

# 智慧城市平台：全面的空間數據基礎設施

## Smart City Platform: A Comprehensive System for Spatial Data Infrastructure

### 人工智能城市對象識別、三維空間大數據獲取、分析與可視化綜合平台

A comprehensive platform for seamless fusion, AI-based urban object cognition, visualisation and analysis of massive 3D urban models, and spatial big data analytics

申請/授權32項中國、美國專利

#### 特色與優點

- 整合室內、室外、地上、地下的三維城市模型於同一綜合平台
- 厘米級精度輕便背包式三維數據採集技術，適用於複雜環境的三維城市測量
- 預測新冠肺炎發病風險的時空分佈，較預測確診病例提供更適時的結果
- 人工智能城市對象識別技術，效率更高、更精準

#### 應用

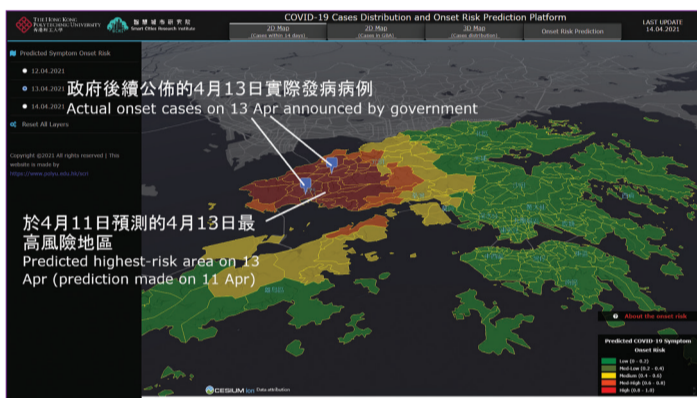
- 城市三維測量與建模
- 支援智慧城市的多領域時空大數據分析，適用於城市規劃、市區分析、交通、人群流動、環境、公共衛生等多個領域
- 建立BIM (包括舊式建築)，可用於城市規劃、舊區重建
- 城市災害防治，如基於人工智能的滑坡識別

#### 獎項

- Smart Cities Connect頒發2021年Smart 50獎 (2021年9月)
- 瑞士日內瓦國際發明展 - 2021年網上特別版 - 金獎 (2021年3月)

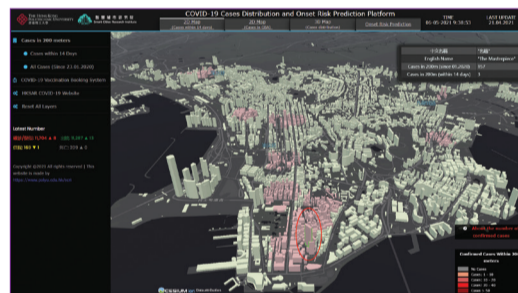
本平台包括智慧城市的三維城市建模、人工智能城市對象識別、三維空間大數據獲取、分析與可視化等領域的多項專利技術，可高效地獲取與處理大規模城市空間數據、三維激光雷達數據、多尺度影像數據，從而創建高精度及切合真實情況的智慧城市空間數據基礎設施。平台可支持政府決策、環境治理、交通優化、市民服務等方面的智慧城市應用。最新研發成果包括：

- 對國際發表了一種新冠肺炎發病風險預測模型，可預測香港291個小規劃統計區未來7天新冠肺炎發病風險。
- 輕量級三維空間數據採集系統，可用於三維城市室內外測圖、建立建築資訊模型(BIM)、舊區改建等。
- 人工智能系列技術，可從遙感影像中識別房屋、道路等城市對象，已應用於香港滑坡識別，支援政府災害防治。



2021年4月13日新冠肺炎發病風險預測結果與當日真實發病病例對比  
Prediction result of COVID-19 symptom onset risk and actual symptom onset cases on 13 Apr 2021

香港建築物周邊新冠肺炎病例數量可視化查詢  
Query and visualisation of no. of COVID-19 confirmed cases in surroundings of buildings in Hong Kong



輕量級三維空間數據採集系統 (移動測圖背包)  
Lightweight 3D spatial data acquisition system (mobile mapping backpack)

32 China and US patents applied/granted

#### Special Features and Advantages

- Integration of indoor, outdoor, aboveground, underground and spatiotemporal dynamic 3D city models on a comprehensive platform
- Lightweight 3D data capture technologies in a backpack, with centimeter-level accuracy, suitable for measuring complicated 3D urban environment
- Prediction of spatiotemporal distributions of COVID-19 symptom onset risk, which is more timely than predicting confirmed cases
- More efficient and accurate urban object recognition technologies based on artificial intelligence

#### Applications

- 3D city measurement and modelling
- Multidisciplinary big data analytics for city planning, urban analysis, transportation analysis, crowd flow analysis, environmental analysis, and public health
- BIM development (including aged buildings) for urban planning and urban renewal
- Disaster mitigation, e.g., AI-based rapid landslide recognition

#### Awards

- 2021 Smart 50 Awards by Smart Cities Connect (Sept 2021)
- Gold Medal - Special Edition 2021 Inventions Geneva Evaluation Days - Virtual Event (Mar 2021)

Incorporating patented technologies of 3D city modelling, AI-based urban object cognition, as well as spatial big data analytics and visualisation, the Smart City Platform can be used to acquire and process massive urban spatial information, 3D LiDAR data, and multi-scale image data to create high-precision and realistic smart city data infrastructure. The platform supports various smart city applications to aid governmental policy making, environmental management, transport optimisation, citizen services, etc. Latest developments of the platform include:

- A model, which was published internationally, for predicting the COVID-19 symptom onset risk in 7 days in 291 Territory Planning Units in Hong Kong;
- A lightweight 3D spatial data acquisition system that can be used in outdoor and indoor 3D city modelling, construction of Building Information Models (BIMs), and urban renewal;
- A series of artificial intelligence technologies to recognise buildings, roads and other urban objects. The technologies have been applied to landslide recognition in Hong Kong to support governmental disaster mitigation.

#### Principal Investigator

Prof. John Wenzhong SHI  
Smart Cities Research Institute

#### Contact Details

Knowledge Transfer and Entrepreneurship Office  
(852) 3400 2929 info.kteo@polyu.edu.hk

Access More info via mobile



Non-Subject to data privacy or network operation