

PALEOPHONOGRAPHIC SCANNERTECHNOLOGIE FÜR 3D-REKONSTRUKTIONEN ARCHÄOLOGISCHER TÖPFEREI UND ANTHROPOLOGISCHEN MATERIALS

PALEOPHONOGRAPHIC SCANNING TECHNOLOGIES FOR 3D-RECONSTRUCTION OF ARCHAEOLOGICAL POTTERY AND ANTHROPOLOGICAL MATERIAL

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Zusammenfassung

Jüngste Fortschritte im Bereich des kulturellen Erbes sind eng mit der Entwicklung und Nutzung von Hightech-3D-Scanning-Systemen verbunden. Diese Entwicklung ermöglicht die Rekonstruktion der archäologischen Keramik und anthropologischen Materials.

Abstract

Recent advances in the field of cultural heritage are closely linked to the development and use of high-tech 3D-scanning systems. This development makes possible the reconstruction of the archaeological pottery and anthropological material.

Recent advances in the field of cultural heritage are closely linked to the development and use of high-tech 3D-scanning systems. Such systems are able to produce accurately a high-speed digitization of cultural values. However, there is always a number of historical and cultural objects, scanning of which is rather difficult or economically unfeasible because of the complex forms and other features. These objects traditionally include numerous fragments of archaeological pottery and anthropological material, which are stored in museums, collections and other institutions. An effective solution to the problem is the necessity to move from high-precision 3D-scanning and model representation, to reproduction of objects through the use of open systems that are installed on low-cost hardware, possible to use by different cultural establishments, which will be convenient for the final user. For example, the using of traditional scanning systems (flatbed scanners, digital non-metric cameras, etc.), focused on specialized tasks (e.g. creation of a thematic database), enables making the similar tasks no less effectively than by using of high-tech 3D-scanning systems. Especially attractive are palaeophonographic scanning technologies that are used for digitization of archaeological ceramics [3]. Besides the 3D-scanning of pottery by the available digital cameras, in addition the interpretation of linear structures, formed in consequences of pot maker's technological operations, is actualized. Such technological operation is physical interaction, between the fixed instrument of treatment or fingers with treated surface, that leaves a linear dint, depth and shape of which is regulated by biomechanical potter's system [1].

The developed technologies allow to carry out researches in real-time, with the joint study of the object by dipping, using high-speed data networks. Integration of “user-friendly” software allows not only rapid digitization of external and internal surfaces of ceramics, to reconstruct shape, colour and texture, but also to create on their basis a thematic database, which can contain individual biometric information (technological script of the potter), prospects of carrying out the art identification of the work’s authorship [2].

The ability to digitize not only the whole or partially preserved pots, but also multiple fragments of ceramics, especially in studies related to the reconstruction of the shape of the pot is essential for the approved technologies.

Software device of the developed system was implemented on the basis of the developing medium of expert systems CLIPS. The essential distinction from the similar systems was the implementation of the independent batch programs, connected with selective (discriminating) sampling ceramics fragments, analysis of histograms, construction of the three-dimensional model of the pot and etc. It is taking heuristics formalization for the creation of the prototype. Heuristics relate to the qualitative analysis of the tracelological formations by the methods of Palaeophonography. It is taken place the stereo-photogrammetric survey of the attributive ceramics fragments with the help of flatbed scanner, and then it is constructed 3D model of the pot, filling with the fragments.

Palaeophonographic scanning technologies are developed in the laboratory of information technologies, in humanitarian and natural-scientific researches of the Teachers’ Training Institute of Saratov State University. At present on the base of this technology there are caring out joint investigations with the Medical Institute of Penza State University on adaptation of the method of 3D- reconstruction of skulls and other anthropological human parts.

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