



Séminaire ISIR
Mercredi 16 novembre 2016 à
14H

Riccardo Spica

Campus Jussieu, 4 place Jussieu, Paris
Salle de réunion H20

Active visual estimation for single and multiple robot systems.

Abstract : When relying on vision-based control techniques, some knowledge about the 3-D structure of the scene is typically needed for a correct execution of the task. This information, however, cannot, in general, be extracted from a single camera image without additional assumptions on the scene. In these cases a Structure from Motion (SfM) estimation process could be exploited for reconstructing this missing 3-D information. However performance of any SfM estimator is known to be highly affected by the trajectory followed by the camera during the estimation process, thus creating a tight coupling between camera motion (needed to, e.g., realize a visual task) and performance/accuracy of the estimated 3-D structure. This talk will discuss a general online trajectory optimization framework that allows maximizing the convergence rate of a SfM estimator by (actively) affecting the camera motion. This active strategy can also be coupled with the concurrent execution of a visual task using appropriate redundancy resolution techniques. The approach naturally lends itself to an instantaneous optimization of the current control inputs driving the system (i.e. the camera linear velocity). Less greedy alternatives, in which an optimized trajectory over a finite time horizon is constantly replanned, will also be discussed. Finally, we will illustrate a recent extension of the active strategy to the problem of estimating the scale of a quadrotor bearing formation in a decentralized way.

Short bio : Riccardo Spica received his M.Sc. degree in Electronic Engineering from the University of Rome "La Sapienza" in 2012. From 2011 to 2012 he joined the Max Planck Institute for Biological Cybernetics in Tuebingen, Germany, as a Master's Student and then as a Graduate Research Assistant. In December 2012 he started his Ph.D. in the Lagadic group of IRISA/Inria, Rennes, France, which he defended in December 2015. Since January 2016 he is a PostDoct in the Lagadic group at IRISA/Inria Rennes, France. His research interests are in planning and control for robotic applications. In particular his current research deals with visual servoing and active structure from motion for single and multiple robot systems.