

Bio-Visualization

Microscopy

Specimen

Anthropocene

Microbiopolitics

Machine Learning

Bio-inspired Computation



Shontelle Xintong Cai

# Augmenting Morphology: The Artificialis Historia

## Project Brief

In the "Augmenting Morphology: The Artificialis Historia", the artist investigates the new insights into biological morphology and multispecies ethnography in micro and machine learning. The aesthetics of micro-biopolitical narratives and bio-visualization critically emerges on a glimpse of the fictional post-specimen museum.

The collections of the unknown AI-generated specimens are based on microscopic images observed and captured in the ecosystem of London. The artist intends to engage the audiences to perceive and build relevant knowledge from the fictional specimens, as well as the visual and textual documents and dialogues around them. The creative process of specimens and their relevant documents are consulted by professionals working on scientific and technological backgrounds. This work reflects the power of micro-biopolitics in the post-pandemic era and historical entanglements with non-humans.



# AUGMENTING MORPHOLOGY

MICROBIOPOLITICS    BIO-INSPIRED COMPUTATION    ANTHROPOCENE    SPECIMEN

SHONTELLE XINTONG CAI  
COMPLEXITY AND SENSUALITY OF

LATENT SPACE EXPLORATION  
SPECIMEN AND MUSEUM NARRATIVES

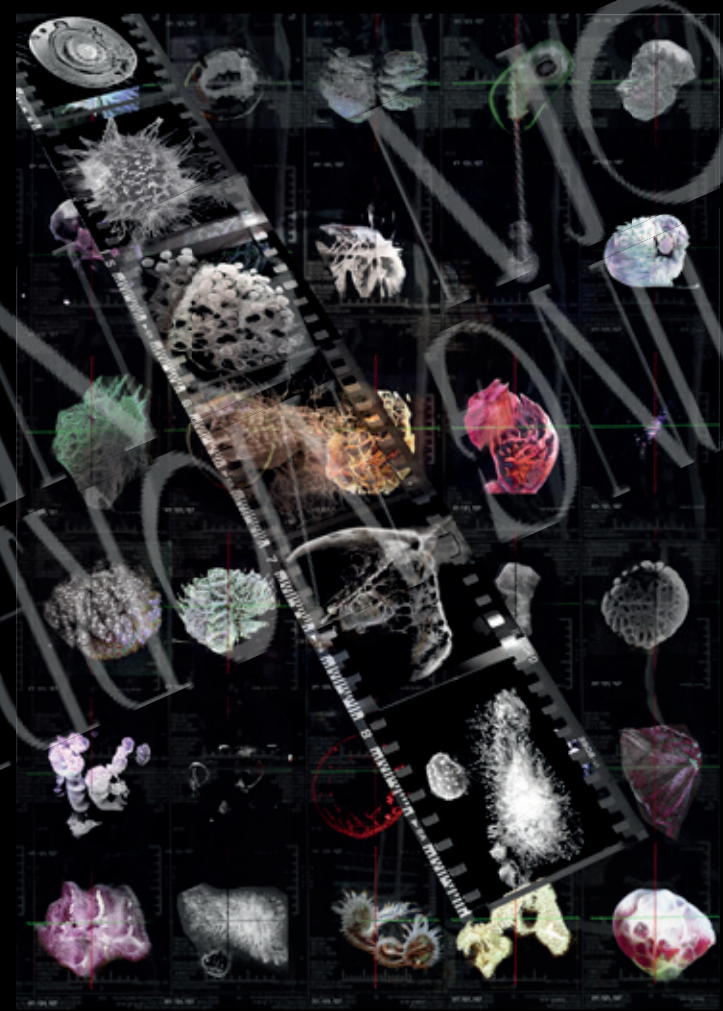
WIP SHOW

JAN 28 2022

ROYAL COLLEGE OF ART  
COMPLEXITY AND SENSUALITY OF  
THE ARTIFICIAL IS HISTORIA

MA INFORMATION EXPERIENCE DESIGN  
SPECIMEN AND MUSEUM NARRATIVES

## AUGMENTING MORPHOLOGY





Bio  
Visualization

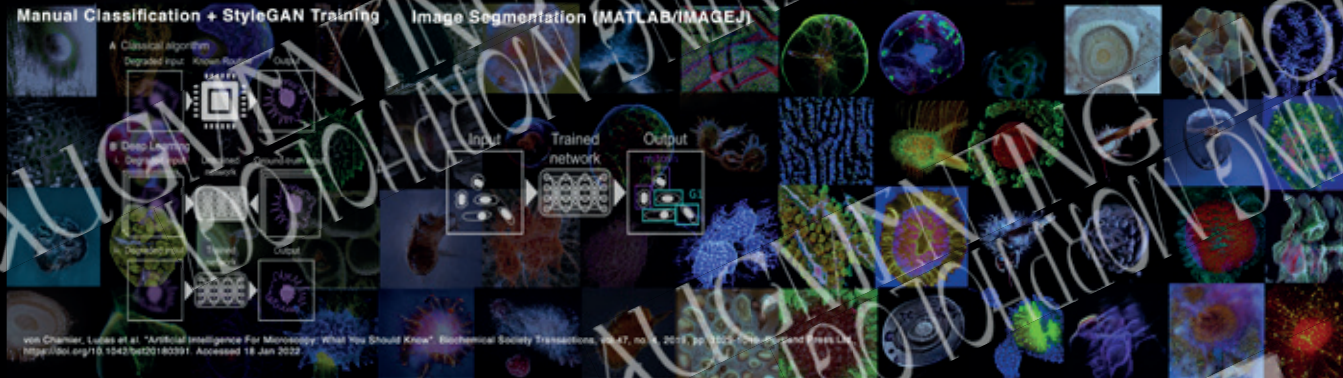
Microscopic  
Observation  
Bio-Inspired Computation  
Bio-Image Analysis

Computer  
Vision

StyleGAN

Digital Image  
Processing

MATLAB/3D  
Reconstruction  
IMAGEJ & FIJI



## Latent Walk: AI Training & Scientific Digital Image Processing

I explore different platforms and methodologies to bridge the latent space, fiction and reality via microscopic observation, generative adversarial network (GAN) and digital image processing.

Training Process of Image Dataset — From October to December 2021, I experimented with the sample observations of London microbial territory under the microscope. To enhance the precision and quality of bio-images produced later, I start analyzing and repeating the training process between neural networks, GAN training and manual image segmentation via MATLAB and IMAGEJ.

## Consultations with Professionals: Train, Generate, Classify and Name Them

After meeting online or e-mail communications of machine learning specialists, scientists and bioinformatics engineers, I re-classify and organize the information based on their supportive responses and feedback.

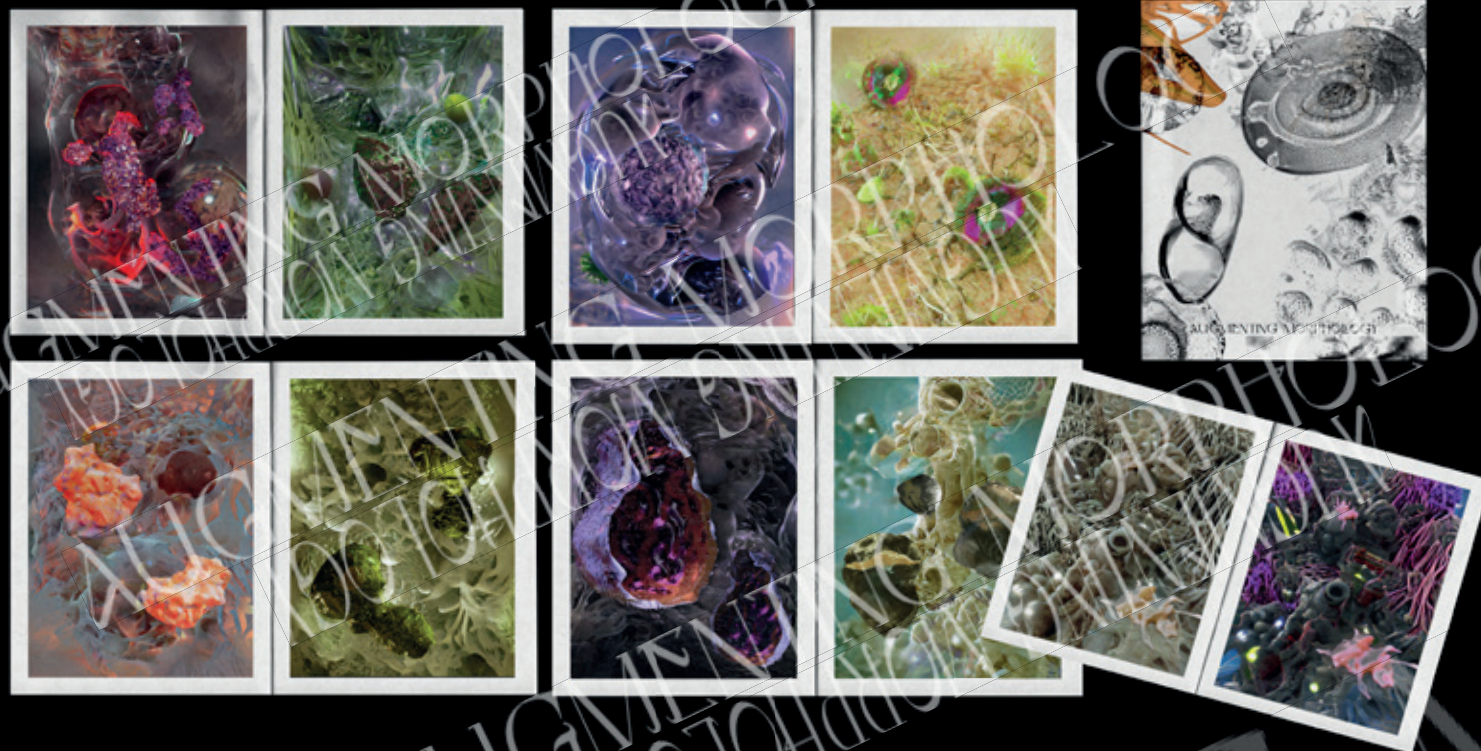
## Acknowledgements:

Charlotte Jarvis, Dr Susana M. Chuva de Sousa Lopes, Dr Patricia Saragueta, Nick Goldman, Dr Junfeng Yao, Weiyu Feng, Xizhe Bai, Alex



<p><b>UNSUPERVISED 3D SHAPE RECONSTRUCTION FROM 2D IMAGE GANS</b></p> <p>CONVERSATION RECORD WITH COPY DOCUMENT NUMBER: 20211027 ANONYMOUS REGISTRATION</p> <p>TECHNIQUE: RECOVER 3D SHAPE FROM A SINGLE 2D IMAGE IS ASSUMED: RECOVER 3D MODELS FROM A SINGLE 2D PHOTO</p> <p>IS GAN-BASED: 3D SHAPE RECONSTRUCTION HAS TO BE USED</p> <p>POSSIBLE CHANGES: HIGH-PRIORITY TO CONTACT</p> <p>TOTAL PLATFORM CHANGE: 40 mins ZOOM N/A</p> <p>NOTE: COLLABORATION PAUSED DUE TO PENDING SITUATION</p> <p>Augmenting Morphology</p>	<p><b>CURVE/CONTOUR CLOSING /COMPLETION IN IMAGE SEGMENTATION - MATLAB</b></p> <p>CONVERSATION RECORD WITH COPY DOCUMENT NUMBER: 20211027 ANONYMOUS REGISTRATION</p> <p>STEP 1: SPECIFIC CODES IT FIRST TO ENHANCE THE QUALITY OF THE INPUT IMAGE</p> <p>STEP 2: BINARY AND ACTIVE CONTOURS TOOLS IN MATLAB</p> <p>TOTAL PLATFORM CHANGE: 30 mins ZOOM N/A</p> <p>NOTE: EXTENSIVE CODE SUPPORT IN IMAGE RECONSTRUCTION SAMPLE</p> <p>Augmenting Morphology</p>	<p><b>PROTEIN STRUCTURE PREDICTIONS</b></p> <p>CONVERSATION RECORD WITH COPY DOCUMENT NUMBER: 20211027 ANONYMOUS REGISTRATION</p> <p>STEP 1: FIND SOME PROTEIN SEQUENCES OR MOLECULAR FORMS TO CORRESPOND TO YOUR CELL IMAGE/FLUORESCENT COMPONENTS</p> <p>STEP 2: CHECK THE MOLECULAR WEIGHT AND WEIGHT AND FEED THEM INTO SWISS-PROT A NEW MOLECULAR FORMULA AFTER GIVE TRAINING</p> <p>STEP 3: USE ALPHALIPS TO PREDICT THE PROTEIN STRUCTURE IN 3D</p> <p>TOTAL PLATFORM CHANGE: 30 mins ZOOM N/A</p> <p>NOTE: MAY ALLOCATE DEEP LEARNING SCHEDULE FOR FURTHER TRAINING APPROXIMATELY</p> <p>Augmenting Morphology</p>	<p><b>AUTONOMOUS MICROSCOPIC IMAGE ANALYSIS DEMO REQUEST</b></p> <p>CONVERSATION RECORD WITH COPY DOCUMENT NUMBER: 20211027 ANONYMOUS REGISTRATION</p> <p>NUMBER: PAUL IS REQUESTER IS BASED ON RANDOM FORMAL TEST</p> <p>TRAINING: 3D OBJECT TRAINING</p> <p>CODE: 30 mins ZOOM N/A</p> <p>NOTE: MAY ALLOCATE DEEP LEARNING SCHEDULE FOR FURTHER TRAINING APPROXIMATELY</p> <p>Augmenting Morphology</p>
<p><b>BIOINFORMATICS AND STAINING/COLOURING TECHNIQUES</b></p> <p>CONVERSATION RECORD WITH COPY DOCUMENT NUMBER: 20211027 ANONYMOUS REGISTRATION</p> <p>KEYWORDS: BIOMOLECULAR COLORING, THE IMAGES MAY HAVE VARIABLE BIOLOGICAL INFORMATION</p> <p>STAINING TECHNIQUE, PROTEIN EXPRESSION</p> <p>DETECTED AND COLOURED ARTIFICIALLY IN ALGORITHM OR HAND</p> <p>MANIPULATION OF IMAGE, SUPPORTING THE PRESENTATION MORE TRAVELLING</p> <p>TOTAL PLATFORM CHANGE: 40 mins ZOOM N/A</p> <p>NOTE: THE COLORING AREA MEANINGFUL, BUT THE NEIGHBORING AND HIGHLIGHTS OF THE IMAGES NEED PROFESSIONALS TO PROVIDE SCIENTIFIC EXPLANATION</p> <p>Augmenting Morphology</p>	<p><b>REFLECTED TO CELL BIOLOGY AND HUMAN EMBRYOLOGY</b></p> <p>CONVERSATION RECORD WITH COPY DOCUMENT NUMBER: 20211119 ANONYMOUS REGISTRATION</p> <p>KEYWORDS: IMAGE IDENTIFICATION, SPANLIVITY, POSTERIOR, PRESENTITY</p> <p>MOST USEFUL TO SPANNING, ELECTRON MICROSCOPY/SEM/IMAGES TO DRAW OR COLOR</p> <p>FORM OF THEM LOOK LIKE: BLUE FIBRE, FIBERS, SURFACES, COCKETS</p> <p>DNA MITOCHONDRIA DENDRITIC SPINES &amp; CELL BODY MICROSCOPY AND USE USE MICROVIL, SERVING THE SURVIVAL PURPOSES</p> <p>TOTAL PLATFORM CHANGE: 40 mins ZOOM N/A</p> <p>NOTE: MAY TRY TO CONTACT LAB IN LONDON</p> <p>Augmenting Morphology</p>	<p><b>AQUATIC ORGANISMS IDENTIFICATION AND NARRATIVES</b></p> <p>CONVERSATION RECORD WITH COPY DOCUMENT NUMBER: 20211119 ANONYMOUS REGISTRATION</p> <p>KEYWORDS: PROLIFERATION OF ALGAE AND CHLOROPHYTES</p> <p>MAKING DEPOSIT/DEMENTS</p> <p>SOME STRUCTURES ARE SIMILAR TO INTACT COMPOSITION OF FIBRES AND ALGAE</p> <p>SYNOPSIS</p> <p>BRIDGE THE GAPS BETWEEN RESEARCHER DESIGNER AND AQUATIC BIOLOGISTS (S.E. ALGAE)</p> <p>TOTAL PLATFORM CHANGE: 45 mins ZOOM N/A</p> <p>NOTE: MAY CONSIDER EXPLORE BIODEGRADABLE MATERIAL</p> <p>Augmenting Morphology</p>	<p><b>NITROGEN-FIXING BACTERIA IN PLANT BACTERIA DISCUSSION</b></p> <p>CONVERSATION RECORD WITH COPY DOCUMENT NUMBER: 20211120 ANONYMOUS REGISTRATION</p> <p>KEYWORDS: NO INCLUDE BACTERIA AND NITROGEN FIXING SUCH AS AZOTOBACTER, BACILLUS, CLOSTRIDIUM, AND KLEBSIELLA</p> <p>NITROGENASE ENZYME</p> <p>MOLECULAR FORMATION</p> <p>NITROGEN CYCLE INVOLVEMENT BY PLANTS</p> <p>TOTAL PLATFORM CHANGE: 40 mins ZOOM N/A</p> <p>EXTENDED TO 40 MINS IN ZOOM</p> <p>NOTE:</p> <p>Augmenting Morphology</p>





## Inspired By Naturalis Historia

Naturalis historia (Also known as Natural History), is an encyclopaedic scientific work in 77 century. I am inspired by these early infographics, charts and diagrams for organising nature. After categorizing and researching the cellular structure and microbial diversity, I intended to create a series of scientific illustration and information graphics to present the messages of an artificial historia created by artists, designers, scientists and techlogists.

3d prototype supported by Donghao Xie, MA Environmental Architecture, RCA

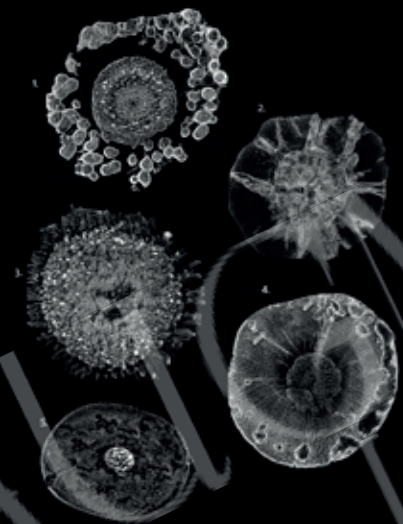
Medium: Prints, Digital Images

Size: A4 in illustration book, A0 in infographic poster

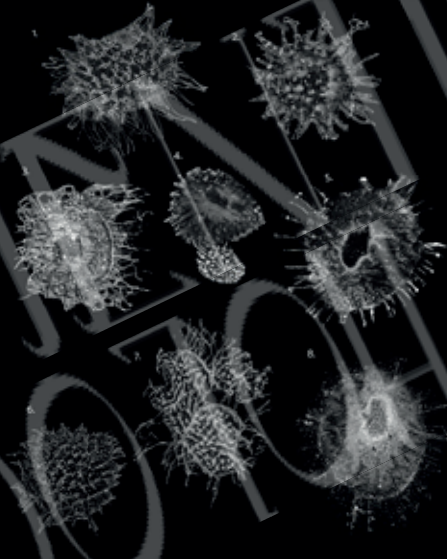
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1. Microscopic structure of a cell
2. Microscopic structure of a cell
3. Microscopic structure of a cell
4. Microscopic structure of a cell
5. Microscopic structure of a cell



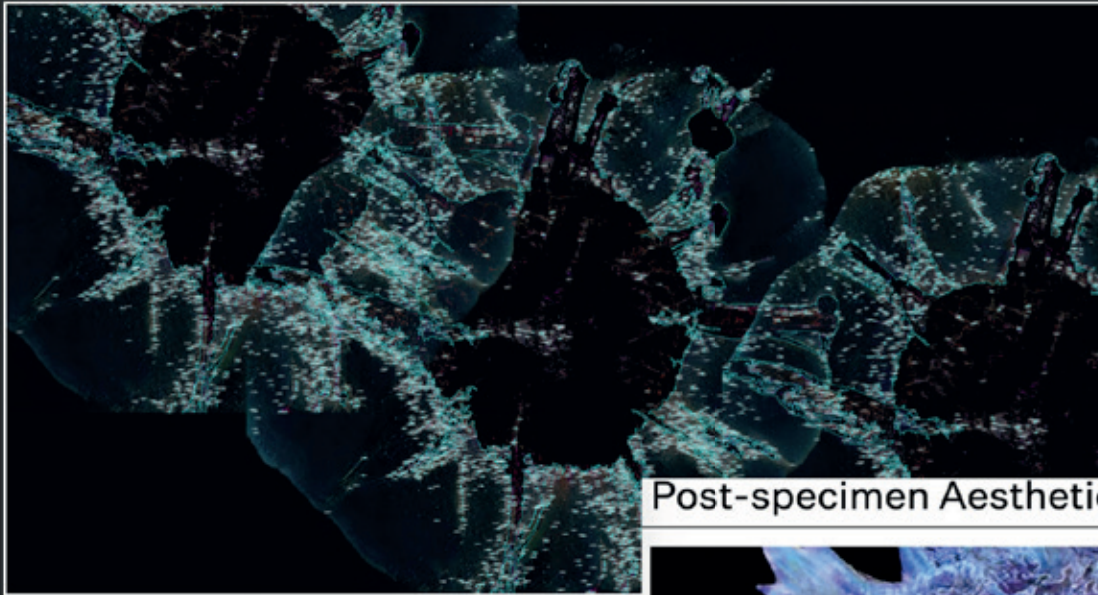
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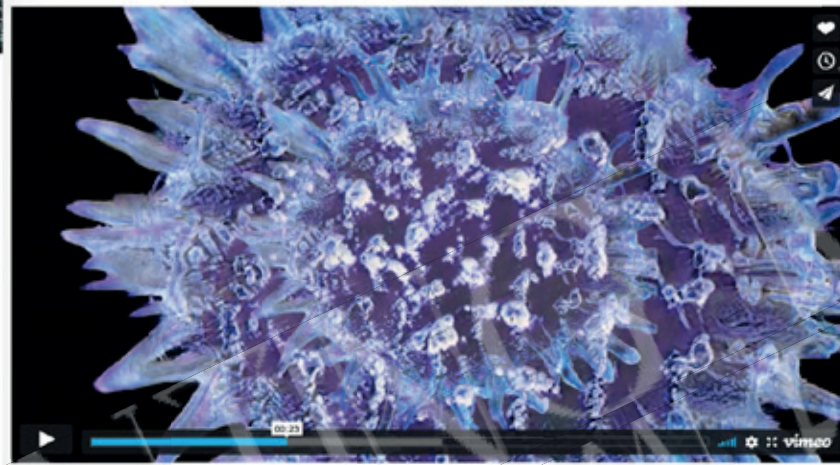
1. Microscopic structure of a cell
2. Microscopic structure of a cell
3. Microscopic structure of a cell
4. Microscopic structure of a cell
5. Microscopic structure of a cell

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Post-specimen Aesthetics

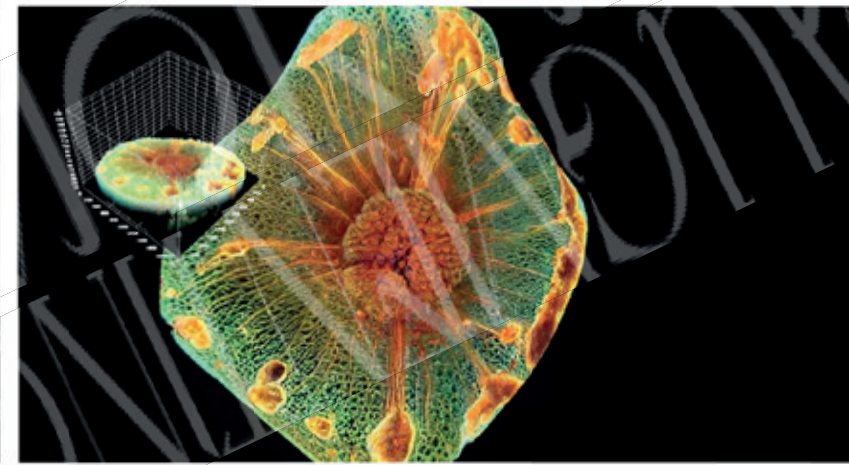


Latent Walks Demo

On-going exploration of data art and moving image demos via Cable GL and Processing

**Medium:** moving images, projection

Biological Code Data Visualization Moving Image



Data Art Demo

Pseudo Counts of AI-generated cell — To explore the aesthetics of bio-visualization in data science, I transfer the images into digital image processing and bio-image analysis software. This process is to prepare for lateral data art exploration in programming environment.

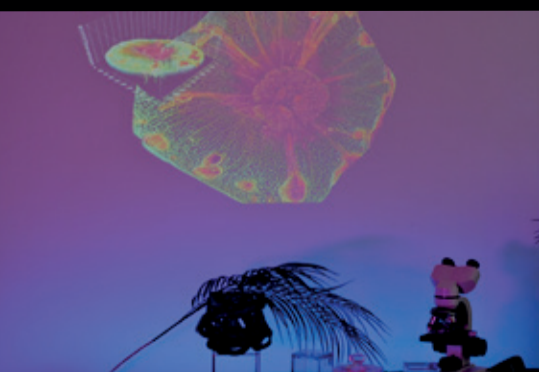


Exhibition Installation



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## Artist Statement

During the degree research at IED, I delve into testing and prototyping the complexity and sensuality of information experience narratives, broadly the life science knowledge and cross-sensory interactive experience. I consider Information Experience Design as Discussion: a design protocol centring around the non-human and ecological approach by sensory narratives and fictional objects.

**"Being respectful to the unknowns and surroundings, and emphasizing how micro-biopolitics highly influence the human and non-human activities."**

To envision the relationships between human and non-human entities in reliable ways, I consult and collaborate with professionals working on scientific and technological backgrounds. At this stage, I majorly connect with computer engineers, scientists and critics regarding bio-inspired computation, computer visions, machine learning, human embryology, microbiome and bioinformatics research etc.

**"We see our own reflection in the microcosms. "**

In the post-pandemic era, we as humans, have witnessed the ongoing trans-species entanglements and empowerment of micro-biopolitics, especially viruses. In London, our surrounding microbial territory also shows the uniqueness of microbiological properties. After collecting the samples and observing them under the microscope, I raise my interest in creating the artificial nature, bridging the virtual and physical ecosystem. I believe the governance of microorganisms and relevant AI tools can lead me to expand the vision of "designing nature" with scientists and data analysts.

That was why I decided to collaborate with my trained AI and present its creativity and value to microscopic image analysis and the entangled artificial/natural information based on London microbial territory.



**AUTONOMOUS MICROSCOPIC IMAGE ANALYSIS DEMO REQUEST**

CONFIRMATION RECEIVED WITH COPY DOCUMENT NUMBER: 2021-1022 AUTONOMOUS REGISTRATION

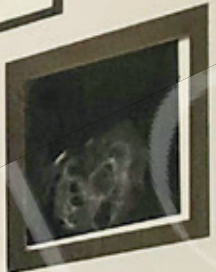
**TECHNIQUES:**

- IMAGE CLASSIFIER IS BASED ON NARROW FOREST TREE
- TRANSFORM 3D RENDERING
- QUANTITATIVE 3D OBJECT TRACKING

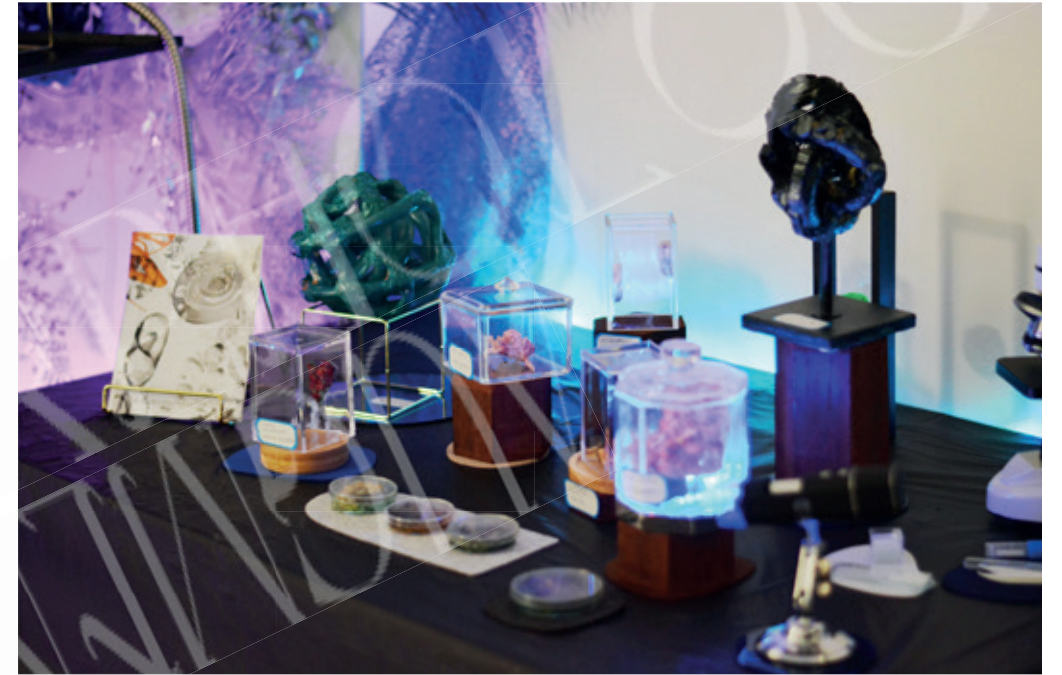
TOTAL PLATFORM CHANGE      US \$1000 EMAIL: N/A

NOTE: MAY ALLOCATE DEEP LEARNING MODELS FOR FURTHER TRAINING IF APPROPRIATE

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