25th Meeting of the Communications/Navigation and Surveillance Sub-group (CNS SG/25) of APANPIRG

Video Tele-Conference, 18 – 22 October 2021

WP/25 Trial Inspection on CNS Outstations by Drone to Enhance Maintenance Work in Hong Kong, China

Presented by Hong Kong, China

Introduction

1. A trial inspection by drone at one of the remote outstations (Cheung Chau Outstation)

2. To explore potential applications and benefits of drone to support CNS maintenance work in remote outstations.

- visual inspection of on-site CNS equipment
- building structure
- building services provisions and
- related site facilities e.g. fencing, cutting of vegetation & etc.

Discussion

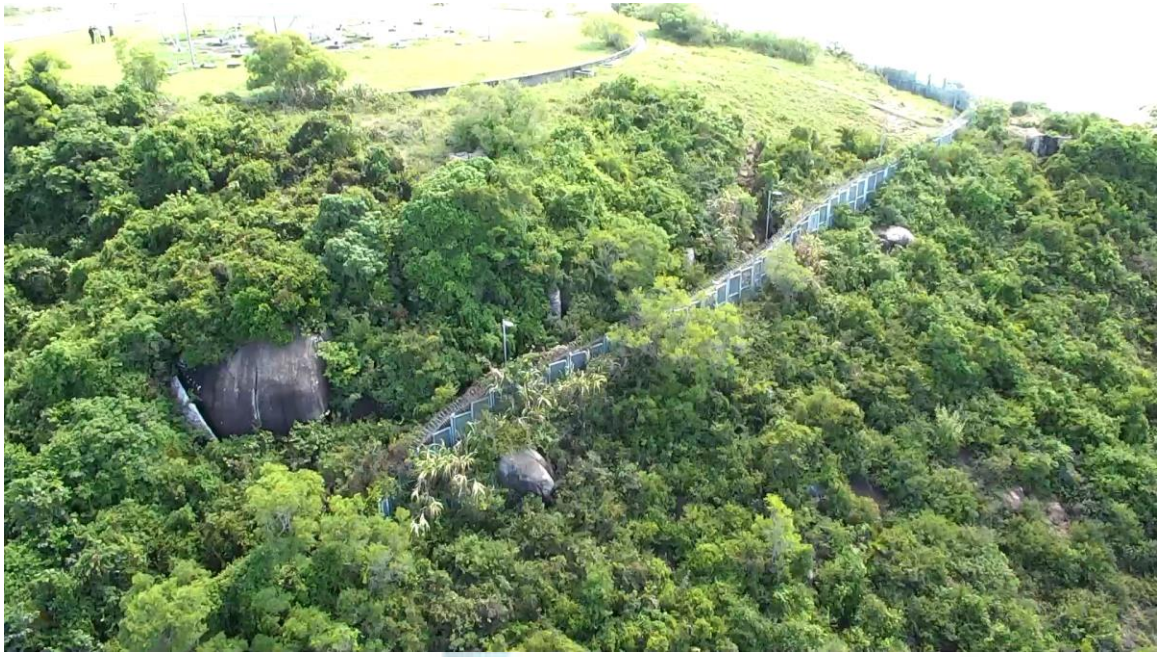
1. Visual Inspection of Site and Equipment

   Outstation may build along steep slope with fencing, CNS equipment at outstations is usually mounted on tall structures.

posing risks to maintenance personnel

Maintenance staff could conduct site inspection by drone

- keeping safe from hazardous locations
- reducing risks in occupational safety and health (OSH)



- drone can access places difficult to safely access by human
- provide unique views for real-time inspection
- visual records for post-flight analysis

- Savings in **cost** and **labour** as well as reduction in **OSH** risks are obvious to justify drone inspection

2. Building Diagnostics and Building Information Management

Thermographic Building Diagnostics to unveil potential defects, such as moisture penetration or water ingress at building roof-top, that was not detectable by naked eyes.

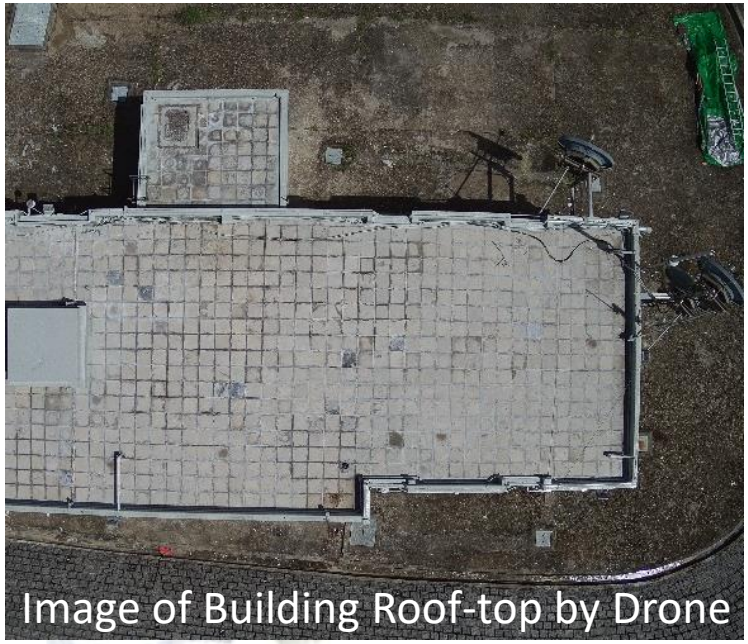
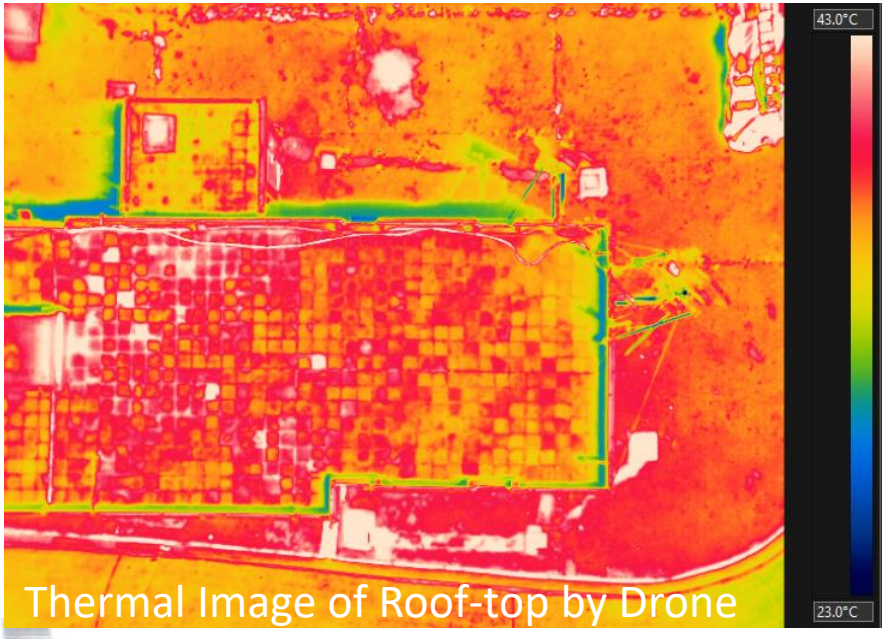


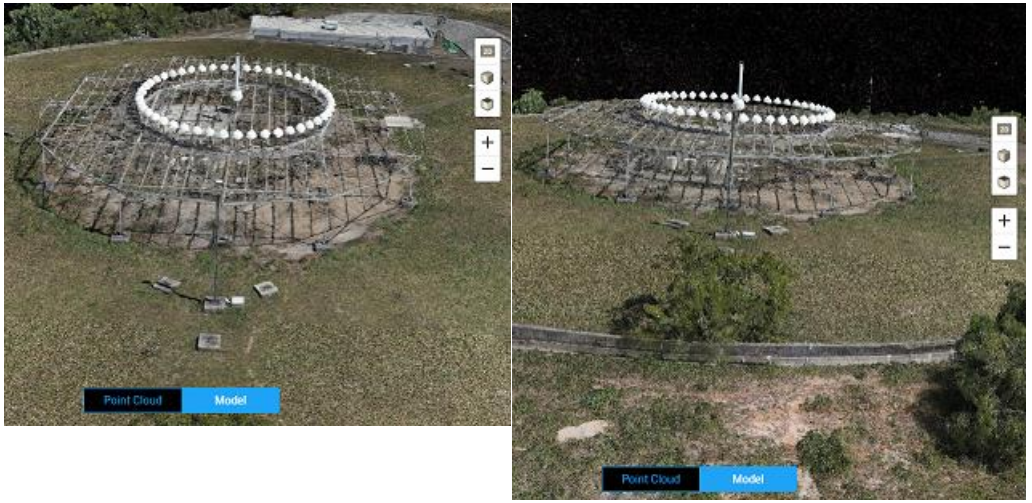
Image of Building Roof-top by Drone



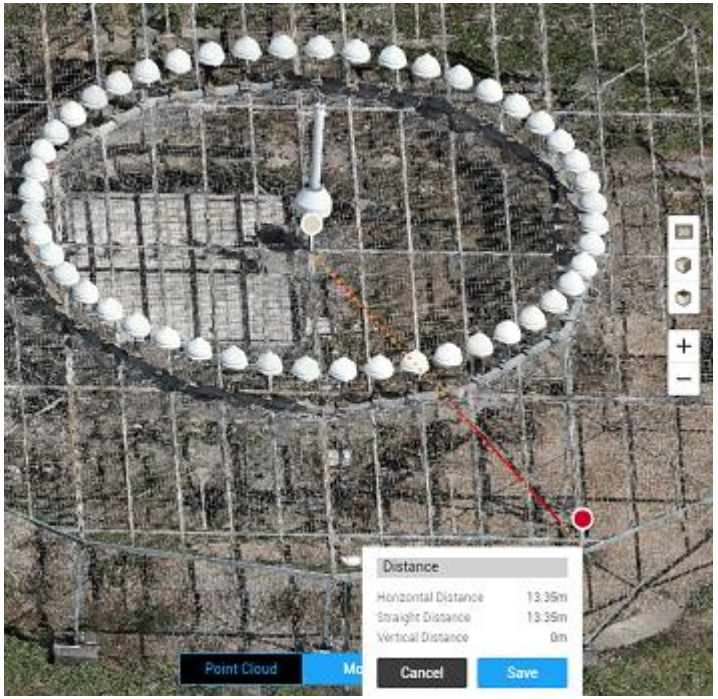
Thermal Image of Roof-top by Drone

BIM for On-site Building and Structures

- Point clouds that are compatible Building Information Modeling (BIM) software could be obtained with drone equipped with high resolution camera.
- The realistic 3-dimensional model so generated could be useful for planning/revamp of future/existing outstations.



3D Model of the Navigation Outstation Built by Drone Survey in Different Elevations



Distance Measurement in the 3D Model

3. Limitations

a) Weather

- drone flight sometimes not feasible under adverse weather

b) Site location

- a site in vicinity of a flight path might prohibit drone flight

c) Interruption of service

- CNS service outage is generally necessary during drone inspection with less outage time

d) Formation of a drone inspection team

- staff resources, service and equipment cost, personnel licensing, continuing training/practice.

4. Way Forward

- The use of drone unfolds **a cost effective way to support maintenance work of CNS outstations** as demonstrated in the trial conducted at the Cheung Chau Outstation.

- further **look into other potential use cases of drone** to enhance the overall robustness and efficiency in our CNS maintenance work.

Action by the Meeting

The meeting is invited to :

a) note the information contained in this paper;

b) encourage States/Administrations to consider and implement cost effective and proven technologies to enhance CNS maintenance work; and

c) discuss any relevant matter as appropriate.

Thank you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• Airworthy • Teamwork
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