



Embedded systems technologies applied to environmental impacts assessment on forest firefight

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ABSTRACT – Embedded systems are electronic devices with a high amount of automation and combine hardware and software to perform specific tasks. In the PROMETEU project (headquartered at the University of Brasília), aiming the environmental impacts assessment of forest fires and firefighting, we develop three families of embedded: SAPHIRA 3, PROMETEU and OBÁ. The SAPHIRA 3 family started on a functional prototype in 2014 and evolved into mobile systems for collecting atmospheric data (eg, carbon monoxide and particulate matter) and terrestrial (eg, iconography and flame temperature analysis). Due the presence of GPS modules, it produces maps on a detailed scale for the study of fire and its fighting. SAPHIRA 3 collects large amounts of data and has real-time and post-processing capabilities in decision making. Thus, for example, we can program the capture of a photograph as for a given condition, such as a standard value for carbon monoxide or flame detection. However, the SAPHIRA 3 family spend a high amount of energy and need a heavy energy cell or a permanent power supply. It has been used in AT-802F aircraft of the Fire Department of the Federal District (Brasília/Brazil), with a capacity to launch 3,000 liters of water. In this case, the data collected presents the atmospheric conditions above the forest fire, as well as the conditions that collaborate and compromise the effectiveness of aerial firefighting. The SAPHIRA 3 family, when attached to the backs (coastal pump) of the brigadiers has its autonomy limited to few hours. So, we develop the OBÁ family, with less processing capacity, but able to map labor conditions (atmospheric pollution and basic weather data) and chemicals scars generated by the use of chemical fire retardants. The last family, PROMETEU, has smaller dimensions and weight for it use coupling into drones (RPA - Remoted Piloted Aircrafts), monitoring or controlling cameras and devices (sensors and cameras) for thermal infrared (IR) and near-infrared (NIR) spectral bands in the assessment of the terrestrial thermal patterns and in the vegetation analysis.

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