



imav2019

11th International Micro Air Vehicle Competition and Conference

September 29-04- October 04, 2019

Madrid, Spain

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Preface

It is our pleasure to present the proceedings of the 11th International Micro Air Vehicle Competition and Conference, which was held in Madrid, Spain from September 29-04 till October 4, 2019. This event aims at stimulating and challenging the research in the area of Micro Air Vehicles (MAVs) for real world applications, by both competing in realistic scenarios (indoors and outdoors) and also by presenting the new proposed solutions in conference papers.

This year, the event has a special focus on the growing interest of using flying robots in the area of logistics. We are very grateful that Correos is our platinum sponsor and could bring real-world elements to the competitions. Together with gold sponsors Airbus, Parrot, AFOSR and Aura, and silver sponsor BitCraze, this enabled IMAV to contribute with innovative answers to realistic industrial problems by using small flying robots.

These proceedings contain twenty-eight peer-reviewed scientific papers presented at the IMAV-2019. The topics of these papers contain a nice mix ranging from aerial vehicle design and energy sources to control, navigation and perception. Together, the papers give an overview of the current state-of-the-art of the field of Micro Air Vehicles.

Finally, we want to express the hope that the specific nature of the IMAV event (a combination of a scientific conference and a real-world competition) in combination with the open-access nature of the publications, will continue to advance the state-of-the-art in the area of small flying robots for real world challenges.

September 2019

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Guest Speakers

Urban Air Mobility, a vision by Airbus

Dr. Isabel Del Pozo de Poza Head of UTM – Urban Air Mobility AIRBUS

Isabel del Pozo de Poza has over 10 year experience in the ATM field. She started working at Boeing Research & Technology Europe (BR&TE) participating in common initiatives between NextGen and SESAR, supporting the trajectory based operation concept on both ATM modernization programmes. Isabel holds a PhD addressing the “Assessment of Fairness and Equity in Trajectory Based Air Traffic Management”. She joined Airbus Helicopters in 2013 as an Expert and in the field of ATM and Civil Operations and Head of Department for Mission Management. She is leading within Airbus the traffic management initiative to support and enable new operations.



Autonomous Drone Racing

Prof. Davide Scaramuzza, Professor of Robotics and Perception at Dept of Informatics at University of Zurich Dept. of Neuroinformatics at Univ. of Zurich and ETH Zurich

Davide Scaramuzza does research at the intersection of robotics, computer vision, and neuroscience. Specifically he investigates the use of standard and neuromorphic cameras to enable autonomous, agile, navigation of micro drones in search-and-rescue scenarios. He did his PhD in robotics and computer vision at ETH Zurich (with Roland Siegwart) and a postdoc at the University of Pennsylvania (with Vijay Kumar and Kostas Daniilidis). From 2009 to 2012, he led the European project sFly, which introduced the PX4 autopilot and pioneered visual-SLAM-based autonomous navigation of micro drones.

For his research contributions in vision-based navigation with standard and neuromorphic cameras, he was awarded the IEEE Robotics and Automation Society Early Career Award, the SNSF-ERC Starting Grant, a Google Research Award, KUKA, Qualcomm, and Intel awards, the European Young Research Award, the Misha Mahowald Neuromorphic Engineering Award, and several conference paper awards. He coauthored the book “Introduction to Autonomous Mobile Robots” (published by MIT Press; 10,000 copies sold) and more than 100 papers on robotics and perception published in top-ranked journals (TRO, PAMI, IJCV, IJRR) and conferences (RSS, ICRA, CVPR, ICCV).

In 2015, he cofounded a venture, called Zurich-Eye, dedicated to the commercialization of visual-inertial navigation solutions for mobile robots, which later became Facebook-Oculus Switzerland and Oculus’ European research hub. He was also the strategic advisor of Dacuda, an ETH spinoff dedicated to inside-out VR solutions, which later became Magic Leap Zurich. Many aspects of his research have been prominently featured in the popular press, such as Discovery Channel, BBC, IEEE Spectrum, MIT Technology Review Magazine.



R&T supporting UAS development. The role of Research Organizations in UAS/RPAS innovation chain

Francisco Muñoz Sanz Head of Department: Center of Aeronautical Innovation and Systems Engineering Subdirector of Aeronautical Systems INTA, National Institute of Aerospace Technology. Spain

Aeronautical engineer. Polytechnic University of Madrid. 1980. He joined INTA in 1983, where he has played the following roles:

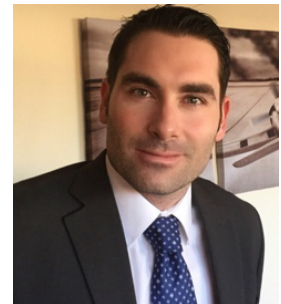
- 1983-1990 Flight Test Engineer
 - Qualification and validation engineer of Aircraft Performance, Flying Qualities and Flight Control in C101, C212, CN235, T26 programmes.
 - Flying qualities and Flight Control engineer and delegate in the Group of Official Test Centers (OTC) of the EF 2000 Eurofighter Programme. 1987 1993.
- In 1993 he was appointed responsible for the development and project manager of the SIVA UAS. First RPAS development system at INTA and first national project in that size and complexity category.
- Following the above, he has been the head of the workgroup (later Department) in charge of all developments on unmanned systems that INTA has addressed:
 - Surveillance systems: SIVA (300kg), ALO (50kg), MILANO (1000kg).
 - Air target systems: ALBA (25kg), DIANA turbojet (160kg).
 - Other studies and developments of related technologies. Nowadays, he conducts the Aeronautical Innovation and Systems Engineering Center (Centro de Innovación Aeronáutica e Ingeniería de Sistemas) at Aeronautical Systems Subdirector, which is coordinating all activities related to RPAS/UAS under development at INTA by endorsing from Project Management up to the Final Integration and Flight Test duties..



The European Regulation Framework for UAS Operations

Juan José Sola Bañasco Head of Remotely Piloted Aircrafts Unit (RPAS/DDRONES) at Agencia Estatal de Seguridad Aérea

Juan José Sola heads the Dept. of Remote Control Piloted Aircraft (RPAS) at AESA State Air Security Agency. He is Aeronautical Engineer from Universidad Politécnica de Madrid, belonging to the State Aeronautical Engineers Corps, and Master in Leadership and Public Management from the Menéndez Pelayo International University. He has been Project Manager for the multinational company SENER and afterwards he developed various activities related to Air Navigation for the ISDEFE consultancy. He has extensive experience in aeronautical auditing with about a hundred inspections as Team Leader. He is currently a member of the ICAO (International Civil Aviation Organization) and participates in national and international working groups, such as the JARUS (Joint Authorities for Rulemaking on Unmanned Systems) initiative. Finally, he has given numerous courses and papers on regulations and supervision in the field of air traffic services and unmanned aircraft.



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