



Autonomous Airborne Radiation Monitoring System



Accurate, affordable and versatile low-altitude aerial radiation detection vehicle

Real-time location, measurement and mapping of radioactivity with isotope identification

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ImiTec

Radiation cannot be seen, smelt or felt but in significant doses can kill. Understanding radiation, its risks and benefits can help individuals and society to make informed decisions about the use of radiation and the actions required to protect from possible harm.

To minimise the risk and impact of radiation, early and rapid detection of contamination, which might be in inaccessible places, is essential as is the need to minimise the exposure of monitoring teams.

The ImiTec Autonomous Airborne Radiation Monitoring (AARM) system is an accurate, affordable and versatile low-altitude aerial radiation detection system

Real-time location, measurement and mapping of radioactivity with isotope identification

Radiation technology specialists Kromek and ImiTec have joined forces to offer the Autonomous Airborne Radiation Monitoring system (AARM) which provides low-altitude mapping of radioactive contamination. AARM delivers metre resolution maps of radiation including over high dose areas and inaccessible locations whilst minimising the risk of operator exposure.

AARM locates measures and maps radioactivity and the isotopes present in real-time significantly speeding and improving the efficiency of radiation detection and decision making.

AARM is comprised of ImiTec's Remote Isotopic Analysis System™ (RIAS™) mounted on a Small Unmanned Aircraft System (SUAS). RIAS payload contains a lightweight Kromek gamma spectrometer and positioning devices utilising custom-built software to combine radiation intensity and geolocation data to produce high-resolution mapping of radiation levels and identification of isotopes present.

Early and rapid detection of contamination in inaccessible places

AARM allows a level of spatial resolution not previously achievable in locations where, due to the radiological hazard, controlled access is required e.g. hot zones. Because no operator shielding is required as with surveys performed by people, AARM effectively reduces worker exposure to radiation.

Although the SUAS is highly autonomous, there is a small need for trained staff to operate the system with only take-off and landing requiring real-time piloting. Each survey route is saved as a collection of GPS waypoints, altitudes and velocities that allows the same survey to be conducted repeatedly to study any change in the distribution of radioactivity over time.



AARM Payload

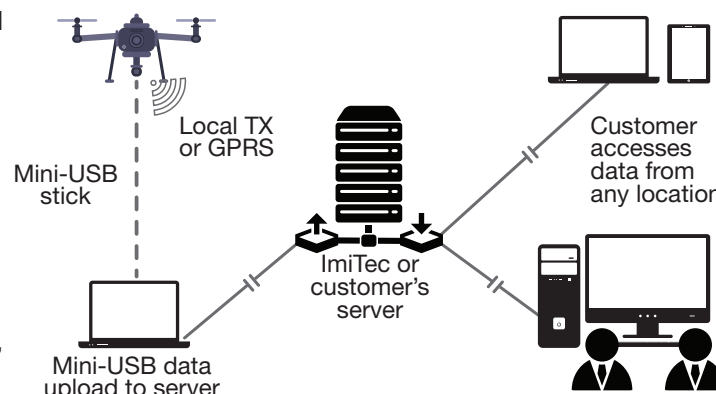
Real-time data collection and transmission through a secured network

Data is transmitted through a secured network utilising a local radio or mobile phone network to a dedicated base station server. This allows the operators conducting the survey, as well as decision makers remote to the area being monitored, to view and interrogate the results

as the survey progresses and enables the near real-time integration and inclusion of the results into the site-wide monitoring and/or command and control systems.

Data is also stored on an on-board mini-USB memory stick for subsequent downloading. The RIAS can be mounted on a client's own SUAS or a SUAS can be supplied if required. As well as examining the radiological contamination over an area, the vantage point offered by a surveying SUAS can be useful for other aspects of site monitoring and assurance

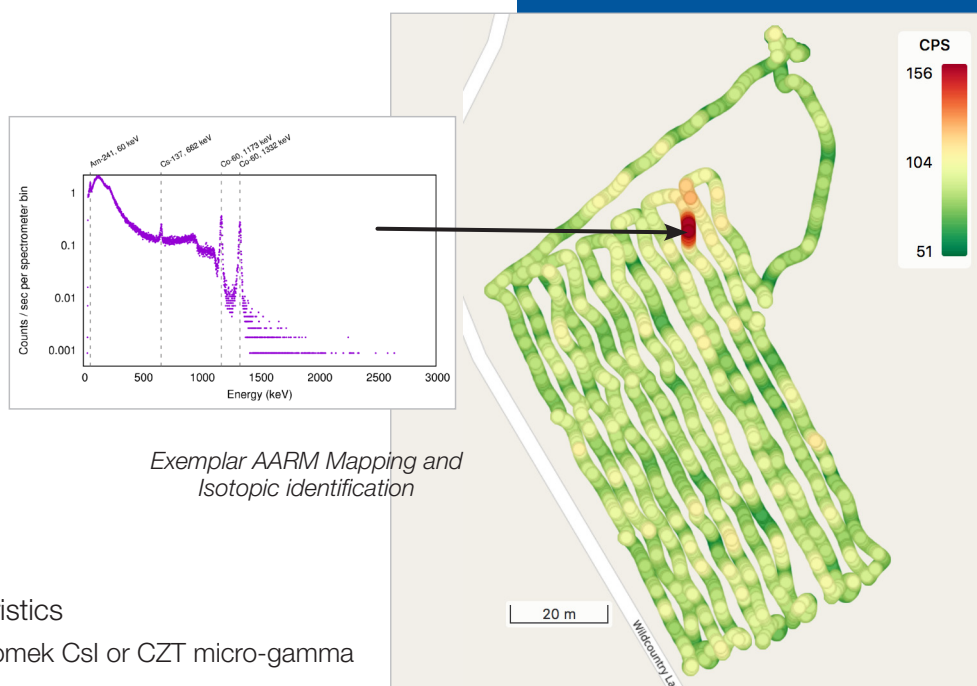
particularly photogrammetry. Combining detailed 3D topographical mapping with radiation surveying has powerful implications for the way that radiological contamination can be measured and displayed.



AARM Data Network

The Kromek / ImiTec offer:

- ImiTec's AARM™ payload including 1 x Kromek micro-gamma spectrometer
- ImiTec's bespoke data processing software or data hosting service
- Small Unmanned Aircraft System
- System training and commissioning at clients' site (NB: SUAS pilot training can be provided through a 3rd party partner)
- Through-life support including Help desk



Exemplar AARM Mapping and Isotopic identification

AARM Characteristics

- Choice of Kromek CsI or CZT micro-gamma spectrometers
- Sub-metre mapping resolution for flying at 1-3 metres altitude
- Counts per second (CPS) and gamma spectrometry spectral data transmitted in real-time
- All data encrypted in AES and RPA format
- All data simultaneously recorded and stored on board
- Bespoke software for processing radiation data in real time
- Laser ranging to determine height above ground to ~1mm over 100m
- Weights: Typical SUAS all up weight: <7Kg
- Typical SUAS characteristics:
 - Range - 1km or line-of-sight (legal)
 - Autonomous deployment and mission capability

Applications

- Rapid emergency response monitoring of radiation events, providing real-time data on spread, source and intensity
- Routine monitoring of nuclear installations throughout the life-cycle from new-build to decommissioning
- Monitoring radiation in the oil & gas industry
- Environmental monitoring for radiation hazards
- Exploring for Rare Earth Elements
- Defence and Homeland security operations

AARM Benefits

- Minimise operator risk
- No operator shielding of micro-gamma spectrometers
- Rapid response
- Wide area coverage
- Isotopic fingerprinting
- Pre-programmed flight paths
- Terrain and hazardous environments independent (over trees, fences, buildings, steep slopes, dangerous ground)
- Rapid, more detailed surveys
- Combination of radiation mapping with aerial imaging and observation



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Kromek is a leading provider of radiation detection solutions based on high performance sensor materials for applications within the medical, nuclear and security screening markets.

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ImiTec

ImiTec specialises in the research, development and manufacture of novel methods for detecting, characterising and mapping radiological contamination in the environment.

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