

ALDAU : A SYSTEM FOR SURVEING AND DRAWING EXISTING BUILDINGS

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This project started from the finding of disparity between the power of modern telemeters (distance, accuracy), the progresses of CAD packages for architects (drawing, calculation) on one hand, and the persistance of manual surveying for existing buildings, on the other hand.

The questions were : is it possible to use modern telemeters for surveying existing buildings, with both technical and economical gains ? to store the data (geometric + qualitative) on magnetic devices and process this data with a CAD architectural package so as to draw layouts and edit quantity bills ?

Although the manual surveying lacks accurancy and reliability, it requires redundant geometric data and it needs a long and costly work of rendering of drawings and quantity bills, why is it still persisting ?

Ultrasonic telemeters are very cheap. However, they are not adapted to surveying because of their short range gun and their lack of accuracy related to the angle of incidence, the variation of temperature and the speed of wind. Standard optical telemeters on the other hand are very accurate (distance -few millimeters per kilometer- and angle). But in addition to their high price, they need a mirror to reflect the laser beam. This makes them almost useless for surveying existing buildings since it is not possible to bring the mirror to the points aimed at.

We looked at possibilities to try to industrialize a telemeter made up of a laser with a red visible beam and a camera. The laser and the camera were on the two ends of a bar over half a meter. The camera was used to detect the reflected laser beam. The camera, the laser and the point aimed at would form a triangle whose base was the length of the bar. The distance to the point could be calculated according to the principle of triangulation. However this apparatus was very fragile and its industrialization was problematic. Fortunately, WILD released its DIOR 3002 which can be used without a mirror.

Then, we went for a joint project with WILD France and KEOPS which develops a CAD architectural package KEOPS - KEOPS is also sold by Computer Vision under the brand-name "Personal architect" -. We originally aimed at devising a system for architects. However, it appeared that surveying was even a more crucial need for management of buildings. Following that, we joined two other partners, the technical office of the city of Chambéry and SOCOTEC an international company specialized in building engineering survey. SOCOTEC develops and commercializes a software for management and maintenance of buildings.

ALDAU is made of :

- a telemeter : DIOR
- a CAD architectural package : KEOPS/Personal Architect
- a software to interface DIOR and KEOPS
- a software for management of buildings : BATENT

The telemeter: DIOR (in german) stands for "Distance-meter Ohne Reflector", it is a standard telemeter whose electronic system has been adapted so that it can process the reflected laser beam up to 60 degrees incidence angle, up to 200 meters far according to the darkness and the brilliancy of the surface hit.

Points are materialized by a red laser beam (He-Ne) which superimposes with the invisible leaser beam used for the measure.

The interface between DIOR and KEOPS is made up of a software to capture the data through the DIOR and running on a portable micro, plus a software to smooth the surfaces given by sets of points and to compute the absolute coordinates of points since the measurements on site are always related to the telemeter. This piece of software reconstitutes from the boundaries of rooms and external wall a wire frame model which can then be processed by KEOPS to draw them and make quantity bills according to data captured on site. It is also possible to use CAD environment of KEOPS to add graphics symbols (furniture, trees, floor patterns, etc).

Afterwards, data are ready for any request by KEOPS or BATENT. For example, it is possible from the surveying to design an extension or a restauration of an existing building.

Test are currently under way. They aim at giving us a general evaluation of surveying with ALDAU in comparison with manual surveyings. While the technical and mathematical principles of ALDAU are well known, it is very important to test ALDAU in detail and under real constraints.

What are the implications of the limitations of the telemeter DIOR ? Is it possible to supply manually some geometric data ?

How to capture length, height or width of components whose limits are not accessible ?

Is it necessary to capture redundant data ?

Is it strictly necessary to chain all the stations as in topographical surveyings ? Is it possible for a single operator to survey ? etc.

All these questions, in the end, should help us to evaluate the possibility to use ALDAU and see if it can compete with manual surveying.