FAUCON NOIR UAV PROJECT

DEVELOPMENT OF A SET OF TOOLS FOR MANAGING, VISUALIZING AND MOSAICKING CENTIMETRIC UAV IMAGES

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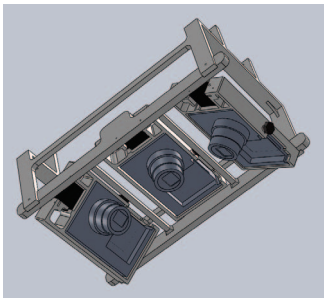
Eager for greater flexibility, and lesser costs, we are often tempted by acquiring high-resolution data with home-made acquisition systems. However, man must admit that we often lack the proper tools to manage and exploit efficiently the flow of data produced in this condition. Indeed, it turns out to be quite difficult to find the suitable picture within a large flow of very high resolution images ; at this scale, the number and the size of the files deny the use of manual searches. It is also almost impossible to be certain that the whole scene has been covered, requiring high redundancy margin. From the exploitation aspect, in high resolution, most of the objects of interest will not be shown in one sole picture but often on several adjoining pictures : we therefore need tools to make simple fusion of the multiple views of the scene. We will present you in this article the realization of a set of tools we made to solve the problems aforementioned.



In our case, as described in our previous article, we have developed an home-made Vertical Take-Off and Landing quad-rotor for low altitude imagery. Our small quad-rotor UAV can embark up to three compact cameras on a stabilized plateform. From the operational point of view, that represents a total of 3500 images at a resolution of 2 to 5 centimetres for a each 20 minutes fly. We will explain the special features of this captor and the problems we face to have fully microsecond-dated and geo-localized pictures at a reasonable cost by fusionning data from in-board GPS and an Inertial Navigation System (INS).

We will then explain the birth of Drone Eye, our data management and visualization tool. Firstly, we will talk about the architecture based on the XML and the XND (XML Native Database) technologies and the XQuery language. Secondly, we will discuss about the conception of an interface with the well-known Google EarthTM for the global visualization of the dataset, giving the opportunity to the users to actually navigate in the image database. Finally, we will present how this tool can be used for operational picture search, mission completion validation and real-time tracking of the dataset acquisition.

In the last part, we will show how a student open-source project of mosaicking, JIM (Jim is an Image Mosaicker) has been included to our process chain. JIM relies on the images contents to calculate the relative geometry of the pictures ; it allow the mosaicking of multiple images by geometric and photometric registration and planar reprojection. After explaining the main steps of the methodology used by JIM, we will present some applications on our data taken from the quad-rotor UAV.