ICARUS: a European Project Using Unmanned Aircraft Systems for Search and Rescue Applications

G. de Crombrugghe[1], S. Ourevitch[1], G. De Cubber[2], D. Doroftei[2]

[1]Spacetec Partners, Brussels, Belgium, crombrugghe@spacetecpartners.eu
[2]Royal Military Academy, Brussels, Belgium, geert.de.cubber@rma.ac.be

Keywords: Search and Rescue, Robotics, C4I.

Abstract:

Recent dramatic events such as earthquakes and flooding have shown that local civil authorities and emergency services may have difficulties with adequately managing crises. The result is that these crises lead to major disruption of the whole local society. A primordial task during any crisis intervention is the search for human survivors on the incident site. This is a complex and dangerous task, which, too often, leads to loss of lives among the human crisis managers themselves. The introduction of unmanned devices can offer a valuable tool to save human lives and to speed up the search and rescue (SAR) process. Therefore, many research projects concentrated on the development of unmanned SAR technologies for detecting, locating and rescuing humans, notably in the context of EU-sponsored projects. However, the technologies developed within these have a great difficulty finding their way to the end-users, due to a number of remaining bottlenecks in their practical applicability. The ICARUS project addressed these issues, aiming to bridge the gap between the research community and end-users, by developing a toolbox of integrated.

The objective of the project was to develop robots which have the primary task of gathering data. The unmanned SAR devices were meant to be the first explorers of the area, as well as in situ supporters to act as safeguards to human personnel. In order not to increase the cognitive load of the human crisis managers, the unmanned SAR devices were designed to navigate individually or cooperatively and to follow high-level instructions from the base station. The robots connected wirelessly to the base station and to each other, using a wireless self-organising cognitive network of mobile communication nodes which adapts to the terrain. The unmanned SAR devices were equipped with sensors that remotely detect the presence of humans. At the base station, the data was processed and combined with geographical information, thus enhancing the situational awareness of the personnel leading the operation with in-situ processed data that can improve decision-making.

Four years after the beginning of the project, the ICARUS consortium successfully built and tested multiple robotic platforms that are now commercially available and ready to be deployed in real life emergency situations. In particular, the ICARUS partners have developed three aerial platforms including:

- A solar aircraft designed for long endurance flights at low altitude. The platform is 6 meters long for only 6 kg and has beaten the world record of continuous flight, staying in the air for a full 81 hours;
- An octocopter equipped with visual and infrared cameras that produce very accurate 3D maps of the environment for incident mapping;
- A smaller RPAS designed for indoor operations and equipped with a sensor for real-time 3D reconstruction.

More information on our website: http://www.fp7-icarus.eu/