

EEE VISAP 2023 – Perpetual Presence https://visap.net 4 – 29 October 2023 Melbourne, Australia



## Table of Contents

- 3 Table of Contents
- 5 Program at a glance
- 6 Perpetual Presence
- 13 Organizing Committee

#### 15 Exhibited Artworks

- 18 Body Cosmos
- 20 Eco-Mending
- 22 Infinite Colours
- 24 Latent Prism
- 26 Mixtures of Human Experience, Intellectual Analysis, Data Representation and Our Natural Environment
- 28 Monster in a Snow Globe: Biographies as Data Physicalizations
- 30 Parasitic Signals: Coexistence with the SARS-CoV-2 Virus
- 32 Plastic Landscape: The Reversible World
- 34 Posts with No Response: The Island of Loneliness
- 36 Solar System
- 38 Spotlight
- 40 The Heart (Video Documentation)
- 42 The Vast Territory
- 44 Waiting for the Wave in Metaverse

#### 47 Papers & Pictorials

- 50 Associative Forms for Encoding Multivariate Climate Data
- 51 Bitter Data: An Exploration into Data Edibilization of Negative Emotion
- 52 Body Cosmos: An Immersive Experience Driven by Real-TimeBio-Data
- 53 Parasitic signals: Multimodal Sonata for Real-time Interactive Simulation of the SARS-CoV-2 Virus
- 54 Posts with No Response: The Island of Loneliness
- 55 Reinterpreted Spaces, an AI Printmaking Collaboration
- 57 Program Committee
- 59 Sponsors

VISAP 2023 acknowledges the land and water of Wurundjeri people of the Kulin nation on which the exhibition is held. The organizing committee, contributing artists, student volunteers, and all supporting staff together pay respect to their Elders of before, now, and then, recognizing that Australia is and always will be Aboriginal land.

# Program at a glance

Date & Time	Location
Tuesday, 24.10 6:00PM – 8:00PM	VISAP Opening reception Library at the Dock Gallery 107 Victoria Harbour Promenade, Docklands VIC 3008
Wednesday, 25.10 10:45AM - 12:00PM	Session: VISAP Papers I Melbourne Convention and Exhibition Centre; Room 103
Thursday, 26.10 10:45AM - 12:00PM	Session: VISAP Papers II Melbourne Convention and Exhibition Centre; Room 103

### **Perpetual Presence**

Xavier Ho, Rewa Wright, Jonathan Duckworth, Uta Hinrichs, Rebecca Ruige Xu

In a world inhabited by data, how might we become active citizens in the information age? Data is all around us, a stream of personal stories that permeates and backgrounds our digital societies. Situated at the intersection of visualization, art, design, and technology, data acts as boundary objects in between fields of practice. At this intersection, data citizens weave together the fabric of social and environmental phenomena-rich in complexity and expansive in historiography by making bold, confronting, and narrative visual art. The 11th edition of the IEEE VIS Arts Program (VISAP) is a celebration of visible, instrumental, and critical visualizations brought to the public realm.

'Perpetual Presence' acknowledges that data has the transformative potential to influence cultural, economic, and political landscapes. If presence is a state of being, of becoming, and of responding to multiple viewpoints and realities, then Perpetual Presence is a new aesthetic in which data abundantly flourishes in 'compound narratives'<sup>1</sup>, reflecting the many ways we interact with the world. But data is much more than human interactions. Artists who work with data understand it intrinsically and are able to 'rely on the familiar' of the everyday mundane in order to 'transform the strange' as novel ways of being<sup>2</sup>. By actively participating in making use of the data around us, artists become global data citizens. This leads to an array of innovative artworks embodying artistic knowledge, pertaining to new methods and techniques of visualization. From hardware technologies that measure and transpose signals to algorithms that manifest through bespoke software systems, the selection of artworks presented in this catalog challenges our perception of the world.

VISAP'23 curates deeply interdisciplinary and artistic interpretations of this year's theme: Perpetual Presence. At first glance, this exhibition seems to contextualize forces of perpetuity: constant permanence, natural global forces, and the human condition. Artworks are presented as invitations to join a state of being, contemplation, utopian hopes and dystopian warnings—imagining futures from being in the present. But natural phenomena change ever so subtly, evading our notice like starfish moving on the ocean bed. Closer inspections reveal that beneath these seemingly constant forces are in fact evolutionary and shifting signals: human bodies, emotions, memories, global climate, local ecosystems, intelligent machines, and the future of the Anthropocene, the 'uncanny recognition of human authorship of climate change'<sup>3</sup> which our society is slowly coming to term.

We all have multiple relationships with data. Being mindful of where, who, and how data captures our world is becoming a part of our digital literacy, global policy and digital ethics<sup>4</sup>. The relationship isn't always visible, even obvious, to the people who produce and capture data, but it is perpetually present. Take smartphone data for example, a ubiquitous device that regularly broadcasts its geographical location with hundreds of thousands of commute data, they are used as the foundation for future ecological crisis adaptation and planning<sup>5</sup>. At the same time, citizen scientists are tracking the sounds of native frogs and other fauna with dedicated smartphone applications such as FrogID<sup>6</sup>. Data is rooted in the 'work of many hands' and profoundly 'underwaged and undervalued'7. Without the ongoing efforts of federal and state agencies, global companies, research specialists, enthusiasts and fans, technologies such as air quality monitoring and forecasting wouldn't exist. The invisible labor of many should be excavated and credited, as the practice of making labor visible is often the making of art itself. In that spirit, the nexus of art and data visualization is the site of ethnography, of reflective contemplation, making visible and questioning the status quo. These modes of inquiry drive more artists to be more introspective with data, and to make extraordinary objects towards this exhibition program, its sister exhibitions, and in global stages to intuit new meaning.

1. Giorgia Lupi. 'The New Aesthetic of Data Narrative'. *New Challenges for Data Design*. Springer-Verlag: London, 2015.

2. Ibid.

**3.** Lawrence May. Confronting Ecological Monstrosity. *Media Culture* 24(5), 2021.

**4.** Jer Thorp. *Living in Data*. New York: MCD, 2021.

**5.** Deborah O'Connell, et al. "Resilience, Adaptation Pathways and Transformation Approach (RAPTA): a guide to designing, implementing and assessing interventions for sustainable futures", CSIRO: Acton, 2019.

**6.** Jodi JL Rowley, et al. FrogID: Citizen scientists provide validated biodiversity data on frogs of Australia. *Herpetological Conservation and Biology* 14(1): 155-170, 2019.

7. Catherine D'Ignazio and Lauren F. Klein. *Data Feminism*. MIT Press, 2020. This year features artistic practices that manifest data not only as a tool or technology, but also as a socio-cultural force in our global communities and networks. Data is not simply informatics. Spending time with data reveals much deeper connections and understanding about our world and what it means to be human<sup>8</sup>. Global diversity, both cultural and linguistic, is manifest as data whose perpetual presence unites communities across borders and regardless of economic opportunity. The exhibiting artists work with conceptual and critical uses of data at the 'in-between' to express a multitude of experiences. Indeed, the experiences allow 'new and novel modes for envisioning ecological problems, solutions, and futures' and empower global citizens to see the 'very interconnectedness that defines the ecosystems'<sup>9</sup> in the Anthropocene through social commentary and ecological thought<sup>10</sup>. The selection also demonstrates that data are feminist, queer, ecocritical, viral and even interplanetary.

Our bodies are brilliantly complex, and so are the visualization works featured in this catalog. **Bitter Data (page 51)**, and **Body Cosmos (page 18)** are two instances of emotional and nerve response juxtapositioned across time and individuals. Bitter Data renders eleven years of distress posts with bitter tea, one cup per year, and invites people to taste the public distress that year measured by the level of bitterness. The pictorial shows photographic reactions, the expressions varying from person to person: disgust, indifference, curiosity, anguish, surprise, disbelief, and introspective. This work beautifully captures a wide array of responses through a tea-tasting event.

**Body Cosmos** is an invitation to transport participants into their own bodies on a signal ride. Quite literally, it delivers an immersive virtual reality experience tour of the nerve system, pulsing and flashing as the electroencephalogram (EEG) sensors detect electrical brain signals in real time. As the name suggests, viewing Body Cosmos gives the sensation of zooming out into the vast universe and an appreciation of the microscopic from a macroscopic vantage point.

Delving into the realm of the infinitesimally small, **Parasitic Signals** (page 30) stands as a testament to the fusion of science and artistic ingenuity at the atomic level of visualization. It seeks to decode the intricate choreography of the SARS-CoV-2 virus and human molecules, transforming the nano-scale into an interactive symphony—a data-driven ballet. Atomic force microscopy probes become the brush, delicately painting the dance of interactions between spike proteins and human cellular entities.

At the larger end of the scale, **Solar System (page 36)** is an audiovisual performance that translates the sidereal period data of the planets in our solar system into a captivating symphony and a visual journey. This artwork renders the ever-present but unseen solar system perceptible to human senses. The distinctive data patterns of each planet come to life through auditory and visual cues, allowing the audience to tangibly perceive the aesthetic marvels of the cosmos—an interconnected realm that extends far beyond our Earth. The project mirrors the perpetual presence by acknowledging how data from 8. Giorgia Lupi. 'The New Aesthetic of Data Narrative'. *New Challenges for Data Design*. London: Springer-Verlag, 2015.

**9.** Lawrence May. Confronting Ecological Monstrosity. *Media Culture* 24(5), 2021.

**10.** Timothy Morton. *The Ecological Thought*. Cambridge: Harvard University Press, 2010.

the universe has continuously revealed unseen worlds, influencing humanity through various forms of expression. Solar System and Parasitic Signals are masterfully transforming raw data into an artistic rendition, illustrating the timeless presence of the cosmos that envelops and endures around us.

Waiting for the Wave in Metaverse (page 44) and Eco-Mending (page 20) are standing reminders of being present. Waiting for the Wave confronts us with the still-standing sculpture. Our brain inevitably wonders how ocean waves could be frozen in perpetual motion. Casting the perfect wave serves as a wonderful memory that only lasts a split moment. What awaits us 'in the then' is characterized as chaotic and flexible for which we meet with a sense of hope. From the future standpoint, Eco-Mending takes us on a retrospective journey back 'to the now' through sculptural aesthetics to examine the effects of climate change and the ozone gap. It uses physical and spatial metaphors to show the enormous Anthropocene issue at the human scale. These two artworks are brilliant sculptural works that surface ecocritical questions, asking us to reflect as we stand 'in the now'.

But ecocritical questions are for the now. Our world has been damaged by so much artificial abuse from human production, yet the topic of climate change remains abstract. Making sense of this issue at the human scale is the artwork **Mixtures of Human Experience (page 26)**, accompanied by its pictorial **Associative Forms for Encoding Multivariate Climate Data (page 50)**. Leveraging visual metaphors of ocean currents and human waste, it depicts our nature going through irrevocable change. By mobilizing and drawing attention to the scale and magnitude of the climate crisis, this series of four artworks dispels the ecological monstrosity, and instead urges us to reflect on how we might all create positive change.

We can learn much from literary history to make change, and capture what was changed in history as data. Monster in a Snow Globe (page 28) manifests biographical data as a sculptural physicalization, connecting literary abstractions with a tactile and tangible form. This monster of 'sheer informational and productional complexity' is transformed and contained in an acrylic block akin to a snow globe, a familiar and fun-sized object that would not deter visitors from curious inspections. In The Vast Territory (page 42) (*El Vasto Territorio*), four iterative novel drafts are visualized as fungus networks in the soil. This artwork leverages machine learning to create an innovative expression of human literature.

Machine Learning and Artificial Intelligence are staple tools of artistic collaboration. Reinterpreted Spaces (page 55) utilizes printmaking techniques where generative adversarial networks and digital photography collide in three-dimensional space. Latent Prism (page 24) is a stack of acrylic prints of artificially generated photographs presented along with over 36-meter-long credits printed on a receipt roll. Through participating and collaborating with image generation tools, these two artworks pose open questions of artificial reality and surfacing invisible labor, and the invisible data fabric around us.

We often think of data as something that is post-realized, captured and stored on a spreadsheet. The Heart (page 40) is a counter example of using living data in the wild: a city-block-sized building itself. Its artificial intelligence network uses sensors that monitor air quality and human occupancy around the building, as well as light and temperature to drive the 10-meter-tall artwork. Situated at 700 Swanston Street in Melbourne, the work communicates to its residents how the building is feeling through responsive light design.

However, data is not always concrete, obvious, or has a physical form. The next two works, **Plastic Landscape (page 32)** and **Posts with No Response (page 34)** stretch data and mold them onto landscapes of our world. Plastic Landscape presents to us an ephemeral frozen landscape that is beautiful at a distance and distressing at close proximities. Wielding surrealism and inspired by Ilwalobongbyeong (a folding screen) behind the king's throne of the Joseon Dynasty, the work brings decayed microplastics into the audience's reality. Posts with No Response turn our attention from the environment to human emotions represented by physicalized islands. The islands, composed of over 22,000 tweets gathered between 2016 and 2019, form a crescent contour of emotions that ripple outward. Even in times of loneliness and in the ongoing environmental slow destruction, these works remind us that we are closer to each other than we might think.

Infinite Colours (page 22) and Spotlight (page 38) portray the amalgamation of intersectional identities and the ongoing struggle for visibility, acceptance and freedom of expression. Infinite Colours draws from a rich archive of 2,499 queer independent games, each contributing a unique hue, form, and melody to the canvas. This generative display, unfolding over 8 hours, symbolizes the infinitely complex LGBTQIA+ lived experiences and the kaleidoscope of creativity within this vibrant community. It eloquently underscores that queer history is an integral part of the human story—a narrative of resilience, activism, and profound expressions.

In stark contrast, **Spotlight** reveals the invisible power of the internet and its abuse by global governments. Spotlight presents its evidence as a concise book. As the pages are exposed to ultraviolet light, the visualizations come alive with textual insights and new details, ingeniously crafted with glow-in-the-dark paint. The act of shedding light intertwines conceptual darkness as a metaphor for giving data citizens the ability to overcome the struggle for being silenced during such shutdowns when freedom of independent speech is most needed. The absence of this integral modern pillar is explored, narrating a tale of societal disruption and the necessity to safeguard the essence of an interconnected world.

Exploring the multiple modes of presence that data has with being and becoming, in turn this diverse collection of artworks examines life itself. After all, data traces many lifetimes. Data visualization art has the power to create two-way relations between subject and object of knowledge<sup>n</sup>. New data aesthetics, coming from advancements in visualization design play an important role in understanding

**11.** Catherine D'Ignazio and Lauren F. Klein. "Feminist Data Visualization". The 1st Workshop on Visualization for the Digital Humanities (VIS4DH), 2016. complex ecological phenomena. By confronting 'viscerally accessible encounters with the horror of an abject aberrant near future (so near that it is, in fact, already the present)<sup>12</sup>, we take on new perspectives for an encouraging and new ecological future, and become more intimate with our bodies and emotions.

This exhibition is hosted on the lands and Country for which stories have been cultivated for more than 65,000 years. Peer reviewed by a committee of international art practitioners and experts, we are delighted to present this year's selection at the Library on the Dock Gallery, Naarm-Melbourne, Australia.

We acknowledge support from the IEEE VIS conference and organizing committee, student volunteers and their coordinators, and thank to ASN Events for helping put together the physical exhibition and artist talks. We thank our sponsors, Monash Art, Design and Architecture, and Small Multiples for the generous financial support that made this year's exhibition possible. We would also like to acknowledge the team behind Creative City, the City of Melbourne, and the entire Library at the Dock Gallery staff for their tireless aid and guidance.

We invite your mind to wander in the Perpetual Presence of new data aesthetics through the exhibition and catalog as an active data citizen of the information age. **12.** Lawrence May. Confronting Ecological Monstrosity. *Media Culture* 24(5), 2021.

# **Organizing Committee**

### General Chairs

Uta Hinrichs University of Edinburgh • utahinrichs.de

Rebecca Ruige Xu Syracuse University • rebeccaxu.com

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# Table of Contents

### **Exhibited Artworks**

- 18 Body Cosmos
- 20 Eco-Mending
- 22 Infinite Colours
- 24 Latent Prism
- 26 Mixtures of Human Experience, Intellectual Analysis, Data Representation and Our Natural Environment
- 28 Monster in a Snow Globe: Biographies as Data Physicalizations
- 30 Parasitic Signals: Coexistence with the SARS-CoV-2 Virus
- 32 Plastic Landscape: The Reversible World
- 34 Posts with No Response: The Island of Loneliness
- 36 Solar System
- 38 Spotlight
- 40 The Heart
- 42 The Vast Territory
- 44 Waiting for the Wave in Metaverse

### **Body Cosmos**

Rem RunGu Lin, Koo YongEn Koo, Leixin Luo

https://vimeo.com/user74394024

Body Cosmos is an artwork that explores the interconnectedness of the human body in a digital cosmic environment. We create a surreal virtual reality that reflects the intricate structures of human anatomy and celestial nebulae, learning from volumetric rendering techniques. This immersive experience connects the macrocosm of the universe with the microcosm of human life. revealing the enduring resonance of our biological rhythms in the cosmic dance (Figure 1). "Body Cosmos" integrates real-time bio-data gathered through heart rate monitors and EEG devices. This life data influences the visualization, creating an intimate, personal connection with the cosmos. The artwork transcends immediate presence, reflecting on the intertwined relationships that humans can form with digital data, thus nurturing a perpetual presence within the cosmic expanse.

Screenshots of Unreal Engine's real-time demo of Body Cosmos (© Rungu Lin 2023)







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Figure 2
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### **Eco-Mending**

#### Jane Adams, Racquel Fygenson

https://universalities.com/

Eco-Mending juxtaposes old and new to tell a story of ecological regeneration. This project finds stories of human-mediated restoration in longitudinal data, and stitches modern data into imagery from the past, creating decorative wall and ceiling hangings. With perpetuality of data, comes the possibility of changing it. In this collection of art pieces, Eco-Mending pairs past ecological destruction with present and future projections of data that highlight successful ecological reconstructions.

Year: 2023 Material(s): Paper, Thread, Foam, Metal, Quartz Format: sculpture, wall art Dimension: 1 sculpture measures 14 x 10 x 26 in. (35.6 x 25.4 x 66 cm.) and 14 prints measure 8 x 8 in. (20.3 x 20.3 cm.) each

A photograph of the hanging sculpture recording data about the ozone layer. Right: A close-up from data about soil remediation in Nigeria.



#### CHROMIUM.



MAP: European Digital Archive of Soil Maps (EuDASM) via ISRIC World Soil Library. PHOTOCRAPH: Pius Utomi Ekpei/AFP/Getty Images. Featured in "Nigeria: The Cost of Oil" by Alan Taylor, *The Atlantic*. 8 June 2011.

DATA: Araka, P. P., Okparanma, R. N., & Ayotamuno, J. M. (2019). Diagnostic screening of organic contaminant level in solidified/stabilized pre-treated oil-based drill cuttings. *Heliyaw*, 5(10), e02644. https://doi.org/10.1016/j.heliyan.2019.e02644



Bioremediation data of heavy metals from oil drilling in Nigeria. Right: An ant's eye view of ozone layer data.



Process phots from the manual labor of 'eco-mending' data into artworks.

### **Infinite Colours**

Xavier Ho, Stephen Krol

#### https://jtg.design

This generative work draws data from 2,499 queer independent games for about 12 seconds each. Each game adds a unique shape and colour onto the canvas, and plays a unique string of notes. Over 8 hours, the canvas will be filled with infinite colours to celebrate LGBTQIA+ independent videogames. History has always been queer. Through this generative visual and sound work, we aim to demonstrate the collective activism, movement, and creative expressions that queer folks are making to be visible, heard, and to say that we are here. But queer movement does not happen over night; queer resistance is accumulative and built over generations of selfsacrifice and self-acceptance. The multitude intersectionality of the unruly times slowly bleeds colour into the world, blends motion into the landscape, and accumulatively becomes a canvas of ever-moving colourful light.

Year: 2023 Material(s): Javascript, projector, primed woodboard Format: generative projection art Dimension: 180cm x 180cm x 20cm



Front photo of the generative projection artwork swirling with mustard orange, muddy and dimmed cyan, and a pool of red and magenta.



Second front photo of the same angle taken at a different time, blood red bleed onto light gray, overtaking the orange and the purple.



 $Side\ photo\ of\ the\ artwork,\ reflecting\ on\ the\ polished\ concrete\ like\ a\ full\ moon.$ 

### **Latent Prism**

Jane Adams

#### https://universalities.com/

Latent Prism is a visually captivating and thoughtprovoking piece that incorporates artificial intelligence (AI) and data visualization. It presents a projection of an imagined environment, created through a generative adversarial network (GAN) trained on thousands of aerial photographs from royaltyfree stock photo websites. The sculpture takes the form of a polished transparent lucite prism, within which layers of translucent mylar film are suspended. These films display frames extracted from an AI-generated video known as a "latent walk" showcasing undulating ocean and forest landscapes captured from an aerial perspective. Frames are selected at regular intervals along the linear interpolation of images from the generative model, such that light from below is still able to permeate up to the viewer. The aggregated effect of these layered video frames results in an eerie visual sensation of peering down at a forested landscape that is being submerged in water. Surrounding the prism is a haphazardly piled 120ft. (36.5m)-long roll of credits, listing the names and photographers for every image used to train the model on a 2.5in (6.35cm) wide strip of drafting paper.

#### Year: 2023

**Material(s):** mylar, lucite, architectural drafting paper, adhesive, LED, StyleGAN2 generative adversarial network **Format:** sculpture **Dimension:** 8 x 8 x 3.5 in. (20.3 x 20.3 x 8.9 cm)

The latent prism is illuminated from below.





Translucent layers from a vector through high-dimensional space depict ghostly aerial imagery.



Below the sculpture are 17,000 credits for the photographs used to train the aerial photograph generative adversarial network.

### Mixtures of Human Experience, Intellectual Analysis, Data Representation and Our Natural Environment

Francesca Samsel

https://sites.utexas.edu/artscivis/

As humans, we are perpetually present in nature. We experiencenature through sensory perception of everything that surrounds us:the breeze on our skin, the warmth of the sun, the scent of floweringplants, the tactile variations in the surfaces of our environment. We are constantly decoding and assimilating the clues our natural environmentprovides through sensory experiences. In contrast, expression of environmental and climatebased changethrough data measurement and analysis separates us from the sensoryexperience of our immediate environment. The current simulations and depictions of climate change data ocean chemistry, coupled ecosystemmodels, the atmosphere far above and the ocean currents far below - are viewed as separate from our personal environments: distant, notpart of us, not connected to us, and unrelated to our perpetually presentsensory experience. The separation of our emotional connection to nature from ourintellectual study inhibits our ability to absorb the growing impacton our daily

lives. The work presented here seeks be a conduit assistingus to close the gap between our human emotional connection to naturefrom our intellectual study and the sterile analytical imagery we use tounderstand the invisible physical changes underway. We rely on the interplay of art, technology and science, and thedance of these disciplines as they augment one another to create anemotional connection between the audience and the data. Prior workfocused on building out artistic vocabulary for clear, engaging scienceexploration and communication. The series presented here, melds thescience inquiry, data representation, artistic contextual content to createnew layers of meaning and connection.

Year: 2022 Material(s): paper and ink Format: print Dimension: 48' x 18'



Disruptions, speaks of ecosystem disruptions being driven by microscopic organisms.



 $Sargassum, references \ the \ 5000 \ mile \ wide \ swath \ of \ toxic \ bloom \ washing \ onto \ coastal \ regions \ across \ two \ continents.$ 



 $Combination\ of\ biogeochemistry\ data\ in\ the\ Gulf\ of\ Mexico\ with\ illustration,\ Oxygen\ speaks\ of\ the\ extended\ reach\ of\ hypoxic\ ecosystems.$ 

### Monster in a Snow Globe: Biographies as Data Physicalizations

Florian Windhager, Viola Rühse, Michael Smuc

https://dataquaria.com/zens

The lives and works of artists inscribe themselves into the cultural, material and media environments of their times, and some of them leave traces living with us in perpetual presence. Similar to the arts, the means to study and document such biographical inscription processes are under constant development: From the heroic accounts of Renaissance artists to feminist visualizations of coexisting urban subjects we have seen the arts and humanities' methods portfolio evolve. In this context, the artwork showcases how the intangible and ephemeral lives of artists can be brought into the physical presence of material exhibition spaces. To that end, it builds on the visualization framework of time geography and remodels biographies diagrammatically as three-dimensional trajectories, drawing unique curves into a translucent space-time sculpture. Focusing on the life and work of the Austrian painter Herwig Zens (1943-2019), the data sculpture shows major steps and movements of his career. Over many decades, Zens kept a multimodal diary and etched logbook-like notes on art projects and his teaching activities, encounters with other artists,

collectors and gallery owners, as well as travel impressions on copper plates. A complete print of the diary from 2005 - which Zens referred to as 'monster' due to its sheer informational and productional complexity - is considered the longest etching in the world at 40 meters. In lieu to this artifact, the sculpture translates the 'monstrous' complexity of a modern-day biography into a distant reading object, oscillating between an epistemic image and a kid's toy - similar to snow globes which are used to contain memorable figures or sites, and which have been invented in Vienna at the end of the 19th century. Acknowledgements: The European Union's Horizon 2020 research and innovation programme supported related research and development under the project No. 101004825.

Year: 2023 Material(s): Acrylic Polymer Format: sculpture, interactive prototype, data story, website Dimension: 134mm x 83mm x 56mm

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Biographical data sculpture.



Data sculpture, next to original prints of the artist's etched copper plates.



The etched diary of Herwig Zens (length = 40 m), also referred to as "monster" by the artist due to its productional complexity (KHM Vienna, 2023).



Data sculpture, presented to the audience of an exhibition on Herwig Zens diary at the Museum of Art History, Vienna.



Reception of the artwork by exhibition visitors and friends of the artist.



Screenshot of the interactive and narrative visualization, accompanying the physical data sculpture.

# Parasitic Signals: Coexistence with the SARS-CoV-2 Virus

Myungin Lee, Sabina Hyoju Ahn, Yoojin Oh, JoAnn Kuchera-Morin

https://www.myunginlee.com/covid

This project aims to transform the nano-scale of a striking biological phenomenon, the relationship between the SARS-CoV-2 virus and human molecules, into an interactive audiovisual simulation. In this work, Atomic Force Microscopy (AFM) touching and imaging a single molecule measures the interaction between the spike protein of SARS-CoV-2 and human cellular proteins and measures the dynamic of the spike protein. We create a comprehensive scientific model based on diverse datasets and theories presenting a real-time interactive complex system with efficient rendering and sonification using a single C++ platform. This project invites the audience into an immersive space where they can control the behavior of biomolecules, allowing them to intuitively perceive biological properties. This project is not only a demonstration of scientific data but also attempts to look at the interspecies relationship in parasitism which particularly deals with our current and postpandemic life with coronavirus and how we might control our coexistence in a virtual space.



Installation of Coexistence with the SARS-CoV-2 virus



From (a) spike trimer of the SARS-CoV-2 virus observed with AFM to (f) rendered dynamic spikes with the labels



 $Four \ stages \ of SARS-CoV-2 \ infection \ toward \ the \ lung \ along \ the \ airway: Appearance, \ Diffusion, \ Penetration, \ and \ Binding \ for \ Entry \ and \ Binding \ for \ Entry \ and \ Binding \ for \ Entry \ and \ Binding \ for \ for$ 



 ${\it Linear-scale\ spectrogram\ of\ an\ exemplary\ narrative\ over\ 4\ minutes}$ 

### Plastic Landscape: The Reversible World

#### Yoon Chung Han

http://yoonchunghan.com/portfolio/plasticlandscape.html

Plastic Landscape - The Reversible World is an AIgenerated 3D animated video design that shows the apocalyptic and surreal world surrounded by artificial plastic mixtures and objects in the ocean, urban city, Antarctica, and forest. Four different scenes are animated, with the camera panning slowly from left to right. Viewers can observe how the plastics are decomposed at a slower speed by looking at particle animations. In collaboration with engineers at Yonsei University, reverse neural network algorithms were applied to create style transferred images and those images were used for textures for surreal 3D objects in the worldmaking process. In doing so, the piece raises awareness about microplastics, which are a cause of environmental issues in the present day. Data like different types of plastics and speed of decomposition are applied in this animation and sound design. This scene animation is inspired by Ilwalobongbyeong (a folding screen) behind the king's throne of the Joseon Dynasty. This animation depicts the twist of the landscape. Surreal objects/ buildings in this animation made from plastic look beautiful and mesmerizing at first glance. However, the viewers can notice

that they are the decayed objects and destroyed nature impacted by human beings. This new multi-sensory artwork addresses the awareness of plastic pollution through the apocalyptic lens. This work explores how humans and non-humans can be mingled in the plastic-impacted situations with an artistic lens and critical point of view. The piece brings audiences face to face with the reality of climate change, while at the same time foreboding a future that has been destroyed by microplastics; the piece will inspire audiences to take action of their own accord.

This artwork is a part of the Digital Silence project in collaboration with Ulsan Art Museum and the School of Electrical and Electronic Engineering in Yonsei University.

#### Year: 2023

Format: Multi-channel video installation 3D Animation and 3D object design: Hung-Hsuan Tsai Music and Sound: Soo Jung Kwak Machine Learning-based image creation: Prof. Sung Lyun Kim, Myeong Hun Seong, Changmin Lee

"Plastic Landscape - The Reversible World by Yoon Chung Han















### Posts with No Response: The Island of Loneliness

Junxiu Tang, Rui Sheng, Yifang Wang, Xinhuan Shu, Xiaojiao Chen, Tan Tang, Yingcai Wu

https://osf.io/3kt8d/

Loneliness and isolation are eternal emotions in human beings. Technological advancements create ample avenues, like social medias, for individuals to articulate themselves and record emotions. However, the sense of loneliness has never vanished, as their expressions are easily buried in the digital stream. We analyze social media posts that express loneliness during holiday seasons but receive few responses. By superimposing digital charts on physical models, we visualize these lonely posts and generate the island of loneliness. We aim to reveal the complexities of human emotions in the digital age and reflect on the interconnections between technology, solitude, and social communication.

Year: 2023 Material(s): wood Format: installation Dimension: 50cm x 50cm x 10cm



The physical model of the loneliness island.



 $The \ complete \ installation.$ 





 $\label{eq:projection} Projection\ onto\ the\ physical\ model.$ 



The island's highest point, representing the popular topics related to loneliness.



Ripples indicate the presence of responded posts when the unanswered posts sediment into the seabed.

### Solar System

Hyemi Song

Solar System is an audiovisual live performance that marries data visualization and sonification. The installation system employs sidereal period data from the eight planets in our Solar System to generate a live soundtrack and visualization. The mission of this endeavor is to use audible and visual media to allow humans to uncover and cognize with the always surrounding, yet invisible, Solar System. Each planet's unique data patterns (sidereal periods) contribute to this exploration by being translated with audible and visible media. The media stimulate audiences' cognitive senses, enabling audiences to tangibly experience the aesthetic wonder of the cosmic world, which is deeply interconnected with the entirety of the Universe and humanity on Earth. The inspiration and message of the Solar System project resonate with this year's theme, Perpetual Presence. Throughout history, data from the Universe has been employed to uncover the existence of unseen worlds, the Cosmos. The discoveries gleaned from the process have influenced numerous sectors of our humanity, communicated through various languages and approaches. Scientists use numerical data and textual explanations to communicate information about the Cosmos. On the other hand, artists use sensory media, such as visuals and sounds, to narrate the story of the Cosmos. This art project

aims to manifest the continuous and timeless presence of the Universe where it surrounds humanity, employing artistic transformation of universe data to illuminate its enduring existence. The sidereal periods of the eight planets are the raw data. These relative orbital periods were transformed into eight distinct sound loops, each with its unique cycle. This transformation was accomplished through the installation system incorporating algorithms. While producing a soundtrack, changes in the sound influence the visualization. The sound signals are transferred to the visual tool, impacting the visualized elements.

#### Year: 2016

Material(s): Processing, Ableton Live, Sound sensors, a MIDI Controller Format: audio-video performance, video installation Solar System, audio-video live performance. The performer operates the installation system at the center of the stage.









 $Solar\ System\ is\ an\ audio-visual\ live\ performance\ that\ marries\ data\ visualization\ and\ sonification.$ 

### Spotlight

Kimiya Pahlevan, Charles Perin

Spotlight is an interactive data visualization project on the topic of government-imposed internet shutdowns. Although originally created in a book format, it is presented as a poster series for the purposes of this exhibition. This project explores the effects of internet shutdowns, some of their common triggers, and their relation to sensitive events such as protests and elections. The pages are made interactive through the use of glow-in-the-dark paint, which requires the viewer to use a

UV flashlight provided to them along with each page to reveal additional information. The glow-in-the-dark-paint was not only an interesting material to experiment with in terms of creating lightbased interactions, but it also symbolically complements the storytelling aspect of this project since internet shutdowns are often associated with phrases such as "being left in the dark". The overall experience aims to replicate a sense of living through an internet shutdown by creating a low-light environment where the viewer is faced with a barrier in order to access some information as it is difficult or at times impossible to access certain sources of information during internet shutdowns.

#### Year: 2023

Material(s): glow-in-the-dark paint and markers, UV flashlight Format: Interactive poster series, Book Dimension: 276cm (w) x 201.5cm (h) x 68cm (d)



Map of internet freedom status



 $\label{eq:visualization} Visualization \ of \ unrest \ events \ vs. \ number \ of \ internet \\ freedom \ shutdowns$ 



 $Stories \ on \ internet \ shutdown \ experiences$ 



Number of internet shutdowns by year

### The Heart (Video Documentation)

Robert Walton, Zaher Joukhadar, Additive (Paul Lim and Bosco Shaw), Brad Hammond, Michael McAtomney (Melbourne Connect)

https://robertwalton.net/project/the-heart/

The Heart is a site-responsive, slow Artificial Intelligence artwork to be lived with over decades. It reveals the pulse of a superorganism: the community visiting, living, and working in Melbourne Connect, a city-block size building, home of businesses, university departments, a kindergarten, accommodation, and a science museum. The Heart beats indefinitely for and with the life of the building and its community. The Heart is connected to 4800 Building Information Modelling sensors. These monitor CO2, humidity, occupancy, movement, light, and more. The building adjusts the environment to create the optimum conditions for human comfort and safety. Normally, the automated work of building sensors and systems is dispersed and imperceptible. The Heart stages the building's 'sensations' in a way people can perceive and begin to empathise with. It does this by taking form in Melbourne Connect as a 10-metre-tall volume of brass droppers, reconstituted brick fragments, and LEDs in the shape of a giant human heart. The Heart operates within a perpetual present, responding live to the activity occurring in proximity to its sensors in perpetuity, and responds through changes in heart rate and animation.

Visitors can also interact directly with The Heart by touching a heart rate monitor and adding their pulse to the building. The Heart uses Manifold Learning to become accustomed to the live 'sensations' it receives from its 'body' (the building) over the course of each day. At night when The Heart sleeps, it creates a new manifold merged with previous days' manifolds. When awake, it compares what it 'feels' in the present against its habituated experience of the past. The Heart also uses a Generative Adversarial Network (GAN) to develop a capacity to anticipate what it is about to 'feel' based on its 'lifetime' of habituated experiences.

Visit: 700 Swanston Street, Melbourne

Artist: Robert Walton AI Programming: Zaher Joukhadar Design: ADDITIVE Heart OS: Brad Hammond

Year: 2023

Format: Durational performance, live computer simulation running in perpetuity, 3D display volume, tapered neon. Dimension: Visible: 10m x 10m x 10m (approx.) Invisible: 100m x 200m x 70m (approx.) **Material(s):** Brass, scientific glass, neon, LED, reconstituted brick and 3D-printed weights, custom printed circuit boards, custom operating system HeartOS (Unity), custom data pipeline, custom Manifold Learning and Generative Adversarial Network implementations, 4800 BIM sensors, Melbourne Connect, people breathing and moving in Melbourne Connect.



The Heart, Melbourne Connect, Robert Walton. Photo: Michael McAtomney





The Heart, Melbourne Connect. Photo: Michael McAtomney



The Heart, Melbourne Connect. Photo: Michael McAtomney

The Heart, Melbourne Connect. Detail of interaction with pulse monitor. Photo: Michael McAtomney





 $The \ Heart, Melbourne \ Connect. \ Detail from \ landing. \ Photo: \ Michael \ McAtomney$ 

### **The Vast Territory**

#### Baltazar Pérez, Simón López Trujillo

#### the-vast-territory.baltazarperez.com

In the novel The Vast Territory (El vasto territorio. Alfaguara, 2021; Caja Negra, 2023), by Chilean author Simón López Trujillo, a mycologist analyses the way a certain fungus infects the mind of a forest worker called Pedro. An abstract image of countless white dots against a black background, in the form of waves or a mountain range, appears to explain the infection: the genetic origin of Pedro's language, when the fungus starts speaking through him. That image, included in the revised edition of the book, is also a depiction of the novel's genetic origin, as it was generated by a visualization of different drafts of the novel. In every literary reading, two texts are involved: the actual text, that we can smoothly read with our eves, and a second, invisible text, made of all the deletions, editions, and additions of words involved in the process of writing. This project conceives the visualization of The Vast Territory as a visual novel on its own that explores the unconscious of the book: that black, secret space, where the words involved in the writing process emerge as ghostly presences. There, the data of the previous draft are manifested in the following one, as a latent presence in the actuality of the text we read. In this work, every white dot represents a word in the juxtaposed draft sequence.

Its construction follows only two straightforward rules: (1) words are sequentially arranged in a horizontal line: (2) the vertical position of each worddot is determined by its initial appearance within the entire sequence of drafts. The result is a "data-palimpsest" where each draft leaves its imprint on the next through their cumulative determination of the spatial order. By using the order of first appearance as the guiding principle, the visualisation emphasises the inherited structure of each draft from its predecessors, akin to looking at the fossil record or geological strata, with the most ancient elements appearing at the greatest depth.

Year: 2023 Material(s): Javascript, four text files corresponding to El Vasto Territorio and its drafts Format: Non-interactive program



Three drafts of The Vast Territory followed by its published version. Each white dot is a word, ordered vertically by first appearance.



The program runs linearly through all the drafts and final version of the novel.



 $Visualization \ of \ J.L. \ Borges' short \ story \ On \ Exact itude \ of \ Science, following \ the \ same \ construction \ rules.$ 

### Waiting for the Wave in Metaverse

Midori Yamazaki, Yves Leterrier, Junya Taguchi, Sandeep Virdi

https://out-of-blue.com/waiting-for-wave-in-metaverse/

This artwork is a visualisation of the moment of a well-formed shape of a wave, ideal for surfing, which retains its aesthetically pleasing shape forever, through a creative process that mixes reality and virtual reality. It attempts to generate an experience in nature with its audience by presenting it and the artwork reaffirms the supple strength of human cognitive abilities and expresses a sense of human existence that will remain unchanged forever, even in a future where reality is in chaos. The artwork mixes reality and virtual reality through a playful creative process that moves between digital and physical, 2D and 3D. It visualises the moment of a shape of a well-formed wave as a perpetual presence, that is aesthetically pleasing and gives us pleasant confusion at the same time. It presents the fleeting moment of a wave, a form of natural force by blending human hand-creation, which generates randomness, with ocean physics, which always works correctly, in the chaos of real and virtual reality. And by building interaction between human beings and nature and reaffirming our identity from a trans-human perspective, like meditation, we can ensure that our sense of being is forever unchanged. Modern technology makes it easy to

replicate visual representations that are indistinguishable from reality. The metaverse has become one of the spaces in which we humans exist, and the definition of existence is being distorted. However, we live in ever-changing times and continue to evolve, recognising and accepting flexibly the chaos of reality and the unreality that technology brings with positive hope.

Year: 2023 Format: printed image, sculpture, screening, display device Material(s): digital data, paper, resin, stone powder



Process 1: The shape of the wave, made of stone powder. Viewed from the side.



Final outcome of the artwork 1



 $Final \, outcome \, of \, the \, artwork \, 2$ 



Final outcome of the artwork 3



 $Final \, outcome \, of \, the \, artwork \ 4$ 



Process 2: The shape of the wave, made of stone powder. Viewed from overhead.



# **Pictorials**

# Table of Contents

### **Papers & Pictorials**

- 50 Associative Forms for Encoding Multivariate Climate Data
- 51 Bitter Data: An Exploration into Data Edibilization of Negative Emotion
- 52 Body Cosmos: An Immersive Experience Driven by Real-TimeBio-Data
- 53 Parasitic signals: Multimodal Sonata for Real-time Interactive Simulation of the SARS-CoV-2 Virus
- 54 Posts with No Response: The Island of Loneliness
- 55 Reinterpreted Spaces, an AI Printmaking Collaboration

### Associative Forms for Encoding Multivariate Climate Data

Francesca Samsel, Daniel Keefe, Gregory Abram, Catherine Bowman

#### https://sites.utexas.edu/artscivis/

We are constantly decoding and assimilating the clues our from our natural environment provides through sensory experiences and recoding them into our own experiential repertory. Research of environmental and climatebased change through data measurement and analysis separates us from the sensory experience of our immediate environment. Our research objective is to facilitate the merging of our sensory perception of the environment with the data representing that environment, through the development of a new visual vocabulary that speaks both to the scientific and artistic representations of our environments, translating data into a sensory perception, making us perpetually present in the deeper, richer reality of our environment. Current visualization glyphs used in climate science represent data with simple geometric primitives. These generic geometries bear no relationship to the sensory aspects of our environmental experiences, and they fail to evoke any personal connection to the data. Here we present handcrafted organic 3D glyph designs, drawn specifically from the forms, textures, metaphors,

and narratives we observe in nature. We demonstrate how this vocabulary can not only accurately and efficiently depict data but also bridge the gap between our current experiences with environmental data and our sensory experience and memory of our environment.

Visualizations from our study on the associative properties of form, top - glyphs from the fauna category, bottom - glyphs from the flora category.



### Bitter Data: An Exploration into Data Edibilization of Negative Emotion

YuFan Li, Yue Huang, Varvara Guljajeva, Kang Zhang

"Bitter Data" transforms 100,000 distress postings from Chinese social media into a multi-sensory experience using data edibilization. We've mapped distress data quantity to the bitterness and color of tea through data analysis and experimentation. Participants taste, smell, and observe 11 cups of tea, each embodying a year's distress data, in our workshop. Their facial expressions, recorded upon tasting, visually indicate emotional states. This project explores benefits and pragmatic solutions to challenges of data edibilization.



Mapping facial expressions in correlation with the bitterness of each year.

### Body Cosmos: An Immersive Experience Driven by Real-TimeBio-Data

Rem RunGu Lin, Koo YongEn Ke, Kang Zhang

https://vimeo.com/user74394024

This paper presents "Body Cosmos", an artwork that creates a symbiotic relationship between the human body and a simulated cosmic environment through volumetric rendering and particle system. Drawing from DICOM data to simulate the human body and nebulae, we create an interactive and dynamic virtual environment. The real-time bio-data of users, collected via heart rate sensors and EEG devices, is integrated into the visualization, fostering a personal engagement and unity within this 'cosmos.' Body Cosmos provokes curiosity and expands users' imagination, and deepens their understanding of life's macrocosm and microcosm. This exploratory project redefines traditional perceptions of the human body in relation to the universe, creating a unique lens to view selfhood, embodiment, and identity. As we look to the future, the system's evolution will include incorporation of more bio-data sensors, an investigation into its potential psychological and physiological benefits, and the development of social interactive features through multi-user capabilities.



Screenshot of Unreal Engine's real-time demo of Body Cosmos (© Rungu Lin 2023)

### Parasitic signals: Multimodal Sonata for Real-time Interactive Simulation of the SARS-CoV-2 Virus

Myungin Lee, Sabina Hyoju Ahn, Yoojin Oh, JoAnn Kuchera-Morin

#### https://www.myunginlee.com/covid

This project aims to transform the nano-scale of a striking biological phenomenon, the relationship between the SARS-CoV-2 virus and human molecules, into an interactive audiovisual simulation. In this work, Atomic Force Microscopy (AFM) touching and imaging a single molecule measures the interaction between the spike protein of SARS-CoV-2 and human cellular proteins and measures the dynamic of the spike protein. We create a comprehensive scientific model based on diverse datasets and theories presenting a real-time interactive complex system with efficient rendering and sonification using a single C++ platform. This project invites the audience into an immersive space where they can control the behavior of biomolecules, allowing them to intuitively perceive biological properties. This project is not only a demonstration of scientific data but also attempts to look at the interspecies relationship in parasitism which particularly deals with our current and postpandemic life with coronavirus and how we might control our coexistence in a virtual space.



Installation of Coexistence with the SARS-CoV-2 virus

### Posts with No Response: The Island of Loneliness

Junxiu Tang, Rui Sheng, Yifang Wang, Xinhuan Shu, Xiaojiao Chen, Tan Tang, Yingcai Wu

#### https://osf.io/3kt8d/

Loneliness and isolation are eternal emotions in human beings. Technological advancements create ample avenues, like social medias, for individuals to articulate themselves and record emotions. However, the sense of loneliness has never vanished, as their expressions are easily buried in the digital stream. We analyze social media posts that express loneliness during holiday seasons but receive few responses. By superimposing digital charts on physical models, we visualize these lonely posts and generate the island of loneliness. We aim to reveal the complexities of human emotions in the digital age and reflect on the interconnections between technology, solitude, and social communication.



 $The \ physical \ model \ of \ the \ lone liness \ is land.$ 

### Reinterpreted Spaces, an Al Printmaking Collaboration

Hannen Wolfe, Charlotte Rogerson, Amanda Lilleston

We present an examination of organic spaces through print, book making, data, and machine learning. Artists created a book that explored the idea of organic and machine-made interpretations of a place that were generate using 3 different processes: a generative adversarial network, traditional printmaking and a camera. The artists found the results unexpected, discussing how the AI-generated image changed and complicated their understanding and constructed narrative about the original image and space. This caused them to think outside the box with over half of the students changing their print matrix and/or ink choices after seeing their AI-generated image. This supported the learning objective for students to collaborate with technology that is uninhibited by perspective or expectation, adapting and responding productively and creatively within a new framework. With the newfound accessibility to AIgenerated images we encourage art teachers to explore how it fits into their curriculum.



Nine of the flag books created by the artists interpreting a chosen space through photography, AI generated imagery and printmaking.

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MONASH ART DESIGN & ARCHITECTURE



Published in conjunction with the exhibition

IEEE VISAP 2023: Perpetual Presence

Held on 4—29 October at the Library at the Dock Gallery, Victoria, Australia. IEEE VIS Arts Program (VISAP) is an associated event of the IEEE VIS Conference.

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