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ETHON: unmanned aircraft for forest fire management

[1]Vinué-Visús, D., [2]Liz-Graña, J.L., [3]Puig-Serra, S., [1]Quílez-Moraga, R., [2]Molina-Lázaro, M.A., [1]Oliver-Villanueva, J.V. and [3]Ortiz-Benito, D.

[1]*Universitat Politècnica de València, Spain*
[2]*Pyro Fire Extinction, S.L., Spain*
[3]*UAV-Works, S.L., Spain*

Abstract

To improve both information gathering and firefighting management and to ensure the complete fire suppression, a new airborne system has been designed based on the integration of three main elements: an unmanned aircraft with a high autonomy and payload, airborne thermal sensors and micro-sensors with ground dispersion capacity. The fixed-wing aircraft is VTOL-capable, allowing its use in rough environments without airfield preparation or catapults to be launched. It has a flight range and payload capacity superior to multicopters of similar weight order. Thermal imaging is used for automatic recognition of temperature thresholds and hot-spot detection to ensure the total fire suppression and to monitor the fire edge. In addition, a dispersion system of miniaturized sensors able to record biophysical variables as temperature and gas concentrations has been included. By spreading those sensors from the UAV´s cargo hold following a controlled bombing plan it is possible to create a local network to monitor the progress of the fire. The integration of the three components has been validated under controlled conditions following the operating methods and criteria required by the fire-fighting services. An advanced type-2 aircraft model is currently being designed while linking all the physical devices into a digital environment of communications and software.

Keywords: airborne sensors, UAV, proximal & remote sensing

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