



When combined with **CultArc3D**, **CultArm3D** is used to capture remaining holes, occlusions or geometrically complex surface areas in more detail.

3D Cultural Heritage

The entire scanning process of one object takes less than ten minutes on average. At any given moment, two artifacts are scanned in parallel. The accuracy of the finished 3D model lies within sub-millimeter range. It can subsequently be linked to other 3D data as well as to provenance information such as its period of origin or artist. For this purpose, Fraunhofer IGD is developing a 3D centered annotation system for artifact classification. It is web-based, has a user-friendly interface and runs on any platform (stationary workstations and mobile devices).

Users

- **Museums:** 3D digitization of geometry, texture and optical material properties of cultural heritage artifacts with high throughput and best possible quality.
- **Industry:** Digitization of companies' product portfolios in the third dimension.

FRAUNHOFER IGD: THE WORLD'S LEADING INSTITUTE FOR APPLIED RESEARCH IN VISUAL COMPUTING

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FAST, ECONOMIC 3D CULTURAL HERITAGE DIGITIZATION

- 2004:** Fire – Herzogin Anna Amalia Library Weimar, many works irreversibly gone.
- 2009:** Collapse – Cologne City Archive 30 km of bookshelves destroyed, years to recover.
- 2015:** Thousands of years old heritage assets in the museum and the library of Mosul as well as further excavation sites in Syria destroyed.

Only when disasters strike does the plea for digitization of cultural heritage artifacts increase. Ten years ago initiatives to mass digitize 2D documents such as books, photos or other works of art laid the foundation for a worldwide market worth 100 Million Euro for service providers and hardware manufacturers. Now Fraunhofer IGD is ready to expand this market into the next dimension: 3D.

Industrialization and Automation of the 3D Digitization process

CultLab3D focuses on industrialization and automation of the whole 3D digitization process of cultural heritage artifacts. We use the latest generation of autonomous, compliant robots and automation systems as platforms for optical scanning technologies as well as dedicated conveyor



solutions while keeping full control of environmental lighting. CultLab3D offers a comprehensive approach to mass 3D digitization, annotation and archival storage in best possible quality. The technology developed allows efficient and large-scale scanning of objects by a fully automated process. At the same time, an object representation true to the original is aspired in the best possible quality by acquiring not only the geometry and texture but also the optical material properties in order to make the objects available for 3D printing processes as well.

CultArc3D

CultArc3D consists of two nested aluminum arcs with cameras and ring lights mounted on them. This allows for the object to be scanned from all sides. Adaptable motion control and image-based methods enable careful handling of an artifact and the capture of his geometry, texture and optical material properties in high resolution. Scanning time is approximately 3 min per object.

CultArm3D

CultArm3D consists either of another camera or a structured light scanner attached to a compliant robotic arm, allowing fully automatic digitization of an artifact's geometry and texture on a turntable.