Preserving the Past for the Future:
3D Scanning and Community Involvement in Hong Kong's Heritage Conservation

Wing-shan WONG, Ka-chi CHAN

HONG KONG BAPTIST UNIVERSITY
HONG KONG
wingshanwong@hkbu.edu.hk, kachichan@hkbu.edu.hk

Abstracts

In the face of rapid urban development in Hong Kong, a unique project since 2016 has been capturing the essence of traditional small businesses via sketches and a novel 3D scanning method using Neural Radiance Fields (NeRF). This collaborative effort between artists and community shop owners produces detailed 3D point cloud models of historic shops, enabling virtual preservation and exploration. The project evolves further into a performative art project, "Foreseen Property Agency," which reimagines the value of these traditional businesses in a speculative commercial setting. This initiative challenges perceptions of cultural heritage and market dynamics, offering a critical commentary on urban transformation.

Additionally, the digitization process results in the creation of the "Book of Points," a physical publication that narrates the spatial and aesthetic essence of these shops through a non-conventional medium, emphasizing the project's innovative blend of art, technology, and community heritage preservation. The initiative's findings underscore the authenticity of a community-led archival process and its potential to foster political dialogue and cultural reevaluation. Through interactive exhibitions and an online archive, this project not only combats the disappearance of small businesses but also enriches public engagement and the understanding of Hong Kong's rapidly changing social landscape.

Keywords

Digital Archive, architecture, spatial history, socially engaged.

Background

Since 2016, illustrator Flyingpig has been delving into the world of local traditional small businesses in Hong Kong. She captures the essence of these time-honoured establishments through sketches and meticulous records. [1] Throughout this journey, we began to ponder the involvement of community members in the drawing and recording process. Simultaneously, we discussed the authenticity of the sketches and their ability to comprehensively unveil and document the spatial narratives of these stores.

Confronted with the swift pace of city development, the archiving process has gained increased value, becoming a competitive endeavour within the timeline of urban transformation. In our quest to preserve this vanishing culture and history, we sought alternative tools. We explored a 3D scanning method employing a 360-degree camera device.

Image 1. Mr. Chu from Chu Wing Kee is placing the plastic piggy bank on the curb of his inherited 80-year-old store.

3D Scan as an Archiving Tool

The 3D scan is widely employed for surveying purposes in Hong Kong, particularly in measuring space for construction and architectural planning before property and land development. When applied in an artistic context, the use of 3D scans opens up opportunities for exploring innovative ideas and adopting archiving methods. We utilize a specific 3D scan method known as Neural Radiance Fields (NeRF) to execute the entire process of transforming 360 videos into 3D point cloud models, comprising 2-5 million individual points. This 3D point cloud model visually represents the spatial concept of the shop, manifesting as a virtual shop within an online archive that audiences can access to delve into the details of each point.

Furthermore, we encourage shop owners to trust their instincts and follow their daily routines during the 3D scanning process. In this dynamic, we take on the role of facilitators, prompting shop owners to act as artists wielding 'the pen.' Throughout this process, they observe, re-explore, and document the familiar spaces they inhabit. Importantly, we collaboratively decide on what to archive during this creative journey.

While considering the impact of image quality on the final 3D scanned model, we also pay attention to the artistic aspects. This involves thoughtful contemplation of the environment and space, guided by the shop owner's mental and psychological state, to determine the scanning route and prioritize the scanning order. Digital devices and technologies become indispensable tools for preservation, significantly contributing to the community's conservation process. Post-scanning, the virtual shop serves as an archived material and functions as a digital access point for research and potential audiences. [2] This extends its utility to facilitating recreation for artists and creators. The entire archiving process encompasses preservation, access, and recreation. [3]
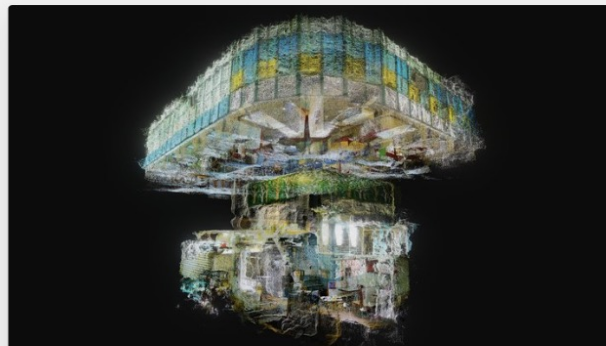

Image 2. A collection of digitally archived Hong Kong stores in the Foreseen project.

Image 3. Vincent from Mido Cafe is using a 360 camera as a 3D-scanning device to capture his 80-year-old class Hong Kong restaurant in Yau Ma Tei.
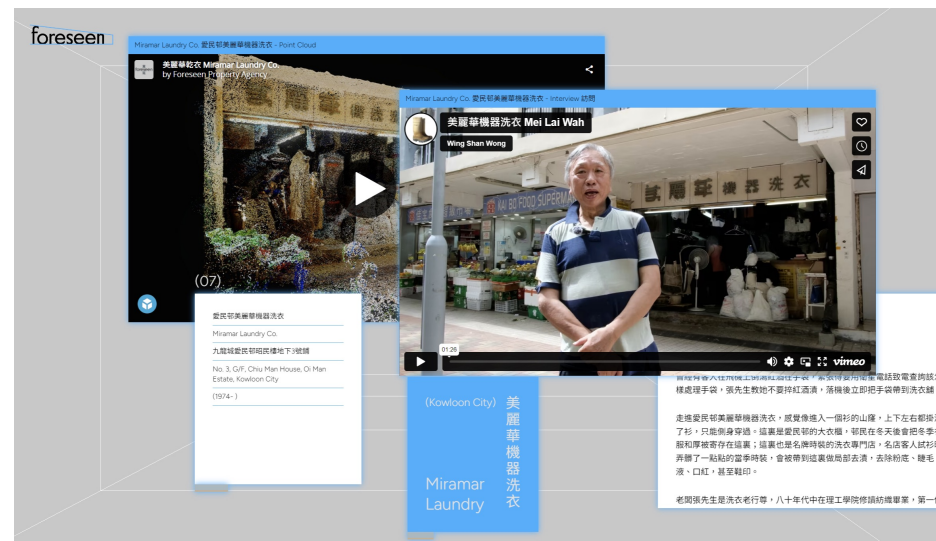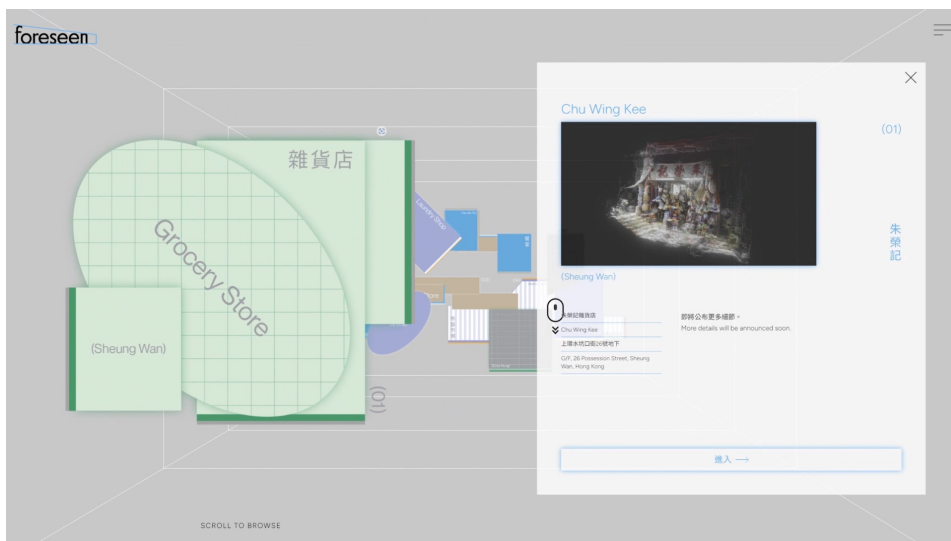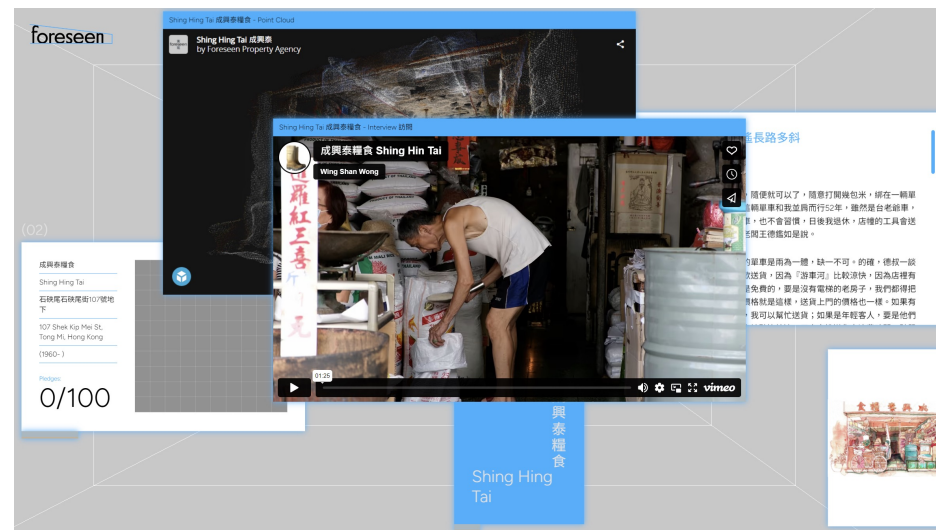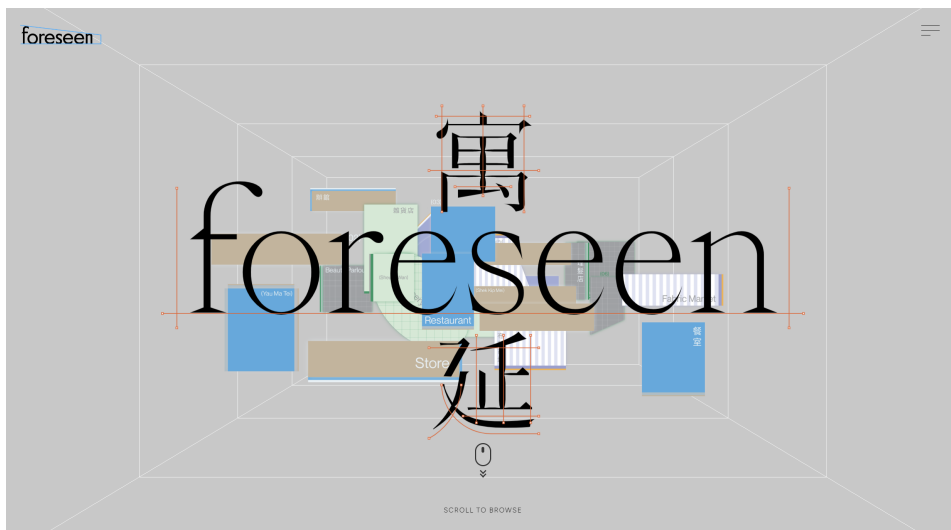
Image 4. www.fore-seen.com. The Foreseen website, also a digital archive, documents each store's the 3D space accompanying with a video documentation, an essay in response to the history and stories of the place and "sale status" of the mock sale.

Point Cloud Recreation and Transformation

Once the archive is constructed and made public, it doesn't signify the inevitable disappearance of the original due to demolition. Instead, we contemplate how to leverage archive materials to unveil the truth to audiences regarding the historical narratives of the shops and the individuals who work there. [4] Individual resources, such as the point cloud, give rise to a series of creative works. As artists and creators, we reimagine an environment as a political act, responding to the ongoing urban transformation in Hong Kong by reconceptualizing space as a platform for debate. [5]

In our endeavour, we curate a speculative narrative within a performative art project titled "Foreseen Property Agency," utilizing archive and research materials, including the 3D scanned point cloud of local traditional small businesses. Functioning as a property agency within the exhibition venue, our participatory commercial activities allow the public to assign material value to local traditional small businesses based on the dynamics of the free market economy. This exploration goes beyond conventional forms of consumption.

In the role of property developers, we simulate the sale of point cloud records in a mock showroom, and the audience engages in 'paying a deposit' to acquire the point cloud of the shops. This concept mirrors the "Off The Plan" idea, akin to a pre-construction sale where developments are marketed to real estate developers and early adopters, allowing purchasers to secure favourable financing terms. Once the shops are demolished or vanish, the buyers will receive the point cloud, completing the transaction and embracing the ephemeral nature of the urban landscape.
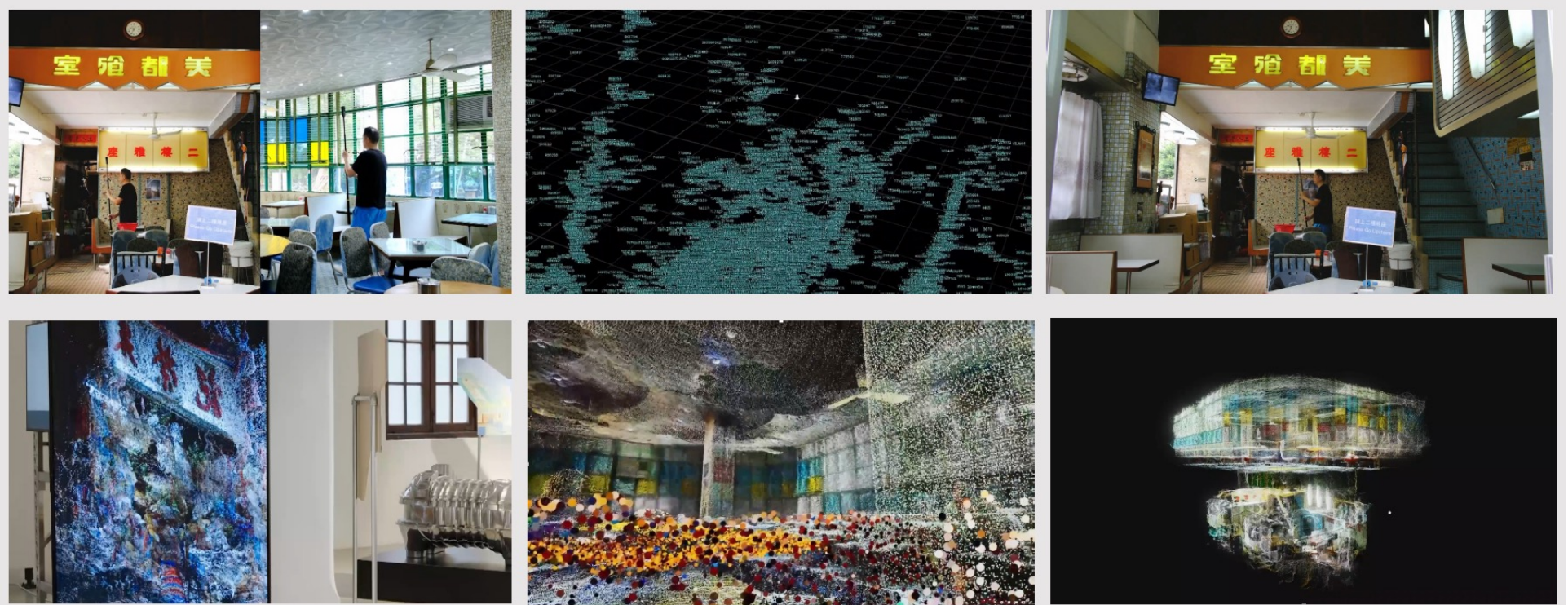

Image 5. 3D capture process and collected results

Physical Transformation of Pointcloud

After digitally capturing each store in Hong Kong using the Neural Radiance Fields (NeRF) method, every point within the resulting dataset encapsulates its unique position and colour information, effectively mirroring the intricacies and visual ambience of the captured store. These points are systematically ordered based on their creation number, arranged sequentially from left to right, top to bottom, akin to the pages of a book. It's noteworthy that, in this unconventional book, the narrative is not conveyed through written words but through the language of colour and spatial data points.

By translating the 3D space narrative into a publication setting, the 3D points are reshaped into distinct pages, culminating in the creation of the "Book of Points." This physical compendium serves as a repository of aesthetic patterns and representative data from traditional Hong Kong stores. This innovative process seamlessly blends art, technology, and tradition, offering a unique perspective on previously familiar spaces. Drawing inspiration from Marshall McLuhan's concept that 'the medium is the message,' the technology used to capture these stores isn't merely a tool but an integral part of the narrative itself. It conveys the message that our understanding and perception of reality can be reconstructed and questioned. [6]

The stores, once captured, transform into simple point clouds, each comprising 2-5 million points. These points are distilled to their bare essence, recording only position and colour, akin to the reduction of life's DNA to four basic building blocks. As arranged in the book, the points unfold a story from left to right, top to bottom, page to page, echoing conventional reading while deviating through their three-dimensional existence. The simplicity of the point clouds reflects the fundamental unit of life's genetic blueprint — DNA — and, by extension, the book becomes the DNA of these stores. Simultaneously, it represents a series of non-meaning codes, burying the intention of consumption to critique desire-driven consumer behaviour.
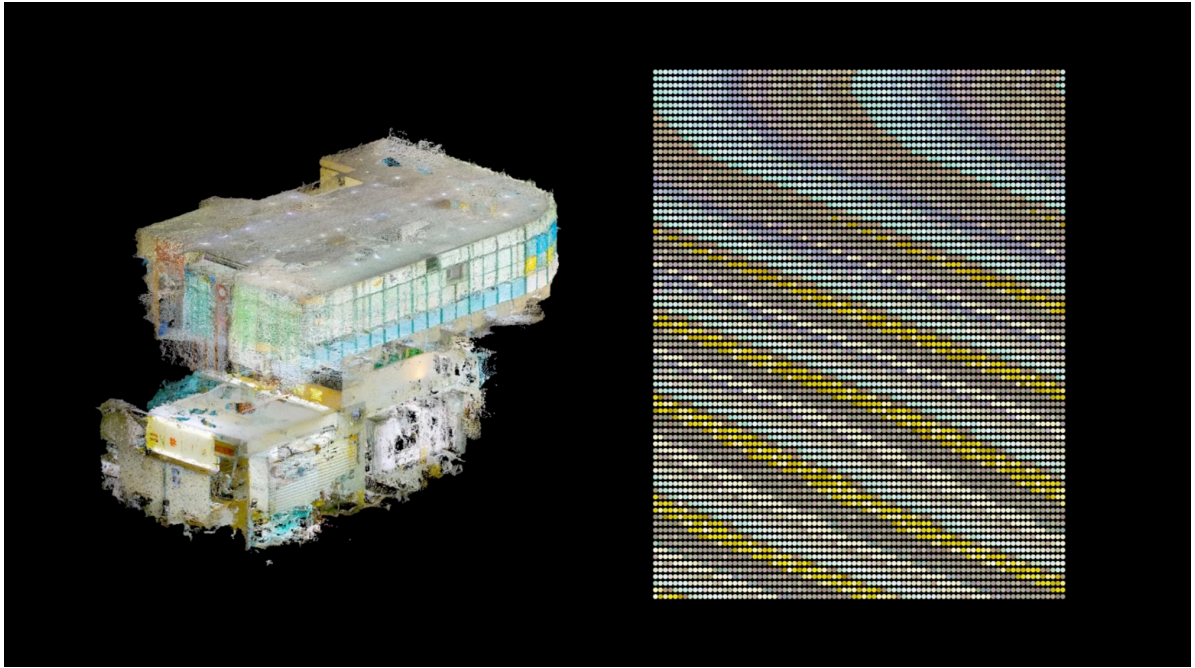

Image 5.1 LEFT is the 3D scan of Mido Café. Each 3D-scanned-store contains 2 to 4 millions of 3D points, as known as pointclouds. RIGHT is a section of the sorted pointcloud by their point order (scanning order).

Image 5.3 A "potential buyer" is "viewing: the "property" in the showroom, which is also the Foreseen exhibition.
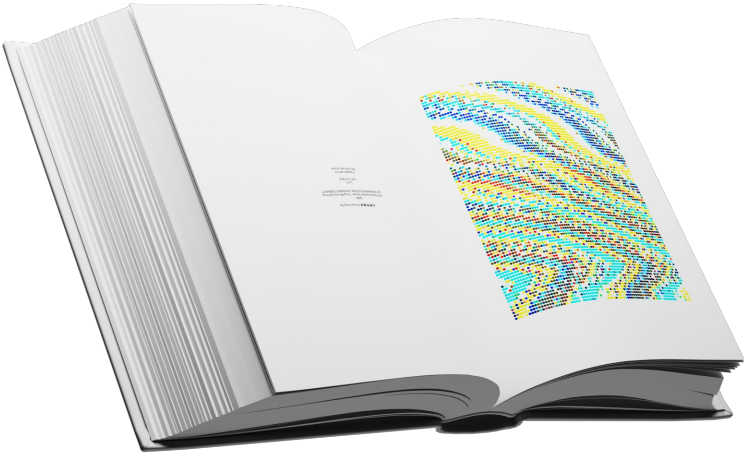

Image 5.2 The 3D-scanned-store produce a massive book of poinclouds, which contains 300 – 500 pages. "Potential buyers" can choose the unit they prefer and buy it by signing a purchase contract.

Conclusion

The project's findings can be delineated into two key aspects: the authenticity of a community-led 3D scan archive and the potential for recreation as a political act.

In the archiving process, we employ a modest device, the 3D camera, as a tool. Its portability and user-friendly design make it easily usable by shop owners, ensuring inclusivity and accessibility in the archiving process. While the precision of the 3D scan data may not rival that of surveying 3D scan equipment, it captures a significant essence of shop owners' memories, documenting their interactions and movements throughout the space. This has, in the meantime, evolved into a community-led digital archiving method and advocacy, continuing to encourage more communities to digitally archive their shops and distribute authorship to additional stakeholders. [7]

Concerning the recreation of archive materials, we anticipate that, with the shop owners' consent, the materials could be employed in different iterations to construct speculative narratives responding to various social norms. [8] Employing an innovative approach to storytelling, the project breathes new life into traditional small businesses, fostering further conversation and debate across disciplines, groups, and stakeholders. This immersive experience bridges the gap between past and present, enabling the public to appreciate, support, and invest in these fading local industries supported by an interactive exhibition and an expansive online archive, this unique initiative unveils the hidden narratives and aesthetic complexities of Hong Kong's social fabric.

Image 6. Contract signing room at the Foreseen Exhibition.

References

[1] Gary Embury and Mario Minichiello, *Reportage Illustration: Visual Journalism* (Bloomsbury Publishing, 2018).

[2] Florian Windhager et al., "Visualization of Cultural Heritage Collection Data: State of the Art and Future Challenges," *IEEE Transactions on Visualization and Computer Graphics* 25, no. 6 (June 1, 2019): 2311–30, https://doi.org/10.1109/TVCG.2018.2830759.

[3] Zhijun Peng et al., "Research, Representation, and Conservation of Mani Heaps: The Digitalization Projects," *Leonardo* 56, no. 3 (June 1, 2023): 272–78, https://doi.org/10.1162/leon_a_02356.

[4] Radmila Janković, "Machine Learning Models for Cultural Heritage Image Classification: Comparison Based on Attribute Selection," *Information* 11, no. 1 (December 24, 2019): 12, https://doi.org/10.3390/info11010012.

[5] Liron Efrat, "Reimagining Places, Reconstructing Histories: Augmented Reality Art and Heritage Apps as an Ultimate Display," *Leonardo* 55, no. 4 (August 1, 2022): 345–50, https://doi.org/10.1162/leon_a_02223.

[6] Joasia Krysa, *CURATING IMMATERIALITY: THE WORK OF THE CURATOR IN THE AGE OF NETWORK SYSTEMS* (Autonomedia, n.d.).

[7] Adam Jaworski and Crispin Thurlow, *Introducing Semiotic Landscapes*, 1st ed. (Bloomsbury Publishing, 2010).

[8] Krysa, *CURATING IMMATERIALITY: THE WORK OF THE CURATOR IN THE AGE OF NETWORK SYSTEMS*.

Author(s) Biography(ies)

The title "Author(s) Biography(ies)" should be 12 point, bold style, centered. Using 9 point, regular type, biographies should be no longer than 150-word count.