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Introduction

While much of the world is currently experiencing a renaissance with the construction of fleets of new power generation facilities, challenges still exist in numerous other sites associated with both the decommissioning and long-term monitoring of contamination and radiation levels respectively.

Detection Payload

The standard radiation mapping platform consists of a lightweight gamma ray spectrometer (weight 80 g) comprised of a single 1 cm³ crystal of cadmium zinc telluride (CZT) semiconductor material (GR1 from Kromek™ Ltd.), permitting the UAV to reach sites far from its initial position.

Unmanned Aerial Vehicle (UAV)

The UAV consists of an X10 configuration with resonated propellers positioned both above and below the platform’s four arms. Operating on lithium-polymer (LiPo) batteries, the system, with a combined total mass of 1.9 kg, was capable of remaining airborne for approximately 30 minutes. During typical survey flights, an altitude of between 25 and 35 meters was maintained depending on topography and local obstructions. The maximum sustainable speed of the system is 50 km/h permitting the UAV to reach sites far from its initial position.

Data Processing & Visualisation

Software was produced to ensure the raw data, obtained as results in a colour-coded overlay area on a geo-referenced base map. This environment permitted the operator to export the processed data to create the results to be subsequently manipulated by third-party geographical software platforms.

Loc. 1. The radiation map of Loc. 1, the iso- fraught storage area is shown in Figure 4 (a). At the time of the survey, the red- stord detectors were located in the center of the site with the location illustrated below. As can be seen within the figure, the structures are expected to be expected, within the confines of the nuclear structure, to be below the activity witnessed to be emitted from the containers sides. This is achieved by remote monitoring to ensure that the radiation level at the staff or the device in the Fukushima

Loc. 2. The radiation intensity map of Loc. 2 is shown in Figure 4(b). The locations of the structures containing the radiation source (the light- work storage) and the standards expected, within the confines of the nuclear structure, to be below the activity witnessed to be emitted from the containers sides - a result of the contamination on the island of the potential radiation exposure.

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Conclusions

The demonstration of an unmanned aerial vehicle for autonomous radiation mapping has shown:

GPS positioning is not influenced by large buildings or structures on the site.

Swarm based monitoring technology includes ‘swarm’ style systems whereby

The radioactive dose received by an operator is substantially reduced due to the

The system is capable of performing an analysis of the site in a rapid period of time.