

# Digital Reconstruction of Lost Architectural Heritage on the Case Study of Two 19th Century Houses

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**Abstract.** I discuss sources, main stages and results of digital three-dimensional reconstruction of destroyed houses from the 19th century in the town of Teteven. The goal is to test a new model of preservation of architectural heritage which exists now only in archived drawings and to establish new conditions of rethinking its value in virtual reality. I introduce the concept of monuments of absence insofar as the digital avatars possess authenticity and sacredness.

**Keywords:** 3D, Preservation, Architectural Heritage, Virtual Reality.

## 1 Introduction

In this paper, I set the question for the preservation of architectural heritage and more precisely the question of its binary opposition - the loss of architectural heritage. The topic is up-to-date because of the contemporary wars that ruin hundreds of architectural monuments in Ukraine, left irreversible damages in the ancient Roman town of Palmyra in Syria and erased the stone statues of Buddha in Afghanistan. The world-renown French researcher and visioner of architectural heritage Françoise Choay is author of one of the best analyses on the phenomenon of vandalism. Her main thesis is that actions for preservation occur when the total absence of architectural heritage is realized and reconsidered (Choay, 2022, p. 90). She sees vandalism in its various forms, for instance, in the wave of ideological destructions during the French revolution (Choay, 2022, p. 91); creative vandalism when reconstruction is unacceptable interference into monument original structure (Choay, 2022, p. 118); vandalism, result of modern urban planning or of excessive use of architectural monument as a tourist attraction which is “kind of slow, imperceptible, invisible vandalism” (Choay, 2022, p. 131). The shock of loss evokes reaction for protection and preservation of what remains in different ways from new laws and conservation protocols to new research and art works.

In several art-projects destruction of architecture is conceptual platform. One of the most significant examples goes back to the 1970's in New York, where an architect, mostly popular by his title anarchist, Gordon Matta-Clark in photographs focuses on

old buildings in the moment just before their demolition. In Bulgaria, the theme of destruction of architectural heritage has been explored in different perspectives, for example, in the picture series about deterioration of the old Sofia mineral baths (Yonchev, 2013) or in the current art installation at the Venice biennale where a theme for neglected, empty and dilapidated schools is exhibited (Tikvarski, Dumarey, Kokalanov, Giaurova, & Valkova-Goranova, 2023). In my search for similar works I get acquainted with digital projects which address collective memory through represented on websites lost architecture and pre-conflict townscapes of virtual Bosnia. A recent study argues about their positive impact on the local community cohesion (Walasek, 2020).

In my paper the focus is onto the methodological essence rather than on the empirical data. I discuss my research approach and integrated components, theoretical platforms and sources while the two selected case studies play the role for more in-depth structural presentation of my study, which I hope will grow into a book. **My aim** is to test a new model of preservation of architectural heritage which now exists only in archived drawings and to establish new conditions of rethinking its loss in virtual reality. This applied-science research is based on selected archive data of graphically represented houses from 19-th century, which are **object of research**. They have one main common characteristic, namely they are all demolished. However architectural documents about them are collected at the architectural archive of the Institute of Art Studies in Sofia. My research project is a process of retrieving from oblivion the extinct architecture on the archive shelves through two modalities.

**The modality of activity** is contemporary discourse of architectural analysis. It is introduced by several architectural thinkers, but in my view, it is most precisely determined by the Finnish architect and university professor Juhani Pallasmaa in his expression that “Architecture is verb” (Pallasmaa, 2005, p. 63). He explains in an interview (Crosbie, 2021) that “architecture creates a “choreography” of movements, perceptions, and emotions. Buildings direct and guide our behavior”. Prof. Pallasmaa very precisely defines that „this experiential, lived activity and reality is architecture” (Pallasmaa, 2005). The contemporary analytical trend finds application into innovative reconsiderations of historical architectural spaces. According to the researcher of old English house from the Northwestern University, Illinois, prof. Matthew Johnson the most reliable scientific approach is when “central theme is that vernacular building is the study of people acting” (Johnson, 2015, p. 4). He formulates his studies of old residential spaces on specific activities of “the everyday realities of cooking, sewing, washing, feeding and caring for livestock and other animals, sleeping, looking after children, sexual relations, eating, working in gardens and fields” (Johnson, 2015, p. 10), which gain the role of generators of cultural practices and historical narratives. I refer the modality of action to the book *Doing Spatial History*, which is a collection of studies that frame a new area of scientific research called spatial history. The focus on doing introduces new approaches in the studies of space, including architectural spaces (Bavaj, Lawson, & Struck, 2022). What is important in this book is that space and acts of doing are interrelated in the analysis. In my research on the architectural heritage, I implement the approach of doing on two levels. Firstly, in rethinking the old houses, the essence of activity is in the process of digital rebuilding which stands in contrast to the passive position of observer of architecture on paper. On the second level, the activity is in

navigating through the digital houses, so the study of old architecture goes through analysis of actions conditioned by the building spatial configuration.

**The digital modality** is related with the global upsurge of digital representations of architectural heritage during the last three years. The restrictions caused by the covid pandemic boost their development and wide spread to compensate the impossibility of visits in place. In both publications the authors stress on the connection between the innovative explorations of space and the digital technologies such as GIS, scanning drones, technical means of entering virtual reality and many others (Bavaj, Lawson, & Struck, 2022). According to prof. Johnson „the new technologies have a central role to play in developing methods and techniques for the exploration of lived experience “ (Johnson, 2015, p. 17). Through them, a direct answer is found to the question „how buildings might have been experienced by contemporaries” (Johnson, 2015, p. 17). The methods of my research include integration of software applications for three-dimensional modeling and virtual reality headset as technical means for conducting spatial research. The potential of three-dimensional digital reproduction unfolds in the multiple ways of navigating into architectural spaces through digital devices. Apparently, it is a contemporary way of discussion on architecture because presented digitally it comes with many opportunities for sharing in internet.

These two modalities formulate the scientific tasks: to transfer and to interpret through doing and in digital environment the archive data of old architectural structures. They predetermine the direction of architectural theoretical analysis of my research so that it is positioned into the realm of spatial history.

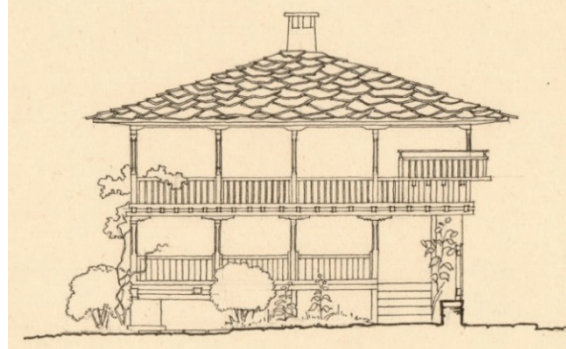
## 2 Essence of Research

### 2.1 Architectural Archive Data

**The Houses.** One of the most renown researchers of house from the Bulgarian lands prof. arch. T. Zlatev in a publication from the time of architectural surveys determines the houses in Teteven into a group of mountain landscape typological model in the middle Stara planina (Zlatev, 1955). My selection of archive units includes two files for houses from the town of Teteven, once situated on G. Dimitrov str 118 (House 1) and on V. Petrov str 1 (House 2), which I find that do not exist in reality.

The two old houses had been assigned protection status of *Monuments of culture of local significance*. This fact is witnessed in a document, issued on May 9, 1963 by the city council executive committee and now available in the Historical Museum in Teteven. Through this act of local power, the two houses along with other are removed from the list of monuments of culture. In another document of 1969 from the scientific archive (unit 162) at the National institute of immovable cultural heritage I find information that the house of Vasil Dermania (House 2) has been demolished and rebuilt with modern building materials. However, in a few years it is removed finally. In fact, this file presents a motivated suggestion by architect A. Bachvarova several old buildings in town of Teteven gain status of Monuments of culture, but it does not happen for these two houses. My conclusion on the collected information is that for several years,

just before their demolition, both houses are of interest for architectural heritage researchers and respectively their architectural value is recognized.



**Fig. 1.** Archive drawing III.1.1.180.05. South façade (House 1), architect L. Kazaski, 1953.



**Fig. 2.** Digital reconstruction. South façade (House 1), architect Dimitrina Popova

After the setup of Communist party-political power, processes of urban modernization begin in a number of small Bulgarian towns such as Teteven. Françoise Choay reminds that the transformations of Paris according to the Haussmann plan in 19th century are criticized as vandalism by some of its contemporaries (Choay, 2022). In my case studies the new urban planning leads to obliteration of the old urban fabric, which is a cultural context that disappears with the layout of new asphalt streets and straight property lines.

Specifically, in his book about the architecture of Teteven from 1975, the author architect Ivanchev testifies that "regulations, regardless of the existing ensemble or of the environment in which house appears, have recklessly destroyed everything around where house remains exposed, without connection to it" (Ivanchev, 1975, pp. 71-72). The architect publishes pictures of several Teteven houses with inscription under them "demolished" (Ivanchev, 1975, p. 72), which means that the destruction is not limited to the two houses I am considering. Physically, the old buildings are not immediately removed when the new streets are imposed. At this moment, houses lose their value after being taken out of context and respectively their meanings fade. "Loss of intrinsic

environment from the time of their construction" (Ivanchev, 1975, p. 72) leads to their final demolition in the 1970s.

**The drawings.** The architectural archive documentation which I use in this study, is available in the sub-fund *Drawings and surveys* and is made by architect L. Kazaski in 1953 (Fig. 1 - House 1) and by architect D. Popov in 1954 (Fig. 4 - House 2). The old houses are measured in situ according to traditional methods of architectural survey and represented in a standardized pattern of architectural rhetoric consisting of abstract lines and signs. It is the house image which is very strongly represented in the drawings where the exact dimensions of building, division of interior spaces and essential elements such as the hearth, doors, staircase and many others are indicated in scale 1:100. I have not found the selected houses' plans or facades in other publications, but even if there are, my point is that the mere publication of two-dimensional drawings is not enough for contemporary reconsidering of old houses' architecture.

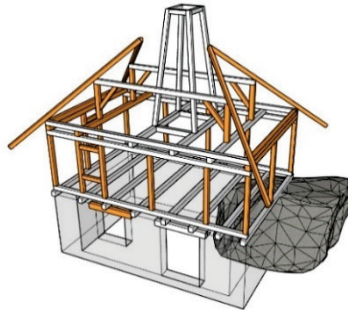
It is important for my study that the houses' image in the archive drawings is idealized to a level that the buildings look like untouched by everyday dwelling. This method of depiction goes back to the antiquarians in Europe from 16 to 18 century when the iconography role arises in the studies of Antiquity (Choay, 2022, p. 66). It is specific that architects draw the ancient buildings into architectural orthogonal projections not in their real condition but by removing the damages of time. The beautiful ideal in the antiquarians' imagery and in the archive documents, which I examine, signifies a demonstrative and rhetorical purpose of the drawings themselves. However, in the archive folder of each house, there are attached, made in situ, hand-drawn sketches. They correct the reconstruction towards reality through complementary, though presented in chaotic manner, information about the house architecture.

## 2.2 Digital Three-dimensional Reconstruction

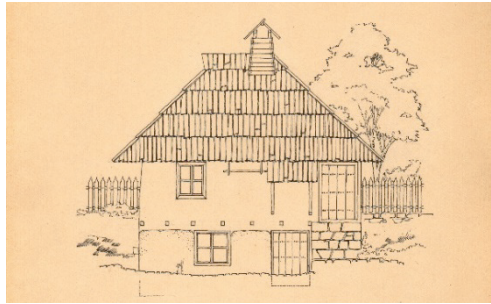
After the study of archive documents, there comes a stage of recreating the selected houses in digital environment. It is implemented by the software applications SketchUp Pro 2022 and Twinmotion 2023. My concept of rebuilding is constructed on three main dispositions.

**Proto image.** The three-dimensional digital reconstruction is the recreation of proto image encoded into the archive drawings. As I point out above, the represented houses in the architectural documents are result of an indirect approach for preservation of architectural heritage known since the 16th century. It is quite possible that the two houses during the time of their existence are home of at least four generations which inevitably affects physically the buildings. But into the architectural graphics there are no any traces of residents' adaptation to daily or social circumstances. It is quite possible that the proto image approach is imposed and not a choice of the architects who represented the buildings. The stylistic, where the temporality aesthetics of the beginning is leading, affects my method of work and analysis as long as I establish continuity with the established approach of depiction. The initial moment of novelty, when the house comes directly from the poetics of architectural idea, is transformed into the new digital reality.

**Diagram.** The digital architectural reconstruction of the lost houses is not just a matter of recreating the image but of preserving the original design including the structural configuration presented into the archive drawings. In my view, at this point of research, it is the essence of doing spatial history. A key task is to overcome missing certain fragments of building documentation which are usually available in a contemporary documentation dedicated for construction works. To achieve high level of credibility of the house reconstruction, my analysis goes through three-dimensional diagrams as an instrument by which I follow the logic of building structure. It is quite possible that the authors of drawings, have decided that the represented information of houses is sufficient to reconstruct the entire structure in height and horizontally (Fig. 3). What is more important is that the analyses which diagrams provoke, go beyond reconstruction because it is a way to prove how a single factor contributes to the final configuration of house spaces and in general the rationale behind this old design.



**Fig. 3.** Structural diagram of House 2; in orange– suggested elements; architect D. Popova.



**Fig. 4.** Archive drawing III.1.1.186.01. South façade (House 2), architect D. Popov, 1954.

**Context.** The context is very important for the architectural heritage because it is perceived in relation to culture that creates it and where it exists. The context suggests concentration of meanings. They are found in the archive drawings, more specifically in the site plans where components of environment connect the two houses with the otherness of Teteven townscape. Elements that refer to other narratives are the entrance gate of house yard, the cherry and plum trees there, household objects like a lit hearth, firewood, a vessel of water. They all are home belongings and are displayed like parts

of a large carrier as long as the house is designed exactly to put things in reference to *The Carrier bag theory* of the American writer Ursula Le Guin and her meaning of “house in its older sense of container in general, a thing that holds something else” (Le Guin, 1989). Therefore, house items add to the digital house reconstruction a sense of carrier of meanings, enough in number to generate multiple narratives, so that the houses not only show but tell stories as well.

### 3 Results

Two digital houses built in 19th century are recreated (Fig. 2). They are copies of the houses located in the town of Teteven. While in the art-projects that I mention at the beginning, the destruction in architecture is central theme, in the present study I recreate houses as if they come from beautiful tales. It is because of the initial data stylistics encoded into the architectural drawings from where I transfer the tempting spaces into the digital reconstruction. Therefore, the rethinking of lost architecture is carried out through aesthetics of the architectural graphics from 1950’s. This specific discourse elevates the digital houses to spaces where the daily domestic activities gain aura of rituals; the fire and smoke, ceiling, hearth seem to come from the legends.

An important result is that once created the digital houses are ready to be represented in different formats including physical model printed by 3D printer. The high export adaptability leads to many opportunities of sharing through different channels and devices, so that digital houses and with them the message about the destroyed architectural heritage reaches many users. I define four digital types of basic formats according to degree of freedom of navigation and exploration of house spaces, and according to the current technical means of access to each format.

- **2D image** (Fig. 2) represents the houses in one fixed view out of many possible for exploring their space. To great extent their presentation is arranged by one author’s view. Its advantage are the several options of publication opportunities on paper or digitally.
- **Video animation** gives a houses’ observer more access to their spaces although viewers’ path is directed. This format comes with higher demands for digital devices.
- **360 panoramic view** is accessible through various digital devices from smart phones to stationary computers, it provides more holistic observation of houses’ spaces. The series of 360 panoramas’ format contains balance between technical requirements and freedom of navigation through the old houses.
- **Virtual reality media** gives the absolute freedom of being into the houses, observing their architecture and navigating through their spaces but nowadays it demands technical equipment of powerful processor, video card, ram memory, paired with vr headset, and specifically, for my research I use Oculus Quest 2.

In the final section of my paper, I comment the representation of houses’ reconstruction into the vr media, which at intervals makes great strides towards development. A difference from the reviewed art works is that I recreate environment which is difficult

to be distinguished from reality. Compared to the houses into the archive paper drawings, the houses in virtual environment are visible, but the feelings of stepping on old wooden floor or of a ceiling above visitor are very strong, as well as the sense of premises that are there after turning back. Exploration of spatial configuration of each house is undertaken by virtual tours. One of the most renowned contemporary researchers of virtual reality prof. Pinotti from the University in Milano states about the immersive media that there are no edges or frames that can help you distinguish what is inside and what is outside the image. The sensation of “presence”, of “being-there”, is very intense (Pinotti, 2017, p. 3). Among his findings, one is very important for my research. He says that virtual environment “has alienated us from the things of the world and their present but at the same time, it has the potential for bringing back some of the things of the world to us” (Pinotti, 2017, p. 3). In my study I face the challenge of bringing back destroyed monuments from the architectural heritage. They are located within the immersive environment of the virtual reality which is not inferior to the real in creating experiences and memories.

#### 4 Discussion on Architectural Memory

After digitally reconstructing and introducing the old houses in various digital media, I come to the fundamental question of memory and its binary opposition - oblivion. My research raises question about the lost buildings in the form of newly recreated digital monuments of architectural heritage, which I define by the term monuments of absence. Prof. Pinotti talks about a paradox that instead of being means of memory, the modern monuments are means of oblivion. Traditionally, memory is associated with material monumental objects - symbols placed in the city to remind. But there occurred a change because in the contemporary townscape where, according to Pinotti, everything including the monuments is taken for granted and constantly losing its ability to impress, they are transformed into way of forgetting. He gives definitions like counter monument, anti-monument, non-ument and non-monumentals (Pinotti, 2017). Indeed, nowadays aggressive visual information in communication dominates and attention is drawn by all kinds of signs in cities.

A new challenge appears from the Teteven houses’ case studies, dedicated to studying and preserving the architectural historical heritage. Memory is addressed through digital devices, where virtual interaction with architecture is of main importance for the spatial experience of house. My point is that the virtual monument stays very close to the architectural monument from reality in two characteristics: authenticity and sacredness.

**Authenticity.** The digital houses are true copies of the houses from the archive documents insofar as they hold the same quantitative and qualitative spatial data for the original buildings in the way they are recorded on paper. Firstly, their image is preserved as precisely as it might have been in a reconstructed monument in reality. At the same time true data about the house materiality is encoded in its completeness into the digital houses, because, for example, the wooden beams and stone base are not substi-



tute by contemporary concrete and steel structures as it often happens now in reconstruction of heritage houses. Secondly, because in reality it is monument which encounters social experience, it is essential what its visitors do around or into it, what action it provokes and what experiences it produces. The recreated digital buildings address memory through experience of the old houses' spaces in a similar way of the house-museums in reality, for example, like those arranged in the town of Koprivshitsa. I find that three-dimensional digital houses are monuments insofar as they recall past and create impressions. It is quite reasonable to say that there is emotional authenticity in remembering the old residential architecture from Teteven, recreated in virtual environment. Therefore the digital houses preserve almost entirely the authenticity of architectural thought from the past.

**Sacredness.** Françoise Choay states that a building is perceived as monument through distancing or when "loss of function creates a historical distance" (Choay, 2022, p. 65). Similarly, the researcher of sacredness in contemporary architecture architect A. Sarbova defines that sacred environment is distinguished from the profane by lack of utilitarian function (Sarbova, 2022, p. 48). In my view, the two houses in virtual reality lack utilitarian function and even more there is no physical, but only emotional and spiritual presence. Like in a sacred architectural place in reality, all architectural elements and their whole spatial composition in virtual reality bear primarily symbolic meanings.

The sacredness in space is distanced from the profane in everydayness, but not from the activity which prof. Sarbova defines as initiation ritual (Sarbova, 2021, p. 279). The activity in a contemporary sacred space is without having any religious meaning and being there is as easy as in a game (Sarbova, 2022, стр. 44). Its role is to "mark frames and give directions of research, development and reflection" (Sarbova, 2022, p. 44). Similarly, I find through the virtual walks and access to the old building spaces, both impossible in reality, that passing through the houses unfolds as easily and tempting as in a game. Being present into the digital houses means to follow an interactive ritual of multiple paths defined by the spatial configuration of old buildings which leaves memories, evokes thoughts and new knowledge.

## 5 Conclusions

The monuments of absence affirm my understanding that reality is dominant and preferred in the pursuit of architectural heritage preservation. Apparently, they dispel concerns that virtual worlds create abandoned architecture. On the contrary, in my research the reconsideration of recreated digitally architecture provokes awareness to heritage buildings in real world that are at risk of destruction.

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