

Experimental: Practice-based research explorations of XR space making

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Abstract

This panel presentation explores disruptive and experimental perspectives of realising immersive 3D virtual spaces. Four XR artists and practice-based researchers discuss their inside and outside approaches to challenging established XR space making aesthetics. The topics covered by each panel member are 1. VR Landscapes and the Tacit Dimension 2. XR Materiality Remixing 3. Historical Placemaking in XR and 4. NanoscapeVR. Ultimately, this panel seeks to unpack and discuss the ways artists can rewire, experiment and reflect on new ways of making XR spaces.

Keywords

Virtual Reality, 3D Visualisation, Extended Reality, Practice-Based Research, 3D Animation, 3D Worldbuilding, Real-time, Computer Arts, Media Art

Introduction

As persistent XR environments develop and XR head mounted displays become ever more ubiquitous, there is an opportunity to realise compelling and alternative virtual worlds. This panel presentation explores disruptive and experimental perspectives of realising immersive spaces. Four XR artists and practice-based researchers discuss their inside and outside approaches to challenging established metaverse aesthetics.

1. VR Landscapes and the Tacit Dimension – Benjamin J Bailey

The process of building 3D immersive virtual environments involves an intricate dance of precise technical knowledge and workflow know-how interwoven with creative intuition and artistry. Scientist and Philosopher Michael Polanyi used the phrase *Tacit Knowledge* [1] [2] to describe the largely inexpressible intrinsic knowledge that professional practitioners bring to a task, often as a result of substantial experience. VR 3D environment artists and designers harness this kind of tacit knowing alongside their more explicit skills to guide their practice. Disentangling the

contributions of forms of knowing is a difficult but important process.

Bailey's VR practice involves the creation of environments that explore the visual aesthetics of the Australian landscape (Figure 1) as navigable virtual environments. As an island continent geographically isolated from the rest of the world for eons, Australian landscapes have a character found nowhere else which has been a source of inspiration and enduring fascination for generations of Australian artists.

As Bailey's creates these works, he interrogates his own processes, observing how, in some circumstances, tacit knowledge coalesces into conventions or 'best-practices'. However, more often these forms of knowledge remain intuitive and unexamined, even by the artist himself – and is only revealed through careful self-examination and reflection. As a member of this panel, Bailey will discuss the interplay between precise technical knowledge, workflow know-how and artistic tacit dimensions to creating VR and virtual world building.



Figure 1. Screenshot from installation VR work UP/N/ROUTED, © 2023 Benjamin J Bailey

2. XR Materiality Reality Remix – Sarah Eddowes

Sarah Eddowes explores the remixing of tactile artmaking in the physical and the virtual. She explores how medium, technique, virtual objects and spaces can

be generated which speak to both digital/mechanical and hand-made aesthetics. Extending approaches from Glitch art and materialist media, her work explores tactile aesthetics through remix and iteration.

She proposes that by remixing techniques of photogrammetry, 3D animation and sculpture, connections emerge, which cross-reference and amplify tactile expression.

The research extends discussion of glitch and materialist media, by writers such as Jussi Parikka [3], Anna Munster [4] and Mitchell Whitelaw [5] who consider virtual space to be interconnected with human bodies and the physical world. These concepts inform artists such as Mike Pelletier [6], Claudia Hart [7] and Rachel Rossin [8] who create dysfunctional Computer-Generated Imagery (CGI), revealing medium-specific structures and their imperfections. These practices breakdown the separation between the physical and the virtual world by illuminating the fundamentally material and imperfect nature of digital processes. Eddowes' research combines this approach with functional CGI, simulating tactile and messy physical processes through realistic animation and rendering.

As our second panel member, Eddowes discusses the creation of her immersive animated VR work *Mind the Globs* (2023). The environment comprises a haphazard scan of her physical studio, populated by a series of animated tactile objects, as seen in Figure 2. This is a pink translucent flesh-like pile of noodles which bounce and wobble. A pile of manually extruded clay was captured using photogrammetry. The object was then textured and animated in the software SideFX Houdini to emulate a soft, elastic jelly material.

The tactile experience of the physical clay informs the objects' re-animation in the virtual space through dynamic simulation. This object, among others, is used to build an immersive virtual world where the scale, movement and placement of objects creates a space which alters and amplifies the experience of the physical material's



interaction.

Figure 2. Object for *Mind the Globs* (VR work) 3D Render. © 2023 Sarah Eddowes.

3. Historical Placemaking in XR – Andrew Yip

Our post-digital world recognises that due to the ubiquity of mobile connective technologies, almost all social spaces are hybrid physical/digital environments. A natural consequence of this is a shift to thinking of purely virtual environments in anthropological or archaeological terms, as spaces of cultural contact that serve as sites for shared meaning making, rather than as information systems for the one-way transmission of knowledge.

This gives rise to a number of provocations to the disciplines of virtual heritage, new media art, immersive visualisation and historical studies. Our third panel speaker, Andrew Yip, questions how we as practitioners design digital environments to foster modes of placemaking and constructivist exploration. Where do the boundaries of authenticity and plausibility lie in determining the aesthetics of historical reconstructions? How can we reframe the practices of historical simulation, visualisation and gamification to produce new ways of exploring places through time?

Yip takes a human-centred approach to questions of placemaking across the XR spectrum, from the digitisation of historical sites to the construction of virtual platforms for social exchange. As seen in Figure 3, he asks how XR engines and their affordances can serve as a medium for the exchange and expression of cultural ideas and identities in the 21st century.



Figure 3. Margel Hinder Immersive II (Civic Park), real-time immersive environment. © 2023 Andrew Yip

4. NanoscapeVR – John McGhee

NanoscapeVR, is a fully immersive VR cinematic experience that takes the audience on a journey to the surface of a human cancer cell (Figure 4). It visualises how a new generation of nanoparticle-based drug therapies interacts with the cell. Built and rendered in Realtime engine Unity this animation explores the vast inner spaces that exist within all of us. These spaces are complex, dynamic, fragile and provide a rich canvas for communication and creative expression. Using the technology and techniques from 3D video games design, 3D computer animation, environment art and molecular simulation, this animated work adapts actual data from cell microscopy imaging and the online protein data bank (<https://www.rcsb.org/>) to visualize the full cellular environment, swarming with hundreds of thousands of biological entities. This animated work takes audiences on a unique voyage across vistas such as the receptor forests, protein garden and lipid landscape. This work aims to connect audience to cellular body and landscape. VR access to this work is available at https://store.steampowered.com/app/1634740/Nanoscape_VR/

The VR work presents the human cell as a vast complex ecosystem. The work draws visual connections with the Australian landscape and our external environment using computer generated 3D materiality. Through these visual connections we expose the awe of the hidden human body. The aim of this work is to connect us with our own human internal ecosystem, a system with amazing complexity and yet at the same time fragility.

Our final panel speaker, McGhee, explores how this VR work challenges the philosophical perspective of what Foucault calls the medical gaze [9], the dominant didactic paradigm of science illustration. Often science and biomedical animation simplifies the human cell and cancer drug treatment to notions of the ‘silver bullet’ analogy - a single lone cancer killing drug. However, the reality of how these drugs work is more complex, diffuse and organic.

This immersive and time-base VR work intends to challenge the single bullet metaphor, bringing a more authentic and chaotic visualisation of the drug’s interactions on and in the human cell. The work is inspired by the cinematic lens and landscape composition, portraying the huge inner space that exists within all our bodies.



Figure 4 NanoscapeVR Screen capture - https://store.steampowered.com/app/1634740/Nanoscape_VR. © 2023 John McGhee

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Artists /Authors Biographies

Vincent's Hospital Sydney, The Garvan Institute of Medical Research, the Australian Museum and Melbourne Science Galleries.

Artist 1 / Author 1 Benjamin J Bailey is a 3D artist and designer specialising in immersive virtual reality placemaking. A 3D environment artist by training, Benjamin has worked across projects in industry, academia and the creative arts. Currently undertaking a PhD research project Ways of making 'Unreality': A practice-based exploration of the Tacit dimension when constructing virtual reality places, his research explores the relationship between the processes and outputs of virtual content production, combining methods adopted from cutting edge industry practice with the unique visual and emotional aesthetic of the Australian landscape which is often neglected in the discourse of mainstream real-time 3D CGI.

Artist 2 / Author 2 Sarah Eddowes is an inter-disciplinary artist and current PhD candidate at UNSW Sydney. She has completed a Bachelor of Fine Arts (painting - UNSW), a Masters of Animation (UTS) and a Master of Fine Arts by research (National Art School). Her current practice-based PhD research explores how a non-linear workflow between digital and physical artmaking tools can explore the experience of tactility. Her experimental practice moves between computer generated imagery, 3D printing and the physical manipulation of materials such as clay, silicone, wax, paint and gel.

Artist 3 / Author 3 Andrew Yip is a new media artist, immersive designer and art historian whose work explores human-centered approaches to the design of virtual heritage systems. He works closely with museums in the fields of digital conservation reconstruction and site simulation and designs interactive installations for exhibitions. His work has been exhibited at major galleries including the Art Gallery of NSW, Powerhouse Museum, Heide Museum of Modern art and the South Australian Maritime Museum. Andrew's practice is based at the UNSW Sydney, where he is currently Senior Lecturer, Immersive Design, and a research fellow at the iCinema Centre for Immersive Cinema research, 3DXLab and the Autonomous Media Lab.

Artist 4 / Author 4 John McGhee is a Professor and research-intensive academic at UNSW Sydney and Director of the 3DXLab in the Faculty of Arts Design and Architecture. His academic research work explores arts-led modes of visualising complex scientific data. His research investigates the application of creative practice, technical innovation, and immersive platforms to new visualisation challenges. Areas of research include Virtual Reality (VR), 3D computer animation, 3D reality capture, 3D virtual world design, 3D biomedical visualisation, VFX, immersive design and reflective practice. This research capacity has developed through funding from the Australian Research Council (ARC) and industry-led external contract research projects. Collaborative research partners include Transport for NSW, Syngenta Global, St