



POLITECNICO  
DI TORINO

# Honors thesis

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MASTER'S DEGREE  
IN ARCHITECTURE FOR THE RESTORATION AND  
HERITAGE

*Abstract*

**Photo modeling techniques for reading architectural  
forms and their decoration  
The Vank Cathedral in Isfahan, Iran**

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The historical and cultural value of the built heritage represents also the identity of the civilization which has formulated it. The conservation and valorization of Cultural Heritage require an extensive documentation, both in properly historic-artistic terms and regarding the physical characteristics of position, shape, color, and geometry.

The survey disciplines have refined over time the techniques of data acquisition in step with technological development, from simple methods based on direct survey to those derived from classic Photogrammetry and Topography.

The latest technologies have allowed the detection and representation of three-dimensional objects with remarkable accuracy as sculptures and archaeological finds, and substantial items such as architectural structures or parts of the cities.

The selected case study is the Vank Cathedral in Isfahan in Iran; it is a building of the Safavid epoch (cent. XVII-XVIII) that is an age in which the architecture and especially the architectural decoration reach their peak.

The migration of Armenians to Isfahan is essential to mark the turning point: the social position of the Armenian merchants was relevant, since they played a significant role in the national consciousness as political delegates of Iran in other countries.

That fact promoted the development of innovative formulations of Armenian art that combine the Iranian art and the Eastern traditions with Western naturalistic works.

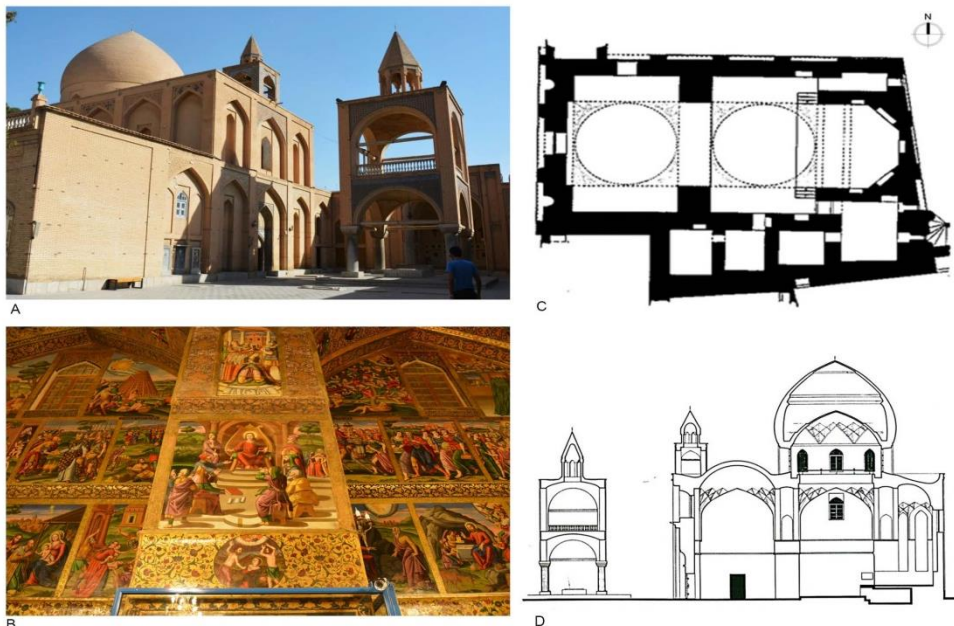


Fig1. (A): A view of the Vank Cathedral in New Julfa in Isfahan, Iran.

(B): The frescoes of the interior walls.

(C, D): The plan and the longitudinal section.

The main objective of this master's thesis proposal is the photo modeling and the subsequent reading of architectural forms and decoration of the interiors that are the frescoed surfaces of the Vank Cathedral. To achieve this goal, our research looked at two main areas:

The first phase of research was directed to the identification of historical, cultural and artistic contexts of the Armenians before and after migration to Iran with the examination of the various selected cases through which we operated a comparison of the architectural features, the decorations and the frescoes. The analyses of recurring characters and peculiarities continued with a specific comparison with Vank Cathedral so that similarities and differences lead to identify the formation of a model of the Armenian Church pertaining the Safavid epoch.

In 1615, the Shah Abbas I assigned an area reserved for Armenians, a large area south of the river "Zayandehrood" which is called "New Julfa". All the churches of New Julfa in terms of religious principles and construction are built in accordance with the churches of Armenia: the plan is longitudinal and the shape of external facade of dome is quite different from the style of Armenian architecture, is based on that style of Iranian Safavid epoch.

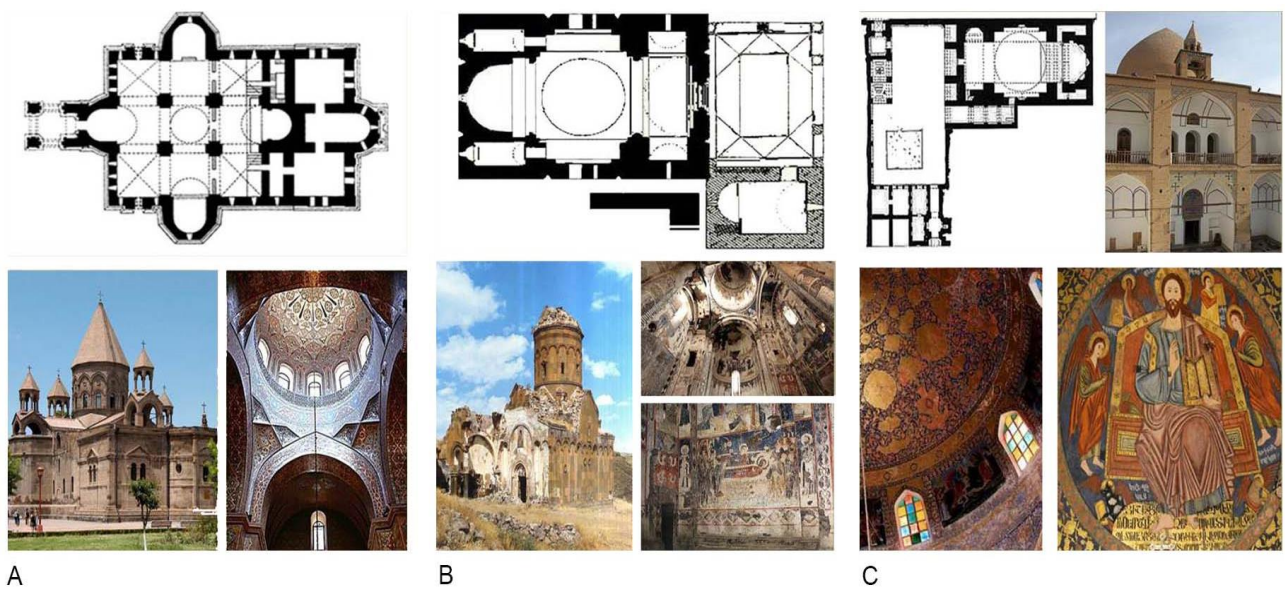


Fig 2. (A): Patriarchal Church of Echmiadzin (Armenia, cent. IV).  
 (B): Church S. Grigor (Ani, Turkey, cent. X).  
 (C): Church of Bethlehem (Isfahan, Iran, cent. XVII).

The characters of Vank Cathedral such as the position of the domes, the arches, decorations leading to the dome are similar to the mosque of Sheikh Lotfollah. The space inside the cathedral is enriched with rich decorations: the lower part of the interior walls is decorated with glazed ceramic tiles called "Haft Rang" which literally means "seven colors"; the rest of the interior walls have a number of important and unique frescoes entirely related to the stories of the Old and New Testaments, the Acts of the Apostles in accordance with the stories of St. Gregory. The 113 panels on five registers have a reading order that proceeds from right to left starting from the apse.

The most important features of the decorations are typical of mosques and Persian architecture of the seventeenth century like typical rules of symmetry, reflection, repetition and geometric order.

The second aspect of the thesis consists of an operational analysis. With the use of digital photogrammetry which make acquisition of photographic images for 3D photo modeling and with the development of a dense and accurate three-dimensional points model, we

have passed to the stage of generating all the traditional two-dimensional architectural drawings as plans, sections and elevations integrated with photogrammetrical orthoprojection of frescoed surfaces.

The availability of orthophotos allows and facilitates the iconographic reading of the frescoes; adding to the radiometric data there is the metric potentiality of reading the proportions and composition of the organization of the frescoes. After we have obtained a deep knowledge of the liturgical sources of the frescoes, we have passed to analyze in each fresco the historical events on which they are based, architectural details, clothings, commonly used objects, composition and depth of the work according to the importance of the characters and the subject of the paintings. After the examination of the many paintings of Byzantine art, Western and Eastern, we identified that the style of the frescoes of Vank Cathedral is an innovative combination that has some elements of Byzantine and Western characteristics intermediate between these two styles. Furthermore, it should not be overlooked the important role of the Armenian and Persian architecture which leads a new style in modern art influenced by the traditions of Armenian and Persian Safavid epoch.

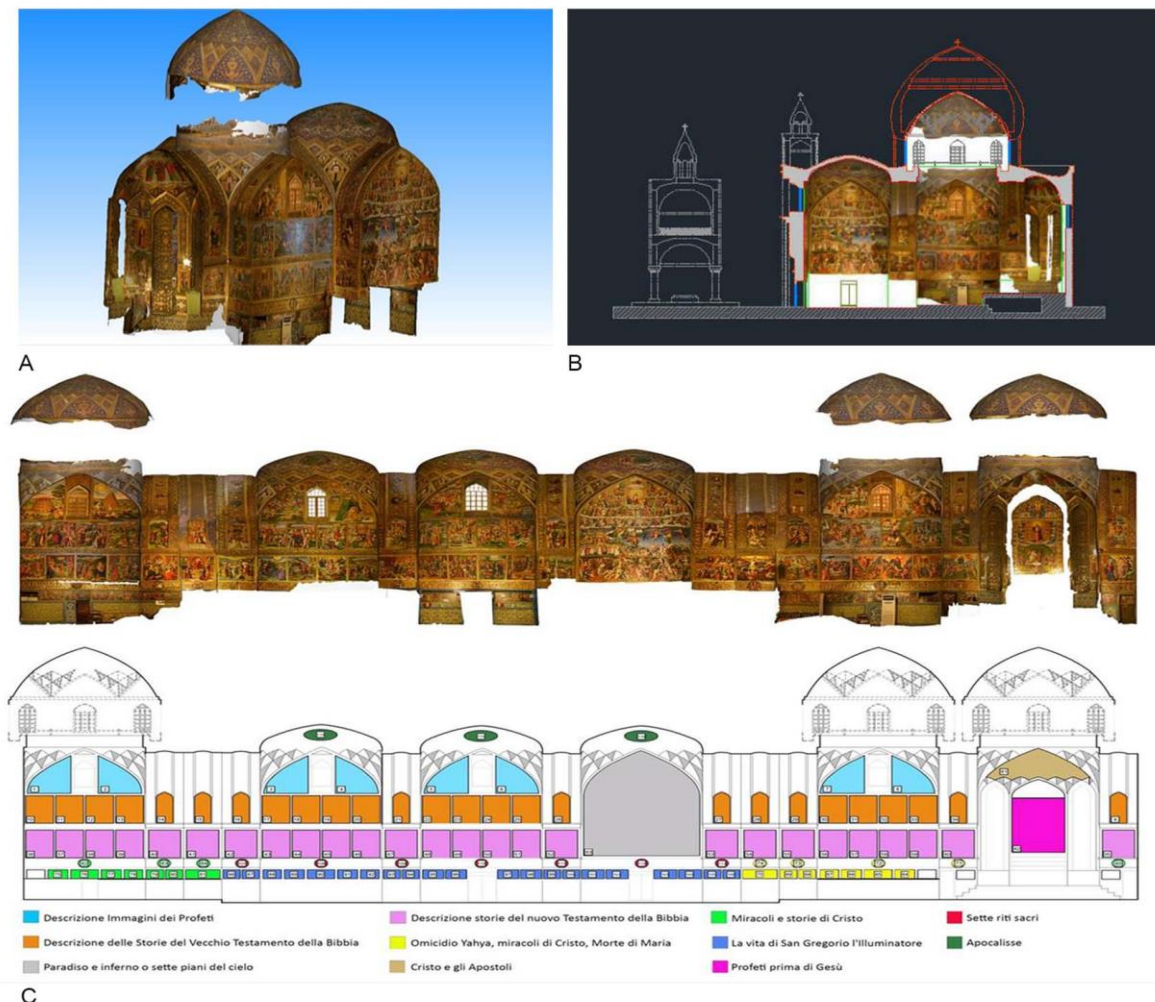


Fig 3. (A): Final result given by the projection of all the orthophotos.  
 (B): Final result of architectural drawings in AutoCAD.  
 (C): All orthoprojection of frescoed surfaces and compositional diagram of the various registers with colorful screens.

Moreover, the processing of usable orthophotos is a proper tool for the documentation and knowledge iconography of the frescoes in the Cathedral, and it can be even exploited for the recognition, preservation and restoration of the frescoes in subsequent periods.

In conclusion, the method based on the correlation of images, i.e. the 3D photo modeling, could lead to an important chance, as regards the need to document, develop, preserve and communicate the presence of cultural heritage such as the frescoes of the "Vank Cathedral" that are an innovative example of this period and they are a result of exceptional and unique quality, perhaps little known.

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