

GEOMATICS FOR CULTURAL HERITAGE SURVEYING AND CARTOGRAPHIC HERITAGE

RESEARCH GROUP: Gabriele Bitelli, Mirko Dellapasqua, Giorgia Gatta, Valentina Alena Girelli, Alessandro Lambertini, Emanuele Mandanici, Ilenia Selvaggi, Maria Alessandra Tini, Luca Vittuari, Antonio Zanutta

KEYWORDS: Cultural Heritage, Archaeology, 3D modelling, historical maps

The applications of Geomatics in the field of Cultural Heritage have several purposes: study and documentation of movable or immovable objects, structural monitoring in support of restoration, integration with non-invasive diagnostic techniques (e.g. multispectral/thermal surveys), high-precision replica of works of art, surveying in support of structural analysis, creating databases for the visualization and exploration in virtual reality, new products for museums. The contextualization in the territory is done by low altitude (UAV, balloon) photogrammetric surveys, large scale numerical cartography, terrestrial or aerial laser scanning, high-resolution satellite imagery. The research of the team is oriented to the data acquisition stage, making use of integrated instrumentation (topography, digital photogrammetry, 3D scanning systems of various types, GNSS, satellite remote sensing, GIS), and to the development and application of algorithms and techniques for optimal processing and high-fidelity 3D modelling.

Activities: multi-scale and multi-technical surveys of archaeological sites, from the territory to the single object; surveying and 3D modelling of architectural complexes, also in support of FEM analysis, painted surfaces, sculptures; high-precision topographic control for ancient buildings and infrastructures; 3D survey of small findings, high precision monitoring of decay evolution on historic outdoor brick masonry.

The group has worked in major multi-disciplinary projects in a variety of interventions: Italy, Egypt, Turkey, Albania, Syria, Malta, Uzbekistan, Tajikistan, Peru, Bolivia.

A particular topic, with some significant realizations, is the use of digital methods for the management and enhancement of historical cartography: analysis of the genesis of the ancient map, metrical acquisition by dedicated scanners, accuracy evaluation, special methods of georeferencing, innovative visual techniques, multidisciplinary study of the map contents.

The group participates in Alma Heritage Science, the Integrated Research Team of the University of Bologna on Science & Technology for Cultural Heritage.



Fig. 1. Structured-light projection scanning for 3D modelling (from the “Colonna dei Francesi”, Ravenna). Left: wireframe view; right: photo-textured view, (picture by Bitelli).

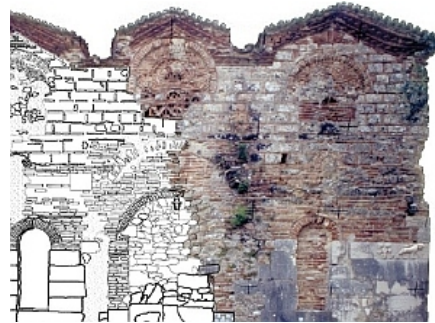


Fig. 2. Vector plotting and raster orthophoto Mesopotam, Albania, (Bitelli et al, 2005).



Fig. 2. Digital processing and 3D modelling from an 18th century scenographic map of Bologna (Bitelli & Gatta, 2011).

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RESEARCH PROJECTS

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PRIN2007 "Approccio multiscala per la salvaguardia di strutture archeologiche murarie in Ercolano: dal rilievo e modellazione alla diagnostica e analisi strutturale". Sc. Resp. A. Zanutta

EU FP7-ENV-2008-1 GA_226995: EU-CHIC - European Cultural Heritage Identity Card. PI: R. Zarnic, UniBO: R. Mazzeo, Local Sc. Resp.: G. Bitelli (2009-2012) <http://eu-chic.eu/index.php>

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PRIN2015 "GAMHer – Geomatics Data Acquisition and Management for Landscape and Built Heritage in a European Perspective". PI: G. Bitelli (2017-2020)

LINKS AND CONTACTS

gabriele.bitelli@unibo.it
valentina.girelli@unibo.it
emanuele.mandanici@unibo.it
mariaalessandra.tini@unibo.it
luca.vittuari@unibo.it
antonio.zanutta@unibo