



Editorial: Special Issue for selected papers from IMAV 2019

US

Micro aerial Vehicles (MAVs) are gathering a lot of attention in Research Groups and Industries all over the world, due to the blooming number of civil applications, including industrial inspection, safety and security, and agriculture among many others. These many applications firstly emerged from the possibility of having “eyes” (i.e. cameras and other sensors) in many different positions that were hardly possible (or simply impossible) before the use of drones.

The International Micro Air Vehicle Conference and Competition (IMAV) is a yearly event focused on encouraging the development of cutting-edge technologies for MAVs with an ever-increasing levels of autonomy in civil applications. IMAV, which first started in Europe (in Braunschweig, then Toulouse, and then Delft...), has become the de facto intercontinental event when it was organized in Beijing in 2016, and has been hosted on different continents ever since, until this last edition in Madrid from September 29th to October 4th, 2019.

IMAV 2019 gathered around 200 participants from 27 different countries; from Asia, the Middle East, North, Central and South America, and Europe. 22 teams participated in the indoor and outdoor competitions and 28 papers were accepted to be presented at the conference, out of which 6 papers were nominated as candidates for the special award and the best paper award, all of them highly qualified after a blind peer-review process. The competition challenges stimulated research on real life scenarios, with several prizes recognizing a variety of achievements. This year, the IMAV event has a special focus on the growing interest in using flying robots in the area of logistics, in which Correos (Spanish Post Company) acted as the conference’s Platinum Sponsor and brought real-world elements to both competitions. Correos, together with Gold Sponsors Airbus, Parrot,

AFOSR and AURA Group, and Silver Sponsor BitCraze, enabled IMAV to contribute to the research on small flying robots.

This Special Issue presents innovations in different areas related to drones and their autonomous capabilities, including mechanical design, fluid mechanics, navigation, control, sensors, pose estimation, simulation, data processing, etc. The selected papers compiled in this Special Edition are an improved version of the papers presented at the conference, in most cases with additional experiments and improved conclusions. The papers present research in both the fields of design as well aerial vehicle autonomy. The research presented include the study of convertible configurations of aerial vehicles, including a flap on a propeller wing configuration, illustrating its advantages on aerodynamic designs for low speed flights. Other research presented also include autonomous flapping wing aerial vehicles weighing around 30g with a monocular camera, demonstrating the achievability of complex perception and control tasks in a miniature sized aerial vehicle in order to achieve autonomous flight in challenging environments. A study regarding multi-aerial-vehicle configurations is also included in this special issue, with a state of the art trajectory following a control-based algorithm, tested in both simulated as well as real world data, capable of maintaining a desired formation in real time with only a single pilot required in the control loop. Together, these selected papers give an overview of the current cutting-edge technologies in the field of Micro Air Vehicles.

Guest Editors:

Pascual Campoy
Centre for Automation and Robotics (CAR),
Universidad Politecnica Madrid, Spain

Paloma de la Puente
Centre for Automation and Robotics (CAR),
Universidad Politecnica Madrid, Spain
Blue Ocean Robotics, Denmark

Hriday Bavle
Centre for Automation and Robotics (CAR),
Universidad Politecnica Madrid, Spain
Blue Ocean Robotics, Denmark

Adrian Carrio
Centre for Automation and Robotics (CAR),
Universidad Politecnica Madrid, Spain