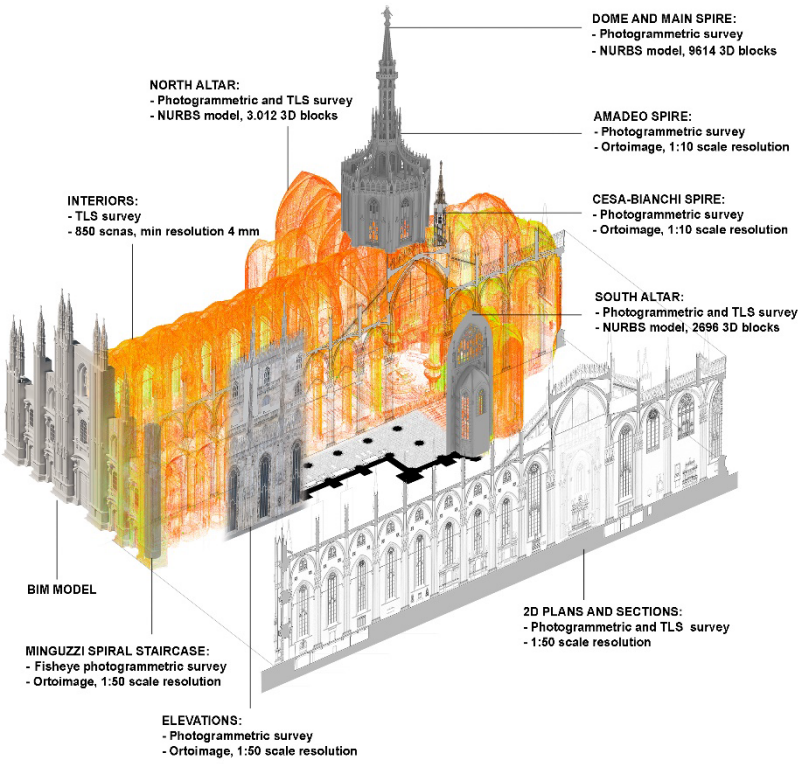
3DSURVEY Group Laboratory (ABCLAB): - https://www.sitech-3dsurvey.polimi.it/

The 3DsurveyGroupLab operates in the field of Geomatics: topography, photogrammetry, and laser scanning. Research activities are focused on 3D digitalization, mainly in the field of cultural heritage. The laboratory specializes in three-dimensional surveying in the archaeological field to support excavation operations, architectural surveying of complex architecture, and environmental surveying with UAV and mobile mapping techniques. Other research topics are BIM and HBIM, 3DGIS, and VR and AR applications.

Milan Cathedral 3D Digitalization project (2008 – 2023)

Scientific head: Prof.ssa Cristiana Achille - Prof. Francesco Fassi

In collaboration with the Veneranda Fabbrica del Duomo di Milano, it is a multi-year project that started in 2008 and is currently ongoing. The primary objective of the project's first phase (2008-2015) was to provide support for the various restoration sites by conducting a high-resolution (less than 1 cm) and high-accuracy 3D survey (representation scale of 1:20–1:50) of several restoration yards, primarily for the main spire. The second phase of the project, which began in 2013, included a survey of the entire cathedral with the overall objective of updating the survey materials and the ultimate objective of creating an information system in the manner of HBIM that might assist ongoing restoration work. After more than ten years of work, a complete 3D point cloud of the Cathedral at a uniform resolution of 5 mm was produced, ready to be used for the widest range of needs. This point cloud was created using laser scanning for the interiors, photogrammetry for the exteriors, and a specially developed patented instrument (Ant3D) for all inaccessible and complex spaces.



A specialized platform for managing the model and site activities, the creation of an Augmented Reality system that can be used accurately during inspection and monitoring tasks, and the development of automatic Point cloud classification at various levels of detail are all current research initiatives.

Fassi, F., Achille, C. and Fregonese, L. (2011), Surveying and modelling the main spire of Milan Cathedral using multiple data sources. The Photogrammetric Record, 26: 462-487. https://doi.org/10.1111/j.1477-9730.2011.00658.x

Fassi, F.:(2020) Reality-Based HBIM for the Management of Monumental Architectonic Heritage. 2019 - The 1st International Symposium on Digital Heritage: convergence of digital humanities. Hwabaek International Convention Center, Gyeongju, Republic of Korea. ISBN: *978-89-299-2130-9* pp: 1-24

Perfetti, L., Fassi, F., and Gulsan, H.: GENERATION OF GIGAPIXEL ORTHOPHOTO FOR THE MAINTENANCE OF COMPLEX BUILDINGS. CHALLENGES AND LESSON LEARNT, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XLII-2/W9, 605–614, https://doi.org/10.5194/isprs-archives-XLII-2-W9-605-2019, 2019.

Perfetti, L. and Fassi, F.: HANDHELD FISHEYE MULTICAMERA SYSTEM: SURVEYING MEANDERING ARCHITECTONIC SPACES IN OPEN-LOOP MODE – ACCURACY ASSESSMENT, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XLVI-2/W1-2022, 435–442, https://doi.org/10.5194/isprs-archives-XLVI-2-W1-2022-435-2022, 2022.