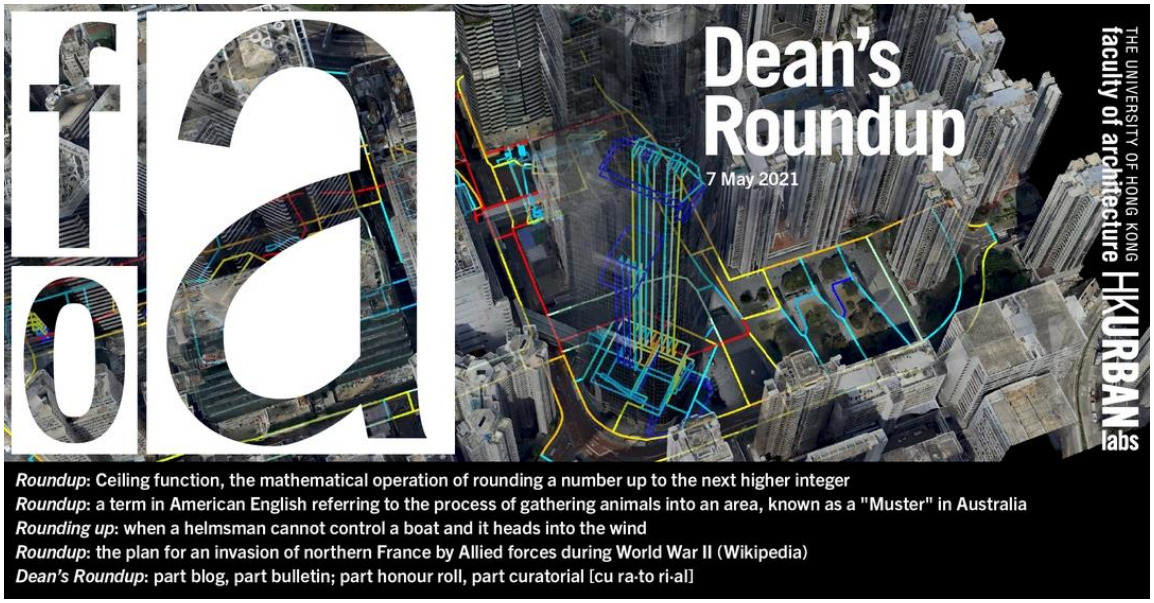


Post-pandemic cities of consumption and the triumph of landscape architecture

I have changed my view on post-pandemic cities. In several international talks on the subject (online), I have argued that cities will return to much the same state as before. I have taken to superimposing a map of Soho, London in the midst of the 1854 cholera pandemic and a map of the same streets in 2019. Nothing much has changed other than the buildings, population, employment and GIS 'points of interest' becoming more, not less, dense. The population growth curves for London and Paris either side of the two medieval plague pandemics show hardly a blip, despite Europe losing an estimated 30-60% of its population.

But 16 months of online working seems to have changed things. Until my first zoom meeting in January 2020 I can only recall one truly successful 'tele-conference'. It was in Honolulu in the mid 1990s and linked speakers in Hawaii and the South Pacific islands via a military communications network. Apart from that experience, every online interview, PhD viva, e-learning session, business meeting and conference talk I can remember was embarrassingly worse than f2f. Now the technology works and the pandemic has shrunk the mass adoption phase from a decade or more to a single year. The world is ready for online.

What does it mean for cities? In a word, it will drastically reduce the cost of human cooperation. Disruptive technologies that do this tend to be civilisation game-changers.

At one stage, city size was limited by walking distances, and settlement spacing limited by how far a messenger or merchant could travel by horse in half a day for minor business and a whole day for major business. Automobile-transit cities of the 20th century tended to grow to an average of around 15km in radius, a limit ultimately determined by the value of time. So what happens now?

Assume that only 2 days of a 5-day work week are spent in the city and 3 working from home and no change to productivity or commuting costs, which rise linearly with distance. For a given household travel budget, a commuter can live two and a half times as far from the city, with those previously living on the city's very edge now able to afford the commute to a home 37.5km away. And since demand for land falls exponentially with distance from the city, the price of property will be lower, allowing the commuter to live even farther out on the same budget for a given amount of land.

So, cities will spread. Chongqing and Chengdu will grow ever nearer to each other. The cities of the PRD will merge.

Or will, as some are suggesting, cities as we know them, cease to exist? Will Europe's 'blue-banana', a settlement belt stretching from Milan and Northern Italy to Liverpool and Northern England, become one homogenous low density sprawl, expanding width by a factor proportional to the reduced number of commutes to work per week?

But such speculation forgets that cities are formed through two types of cooperation not one. They emerge over decades and centuries as environments in which individuals can relatively frictionlessly cooperate to both *produce* and *consume*. Even if home working allows us all to become post-pandemic ex-urban survivalists, we shall still want to live near other people who share our tastes for consumption goods, services and activities. So, it may be consumption agglomeration economies that will save cities as we know them. Cities will exert their magnetic draw as places of education, leisure, entertainment, cultural and social experiences.

The demand for daily goods and services explains the emergence of the most primitive settlements – villages. If daily goods and services are ordered online and delivered by drone in tomorrow's world, the first rung of settlement systems that have been in place in some regions since late Neolithic times, is taken out. Will this be the start of the collapse of the entire inherited settlement system? Will a system of human settlements that has evolved over 6,000 years find that its lowest and highest level nodes are under existential attack at the same time, from the same 'de-spatialising' forces? Will post pandemic online be the real death of distance predicted by architect Bill Mitchell, geographer Waldo Tobler, futurist Alvin Toffler and many others?

Will we still need to live in communities for social contact, or will there be a reprise of isolated homesteads? Occasional commuting into big cities for cultural experiences has always been part of urban life over the millennia, the frequency of visits rising with wealth, and distance travelled rising with the efficiency of transport technology. Personalised drone transport will make cities accessible from a much wider planar hinterland. Might our new assistant professors be facing a future in which they live in distant bucolic country homes, commuting 2 days a week to work and travelling perhaps once a week over large distances to cultural, leisure and entertainment experiences in repurposed 'cities of consumption'?

What may this mean for architecture, planning, landscape, real estate and construction in our East and South-east Asian region? It will put unbearable pressure on China's unreformed dual land market, which will have to reform. The architecture of single free-standing ex-urban houses will be back in vogue. There are few Chinese architects with experience building single family homes. Landscape architecture will truly come into its own as a discipline that designs holistically with land and environment.

Which is why, of course, FoA in its visionary wisdom, is creating a new Department of Landscape Architecture!

Many congratulations to all those mentioned below.

Chris Webster

Dean, FoA

Faculty of Architecture

1. Inauguration Ceremony of Architectural Society, HKUSU, Session 2021-22

   Dean Webster, Professor Samson Tse, Dean of Student Affairs, and Professor Bo-sin Tang, Interim Head of the Department of Urban Planning and Design, attended the Inauguration Ceremony of Architectural Society, HKUSU, Session 2021-22, on 8 April 2021, 7:30pm, at Rayson Huang Theatre. The Dean also delivered a speech at the beginning of the Ceremony.

2. CIB Sebestyén Future Leaders Award 2021

   A team of Ph.D. candidates at the CIB Student Chapter of The University of Hong Kong has received the CIB Sebestyén Future Leaders Award 2021, for the project 'An exploration of a resilient communication model for CIB connecting academics and industrial practitioners in COVID-19'. Details are as follows:

CIB STUDENT CHAPTER
FACULTY OF ARCHITECTURE
THE UNIVERSITY OF HONG KONG

International Council
for Research and Innovation
in Building and Construction

Team Members:

Liu Sibei
President of HKU CIB Student Chapter
Ph.D. Candidate in Architecture

Wang Ting
Vice President of HKU CIB Student Chapter
Ph.D. Candidate in Architecture

Vikrom Laovisutthichai
Project Coordinator of HKU CIB Student Chapter
Ph.D. Candidate in Real Estate and Construction

Damithri Gayashini Melagoda
Project Coordinator of HKU CIB Student Chapter
Ph.D. Candidate in Real Estate and Construction

Winning proposal: An exploration of a resilient communication model for CIB connecting academics and industrial practitioners in COVID-19

Awarded amount: € 2,500

Abstract: This project aims to propose a prototype communication media model specifically tailored to the construction industry and the academics whose needs are multi-scaled demonstration, immersive information transmission and semi-formal networking. This new model was constructed with the purpose of enhancing visual and auditory perception and experience, triggering positive and efficient conversations between researchers and practitioners, as well as establishing semi-formal social connections. It would help rebuild a resilient and sustainable communication platform for linking academics and industry people whether in the COVID-19 or post-COVID-19 era.

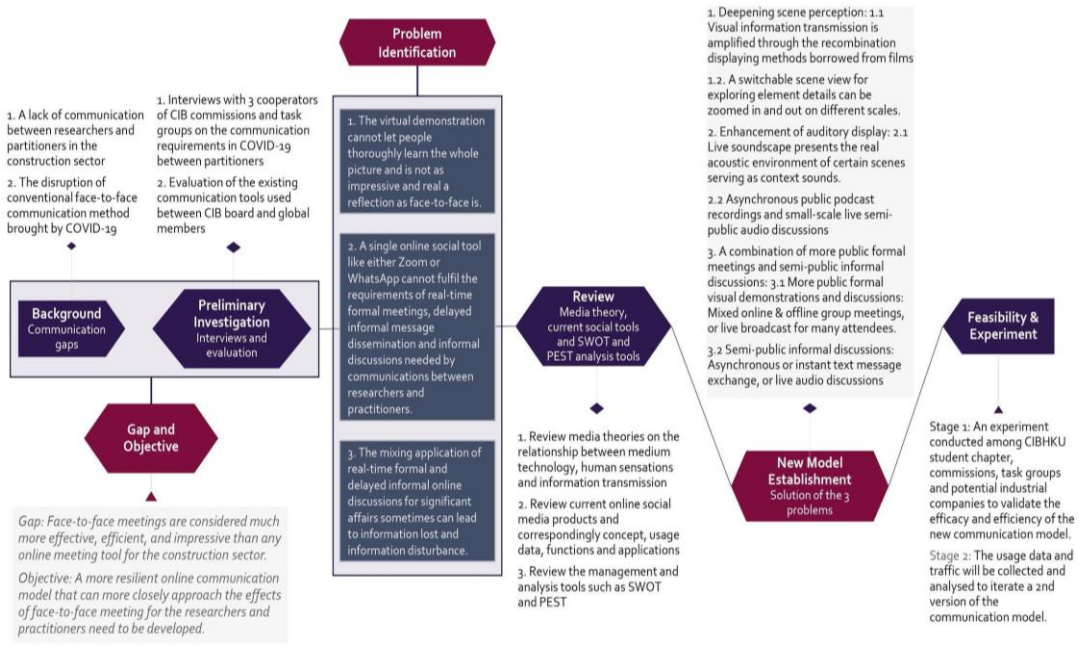


Figure 1: Methodology of the study

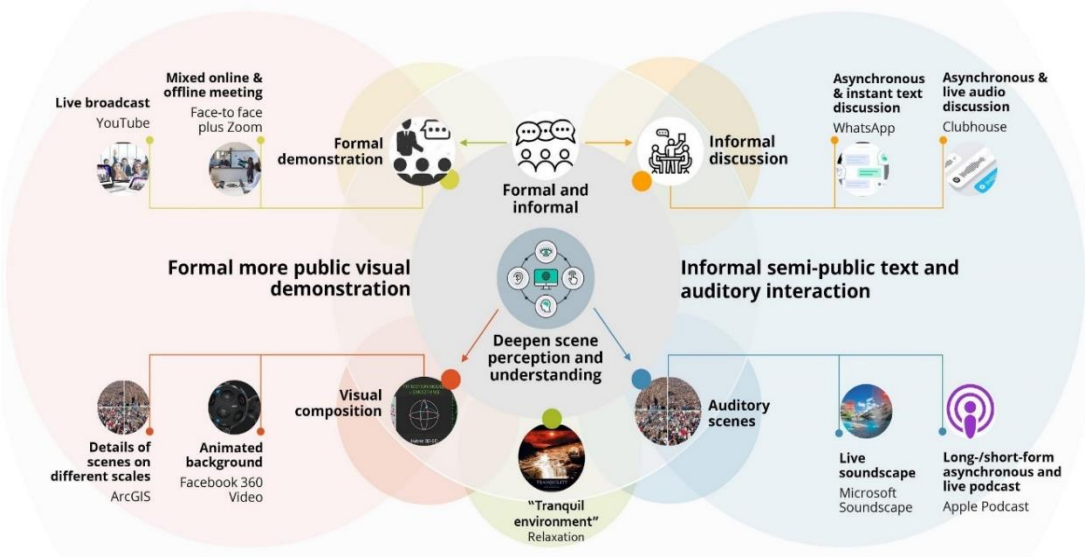


Figure 2: Newly established concept model

Background of the Award: Formerly the CIB Gyula Sebestyén Award, the CIB Sebestyén Future Leaders Award was named after the late former CIB Secretary General Professor Gyula Sebestyén (1980-1993) and launched in 2002. The purpose of the Award is to expose future leaders of the building sector to the latest developments in building research. CIB Student Chapters are invited to submit proposals for projects that are in line with the CIB objectives for the yearly CIB Sebestyén Future Leaders Award. Proposals around any research area in the built environment sector are welcome and must be connected to CIB Commission or Task Group work. Preference will be given to proposals for projects with defined outcomes that address the theme of 'Built Environment in the COVID-19 World'.

CIB-HKU website: http://www.ad.arch.hku.hk/hkucib

Department of Architecture

1. Cesar Jung-Harada

   - has been awarded the **UGC Special Grant for Strategic Development of Virtual Teaching and Learning: Institutional Projects**, for his joint project with City University of Hong Kong in which he is a Co-I. Details of the project are as follows:

Project Title	Reverse Panopticon: a modular multi-camera system for remotely teaching lectures involving practical demonstrations, providing students with a choice of viewing perspective
Grant Amount	HK$530,000
Leading Institute	CityU
Participating institute	HKU

2. Dr B.S. Jia, Ms Sibei Liu and Ms Michelle Ng

   - have published the following paper:

   Jia, B., **Liu, S.**, **Ng, M.** (2021). Air quality and key variables in high-density housing. *Sustainability*, *13*(8), 4281.

   DOI: https://doi.org/10.3390/su13084281

   Abstract*:* The high-rise and high-density housing development in nearby industry relocations is a general urban sprawl phenomenon in fast-growing cities in Southern China. Aside from the low price, the improved air quality in the suburban area is always a reason for home buyers, but the consistent monitoring of air quality and knowledge about how to plan housing estates are lacking. This paper investigates the relationship between the housing morphology and the air quality in three housing estates in Shenzhen. This research utilises on-site monitoring equipment to examine negative air ions (NAIs) and fine particulate matter (PM2.5) and the Computational Fluid Dynamics (CFD) simulation to examine the air flow. This study reveals the effect of the urban form on the concentration of NAIs and PM2.5 in spatial variation. A correlation study between the configuration variables of the urban form and the CFD air flow pattern helps to identify the key variables influencing the air quality. This study concludes that in housing estates with good air quality of surroundings, the building density has no remarkable effect. However, the footprint of buildings, the layout of podiums, the roughness length of the building, the distance between buildings, the open space aspect ratio and the mean building height may have a remarkable impact on the air flow and quality. These findings may encourage high-density housing development and provide planning guidance for the configuration of housing forms in Southern China and subtropical climate regions around the world.

Division of Landscape Architecture

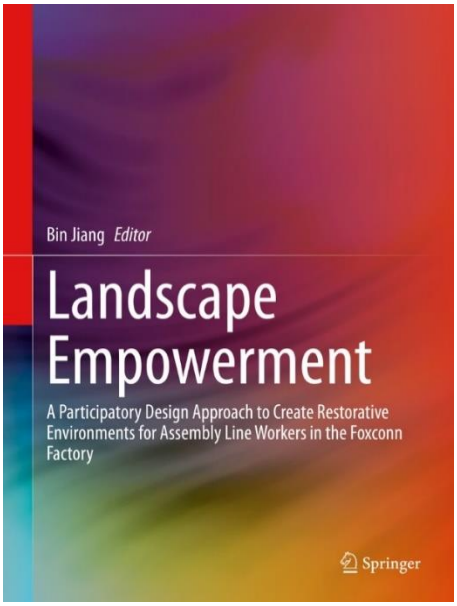
1. Dr Bin Jiang

- has edited a book of studio pedagogy and design outcomes, published by Springer Nature:

  Jiang, B. (Ed.). (2021). *Landscape empowerment: A participatory design approach to create restorative environments for assembly line workers in the Foxconn factory*. Springer. https://doi.org/10.1007/978-981-15-2067-9

  Co-authors are graduated MLA students who participated in studio or thesis projects: Fengyu Bao, Leung Kong Chang, Qi Fan, Siu Man Kwok, Xianwei Long, Shanshan Su, Ting Wang, Wing Tung Wong, Ming Yang, Kitty Yuen and Danying Zheng.

  Abstract: This book discusses essential strategies and approaches to creating mentally restorative environments for highly stressed and depressed workers at sweatshop factories. Drawing on the Foxconn factory in Longhua, China and an adjacent urban village as a sample site for research and design practice, the book employs a bottom-up and participatory process. The content is divided into two main parts, the first of which investigates economic, cultural, human rights, and environmental issues related to the electronic industry and urban village, providing in-depth research on various aspects, especially the working and living conditions for Foxconn workers. Based on these findings, the second part highlights potential landscape designs to address a range of issues, locations, and scales. The book's goals are to provide a set of original methods for research and design practice in a complex social and economic context, and to raise awareness regarding the health, dignity and freedom of millions of workers.



More information: https://www.springer.com/gp/book/9789811520662

Department of Real Estate and Construction

1. Professor Lawrence Lai

- and his team brought a group of media friends to the Jubilee Battery and Chung Hom Kok Battery for a guided field trip on 21 April 2021.

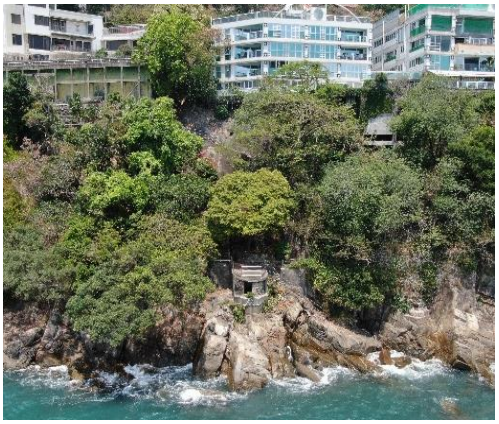
  The Jubilee Battery was one of the battlefields in the defence of Hong Kong in December 1941. During the occupation, the Japanese used a magazine as a cell for war prisoners. After the war, the site was used as a camp for KMT soldiers, then squatters, cottage industries, and the Special Branch of the Hong Kong Police.

  Professor Lai and his team consider the Jubilee Battery of high conservation value and that it should be graded and comprehensively conserved as a heritage site. The Jubilee Battery has three well preserved gun emplacements and is far bigger than Chung Hom Kok Battery (which only has a single gun emplacement left). Further conservation planning can also take advantage of the fact that part of the Battery has already been protected as part of the Chicago University campus, which can be used as an anchor for such planning.

  The trip had attracted more than 15 reporters and photojournalists to attend, and the research project has been widely covered across the media:

  - Hong Kong WWII military site deserves sprucing up so people can visit, learn about history, experts say
  - 香港大學促復修銀禧炮台 打造旅遊景點
  - 學者倡銀禧炮台列二級建築保育
  - 專家批銀禧炮台選擇性保育 古蹟辦指將研究未評級部分
  - 82 年歷史摩星嶺銀禧炮台 部份未獲評級荒廢 港大學者促政府復修
  - 炮位拆牆響警號 銀禧炮台建築群多處仍未評級 學者嘆古蹟被遺忘冀政府保育
  - 港大研究: 銀禧炮台適合列作二級或更高歷史建築文物
  - 摩星嶺銀禧炮台具保育價值 港大學者倡列二級或更高歷史文物
  - 摩星嶺銀禧炮台 促列二級歷史建築
  - 香港保衛戰 銀禧炮台建築群變廢墟 學者促修繕評級 嘆政府忌諱港人了解本地軍事史

  HKU Press Release: https://www.hku.hk/www/edm/readmail.php?id=5332



Department of Urban Planning and Design

1. Dr Jiangping Zhou

   - will moderate the following webinar organised by HKU Institutue of Transport Studies, at his capacity of the Chairperson of Transport Policy Committee of the Institute.

     Transportation Responses to the COVID-19: a dialogue between the East and the West by Professor Patricia Mokhtarian and Professor Sugie Lee, on Wednesday, 26 May 2021, at 8:00pm HKT.

Centre of Urban Studies and Urban Planning

1. Professor Rebecca Chiu

   - was invited to speak at the **2021 Urban Affairs Association Symposium – Confronting COVID, Racial Injustice, and Economic Inequality**, on 23 April 2021.

     Talking points

     i) Urban Communities: do urban forms and built forms of urban communities matter in combating COVID19?
     From the patterns of COVID19 prevalence across urban communities of different population and building densities and urban forms, it seems that density and urban forms are not significant factors. Rather, socio-cultural values, political ideologies, urban governance, city management matter much more in making cities resilient against public health problems. If the observation is correct, what then are the implications of COVID19 in health-induced inequalities in cities? Or is COVID19 a single incident not carrying signposting effects?

     ii) Normalisation of social media as the main means of socialisation: who suffers most?
     As COVID19 prevails, there has been rapid increase in, and dominant use of, social media to maintain social contacts. Will this trend lead to normalisation of using social media as the main means of socialisation? If this is the case, what are the implications to disadvantaged urban communities and groups, e.g. the old losing face-to-face contacts with their relatives and friends, served by robotics only, thus becoming even more lonely and depressed? Will those who are illiterate with social media, or unaffordable with social media be further isolated?

     iii) Using smart tech advancement to enable city resilience during COVID19: who are disadvantaged?
     Because of the advancement in ICT and other smart technologies, we can work from home under the pandemic, making cities more resilient to pandemic threats. However, it is mostly professionals and production service industry employees who can work remotely and sustain their employment while enabling their companies to sustain the business, but not low level service industries and providers. Thus, would employers of the personal service industry be further motivated to use robotics and the like to replace manual labour, thus enlarging socio-economic inequality? If so, is city resilience, with the continued and fast advancement of smart technology, achieved at the expense of the employment opportunities and thus financial wellbeing of the less skilled?

iv) Is environmental sustainability achieved at the expense of social sustainability?

Working from home as a possible work mode is tested by COVID19, and is taking root as a new form of work culture. The same for online retail services. A major implication would be reduction in the demand of land for office and commercial uses, and transport energy consumption and pollution. This trend will, on the one hand, help reduce the need to source new land and energy for development and improve environmental quality, thus fostering environmental sustainability. However, on the other hand, it reduces human interaction, diminishes the nature of human as social beings, and deprives the chances of social capital accumulation by individuals, thus weakening the bases of social support. Hence, can we argue that while COVID19 facilitates environmental sustainability, it is achieved at the expense of social sustainability?

2. Alain Chiaradia

- has published the following article:

Lingzhu Zhang, Minyu Cui, **Alain Chiaradia**. (2021). Evaluating human centered accessibility of open space in high density cities, a case study of Hong Kong, (in Chinese), *Landscape Architecture*, 04/2021, 189(28), 34-39. DOI: https://doi.org/10.14085/j.fjyl.2021.04.0034.06

Abstract: *Ensuring easy and equitable access to open space by all residents is a significant aspect of assessment of environmental sustainability. However the current evaluation of open space often takes the per capita green area as the core indicator, ignoring its actual distribution and use and rarely considering the users' actual routes or their perception of the pedestrian network. Taking Hong Kong's open space as a case, this research deploys the 3D spatial design network analysis (3D sDNA) technology in the GIS platform to evaluate pedestrian accessibility based on generic human route choice preference. By combining socio-demographic characteristics such as residential density, elderly population proportion, and income level, it identifies the areas with high population density or more socially vulnerable groups and insufficient open space. This approach provides a refined quantitative method to assessing the accessibility of open spaces in high density cities, and helps to assist planning and design practices based on a human centered equity perspective.*

Keywords: *high density city, open space, human centered perspective, pedestrian accessibility, equity, community life circle.*

Funding: The National Natural Science Fund of China (No. 52008297); Open Grant from Key Laboratory of Ecology and Energy-Saving Study of Dense Habitat (Tongji University), Ministry of Education (No. 2020010205). Hong Kong SAR Government Strategy Public Policy Research Funding Scheme (No. S2017.A7.004.17S).

3. Dr Derrick Ho

- has published the following article:

  Nektarios Chrysoulakis, Giorgos Somarakis, Stavros Stagakis, Zina Mitraka, Man Sing Wong, **Hung Chak Ho**. (2021). Monitoring and evaluating nature-based solutions implementation in urban areas by means of earth observation. *Remote Sensing*, 13(8), 1503. DOI: https://doi.org/10.3390/rs13081503

  Abstract: *Climate change influences the vulnerability of urban populations worldwide. To improve their adaptive capacity, the implementation of nature-based solutions (NBS) in urban areas has been identified as an appropriate action, giving urban planning and development an important role towards climate change adaptation/mitigation and risk management and resilience. However, the importance of extensively applying NBS is still underestimated, especially regarding its potential to induce significantly positive environmental and socioeconomic impacts across cities. Concerning environmental impacts, monitoring and evaluation is an important step of NBS management, where earth observation (EO) can contribute. EO is known for providing valuable disaggregated data to assess the modifications caused by NBS implementation in terms of land cover, whereas the potential of EO to uncover the role of NBS in urban metabolism modifications (e.g., energy, water, and carbon fluxes and balances) still remains underexplored. This study reviews the EO potential in the monitoring and evaluation of NBS implementation in cities, indicating that satellite observations combined with data from complementary sources may provide an evidence-based approach in terms of NBS adaptive management. EO-based tools can be applied to assess NBS' impacts on urban energy, water, and carbon balances, further improving our understanding of urban systems dynamics and supporting sustainable urbanisation.*

- has co-authored the following book chapter:

  Ho, H. C., & Chan, T.-C. (2021). Community health risk associated with weather-related air pollution events: Perspectives of urban resilience and mitigation. In M. Gao, Z. Wang, & G. Carmichael (Eds.), *Air pollution, climate, and health: An integrated perspective on their interactions* (pp. 273-279). Elsevier. DOI: https://doi.org/https://doi.org/10.1016/B978-0-12-820123-7.00007-3

Abstract: *Weather-related air pollution can create community health risks in a high-density city with a compact environment. However, how to develop protocols for urban resilience and mitigation has seldom been discussed. Based on case studies related to dust storm and haze events in Hong Kong, this chapter examines the potential improvement of urban design and community planning for mitigation and emergency management. In particular, this chapter suggests that major road networks and areas of refuge in high-rise buildings could be part of the vertical and horizontal sections of urban ventilation corridors to improve airflow within a compact environment. Urban greenery for mitigation should consider the elements of patterns, diversity, and density. These include traditional settings of vertical greening and terrace/rooftop gardens as well as greenery within areas of refuge; vegetation types with greater ability to remove air pollution with less risk of tree failure during extreme weather; and urban planting along not only pedestrian areas but also areas with high mobility of individuals such as social spaces or outdoor environments with clustered population during peak hours. Additionally, multifunctional centres with integrated social and health services could be developed in order to reserve spaces as well as support local community timely, passively, and actively through delivering disaster-related information in different platforms and settings, such as social media and community workshops.*

iLab

1. Professor Wilson Lu and Dr Frank Xue

   - have been approved by Innovation and Technology Commission of the HKSAR Government, two applications to the Research Talent Hub Scheme, for an Innovation and Technology Fund (ITF) project.

     Project title: "BIM Square": Blockchain and i-Core-enabled Multi-stakeholder Building Information Modelling Platform for Construction Logistics and Supply Chain Management in Hong Kong (ITP/029/20LP).

     A total amount of HK$879,154.82 will be utilised to support two research talents to assist in the above project for the period from 3 May 2021 to 31 December 2022.

2. Professor Wilson Lu

   - met with Mr Hon Chi-keung, the retired Permanent Secretary for Development (Works), Development Bureau, in HKIE Causeway Bay HQ on 5 March 2021 to report to him the blockchain ITF project and invite him to be the International Advisor of the project.

   - together with Dr Frank Xue, Dr Shell Li, and Ms Jinying, met CIC colleagues Dr Richard Pang, Mr Alex Ho, and Dr George Wong via Zoom on 12 March 2021 to report the progress of the ITF and appreciate their support. On the meeting, the research team reported the work on e-inspection and MiC naming and sought further support from CIC.

3. Dr Frank Xue

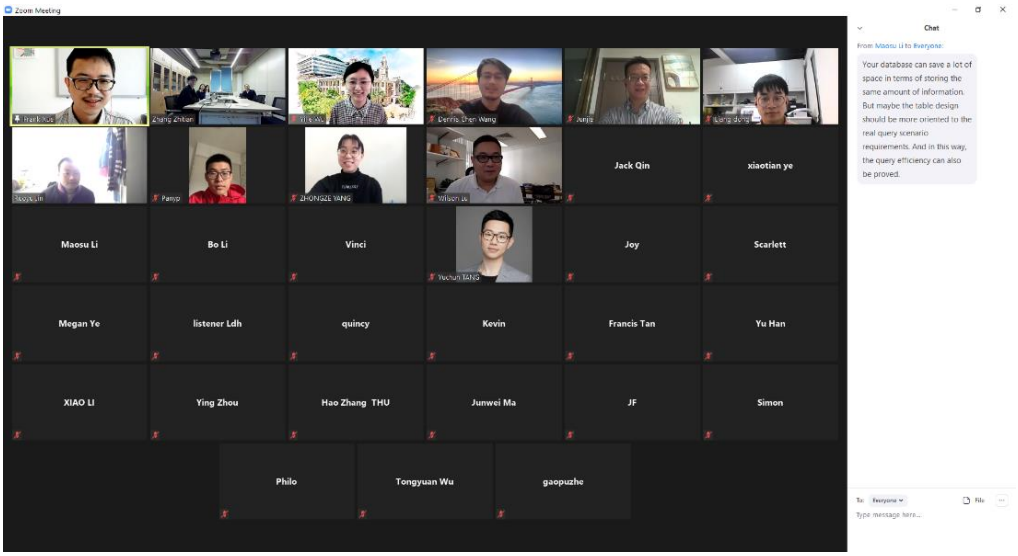
   - won a HKU Teaching Development Grant (TDG) 2020 in collaboration with two Co-Is, **Professor Anthony Yeh** (DUPAD) and **Dr Isabelle Chan** (REC):

     Project title: 'Multi-user Internet Narrative Environment of HKU (MineHKU) for Smart City Courses and Virtual Campus Events'.

     Project duration: 12 months

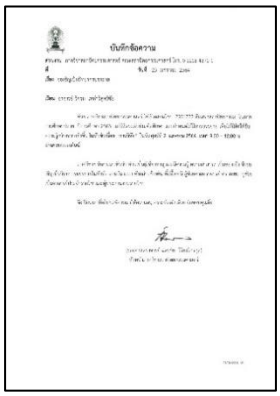
   - organised and hosted an HKU-Tsinghua Workshop on Construction Scene Understanding and Applications on 27 March 2021. The six presentations were:

i. A Sensor-based Method to Detect Near-miss in Construction Site (Mr Xiao Lin)
ii. Toward Better Understanding of Construction Waste Composition: A Perspective of Machine Vision (Dr Junjie Chen)
iii. A Computer Vision-based Approach to Classifying and Storing Image Data for Construction Safety Management (Miss Zhitian Zhang)
iv. Digital Twinning of Building Interior: Simultaneous Reconstruction of Semantics, Geometry, and Appearance (Miss Yijie Wu)
v. Analysis of the Relationship between Construction Workers' Personality Traits and their Safety Behavior Based on Myers-Briggs Type Indicator Personality Test (Miss Ling Ma)
vi. Pose and Helmet Detection for Safety Using Low-cost and Low-power Tensor Process Units (TPU) (Mr Dennis Chen Wang)



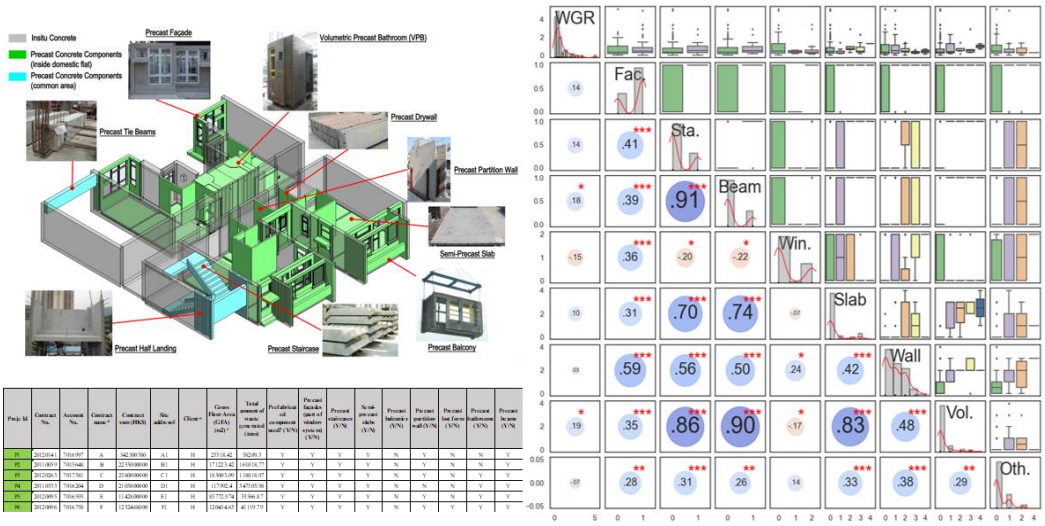
4. Mr Vikrom Laovisutthichai (a PhD Fellowship student at iLab)

   - was invited by Faculty of Architecture, Chulalongkorn University, Thailand, to give a lecture on ‘Architectural Design and Construction: Research and Practice’ on 30 March 2021 and 2 April, 2021.



5. iLab academics and researchers have published the following papers:

   i. **Lu, W., Lee, W. M., Xue, F.,** and **Xu, J.** (2021). Revisiting the effects of prefabrication on construction waste minimization: a quantitative study using bigger data. *Resources, Conservation & Recycling*. 170, 105579. In press.



Abstract: *Prefabrication has long been recognised as a green production technology to minimise construction's adverse environmental impacts such as waste, noise, dust, and air pollution. Previous studies reported the effects of prefabrication on construction waste minimisation. However, these studies relied primarily on small data obtained by ethnographic methods such as interviews and questionnaire surveys. Research to evaluate the effects using bigger, more objective quantitative data is highly desired. This research aims to re-evaluate the effects of prefabrication on construction waste minimisation by exploiting a quantitative dataset stemmed from 114 sizable high-rise building projects in Hong Kong. It was discovered that the average waste generation rates of conventional and prefabrication building projects were 0.91 and 0.77 ton/m² respectively. Compared with conventional construction, prefabrication logged a 15.38% waste reduction. Further probing into specific prefabricated components adopted in the samples, it is discovered that precast windows and walls are more conducive to waste minimisation. This is coincident with the fact that these components are also widely adopted in the sample buildings. This study reconfirms the positive effects of prefabrication on waste minimisation and articulates that two types of prefabricated components play a relatively bigger role in minimising construction waste. The strengths of this study lie in its statistical analyses of a valuable and objective quantitative dataset measuring prefabrication and waste generation rates. Future studies are recommended to prove the corollary – it is not what category of the prefabricated component, but the actual proportion of prefabrication in the total construction volume that matters to waste minimisation.*

ii **Chen, J.J.**, Li, S., Liu, D.H., and **Lu, W.S.** (2021). Indoor camera pose estimation via style-transfer 3D models. *Computer-Aided Civil and Infrastructure Engineering*. Forthcoming.

Abstract: *Many vision-based indoor localisation methods require tedious and comprehensive pre-mapping of built environments. This research proposes a mapping-free approach to estimating indoor camera poses based on a 3D style-transferred building information model (BIM) and photogrammetry technique. To address the cross-domain gap between virtual 3D models and real-life photographs, a CycleGAN model was developed to transform BIM renderings into photorealistic images. A photogrammetry-based algorithm was developed to estimate camera pose using the visual and spatial information extracted from the style-transferred BIM. The experiments demonstrated the efficacy of CycleGAN in bridging the cross-domain gap, which significantly improved performance in terms of image retrieval and feature correspondence detection. With the 3D coordinates retrieved from BIMs, the proposed method can achieve near-real-time camera pose estimation with an accuracy of 1.38 m and 10.1° in indoor environments.*

iii Huang, C., Li, W., **Lu, W.S.**, **Xue, F**., Liu, M., and Liu, Z (2021). Optimization of multiple-crane service schedules in overlapping areas through consideration of transportation efficiency and operational safety. *Automation in Construction*. DOI: https://doi.org/10.1016/j.autcon.2021.103716.

Abstract: *Tower crane scheduling is a classic conundrum. It is further complicated to prevent collisions and reduce idle transportation time among multiple overlapping tower cranes. Unlike previous research attempts, this study aims to provide an optimal solution to this multiple crane service scheduling problem (MCSSP). Firstly, the MCSSP was translated to a Mixed Integer Linear Programming (MILP) model. Then, the model was optimised by 1) distributing the lifting requests in overlapping areas to the proper tower cranes; 2) selecting the appropriate supply location to serve each lifting request; and 3) arranging the lifting sequences of each tower crane to complete the requests. Compared with previous methods, the proposed MILP model (solved using Gurobi™) can result in the saving of 6.54%-18.07% of total operation costs meanwhile achieving the non-collision goal. The findings of this research can be deployed in optimising efficiency and safety in the real-life scheduling of multiple overlapping tower cranes.*

iv **Li, X**., Chi, H.L., **Lu, W.S.**, **Xue, F.**, Zeng, J., and Li, Z.D. (2021). Federated transfer learning-enabled smart work packaging for preserving personal image information of construction worker. *Automation in Construction*. DOI: https://doi.org/10.1016/j.autcon.2021.103738.

Abstract: *The rapidly expanding number of IoT-based camera devices makes smart work packaging (SWP) easier to access massive*

construction workers' personal image information for occupational health and safety (OHS) status monitoring. SWP can then transmit these personal data to the cloud for training the machine learning models and offer safety alerts or health insights. However, there are two urgently important challenges. Firstly, the machine learning model needs to aggregate the SWPs' image data from each construction worker, which may pose a risk to private data leakage without strict privacy and security agreement. In addition, the machine learning models trained on all SWPs' image data may compromise the personalisation of image-based OHS status monitoring for each construction worker. To address the above issues, this study proposes a FedSWP framework, the federated transfer learning-enabled SWP for protecting the personal image information of construction workers in OHS management. FedSWP executes the gradient parameters aggregation through federated learning for the image data in each SWP and builds relatively personalised models by transfer learning. Crane operators' facial fatigue monitoring experiments are conducted and have evaluated that FedSWP can achieve accurate and personalised safety alerts and healthcare. This study paves the way for the generalisation and extension of FedSWP in many construction OHS applications.

Ronald Coase Centre for Property Rights Research (RCCPRR)

1. RCCPRR academics and researchers have published the following papers:

   i. **Lai, L. W. C.**, **Davies, S. N. G.**, **Lorne, F. T.**, **Chau, K. W.**, & **Choy, L. H. T.** (2020). A neo-institutional economic analysis of revising informal and formal proprietary boundaries. *Journal of Environmental Policy & Planning*, 1-18. DOI: https://doi.org/10.1080/1523908X.2020.1856055

   ***Abstract**: This paper follows up on six propositions in recent works that considered lot boundaries as units of private planning in a state prepared/endorsed layout and interprets land readjustment as a coordinated way to revise that layout. From a neo-institutional economics perspective, it canvasses the difficulties in and coordinated solutions to revising formal and informal proprietary boundaries and the ways the constraints posed by lot boundaries for planning can be overcome. The discussion is anchored by the thesis of the 'corollary of the Coase Theorem' that positive transaction costs entail differences in land use efficiency due to differences and changes in the forms of layouts as well as the need for a Coasian firm (coordinated) solutions in boundary revision.*

   Keywords: Lot boundaries; transaction costs; land readjustment; transfer of development rights; carbon trading

   ii. **Lai, L. W. C.** (2021). A Dialogue on Town Planning and Boundary Delineation. *Planning Practice & Research*, 1-8. DOI: https://doi.org/10.1080/02697459.2021.1899647

   ***Abstract**: This is another dialogue on planning. Its novelty lies in its potency in discovering new cutting edges in planning theory and education by examining the roots of planning in real world practices. This invokes the meaning and necessity of a definition. It recalls that surveyors were bona fide town planners in all former British colonies.*

   Keywords: Town planning; zoning; boundary delineation; layout; surveyor

   iii. **Lai, L. W. C.**, **Chau, K. W.**, **Davies, S. N. G.**, & **Kwan, L. M. L.** (2021). Open space office: A review of the literature and Hong Kong case studies. *Work*, *68*(3), 749–58. DOI: https://doi.org/10.3233/wor-203408

   ***Background:** Open plan or open space office has become increasingly popular but those who promote the concept seldom refer to health studies or workers' perceptions of a change in office layout towards an open space arrangement.*

Objective: *To review the literature on open plan or open space office layouts in terms of facilities management (FM) with users' perceptions in mind and to obtain opinions of users of open space offices for a better appreciation of the FM issues.*

Methods: *A literature search of research papers from 2007 in journals using the keywords 'open plan office' and 'open space office' plus "health", first in the titles then in the text, was carried out. Thirty-two of those papers, accessible by the authors' institutions, were consulted together with five other works in the Harvard Business Review. The review consulted but excluded papers and reports published or sponsored by commercial firms that were in favour of open space layouts. Case studies were conducted by face to face meetings in confidence with workers in the middle management of 12 Hong Kong organisations known as friends to two of the authors. Problems as seen by staff are reported and discussed.*

Results: *The literature review reveals that apart from writing that promotes the use of an open plan office layout, a host of scientific works point to the problems of perceived dissatisfaction with such a layout, the nature of the dissatisfaction tending to depend on the actual design. Most workers interviewed disliked the new style open plan layouts, which points to the necessity of consulting workers when such changes are contemplated, as well as monitoring the results of the change once it is in place whether against workers' wishes or with their support. There is a need for a number of facility arrangements in making a change to open plan that ensures that workers' needs for proper lighting, privacy, and indoor health will be met.*

Conclusions: *If the aim of a change to an open plan arrangement is to promote collegial communications in office, the study sheds light on the extent to which such arrangements may not in practice be suitable for achieving the aim. It follows that further, more specifically sociological studies of workers' job satisfaction and emotional health in open plan office settings would be worth doing.*

Keywords: Office layout, facilities, lighting, privacy, indoor health

iv. **Lai, L. W. C.**, **Ho, D. C. W.**, **Chau, K. W.**, Yu, E. Y. T., Lam, C. L. K., **Leung, N. T. H.**, & **Davies, S. N. G.** (2021). Property rights & the perceived health contribution of public open space in Hong Kong. *Land Use Policy*, *107*, 105496. DOI: https://doi.org/10.1016/j.landusepol.2021.105496

Abstract: *This interdisciplinary paper, informed by property rights economics, urban planning, facility management, and medical science, as well as the study of the quality of life, presents (a) a typology of Hong Kong open space transformation in terms of property rights; and (b) a small scale indicative survey with a sample that was > 1% of the workforce of the*

constituency. The authors argue with the help of the findings of the survey that the government, as a major provider and regulator, should be able to assign a higher priority to, or enact better designs and plans for usable open spaces to contribute to better public health. This would counterbalance the focus on the indoor environment and health after the outbreak of Severe Acute Respiratory Syndrome (SARS) in 2003 and articulate with the issues of property rights and social justice in open space provision.

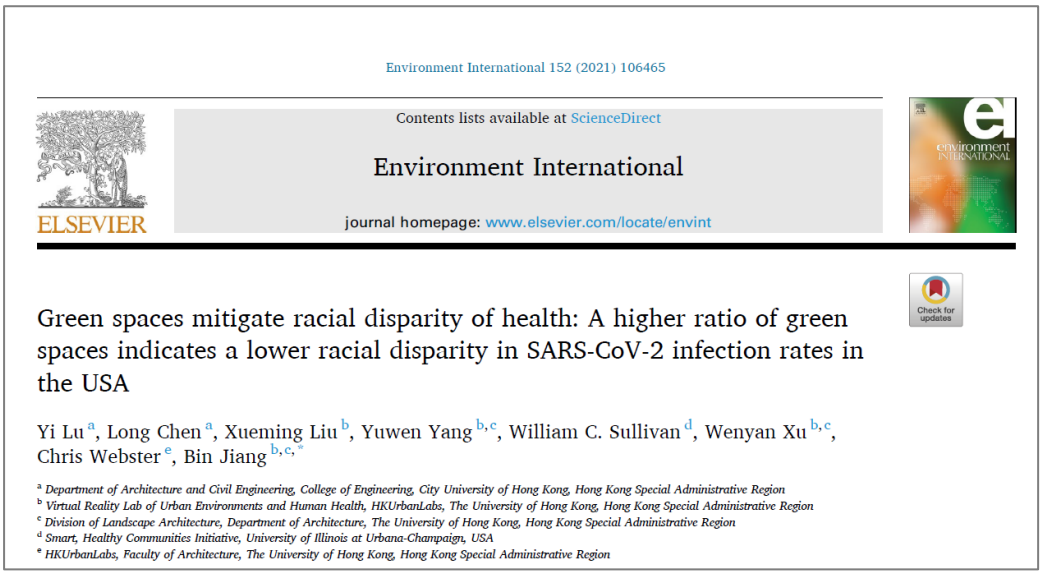
Keywords: Open space, public health, social justice, property rights, planning standards

Virtual Reality Lab of Urban Environments & Human Health

1. Dr Bin Jiang, Ms Xueming Liu, Ms Yuwen Yang, Ms Wenyan Xu and Dean Webster

   - have co-authored the following paper:

   Lu, Y., Chen, L., **Liu, X.**, **Yang, Y.**, Sullivan, W. C., **Xu, W.**, **Webster, C.**, **Jiang B.*** (2021). Green spaces mitigate racial disparity of health: A higher ratio of green spaces indicates a lower racial disparity in SARS-CoV-2 infection rates in the USA, *Environment International*, Volume 152, 106465, ISSN 0160-4120, DOI: https://doi.org/10.1016/j.envint.2021.106465. [SCIE. IF: 7.577 (2019). Q1.]



Environment International 152 (2021) 106465

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Green spaces mitigate racial disparity of health: A higher ratio of green spaces indicates a lower racial disparity in SARS-CoV-2 infection rates in the USA

Yi Lu [a], Long Chen [a], Xueming Liu [b], Yuwen Yang [b,c], William C. Sullivan [d], Wenyan Xu [b,c], Chris Webster [e], Bin Jiang [b,c,*]

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[b] Virtual Reality Lab of Urban Environments and Human Health, HKUrbanLabs, The University of Hong Kong, Hong Kong Special Administrative Region
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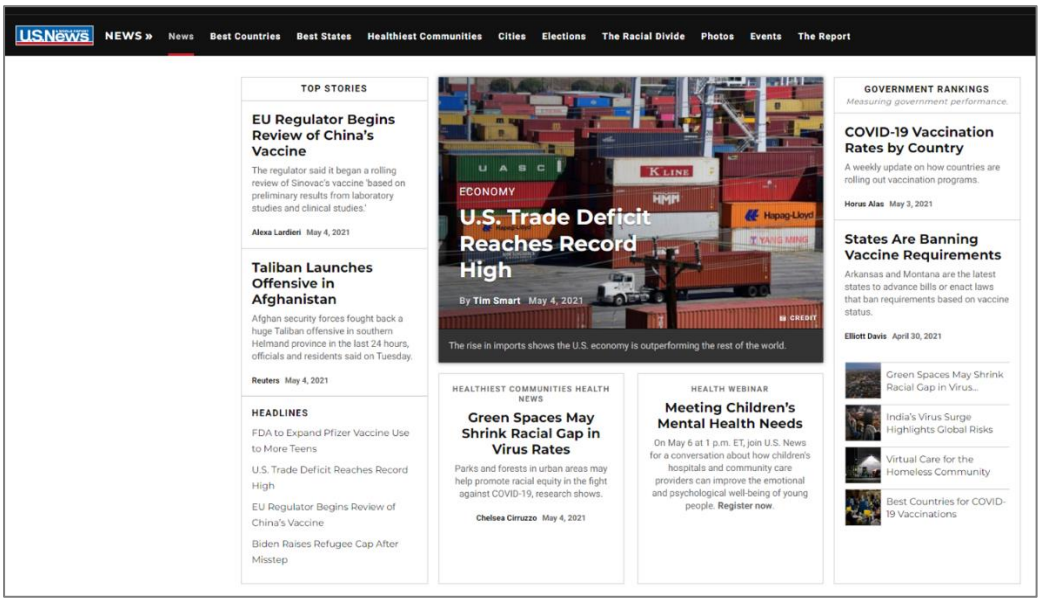
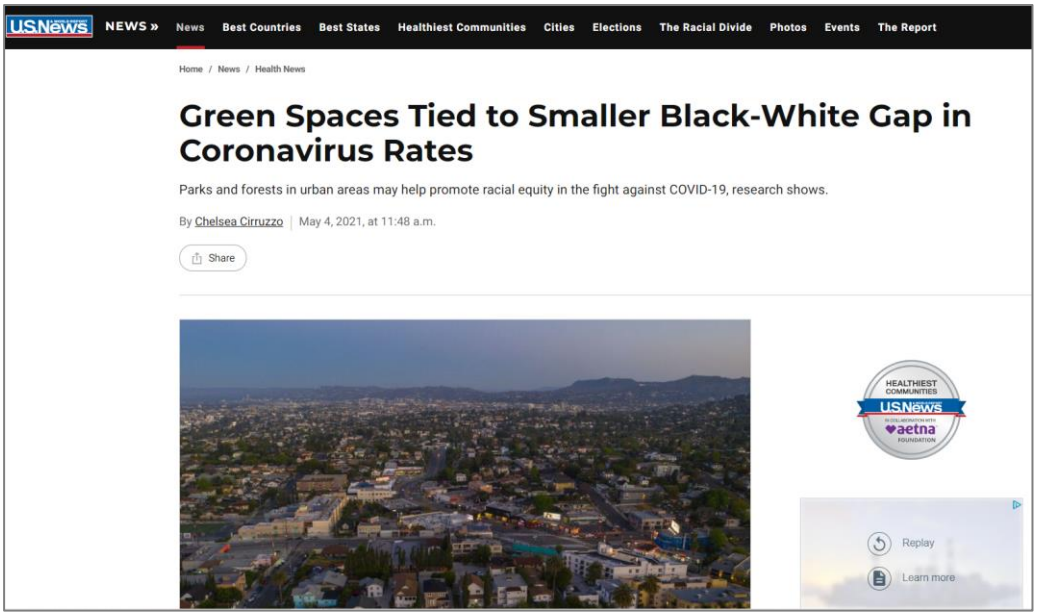
[e] HKUrbanLabs, Faculty of Architecture, The University of Hong Kong, Hong Kong Special Administrative Region

Abstract: *There is striking racial disparity in the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection rates in the United States. We hypothesise that the disparity is significantly smaller in areas with a higher ratio of green spaces. County level data on the SARS-CoV-2 infection rates of black and white individuals in 135 of the most urbanised counties across the United States were collected. The total population in these counties is 132,350,027, comprising 40.3% of the U.S. population. The ratio of green spaces by land-cover type in each county was extracted from satellite imagery. A hierarchical regression analysis measured cross-sectional associations between racial disparity in infection rates and green spaces, after controlling for socioeconomic, demographic, pre-existing chronic disease, and built-up area factors. We found a higher ratio of green spaces at the county level is significantly associated with a lower racial disparity in infection rates. Four types of green space have significant negative associations with the racial disparity in SARS-CoV-2 infection rates. A theoretical model with five core mechanisms and one circumstantial mechanism is presented to interpret the findings.*

- The above paper on the study of the COVID-19 racial disparity issue has been reported in the U.S. NEWS and other media:

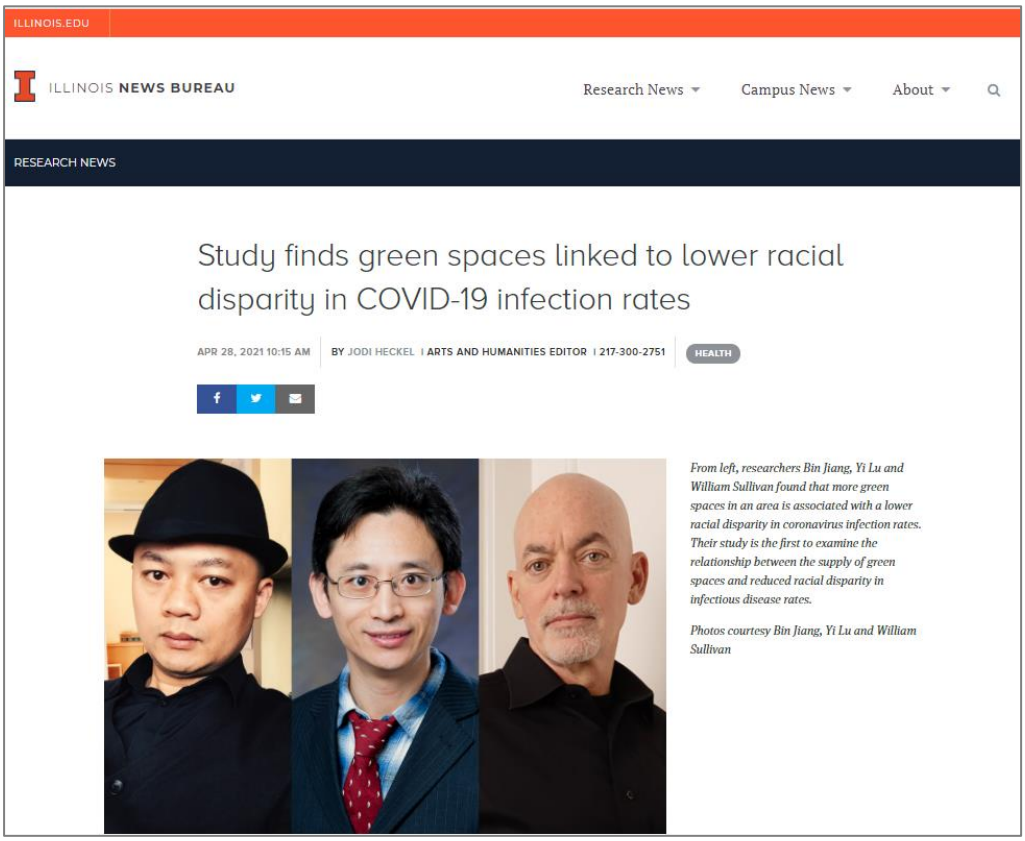
  https://www.usnews.com/news/health-news/articles/2021-05-04/green-spaces-tied-to-smaller-racial-gap-in-coronavirus-infections





Other media reports:

https://news.illinois.edu/view/6367/1196376765



https://www.sciencedaily.com/releases/2021/04/210428133020.htm

https://medicalxpress.com/news/2021-04-green-spaces-linked-racial-disparity.html

https://www.news-medical.net/news/20210428/Higher-ratio-of-green-spaces-associated-with-reduced-disparity-in-coronavirus-infection-rates.aspx

http://www.xinhuanet.com/english/2021-04/29/c_139913118.htm

http://www.china.org.cn/world/Off_the_Wire/2021-04/29/content_77450084.htm

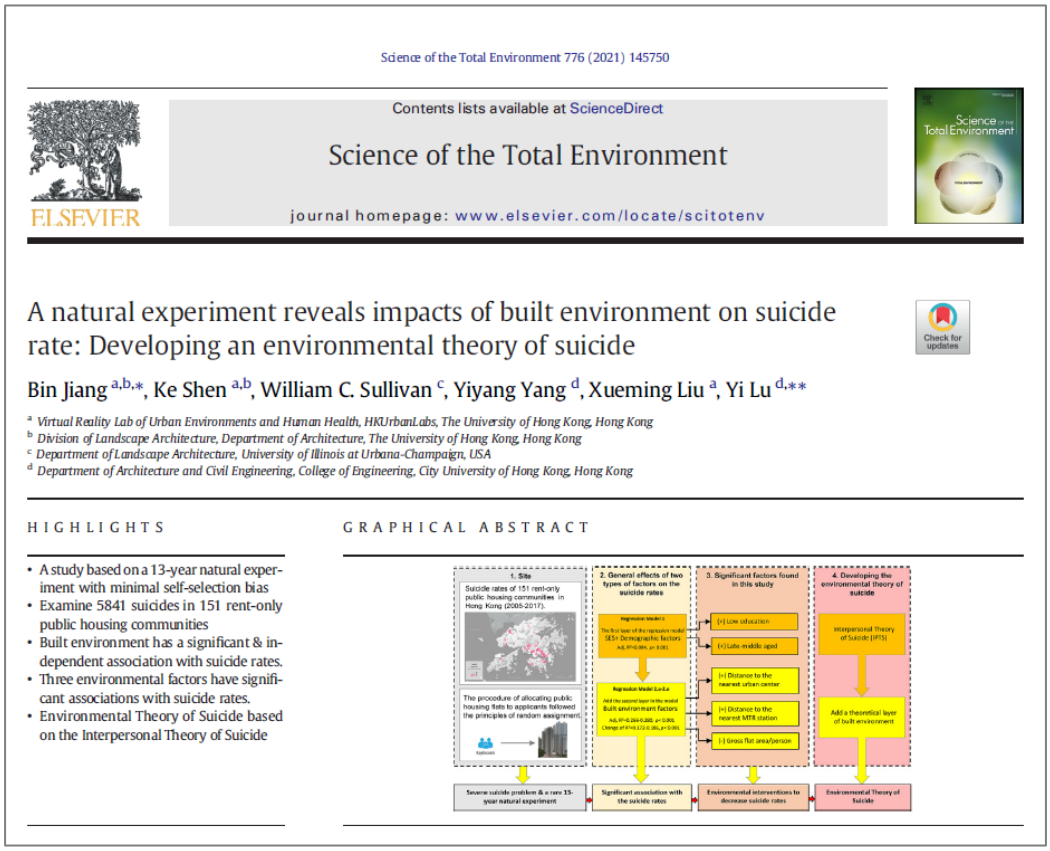
https://scienmag.com/study-finds-green-spaces-linked-to-lower-racial-disparity-in-covid-infection-rates/

https://bioengineer.org/study-finds-green-spaces-linked-to-lower-racial-disparity-in-covid-infection-rates/

2. Dr Bin Jiang, Ms Ke Shen, Ms Xueming Liu

- have co-authored the following paper:

Jiang, B., **Shen, K.**, Sullivan, W. C., Yang, Y., **Liu, X.**, Lu, Y. (2021). A natural experiment reveals impacts of built environment on suicide rate: Developing an environmental theory of suicide. *Science of the Total Environment*, 776, 145750. ISSN 0048-9697, DOI: https://doi.org/10.1016/j.scitotenv.2021.145750 [SCIE. IF: 6.551 (2019). Q1.]



Science of the Total Environment 776 (2021) 145750

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A natural experiment reveals impacts of built environment on suicide rate: Developing an environmental theory of suicide

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[b] Division of Landscape Architecture, Department of Architecture, The University of Hong Kong, Hong Kong
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HIGHLIGHTS

- A study based on a 13-year natural experiment with minimal self-selection bias
- Examine 5841 suicides in 151 rent-only public housing communities
- Built environment has a significant & independent association with suicide rates.
- Three environmental factors have significant associations with suicide rates.
- Environmental Theory of Suicide based on the Interpersonal Theory of Suicide

GRAPHICAL ABSTRACT

Background: *Suicide is a global challenge. Although it is clear that socio-economic and demographic factors influence suicide rates, we know little about the impacts of the built environment on suicide rates.*

Methods: *We investigated the relationship between characteristics of the built environment and suicide death rates over a 13-year period in 151 rent-only public housing communities in Hong Kong. The regulations of the public housing authority in Hong Kong constituted a natural experiment with minimal self-selection bias. We conducted hierarchical regression analyses and found that characteristics of the built environment were significantly associated with suicide rates after controlling for SES and demographic factors at the community level.*

Results: *Three significant environmental factors were identified: distance to the nearest urban centre, distance to the nearest Mass Transit Railway station, and gross flat area per person.*

***Conclusion**: These findings demonstrate a significant association between features of the built environment and suicide rates. They also suggest possible interventions that might reduce suicide through design, or redesign, of the built environment. Lastly, we propose an environmental theory of suicide based on the Interpersonal Theory of Suicide.*