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Application of Miniaturized sensors to Unmanned Aerial Vehicles, a new pathway for the survey of critical areas

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During the latest decades, an increasing of threats associated to CBRN events took place.

For what regards break-out of chemical and radiological compounds, several episodes have occurred, such as unwanted industrial leakage, intentional use of chemical weapons by non-state actors or smuggling of nuclear material, that, by materializing a global threat, have conducted to casualties the actors involved, inter alia fire brigades and military first responders. Concerning the equipment provided to these operators, huge progresses have been done in portable detectors, now able to employ numerous different working principles and technologies. Nonetheless, especially during the survey phase after a CBRN release, the operators enter in a potentially contaminated area without knowing type and amount of the contamination, running the risk of losses during the reconnaissance.

On the other hand, nowadays we are witnessing a worldwide spread development of Unmanned Aerial Vehicles (UAV), with countless uses in different fields. They have founded fruitful implementation across civil and military ground in aerial photography, express shipping, gathering information during disaster management, thermal sensor drones for search and rescue operations, geographic mapping of inaccessible locations, severe weather forecasting.

What if we could send one or more of these flying platforms equipped with CBRN sensors, geo-localized and able to collect samples and to detect in real time a contamination. Subsequently, once the CBRN incident occurrence is confirmed, after the analysis of collected samples is likely to determine the chemical compound or the radiation emitter involved and the level of contamination. If all this is made feasible, we will be able to minimize or completely avoid the exposure of personnel, moreover it will be determined the exact position of the hotspot and better supported the choice of personal protective equipment to be used to enter in the hazard area. Finally, time will be saved by an early UAV survey, while waiting to obtain the safety permissions for entry in the area.

To sum up, in this paper will be examined different possible applications of sensors for detection and identification of CBRN materials, miniaturized with the aim to be applied to a flying platform in the way to lower the exposure of personnel, civil defense or military personnel, with drastic reduction of casualties and time loss.

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