



Postdoctoral Research Proposal: Visual Servoing for UAVs

Keywords:

Automatic Control, Image Processing, Navigation

Problematic:

This postdoctoral research proposal is part of the research project *Explo-drone* which consists in developing mini-UAVs capable of exploring closed environments (grottos, destroyed buildings...). The autonomous displacement in such an environment forbids the use of GPS and makes it delicate to estimate the state of the UAV. The use of visual sensors seems to be necessary, both to move in a controlled way and to increase the stability of the UAV (presence of walls or aerodynamic perturbations in confined environments). This work will be performed in collaboration between the Onera-DCSD department which has experience in the visual servoing field, and the ISAE-DMIA department which operates embedded systems for UAVs.

Envisioned Approach:

Visual servoing will be the preferred approach during the work because it can lead at the same time to a quick stabilization with respect to a scene of interest (a photography taken at a given moment in time), which can allow for a landing at a given spot, or hovering while the next action is being planned. The second problematic is dedicated to taking into account the aerodynamic effects generated by the proximity of the walls and the presence of strong air flow. In order to deal with these aspects, the combination of visual techniques and adaptive control laws should allow increasing the motion robustness of the UAVs. Several UAVs and robots are available to collect data and to test algorithms. The test platform is based on a Cortex A8 type architecture (Gumstix) on which is present a real-time linux (Xenomai). The implementation is based on the middleware Orocos in order to be compatible with the different UAVs.

Duration: 12 month

Degrees

PhD degree in automatic control (visual servoing, non-linear control).

Contacts

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Applicants should submit their letter of application along with a curriculum vitae to postuler.postdoc.isae@gmail.com **AND** to francois.defay@isae.fr

Limit validity date: december, 31st 2014