



## VIRTUAL PALMYRA: 3D RECONSTRUCTION OF THE LOST REALITY OF “THE BRIDE OF THE DESERT”

*PALMIRA VIRTUAL: 3D RECONSTRUCCIÓN DE PERDIDO DE LA REALIDAD DE LA “NOVIA DEL DESIERTO”*

Ahmet Denker

Faculty of Engineering and Natural Sciences, Istanbul Bilgi University, Eyup, 34060 Istanbul, Turkey. [ahmet.denker@bilgi.edu.tr](mailto:ahmet.denker@bilgi.edu.tr)

### Abstract:

Palmyra in Syria had been, with its Corinthian colonnades, amphitheater and splendidly built temples to ancient gods, source of inspiration and imagination for Western architecture. Virtual Palmyra project offers a glimpse of the grandeur and beauty of the ruins of Palmyra, none of which any longer remains. 3D models of the most significant structures of Palmyra, including Temple of Bel and Temple of Baalshamin which have been leveled as a result of conflict based vandalism, as well as the colonnaded street and the amphitheater are presented as “ghost images” through reconstructed 3D models. Focus has been in maintaining the accuracy and validity of the visualized data of the relics and environment of Palmyra, as they were once extant.

**Key words:** Palmyra, virtual archaeology, world cultural heritage, 3D reconstruction, digital cultural heritage

### Resumen:

Palmira en Siria, ha sido con sus columnatas, anfiteatro y los templos de antiguos dioses Corintios, construidos espléndidamente, una fuente de inspiración e imaginación para la arquitectura Occidental. El proyecto de Palmira virtual ofrece una vista rápida de la grandeza y la belleza de las ruinas de Palmira, de las cuales ninguna permanece hoy en día. Los modelos de 3D de las estructuras más significativas de Palmira, incluyen el Templo de Bel y el Templo de Baalshamin, los cuales están severamente destruidos a causa de los conflictos basado en el vandalismo, así como el gran columnata monumental y el anfiteatro son presentados como “imágenes fantasma” a través de los modelos reconstruidos de 3D. El enfoque ha sido mantener la precisión y la validez de la información visualizada de las reliquias y del ambiente de Palmira, como eran antiguamente.

**Palabras clave:** Palmira, arqueología virtual, Patrimonio mundial, reconstrucción 3D, Patrimonio cultural digital

## 1. Introduction

Pliny the Elder said: "Situated in a vast expanse of sand and renowned for its fertile soil and pleasant streams, the ancient city of Palmyra was a stopping point for caravans traversing the Syrian Desert" (Pliny the Elder, *Natural History* 5.88.1) An oasis in the Syrian desert, Palmyra was known as “the Venice of the sands” and “the bride of the desert”. Palmyra used to contain well preserved temples which were dedicated to ancient Arab gods, a colonnaded street with Corinthian columns, an amphitheater, and the valley of tombs. It had long been counted among the most eloquent and stupendous ruined cities from the ancient world. As one of the outstanding cultural centres of the world, it was also listed as a UNESCO world heritage site.

Being a pearl of our cultural heritage which holds a significant part of the historical wealth of our modern society, Palmyra had constantly been under threat of demolition. As the latest act in the dark history of

vandalism, Isis (Islamic State of Iraq and al-Sham) imperiled Temple of Baal Shamin. It was followed by the Temple of Bel and the Arch of Triumph. They were unique monuments of a hybrid architectural style which blended Graeco-Roman canons with ancient Middle-Eastern architecture. All landmarks of Palmyra are now gone. With their destruction and disappearance, irreplaceable treasures of the World Cultural Heritage are lost to posterity.

3D computer graphics and virtual reality are the only means of remedy for our collective and irreversible loss. By the project of “Virtual Palmyra” we have aimed at reviving the lost reality of Palmyra by digitally constructing its “ghost images.” Virtual Palmyra project offers a glimpse of the grandeur and beauty of the treasures of Palmyra, none of which any longer remains. 3D models of the most significant structures of Palmyra, including Temple of Bel and Temple of Baalshamin which have been leveled as a result of conflict based

vandalism, as well as the colonnaded street and the amphitheater are presented.

## 2. Digital reconstruction of Palmyra

Records of Palmyra by travellers in the 17th and 18th centuries contributed greatly to this reconstruction work. The British explorer Robert Wood's book (Wood 1753) which had appeared subsequent to Wood's visit to Palmyra provided important sources of graphical data thanks to the drawings by Giovanni Battista Borra. These were the first accurate records of the monumental ruins of Palmyra. Another important source of graphical data has been the drawings of Louis Francois Cassas (Cassas 1900). Cassas had travelled to Palmyra in 1785. He made several drawings of the ruins of Palmyra. His drawings are of indispensable value in providing the much needed graphical data about these ruins. Photos taken between 1867 and 1876 by Felix Bonfils provided the most complete visual record of Palmyra from the 19th century. Wiegand's book (Wiegand 1932) has been the main repository of 20th century information in this reconstruction work as regards to graphical data. Transporting this information into digital models may be compared with Evans' procedure of "translation from drawings to buildings" (Evans 1995).

### 2.1. Digital reconstruction of the temples

Palmyra's temples were the remarkable examples of monumental architecture which blended the Greco-Roman architecture with Oriental architecture. The hybrid elements of these temples demonstrated the numerous cultures that frequently overlapped and intermixed in Palmyra. Temples of Palmyra were among the greatest architectural achievements of mankind until they fell victim to vandalism. They drew on wealthy, canonical forms stemming from both Greco-Roman and Ancient Near Eastern roots.

#### 2.1.1. Temple of Bel

Temple of Bel was the most impressive and the primary sanctuary in Palmyra. It was dedicated to God Bel, the most important of the Palmyrene Gods, the equivalent of Greek Zeus and Roman Jupiter (Schlumberger 1971). Its relic was preserved remarkably well and constituted the most impressive part of the ruins. It used to exhibit the splendid synthesis of Greco-Roman and Ancient Near Eastern Architectures. The temple building was in the middle of an almost square temenos (205 by 210 meters). The cella was a rectangular building which was surrounded by one row of columns. The order was Corinthian. In its outward appearance, the temple looked to derive from the canon of Hellenistic architecture. The isomorphic reconstruction of this temple was presented in (Seyrig *et al.* 1975). The drawings of Propylaeum were given in Wood's book. A scene from the reconstruction of Temple of Bel is given in Figure 1.

#### 2.1.2. Temple of Baalshamin

As with Temple of Bel, Temple of Baalshamin also exhibited hybridity in design. The Greco-Roman traits were demonstrated by its colonnaded precinct, prostyle façade and tetrastyle structure (Collart 1970). The four free standing columns in the façade were finished in

Corinthian order. Alongside overall Classical Graeco-Roman appearance, it also embodied prominent Near Eastern motives. The most visible of them were the windows of cella. These windows which did not exist in the Greco-Roman canon signified that the Deity was inside (Fig. 2).

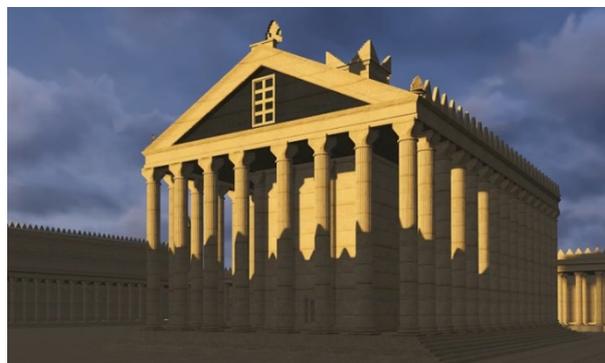


Figure 1: Reconstructed view of the Temple of Bel while sun is setting.



Figure 2: Reconstructed outer-view of the Temple of Baalshamin and its environment.

### 2.2. Digital reconstruction of other landmarks

#### 2.2.1. Colonnaded Street

Colonnaded street is another of Palmyra's great archaeological sites. Despite the Greco-Roman character of the columns, the colonnaded street itself was the most significant of the traits of Eastern tradition in Palmyra. This is because, in contrast to the ubiquity of the colonnaded streets in the Eastern provinces of the Roman Empire, they were almost completely absent in the Western provinces (Ball 2014). It had bestowed upon Palmyra an architectural unity, a common thread that brought Eastern, Western and Central sections of the city together. The Eastern section which ended at the Temple of Bel connected the temple to the Monumental Arch which led the way to Temple of Bel (Fig. 3).

#### 2.2.2. Amphitheater

The Amphitheater has a totally western form. It is a horseshoe-shaped building with a cavea of 92 meters in diameter and an adjoining portico. It was surrounded by a ring-shaped area of 104 X 82 m.

This expansive area had been very likely to be used both by the visitors of the theater and of the caravan dealers who were coming to market their merchandise at the Agora (Fig. 4).



**Figure 3:** Reconstructed view of the colonnaded street.



**Figure 4:** Reconstructed view of the Amphitheater.

### 3. Conclusions

3D Computer Graphics, through technological innovations, offers an ability in 'reconstructing the past' beyond those originally imagined. Starting from 90's (Forte and Siliotti 1997) the use of 3D computer graphics in relation with archaeology and cultural heritage has been a focus of attention for scholars in multi-disciplinary fields. An abundance of publications have emerged in the last two decades which have presented photo-realistic reconstructions of the past. This stream continues to make contributions to the creation of a new legacy in cultural heritage. Reconstructions of the past with the advent of 3D computer graphics and high resolution rendering are increasingly produced and maintained in digital form, thus creating a legacy: Digital cultural heritage. With this work lost reality of Palmyra has been recreated as a new edition to our digital cultural heritage.

### Acknowledgements

The author acknowledges with pride the contributions of his students Berk Gencan, Eren Can Yildirim, Mehmet Cicekler and Meltem Sezer in creation of the 3D reconstructions of this project.

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