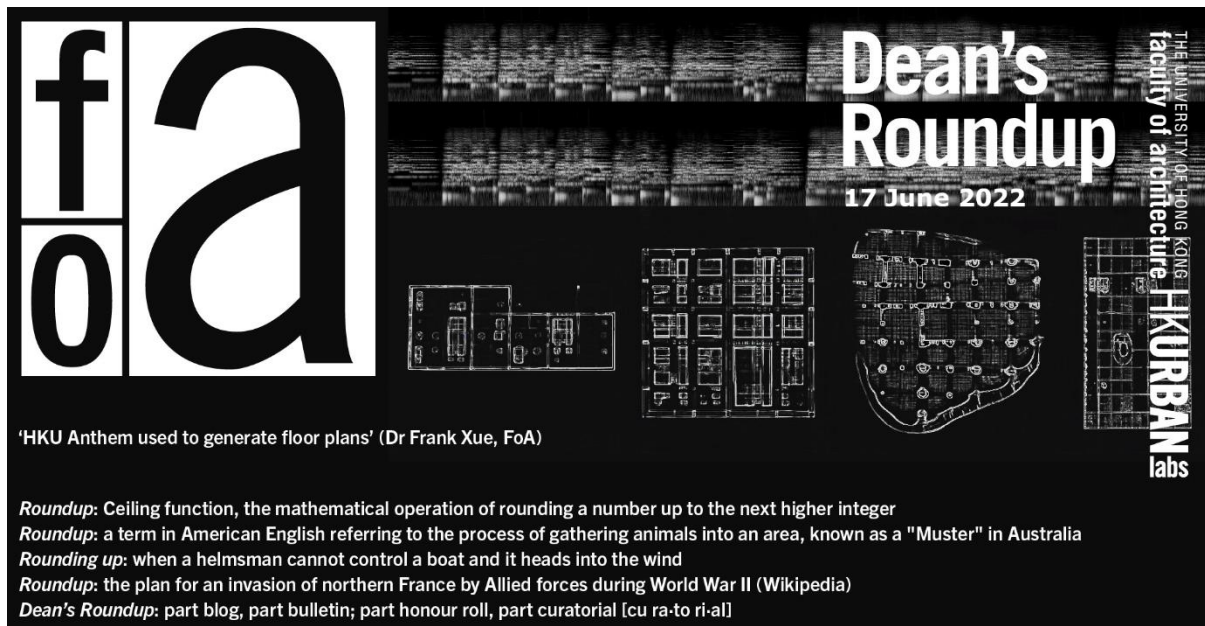


Header image: 'AI Generative Floor Plans from the HKU Anthem' by Dr Frank Xue (iLab, REC). The spectrogram of HKU Anthem is visualised in the upper part of the image, and the four plans below are designed by a music-to-video generative AI using Lucid Sonic Dreams and NVLabs StyleGAN2.



More on AI and architecture

There exists in the university application 'industry' a set of highly qualified and gifted architects who tutor applicants for the world's top schools, including our own. Tutoring has always generally been thought of as a good thing. Only more recently has the scale and impact of the industry given rise to questions. President Xi recently took a bold stand against the secondary and primary education tutoring industry – one that was regarded by the West as sure evidence of China's slipping capitalist credentials, but a move that every good democratically leader in Europe would love to have copied, at least in part (along with President Xi's weekly dose of video-game exposure for minors). One of the more interesting questions about advanced tutoring that educators like us have to consider, is what the design-portfolio tutoring industry tells us about the future, and indeed, nature of architecture.

The image below and [this video](#) show a simple architectural floor-plan generator, adopted by Frank Xue from FoA's iLab. It mutates a floor-plan dataset¹ collected by Mr Mayur Mistry from UIUC according to the musical signals of HKU's 100-year-old anthem². This is not merely music moving graphics. Frank tries several generative design algorithms and selects LucidSonicDreams³ to map the design patterns and texture (as 'smart interpolations' of the classes in GanSpace according to Frank) morphing from the musical score. The input to the AI-driven designer may equally well be a micro-climate environmental model, or a pedestrian flow model, or construction cost model, or whole-life energy model.

¹ Trained with 14 classes of plans:

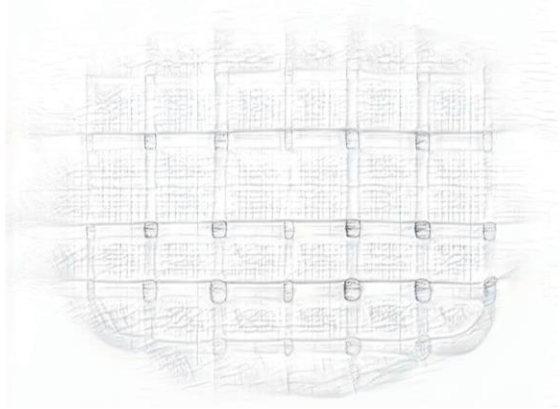
<https://github.com/Mistrymm7/AlforArchitects/blob/master/StyleGAN2-Ganspace-Explorations-on-Building-FloorPlan.md>

GAN algorithm (StyleGAN2): <https://github.com/NVLabs/stylegan2>

Model (GanSpace): <https://github.com/harskish/ganspace>

² Source: HKU Libraries; audio by Hong Kong Sinfonietta, DBS/DGS Choirs: <https://lib.hku.hk/muslib/HKUanthem.html>

³ Source: <https://github.com/mikaelalafritz/lucid-sonic-dreams>



AI software is already performing some of the work of built environment professionals, including surveyors (cost engineering optimisation), construction managers (logistical optimisation), architects (interiors and layout optimisation), transport engineers (traffic signal and road-price scheduling) and urban designers (simple urban design scheme massing and more). We have discussed such issues in previous Dean's Roundups, but I am personally shocked at the pace of developments. We should all reflect and adjust to the future with an appropriate mix of uncertainty, excitement and sense of adventure.

To trigger discussion about how to handle portfolio tutoring in admissions, Head of FoA's Architecture Department, Eric Schuldenfrei, circulated '10 points from the Dean' regarding AI, portfolios and the future of architecture. One or two points in the list came, I think, from Alain Chiaradia and perhaps others in various other discussions and I apologise for not being able to cite them as sources of specific points. Here they are:

1. Architects will increasingly source BIM-ready 3D designs from a library/warehouse. Some firms, particularly big ones, already do this.
2. Over time, we might expect designs to be better categorised, geometrically, topologically, and in more subtle ways – as would have to happen in a design-grammar lexicon or database of images, architecture 'primitives' or database of case studies, and as would be the case in a warehouse of electric car engine designs, or a database of drug-interaction cases in medical patients or surgery designs for different complications and co-morbidities, for example.
3. As well as their descriptive search categorisation, some 'made-earlier' architectural designs might also be named for the architect who made them famous. This will elicit a stronger culture of citations, IP (and litigation) in architecture (as has been the case in the digitised music industry). There will be more structured access and citation data for citing sources and establishing IP. In turn, this will drive designers to consider more specifically what is unique about a design. Design patents are already a tradition, but a difficult tradition for all the obvious reasons. Blockchain and NFT technologies offer efficiency, but do not really overcome the intrinsic difficulty of claiming ownership of all or part of an architectural design (refer to recent high profile cases of alleged music plagiarism – from Led Zeppelin's 'Stairway to Heaven' to Mariah Carey's 'All I want for Christmas is you' – or was it Justin Bieber?... or Andy Stone?). Assume that digitisation has to lead to better systems of preserving design IPR, however.

4. More than just selecting shapes, students and professionals will be able to search an architectural design warehouse of the future for shapes suitable for certain constraints: geometry of site, topography, height, surrounding buildings for sunlight, road and pedestrian access etc. The input to the search will itself eventually become a 3D site model with as many constraints as possible. Architects tell me that both in school and in the office, there is a tendency to focus within the site. From observation and from reason, the more stunning architecture accomplishments speak to the site and the surrounds. In the future, will we teach students to first model the surrounds (digitally – utilities, traffic and pedestrian circulation, run-off, micro-climate and so on) before going to a digital architectural warehouse?

5. As with individual building designs, certain problem-solution configurations/models might emerge as cardinal dimensions of particular kinds of problem spaces. Again – named for generic description and for original inventors, with citations. This could further democratise architecture in the way that systematic allocation of IPR in science and humanities has democratised those fields of enquiry and invention. There may even be something of a war between the democrats and the aristocrats. If aristocrats do not go with the flow, they will lose their monopoly status (on prestige) and the masses will turn to sources of the most easily accessible great design ideas for buildings, streets, landscapes, traffic systems and so on. Like the kings of the now forgotten kingdoms of Europe who tried to hold on to their monopoly (tax) rights over merchants' profits and lost out to the more open (low tax) city states that birthed modern industrial Europe.

6. Participating in this cultural and industrial transition, gives us a focus as an elite architecture school. Probably for the next 50 years, part of our teaching, research and knowledge exchange mission will be to improve the knowledge, designs, architectural performance algorithms and user interfaces of such systems – to load the warehouses up with design innovations 'made in HKU'. But perhaps more profoundly, we would be wise to focus on what's left once the automated architect machine has established itself in the eco-system. What's left will probably determine the nature of elite architecture education for the rest of the century.

7. At the very least, 'what's left' will include the artistry of piecing together shapes to create a beautiful form that serves a set of functions and that can be built. That has always been one description of architecture and will always be. 'That can be built' distinguishes architecture from fine art. It's what gives architecture its prestigious position in history. The idea of architecture of the future being some kind of massive CAD-CAM system is a horrible one and would be rejected by society even if it were possible. So – artistry in AI-enabled design of structures that can be built and cause people to gasp in awe. Like the MArch thesis design featured at the end of this Roundup blog. I would buy that and live in it if it could be built.

8. What else? Choice of overall scheme. Sifting through multiple templates to imagine something that suits the site, the locale, the region, the client, the functions, the programme, the budget, etc. This could be done by a computer, but perhaps not as easily as choice of building design elements (especially in cities of small building footprints like China's coastal belt). As you scale up, the constraints multiply. As the constraints multiply, the more the architect's design expertise becomes king, likely to outperform even a highly sophisticated AI machine. But certain first cuts of this process

could feasibly be made by machine. Imagining an overall scheme by studying the site constraints and reference to experience and precedents is not a lot different from neoclassical architects of old doing a tour of Italy or Greece to gain inspiration from great buildings. Only AI may be more efficient at some of the matching.

9. It might be of interest in thinking about our research and curricula innovations to ask what can be done now, with a technology-enhanced version of the old touring approach? What can be done now that could not be done then? One obvious answer is that the student / professional can more easily optimise performance, selecting an overall / elemental / composite formalistic scheme that best fits (optimises) key performative parameters. Selecting, for example, three proforma schemes as different as possible from each other in form, but all of which match a given site, budget and floor-area, land-use and energy targets, and so on. AI systems doing this routinely will be with us within 5 years. That, of course, would not be the end of the design, rather the start. But the designing will be within a more tightly designed solution space, determined by the machine. In that sense, perhaps it is better to see the AI-architect machine as more precisely shaping the brief and the architect doing what the architect has always done.

10. Wherever this takes FoA in the coming decades, I would imagine we might still want to teach architecture as a craft – as a continuity with the past; to give students a feel for the 1:1 relationship between design, making and experiencing; to help them understand construction ideas, and so on; and above all, to undergo the necessarily repetitive learning process of becoming a refined designer. Perhaps much of the essential skill in architecture, making it one of the core occupations at the heart of civilisation and industry, is best learned in the craft domain.

All the above is pure speculative future-casting of course. All enterprises should do this, including universities and their faculties and departments. An alternative hypothesis (future) might go as follows:

AI can never replace the essential skill of the architect, landscape architect, and urban designer. A 2017 McKinsey & Co report estimated that 40% of the real estate industry can be replaced by machine ‘labour’.⁴ For education as a whole sector, it is 27%. A similar Brookings Institute analysis of AI-exposure in the USA, placed ‘Architecture and Engineering’ high up on an ‘AI-exposure’ metric that measures patent-based inroads into a large range of professional activities. I.e., this is an employment sector at risk. But whether it’s 27% or 40%, we might guess that the human creativity aspects of an architect’s work can never be adequately replaced by machine and conclude that built environmental design is more like primary school teaching (which topped McKinsey’s list of least-threatened profession – and the best one to encourage our children to train for). That gives academic architects a focus not dissimilar to the one suggested under my first hypothesis. For the next 50 years, FoA should educate BE designers to do what machines cannot – and, by extension, to become the human partners of the machine workers that will join the industry of the future.

⁴ See page 44 of Manyika, J., Chui, M., Miremadi, M., Bughin, J., George, K., Willmott, P., & Dewhurst, M. (2017). *A future that works: Automation, employment, and productivity*. McKinsey Global Institute. <https://www.mckinsey.com/~media/mckinsey/featured%20insights/digital%20disruption/harnessing%20automation%20for%20a%20future%20that%20works/a-future-that-works-full-report-mgi-january-2017.ashx>

Another alternative future is a profession divided by function:

As they become more adept and find their niche (albeit one with natural boundaries), machines will do much of the job of designing for performance-driven architectural and other BE-design problems. So, perhaps we're back to the bad-old days of, for example, the 1970s-90s mass produced housing industry in the UK with not a well-designed expensive little box in sight. But much better this time, as our architecture colleagues John Lin, Joshua Bolchover, Christian Lange, Donn Holohan, Kaicong Wu, Lidia Ratoi are showing us, AI and robotics may deliver a future of re-invented bespoke architecture, individualisation and mass-produced craft design. That would be one part of the split, with AI penetration being high. Also included might be highly technical buildings designed for ever-increasingly demanding energy, thermal, whole-life social cost, and other targets. The other part of the split would be architects as artists, doing what machines cannot, and focusing on artistic form. Clearly the division is already there – in architecture schools and in practices. In this future, artist-architects design beautiful forms, themselves perhaps viewed as hypothetical solutions to a client's needs, or propositions to be refined and extended in conversation with clients and machines. These become fixed points in the built-environment design and production process, and inputs into AI-driven architectural technician machines that do the performance calculations in conversation with designer and client. That's not too dissimilar, perhaps, from where we are now. Hopefully we're on the right track!

Congratulations to colleagues and students mentioned below. This year's end-of-year architecture show certainly endorses the idea that some of the best contemporary architectural exploration comes in the craft domain. If you haven't viewed the exhibition yet, please do so. I include my favourite MArch thesis design below – a woven mud-tube house by Ms Yujie Liu, advised by Dr Kristof Crolla. Next Dean's Roundup blog will be a review of the show by some of our recently-recruited architecture colleagues.

And finally, particular congratulations to Anderson, Weijen and Su Chang, and our alumni who bagged prizes at this year's HKIA Annual Awards.



'Weaving Earthbag – Optimised Superadobe System in a Post-digital Age', MArch thesis by Ms Yujie Liu

Chris Webster
Dean, FoA

Faculty of Architecture

1. HKIA Annual Awards 2021

- were presented to six projects, including the following four that involve a number of our colleagues, alumni and students:

(i) **HKIA Merit Award (Hong Kong – Institutional Building)**

Project Title: Christian Zheng Sheng Ha Keng Centre

Architect: Index Architecture Ltd (Founder and Principal: Anderson Lee)

Location: Lantau Island, Hong Kong

Building Type: Rehabilitation Centre

Project Description: The remoteness of the site prohibits any kind of large-scale machinery or large prefabrication pieces to access economically. Posts and beams cast-in-place concrete system was chosen as it presented the most direct way to transport building materials from the pier to the site. The entire structure is built on stilts to minimise disturbance to the landscape. The nature of the facility demands maximum spatial and programmatic flexibility. The exo-skeletal structure system addresses this demand. Each of the three building blocks, oriented slightly differently from each other, respects the topography and maximises sunlight/ventilation exposure, cascades down the valley and follows the natural terrain of the site. The architecture responds directly to the physical and spiritual needs of a rehabilitation facility – for the body and the soul.



(ii) **HKIA Medal of the Year (Outside Hong Kong)**

Project Title: Valley Retreat: Xiaoyou Dongtian

Principal Architect: Professor Wang Weijen

Project Architects: Su Chang, Halley Qian

Design Team: Feng Li, Wang Ying

Design Assistants: Sun Bochao James, Zhou Zheng Elliot, Li Geng, Jiang Jing, Li Andrew

Location: East bank of Xiaoyou River, Wangwu Town, Jiyuan City, Henan Province

Building Type: Resort Hotel

Project Description: Valley Retreat transforms abandoned village houses and farmlands into culture landscape, rethinking the relationship between topography and typology, rammed earth construction and courtyard dwellings. Integrating the new additions with existing houses, the design works with traces of stone-wall and farmland, starts with five remaining courtyard houses, extends them into linear sequences of patios along the river stream, creating dialogues with adjacent trees and rocks, as well as the distant valley and mountain. Through exploring courtyards and alleyways, platforms and steps, ponds and woods, the Retreat re-establishes the connection between the physical construct of building and the culture of living with nature.

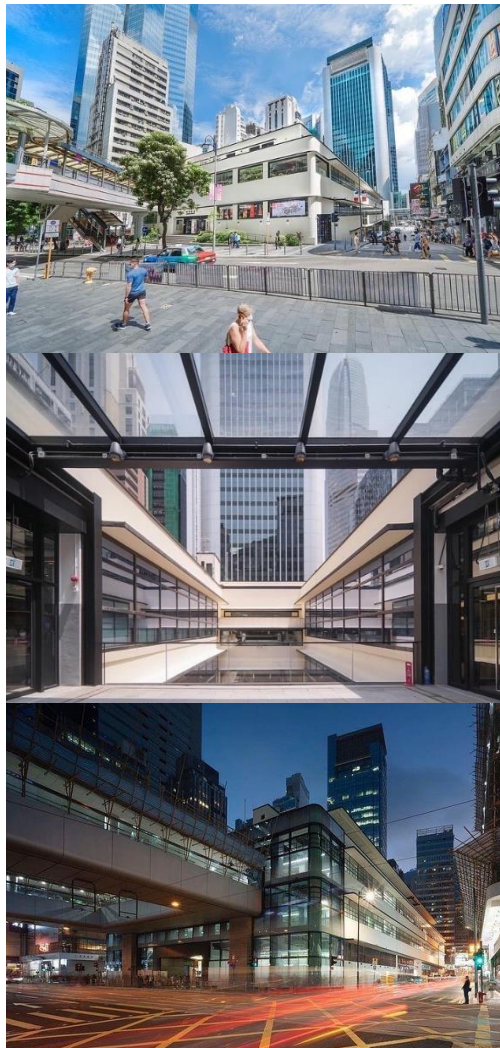


(iii) HKIA Special Architectural Award – Heritage & Adaptive Re-use

Project Title: Central Market

Architect: AGC Design Limited (Senior Directors: Vincent Ng [BAAS 1983, BArch 1985, MUD 1994], Tony Lam [BAAS 1982, BArch 1984, MScCon 2005], Michael Tsang [BAAS 1982, BArch 1985])

Project Description: Conservation principles of minimum intervention and maximum reversibility are adopted on the character defining elements: façade, structural grid, atrium, grand staircases and market stalls. Walls facing Jubilee Street and Queen Victoria Street at ground floor are opened up to increase accessibility for the public to get into the market. Façade facing Des Voeux Road Central was rebuilt in 1994 for the escalator and walkway system; the rebuilt facade lost the horizontality character of the original design. A new curtain wall façade is constructed to recall the horizontality and allow visual connection to the new circulation system behind. The atrium is landscaped for public enjoyment. The high walls facing the atrium are opened up so that more natural lighting is introduced to the interior space. Physical and visual connection between the interior and atrium garden at the ground and upper floors are improved.



(iv) HKIA Special Architectural Award – Curation & Exhibition Design

Exhibition Title: 'BRUTAL! – Unknown Brutalism Architecture in Hong Kong'

Curator: Pang Chin Wah, Bob (BAAS 2004; MArch 2007)

Co-curators: Siu Kin Wai, Kevin (BAAS 2004; MArch 2007)
 Wong Hin Fai, Kenji (BAAS 2004; MArch 2007)
 Law Ka Wai, Charlotte (BAAS 2006; MArch 2009)
 Tsang Ka Lee, Candy (BAAS 2020)
 Chan Lok Yan, Alison (BAAS Year 3)
 Ting Wing Sze, Vivian

Photographer: Mak King Huai, Kevin

Concrete Artists: Lau Chung Ming, Mig, and Ma Cho Fai, Joe

Sponsor: Design Trust Seed Grant

Project Description: The exhibition interprets the historical cases of local brutalist architecture in four dimensions, namely 'inherit unknown stories through textual research', 'reshape architectural imprint by hand', 'record the present with unique lens' and 'interpret Brutalist details with concrete art'. The four different perspectives are different from the usual way of narrating historical building exhibitions, and arouse more public interest and curiosity. In addition to displaying historical materials, the curatorial direction of the exhibition focuses more on how to narrow the distance between the public and historical buildings, so as to establish a connection between the two through more creative communication methods. This exhibition effectively attracts the public, professionals and historians to pay attention to the issue of post-war architectural conservation through different creative curatorial methods, and finally successfully introduces and publicises the history of Hong Kong's Brutalist architecture, and gradually constructs related conservation discourses.



All the awarded and finalist projects were showcased in ‘**Central’s Hub**’ – **HKIA Annual Awards 2021 Exhibition**:

Venue: 1/F Event Space, Central Market, 93 Queen’s Road Central and 80 Des Voeux Road Central, Hong Kong

Exhibition Period: 20 – 29 May 2022

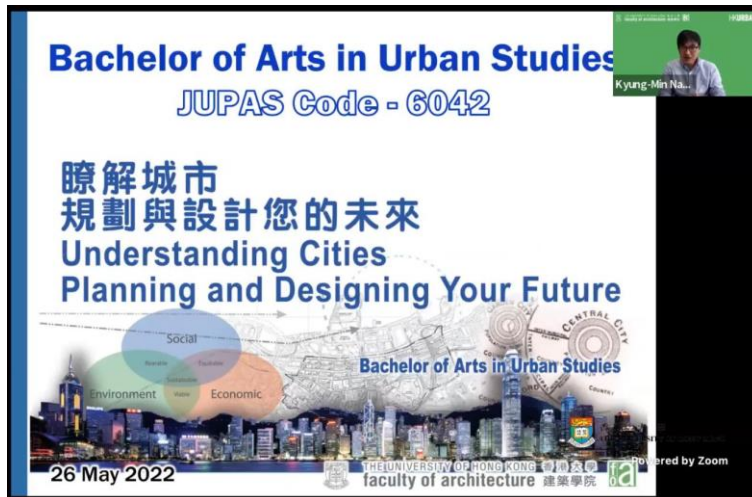


More information:

<https://www.hkia.net/en/awards-competition.html?id=1&news=156>

2. HKU JUPAS Info Week 2022

- Undergraduate admissions events were held online and on campus, on 26 May 2022, where hundreds of participants joined in for admissions talks, school tour, student presentations, alumni sharing and Q&A:



BAUS admissions talk by Dr Kyung-Min Nam



BSc(Surv) Q&A Session with, from left, Dr Isabelle Chan (Programme Director), Stephanie Tse (Class of 2016), Sr Alvin Leung (Class of 2012), Sr Charlotte Hui (Class of 2016) and Mr Yu Ka-sing (Deputy Programme Director)



Virtual tour and student presentation in a joint event for BAAS, BALS and BAScDesign+

More information: https://www.arch.hku.hk/event/_hku-jupas-info-week-2022

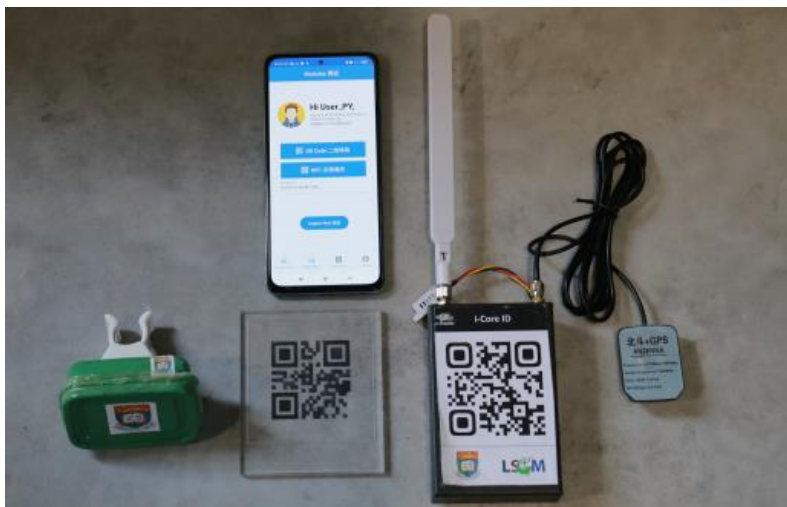
3. Blockchain-enabled E-Inspection 2.0 System for Effective Offsite Monitoring of Modular Integrated Construction for Student Residence

- A team led by Professor Wilson Lu, with members including Professor Anthony Yeh, Dr Frank Xue and Ir Mr K L Tam (Director of Estates, HKU) has developed a novel e-inspection 2.0 system with an in-house developed mobile application (APP) 'e-inStar', which is used to monitor the manufacturing and cross-border delivery of student residence modules constructed in the Mainland during the COVID-19 pandemic.

The new system has adopted cutting-edge digital technologies including blockchain, building information modelling (BIM), internet of things (IoT), and geographical information system (GIS), and is demonstrated to be an effective and reliable tool for real-time offshore monitoring and inspection of building works.

The project was supported by the Logistics and Supply Chain MultiTech R&D Centre established under the Innovation and Technology Fund. Its research findings have been published in the *Journal of Management in Engineering*, an academic journal of the American Society of Civil Engineers (ASCE).

A press conference on the Blockchain-enabled E-Inspection 2.0 System was held on 6 June 2022, which was widely covered by the media.



Ir Mr KL Tam, Director of Estates (left), Professor Wilson Lu, Department of Real Estate and Construction, and Professor Anthony Yeh, Department of Urban Planning and Design

More information:

- [Demonstration Video of e-inStar App](#)
- [Presentation at Media Conference](#)
- [Published Article in *Journal of Management in Engineering*](#)
- [HKU Press Release](#)

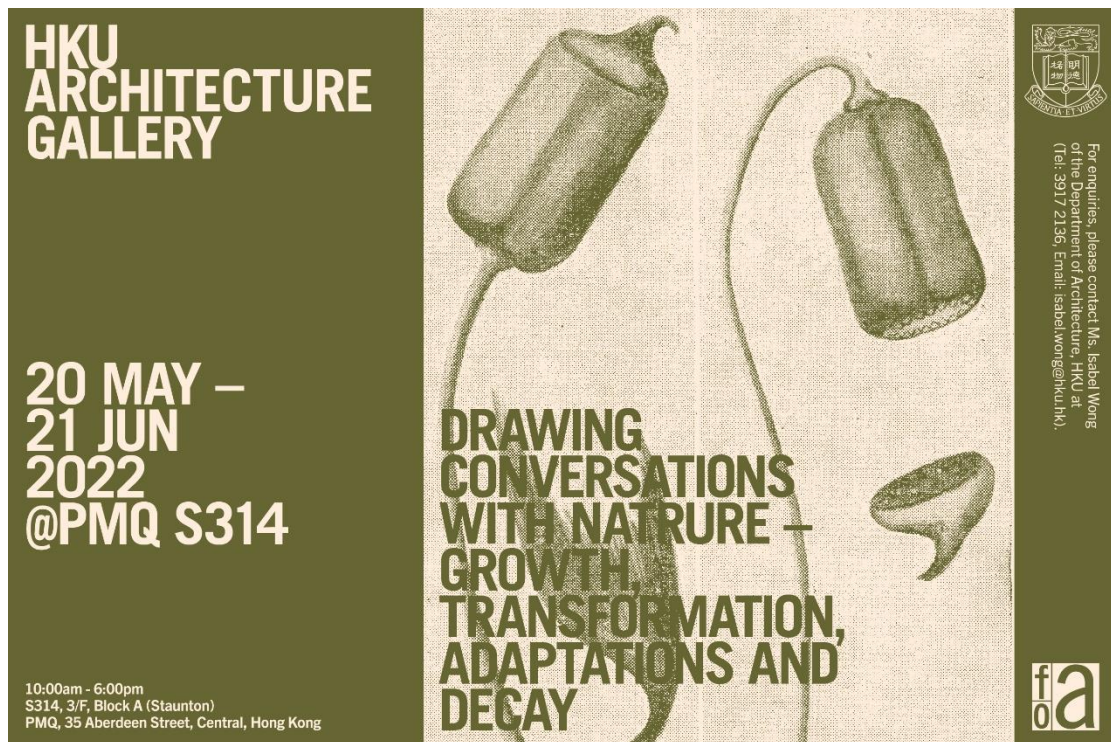
Media coverage:

1. [港大首創系統 遠程監察宿舍組件 \[Hong Kong Economic Times\] 2022-06-07 A14 港聞](#)
2. [新 Hall 組件 港大遙距監控兼省錢 \[Ming Pao Daily News\] 2022-06-07 A09 港聞](#)
3. [港大研發遙距監測樓宇組件系統 減省大量北上檢查人手 \[Oriental Daily News\] 2022-06-07 A06 港聞](#)
4. [港大研新系統 遙距監察建築組件質量 \[Sing Tao Daily\] 2022-06-07 F01 教育](#)
5. [港大研發電子化質檢系統 實時監察 建築組件製造運輸流程 \[Sky Post\] 2022-06-07 P09 港聞](#)
6. [港大研發新檢測系統監建「組裝合成」宿舍 \[am730\] 2022-06-07 A04 本地新聞](#)
7. [港大研新一代「組裝合成」組件質量檢測系統 可遙距監察品質 \[TVB\] 2022-06-06](#)
8. [港大研新監測系統 實時監測內地運抵香港建築組件 \[i-Cable\] 2022-06-06](#)
9. [港大研發系統監察學生宿舍工程質量 \[RTHK\] 2022-06-06](#)
10. [HKU's world's first remote monitoring program for quality of assembled composite components reduces border crossing inspection manpower \[The Limited Times\] 2022-06-06](#)
11. [港大黃竹坑學生宿舍工程首應用新檢測系統 實時監察建築質量 \[Sing Tao\] 2022-06-06](#)
12. [香港大学黄竹坑学生宿舍工程首次应用新检测系统，实时监控建筑质量 \[星岛环球网\] 2022-06-06](#)
13. [港大團隊運用區塊鏈技術開發 e-inspection 2.0 檢測系統 \[HKCD\] 2022-06-06](#)
14. [港大研發遙距監察系統 毋須赴國內廠房可掌握工序進度 \[on.cc\] 2022-06-06](#)
15. [港大全球首創遠程監測組裝合成組件質量程式 減省過境檢測人手 \[HK01\] 2022-06-06](#)
16. [港大黃竹坑學生宿舍工程首應用新檢測系統 實時監察建築質量 \[Headline Daily\] 2022-06-06](#)
17. [港大研發系統監察學生宿舍工程質量 \[BastillePost\] 2022-06-06](#)
18. [HKU Team Develops Blockchain-Enabled E-Inspection 2.0 \[Open Gov Asia\] 2022-06-07](#)
19. [港大建築學院團隊運用區塊鏈技術開發 \[CNYES 鉅亨網\] 2022-06-07](#)
20. [港大建筑学院团队运用区块链技术开发 \[澎湃新闻\] 2022-06-07](#)
21. [港大建筑学院团队运用区块链技术开发电子化质量检测 2.0 系统 \[巴比特\] 2022-06-07](#)
22. [港大建筑学院团队运用区块链技术开发 \[链门户\] 2022-06-07](#)
23. [HKU Architecture Research Team Develops e-Inspection 2.0 for Offsite Monitoring of a MiC Project \[Construction+\]](#)
24. [HKU Applies Modular Design for Student Dormitory \[Hong Kong International Business Channel News\]](#)

Department of Architecture

1. 'Drawing Conversations with Nature' Exhibition @ PMQ

- showcases collective works by the HKU Bachelor of Arts in Architectural Studies Year 3 students in their Fall Design Studio in 2019 – 2021.



Exhibition Statement:

Our exploration begins with researching nature by drawing, analysing, and unveiling the substrate that entails various coordinated disciplines speaking to one another in a natural phenomenon where vegetables and fruits grow as ordinary objects of study. Using architectural tools such as scale, plans, sections, dissections, transparency, and alternative languages, students may invent new tools, techniques, and methods for their drawing translations.

This exhibition challenges the ways of seeing the world around us and discovers new possibilities through a reading of representation and abstraction with depth and imagination.

We aim to develop a deeper understanding of forms, space, and material organisation that describe the environment in terms of performance, structure, life cycle, and energy processing. Through these drawings, we discover how nature grows and search for the relationship between architecture and our built environment.

Curator: Ms Miho Hirabayashi

Year 3 Studio Coordinator: Mr Thomas Tsang

Contributors: All students of HKU BAAS Year 3 Fall Studio, 2019 – 2021

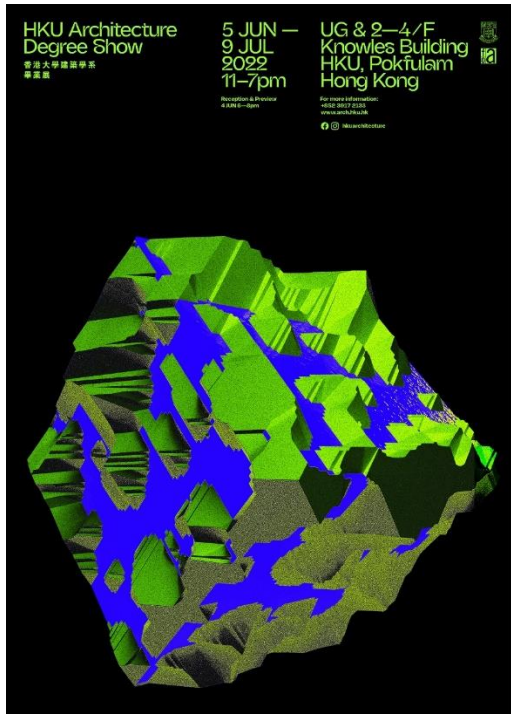
Date: 20 May 2022 (Friday) – 21 June 2022 (Tuesday)

Time: 10:00 am – 6:00 pm

Venue: S314, 3/F, Block A (Staunton), PMQ, 35 Aberdeen Street, Central, Hong Kong

2. Degree Show 2022

- The Degree Show is an annual exhibition of thesis projects produced by our MArch final year students. The exhibition also includes works from our overall MArch Programme, and the BAAS, PhD and BAScDesign+ Programmes. These projects represent the students' reflection, vision and imagination of the built environment, their concerns with the social and cultural milieus as well as their determination to engage in and design new spaces for contemporary conditions in our societies.



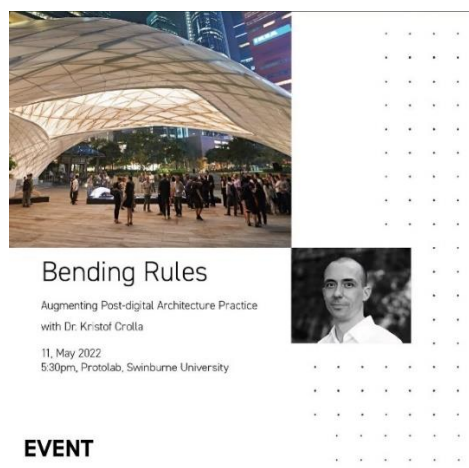
Date: 5 June 2022 (Sunday) – 9 July 2022 (Saturday)

Time: 11:00 am – 7:00 pm

Venue: Knowles Building, HKU
UG/F: BAAS Year 1
2/F: BAAS Year 1 – 3
3/F: March Thesis Works
4/F: BAAS Year 4, PhD & BAScDesign+

3. Dr Kristof Crolla

- delivered lectures on 'BENDING RULES: Augmenting Post-Digital Architecture Practice', exploring various aspects of digital design and architectural practice, for the following institutions:
 - o Royal Melbourne Institute of Technology, Australia, 7 April 2022
 - o School of Design and Architecture, Swinburne University of Technology, Australia, 11 May 2022
 - o School of Architecture, Soochow University, China, 18 May 2022 [Zoom]



Division of Landscape Architecture

1. Lilian Ka Lai Tsang and Xinke Yu (MLA Year 2 students)

- won the Egis Foundation's 'Team up for Climate Challenge' for their proposal 'Eco-Megablock: An Alternative Urban Planning Methodology in Hong Kong to Combat Heat Pockets and Improve Urban Living'.

The proposal, which is based on their MLA thesis project supervised by Mr Ivan Valin and Dr Chao Ren, aims to tackle the urban heat island effect with a series of sustainable megablock planning strategies in order to create high-quality heat-adaptive living neighbourhoods.

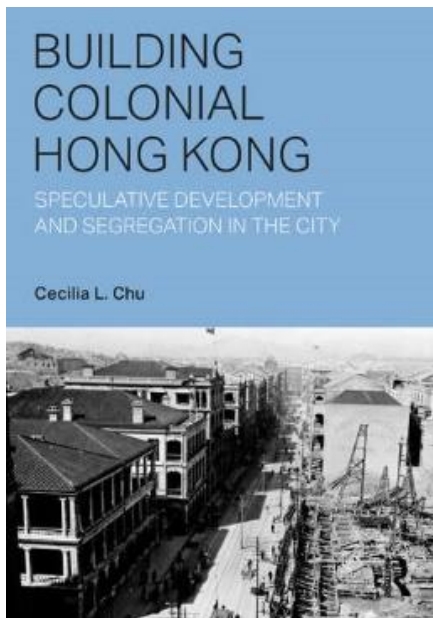
More information: <https://www.egis-group.com/all-news/finalistes-challenge-team-up-for-climate>



2. Dr Cecilia Chu

- has published the following book:

Chu, C. L. (2022). *Building Colonial Hong Kong: Speculative Development and Segregation in the City*. Planning, History and Environment Series, Routledge.



Book Description:

In the 1880s, Hong Kong was a booming colonial entrepôt, with many European, especially British, residents living in palatial mansions in the Mid-Levels and at the Peak. But it was also a ruthless migrant city where Chinese workers shared bedspaces in the crowded tenements of Taipingshan. Despite persistent inequality, Hong Kong never ceased to attract different classes of sojourners and immigrants, who strived to advance their social standing by accumulating wealth, especially through land and property speculation.

In this engaging and extensively illustrated book, Cecilia L. Chu retells the 'Hong Kong story' by tracing the emergence of its 'speculative landscape' from the late nineteenth to the early decades of the twentieth century. Through a number of pivotal case studies, she highlights the contradictory logic of colonial urban development: the encouragement of native investment that supported a laissez-faire housing market, versus the imperative to segregate the populations in a hierarchical, colonial spatial order. Crucially, she shows that the production of Hong Kong's urban landscapes was not a top-down process, but one that evolved through ongoing negotiations between different constituencies with vested interests in property. Further, her study reveals that the built environment was key to generating and attaining individual and collective aspirations in a racially divided, highly unequal, but nevertheless upwardly mobile, modernising colonial city.

Review:

This is a stellar, insight-filled, and beautifully written analysis of the built environment of one of the world's most remarkable and still-politically-charged metropolises: 'the fragrant harbor' (Xianggang) or, as most know it, Hong Kong.

Cecilia Chu's excellent book will appeal not only to those, like me, who are familiar with many of the examples she cites, but also to students of colonial urbanism more broadly, particularly those with interests in Asian urban history. She does a remarkable job of making salient and significant points at different scales of analysis, from site-specific cases to broader perspectives about racial segregation and economic inequality throughout colonial dominions [...] For those with an interest in Hong Kong's evolution – from a colonial entrepôt to a Chinese city among many, in what is now often called 'the Greater Bay' – will learn key lessons from an extremely perceptive scholar, who writes with clarity and insight.

Jeff Cody, Architectural Historian and Former Project Specialist, The Getty Conservation Institute. *Built Environment* 48, no. 2, 2022.

The [eBook](#) can be retrieved from HKU Libraries. For more information, please visit the [publisher's website](#).

3. Dr Chao Ren

- was invited as the lead author to present the newly developed 'Guidance to Measuring, Modelling and Monitoring the Canopy Layer Urban Heat Island (CL-UHI) of the World Meteorological Organization' at its online launch event on 20 May 2022.

The Guidance introduces different approaches on how to measure and model the CL-UHI and its potential applications for urban services. It is written for the WMO Members, the National Meteorological and Hydrological Services (NMHSs) and their many potential partner agencies and stakeholders undertaking activities in cities that are impacted by weather and climate across a wide range of time and space scales.



4. Ms Vincci Mak

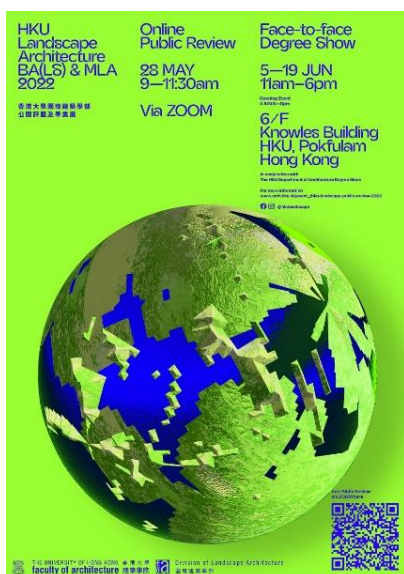
- is awarded the Lord Wilson Heritage Trust Grant 2021/22, for the amount of HK\$305,300, for her proposal 'Village, Tree, Heritage'.

Project Summary: There is a growing awareness of the built heritage of traditional villages, and the landscapes there also have great significance in the everyday village life. In particular, old trees have great symbolic/cultural values and are the centre of village traditional practices. Anchoring village communal spaces and events through time, they are significant in telling stories, local history, and collective memories of the villagers.

This project will identify old trees in various villages having significance in everyday village culture. They will be studied as a lineage to analyse trends, patterns, and relationships among different practices and rural stories. In the long run, the study aims to establish a comprehensive database and set of knowledge about Hong Kong's old village trees and their interrelationships with everyday village cultures.

5. HKU Landscape Architecture Degree Show 2022

- presents works by our BALS and MLA graduates of 2022, from 5 to 19 June.



Date: 5 June 2022 (Sunday) – 19 June 2022 (Sunday)
Time: 11:00 am – 6:00 pm
Venue: 6/F, Knowles Building, HKU

The Degree Show also features two guided tours on 11 and 18 June (10:00 – 11:00). More information: https://www.arch.hku.hk/event/_hku-landscape-public-review-2022/

For enquiries, please contact Ms. Ada Jiang at jg1201@connect.hku.hk.

Department of Real Estate and Construction

1. Dr Frank Xue

- won Merit Award of Digital Graphics (HKU Group) in the 'Data is the New Art Form' Art Competition 2022, organised by the Musketeers Foundation Institute of Data Science (HKU-IDS), with his work 'Science and Light'.



The award-winning artworks are currently exhibited at G/F, Chi Wah Learning Commons, Centennial Campus, until 21 June 2022.



Image: [HKU-IDS Facebook](#)

Department of Urban Planning and Design

1. CAUPD–HKU Symposium on Collaborative Research

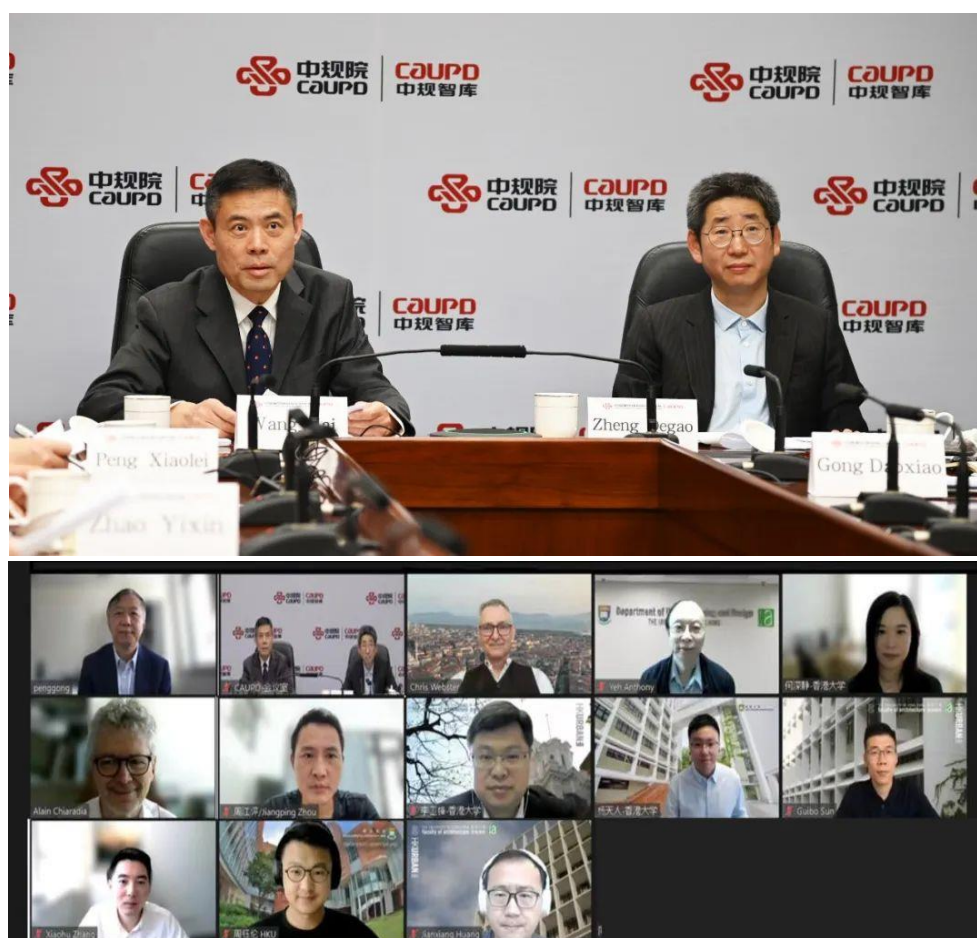
- was successfully held on 19 May 2022 via Zoom, in which Professor Shenjing He, Head of DUPAD, co-hosted the meeting with Professor Degao Zheng, Vice President of China Academy of Urban Planning and Design (CAUPD).

The meeting started with a Welcome Speech and Introduction by Professor Chris Webster, Dean of FoA, and Professor Zheng, followed by the Opening Remarks from Professor Peng Gong, Vice-President and Pro-Vice-Chancellor (Academic Development) of HKU, and Professor Kai Kong, President of CAUPD.

During the meeting, Professor Anthony Yeh and Professor He shared a Research Overview of the HKU team, while a number of DUPAD academic staff also shared their research in an open discussion session on ways of collaboration, including Dr Weifeng Li, Dr Jiangping Zhou, Mr Alain Chiaradia, Dr Jianxiang Huang, Dr Guibo Sun, Dr Zhang Xiaohu, Dr Tianren Yang and Dr Yulun Zhou.

The meeting was concluded by Professor Gong, with a mutual understanding that both parties will further develop their respective strengths to contribute to the areas of national urban and rural planning and construction.

https://mp.weixin.qq.com/s/OzENpKvTvAGD_zW0kphglw



2. HKU-USF Distinguished Professor Webinar Series

- is organised by HKU and the Urban System Forum (HKU-USF), and was launched under the leadership of Professor Peng Gong, Vice-President (Academic Development) of HKU. The Webinar Series features presentations by outstanding urban scientists and theorists from around the globe, aiming to inspire cross-disciplinary research and nurture future leaders in urban systems research at different scales and from various perspectives.

Two HKU-USF Distinguished Professor Webinars were held via Zoom, on 6 May and 25 May 2022 respectively:



HKU-USF Webinar Series
**Between the colossal and the catastrophic:
 Planetary urbanization and
 the political ecologies of
 emergent infectious disease**
 6 May 2022 (Friday), 10:00 - 11:30 HKT
 Zoom ID: 970 7705 0979



Mr. Swarnabh Ghosh
 PhD Candidate
 Harvard University



Prof. Neil Brenner
 Lucy Flower Professor
 Urban Sociology
 University of Chicago

About the Speakers
Neil Brenner, University of Chicago
 Neil Brenner is Lucy Flower Professor of Urban Sociology at the University of Chicago. Brenner's writing and teaching focus on the challenge of rethinking our approaches to urbanization in relation to the class, contradiction and energies of our time. Brenner's books include *New Urban Spaces* (Theory and the Urban Question, October 2010) and *Culture of Urbanization: Selected Essays* (Brenner Fundamentals, 2016), as well as the forthcoming volume *Imperial Challenges: Towards a Study of Planetary Urbanization* (2022).

Swarnabh Ghosh, Harvard University
 Swarnabh Ghosh is a PhD candidate at Harvard University working at the intersection of geographical political economy, infectious disease studies, and environmental history. His doctoral research focuses on the historical geographies of capitalism, migration, and planetary connectivity in relation to the support technologies of capitalism, including the technological and social networks of the transatlantic slave trade, the history of capitalism, critical urban theory, and the relationship between urbanization and capitalist change. He holds research fellowships at urban studies from Yale University and the University of Cambridge. His research has been published in *Anthropology in Action*, *Environment and Planning A*, and *The Theory Review*.



HKU-USF Webinar Series
**Global Optimization of Complex Systems Enabled by
 a Unified Input-Output Transfer Function**
 25 May 2022 (Wednesday), 10:00 - 11:30 HKT
 Zoom ID: 970 7705 0979



Dr. Chih-Ming Ho
 Distinguished Professor Emeritus
 Henry Samueli School of Engineering School
 University of California, Los Angeles

About the Speaker
Dr. Chih-Ming Ho received his Ph.D. from Johns Hopkins University. He was the UCLA Ben Rich-Lockwood Eminent Scholars Professor and his retirement in 2016, he served as UCLA Associate Vice-Chancellor for Research from 2003 to 2005.

He is among the pioneers of AI-personalized medicine, microfluidics, and control of nanofabrication. He was ranked by *US News & World Report* as one of the top 250 most cited researchers in all engineering categories (2016-2020), in 2021, he was ranked as a member of the National Academy of Engineering. In the next year, he was elected as an Academician of Academia Sinica. He has received a Doctor of Engineering Honorary Degree from the Hong Kong University of Science and Technology and holds ten honorary professorships globally. He was elected as Fellow of AAAS, APS, ASME, AIAA and JSE (Japan Society).

By taking an inductive approach based on experimental evidence and small-data artificial neural networks analysis of the test data, we discovered that the phenotypic response surface (PRS) to the combinatorial drug combinations is a single smooth surface, which can be represented by a non-linear dynamic function. The PRS function links the emerging property, phenotypic response, to the drugs interacting with the entire body system.

The PRS function is mechanism-independent and hence induction agnostic. We have varied the function in more than 10 different disease models. The results of the PRS function analysis as to dynamically optimize the combinatorial regimen of specific patients, the first accurate personalized and personalized medicine in prospective clinical trials of cancer, organ transplants, and infectious diseases.

Optimization of mechanical properties in physical complex systems, e.g., material synthesis or manufacturing process, involves searching in a very large space. In fact, physical complex systems are also governed by the PRS functions. This finding can save orders of magnitude in the effort, time, and cost of designing material synthesis and manufacturing processes.

G.M. Ho has found many metrics, e.g., wages and crime rate, of urban areas follow the universal scaling law. His research team's data and found that the PRS function can also work in the social complex system. The PRS function seems to be a unified input-output transfer function for complex systems in general.

- (i) Professor Neil Brenner, Lucy Flower Professor of University of Chicago, delivered a presentation titled 'Between the Colossal and the Catastrophic: Planetary Urbanization and the Political Ecologies of Emergent Infectious Disease', with Mr Swarnabh Ghosh, PhD Candidate of Harvard University, on 6 May 2022.
- (ii) Dr Chih-Ming Ho, Distinguished Professor Emeritus of University of California, Los Angeles, delivered a presentation titled 'Global Optimization of Complex Systems Enabled by a Unified Input-Output Transfer Function', on 25 May 2022.

More information: https://www.arch.hku.hk/events_index/seminars/?cat=hku-usf-distinguished-professor-webinar-series

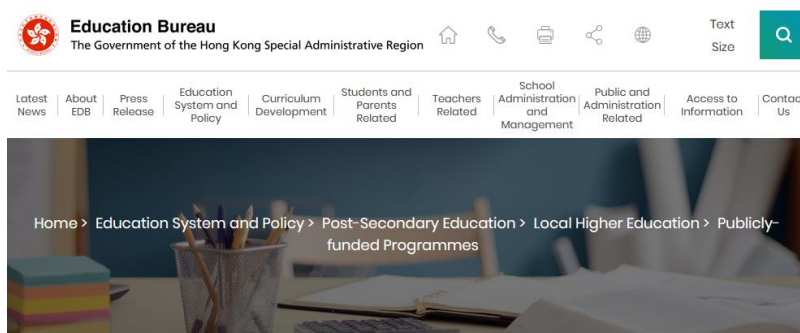
3. Miss Yuebing Liang (PhD Year 2 student)

- received the Best Paper Presentation Award at the HK-Swiss Symposium on Future Cities, for her presentation titled 'Dynamic Spatiotemporal Graph Convolutional Neural Networks for Traffic Data Imputation with Complex Missing Patterns'.



4. Mr Maosu Li (PhD Year 3 student)

- received the Talent Development Scholarship (TDS) of Innovation, Science, and Technology 2021-22, from the Education Bureau of HKSAR Government.



HKSAR Government Scholarship Fund

HKSAR Government Scholarship Fund

The Talent Development Scholarship, supported by the HKSAR Government Scholarship Fund, was established in the 2012/13 academic year to benefit a wider range of students with both outstanding academic performance and achievements and talents in other non-academic fields such as technology, culture, sports, and arts.

5. Dr Tianren Yang

- received 2022 Emerging Scholar Award from the Regional Development and Planning Specialty Group of the American Association of Geographers.



Centre of Urban Studies and Urban Planning

1. Dr Kyung-min Nam

- has published the following papers:

- (i) **Nam, K. M., Ou, Y., Kim, E., & Zheng, S.** (2022). Air pollution and housing values in Korea: A hedonic analysis with long-range transboundary pollution as an instrument. *Environmental and Resource Economics*, 82(2), 383-407. <https://doi.org/10.1007/s10640-022-00682-1>

Abstract: We estimate the degree and scope of PM_{2.5}-induced negative price shock in Korea's local housing markets, taking a two-stage hedonic approach. For the analysis, Korea's local PM_{2.5} levels are treated as endogenous and are instrumented with regional air pollutants from China. We find that a unit $\mu\text{g}/\text{m}^3$ PM_{2.5} level increase in a Korean city is associated with a 3.7% decline in local residential property value. Long-range transboundary pollution has significant effects on Korea's local PM_{2.5} levels with an elasticity of 0.05. These results enrich the sparse hedonic literature on local air-quality valuation in connection to long-range transboundary pollution in East Asia. The advanced methodological features presented in our two-staged identification strategy with a novel instrument is another contribution of this paper.

- (ii) Wang, Y., Sharp, B., Poletti, S., & **Nam, K. M.** (2022). Economic and land use impacts of net zero-emission target in New Zealand. *International Journal of Urban Sciences*, 26(2), 291-308. <https://doi.org/10.1080/12265934.2020.1869582>

Abstract: In this study, we examine the economic impacts of net zero-emission target in New Zealand, applying an integrated forest-computable general equilibrium model. The model is set to simulate equilibrium carbon permit price and sectoral output levels given the emission trading market, which is also endogenously determined within the model. When the agricultural sector is subject to a legally binding target, an equilibrium carbon permit price is estimated to be NZ\$85/tCO₂e (US\$60/tCO₂e) and this results in a 1.4% loss of gross domestic product from the baseline level and a 22% reduction of greenhouse gas emissions. Exclusion of the agricultural sector, however, would reduce the permit price to NZ\$68/tCO₂e (US\$48/tCO₂e) and lead to a 1.2% loss of gross domestic product and a 5% emissions reduction. This result suggests that the inclusion of the agriculture sector in the emissions trading scheme requires costs for policy compliance but can be cost-effective. It drives up compliance costs by 17%, but leads to 4.4 times the absolute emissions reduction expected when the agriculture sector is excluded.

2. Dr Tianren Yang

- has published the following papers:

- (i) Fang, Z., Jin, Y., & **Yang, T.*** (2022). Incorporating planning intelligence into deep learning: A planning support tool for street network design. *Journal of Urban Technology*, 29(2), 99-114. <https://doi.org/10.1080/10630732.2021.2001713>

Abstract: Deep learning applications in shaping ad hoc planning proposals are limited by the difficulty of integrating professional knowledge about cities with artificial intelligence. We propose a novel, complementary use of deep neural networks and planning guidance to automate street network generation that can be context-aware, learning-based, and user-guided. The model tests suggest that the incorporation of planning knowledge (e.g., road junctions and neighborhood types) in the model training leads to a more realistic prediction of street configurations. Furthermore, the new tool provides both professional and lay users an opportunity to systematically and intuitively explore benchmark proposals for comparisons and further evaluations.

- (ii) Fang, Z., Qi, J., Fan, L., Huang, J., Jin, Y., & **Yang, T.*** (2022). A topography-aware approach to the automatic generation of urban road networks. *International Journal of Geographical Information Science*, 1-25. <https://doi.org/10.1080/13658816.2022.2072849>

Abstract: Existing deep-learning tools for road network generation have limited applications in flat urban areas due to their overreliance on the geometric and spatial configurations of street networks and inadequate considerations of topographic information. This paper proposes a new method of street network generation based on a generative adversarial network by designing a pre-positioned geo-extractor module and a geo-merging bypass. The two improvements employ the complementary use of geometric configurations and topographic features to automate street network generation in both flat and hilly urban areas. Our experiments demonstrate that the improved model yields a more realistic prediction of street configurations than conventional image inpainting techniques. The model's effectiveness is further enhanced when generating streets in hilly areas. Furthermore, the geo-extractor module provides insights from the computer vision perspective in recognizing when topographic information should be considered and which topographic information should receive more attention.

- was invited by the Urban Governance and Design (UGOD) Thrust at the Hong Kong University of Science and Technology (Guangzhou) to deliver a research seminar titled 'Modelling the Urban System: The Case of Greater Shanghai', on 22 April 2022 via Zoom.

More information: <https://calendar.hkust.edu.hk/events/ugod-thrust-seminar-modelling-urban-system-case-greater-shanghai>

The poster is for a seminar titled "Modelling the Urban System: The Case of Greater Shanghai". It features a portrait of Dr. Tianren Yang, an Assistant Professor at the Department of Urban Planning and Design at the University of Hong Kong. The background shows a stylized city skyline of Shanghai. Logos for HKUST(GZ) SOCIETY HUB and UGOD (Urban Governance and Design Thrust) are in the top left. A diagonal banner in the top right says "UGOD THRUST SEMINAR Spring 2022". The event details are listed at the bottom: Date: April 22 (Fri), 2022; Time: 10:00 – 11:00 am (GMT+8); Zoom in English (online); Zoom ID: 940 1338 1291; Passcode: UGOD.

HKUST(GZ) SOCIETY HUB 社會網絡

UGOD 城市治理與設計學城
Urban Governance and Design Thrust

Modelling the Urban System: The Case of Greater Shanghai

Date: April 22 (Fri), 2022
Time: 10:00 – 11:00 am (GMT+8)

Zoom in English (online)
Zoom ID: 940 1338 1291
Passcode: UGOD

Dr. Tianren YANG
Assistant Professor
Department of Urban Planning and Design
at the University of Hong Kong

UGOD THRUST SEMINAR
Spring 2022

3. Professor Anthony Yeh and Dr Weifeng Li

- have published the following paper:

Zhou, X. G., **Yeh, A. G. O.**, Yue, Y., & **Li, W. F.** (2022). Residential-employment mixed use and jobs-housing balance: A case study of Shenzhen, China. *Land Use Policy*, 119, 106201. <https://doi.org/10.1016/j.landusepol.2022.106201>

Abstract: Residential-employment mixed use has often been proposed to promote jobs–housing balance and to increase employment self-containment of residents, thereby reducing commuting distance and motorized travel. However, the relationship between residential-employment mixed use and work trips has few consensuses. Whether residential-employment mixed use is correlated with employment self-containment of residents remains to be explored. In this study, the relationships between residential-employment mixed use and employment selfcontainment of residents are examined in the industrial and commercial areas in Shenzhen, China. The relationships between commercial–residential and industrial–residential mixes and employment self-containment of residents are examined using mobile phone data. Results indicate that residential-employment mixed use is positively correlated with employment self-containment of residents in industrial–residential mix areas in the suburbs, but is not correlated in commercial–residential mix areas in the central city. Residential-employment mixed use alone does not achieve high employment self-containment of residents, which also depends on other factors such as its economic sector, location, and housing prices.

4. Dr Zhan Zhao, Miss Yuebing Liang (PhD Year 2 student) and Mr Guan Huang (PhD Year 3 student)

- have published the following paper:

Liang, Y., Huang, G., & Zhao, Z.* (2022). Joint demand prediction for multimodal systems: A multi-task multi-relational spatiotemporal graph neural network approach. *Transportation Research Part C: Emerging Technologies*, 140, 103731. <https://doi.org/https://doi.org/10.1016/j.trc.2022.103731>

Abstract: Dynamic demand prediction is crucial for the efficient operation and management of urban transportation systems. Extensive research has been conducted on single-mode demand prediction, ignoring the fact that the demands for different transportation modes can be correlated with each other. Despite some recent efforts, existing approaches to multimodal demand prediction are generally not flexible enough to account for spatiotemporal correlations across different modes with heterogeneous spatial units. To tackle these issues, this study proposes a multi-relational spatiotemporal graph neural network (ST-MRGNN) for multimodal demand prediction. Specifically, the spatial dependencies across modes are encoded with multiple intra- and inter-modal relation graphs. A multi-relational graph neural network (MRGNN) is introduced to capture cross-mode heterogeneous spatial dependencies, consisting of generalized graph convolution networks to learn the message passing mechanisms within relation graphs and an attention-based aggregation module to summarize different relations. We further integrate MRGNNs with temporal gated convolution layers to jointly model spatiotemporal correlations. Extensive experiments are conducted using real-world subway and ride-hailing datasets from New York City, and the results verify the improved performance of our proposed approach over existing methods across modes. The improvement is particularly large for demand-sparse locations. Further analysis of the attention mechanisms of ST-MRGNN also demonstrates its good interpretability for understanding cross-mode interactions.

Future Urbanity & Sustainable Environment Lab

1. Dr Binley Chen and Dean Webster

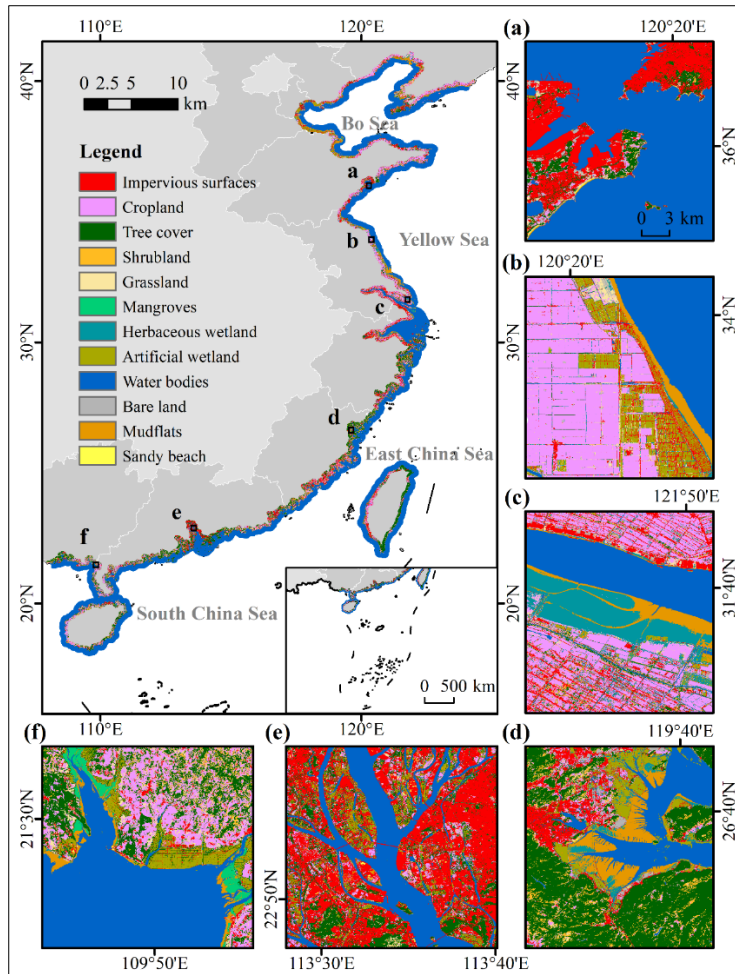
- have the following paper accepted for publication in *Science Bulletin* (Impact Factor: 11.78):

Li, M., **Chen, B.***, **Webster, C.**, Gong, B. & Xu, B. (2022). The land-sea interface mapping: China's coastal land covers at 10 meters for 2020. *Science Bulletin*. In press.

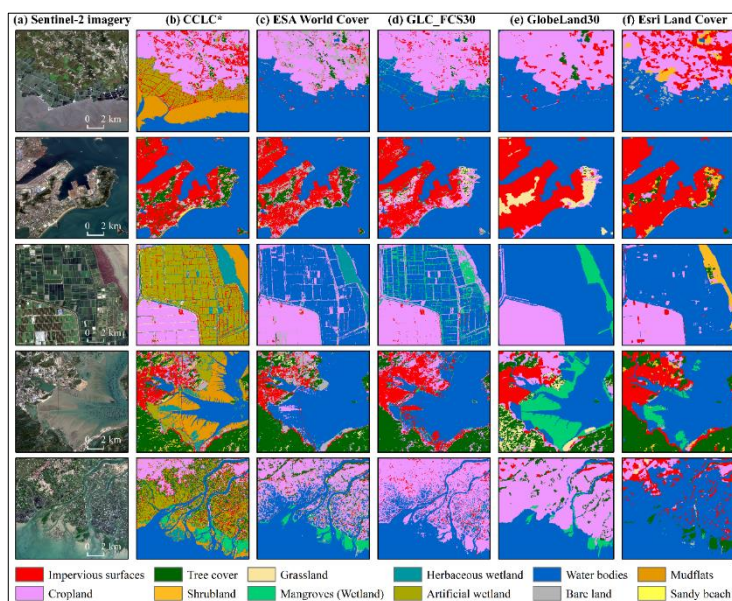
Abstract: *The so-called 'Great Sea Wall of China' has recently been said to cover 60% of the country's coastline. The statistic is alarming, and while lacking in accuracy, provides a spur to investigate the problem more carefully. The land-sea-interface (LSI), generally referred to as coastal areas, is among the most productive ecosystems. In China, the rapid urbanization along the coastal regions has dramatically reshaped the geomorphology, which arouses a series of environmental concerns. Multi-source and multi-scale remote sensing has enabled large-scale monitoring of the complicated and highly dynamic LSI over time. However, inconsistencies in data quality, mapping standard, modelling method, and spatiotemporal coverage of these datasets have often yielded different results, making it challenging for an accurate and comprehensive socio-ecological assessment. To address this challenge, we report a new high-resolution LSI mapping: China's Coastal Land Covers (CCLC) at 10 meters for the year 2020. We first establish an LSI classification system containing 12 essential coastal land cover types that outline anthropogenic influences and biophysical processes in China. We then build a coastal land cover sample library across the LSI of China using a semi-empirical generation approach based on existing datasets and visual interpretations. We further develop region-specific random forest models using features extracted from the time-series of Sentinel-1 and Sentinel-2 imagery, topography, nighttime light, and population data. Based on the initial pixel-based classification results, we refine them by integrating the object-based and knowledge-based post-processing procedures. The validation results indicate that the CCLC has achieved an overall accuracy of 80%, outperforming that of ESA WorldCover (64%), Esri Land Cover (54%), GlobeLand30 (52%), and GLC_FCS30 (49%) on China's coast. This CCLC map can provide comprehensive information on uncovering coastal human-natural interactions and support integrated coastal conservation and management.*

Online visualisation: <https://hkufuselab.users.earthengine.app/view/cclc>

Download: <https://drive.google.com/file/d/1RkrRT5zYwRJbn5Aiwe053SfovQHdB2hA/view?usp=sharing>



Map of China's coastal land covers in 2020. (a) Ports and sandy beaches at Jiaozhou Bay, Shandong Province, (b) cropland, ponds and tidal wetland in Jiangsu Province, (c) herbaceous wetland along Chongming Island, in Shanghai, (d) hills, ponds and tidal wetland in Sansha Bay, Fujian Province, (e) water network and impervious surfaces at the Pearl River Delta in Guangdong Province, (f) ponds and mangroves along the Beibu Gulf in Guangxi Province.



Comparison of local details from five land cover products on China's LSI

Healthy High Density Cities Lab

1. Dr Chinmoy Sarkar, Ms Ka Yan Lai, Ms Rong Zhang and Dean Webster

- have the following paper accepted for publication:

Sarkar, C., Lai, K. Y., Zhang, R., Ni, M. Y., & Webster, C. (2022). The association between workplace built environment and metabolic health: A systematic review and meta-analysis. *Health and Place*, 76, 102829. <https://doi.org/10.1016/j.healthplace.2022.102829>

Background: *Metabolic health is one of the key determinants of healthy living. Specifically, maintaining healthy weight, regulation of blood pressure, lipids and glucose over the life course have been reported to be protective on chronic diseases and premature mortality. With the global workforce spending, on average, one-third of the weekly time budget in the workplace, the role of workplace environment in enhancing metabolic health becomes important. However, there has thus far been no review synthesizing evidence on the links between workplace built environment and metabolic health.*

Methods: *A systematic review and meta-analysis was conducted synthesizing evidence on the associations of built environment attributes measured within the workplace neighbourhood and metabolic health. A total of 16 studies that fulfilled the inclusion/exclusion criteria were identified via systematic search of English language peer-refereed publications up to July 2021, in six databases. A systematic coding system was developed, indicating significant findings in expected/unexpected directions including null findings, and the quality of the pooled study was assessed. The Weighted-Z test method that accounts for the study quality was used to examine the strength of evidence.*

Results: *A quarter of the pooled studies were categorized to be of high quality. Among the workplace built environment attributes of access to/density of recreational facilities, street pattern, access to/density of destinations and services, and land use mix, very strong evidence was found for the association between access to/density of destinations and services and metabolic health ($p < 0.001$); specifically, access to full service establishments such as supermarkets, grocery stores and restaurants ($p = 0.001$). A relatively weak association between proximity to workplace and metabolic health ($p = 0.019$) was also reported.*

Discussion: *Given the lack of high quality studies, overall confidence in the currently available evidence is 'low'. Well-designed longitudinal studies with rigorous measurements for exposures and outcome variables are necessary.*

Keywords: *Metabolic health; obesity; built environment; workplace; systematic review.*

2. Ms Ka Yan Lai (PhD student)

- was selected as one of the 53 policy makers, business leaders and academics in Salzburg Global Seminar's 'Global Lessons on Greening School Grounds and Outdoor Learning', an 18-month programme within the [Parks for the Planet Forum](#) to identify and disseminate successful approaches to school ground greening from around the world. She has attended the following meetings:

Meeting 1:



Global Lessons on Greening School Grounds and Outdoor Learning – Advocacy (16 February 2022)

Meeting 2:



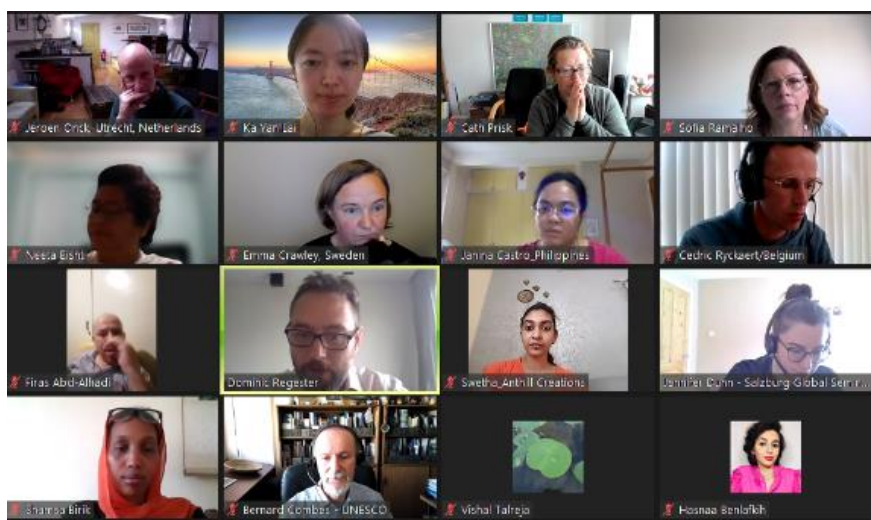
Global Lessons on Greening School Grounds and Outdoor Learning – Approaches and Innovations (23 March 2022)

Meeting 3:



Global Lessons on Greening School Grounds and Outdoor Learning – Global Barriers (27 April 2022)

Meeting 4:



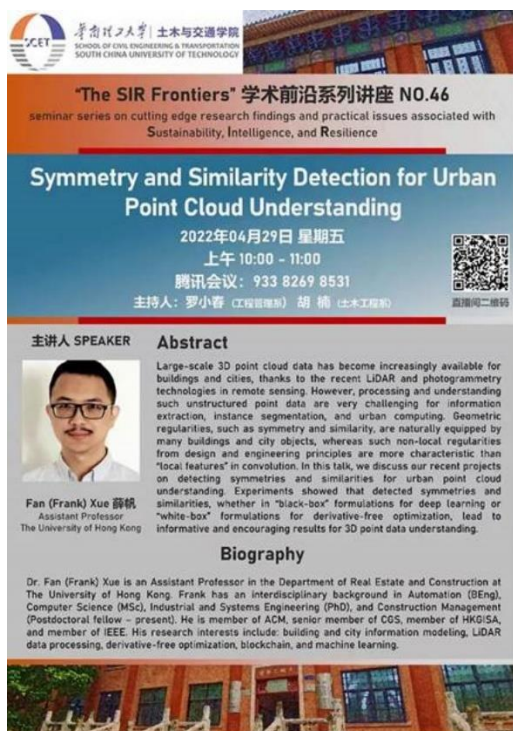
Global Lessons on Greening School Grounds and Outdoor Learning – Geographic & Climate Considerations (25 May 2022)

More information:

<https://www.salzburgglobal.org/multi-year-series/parks/pageId/10144>

1. Dr Frank Xue

- received a Seed Fund for Basic Research from the University Research Committee for 18 months, for his project 'Explainable AI (xAI) for Buildings and Cities: Semantic Vector Modelling of Deep Features'.
- was invited to give a webinar titled 'Symmetry and Similarity Detection for Urban Point Cloud Understanding' for the Sustainability, Intelligence, and Resilience (SIR) Frontiers Seminar Series (No. 46), organised by the School of Civil Engineering and Transportation, South China University of Technology, on 29 April 2022.



2. iLab Researchers

- have published the following papers:
- (i) **Xu, J. Y.** (PDF, REC), & **Lu, W. S.** (2022). Developing a human-organization-technology (HOT) fit model for information technology adoption in organizations. *Technology in Society*, 70, 102010. <https://doi.org/10.1016/j.techsoc.2022.102010> (IF=4.192, ranking as 10 out of 110 in Social Sciences, Interdisciplinary)

Abstract: Some information technologies (ITs) are better adopted than others and even the same IT may be adopted differently even in similar organizations. Existing old-fashioned theories which focused on one or several of technical, managerial, personnel factors cannot fully explain the

phenomenon. This paper proposes human-organization-technology (HOT) fit as an overarching concept to explain the IT adoption heterogeneity in organizational technology management. The HOT fit model includes the characteristics and bi-party relationships of the human, organization, and technology dimensions. The model can be further used to holistically evaluate the HOT fit, diagnose the HOT configuration, and strategize organization adaptation directions iteratively. It provides a genuine theoretical perspective to investigate IT adoption in society.

- (ii) Charef, R., **Lu, W. S.**, & Hall, D. (2022). The transition to the circular economy of the construction industry: Insights into sustainable approaches to improve the understanding. *Journal of Cleaner Production*, 132421. <https://doi.org/10.1016/j.jclepro.2022.132421>

Abstract: In the context of shifting the built environment to a circular economy, this paper first provides a meta-synthesis of the literature that clarifies the strategies related to the asset lifecycle in the circular economy (CE) context. The definitions of forty-two approaches, classified into seven categories (A to G) were analysed to identify their differences and similarities using a text mining method. Based on the definitions, approaches', their needs and requirements, and their benefits and impacts have been listed. Four variables have been identified: the asset phases (V1), the sustainable approaches (V2), the benefits and impacts (V3) and the needs and requirements (V4). As the main contribution to knowledge, two diagrams have been drawn to picture the relationships between, first, V1, V2 and V3 and secondly V1, V2 and V4. An additional contribution is semantic information captured and drawn in a Force Directed Graph (FDG) to clarify the diversity of existing approaches and their relationships. More than a hundred approaches/concepts are staged in a diagram and their links are identified. Particularly the importance of the design phase and its related approaches are developed. The FDG illustrates the complexity of the building projects involving multiple stakeholders. The paper also provides the limitations of the variety of approaches that should be overcome to achieve CE. In particular, the limitations of reuse (components cannot be reused indefinitely) and limitations of design-only approaches (like prefabrication where deconstruction is not prepared). Further research is recommended about the Product Service Systems associated with Extended Producer Responsibility that appears to be key enablers for the CE. Work is also needed to define the circularity of buildings and the associated circularity assessment tools. The outputs could be used to rationalise policies to foster those approaches to enable the construction sector to develop strategies to overcome the current obstacles to the transition to a circular economy.

- (iii) **Lu, W. S.**, **Ghansah, F. A.** (PhD Student, REC), & **Xu, J. Y.** (PDF, REC) (2022). A category and index hybrid (CIH) approach to measuring the level of prefabrication. *International Journal of Construction Management*, 1-12. <https://doi.org/10.1080/15623599.2022.2084599>

Abstract: Two generic approaches exist to measuring the Levels of Prefabrication (LoP) in construction. One is the ‘category’ approach to indicating which prefabrication type a building adopts. Another is the ‘index’ approach to measuring the ratio of prefabrication in the total construction volume. However, existing studies still face difficulty in understanding the true picture of prefabrication in a building project by adopting either category or index approach. To address this issue, this study aims to develop a ‘category and index hybrid’ (CIH) approach to measuring the LoP holistically. Firstly, a tentative CIH model was developed. Then, the model was used to measure 15 sizeable high-rise building projects in Hong Kong, which have adopted different prefabrication components. Finally, the approach was presented to industrial stakeholders for validation via interviews on its strengths, weaknesses, and prospective applications. A strong positive correlation was revealed between Levels 0 and 1 prefabrication usage based on Pearson correlation, r . It also found that the CIH approach’s ‘category’ component allows people to quickly grasp a building’s prefabrication types, while its ‘index’ component allows a numerical understanding of prefabrication in the entire construction. The interview results denoted that the CIH approach can enable a series of meaningful applications.

- have the following papers accepted for publication:

- (i) **Laovisutthichai, V.** (PhD, REC), Srihiran, K., & **Lu, W. S.** (2022). Towards greater integration of building information modelling in the architectural design curriculum: A longitudinal case study. *Industry and Higher Education*. Accepted.

Abstract: Building information modeling (BIM) has been a disruptive development in the global architecture, engineering, construction, and operations (AECO) industry. While architecture schools have sought to integrate BIM in their curricula, most current pedagogical approaches and lessons are derived from engineering and construction management perspectives. There is a scarcity of investigations to monitor outcomes, reveal difficulties, and articulate strategies for this context. This research aims to explore how to better incorporate BIM into the architectural design curriculum. It does so by gathering pedagogical strategies, redesigning the curriculum, and taking action in one of Thailand’s top architecture schools. It reveals that treating BIM as a discrete topic in the architectural curriculum, where BIM is somewhat not the main focus, misunderstood, and alleged of jeopardizing creativity, is ineffective. Instead, infusing BIM learning modules throughout the existing curriculum structure, core design studio and supporting areas, allows for consistent and concurrent development of BIM skills and architectural knowledge. The concepts and practice examples developed in this research, along with feedback received and challenges met, are a valuable resource for further BIM-integrated architecture curriculum development. Future studies are recommended to improve BIM learning and advance the full potential of BIM in the education of next-generation architects.

- (ii) **Chen, J. J.** (PDF, REC), **Lu, W. S.**, & **Dong, Z. M.** (PhD student, REC) (2022). Monocular vision-enabled 3D truck reconstruction: A novel optimization approach based on parametric modeling and graphics rendering. *ASCE Journal of Computing in Civil Engineering*. Accepted.

Abstract: *Three-dimensional (3D) truck information, e.g., geometry, orientation and position, can enable various smart construction applications such as monitoring earthwork, enhancing construction safety, and promoting productivity. While stereo cameras have been extensively explored, the use of monocular vision (MV) for object 3D reconstruction still lacks substantial documentation. This study aims to advance the field of MV-enabled 3D truck reconstruction, by formulating it as an optimization problem. First, the general geometry of trucks is conceptualized and used to form a truck parametric model (TPM). Then, the TPM is rendered by a computer graphics engine to generate synthetic views of the truck. Finally, an optimization algorithm is proposed to progressively calibrate variables of the TPM, with an objective to maximize the alignment of the synthetic views with a target truck image. The proposed approach, called Mono-Truck, was evaluated by both lab tests and field experiments. The lab tests demonstrate an average error of 10.1%, 6.7 mm, and 0.7°, respectively, in estimating the truck's dimensions, position, and orientation. In the field experiments, the Mono-Truck reports a solid performance comparable to the baseline. This study contributes to the knowledge body by opening a new avenue to the monocular 3D truck reconstruction problem from an optimization perspective. The proposed approach can be further generalized to other types of construction machinery (e.g., excavators, cranes, and bulldozers) for their 3D reconstruction and smart applications.*

Ronald Coase Centre for Property Rights Research

1. Professor Lawrence Lai, Professor Stephen Davies, Professor K. W. Chau and Dr Lennon Choy

- have the following paper accepted for publication:

Lai, L. W. C., Davies, S. N. G., Chau, K. W., Choy, L. H. T., Chua, M. H., & Lam, T. K. W. (2022). A centennial literature review (1919-2019) of research publications on land readjustment from a neo-institutional economic perspective. *Land Use Policy*, 106236. <https://doi.org/10.1016/j.landusepol.2022.106236>

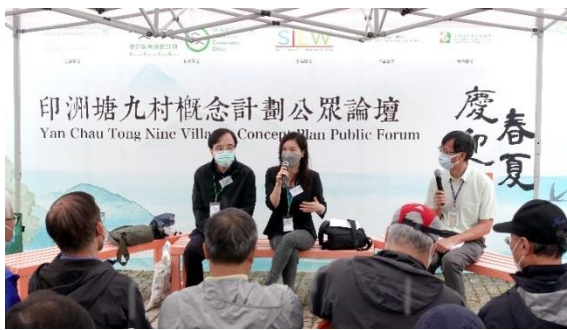
Abstract: *Informed by Coasian transaction cost reasoning from a neo-institutional economic perspective, this literature review identifies and examines 225 available research works involving 188 sets of author entries spanning from 1919 to 2019. All are on or connected with land readjustment, with a focus on lot boundaries as rigidly delineated. Over the years researchers and practitioners have considered and reconsidered land readjustment under various names in different forms (whether consensual or non-consensual among land owners affected) but almost invariably involving replotting of proprietary boundaries and reallocation of rights to realigned lots in a new layout as an alternative to state taking of land (eminent domain) or developer purchase of all properties. This literature review, connected with the adoption of a policy proposal, is unique in four ways as far as land readjustment is concerned. First, it has a time span of just over a century from 1919 to 2019 and traces works on Japan from the 1920s. Second, it cross-references the works reviewed. Third, it has a theoretical interest in property rights with a specific focus on boundaries as a dimension of those rights, and articulates land readjustment as a subset of the transfer of development rights. Fourth, it employs 'culturomics' (Michel et al. 2011, Roth 2014) in fathoming the context of the concept of land readjustment and associated terms.*

Social Infrastructure for Equity and Wellbeing

1. Professor Shenjing He

- organised with her project team a public forum and tourism festival in Lai Chi Wo, to present the concept plan and preliminary research findings of their Countryside Conservation Funding Scheme (CCFS) project, 'Towards Sustainable and Inclusive Conservation and Revitalisation in Hing Chun Yeuk Seven Villages, Kuk Po and Fung Hang, Hong Kong'.

The public forum attracted over 100 participants and visitors, receiving constructive feedback and comments from a wide range of stakeholders, including local villagers, NGOs, researchers, Government officers and volunteers.



- has published the following paper:

Wang, L., He, S., Su, S., Li, Y., Hu, L., & Li, G. (2022). Urban neighborhood socioeconomic status (SES) inference: A machine learning approach based on semantic and sentimental analysis of online housing advertisements. *Habitat International*, 124, 102572. <https://doi.org/10.1016/j.habitatint.2022.102572>

Abstract: Understanding the dynamic distribution of residents' socioeconomic status (SES) across neighborhoods within cities is essential for urban planning and policy-making aligning to the Sustainable Development Goals 2030. Whereas the promise in explicitly linking geographical features to SES has been highlighted fairly clear in previous works, scholars hold an eclectic attitude in their outlook, given the absence of theoretical ground, the heavy reliance on nontransparent proprietary data sources and the relatively coarse resolution predictions. Drawing on a case study of Hangzhou metropolitan in China, this paper aims to address these problems by demonstrating a novel approach to neighborhood SES inference based on online housing advertisements. We first revisit the theoretical debates on the linkage between neighborhood SES and online housing advertisements. Then, the Naïve Bayes classifier is employed to semantically identify the topics from online housing advertisements and the associated sentiments are quantified using the lexicon-based approach. Following that, seven commonly used machine learning algorithms are compared and utilized to infer the fine-grained neighborhood SES at residential quarters scale based on the housing attributes and extracted topics from online housing advertisements. Results show that machine learning algorithms vary with predictive ability and the tree-based algorithms are much more powerful in inferring neighborhood SES. More specifically, we distinguish 8 reliable

features which not only present relative high importance estimated by all the machine learning algorithms but also exhibit great robustness in inferring neighborhood SES and show promising potential to being applied for unraveling social inequalities. We also observe noteworthy spatial heterogeneity in neighborhood SES across the research site. The demonstrated approach not only enables the policymakers to take stock of deprived neighborhoods in a timely manner, but also lays firm ground for framing contextualized strategies of urban governance. This study is among the first attempts to bridge the theoretical interpretation of housing attributes with the proxy indicator -based approach for fine-grained neighborhood SES measurement.

Sustainable High Density Cities Lab

1. Dr Jianxiang Huang, Ms Tongping Hao (PhD student) and Dr Xiao Liu

- have published the following paper:

Huang, J.*, **Hao, T.**, **Liu, X.**, Jones, P. J., Ou, C., Liang, W., & Liu, F. (2022). Airborne transmission of the Delta variant of SARS-CoV-2 in an auditorium. *Building and Environment*, 219, 109212. <https://doi.org/10.1016/j.buildenv.2022.109212>

Abstract: *The Delta variant of SARS-CoV-2 has inflicted heavy burdens on healthcare systems globally, although direct evidence on the quantity of exhaled viral shedding from Delta cases is lacking. Literature remains inconclusive on whether existing public health guidance, formulated based on earlier evidence of COVID-19, should respond differently to more infectious viral strains. This paper describes a study on an outbreak of the Delta variant of COVID-19 in an auditorium, where one person contracted the virus from three asymptomatic index cases sitting in a different row. Field inspections were conducted on the configuration of seating, building and ventilation systems. Numerical simulation was conducted to retrospectively assess the exhaled viral emission, decay, airborne dispersion, with a modified Wells-Riley equation used to calculate the inhalation exposure and disease infection risks at the seat level. Results support the airborne disease transmission. The viral emission rate for Delta cases was estimated at 31 quanta per hour, 30 times higher than those of the original variant. The high quantity of viral plume exhaled by delta cases can create a risky zone nearby, which, for a mixing ventilation system, cannot be easily mitigated by raising mixing rates or introducing fresh air supply. Such risks can be reduced by wearing an N95 respirator, less so for social distancing. A displacement ventilation system, through which the air is supplied at the floor and returned from the ceiling, can reduce risks compared with a mixing system. The study has implications for ventilation guidelines and hygiene practices in light of more infectious viral strains of COVID-19.*

2. Dr Jianxiang Huang, Ms Yuming Cui (PhD student), Dr Derrick Ho and Dean Chris Webster

- have the following paper accepted for publication:

Huang, J*., **Cui, Y.**, Li, L., Guo, M., **Ho, H. C.**, Lu, Y., & **Webster, C.** (2022). Re-examining Jane Jacobs' theory using new urban data in Hong Kong. *Environment and Planning B: Urban Analytics and City Science*. In press.

Abstract: *Jane Jacobs theorized that four urban form conditions, namely, mixed use, short block, aged buildings, and density, are indispensable for the “exuberant diversity” and conducive to, or perhaps even determinant of, the success of a city district. Jacobs’ theory has been used widely as a reference point in case study research and policy and design prescriptions. We found five studies that attempted to test it more formally, using various performance indicators such as mobile phone activities, walking, crime and mortality. Their findings were inconsistent and unable to settle theoretical controversies. Questions remained as what performance indicators are most strongly associated with her urban form conditions? Are these conditions independently associated with desired outcomes or in combination and what are the*

- was invited to present his research titled 'The Thermal Environment of Urban Outdoor Spaces: Performance Simulation, Multi-Source Data Analytics and Design Optimisation (城市室外空间热环境研究:性能模拟、多源数据与设计优化)', at the Architecture Discipline Young Scholars Symposium (建筑学课青年学者学术沙龙), hosted by the National Natural Science Foundation of China (NSFC), on 17 January 2022.



4. Dr Xiao Liu

- has received research grants for the following projects, for which he is the PI:
 - (i) Dynamic Optimisation of Green Campus Planning and Design Based on Computational Thinking under the Vision of Carbon Neutral
(Funding source: National Natural Science Foundation of China)
 - (ii) Evaluation Method of Low-carbon Campus Planning Based on Computational Intelligence
(Funding source: China Postdoctoral Science Foundation)
 - (iii) Carbon Neutrality of University Campuses in the Guangdong-Hong Kong-Macao Greater Bay Area
(Funding source: Guangzhou Social Science Planning Leading Group)
- has been listed as a co-author of the 'Guidelines for the Accounting and Evaluation Methods of Carbon Emissions on Campuses of Colleges and Universities', drafted for the China Association of Building Energy Efficiency (CABEE).