Touchless On-Site Data Acquisition System For Freeformed Details Of Architecture Like Statues, Reliefs, Capitals

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Three-dimensional documentation of cultural objects like architecture, facades, monuments, statues or during archaeological excavations becomes a standard more and more. Practical works in the field of on-site measurement and documentation of cultural heritage often demand different, object specific accuracy and resolution. If for large, regular object parts a single-point measurement with point-distances up to 1m may be sufficient, other object parts or details should be measured with millimeter space resolution or even more. Available non-destructive, contactless measurement methods and digitalization approaches are mainly limited to special tasks, object sizes and environment conditions.

At EVA´99 Berlin we present an On-Site 3D-geometry acquisition system for complex freeformed objects that could be widely used in documentation and restoration of cultural heritage. Measurement and modelling capacity as well as the implemented possibilities for result visualization, presentation and analysis are demonstrated. We are ready to show some result examples of indoor and outdoor measurements of objects sized up to several meters.
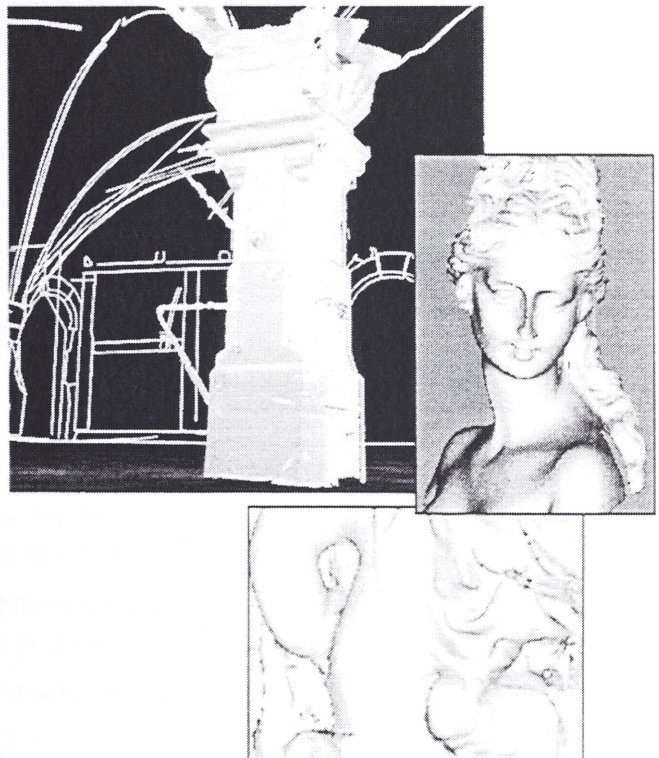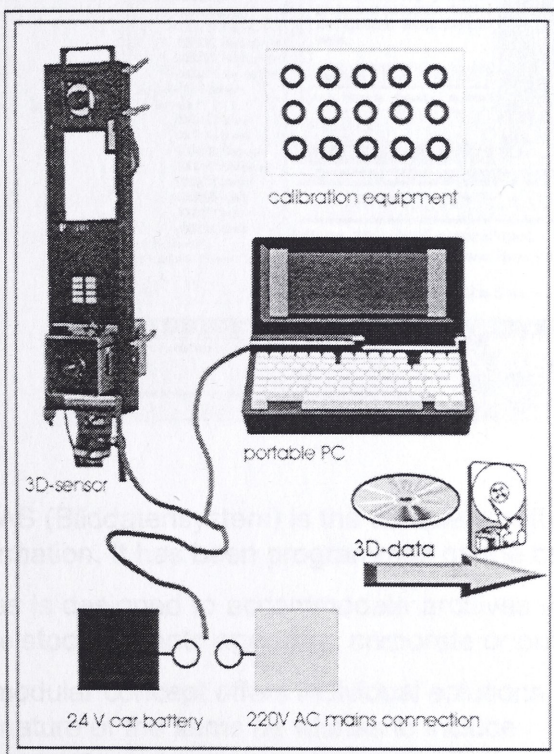
The presented system can be used in stand-alone mode and -in the case of need- as complementary equipment for the widely used theodolits and laser range finders. It allows to aquire high-dense 3D-coordinate sets of freeformed object parts, to fit this data into given global co-ordinate systems and to calculate and visualize virtual surface representations of the freeformed objects. The system is transportable and can be used on-site, powered by car-batteries. The point resolution is mainly defined by the size of the object part covered by one measurement (about 1/1000 of the lateral size and 1/2000 in depth). The acquisition of one 3D-data set (up to 1.000.000 co-ordinates) is performed in 2-3 seconds.