SCAN4RECO Multimodal Scanning of Cultural Heritage Assets for their multilayered digitization and preventive conservation via spatiotemporal 4D Reconstruction and 3D Printing

Kurzbeschreibung des Projekts:

Scan4Reco will develop a novel portable, integrated and modular solution for customized and thus cost-effective, automatic digitization and analysis of cultural heritage objects (CHOs), even in situ.

A multi-sensorial 3D scanning - facilitated by a mechanical arm – will collect multi-spectra data and then, a hierarchical approach for 3D reconstruction of CHOs will be applied, enabling multi-layered rendering, advancing both analysis and 3D printing procedures. The goal will be to create highly accurate digital surrogates of CHOs, providing also detailed insight over their surface and also the volumetric structure, material composition and shape/structure of underlying materials, enabling rendering either via visualization techniques or via multi-material 3D printing.

Material analyses will be applied, to understand the heterogeneous nature and complex structures of CHOs, to identify the broad and varied classes of materials and to understand their degradation mechanisms over time, deriving context-dependant ageing models per material. Uni-material models will be spatiotemporally simulated, based on environmental phenomena modeling, so as to collectively render imminent degradation effects on the multi-material CHOs, enabling prediction and recreation of their future appearance, as well as automatic restoration, reaching even back to their original shape. Scan4Reco will further facilitate conservation, by indicating spots/segments of cultural objects that are in eminent conservation need and require special care, while suggestions will be provided by a dedicated Decision Support System (DSS), over conservation methods that should be followed.

All the above will be validated on real case scenarios involving heterogeneous objects of various sizes and materials, in 2 pilot real-world use cases. To enhance the accessibility of the digitized cultural objects to the scientific community, field experts and the general public, a virtual model of a museum will be launched.

Deutsche Partner in diesem Projekt:
Fraunhofer-Institut für Graphische Datenverarbeitung IGD, Darmstadt
Dr. Philipp Urban
www.igd.fraunhofer.de

B&W Tek Europe GmbH, Lübeck
Daniel Barchewitz
http://bwtek.com

Weitere Partner:
ORMYLIA FOUNDATION, GR
UNIVERSITA DEGLI STUDI DI VERONA, IT
OPIFICIO DELLE PIETRE DURE, IT
CENTRO DI RICERCA, SVILUPPO E STUDI SUPERIORI IN SARDEGNA, IT
AVASHA AG, CH
RESEARCH FOR SCIENCE, ART AND TECHNOLOGY (RFSAT) LTD, UK

Koordination:
Centre for Research and Technology Hellas
Information Technologies Institute
Dr. Dimitrios Tzovaras
Thessaloniki, Griechenland
www.iti.gr

Förderlinie:
Research and Innovation Action (RIA)

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6. Gesellschaftliche Herausforderung/
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