Digitizing archaeological finds using 3D imaging

Challenges and future prospects (The Royal Commission for Al-Ula as Form A)

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Archaeological finds are a mirror that reflects the cultural and civilizational heritage of peoples and human groups that prevailed and then perished. There is no doubt that documenting and studying it and knowing how man adapts to his environment and his connection with it and benefiting from its resources requires the use of all modern methods that enable him to do so.

One of these modern methods is digitization, which contributes greatly to achieving the goal, and in the Royal Commission for Al-Ula Governorate, a studio has been established for the digitization of archaeological finds, which includes many equipment and devices, including a 3D imaging device.

In this research, we will address the challenges and dilemmas that we deal with when photographing collectibles using the 3D imaging device and they can be summarized in several points, as follows:

Human challenges

Technical challenges

Collectibles challenges

Challenges related to standards and procedures

Then we will discuss the solutions through which we can deal with the challenges and dilemmas that will face us and finding the best and easiest possible solutions.

At the end, we will talk about the uses of 3D imaging in the field of archeological and heritage, and the ability to benefit from its outputs in new and modern technical projects that keep pace with developments in the field of technology and digitization. The 3D imaging process is just a key to create several projects through which we can add new and useful ones, whether for specialists or others who wish to enjoy these technologies by merging them with this civilized and cultural heritage and coming up with an interactive tourism product that is easy to deal with, and adding more fun to offer and identify holdings, get acquainted with the collectibles that are full of warehouses, And enhancing awareness and respect for this cultural heritage for future generations.

Challenges of using 3D imaging:

Human challenges, which include:

There is no sufficient number of employees to cover the process of photographing the huge number of antiquities in the warehouses.

There is no sufficient number of human cadres with sufficient experience to deal with the 3D imaging process.

The solutions are as following:

Employing a sufficient number of employees to cope with the quantity of holdings filled with warehouses.

Giving employees more training in order to obtain sufficient knowledge to conduct work in accordance with the highest levels of professionalism.

Technical challenges, which includes:

The 3D imaging device shall visualize the finds through a fixed camera and thus the presence of a blind spot at the bottom.

Difficulty dealing with the 3D image processing system, as many steps must be taken to reach the final image.

The solutions are as following:

2.1 Dealing with the blind spot during the photography process, by photographing the piece in two different positions, one horizontally and the other vertically, and then merging the two images with each other to become a complete picture from all sides.

2.2 With regard to the image processing system, it is possible to find the easiest and fastest way to complete the work by identifying the capabilities of the available system, and how to benefit from them.

Collectibles challenges, which include:

The difference and diversity of holdings in warehouses, which requires dealing with each piece in a different way when photographed, according to its type and current condition.

The presence of pieces in bad physical condition or with damage that is difficult to deal with when transporting them to and from the photography studio.

The presence of pieces that need to be fixed when photographed in order to take a clear picture showing all the distinctive features in them.

The solutions are as following:

3.1 Providing a 3D imaging device that can deal with large pieces, such as a handheld 3D imaging device that can deal with different sizes.

3.2 Restoration, maintenance and cleaning of parts which are in poor physical condition, so that they are easy to deal with and not cause further damage to them.

3.3 Use some plastic or sponge tools to fix the pieces when photographing them and clarify their most important features and fine details.

Challenges related to standards and procedures

Establishing standards for photographing pieces commensurate with the nature of each piece, taking into account the quality and clarity of the images.

The absence of a guide for procedures for dealing with pieces when transporting them to and from the photography studio, and how to install them when needed.

The solutions are as following:

Establishing standards for photographing pieces commensurate with the nature of each piece, taking into account the quality and clarity of the images.

Writing a clear guide for the procedures for dealing with pieces in case they are moved, in addition to the method of delivering 3D images, in addition to setting a clear procedure for fixing images with the help of the person responsible for dealing with the pieces.

3D imaging technology uses

3D imaging technology is used in the field of antiquities and heritage in several fields, for example but not limited to the following:

Reproducing or manufacturing three-dimensional models that help researchers and specialists study artifacts, take accurate measurements of length and dimensions, display decorations and inscriptions clearly, in addition to preserving, documenting and protecting cultural heritage by displaying it as a replica model.

Reviving destroyed archaeological and cultural sites through the use of triple imaging technology and creating models of buildings and tools that were used in the past, and presenting them to scientists and the public to learn about how life was in the past and to understand how to live in the best possible way.

Education, teaching and awareness, as 3D imaging technology can be used to provide an informative and realistic archaeological educational experience that enables students and visitors to explore archaeological sites and view museum collections.

Preservation and restoration, as imaging technology allows restorers and conservators of artifacts to better understand them, and analyze damage, erosion, and damage to them, which helps in the process of treating and preserving artifacts.

New technology projects

We can mention some of the projects that we can implement when photographing pieces using 3D imaging technology, as follows:

The virtual museum, which relies mainly on the existence of a 3D image, and a website in which to tour and display the holdings, and add texts and explanations.

Virtual reality or augmented reality, in which the holdings are displayed in a virtual environment using three-dimensional images that combine the use of devices such as a mask that provides screens with realistic visual vision, headphones, hands to control movement and touch gloves that in turn create interaction with the user, and the use of programs that design the environment Virtual reality simulation.

Hologram is a technology that gives the ability to recreate images of three-dimensional objects in space using lasers that rely on light waves, and sounds or explanations can be added when displayed.

In conclusion, the 3D imaging technology can be used in several projects to achieve the goal of education, display in innovative and fun ways, and educate the various members of society about the importance of antiquities and cultural heritage.

Definitions:

3D imaging: It is a holographic imaging technique that displays images in three dimensions, length, width and depth, which makes the image more interactive and realistic.

Technology: the effective organization and use of human knowledge and experience, through means of high applied efficiency, directing discoveries and the potential forces surrounding it for the purpose of development and achieving the best performance.

Documentation: A set of technical operations necessary to provide the maximum use of published or unpublished information. These operations include collecting, drawing, photographing, analyzing, organizing, storing, retrieving and publishing information according to the various needs of scientists and researchers, with the aim of saving effort and money.

Virtual Reality: It is the real reality resulting from the development of interactive technology that allows for the design of a semi-realistic virtual environment.

Digitization: It is the process of converting information into a digital format that can be read by a computer, with the aim of representing an image, sound, document, etc. that is processed to provide an innovative product and services.

Virtual Museum: It is a museum that does not have a tangible physical entity that is displayed on the Internet and allows us to tour it and review museum holdings.

Hologram: It is a unique technology with the ability to form a three-dimensional image in space based on laser beams.

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