Journée GT UAV
18 mai 2018

GdR MACS / GdR Robotique

Sorbonne Université, Paris, Tour 55-65, Salle 304 (3ème étage)
Accés: **Métro Jussieu**

• **9h15-9h45: Accueil**

• **9h45-10h30: Juan-Antonio Escareno**, IPSA
Title: **Modeling and Control of Rotorcraft MAVs for Aerial Interactive Operations**

• **10h30-11h15: Jean-Marie Kai**, I3S
Title: **A nonlinear global approach to scale-model aircraft path following control**
Abstract: In this talk, I will present an approach to the path-following control of scale-model fixed-wing aircraft, where kinematic guidance and dynamic control laws are developed within a single coherent framework that exploits a simple generic model of aerodynamics forces acting on the aircraft and applies to almost all regular 3D paths. The proposed control solutions are derived on the basis of theoretical stability and convergence analyses. They are complemented by addressing several practical issues, and validated via hardware-in-the-loop simulations, and experiments.

• **11h15-12h00: Ernesto Gomez Balderas**, GIPSA Lab
Title: **UAV teleoperation in structured environment**
Abstract: In the teleoperation of an unmanned aerial vehicle (UAV), the operator and vehicle are physically separated. The limited sources of information of the environment often lead to poor situation awareness. In order to solve this problem, teleoperation usually involves the use of a visual interface, providing a navigation display and an outside visual generated by a camera mounted onboard the UAV. Additionally, accelerations of the platform and forces on the control perceived on board provide extra information through other sensory channels, enabling a higher control bandwidth as compared to using visual feedback only in the teleoperation. Research in autonomous robots and ground vehicles has commonly suggested the use of an artificial force field (AFF) to map environmental constraints to steering commands for avoiding collisions with objects. Such artificial force field algorithms use the relative position and velocity with respect to environmental constraints, measured by other sensor, in our case we propose a radar mounted on the UAV. Haptic feedback is used in various areas and with different goals; application of haptic feedback in UAV teleoperation for collision avoidance has not been investigated so far. Particularly, when obstacles are outside the field of view, the

haptic feedback might compensate for the lack of visual information about these objects. In order to test our UAV teleoperation system, two systems have been developed, a mini-UAV and a portable helmet. The mini-UAV will be able to receive and send information to the portable helmet, placed on the head of the teleoperator. The helmet could display the images coming from UAV on glasses adapted and at the same time send the navigation controls of the teleoperator.

12h00-13h30: Lunch

• **13h30-14h15: Claude Samson**, INRIA/I3S
Title: **A study of dynamic soaring**
Abstract: We revisit dynamic soaring on the basis of a nonlinear flight dynamics model previously used to design autopilots for scale-model aircraft. The energy-harvesting process associated with specific manoeuvres of a glider subjected to horizontal wind, and on which dynamic soaring relies, is explained at the light of this model. Expressions for the estimates of various variables involved in dynamic soaring along inclined circular paths crossing a thin wind shear layer, as experienced by model glider pilots over the world, are derived via approximate integration of the model equations. A complementary asset of this model is that, given an arbitrary path followed by the glider and an arbitrary wind profile, it yields a closed-form ordinary differential equation (ODE) whose numerical integration allows for easy simulation of dynamic soaring over a large variety of operating conditions. This simulation facility is first used to validate the aforementioned estimates in the case of circular trajectories crossing a thin wind shear layer. It is then illustrated with other examples of trajectories and ocean wind profile models commonly considered in studies about the albatross dynamic soaring abilities.

• **14h15-15h00: Christophe Bertholet**, Alcore Technologies
Titre: **Applications et évolutions des services de la Robotique Aérienne chez Alcore technologies**

• **15h00-15h45: Ioannis Saras**, ONERA
To be confirmed