# GT UAV June 21st, 2019

## Detailed Program (abstracts included)

**Venue :** Auditorium de l'Hexagone (new university library), Luminy Campus, Marseille, France, https://goo.gl/maps/HR5UaFaJGBJ2

Bus stop (line B1): Luminy Faculté

Authors are encouraged to make their presentations in English.

09:20 Welcome by F. Ruffier, P. Castillo

09:30 **Vito TRIANNI** (CNR, Roma, Italy) "Precision agriculture with UAV swarms" *Invited talk*

10:15 **Sylvain BLAYAC** (EMSE -ISMIN-, Gardanne) "Toward fast prototyping of conformable and lightweight sensitive interfaces for robotic systems" (Short talk)

10:30 Coffee break & Demos

Demo 1 Valentin Divay, Roger Delattre (EMSE -ISMIN-, Gardanne) "ID-Fly mini airship project"

10:50 Vito CIULLO, **Lucile ROSSI** (UMR CNRS 6134 SPE - Université de Corse) "Monitoring the geometric characteristics of a vegetation fire by drone"

11:20 **Juan-Antonio ESCARENO** (XLIM Institut de recherche - Université de Limoges) - "Energy-based Consensus in Multi-Agent Systems"

11:50 **Julien MARGRAFF** (XLIM Institut de recherche - Université de Limoges) - "Navigation autonome de drones avec évitement sub-optimale d'obstacles dynamiques basée sur courbes de Bézier"

12:20 Lunch at CROUS Luminy (offered by ISM lab)

13:45 **Pascual CAMPOY** (Universidad Politécnica de Madrid, Spain) - "Vision on board Drones: from inspection to guidance in GPS denied environments" *Invited talk*

14:30 **Thibaut TEZENAS DU MONTCEL** (Gipsa-lab, Grenoble) - "BOARR : A Benchmark for quadrotor Obstacle Avoidance using ROS and Rotors".

15:00 Coffee break

15:20 **Hernan ABAUNZA** (UMR Heudiasyc, UTC - CNRS, Compiègne) - "Aggressive deployment of a quadcopter aerial vehicle".

15:50 Visit of ISM-Biorobotics lab

16:30 Closing of the meeting

Invited talks

9:30 **Vito TRIANNI**
*CNR, Roma, Italy*

*Title:* **Precision agriculture with UAV swarms**

*Abstract:* Precision agriculture represents a very promising domain for swarm robotics, as it deals with expansive fields and tasks that can be parallelised and executed with a collaborative approach. Weed monitoring and mapping is one such problem, and solutions have been proposed that exploit swarms of unmanned aerial vehicles (UAVs). In this talk, I will present the work performed towards the deployment of UAV swarms in the field. I will present the implementation of collective behaviours for weed monitoring and mapping, starting from parallel field coverage, moving to collaborative mapping of weeds, and finally discussing strategies for the self-organised deployment of UAVs into the field to implement non-uniform coverage strategies.

*Biography:* Vito Trianni is a permanent researcher at the Institute of Cognitive Sciences and Technologies of the Italian National Research Council (ISTC-CNR). He received the Ph.D. in Applied Sciences at the Université Libre de Bruxelles (Belgium) in 2006, a master in Information and Communication Technology from CEFRIEL (Italy) in 2001, and the M.Sc. in Computer Science Engineering at the Politecnico di Milano (Italy) in 2000. His research mainly involves swarm intelligence and swarm robotics studies, with particular emphasis on the design and analysis of complex self-organising systems and distributed cognitive processes.

13:45 **Pascual CAMPOY**
*Universidad Politécnica de Madrid, Spain*

*Title:* **Vision on board Drones: from inspection to guidance in GPS denied environments**

*Abstract:* Unmanned Aerial Vehicles are increasing their application field to indoors, where their high manoeuvrability and agility can play an essential role. The main challenge for these indoor applications is the UAV accurate positioning and control regarding its environment and the objects to interact with (e.g. inspection and physical manipulation) in such a GPS denied environment. Such a big challenge requires to successfully exploit sensor fusion based on vision as a key sensor, that also plays and especial role not only in positioning, but also in scene recognition, see&avoid, as well as control and navigation itself. Several of the techniques that are now giving a big impulse in improving UAV autonomy for indoors are Visual Inertial Odometry (VIO), Visual Semantic SLAM, Deep Learning object recognition and localization, as well as direct Reinforcement Learning for planning and control, among others. This talk is aimed to bring together mentioned techniques with the common objective of contributing to use UAV as a versatile Aerial Robot in a huge amount of GPS denied robotics applications.

*Biography:* Pascual Campoy is Full Professor on Automatics at the Universidad Politécnica Madrid UPM (Spain) and visiting professor in TUDelft (The Netherlands), he has also been visiting professor at Tong Ji University (Shanghai-China) and Q.U.T. (Australia). He currently lectures on Control, Machine Learning and Computer Vision

He is leading the Research Group on "Computer Vision and Aerial Robotics" at U.P.M. within the Centre of Automatics and Robotics (C.A.R.), whose activities are aimed at increasing the

autonomy of the Unmanned Aerial Vehicles (UAV) by exploiting the powerful sensor of Vision, using cutting-edge technologies in Image Processing, Control and Artificial Intelligence.

He has been head director of over 40 R&D projects, including R&D European projects, national R&D projects and over 25 technological transfer projects directly contracted with the industry. He is author of over 200 international scientific publications and nine patents, three of them registered internationally. He is awarded several international prices in UAV competitions: IMAV12, IMAV13, IARC14, IMAV16 and IMAV17.

## Regular talks

14:30 **Thibaut Tezenas du Montcel**, Nicolas Marchand
*Gipsa-lab, Université Grenoble Alpes*

*Title:* **BOARR : A Benchmark for quadrotor Obstacle Avoidance using ROS and Rotors**

*Abstract:* Multiple obstacle avoidance algorithm have been proposed over the past years but they have been tested according to different protocols. Some were tested statistically by repeating a task in specific simulated worlds, some were tested to avoid a number of real and strategically positioned obstacles, and another group went through outdoor flights testing in environments that are tough to characterize. The BOARR benchmark aims to give a common framework to test and compare obstacle avoidance algorithms for quadrotors. It offers multiple sensors and multiple indicators relevant to all quadrotors obstacle avoidance algorithms. It uses Ros, Gazebo and RotorS and can be easily deployed.