

城市级人工智能系统应用

智慧城市管理



1

智慧环境

利用人工智能保护绿色资产

2

智慧基础设施

人工智能在智能建筑和施工领域的应用

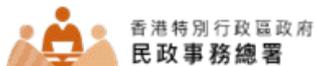
3

智慧房地产

房地产管理的人工智能应用

我们的客户

建筑和城市发展领域



公共事业领域



种植园和保护领域



Logistics and Supply Chain MultiTech R&D Centre
物流及供應鏈多元技術研發中心

大数据数据来源



无人机系统 (UAS)



卫星



载人飞机

智能或非智能摄像头和传感器



核心技术

- 1. 经过大量训练的人工智能系统，利用数百万个专有的高分辨率图像数据进行训练
- 1. 用于处理无人机、机器人、车辆和卫星数据
- 1. 自主研发的计算机视觉算法，用于处理大容量数据（以TB计）
- 1. 基于仅使用照片而非昂贵的激光雷达技术，实现城市规模的三维重建

公司内部的人工智能训练数据集（非来自互联网）

- 1. 来自香港、印度尼西亚、柬埔寨、泰国和中国的无人机图像，总面积为**9,000**平方公里。
- 1. **600**万棵油棕树的无人机图像，包括不同的健康状态、年龄和高度。
- 1. **10**万张混凝土裂缝图像（包括无人机和数据采集车采集）。
- 1. **5**万张混凝土和道路裂缝图像（使用数据采集车采集）。
- 1. **100**万张其他类型的树木和植物图像。
- 1. **1**万张佩戴口罩的人脸图像，**5**万张人脸图像。
- 1. **20**万张车牌图像。
- 1. **40TB**的道路图像数据。

应用案例

交通基础设施(码头)的裂缝检测

来自市民手机、无人机等的图像来源。

完全自动化的人工智能裂缝检测。

世界级的误报抑制算法。



顶级的误报抑制算法

- 针对复杂场景进行训练的人工智能

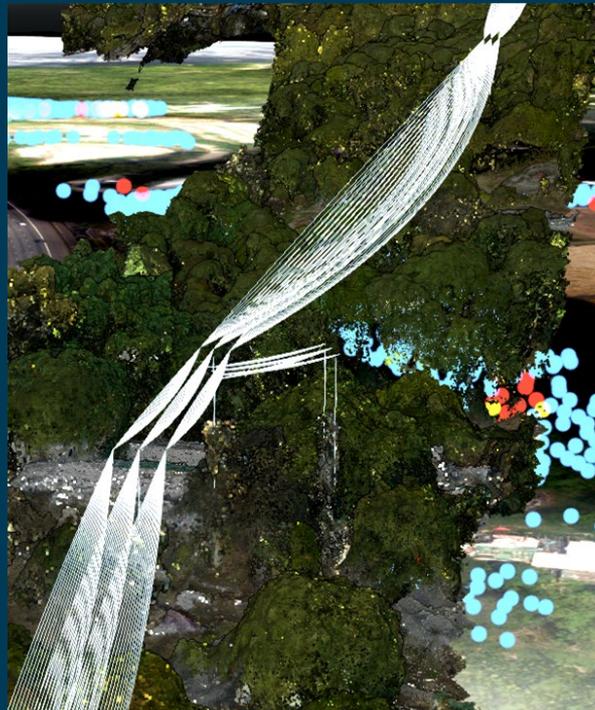
不会将此间隙识别为裂缝

裂缝

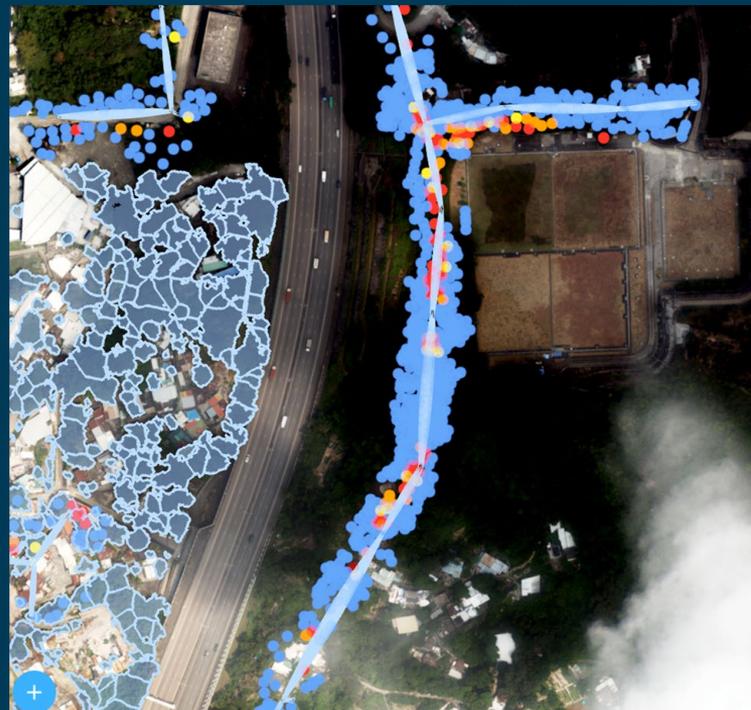
无人机+人工智能树木风险调查用于电力线路



无人机拍摄的电网照片

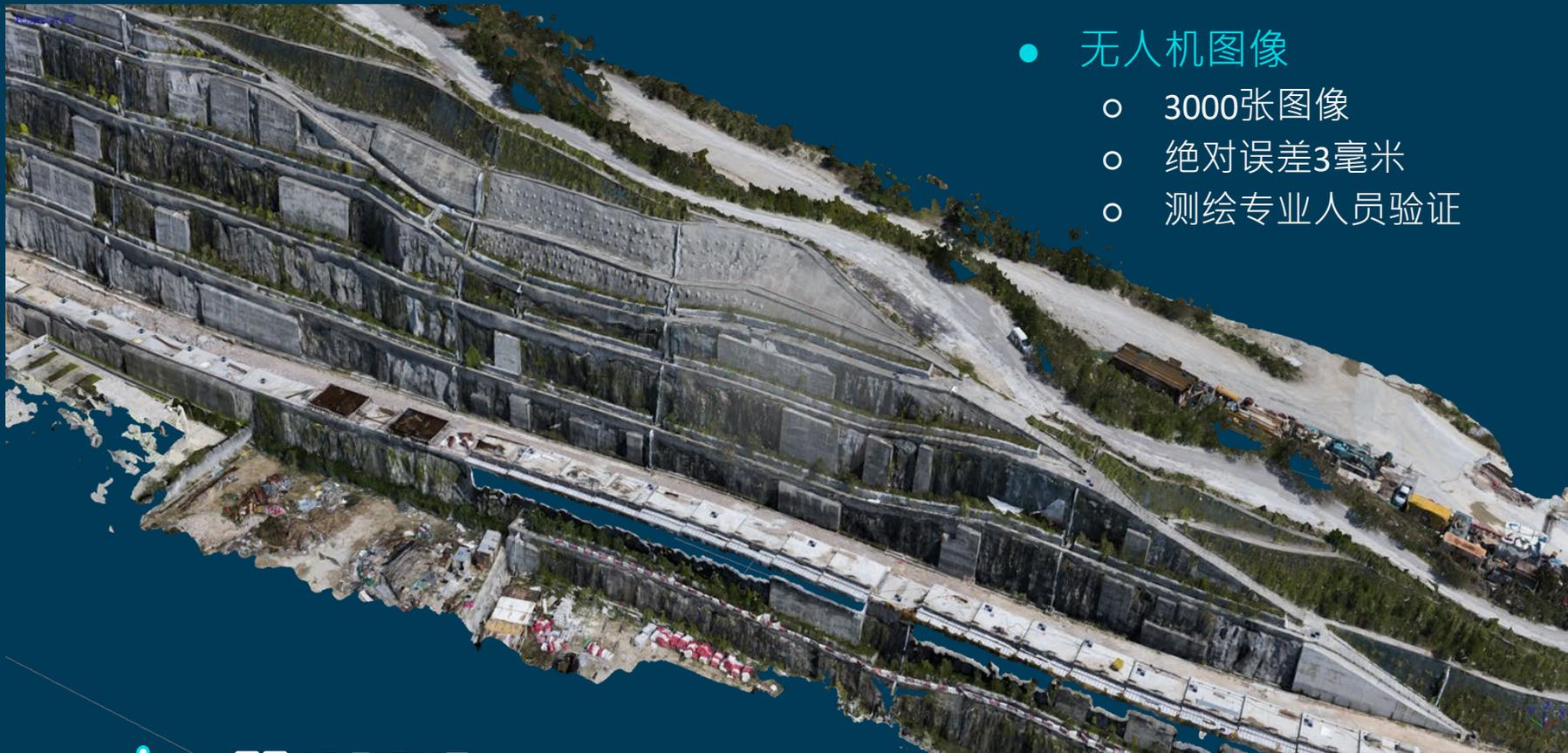


电力线摆动分析



自动检测风险树木

超高分辨率三维重建



- 无人机图像
 - 3000张图像
 - 绝对误差3毫米
 - 测绘专业人员验证

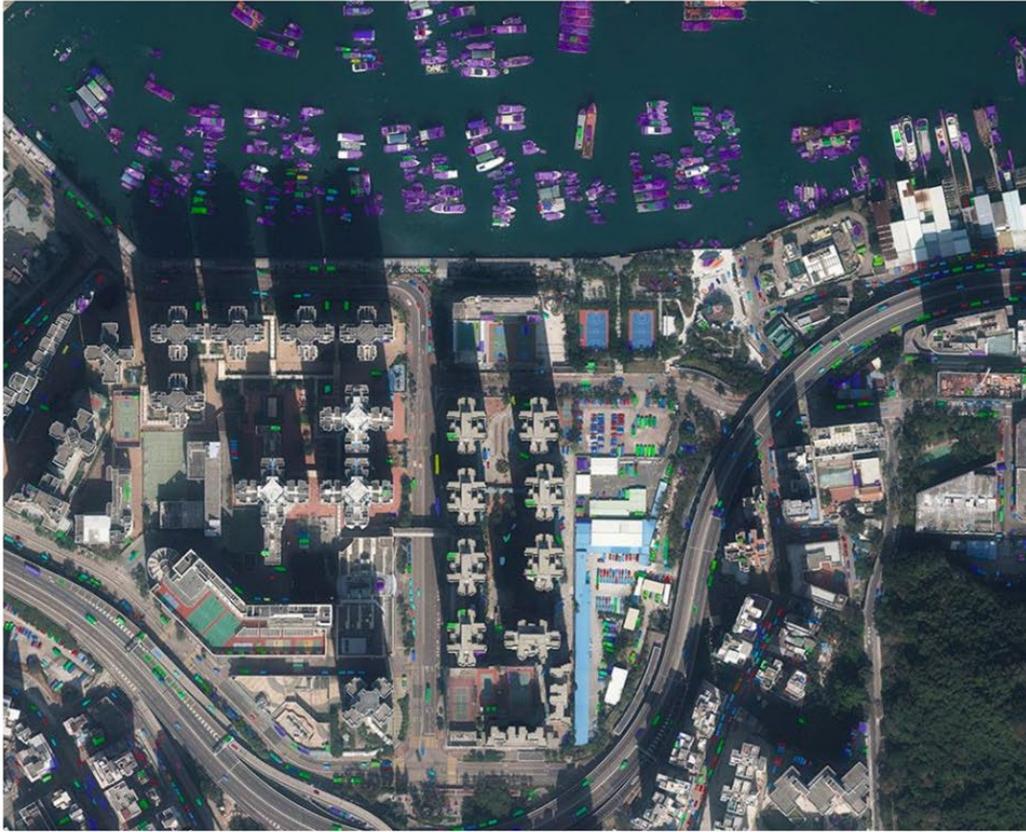
使用载人飞机图像 进行城市规模的三维重建



仅使用照片自动重建的三维模型。

主要客户：地政总署和建筑公司

Vehicle Detection For Traffic Planning



Manned Aircraft Images

A.I. Trained to Detect Vehicles
from God's View

Plantation Plants Counting & Health Monitoring



Trained A.I. for
Classifying 30
Different Plants

Plant Count
Auditing for
Japanese and
Korean Insurance
Companies and
Investment Firms
in South East Asia

Automatic Building Detection and Classification



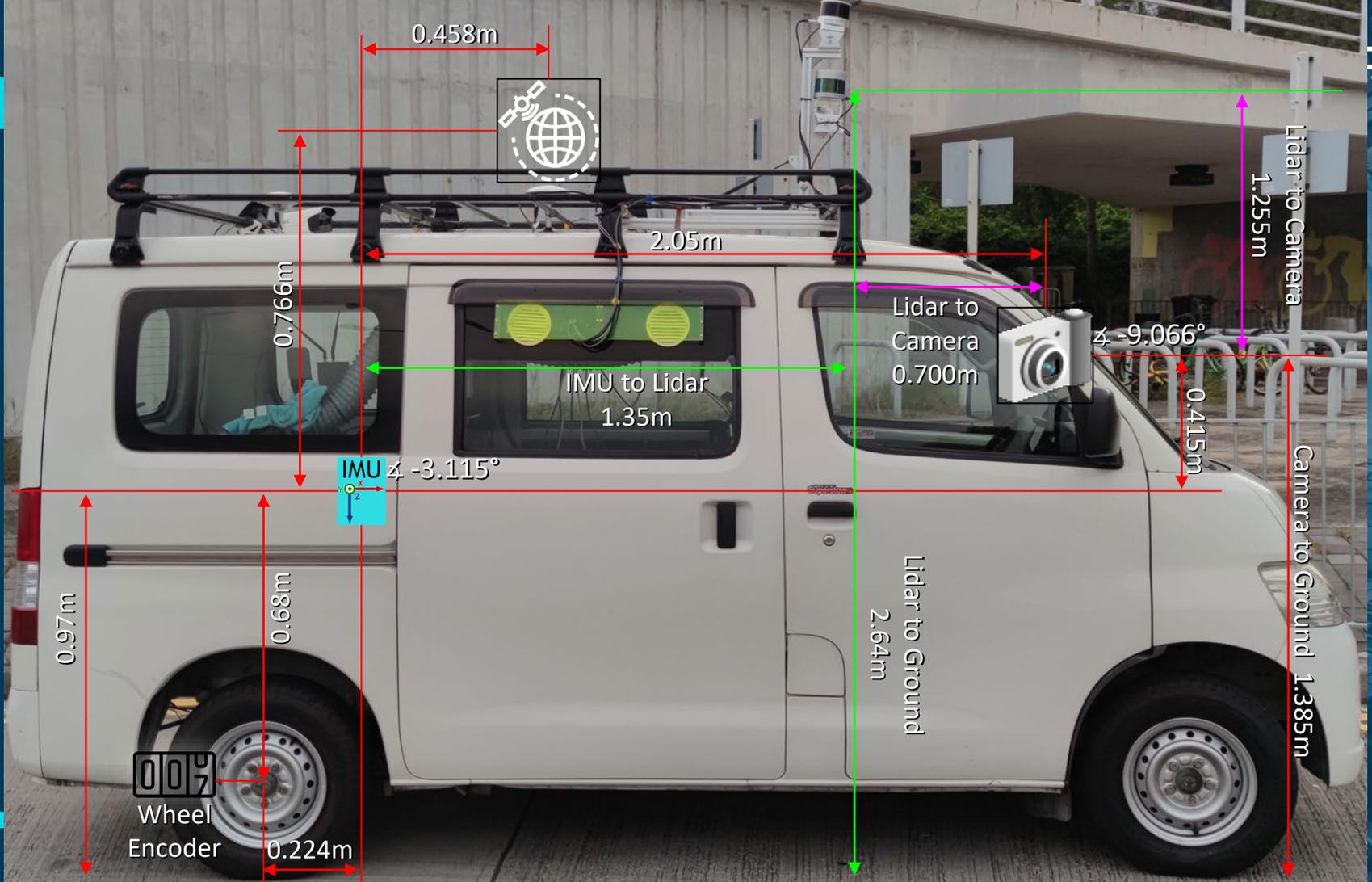
Satellite Image from Google Earth

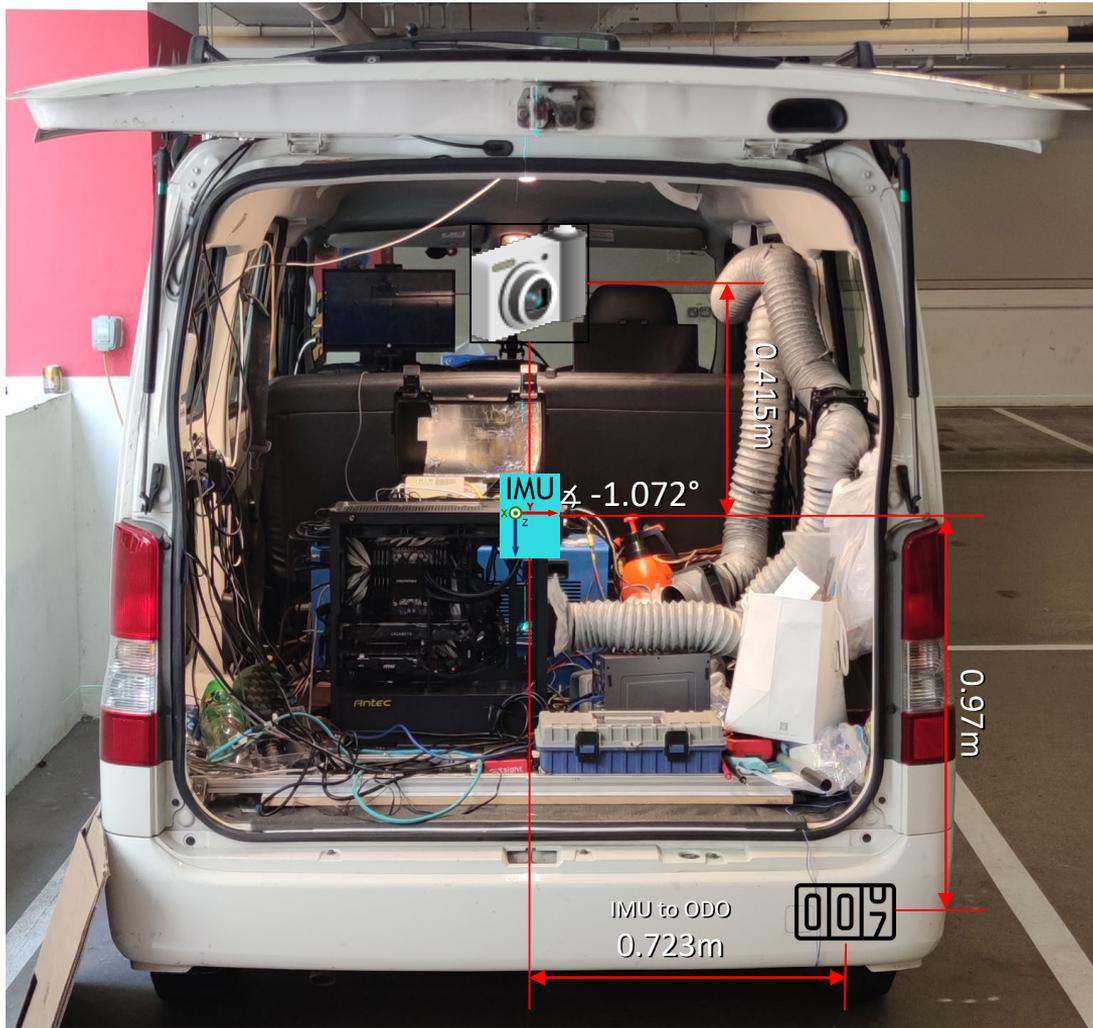


Size Estimation of Villa



- A.I. Automatic Squatters Detection
- Illegal Construction Law Enforcement
- Detect Change of Landuse







14%

13%

13%

13%

14%

12%



Sharp Street East
11-51 蠟業街

PROPERTY CONSULTANTS
22948807
22948221

Wing Lai Hin

新時代

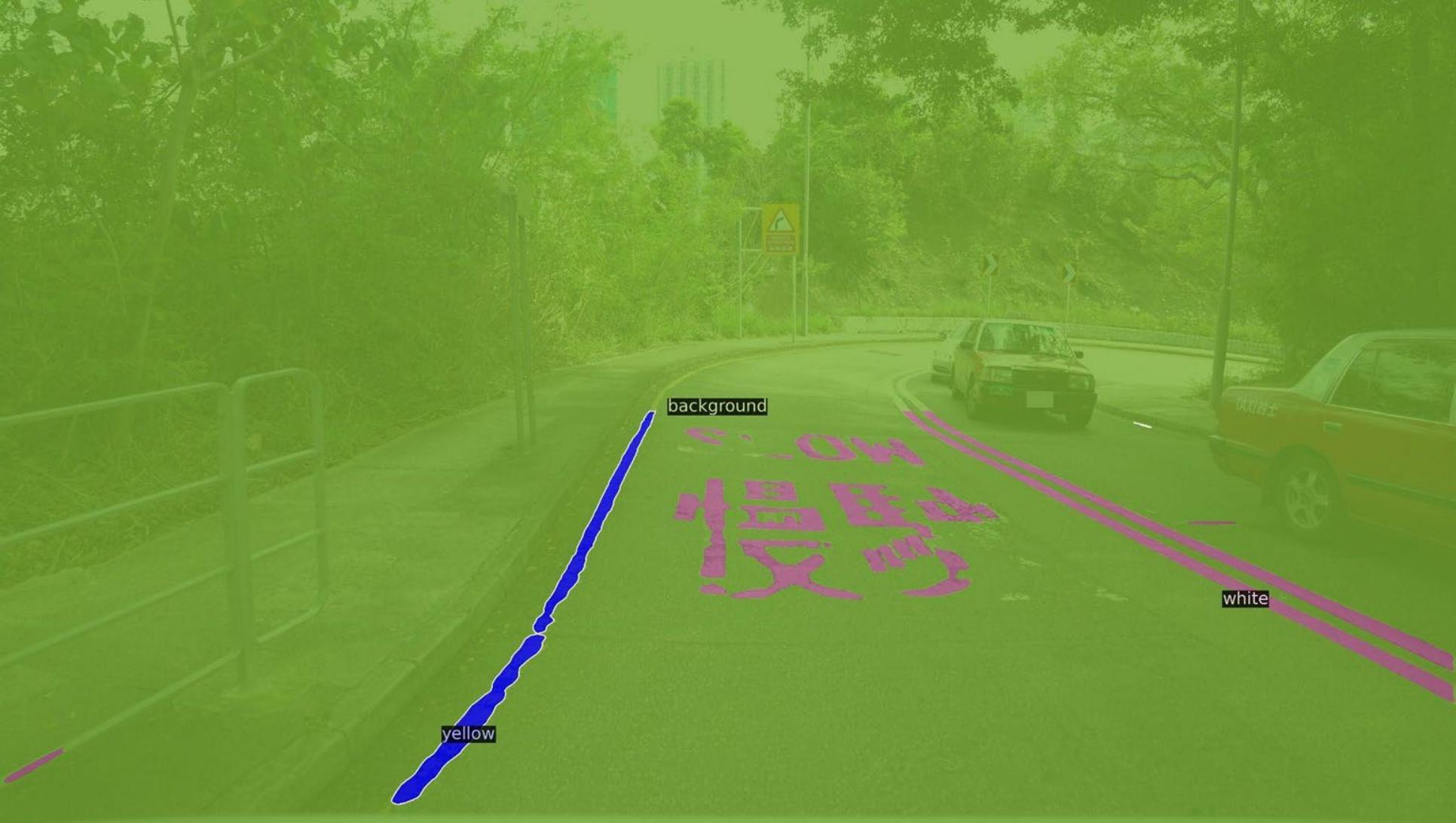
PLAZA 香港 聯受管理社區

10%



New Algorithm

A Random Sample of Discolored Road Marking with Chinese and English Characters



background

yellow

white



background

yellow

white

路面缺陷监测数据

每台车
每天跑

300km

每台车
每天拍

150,000张

4K高清照片



A.I. 计算机
每天处理

750,000张

照片

现时有5台车每天在采集数据

自动计算路面被摄物位置

自动在地图上显示

可以按缺陷大小/严重程度进行搜索

2024扩展18台车

每天处理2,700,000照片

Road Defects - Map View

Hong Kong 3D

Hong Kong City Inspection

Leave... R W +1

+ Add Layer

- HYD Shek O Road Defect Survey
- Hong Kong Island
- Aerial (Bing Maps)

Annotation (Marker)

Faint Paint on Road

Properties Attachments Comments

Created: 2 Aug 2019 Created By: Rex Sham

Description

The paint on the road faded too much.

Display

Color: [Yellow] [Red] [Orange] [Green] [Blue] [White]

Location

Longitude	Latitude	Height
114.23367°	22.247303°	0 m

+

海岸公园保育



id: 1, conf: 0.26646435280772705, c: 0, speed: 5.197239903169406 m/s, lat: [22.1688107], lon: [113.90872811], northing: [803383.09689515], easting: [808611.44414488]

id: 1, conf: 0.26646435260772705, c: 0, speed: 5.197239903169406 m/s, lat: [22.1688107], lon: [113.90872811], northing: [803393.09689515], easting: [808611.44414488]

2023年11月30日 星期四 13:38:23

车辆和船只检测用于交通规划



使用载人飞机图像

经过训练的人工智能可从俯视角度探测车辆类别, 位置, 密度

Automatic Building Detection and Classification



Satellite Image from Google Earth

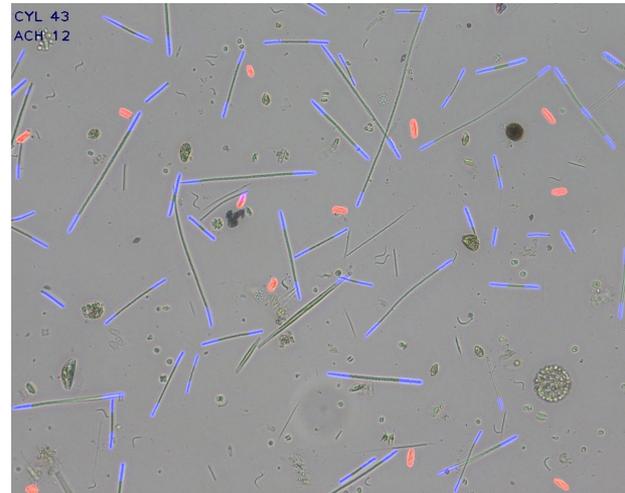
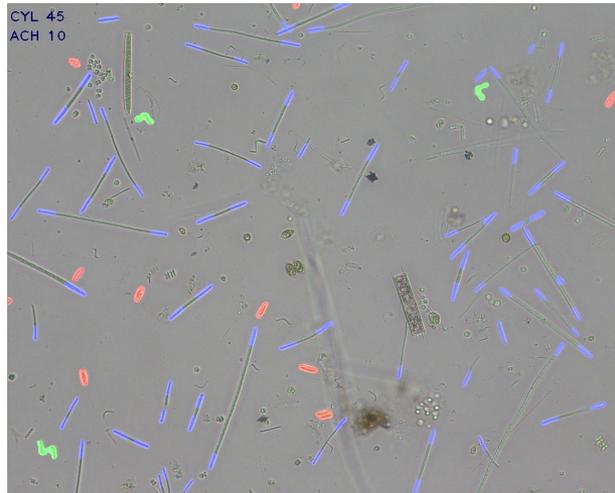
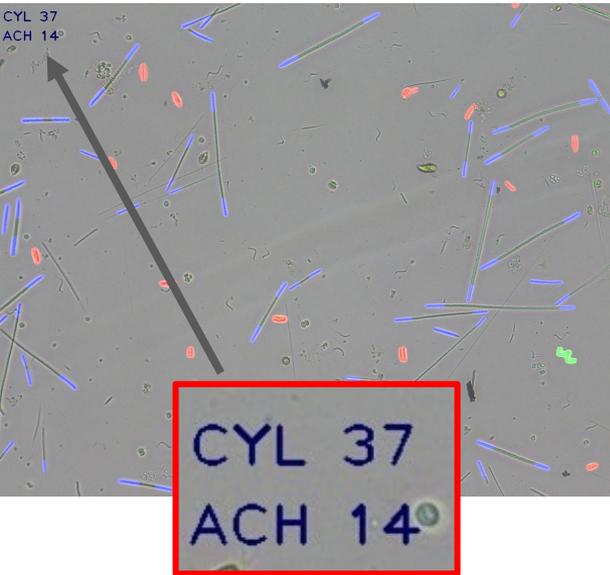


Size Estimation of Villa



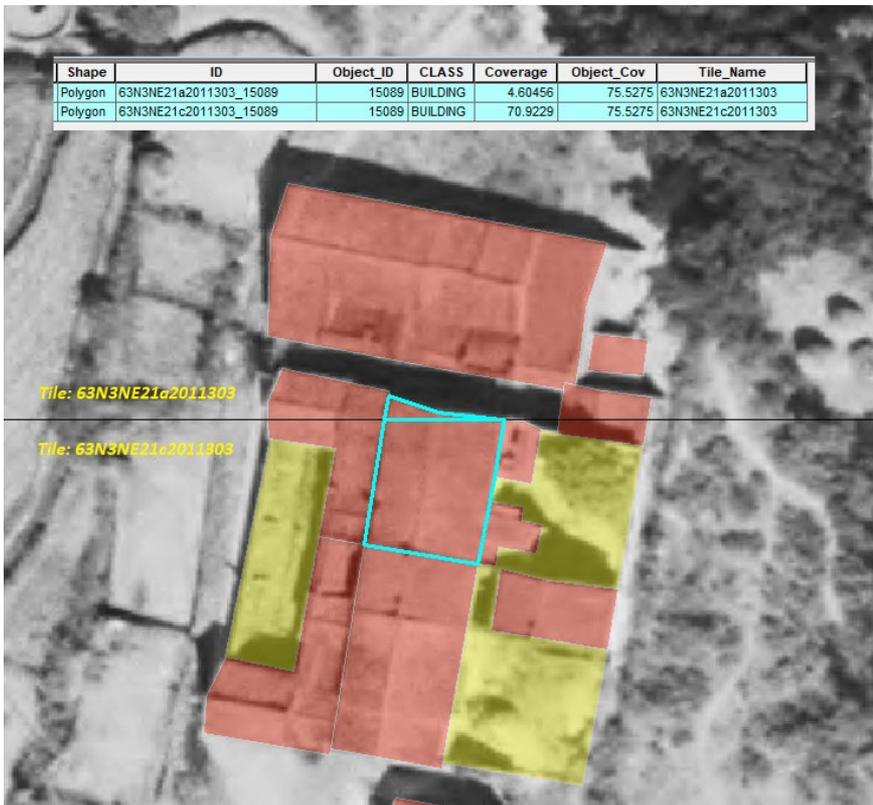
- Satellite Photos
- A.I. Automatic Squatters Detection
- Illegal Construction Law Enforcement
- Detect Change of Landuse
 - From Vegetation to Squatter
 - From Farmland to Car Park
 - From Car Park to Container Storage area

利用人工智能进行藻类细胞计数



- 在不同种类的细胞上使用不同颜色的高亮显示。
- 颜色可以在概念验证项目开始之前定义。
- 细胞计数器显示在该图片中找到的细胞数量。

使用黑白DOP5000 航空拼接照片进行永久和临时结构标注



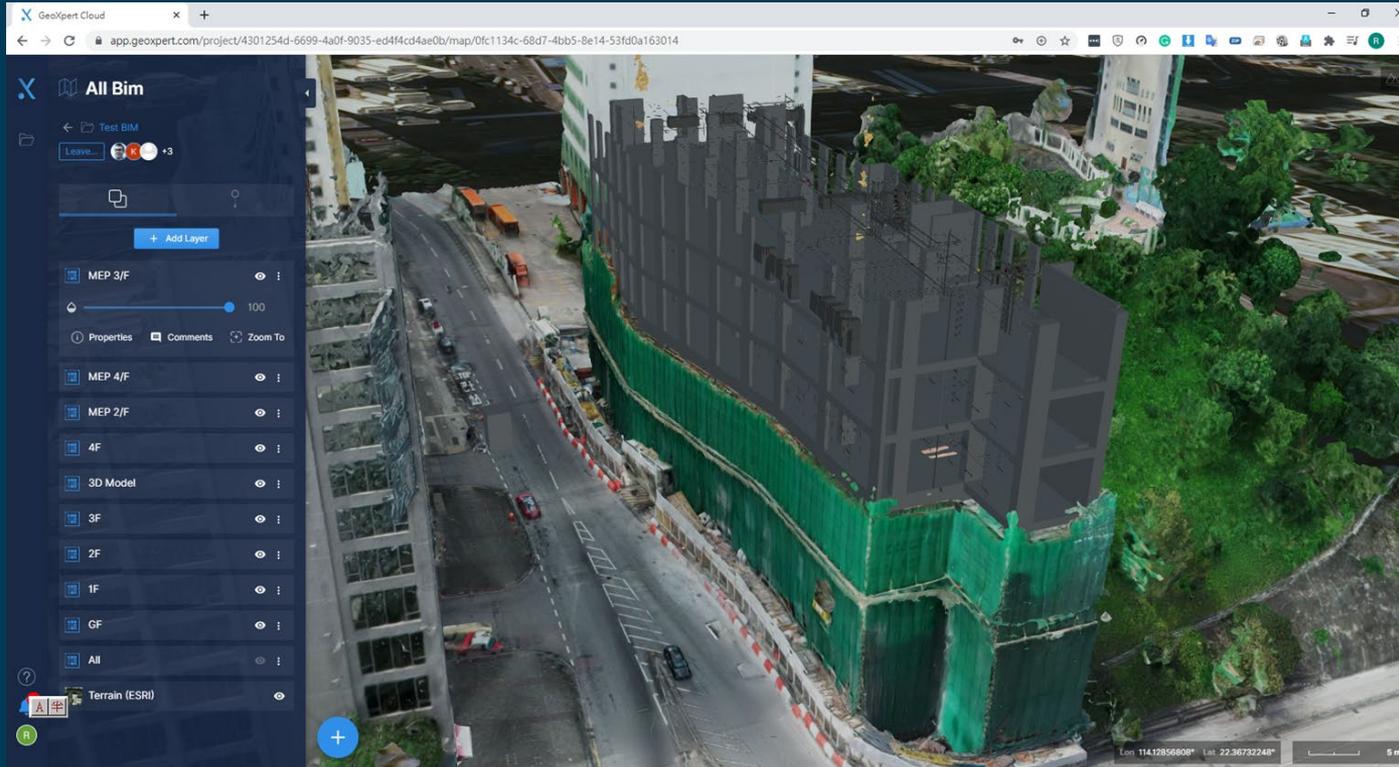
我们开发了一个合并算法，用于合并和测量整个对象多边形的大小。

提供“Coverage”和“Object_Cov”属性。

Coverage：表示在特定瓦片上出现的对象的大小。

Object_Cov：对象覆盖：横跨两个瓦片的整个对象的大小。

Reality Model + BIM Fusion on CLOUD



Drone Survey

3D Reconstruction

BIM Fusion

Check Progress of Building

Detect Construction Errors



利用起重机移动带动摄像机
多角度拍摄工地楼顶。

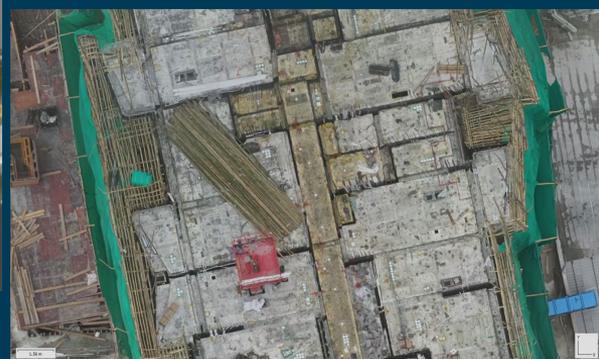
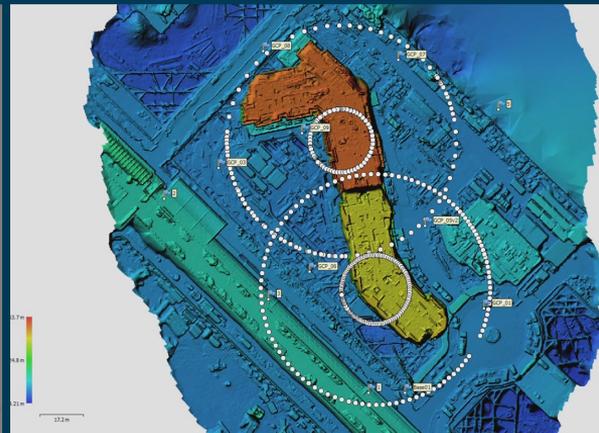
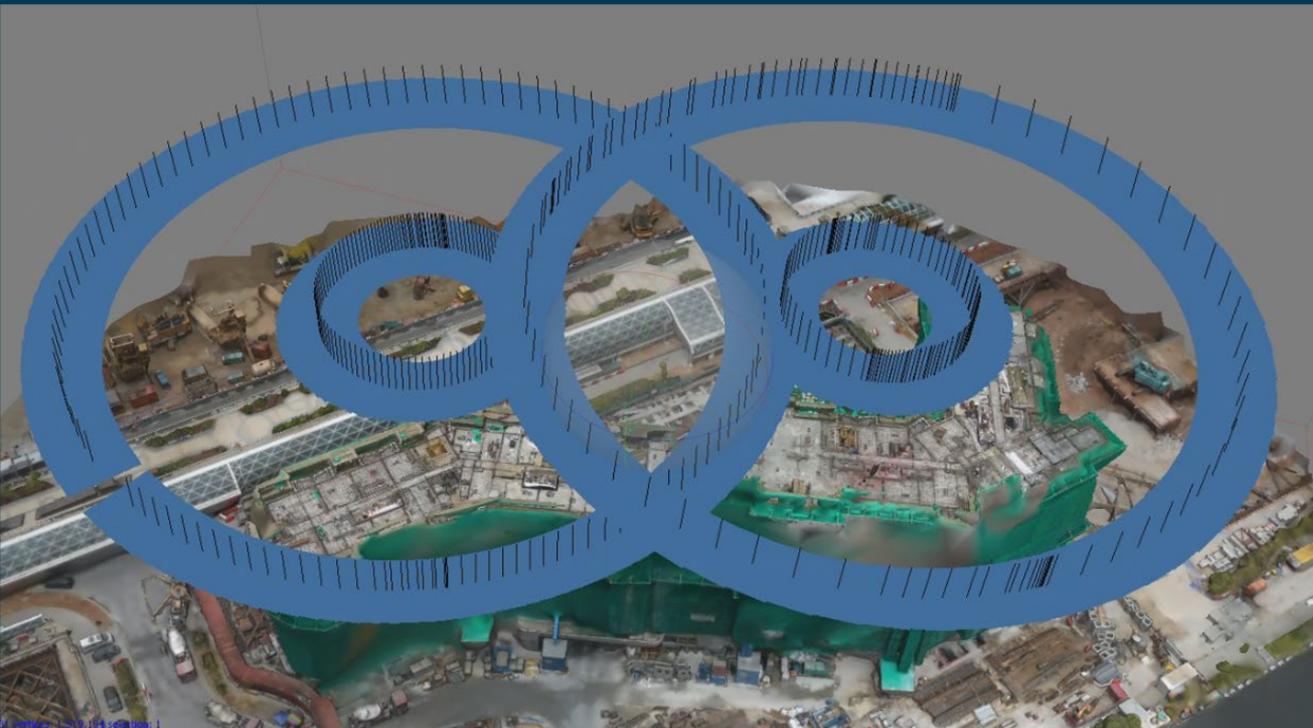
利用三维及二维重构生成正
射平面图, 可以测量:

1. 铝模安装位置
2. 预制组件安装位置

Precast and MIC modules location measurement

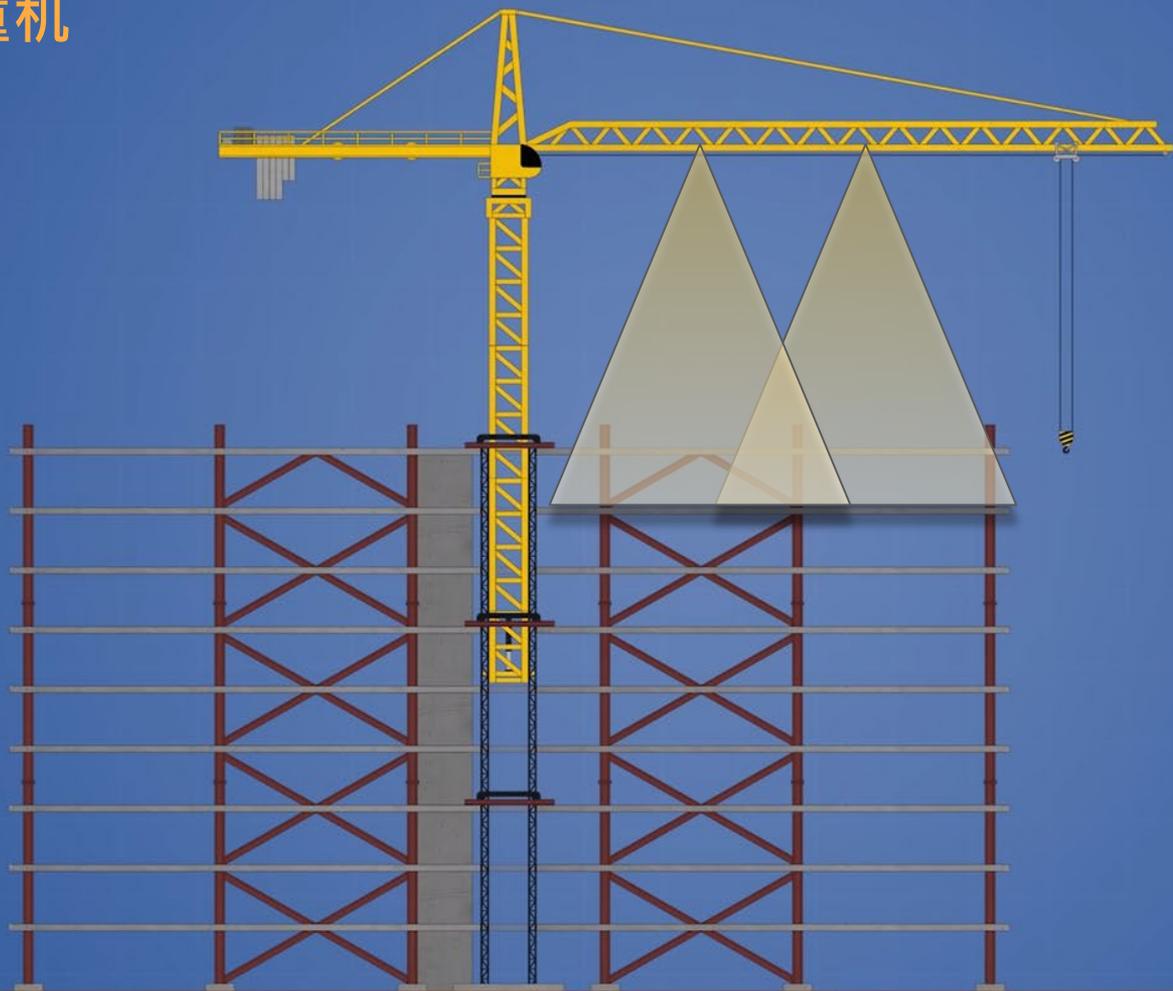


塔式起重机摄像头三维建模

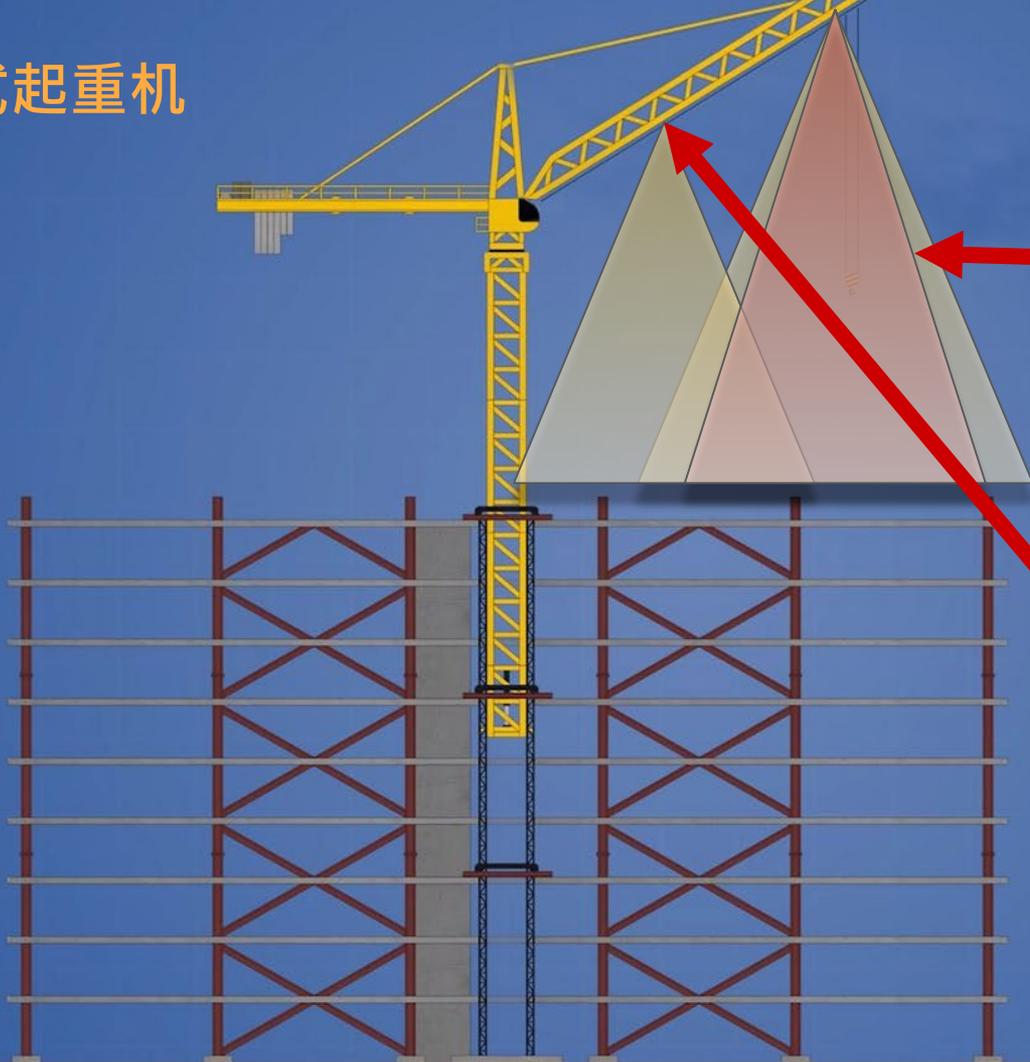


使用CAD叠加进行建筑错误检测

锤头起重机



摆臂塔式起重机



Automatic Zoom in
when Luffing Crane
Raises

Automatic Passive Tilting
Mechanism to make sure
images are orthogonal

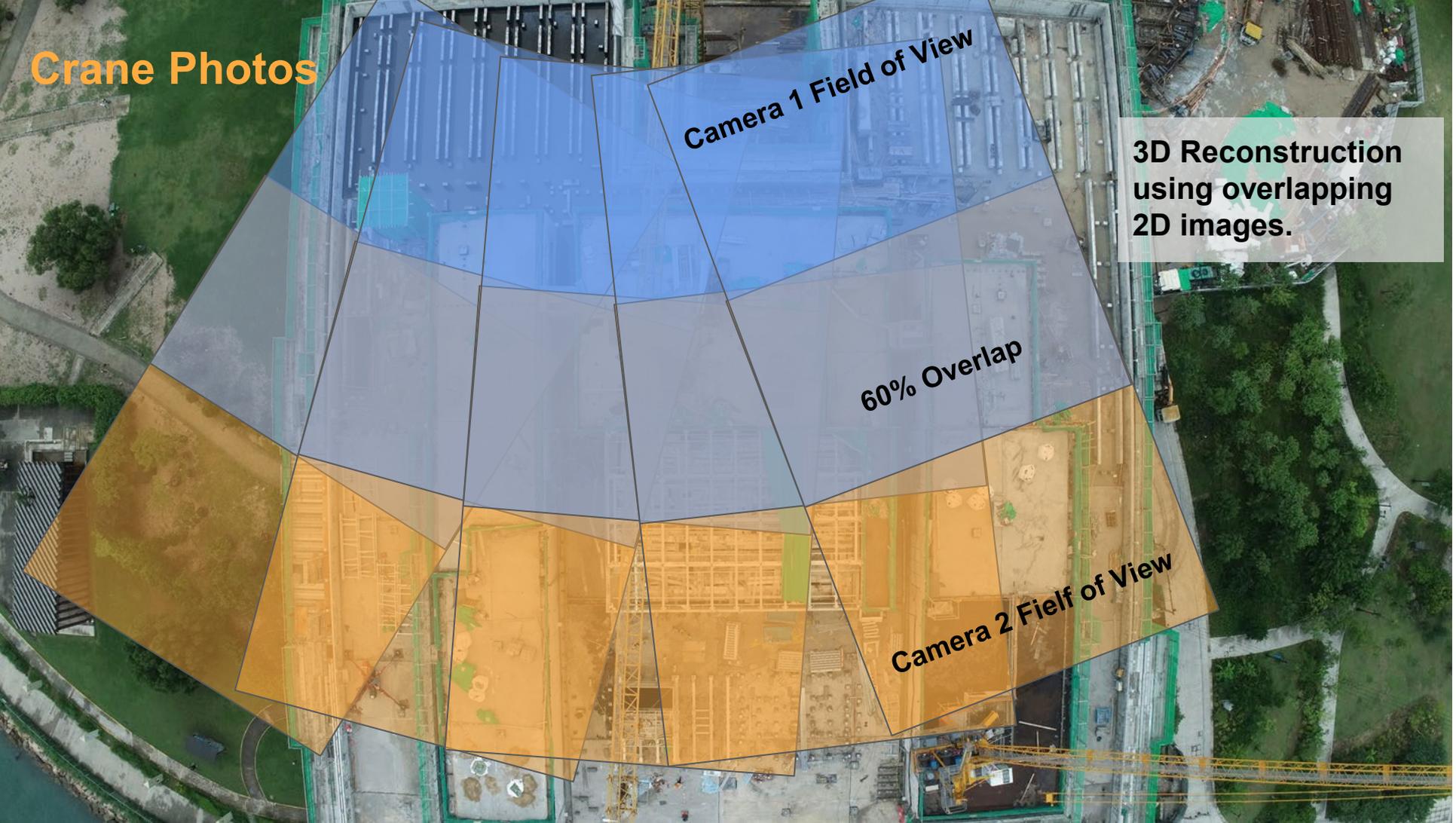
Crane Photos

Camera 1 Field of View

60% Overlap

Camera 2 Field of View

3D Reconstruction
using overlapping
2D images.



错误检测

光测拼接 (Photogrammetry stitching)

三维重建 (3D Reconstruction)

二维正交视图 (2D Orthogonal View)

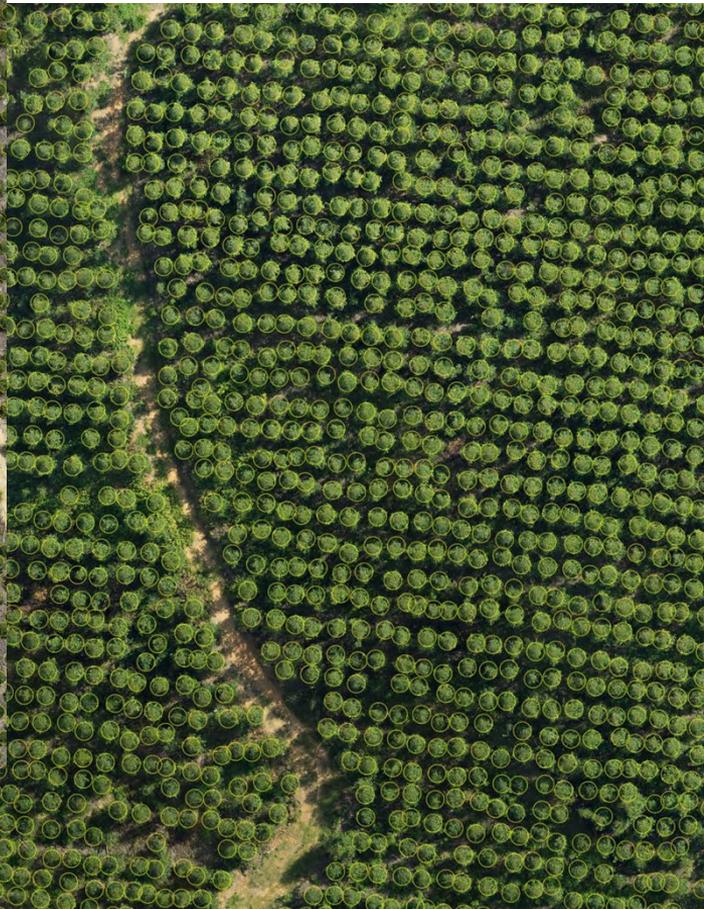
CAD叠加 (CAD overlay)

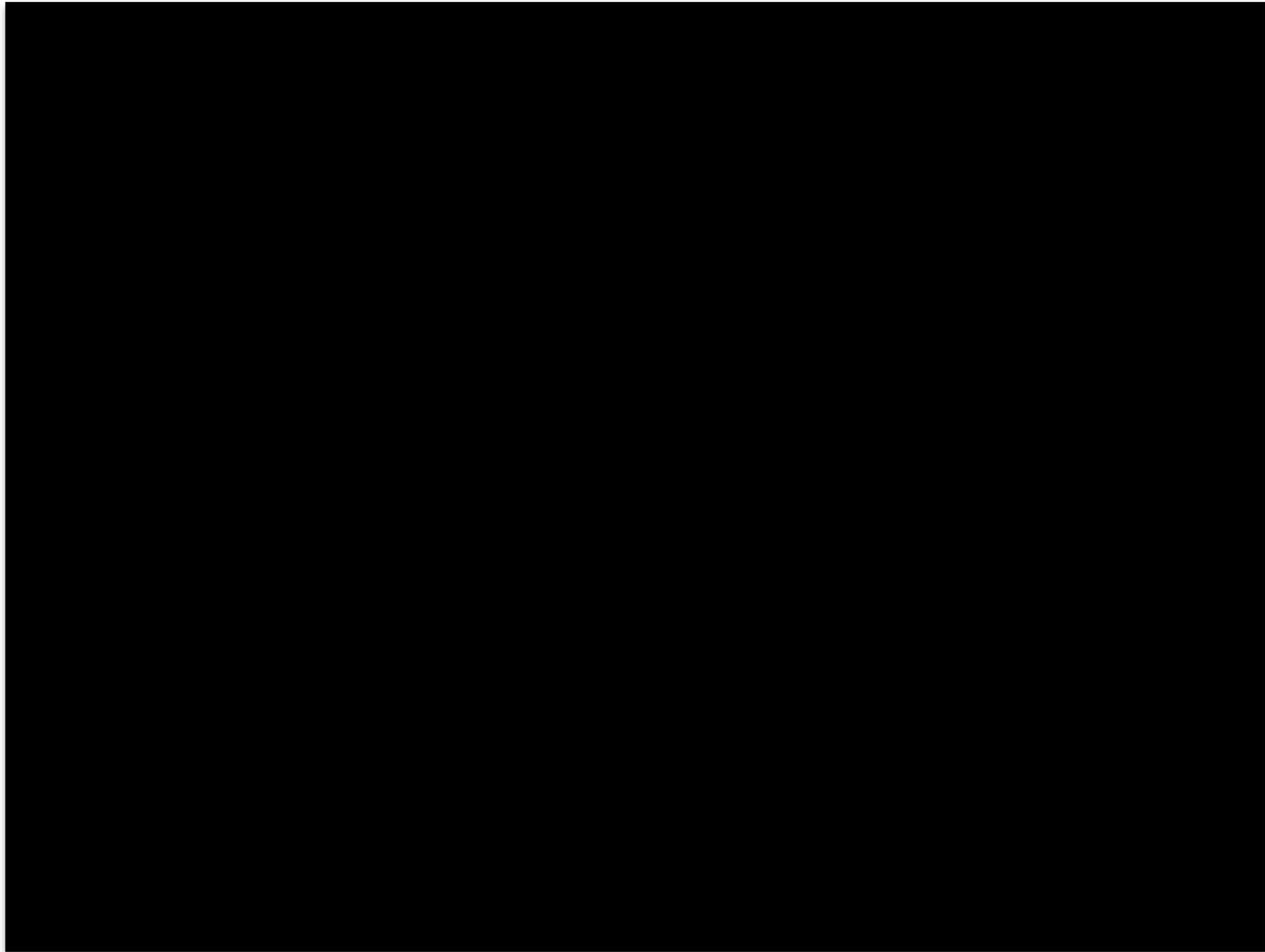
错误测量 (Measurement of Errors)



人工智能树木计数

印度尼西亚的多个私营种植公司 (超过7,000平方公里的经验 700,000公顷)





An aerial, top-down view of a city roundabout. In the center of the roundabout, a white drone is hovering. The roundabout has a central green island with a circular pattern. Surrounding the roundabout are several multi-story buildings, parking lots with cars, and roads. The entire image has a blue tint.

THANK YOU

info@anavision.com

www.anavision.com

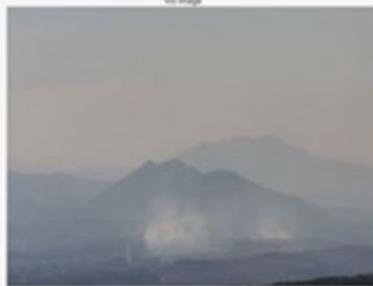
University R&D Collaborations: rex.sham@insightrobotics.com

World Wide Wildfire Detection Robots

- Partner Insight Robotics Build and Deploy Robots (50 Cities Worldwide)
- Anavision Learn Fire and Smoke pattern data from fire events to improve algorithm
- Detects > 10 fires per day, Largely Reduce Carbon Emission



2D Image to 3D Map



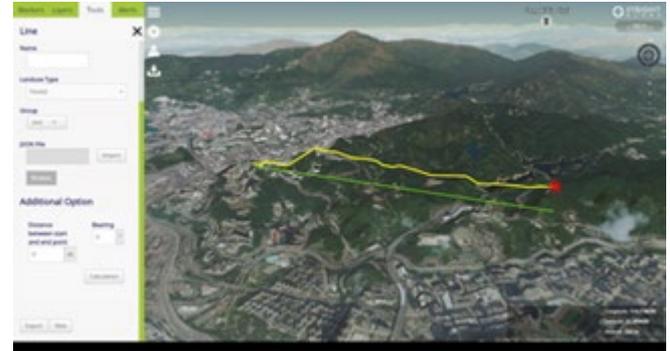
Fire Predictions Model



Fire Risk Prediction



Real Time Fire Simulation (with Wind, Terrain, Fuel Type)



Spatial Distance vs Surface Distance
Flying, Driving, Walking (Different Paths)



Spatial Path vs Optimal Path
For Evacuation And Access to Fire Scene



Rex Sham

Executive Director
Technology Advisor

BSc Computer Science, CUHK
Founder of Hong Kong Robotics Ltd and
Edutechnic Ltd



William Tao

Founder and CEO

MPhil Information Theory, Electronic Eng, HKUST
MSc Financial Analysis, HKUST
BEng Electronic Eng, HKUST



Man So

Chief A.I. Engineer

BEng Electronic Eng, HKU
Robocon Champion Team
Teamleader

Committee on Innovation, Technology and Re-industrialisation of Hong Kong
Advisory Committee on Innovation and Technology - HK Trade Development Council
Steering Committee on Strategic Development of Information Technology in
Education

Over 50 years of Engineering Experience in Leadership Team

Founded 2019 in Hong Kong

Focus: Develop A.I. and Big Data Technologies for Smart Cities Management

Received Intellectual Property Rights Investments from Insight Robotics Ltd and an early stage investor of DJI in October, 2020

