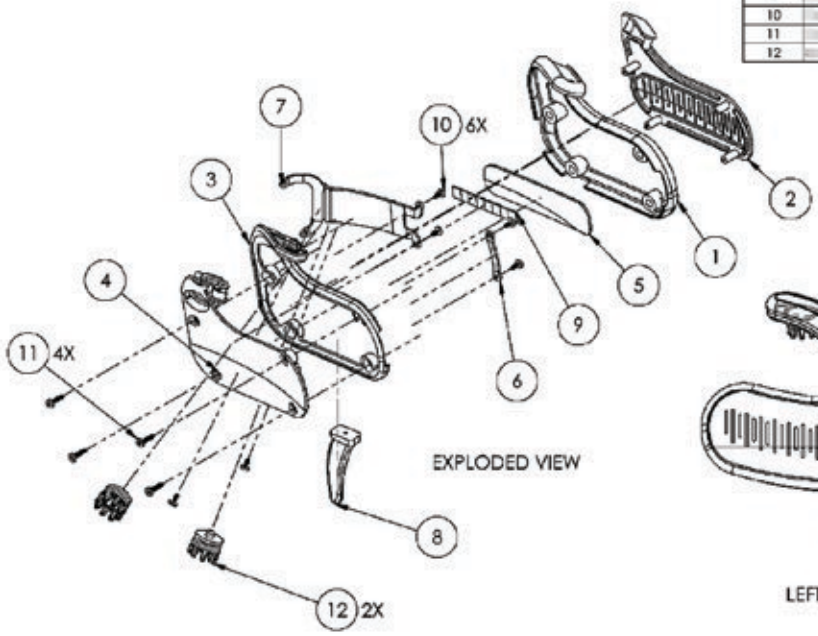
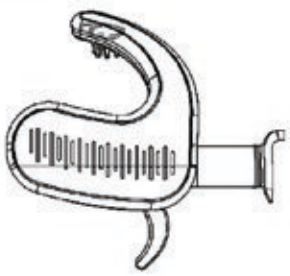
7		1
8		1
9		1
10		6
11		4
12		2

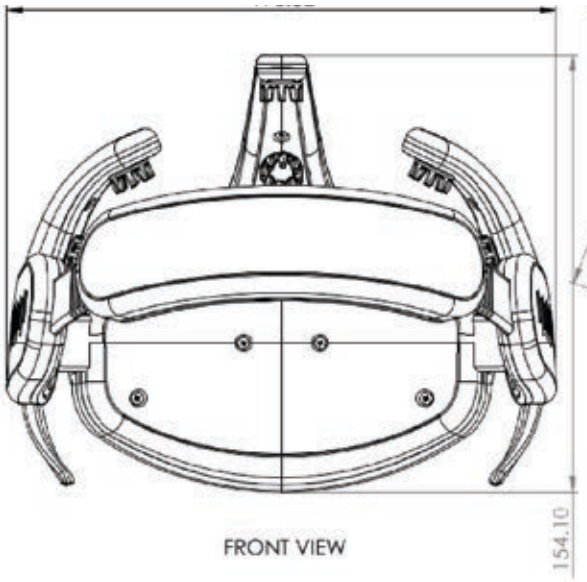


EXPLODED VIEW

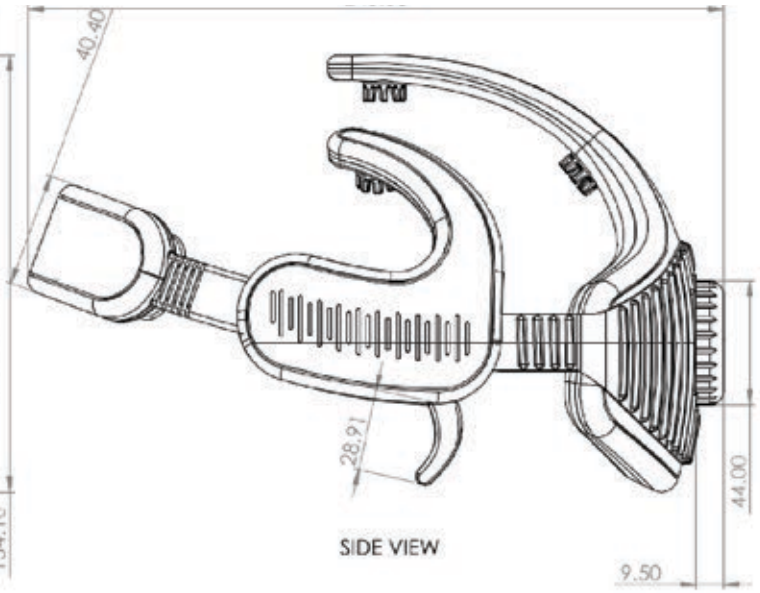


LEFT VIEW

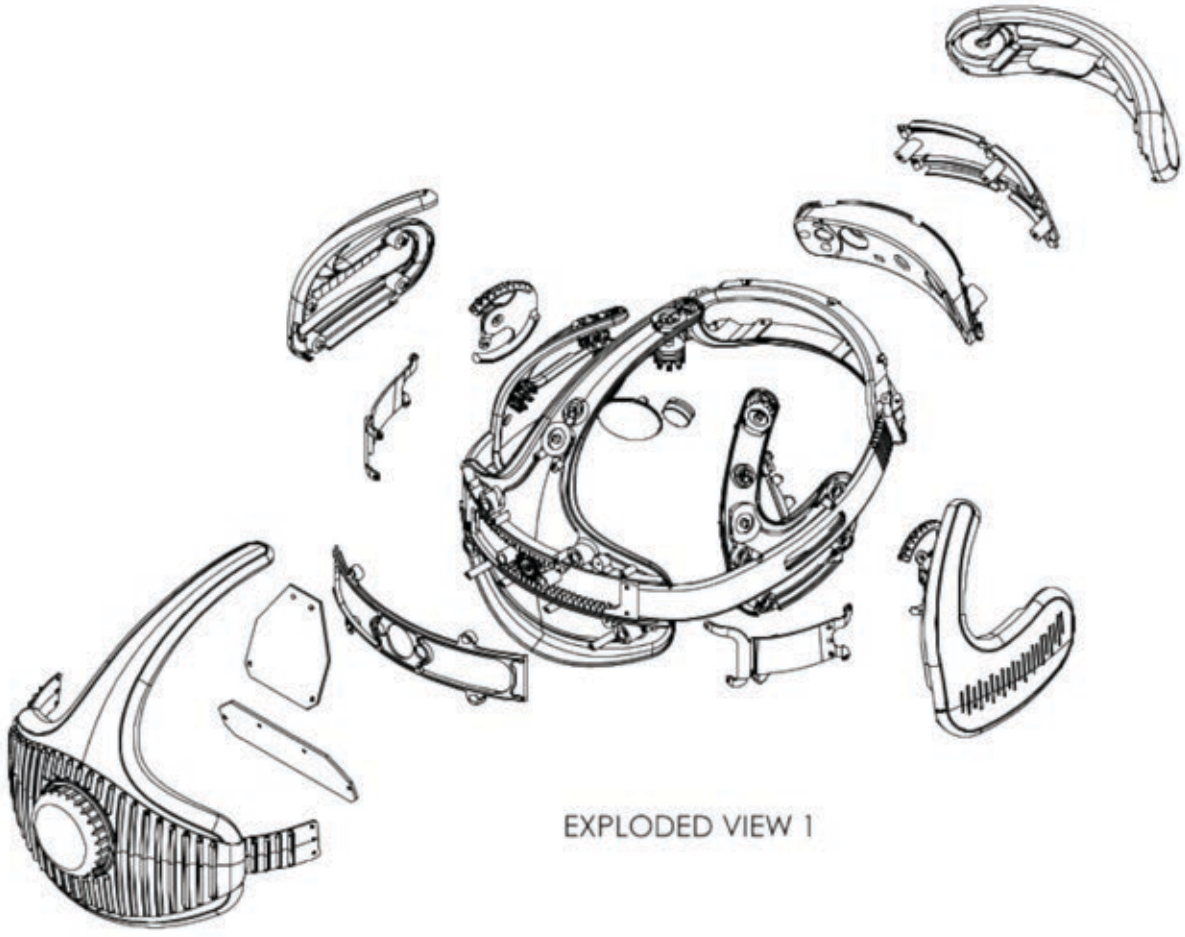
FRONT VIEW



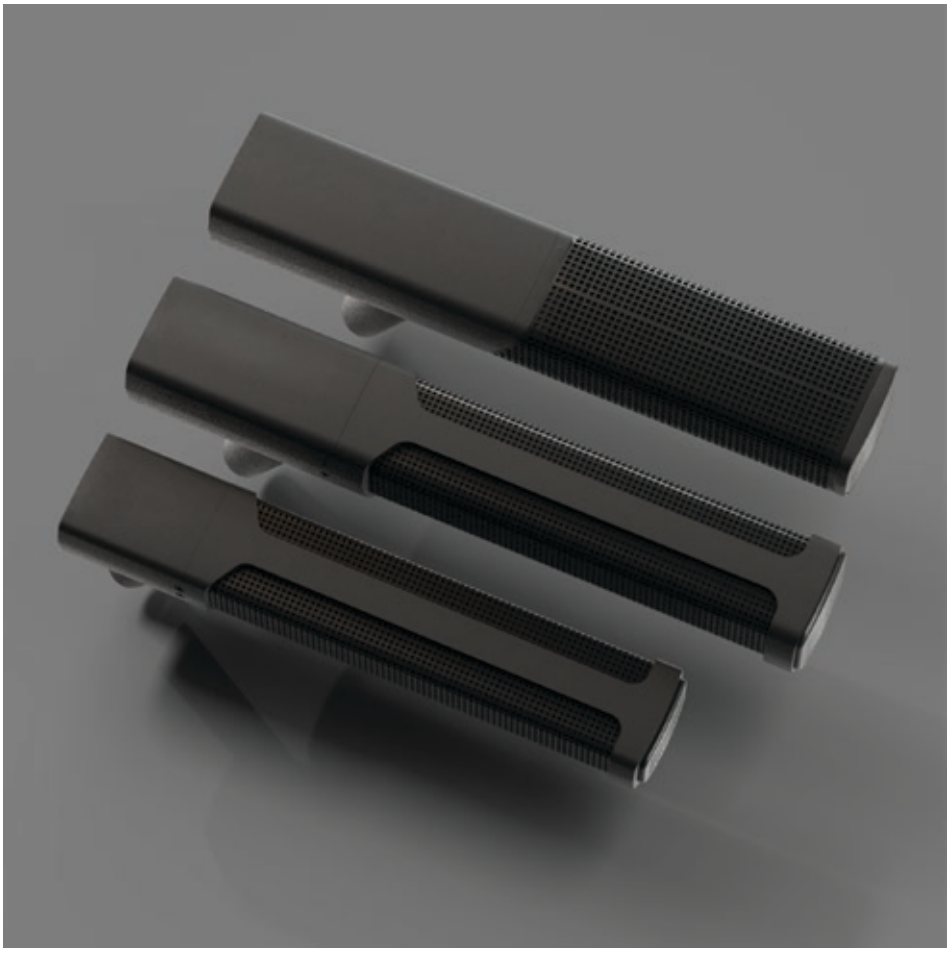
FRONT VIEW



SIDE VIEW

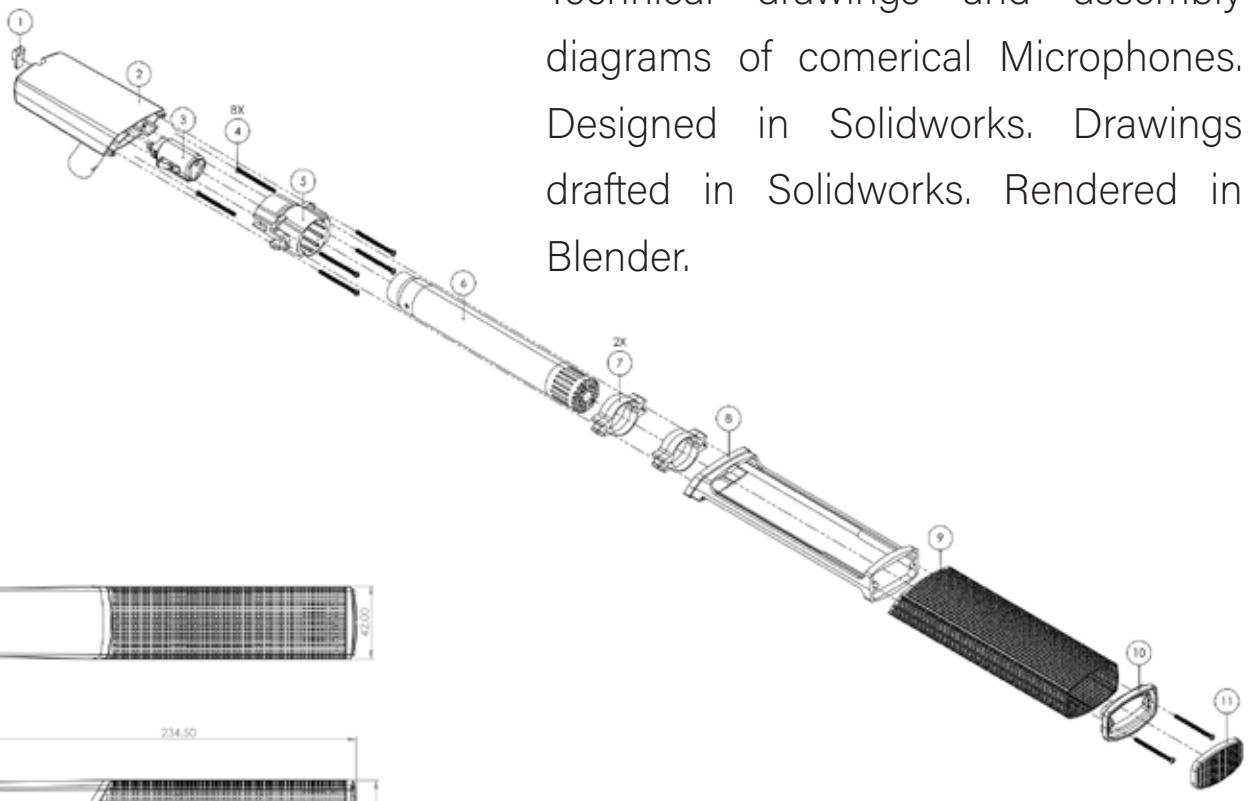


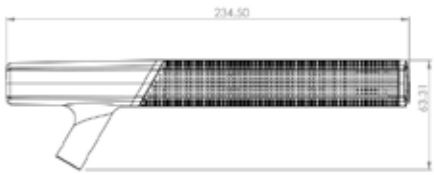
EXPLODED VIEW 1



Microphone Design and Production Drawings

Technical drawings and assembly diagrams of comerical Microphones. Designed in Solidworks. Drawings drafted in Solidworks. Rendered in Blender.



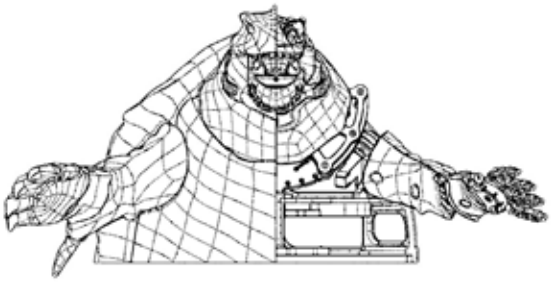


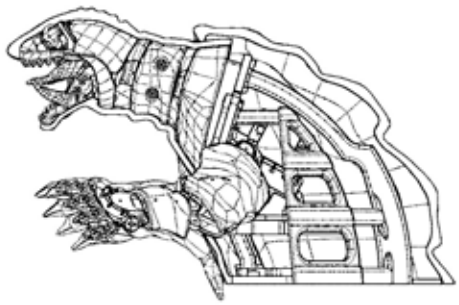
Jewelry and Costume CAD

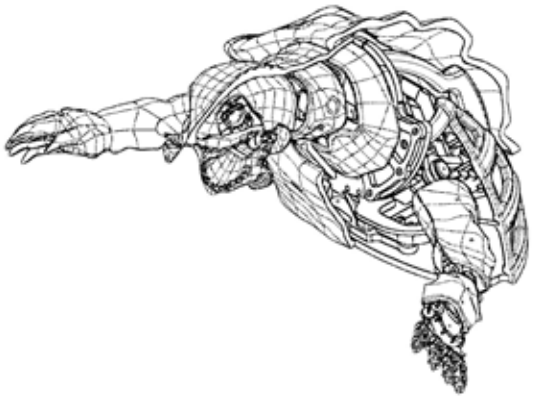
These are some examples of CAD files and for ewelry and costume designs that I have created for use in different ornate character costumes. The jewelry and Costume was designed using Zbrush and Rhino, then rendered in Keyshot.

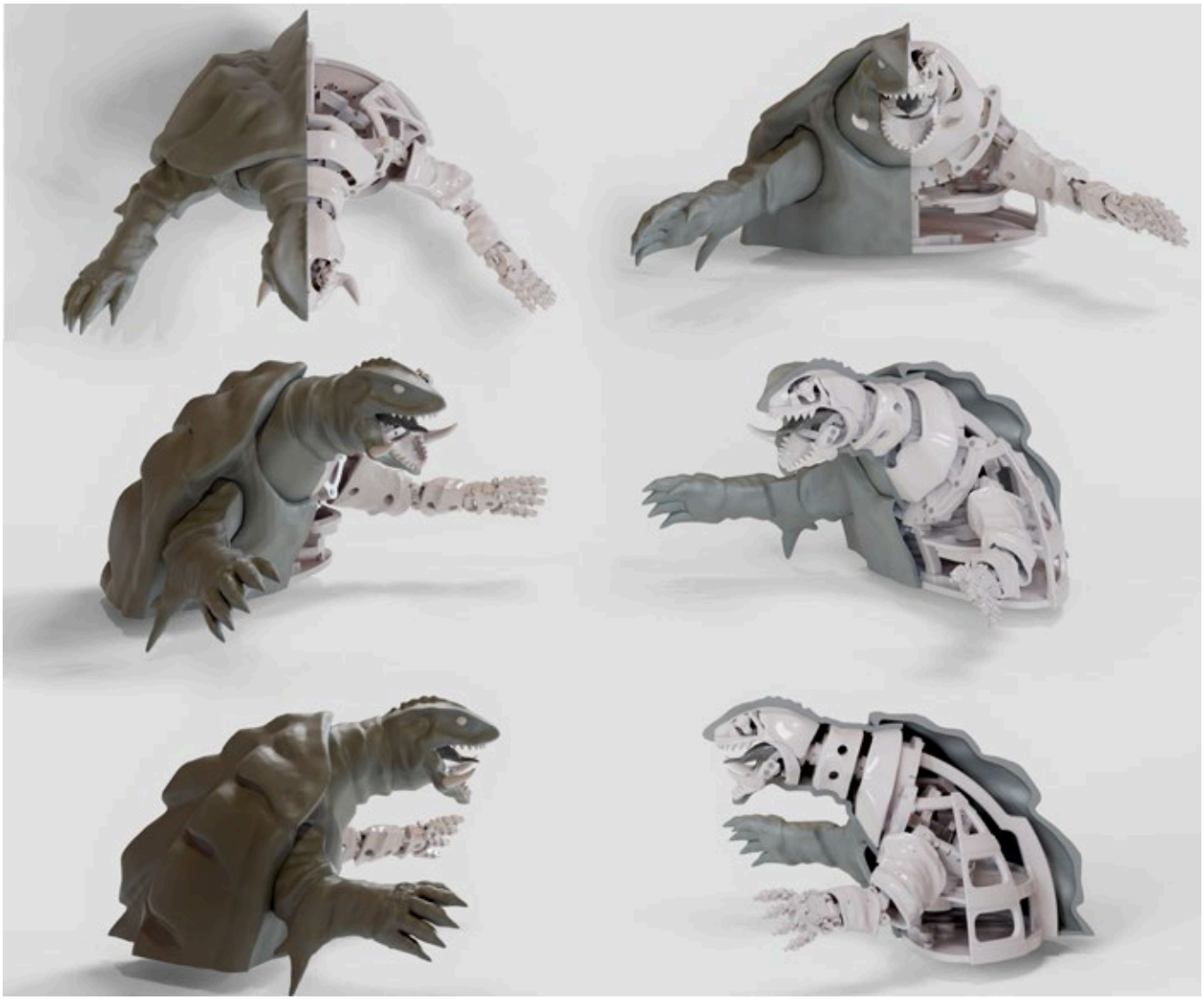
Animatronic Scale Model

An animatronic scale model of a 90's Japanese film monster with 16 motorized motions, including moving neck, arms, eyes, mouth, and tongue. Designed for production as a consumer product in the Scale-model collectors market. Designed in Zbrush and Solidworks. Rendered in Blender.









Aircraft Models

Airbus H715 Helicopter and Bombardier 6000 Series Jet

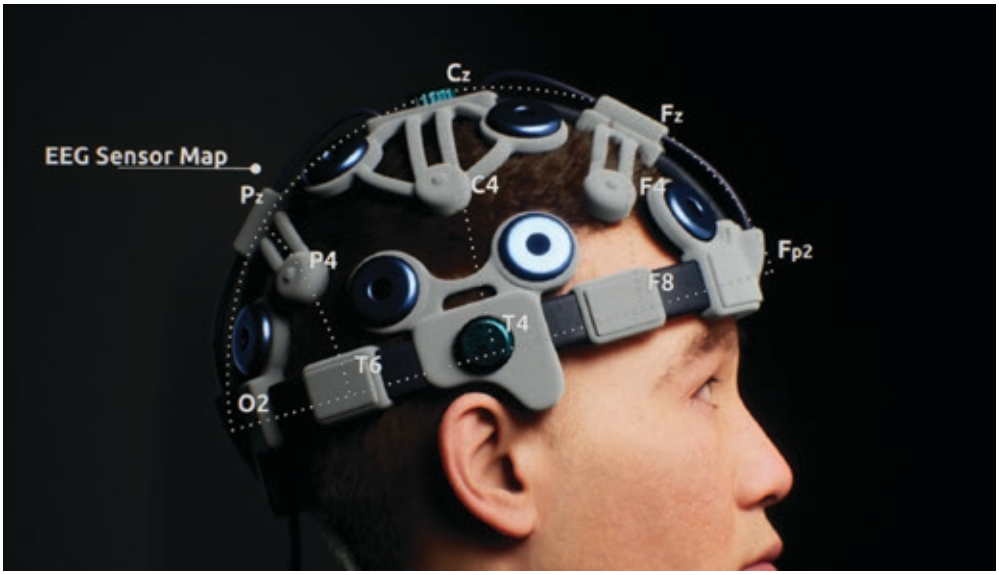
A project that required creating highly detailed 3d models of an Airbus H175 helicopter along with a Bombardier 6000 Series jet, as well as texturing, and creating animation libraries for bot aircraft models for use in AR and VR applications as well as web-based renderings.

Airbus H715 Helicopter

Bombardier 6000 Series Jet

BCI Design

A real-time rendered cinematic video of a BCI product concept. Designed in Soildworks and rendered in Unreal Engine 5.



Character Design

This is a player controlled character with clothing and hair customization mechanicsusing cloth and hair physics simulation. The character and clothing were sculpted in Zbrush and Blender, textured and rigged in Blender, then programmed for realtime player control and realtime cloth and hair physics simulation in Unreal Engine 5, for use as a game character for a third party client.

Chinese Architecture

Chinese Architecture and Foliage Asset pack for Unreal Engine

An asset pack of Chinese style architecture pieces and native Chinese foliage, consisting of 15 plant models and 85 architecture models, designed to be used in realtime applications. The Architecture Models were modeled using Solidworks, Zbrush, and Blender. The texture mapping and materials were done unsing Blender, as well as the 3D modeling for the foliage. I imported the assets to Unreal Engine 5 and created the scenes shown using realtime rendering. The landscape was created in Gaea.

Concept Art

An example of the asset pack that I created as a piece of concept art, showcasing dynamic lighting and volumetric fog in Unreal Engine 5.

Sculpting and Rendering

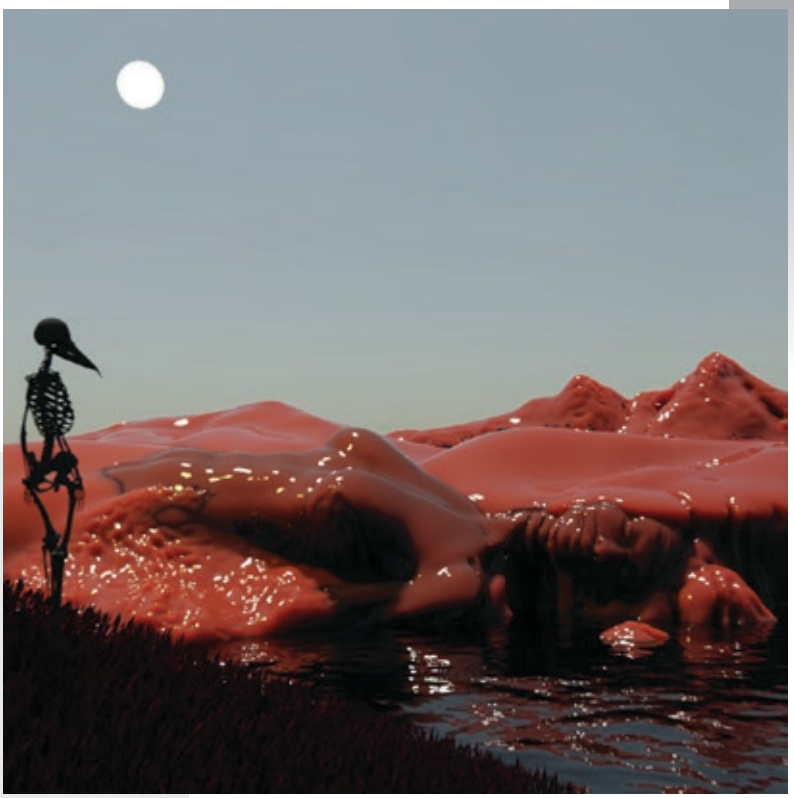
I have extensive experience in sculpting and rendering a wide range of products and concepts. I have modeled and rendered mass-manufactured products, complex industrial assemblies, custom-made designer products, faces and bodies, landscape and character art, and various static assets. I have experience modeling, texturing, and rendering high-detail models, as well as texturing and optimizing skeletal and static meshes for real-time applications and real-time rendering.

Face Detail Render

A detail shot of a face, sculpted and textured in zbrush then rendered in Keyshot.

Strange Landscape Render

A rendering depicting a character standing on a hill, looking across a body of water at hills that form the shape of a reclining woman. Sculpted and textured in Zbrush, rendered in Keyshot.



Snail People Render

A rendering that depicts two golden snails sitting across from each other. Sculpted and textured in Zbrush, rigged and posed in blender, then rendered in Keyshot.

Galaxy System

3D real-time renderings of scenes in space using volumetric shading and Niagara particle systems in Unreal Engine 5.

Phone Scene

A rendering of a scene depicting a phone and various phone accessories. Modeled in Solidworks and rendered in Cinema 4D.

Flight Uniform

A rendering of a flight uniform for a Helicopter winch operator, scanned using a 3D scanner, The 3D model was reduced, retopologized and retextured using Blender.

Glass Skin

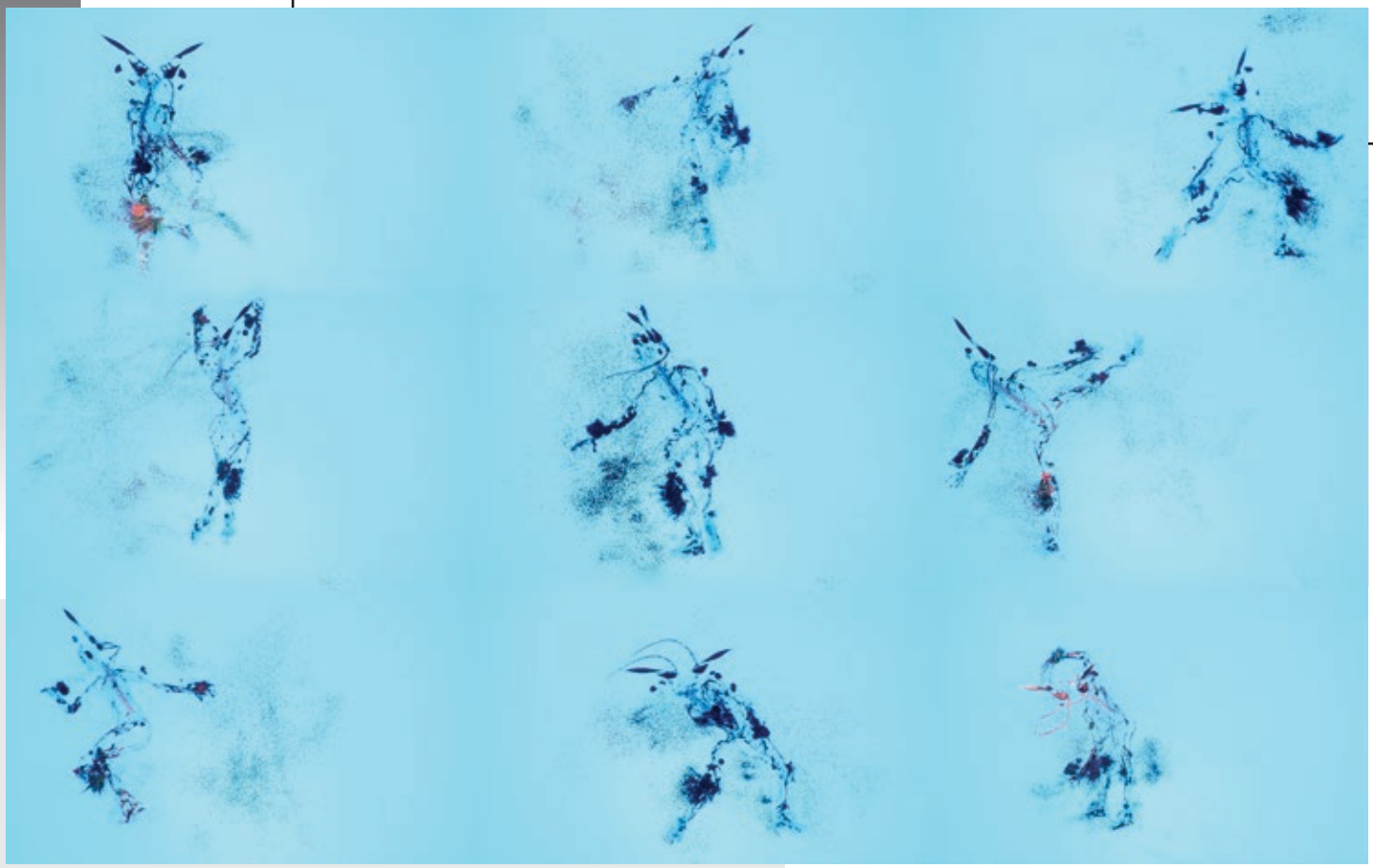
A rendering of a human head and neck, with transparent glass-like skin and a opaque glass-like bones. Sculpted in Zbrush and rendered in Keyshot.

Motion Capture

I have used facial mo-cap to create animations for real-time applications in game environments and for pre-rendered cinematics. Along with facial mo-cap I have professional experience using mo-cap suits for use in live performances, and character animations.

Facial Mo-Cap

This project is using three custom sculpted faces created in Zbrush, which are animated using the Metahuman face rig in Unreal Engine 5. The animation for each face was recorded using Live Link marker-less facial motion capture then played in real-time across three faces simultaneously.



Dance Mo-Cap

A live performance rendered in real-time using Unreal Engine 5.
A dancer is wearing the Perception Neuron Mo-Cap suit to capture their performance, which is then live-streamed into Unreal Engine. The avatar and texture maps were created in Zbrush, and the animation rig was created in Blender.

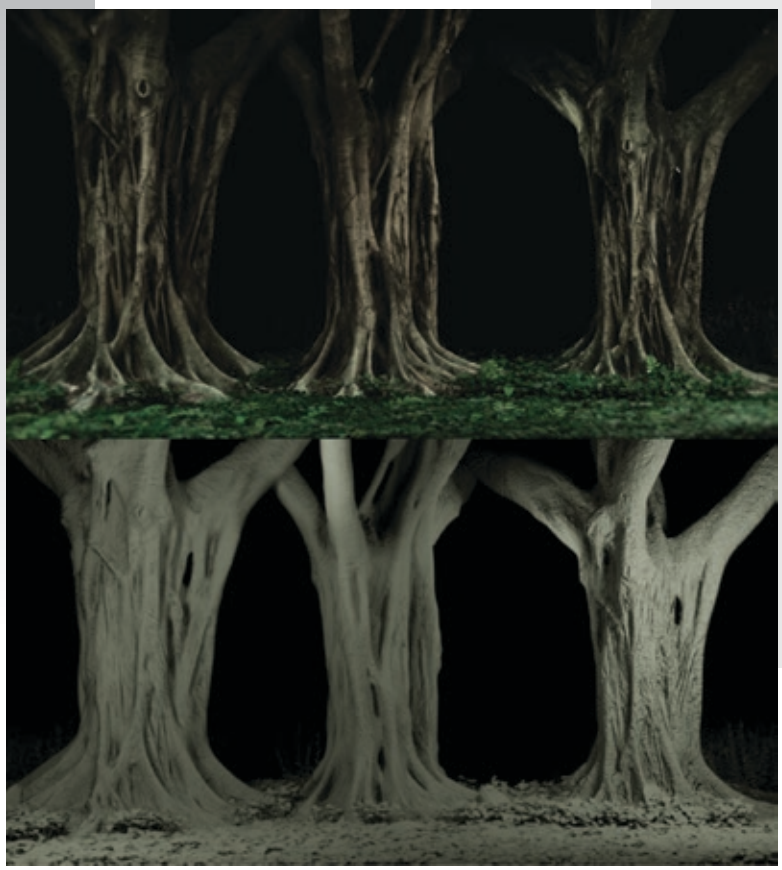
Dance Mo-Cap

A recorded performance rendered in Blender Cycles. A performance was captured using RoKoKo Mo-Cap and re-targeted to the avatar in Blender. The frames of the performance were then manually cleaned and adjusted to remove any errors. The avatar was sculpted in Zbrush and rigged in Blender.

Photogrammetry

As a Designer and 3D modeler I have used Photogrammetry as a tool to aid in design. My experience with Photogrammetry includes re-creating architectural and landscape components as 3D models based on photo sets, as well as creating Human face and body models, plant models, and topographic models.

I have used this technique as the starting point for creating game-ready assets and to aid in producing more realistic texture maps and bump maps for 3D models, as well as to ensure my 3D models have the correct proportions and measurements compared to their physical counterparts.

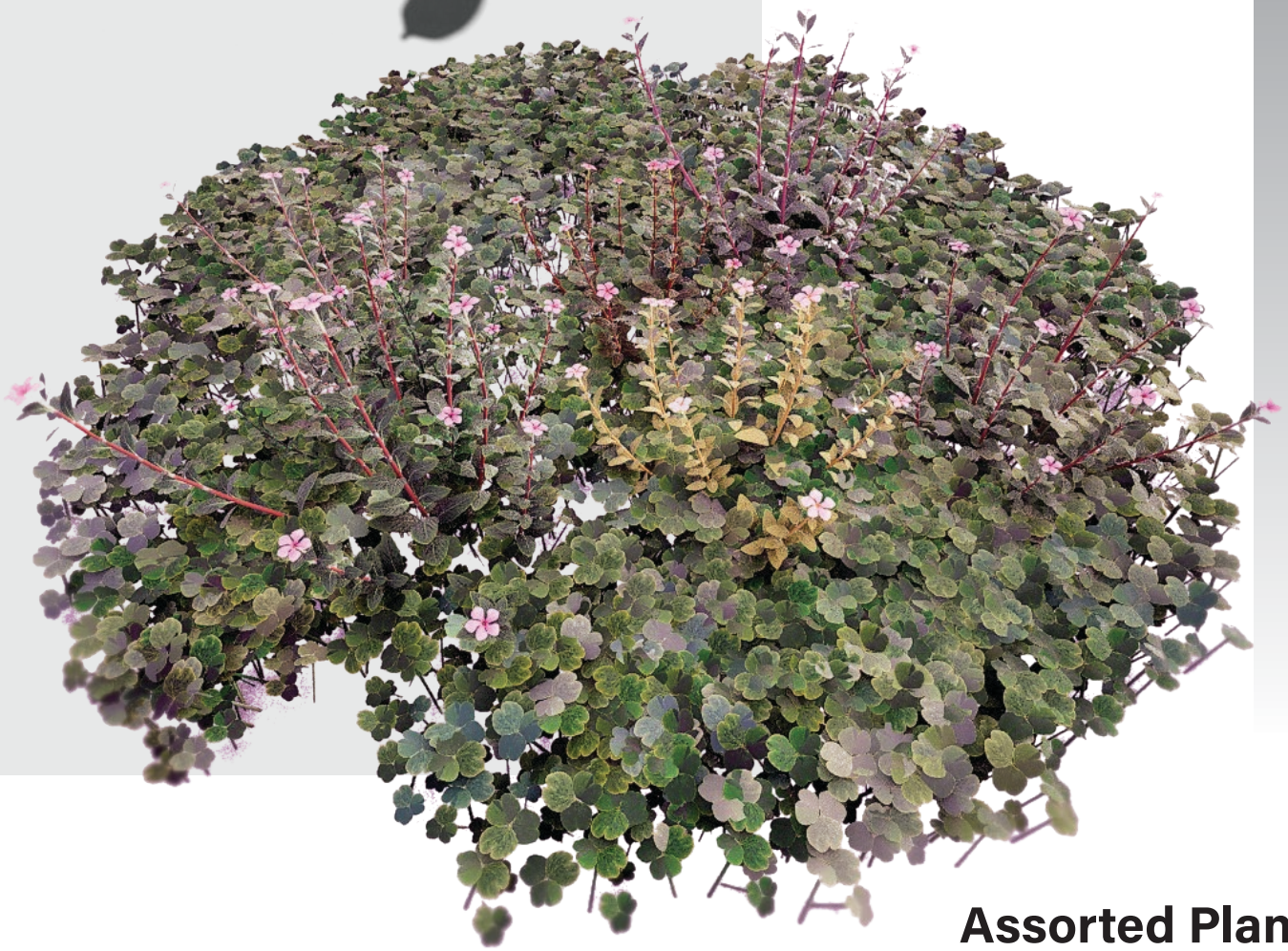


Banyan Trees

These banyan trees were photographed in 360° at incremental heights using a drone, then reconstructed into 3D models from the photo sets using RealityCapture. Using Zbrush the 3D models were then cleaned up, and re-topologized into game-ready assets with multiple LOD models. UV mapping and texture map baking was also done in Zbrush. The final models were then imported (along with other models created using the same work-flow) into Unreal Engine 5 and rendered in Real-Time.

Assorted Leaves

These assorted leaves were created from plants in Hong Kong. The textures were scanned, then cleaned up using Adobe Photoshop. The 3D models and UV maps of the Leaves were created in Zbrush.



Assorted Plants

Following the section above, these assorted plants were created based on observation of various domestic plants found in Hong Kong, Including ***Catharanthus roseus*** among others. The 3D models and UV mapping of each plant was done in Zbrush, and then texture optimization was done in Blender. The final plant model was then rendered in Unreal Engine 5, using procedural color size and shape variations set within realistic parameters to prevent repetition.

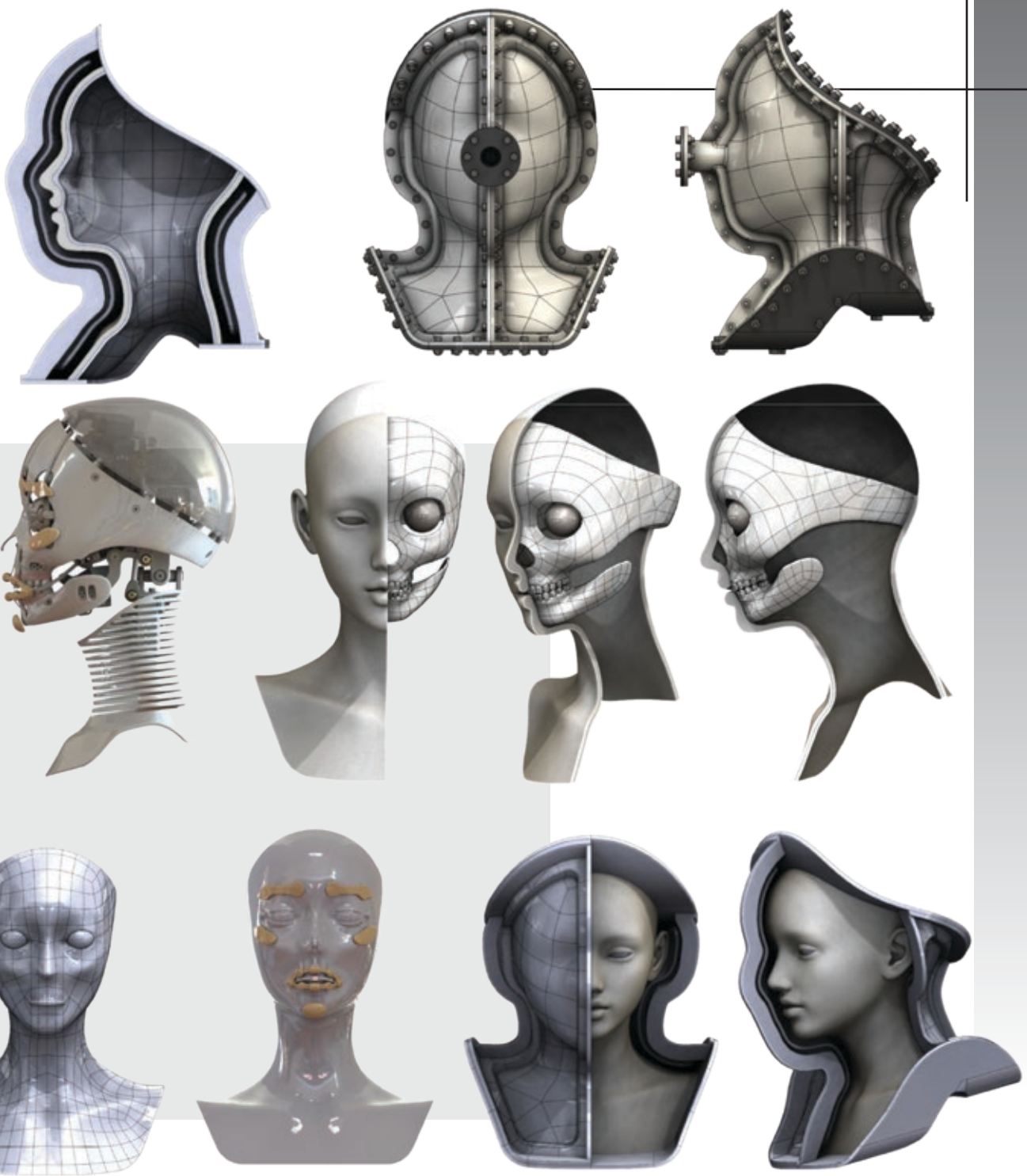
Section Two : Projects

Grace

The Grace project set out to create an animatronic human head for mass manufacturing to be used as an AI powered service robot with conversational abilities and human-like charm. The design of this head is made for mass manufacturing, with modular sub-assemblies and easy to assemble designs. The head consists of over 30 actuators and is capable of expressing a wide range of expressions and speaking.

Physical Product

This is a physical version of the Grace head, being tested after full assembly.

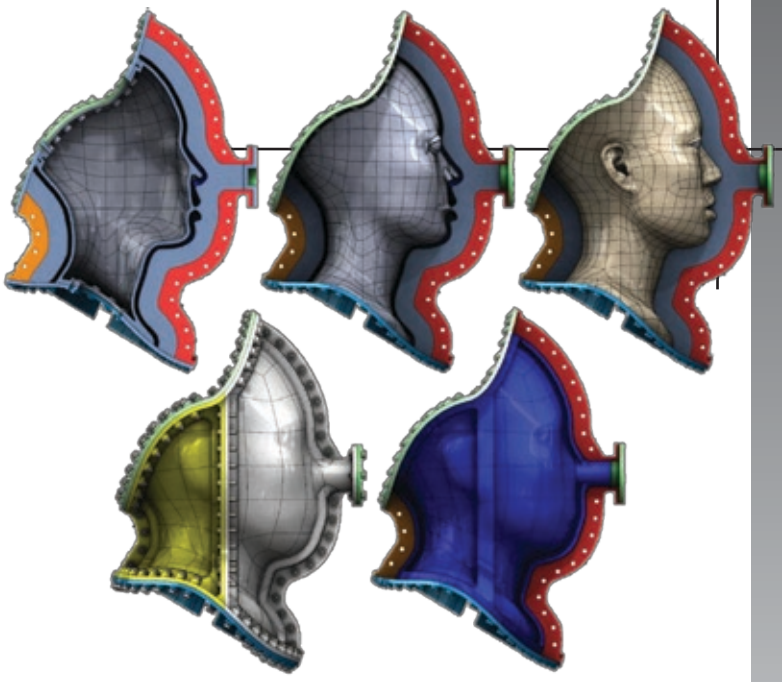


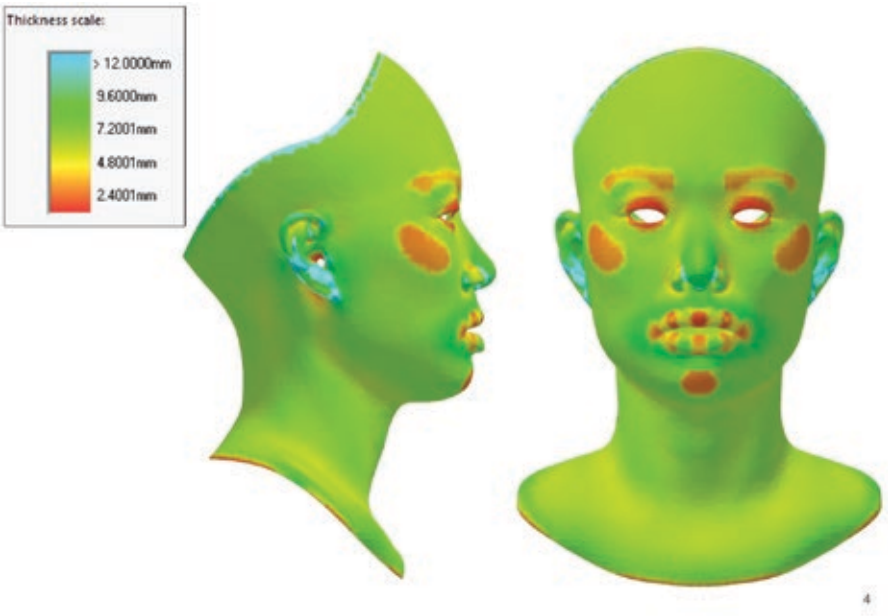
Caspar

The Caspar Project was created as an exploration of different methods for actuating human faces. Through the project I explored different methods and approaches to designing and actuating human faces. This project included many different parallel approaches to evaluate the benefits and draw-backs of each method. The project included MRI scans to model the skeletal structure and skin thickness of the subject, testing different approaches to mold design and facial actuation, comparing the surface deformations of life-casting vs. 3D scanning, and testing different methods of fabricating realistic eyes and teeth. The head design is actuated by approximately 34 motors and combines a variety of fabrication methods including CNC cut metal pieces, SLS 3D printed Nylon pieces, acrylic cast parts, and silicone and polyurethane cast parts.

Blanket Mold

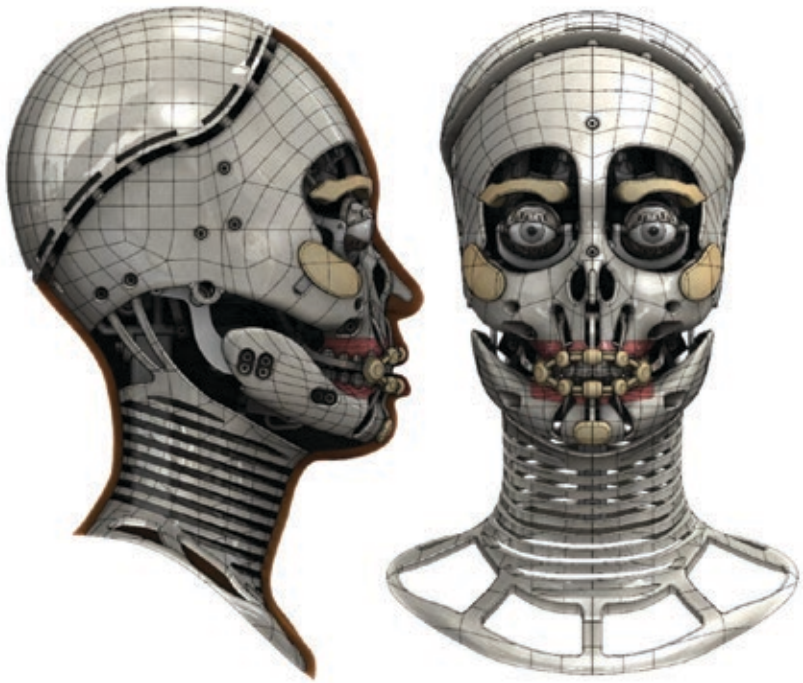
The second iteration of the blanket mold for the Caspar project. The shell is separated into four sections, with a top and bottom cap. The mold produces seamless silicone skins with over-molded attachment points and rubber actuators.





Thickness Map

A thickness map of the silicone skin for the Caspar project, showing how close over-molded components are to the surface of the skin, and the overall thickness of the skin.



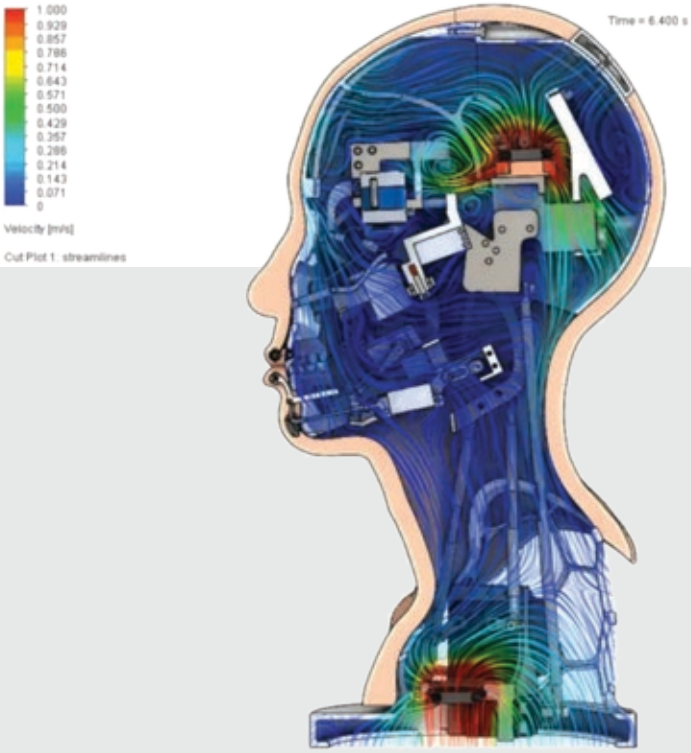
Mechanical Assembly

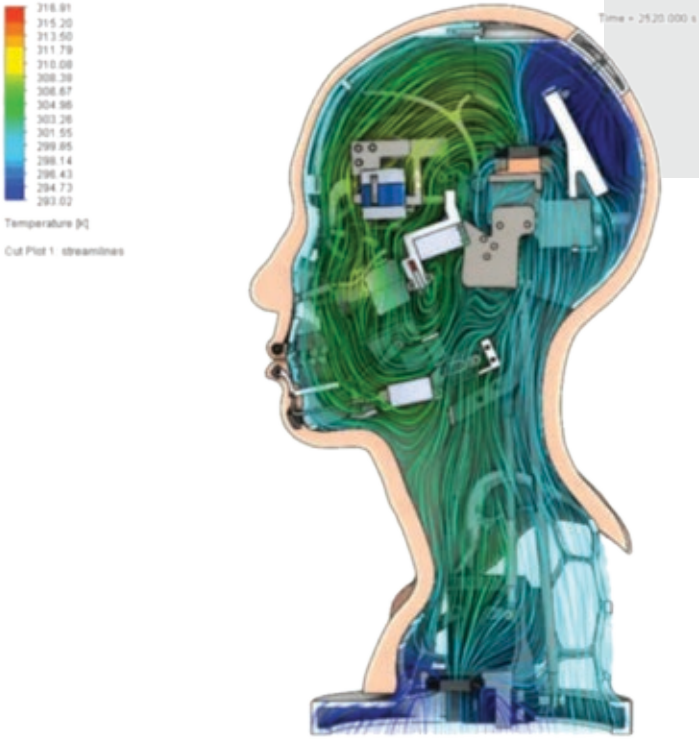
The mechanical assembly of the Caspar project as seen in Solidworks.

Caspar

Airflow Simulation

This is a fluid motion analysis showing the velocity of air inside of an animatronic human head over a 10 second time period. The velocity of air in the model naturally increases around the cooling fans in the assembly.



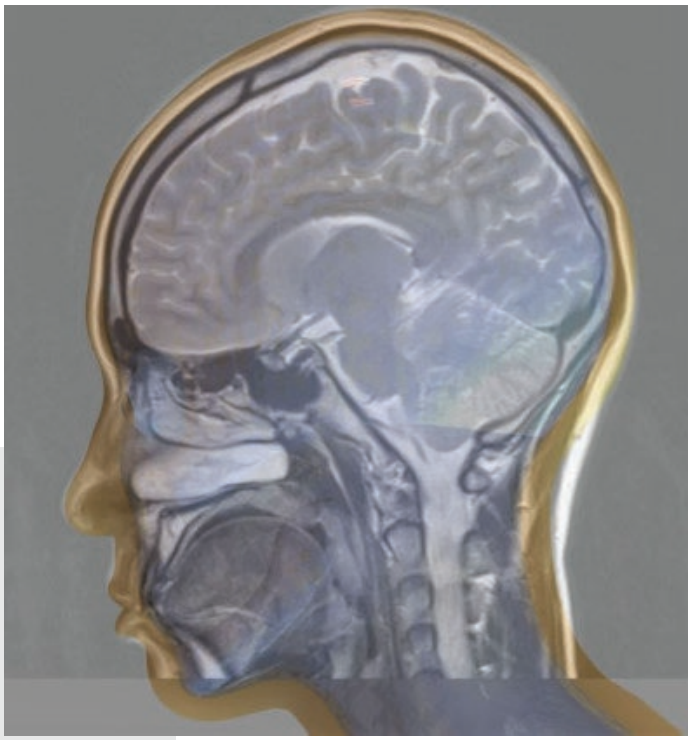


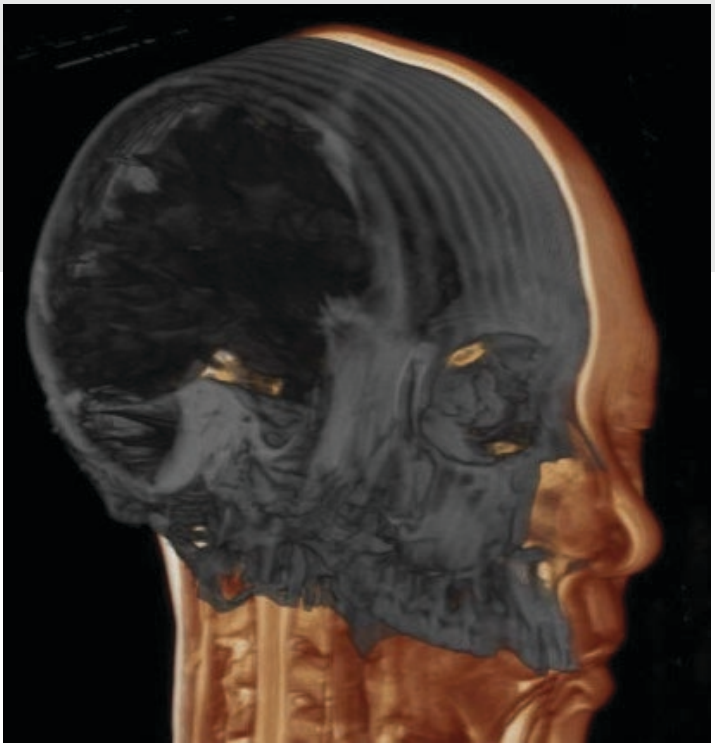
Heat Simulation

This is a fluid motion analysis showing the ambient temperature inside of the mechanical assembly over a 3 hour time period. The heat generation in this model is based on the average power consumption of components within the assembly.

MRI

An MRI was taken of the model's head and neck to calculate the skin thickness.





MRI 3D model

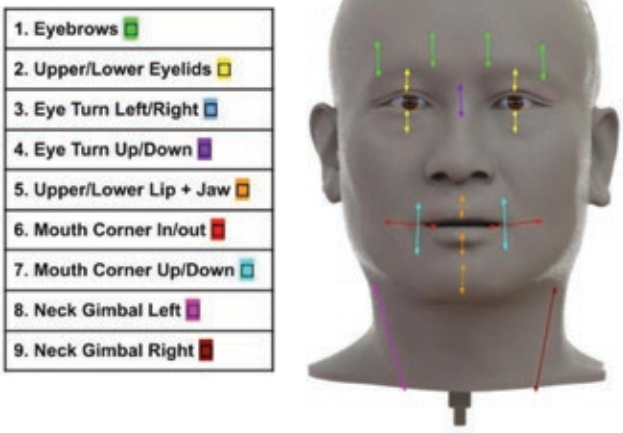
A 3D model of the soft tissue and skeletal structure was created from the MRI data. The tissue thicknesses from the 3D model were then used to create the topology of the mold core and mechanical skull assembly.

Dean

This project started from a 3D scan of a model's head and a dental impression of their teeth. From there molds and mechanical assemblies were designed and fabricated to create a 1-1 animatronic copy of the model's head that is capable of moving and creating dynamic facial expressions.

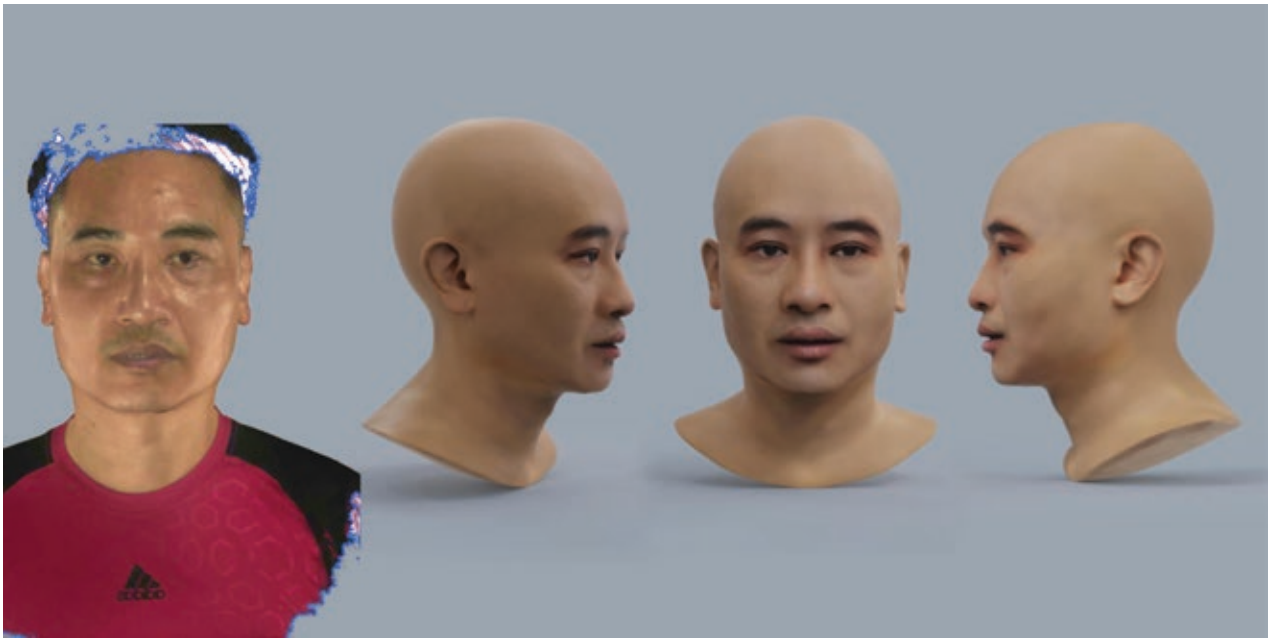
Degrees of Freedom Diagram

A diagram of the degrees of motion for each facial actuator in this mechanical assembly.



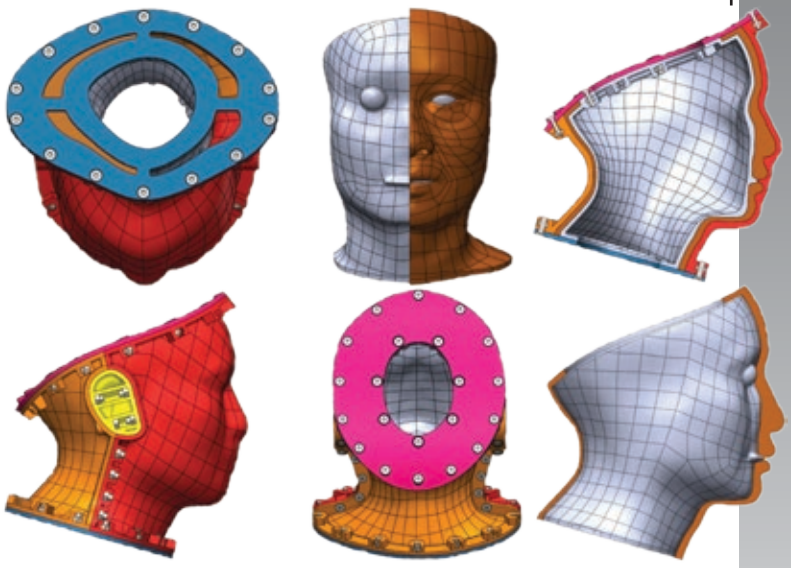
3D scan

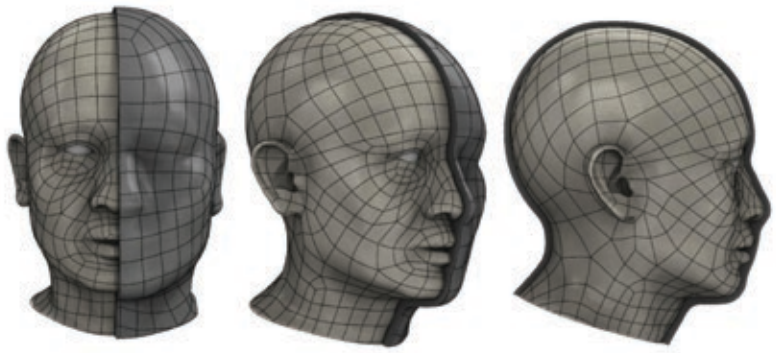
This is a comparison between the original 3D scan of the subject's head and the refined version which was processed using Zbrush to fill missing sections and remove artifacts and noise from the 3D scan.



Dean Mold

The mold design for this consists of a rigid mold with a front and back half, a top and bottom plate, and removable ear sections. This mold is very durable and easy to operate since it is totally rigid with no blanket component. It does however produce skins with a small seam-line along the side of the neck where the front and back half of the mold meet.





Mechanical Assembly

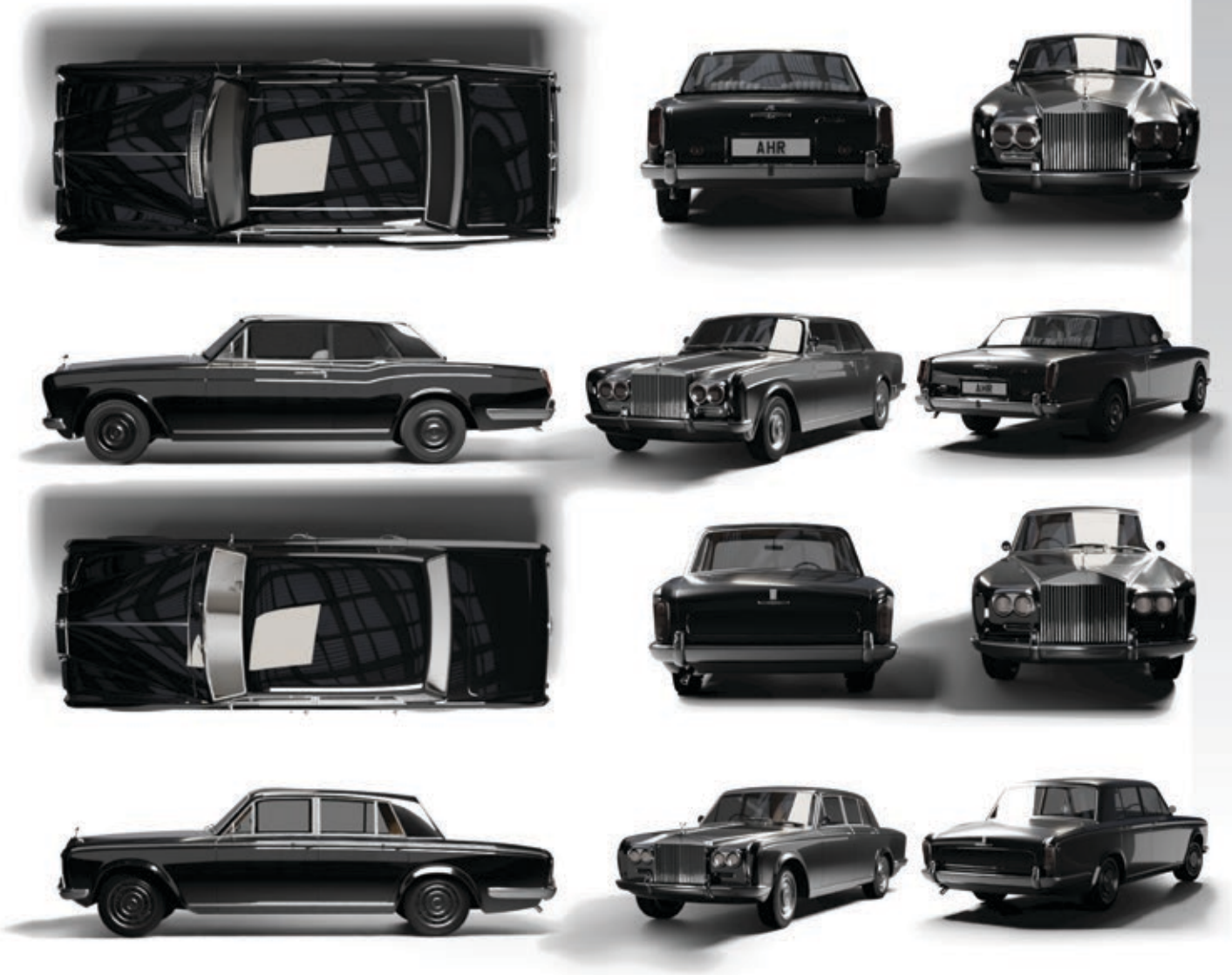
The mechanical assembly, and mold shell thickness of the Dean project as seen in Solidworks.

Teeth

Teeth model created by taking a casting of the subject's teeth, 3D scanning the casting, refining the 3D model, and fitting to the mechanical skull.

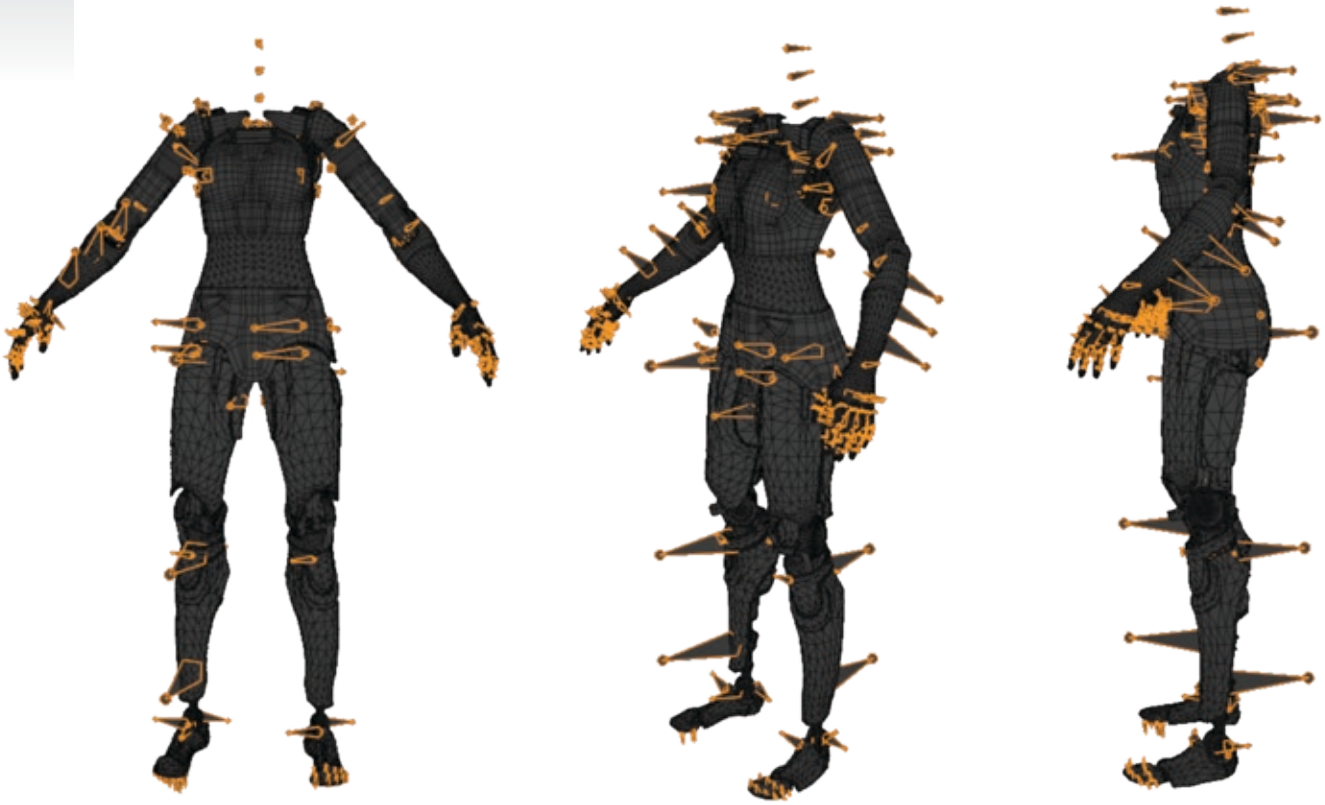
JAY-AHR

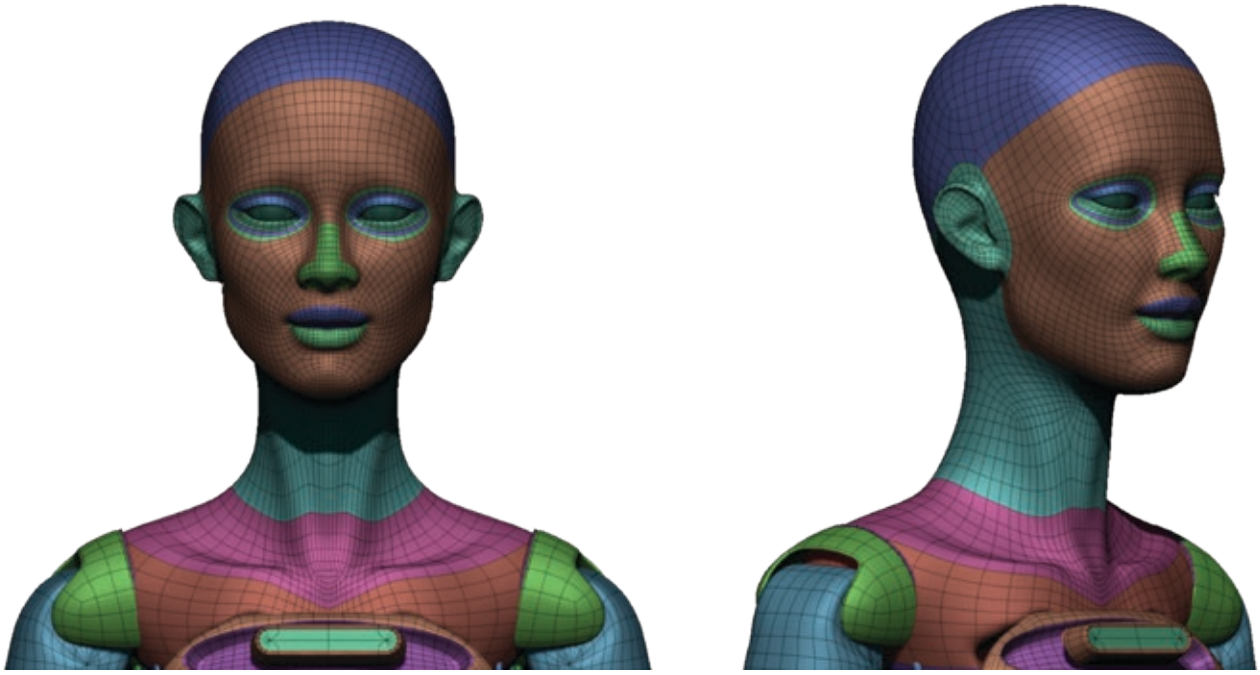
The purpose of this project was to provide a rapid means of visualizing the final material profiles and color pallets for a series of rebuilt, customized, vintage Rolls-Royce cars for the client JAY AHR. The renderings for this project required high-fidelity, realistic renderings of the interior and exterior of several models of Rolls-Royce cars to be used as visual references to streamline the decision making of which designs would be chosen for fabrication. The interior renderings provide a 360° panoramic view of the interior, Which was used to provide an immersive preview of each design using a phone gyroscope to navigate the 360° view intuitively. The renderings and procedural materials for this project were created using Blender Cycles. UV mapping, normal maps, topological and sculptural changes for each model were done in Zbrush. Parametric changes to mechanical components, were done using Solidworks. The 360° visualization of the interiors with gyroscope navigation was done using Spherualizer on IOS.


AHR

SAIL

This project included modeling, texturing, rigging, animation and optimization of character body and face models for use in Unreal Engine 5, as well as creating cinematics in Unreal Engine 5.





ART Roof Top

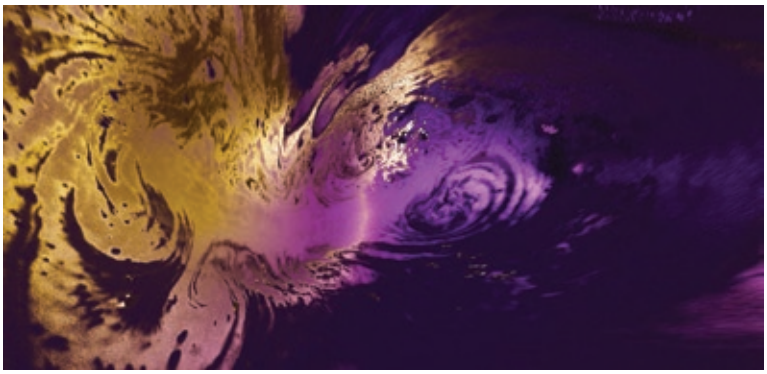
Adidas Office

An installation created in collaboration with ART Roof Top Ltd. For the Adidas Corporate Office in Hong Kong, consisting of a 4 meter tall diagram of a shoe sole created using over 7,000 nails spaced apart and weaving lengths of shoelace around each nail. The diagram and nail spacing was designed in Solidworks and printed on sheets of A1 paper which were then taped to the wall to be used as guides. Different jigs were used when installing nails to ensure the correct height levels.

Delta Aluminum

An installation created in collaboration with ART Roof Top Ltd. For Delta Aluminum Ltd.
The installation consists of over 2000 laser cut sheets of aluminum depicting a map of Hong Kong. The design and laser cutting layouts were created using Solidworks.

Dominic Lam



The Art & Science of Vision

A series of renderings created in Collaboration with artist and Scientist Dr. Dominic Lam, rendering abstract patterns based on his paintings.

Letters of Recommendation

David Hanson, PH.D.
CEO and Owner of Hanson Robotics

DAVID HANSON, PH.D.
G/F Photonics Building
2E Science Park Road
Shatin, New Territories, HK
+852-5149-0926, david@hansonrobotics.com

January 1, 2020,

To Whom It May Concern:

This letter is in support of Joseph Watsons qualifications for work in the fields of Arts and Robotics. In his work for Hanson Robotics Limited as a robotics designer and artist, Joseph made a pivotal difference in developing robotics products for my company. I whole-heartedly proclaim Joseph one of the most inspired and capable scholars and artists that I have encountered in my career.

In my opinion, Joseph's creativity and intellect particularly qualify Joseph for work in the fields of engineering and the arts. He does not hesitate to acquire or invent any knowledge needed to solve an engineering challenge, and persistently seeks definitions to novel problems that need solving.

During his work with my company Hanson Robotics in 2015, Joseph served as robotics designer and artist, leading the product definition and development of several robotics systems and components, especially in animatronics heads, and collaborating with a team of 20 professionals, and implementing numerous functioning prototypes and deployed product, and assisting with their production and maintenance. In addition to designing robotics mechanical systems and new materials for our humanlike robot faces, Joseph also designed novel mechanisms for facial expressions for our robots, and co-developed human-scale humanoid arms performing complex grasping and manipulation tasks. In these activities, Joseph coordinated with a diverse team of engineers and artists, including software developers, mechanical engineers and animators. Furthermore, Joseph assisted with physical construction the humanlike robot faces and bodies, researching materials and components, and designing and assembling testing of closed-loop electronics for robotics controls. In his duties, Joseph integrated quickly into this new team, gained respect and worked alongside the team throughout to get projects completed, and displayed keen skills in prototyping and associated problem solving during each iteration of the product. He learned quickly about the product, interdependencies between different systems and how to manage its development in the context of day to day business constraints. In these activities Joseph's range of skills and imagination greatly impressed me.

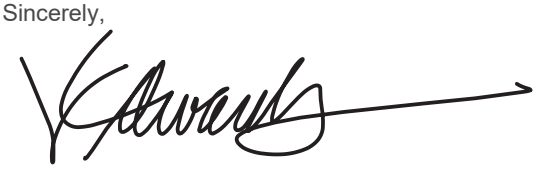
Valerie Edwards
Former Chief Sculptor for Walt Disney Imagineering

To whom it may concern, 01-23-2020

I whole heartedly write this letter of recommendation for Joseph Watson whom I was privileged to work side by side with. Joseph and I have collaborated on art and robotic research and development, with very compressed schedules and dynamically varied skill sets. Joseph showed great innovation and an amazing ability to translate organic movement and complexed sculptural shapes into computer generated design information and realized in physical mechanical structure. Having been the Director of Sculpture and Chief Sculptor for Walt Disney Imagineering for over two decades, I have seen my share of talent, but in Joseph I see rare talent and intelligence that proceeds his years.
Joseph works hard, he shows up on time, is driven to perfection, and is a kind and gentle person. What an asset!

If you have any further questions, do not hesitate to call.
+1-818-489-7744

Sincerely,



Valerie Edwards

Section Three : Art
Painting

Medium: Oil Paint on Canvas

Size: 50 x 70 cm

Life Drawings:

A series of life drawing poses done in charcoal and graphite with various different live models.

Joseph Watson

joseph.w.m.watson@gmail.com

+852 5541 8371