

## High Resolution, Terrain Independent Radiation Mapping

SCOTT, Thomas<sup>1\*</sup>

<sup>1</sup>Interface Analysis Centre School of Physics University of Bristol

The University of Bristol has developed a terrain-independent, wide area radiation mapping system using an UAV (Unmanned Aerial Vehicle). At the heart of the system is a micro computer, carried by a semi-autonomous multi-rotor copter (drone), combining data from a lightweight gamma spectrometer, laser range finder, and GPS, to geospatially map radioactive anomalies.

Aerial vehicles can be purpose built, according to range/flight time required, payload/sensing strategy and operational environment. For example, an unmanned vehicle could be tailored for mapping over both land and sea areas, where it could land in the sea at different locations to make water based gamma measurements. The system is also adaptable for use on ground vehicles, or handheld, walking surveys.

Information is streamed in real-time, providing high resolution detail on source isotopes, intensity and location of the radiation anomaly. More than just a flying Geiger counter, the system can differentiate between natural and man-made anomalies - such as types of nuclear fuel, radioactive waste or spent munitions.

This is all achieved from a safe distance, keeping people and manned aircraft away from hazardous environments.

Examples of uses include;

\*Rapid disaster response monitoring of nuclear events, providing real-time data on spread, source and intensity. This could range from site incidents to terrorist events.

\*Routine monitoring of nuclear sites (internally and externally), mining operations and oil and gas facilities.

\*Nuclear plants - new build: site survey and characterisation of pre and post construction and monitoring during plant life time.

\*Environmental monitoring for site decommissioning.

\*Environmental monitoring of war zones for spent depleted uranium munitions.

\*Homeland security and nuclear material detection.

The instrument securely transmits the location, identity and intensity of radionuclide contamination to a remote operator or base station. Sub metre resolution is attainable by flying slowly, even to the point of a fixed hover, relatively close to the ground.

It can be operated manually, using traditional radio-controls or semi autonomously via programmed GPS waypoints. Grid lines are used to create survey routes that provide detailed geographical coverage of a designated area. Programming can include automated landing and take-off, such that the device can gather long exposure spectra of the region of interest.