3D SCANTASTIC

The vision of the Smithsonian Institute is to "shape the future by preserving our heritage, discovering new knowledge, and sharing our resources with the world". The Smithsonian Institute's 19 museums and 9 research centers are proof of this statement, yet everyday curators and researchers work to discover new, innovative ways to execute this vision. One of which is 3D scanning. The Digitization Program Office (DPO) is head of the 3D scanning initiative and serves all of the museums. From the Cosmic Buddha in the Sackler Gallery of Art and the skeleton of a Wooly Mammoth in the Natural History Museum to the Wright flyer in the Air and Space Museum and a blue crab from the Environmental Research Center, various objects have been 3D scanned. 3D scanning and imaging remains true to the vision statement as it becomes a tool that encourages research, enables conservation, and inspires education.

One of the main goals of the Digitization Program Office's 3D scanning initiative is to deliver another medium through which the public can view the Smithsonian's numerous artifacts. The DPO launched the Beta Smithsonian X 3D Explorer as a public access tool to view the 3D scans of various artifacts. A team of museum curators and conservators from each Smithsonian museum formed to choose iconic objects to be 3D scanned and available on the Smithsonian X 3D viewer. It currently contains the 3D scans of about 60 objects. The objects can be rotated 360◦ and the parameters of the objects, such as colors, opacity, reflection, occlusion shadows, and specularity, can be adjusted by the user. Each object contains hotspots, that when selected, displays information and act as a guide for a tour of the object. The program also puts the 3D scans on the public domain, so that they can be downloaded and printed by a 3D printer. The 3D viewer allows for a more engaging interaction with the historical artifacts. Schools and educational programs can use the 3D viewer as an educational tool to get a closer examination of artifacts without ever leaving their schools. The Smithsonian X 3D viewer continues to become integrated in the K-12 education system as the viewer and 3D technology gains popularity within local schools and afterschool programs to teach about science and technology through historical artifacts.

3D imaging also helps to conserve and preserve artifacts. The Smithsonian's Museum Conservation Institute (MCI) is a center specialized in the conservation of museum collections. MCI uses knowledge of material sciences and history along with innovative technical devices to preserve cultural heritage and provide scientific analyses on museum collection to aid in its conservation. The MCI is challenging and changing the way we think about conservation. Usually conservation is thought of physically restoring an object to its original, but by using 3D imaging techniques, objects and artifacts can be digitally restored and conserved virtually. An example is a terra cotta statue that was digitally conserved by 3D imaging techniques. The statue was completely destroyed into several pieces. However with 3D imaging, the pieces are individually scanned, and the statue is digitally reconstructed. Although, the statue cannot be physically conserved, it is digitally conserved. The remains of a skeleton in Jamestown that was

in very poor condition were also digitally conserved. Each bone was 3D scanned, and the skeleton could be remodeled digitally. These examples show how the typical definition of conservation is changed. The MCI also helps with conservation research by working to understand how and why materials and objects deteriorate. 3D scanning is used to do a deviation analysis to see how an object changes over a certain time period. This data provides conservators knowledge that external or internal factors contribute to the deterioration. The conservator can then create treatment technologies that minimalize or stabilize deterioration. Hence, 3D imaging contributes to the process of conservation and conservation research.

Although the 3D scanning initiative is growing, there are challenges to overcome. Scanning objects is an incredibly time and labor intensive process because everything is done manually. To mitigate these challenges, researchers are developing CT scanning robots and conveyor belts integrated with 3D scanning technology. These innovative ways will make the process faster and less expensive. The future of 3D scanning looks bright.