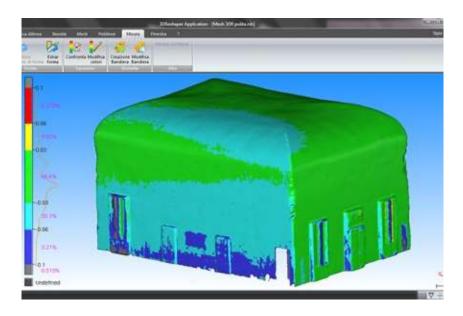**3D Modelling and Augmented Reality. An application on the Salone d'Onore at the Castello del Valentino.**

by: Mirko Dalpozzi
Tutor: Antonia Spanò
Co-tutor: Filiberto Chiabrando

Since the early years of the XX Century was warned and emphasized the need for an efficient solution to the problems related to the preservation of the artistic heritage and the related documentation. The degree thesis analyzes two methods for the survey of cultural heritage: the first is based on the acquisition of data made with the technology of laser scanner, while the second addressed is the "fotomodellazione" or also called image matching, born from the integration of methods modeling following the generation of photogrammetric models points. These methodologies, studied initially by a theoretical point of view, have been put into practice on the Salone d'Onore at the Castello del Valentino.

On it were carried out two acquisitions data: the first with laser scanning and the second with the acquisition of images. As regards the processing phase of the laser scanner, the operations have been completed with two distinct approaches: the first based on the use of open-source programs in order to make architectural documentation more economic, the other through the use of commercial software to generate a results comparison; while "fotomodellazione" was made with a proprietary software. Both techniques are constituted by two phases, the first related to the processing of data which has been analyzed the complete procedural process, while the second is the visual feedback through the projection of texture, for which different solutions have been undertaken in relation the methodology and approach. The first is a system by which you can get good metric results but poor graphics results, the latter due to the lack of the acquisition of images by the laser scanner; while the second allows to obtain excellent results from the point of view of graphics but less as regards the accuracy of the data.

Comparison of the mesh generated and processed with 3DReshaper than PhotoScan"

A common factor of these two technologies is the production of the same products from the point of view of the type, getting 2d and 3d results. Instead, the substantial difference, in addition to accuracy, is the cost to reach the final product. In fact, the economic analysis show how the use of the laser scanner is more expensive, but to overcome this problem has been tested an open-souce approach in the data processing step, even if not sufficient . These two techniques are not opposed solutions, but rather in some cases can also be integrated, this, however, must be chosen on the basis of objectives and obstacles of each survey. The "fotomodellazione" system could lead up to an essential change, with regard to the need to document, promote, preserve and communicate the presence of cultural heritage.

Render the model of the Salone d'Onore entered in the Castello del Valentino, view from the river

The documentation can be easily exploited to share it with the entire community through the use of augmented reality, allowing the enrichment of human sensory perception through information, usually modified and conveyed electronically, that would not be perceived with the five senses. The execution of these apps on everyday devices make possible a view of the innovative model; this system also has the ability to integrate 3d models with general information by input of texts, possibly originated from the analysis done on the work.

Running the "SLAM for full 6D VR / AR" on iPad"

In conclusion realize an effective documentation, with a simple visual interpretation and sharable among different individuals is an essential element for the study of our cultural heritage.

For further information, please contact:
mirko.dalpozzi@gmail.com