

Smart Geospatial Engineering by Laser Scanning and AI

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Smart Cities Research Institute

Seminar on Latest Surveying Technology and Solution 15/12/2022

Smart City (Shi, 2020)



- Vision

- To be a center of excellence in urban informatics worldwide and a living laboratory of Smart City development for Hong Kong and the Guangdong-Hong Kong-Macao Greater Bay Area (GBA).

- Mission

- To develop cutting-edge Smart City technologies;
- To translate the developed technologies to industry; and
- To provide and demonstrate Smart City solutions to Hong Kong and the GBA.



1. Metaverse – Digital Twin





YUEXIU PLAZA

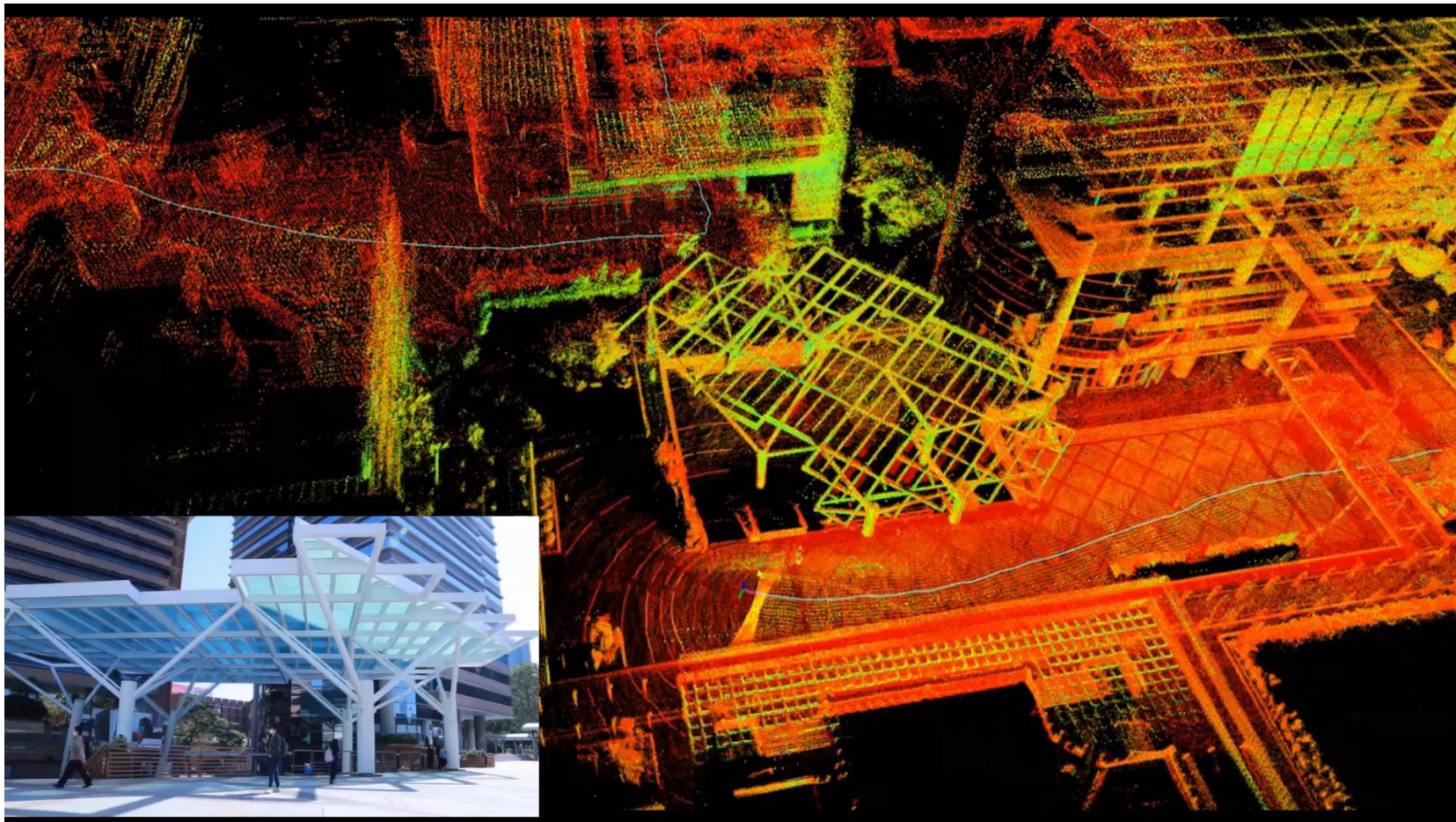


Gold Medals
2021 Int. Inventions Geneva

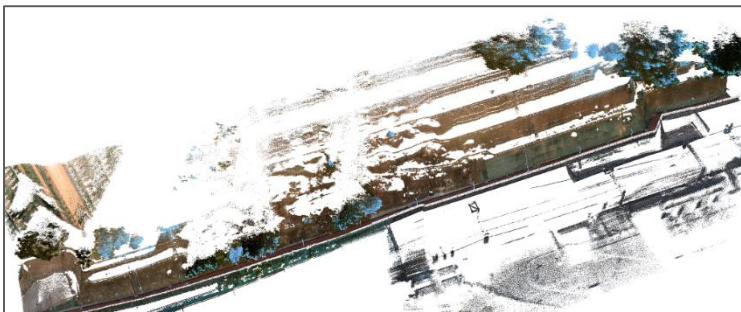
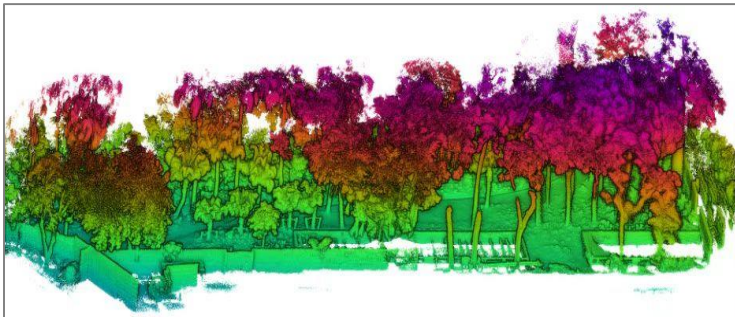
Features

- Indoor and outdoor **continuous seamless** mapping
- **Centimeter**-level high accuracy
- **Lightweight**, 7 kg
- Range: up to **200** meters
- Point density: **900,000** points per second
- **Flexibility**: mapping in GPS-denied complex environments
- **Real-time** 3D data acquisition
- **Geo-referenced** point cloud by RTK
- Products: registered point cloud, colored point cloud, street view, BIM Model, objects extracted from point cloud etc.

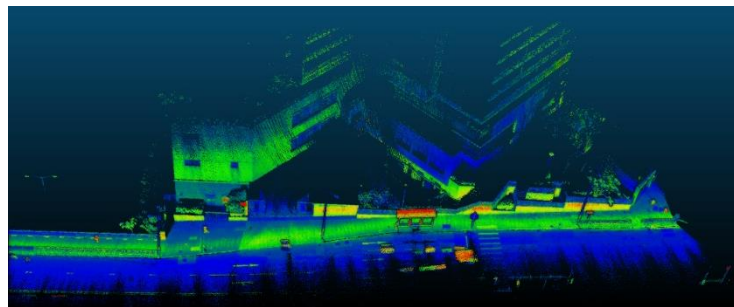
3D scanning by *SpaceScanX*



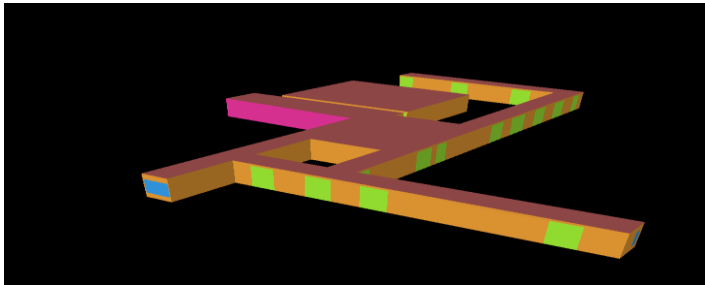
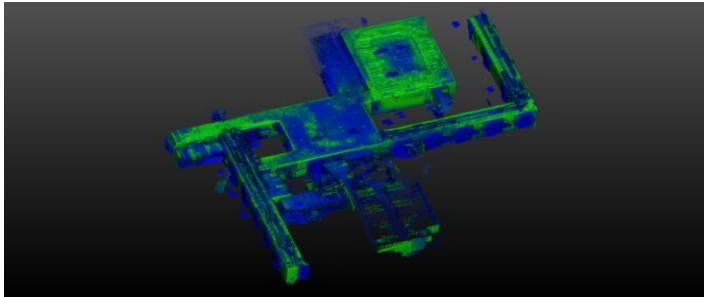
Forest mapping and slope management



Highways and HD mapping: detection objects on roads



BIM generating from LiDAR data



2. Smart City Platform

An effective system for handling digital twin data

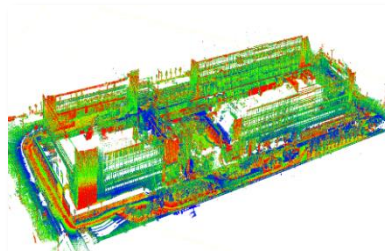




- 2D, 2.5D, 3D model



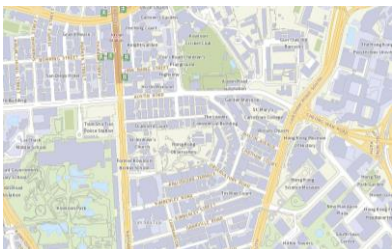
- Mesh model



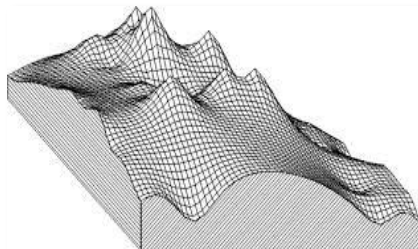
- Lidar point cloud



- IoT data



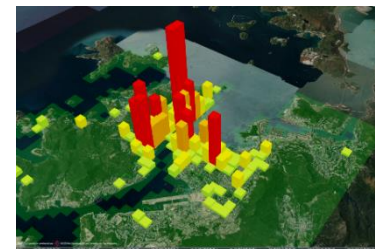
- Base maps – iB1000



- Digital elevation models

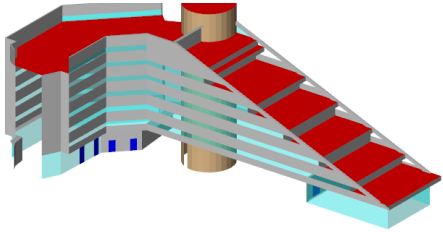


- Geo-rectified images



- Geo-social media data

3D model in BIM and GIS



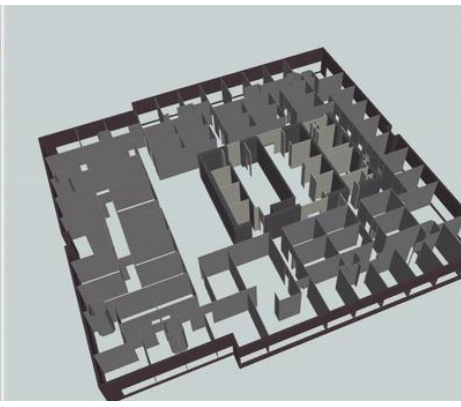
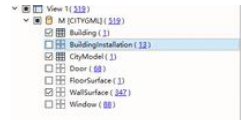
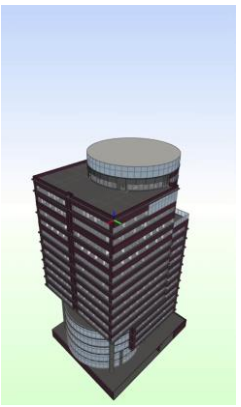
- CityGML with color



- CityGML with texture



- CityGML model on the platform



- CityGML with building parts



- Selection by floor ID in the system

COVID-19 Symptom Onset Risk Prediction Platform



COVID-19 Cases Distribution and Onset Risk Prediction Platform

LAST UPDATE
21.04.2021



智慧城市研究院
Smart Cities Research Institute

2D Map
(Cases within 14 days)

2D Map
(Cases in GBA)

3D Map
(Cases distribution)

Onset Risk Prediction

Cases in 200 meters

- Cases within 14 Days
- All Cases (Since 23.01.2020)

COVID-19 Vaccination Booking System

HKSAR COVID-19 Website

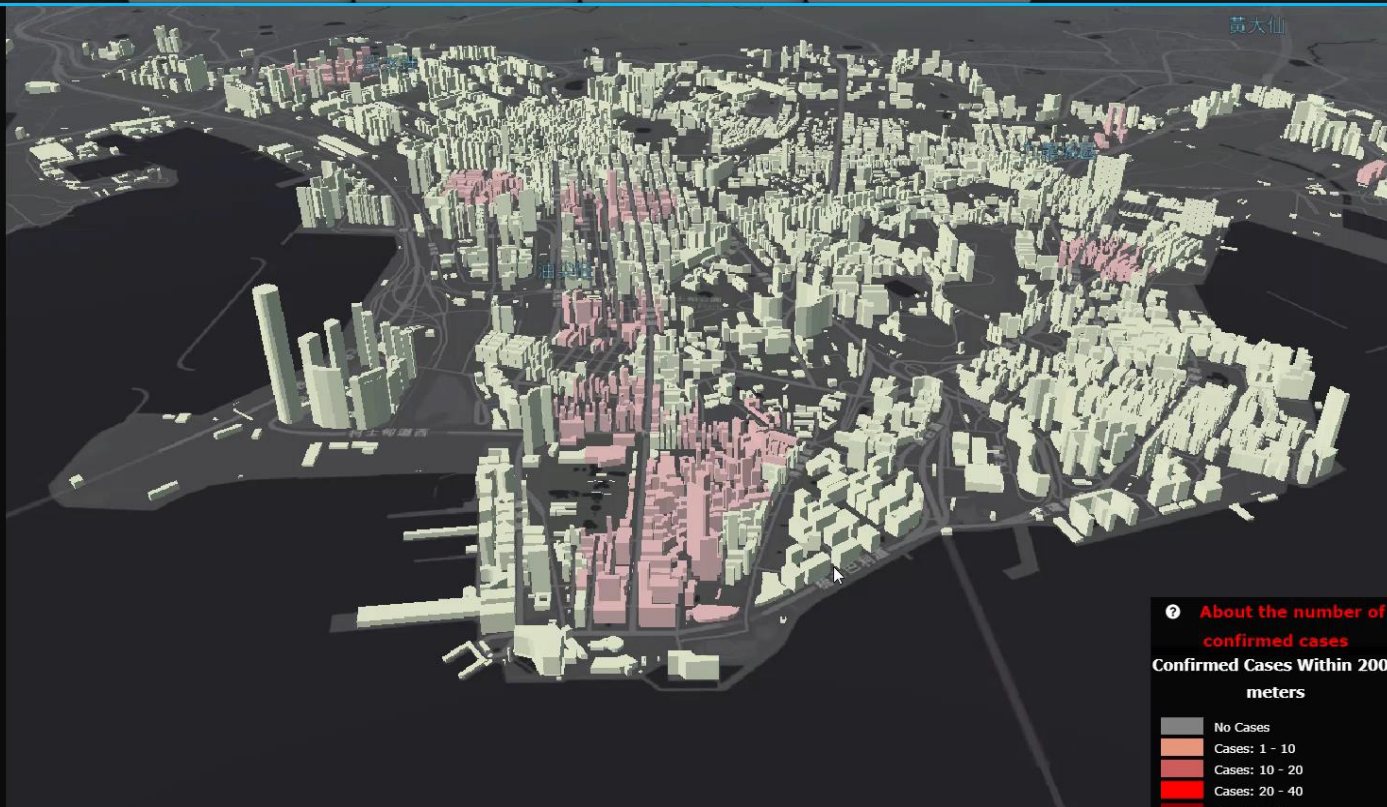
Reset All Layers

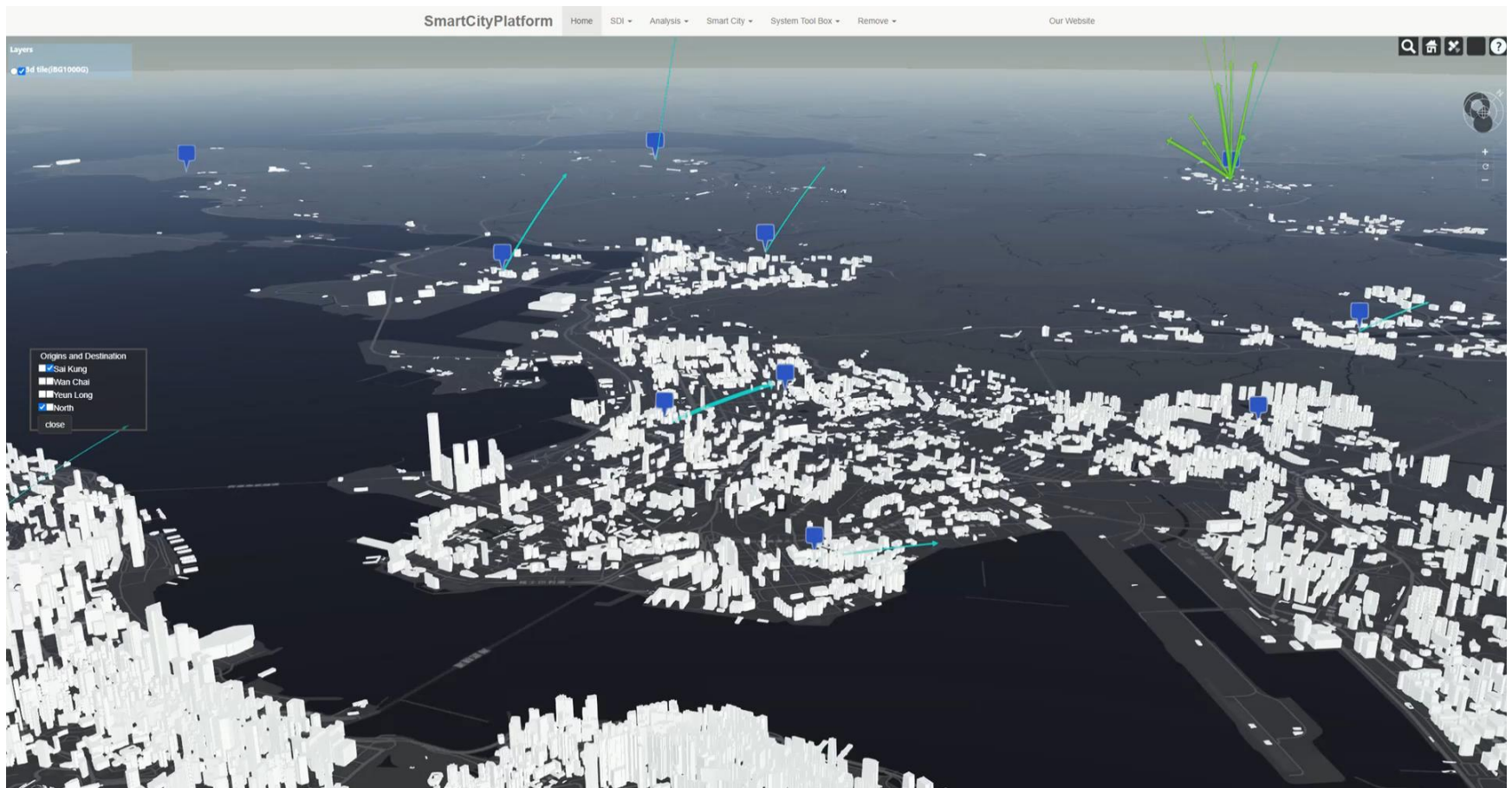
Latest Number

確診/疑似: 11,704 ▲ 8 出院: 11,287 ▲ 13

住院: 169 ▼ 1 死亡: 209 ▲ 0

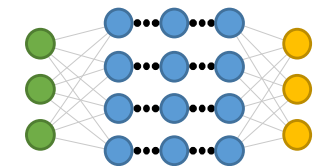
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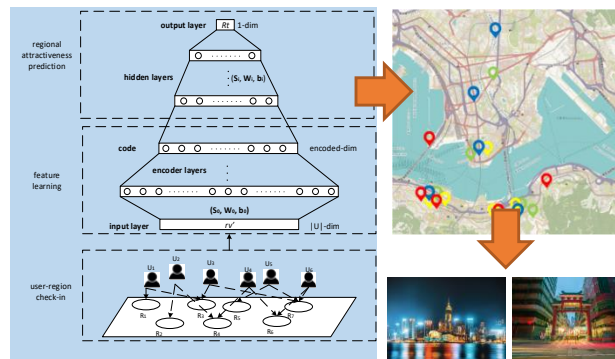
3. geoAI

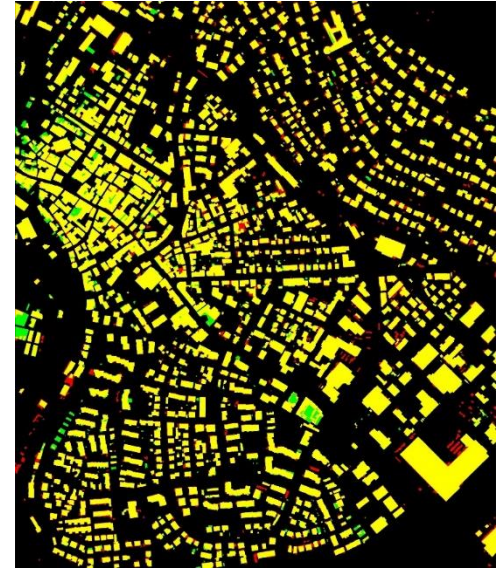




Urban object recognition

Fine-resolution remote sensing

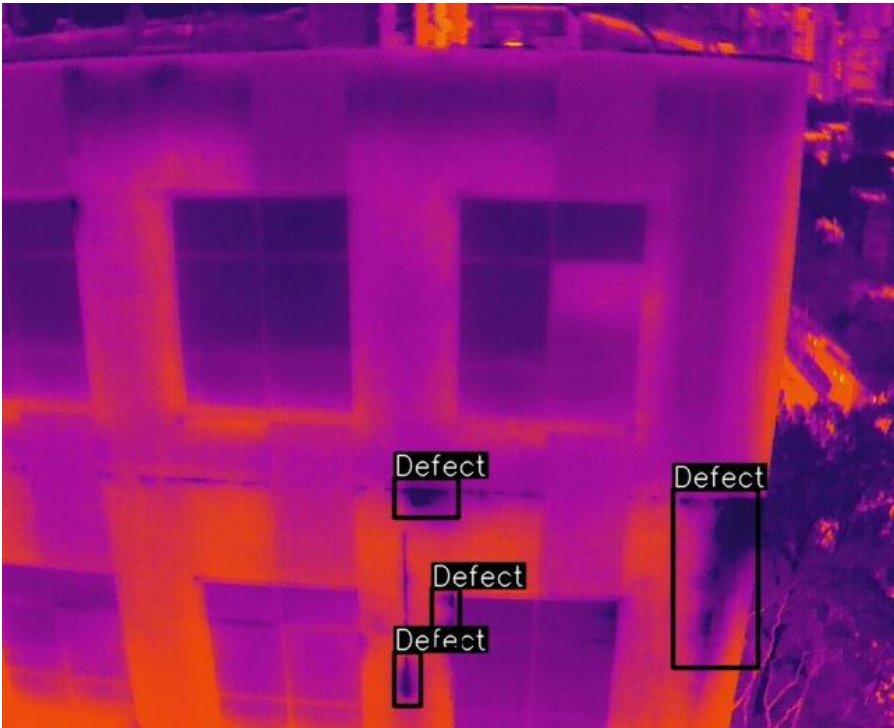




Experiments were conducted on the ISPRS Vaihingen benchmark dataset. Evaluation results show that the proposed method achieved a completeness of 94.1%, a correctness of 90.3%, and a quality of 85.5% over the whole Vaihingen dataset, indicating that the method is robust, with great potential in practical applications.



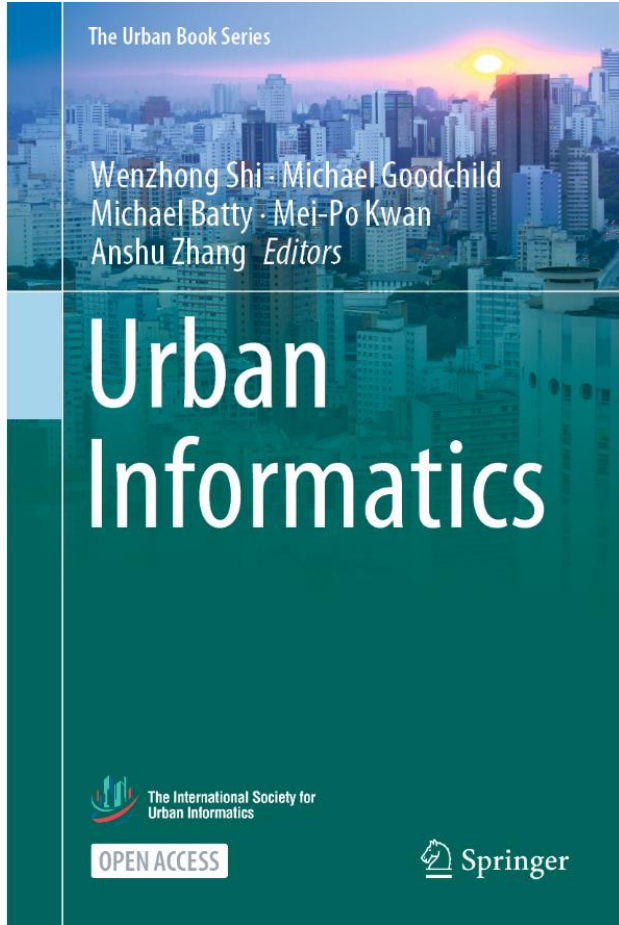
Face detection and temperature measurement



Building defect detection

4. Urban Informatics





- Access: over **1 million** within 1.5 years
- Used as referenced/ text book by many universities worldwide, including **MIT**



85th THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

The International Society for Urban Informatics

isprs International Society for Photogrammetry and Remote Sensing

The Second Announcement

WEBINAR ON URBAN INFORMATICS

MORE INFORMATION :

Monday, 7 March 2022

Beijing Time: 9:00PM-10:00PM
London Time: 1:00PM-2:00PM
US Eastern Time: 8:00AM-9:00AM

online@YouTube live
online@Bilibili live

REGISTER AS A MEMBER FOR ISUI NOW

Urban Informatics Journal

Urban Informatics Book

- Introduction to Urban Informatics**
Prof. Wenzhong Shi, PolyU, HK
- Urban Science**
Prof. Michael Batty, UCL, UK
- Urban Big Data Infrastructure**
Prof. Michael Goodchild, UCSB, USA
- Urban Systems and Applications**
Prof. Mei-Po Kwan, CUHK, HK
- Urban Sensing**
Prof. Carlo Ratti, MIT, USA
- Urban Computing**
Prof. Eric Miller, UoFT, CA

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HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

85th International Conference on Urban Informatics (ICUI)

DEPARTMENT OF LAND SURVEYING AND GEO-INFORMATICS 土地測量及地理資訊學系

LSGI

The Webinar attracted **200,000** views

5. International recognition





Gold Medals at 2021 Inventions Geneva



2021 Smart 50 Awards (US) by Smart Cities Connect



CPGIS Distinguished Scholar Award 2021





謝謝！

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