



RADIOLOGICAL MAPPING SOON AUTOMATABLE BY DRONE

CBRN-E

After multi-tasking robots capable of taking action in a nuclear zone, land mapping, taking samples and measuring radioactivity without exposing personnel and drones with investigative radiological capacities conceived to intervene in nuclear power plants, a new indispensable drone has been brought to the table of inventions specialised in the detection and identification of nuclear and radiological materials.



MEASURING, MAPPING, IDENTIFYING, CONFINING

In the last few decades, the French National Radioactive Waste Management Agency (ANDRA), the Radioactive Protection Service of the Armed Forces (SPRA), the Institute for Radiological Protection and Nuclear Safety (IRSN) and the French Society for Radiation Protection (SFRP) have all worked to measure, map, identify and confine radionuclides in a bid to limit danger. These radionuclides can be found in all types of difficult to access environments on account of incidents, or voluntary dispersal (terrorism). Many land based systems were developed to closely measure these risks, but once dispersal covers too great a surface the rover cannot carry out its work, and the only recourse is the helicopter, the use of which is expensive and limits possible interventions. This solution was notably used to measure the radiation levels in Fukushima after the 2011 catastrophe. Two years later, almost 300,000 people were still unable to return home due to high radiation levels. The Japanese government decided after using these helicopters in 2013, because of the expenses incurred and the inaccurate results achieved, to send drones to obtain more precise

results. Readings were carried out in an elementary school in Yamakiya (40km from the factory) using a Hexacopter Mini-Surveyor equipped with a Geiger computer.

In 2013, French authorities had also launched an appel d'offre for the Homeland Security Department to study the capacity of these drones in nuclear, biological and chemical detection. The company EURIWARE, an IT subsidiary of Areva, bought in the same year by Capgemini, won the tender at the time for 205,000 euros excluding tax.

The expected technological advancements offered hope especially as the drones were a precious tool in the inspection and preventative detection of nuclear incidents.

BUILT-IN RADIAMETER AND SPECTROMETER

For the last 4 years, companies, SMB, researchers, academics and experts have continued their work. Among them, the SDS group who work in radioprotection under their brand IMS Innovation and Measurement Systems, a golden nugget created in France in September 2011 following the transfer of CEA LIST technologies from their centre in Saclay. Depicting the reflection of these SMB of



manageable size that bring innovation to high technologies on French soil, Bernard Leibovici - President of SDS – and his team imagined constructing a purpose built drone with a radiometer and spectrometer so as to allow to measure and identify from a distance and quickly map an area. *“The very light and communicative IMS tools represent a rising interest in the equipping of drones and robots. The organization should adapt to pre-empt new threats. The demand for equipped unmanned vehicles is very clearly rising”* specifies Bernard Leibovici.

IMMEDIATE AVAILABILITY

By the end of the summer, in collaboration with ADT Drones, a startup company, SDS will present their drone with two different rotating pods, each carrying IMSRAD sensors. This highly stable drone will enable the user to carry out remote fixed measurements in humid environments. It will also automatically carry out detailed mapping of large, potentially contaminated areas. Designed for action, this drone as well as its ground station will be easily transportable and set up in less than 5 minutes.

This invention is directed at the monitoring of;

- Basic nuclear facilities
- Critical facilities in particular delicate

Seveso sites

- Basic nuclear facilities undergoing dismantling
- Waste management facilities
- Vitally important locations
- Sites open to the public

UNIQUE PERFORMANCES

The SDS-ADT Drones system allows the operator of the drone or a rear base (up to 1km) to control monitoring requirements, dose, spectrums and their real-time identification, the position of the drone on a map and triggered alarms. With a weight of 4kg, the drone has a battery life of 30 minutes. Furthermore, a specific capacity drone for radiological remote measurements in a reduced size will be developed at the end of 2017. Its flying distance will be 4km in UHF (due to transmission limitations for data link synchronisation from the French national frequency agency) (ANFR) and 70km GSM. With a weight of 2kg the battery life of this drone will be 40minutes. The conditions of use allow a flight out of visibility for personnel security, an automatic navigation for speed and the reproduction of measures and automatic area mapping.

Also selected by the Directorate-General of Civil Aviation, it can fly in S1 S2 and S3 mode (three flight scenarios issued by the aviation regulation of

December 17th, 2015) and could therefore intervene anywhere necessary. Its data transfer technology allows it to adapt to its urban environs (by using GSM networks) or rural (by using UHF connections), within the limits fixed by the French national frequency agency (ANFR).

The radiological drone will become an indispensable tool in the near future in the monitoring of nuclear facilities, of radiological mapping in the case of an incident, of accidents or even malicious acts (dirty bombs) Site managers of vitally important French facilities are already expressing their interest in this device for which tactical experimentation is already scheduled for September. With 1381 identified sites of vital importance, the future seems promising for our two SMB.

And SDS doesn't hide its intentions to export; *“We have won our spurs with the transfer of technologies from the French Alternative Energies and Atomic Energy Commission (CEA). We have since consolidated our expertise, our savoir-faire and affirmed our legitimacy with our promising projects and our operational and efficient implementation with renowned French clients. This allows us to turn towards the world market.”* concludes Bernard Leibovici.

The Republic of Singapore has already expressed its interest for this solution which should be available and perfectly operational by the end of the year.

Key Assets

The use of drones in measuring is a mature technology due to the development of transporters and their piloting skills, in the miniaturization of captors and automatic data processing. Their use allows valuable time saving and is a means of securing control by reducing risks and limiting personnel's exposure to ionizing radiation.