

Multimodal Hong Kong: Documenting soundscape and smellscape at places of intangible cultural heritage

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ABSTRACT

The sensory cultural heritage creates identity and cohesion in a community. The Multimodal Hong Kong (MMHK) started in January 2023 and aims to build a database of soundscape and smellscape at culturally significant sites. This paper will introduce the project and its objectives, present results from a pilot survey, and describe the development of a field work methodology. Data collection methods include Ambisonics audio, 360° video, and 'smellprints', together with on-site observations based on the Soundscape Indices survey protocol and the Dravnieks-McGinley-Zarzo 'smell atlas'. Currently having data from 20 sites, MMHK aims to reach 100 within the project's duration, as well as conduct outreach such as sensory walks, interviews, and workshops with stakeholders. The overall goal is to produce in-depth knowledge of how information, via multiple sensory modalities, constitute the perceived quality of places, and thence, how an intangible

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cultural heritage emerges in Hong Kong. This knowledge will enable future research and applications in urban spatial design, experiencescape, and virtual tourism.

1. INTRODUCTION

The sensory cultural heritage, combining tangible and intangible heritage, creates identity and cohesion in a community. In urban research, analysis of everyday-ish and informal customs typically rely on visual images, texts, and archival materials, to describe the multifarious aspects of culturally significant places and practices. By contrast, the acoustic environment is often not part of the narrative, and very rarely is the olfactory environment recorded. Given the contemporary context of rapid and profound transformation in Hong Kong, essential threads of the city fabric risk being neglected, and might even disappear before they can be documented. Can we really claim to know urban places without thoroughly considering, and documenting, the sensory cultural heritage represented by sounds and smells?

The project which is presented here, Multimodal Hong Kong (MMHK, <https://mmhk.scm.cityu.edu.hk/>), seeks to preserve the threatened environment of some of Hong Kong's signature sites and create a more accurate and richer understanding of culturally important places, rituals, and social practices, allowing greater appreciation of the heritage. In the meantime, we aim to shed light on the crossmodal relationships between urban landscape, soundscape, and smellscape. MMHK aims to document a large sample of characteristic sites in Hong Kong, focusing on places for Street food (街頭小食), Chinese Temples (寺廟 [佛祖, 天后...]), and Wet markets (傳統市場). The online and open-access database will contribute detailed information of the local intangible cultural heritage; support interdisciplinary collaborations; be a resource for future longitudinal studies of urbanism in Hong Kong; and a reference point for cross-cultural studies with other cities.

2.1. Research context

In cities such as Hong Kong, there is a constant struggle between human traditions, forces of technologically driven desires (e.g. 'smart cities'), and natural contextual constraints (e.g. climate change). The sites that a community values combine physically persistent and ephemeral qualities. Urban places that are culturally valued typically present an "intertwined tangible-intangible duality, expressed both as a physical construction and as a set of social, traditional practices" [1]. The notion of 'sensory heritage' is not yet established in Hong Kong cultural policy [2]. France has adopted a law that explicitly aims at protecting culturally valuable sounds and smells (*patrimoine sensoriel sur les sons et odeurs*; [3]). The background to this concept lies in tangible heritage which emphasises "architecture, their homogeneity or their place in the landscape" [4], and intangible cultural heritage [ICH], which is "any non-corporeal manifestation of tradition-based creativity [that reflects] the community's social or cultural identity. It includes... the social, intellectual and cultural processes that... have made possible the development of a distinct cultural tradition whose preservation and protection is important..." [5 p. 5]. The latter is typically related to rituals, festive events, and crafts within a community, yet it is not so much about the cultural manifestations themselves but rather the wealth of knowledge and skills being transmitted [6]. Moreover, social enactment is an "essential and defining aspect of intangible heritage, in the sense that this heritage exists and is sustained through the acts of people" [7 p. 2]. Soundscape is recognised as such by UNESCO [8 p. 57].

However, the tangible/intangible framework is not without critique (see e.g. [9]) and the dichotomy enshrined in these conventions may appear artificial in the way it is based in an entrenched hierarchisation of the senses. It has proved easier to find international agreement about values that can be perceived with the eyes, over those that can only be appreciated from touch or hearing, and certainly over those which come to us via the 'lower' olfactory and gustatory senses. How can we frame a research project, localised in Hong Kong, to avoid

conceptual challenges of this kind? Defining what constitutes ‘acoustical heritage’ is not a straightforward task. Zhu and collaborators [10] launched a qualitative study based on interviews with experts, discussing terminology, values, challenges, and categories (such as tangible vs. intangible). Meanwhile, Firat argued that sounds, and acoustics in general, are in fact tangible, because “any sensory modality which can be preserved with digital methods should be regarded as tangible heritage” [11 p. 3]. His socio-historic analysis argued that insisting on this dichotomy perpetuates a Western worldview dominating the Eastern; the former is oculo-centric, while in the latter, imagination is “beyond the visual” or any other sense (op. cit. p. 5), noting that “ephemerality is one of the main attributes of auditory [and] olfactory... cultural objects, which cause them to be considered as abstract phenomena and associated with the intangible heritage” (p. 9).

For the purposes of MMHK, we avoid the dichotomy altogether by adopting the notion of *sensory heritage* [3]. Furthermore, we are influenced by the Burra Charter’s definition of cultural significance as the “sum of aesthetic, historic, scientific and social values”, in particular because ‘aesthetic value’ here includes the “smells and sounds associated with the place and its use” [12 p. 120]. A practical example is given by Bembibre and Strlič [13] who discuss smellscape as a constituent part of place-making in cultural heritage sites as well as its use in museum exhibition design, and soundscape as cultural heritage [8] is discussed by Jordan and collaborator [14-15].

The impetus for the project came from two places. Firstly, in an important paper which highlighted the current lack of data, Xiao, Aletta, and collaborators wrote that “the biggest challenge to the advance of smellscape research and practice in the built environment is the lack of applicable smell databases to aid the design process and predict outcomes” [16 p. 2]. We aim to address this lack by creating an open-access database of smellscape and soundscape. Secondly, Lindborg and Liew had recently conducted an empirical study comparing the perception and imagination of sounds and smells at a wetmarket in Singapore [17]. Pursuing this line of research, MMHK seeks to elucidate crossmodal correspondences in ecologically valid contexts [18].

2. OBJECTIVES

The literature review led us to formulate the following questions: *How do sounds and smells contribute to our appreciation of culturally significant places? Can we really claim to know urban places without thoroughly considering, and documenting, the sensory cultural heritage represented by sounds and smells? How could a digital archive of environmental factors be constructed to contribute as broadly as possible to research and development?* Within its initial three-year scope (2023–25), the main objectives of the project are to: 1) create a multimodal database; 2) investigate ‘smellprint’ capture; 3) make policy contributions; and 4) engage with stakeholders. **Figure 1** gives an overview of the project's objectives and methods.

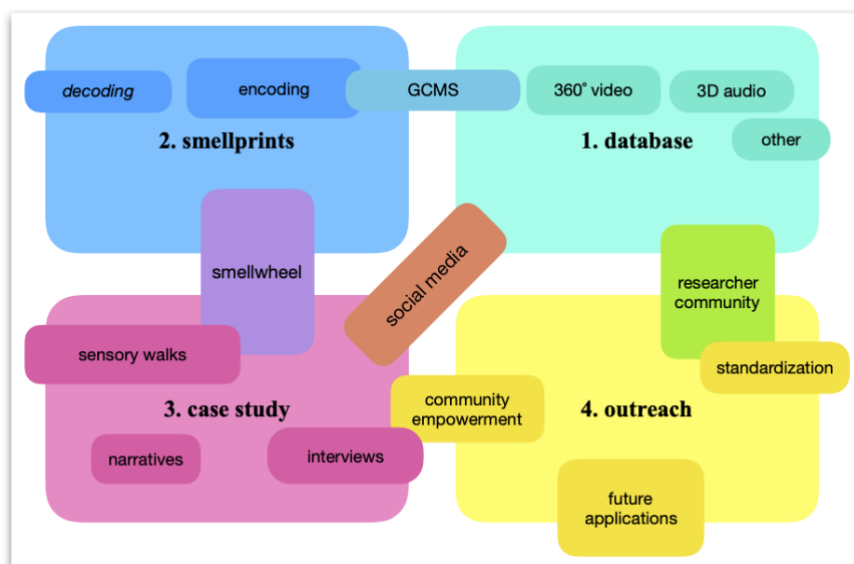


Figure 1: Components of the Multimodal Hong Kong project.

3. MULTIMODAL DATABASE

The first objective, the database, takes a pilot survey as a point of departure. The survey was conducted in October 2021 to estimate the perceived importance, in relation to Intangible Cultural Heritage (ICH), of typical kinds of urban places in Hong Kong. We briefly describe the design and results.

3.1. Pilot study

One group of participants was sourced from Prolific (<https://www.prolific.com/>), preselected by nationality: either Hong Kong, Singapore, or Taiwan (N = 42), and another group by snowball sampling starting in Hong Kong (N = 19). Note that this webservice does not at present enlist people based outside the OECD in their pool of subjects.

The survey was implemented in QuestionPro (<https://www.questionpro.com/>) in English and Cantonese (i.e. traditional Chinese; the translations had been independently verified by four native speakers). After choosing language, participants ranked eight types of locations (listed below, and an 'Other' option) using an interactive box-dragging method. The following information was provided:

"Intangible Cultural Heritage is defined as "Peoples' learned processes along with the knowledge, skills and creativity that inform and are developed by them, the products they create, and the resources, spaces and other aspects of social and natural context necessary to their sustainability; these processes provide living communities with a sense of continuity with previous generations and are important to cultural identity, as well as to *the safeguarding of cultural diversity and creativity of humanity*" (*UNESCO March 2021*)"

and followed by the instruction:

"Below are different TYPES OF PLACES that are relevant to the lifestyle in Hong Kong and similar Asian cities. From your own perspective and lived experience, how IMPORTANT do you see each one in the context of intangible cultural heritage?"

To filter out 'junk' respondents, the ranking task was presented twice, at the beginning of the survey and at the end, with demographic questions in between. We analysed the non-parametric correlation (Spearman's ρ) between rankings within each participant, and those with a probability value of less than 0.1 were discarded. This left 59 participants for further analysis. The merged participant group had a mean age of 29 years (range 20...54), and there

were 33 females. Twenty-three were Hong Kong nationals, 16 Singaporeans, and 10 Taiwanese. About half reported having lived the longest time in Hong Kong (and most of the others in either Singapore or Taipei). Half of the group had lived in this city more than 10 years after the age of 12, and another quarter at least 5 years. These results are important to show that our sample had substantial living experience in a large Asian city, and can be relied upon to have a personal, lived opinion on which kinds of places would be important in the given context.

Means were calculated across all rankings. This yielded scores for the eight place-types (where a high number means more important for ICH), as follows: Street food (6.1, 街頭小食), Temple (5.6, 寺廟), Wet market (5.3, 傳統市場), Night market (4.7, 夜市), Hawker centre (4.5, 熟食中心), Cemetery (3.3, 墓園), Urban park (3.2, 城市公園), Shopping mall (1.8, 購物商場). See error bar plot in **Figure 2**. Interpreting these results, we decided to focus on three kinds of environments:

- **Street food** (街頭小食; https://en.wikipedia.org/wiki/Hong_Kong_street_food). It has been noted that “food is culture when it is produced because humans do not use only what they find in nature but want to create their own food” (Maffei 2012 p. 225-6). Indeed, food production, preparation, and consumption are practices that are simultaneously traditional and expressive of contemporary living culture. It is paradoxical that “something as perishable as food constitutes a living legacy of the past... The transmission of food practices from one generation to the other contributes to constructing identity and memory of both individuals and communities [and constitutes] a form of intangible cultural heritage” (Vadi 2013 p. 3; cf. Kong 2015).
- **Temples** (https://en.wikipedia.org/wiki/Places_of_worship_in_Hong_Kong; 寺廟 [佛祖, 天后]). As indicated by the Chinese characters, we focus on Taoist and Tin Hau (‘joss houses’) because these have developed rituals and expressions that are idiosyncratic to Hong Kong (and in the larger diaspora of overseas Chinese, 海外華人). Therefore we exclude places of worship of other religions while being aware of the large range of religions active in contemporary Hong Kong. Other kinds of temples might form the subject of future research.
- **Wet markets** (傳統市場; https://en.wikipedia.org/wiki/Wet_markets_in_Hong_Kong) are “open-air, partially sheltered spaces populated with dozens of vendors selling fresh food products, such as fish, poultry, pork, beef, vegetables and fruits, as well spices and other sundries. The name, ‘wet market’, refers to the practice of regularly splashing water on the floors with hoses. Wet markets in Asia are rather like the local grocery stores in Western countries. The seasonal availability of items govern the rhythm of culinary practices and calendar events in people’s lives.

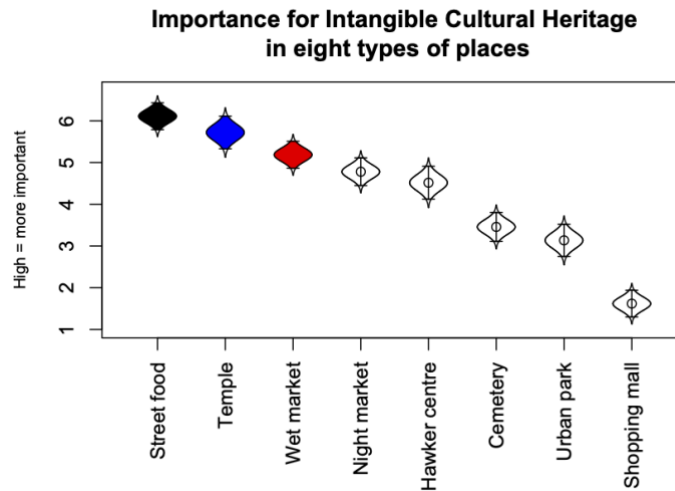


Figure 2: Relative importance of places; means w. 95% confidence intervals (N = 59).

3.2. Corpus of sites

Through web searches, scouting, and interviews with local residents, the team identified ~250 representative places of Street food, Temples, and Wet markets throughout Hong Kong. See **Figure 3**. They are currently being investigated one by one in field work. At the point of writing, we have collected data at ~20 sites. See **Table 1**.

3.3. Data collection methods

Field data from the MMHK sites are objective (measured by instruments) and subjective (annotations and ratings by observers), capturing aspects of the auditory, olfactory, visual, ambient, physical, and social aspects of the places under study. We are developing a field protocol based on [19–23].

- Acoustic environment / Soundscape. Sound pressure level (SPL; LAeq) using an iTestMic2 and AudioTools app. Audio recordings made in 1st-order Ambisonics (Zoom H3-VR), while case studies will employ higher-order Ambisonics (2nd-order Brahma, 3rd-order Zylia hardware). Soundscape ratings based on ISO standard [24]. See **Figure 4** for a field set-up of microphone and camera.
- Olfactory environment / Smellscape. Capturing ‘smellprints’ is a significant and novel part of the work. We do on-site air sampling and gas chromatography - mass spectrometry (GCMS) analysis to yield a chemical profile (see [25] especially chapter 3), developing a pragmatic method using Tedlar bags and liquified MonoTrap carbon substrates. To create a parsimonious smellprint that is representative of complex smellscape is challenging [26]. If successful, this might allow reproduction, i.e. ‘smellscape playback’, for e.g. virtual tourism and museum displays. One important avenue of future research lies in psychophysical linking of GCMS data with human assessment of perceived smells and smellscape (see [16 p. 2]; cf. ‘dynamic olfactometry’, e.g. [25 p. 40-3]). For an ongoing study [41], we are developing a ratings protocol based on Dravnieks’ smell atlas [27], McGinley’s smell wheel [28] (which we previously employed in [17]), and Zarzo’s multivariate approach [29].
- Visual environment / Landscape. Video recordings in 360° spherical format (Insta360). One issue is to anonymise video footage i.e. blurring people’s faces, to comply with Hong Kong privacy laws and best international practices [30].
- Physical environment / Ambience. On-site measurements of temperature and humidity, and online retrieval of air pollution indices (<https://aqicn.org/city/hongkong/>). Observational annotation of architectural layout, interior materials, building materials (blueprints, maps etc).

- Social environment / Servicescape. Observational annotation of activity (flow, headcounts, crowdedness), cost levels (e.g. comparing typical items across sites as in [19]). Retrieval of open-source geo-tagged social media messaging and blog postings about the sites, to gauge visitor (particularly tourists’) narratives of memories and experiences [31–33].

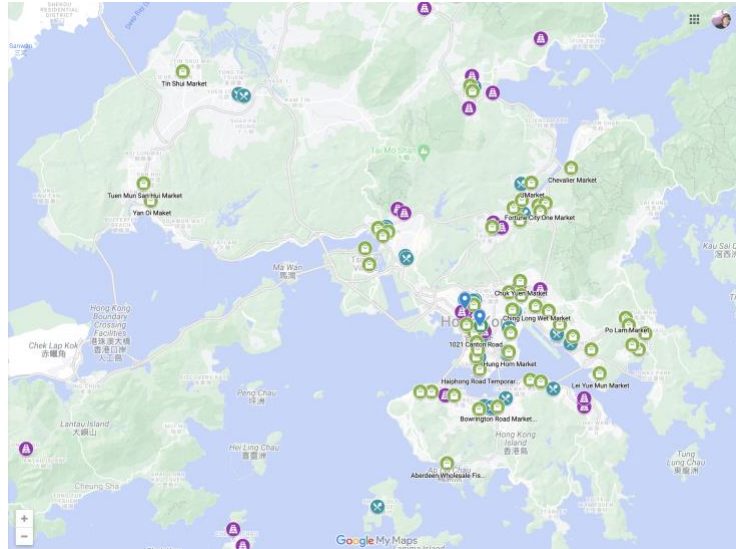


Figure 3: MMHK places for Street food (blue), Temples (red), and Wet markets (green). Google Map layer accessible at <https://mmhk.scm.cityu.edu.hk/index.php/map/>.

3. QUALITATIVE STUDIES AND OUTREACH

Complementing the quantitative data collection for the database, we also conduct open-ended investigations through case studies. ‘Sensewalking’ is a systematic research method whereby people move through a physical environment while activating all their senses, and make observations (smellscape: [34–3736, 13]; soundscape: [38–39]; and for both: [40]). One of our present studies is using this method in the investigation of a pedestrian footbridge area in Kowloon [41–42]. Local residents were invited for six sensewalks, each with a post-walk focus group to discuss how smell- and soundmarks relate to their everyday life and cultural values (cf. [43]). Our previous study [17] showed that people are able to correctly imagine smells not only from visual information but also from audio-only recordings. This line of cross-modal environmental perception research is furthered in [18].

Table 1: The first 20 site visits for data collection.

ID	Date	Name	Type	Area
001	2022-10-30	Tai Wai Market	Wetmarket	Tai Wai
002	2022-10-30	Tai Po Hui Market	Wetmarket	Tai Po
003	2023-03-30	Man Mo Temple, Tai Po	Temples	Tai Po
004	2022-10-30	Fu Shin Street Wet Market	Wetmarket	Tai Po
005	2023-03-31	Shek Kip Mei Estate Market and Coc	Wetmarket	SKM
006		(deleted)		
007	2023-05-25	Cheung Fat Noodles	Streetfood	SKM
008	2023-06-02	Gresson Street Market	Wetmarket	Wan Chai
009	2023-08-25	Tai Wai Market	Wetmarket	Tai Wai
010	2023-08-25	Lok Fu Market	Wetmarket	Lok Fu
011	2023-08-25	Fa Yuen Market	Wetmarket	Mong Kok
012	2023-09-27	Corner-Tung-Choi-Mong-Kok-Rd	Streetfood	Mong Kok
013	2023-10-26	Tin Hau Temple, Shau Kei Wan	Temples	Shau Kei War
014	2023-10-26	Shing Wong Temple, Shau Kei Wan	Temples	Shau Kei War
015	2023-10-26	Tam Kung Temple, Shau Kei Wan	Temples	Shau Kei War
016	2023-11-23	Sam Tai Tze & Pak Tai Temple	Temples	Sham Shui Po
017	2023-11-23	Tin Hau Temple, Sham Shui Po	Temples	Sham Shui Po
018	2023-11-23	Kwan Tai Temple, Sham Shui Po	Temples	Sham Shui Po
019	2023-11-23	250-252 Ki Lung Street (Hei Lam Mu	Streetfood	Sham Shui Po
020	2024-03-01	Shek Kip Mei Market	Wetmarket	Shek Kip Mei
021	2024-03-22	Qi Shan Fei, Tai Po	Temples	Tai Po

Regarding stakeholder interviews, we created a documentary film of interviews with three wet market stall owners, presented at the ‘Symposium on Inclusive design with multi-senses’ at Birmingham City University, UK, in April 2023. The Symposium included not only a paper session but also workshops and an interactive exhibition of multimedia and sculptural objects [44–45]. MMHK engages with these activities in order to engage audiences through outreach, and to gain a qualitatively deeper understanding of sensory heritage in Hong Kong.



Figure 4: Poultry stall at Tai Wai market. Note 360° camera and Ambisonics audio recorder.

4. DISCUSSION

Wet markets in Asia are rather like local grocery stores in Western countries. The seasonal availability of items govern the rhythm of culinary practices and calendar events in people’s lives. Examining social identity in Singapore, one study contended that the “collective attachment to wet markets anchors Singaporeans and provides a fragile basis for consistency and stability” [46 p. 105]. Their analysis, if applied to Hong Kong, supports the argument that

it is both valuable and urgent to document such places, to empower the cultural understanding of residents today and for the future. Moreover, note in this context that a clear distinction must be made to ‘wildlife markets’, which trade in living animals that are often caught wild. Wildlife markets received considerable bad press during the COVID-19 pandemic as it is believed that zoonotic diseases can spread to humans at such places [47]. In the proposed project we do not include ‘wildlife markets’ in the corpus, as wet markets in Hong Kong do not hold wild or exotic animals, and slaughter of animals larger than chicken or fish is regulated.

To deepen our understanding of meaning-creation in complex physical environments, the MMHK project adopts a multimethodology, combining quantitative and qualitative methods. This reflects the way that, in people’s experience of living environments throughout life, their senses combine to generate memories with cross-modally interrelated information [48 p. 2]. Congruence between sensory information channels - especially auditory, visual, and olfactory - leads to perceptual processing fluency, which in turn is associated with positive evaluation [49]. More knowledge is needed on how people are affected by sound (noise, music, signals, soundmarks) and smell (odours, scents, flavours, smellmarks) throughout their everyday activities [16]. Based within a paradigm of embodied ecological perception, our project aims at accurately documenting and describing complex real-life environments in their multi-sensorial richness.

Soundscape studies have a natural affinity with environmental psychology. The soundscape is both an indicator of environmental quality and a component of cultural identity. The reliance on traditional descriptors of the acoustic environment is giving way to perceptual qualities such as Pleasantness – Eventfulness [39] or Calmness – Vibrancy [50], and context-dependent sound source identification [20, 51]. See also Jordan and Fiebrig [15] who assessed ‘significance’ and ‘meaning’ in historical soundscapes.

Smellscape is the olfactory environment as perceived and understood, consisting of odours and scents from multiple smell sources [17]. The term was introduced by Porteous [52] who based his methodology on soundscape research. While ‘soundmark’ (as defined by Schafer) is a sound that is intimately linked to a site and carries meaning for its community, ‘smellmark’ is a culturally highly important smell. A smellscape should be understood as the sum total of numerous smell sources that each may connote cause and effect (op.cit. p. 360). When considering living spaces and everyday environments, the quality of the olfactory environment affords stress recovery [53] and affects people’s general wellbeing [54]. Smellscape is intimately connected with personal experience and episodic memory, and at a societal level, the shape and form of cultural activities. Xiao and collaborators wrote that “smellscape are representations of individuals’ imaginations of places, triggered by smells in a space-time structure” [37 p. 14] (see also [22 p. 106], [44–45]).

4.1. Future work

The MMHK project has been running for sixteen months, and we have another twenty to go. During this time, the focus is on building the database and conducting case studies, as we have outlined above. Going further, we might consider activities such as:

- Designing a user-friendly interface to the online database, with an eye towards future applications in spatial design, ‘experiencescape’ [32]; virtual tourism [26, 55], as well as film, games, and other VR/XR applications [56].
- Growing the database user community, initially in the fields listed above, then in ethnographic and museal settings.
- Continuing work on policy-making for sensory cultural heritage in Hong Kong [2].
- Organising a stakeholder workshop and seminar on soundscape and smellscape in Hong Kong.
- Increasing the awareness of smellscape via an ‘International Year of Smell’ (cf. <http://www.sound2020.org/>).

4.2. Conclusion

Many cities are transforming in the same way as Hong Kong, by getting denser, smarter, and more complex, while at the same time seeking to maintain or improve the quality of life for residents. The database generated in the Multimodal Hong Kong project will serve research in urban studies, environmental psychology, and multimodal perception. It will prepare the ground for future multisensorial applications in virtual tourism, art, games, film, and spatial design, for example at museums and commercial venues. As a whole, the project aims to contribute a detailed documentation of the local intangible cultural heritage; support interdisciplinary collaborations; be a significant resource for future longitudinal studies of urbanism in Hong Kong; and a reference point for cross-cultural studies with other cities.

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