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Author: Prof. Fernando Aguado Agelet
University of Vigo, Spain, faguado@uvigo.es

Mr. Diego Nodar
Universidad de Vigo, Spain, diego.nodar@space.uvigo.es
Mr. Alberto González-Muiño
University of Vigo, Spain, alberto.gonzalez@space.uvigo.es
Mr. Aaron Nercellas
University of Vigo, Spain, aaron.nercellas@space.uvigo.es
Mr. Diego Hurtado de Mendoza
University of Vigo, Spain, diego.hurtado@space.uvigo.es
Mr. Simon Lacroix
CNRS, France, simon.lacroix@laas.fr
Mr. Rafael Bailon-Ruiz
LAAS-CNRS, France, rafael.bailon-ruiz@laas.fr
Prof. Joao Tasso de Figueirido Soussa
University of Porto, Faculty of Engineering, Portugal, jtasso@fe.up.pt
Mrs. Maria Costa
University of Porto, Faculty of Engineering, Portugal, mariajoaocosta1989@gmail.com

RESULTS OF THE FIELD-TRIALS OF THE THE WILDLAND FIRE REMOTE SENSING (FIRE-RS) PROJECT

Abstract

The Wildland Fire Remote Sensing (FIRE-RS) project, with an execution period from July 2016 to July 2019, developed within the European Interreg SUDOE Programme, implements an innovative system for prevention, detection and mapping of natural disasters, centred on wildland fires.

The final concept can be considered as a system of systems, integrating four technologies: forest-based infrared land sensors for fire in-situ detection, CubeSat spacecraft (LUME-1) for early warnings and communications coverage, UAVs for high-accuracy fire mapping and real-time data acquisition, and a situation assessment tool for performing efficient risk assessments and coordination strategies, both during and after the wildland fire emergency.

Before the final integration of the system of systems, each constitutive technology has been tested individually, including the LUME-1 2U Cubesat satellite, launched on 27 December 2018 from the Russian Vostochny Cosmodrome on a Soyuz 2-1a Fregat rocket. The LEOP and Commissioning phases of LUME-1 have been successfully completed, and the satellite platform, the communication payload and the ground transceivers are fully operational.

Besides, two pilot tests have been defined to evaluate the overall end-to-end system performance. The first scenario includes the detection of real and/or synthetic fire from the infrared land sensor within a maximum radius of 2 Km that generates alert messages to be broadcasted to the LUME-1 satellite. The spacecraft (LUME-1) receives the alert message and automatically relays it to the ground facilities located at Vigo University, using the on-board SDR communications payload. The Payload Operations

Centre distributes the hazard message to the Control Centre located at LAAS, which will generate specific actuation guidelines to the UAVs controlled by Porto University.

The second pilot test incorporates real flights of UAVs. This scenario includes a synthetic fire detection retransmitted from LUME-1 satellite to the Control Centre. In this case, two UAVs fly over the emergency area to perform a more detailed mapping and characterisation of the zone. They use onboard optic payloads, wind sensors and an SDR communication system to gather detailed data. The data is integrated within a Situation Assessment software suite.