Project Archeye - The Quadrocopter as the archaeologists eye

Christian Seitz and Holger Altenbach

Heidelberg University, Institute for Pre- and Protohistoric Archaeology, Marstallhof 4, 69117 Heidelberg

In archaeological research, the exploration of archaeological monuments from the air has a long tradition and thus can be seen as a necessary component. In contrast to the surveying of new ground findings, this technique - as well as other available methods - is rarely used for the documentation of ongoing excavations and the research of architectural monuments, even though vertical photos are very important for the documentation. Possible reasons for this include high costs for existing orthophoto techniques or their long preparation time before takeoff, i.e. in case of a small Blimp. At this point our project Archeye steps in as a cheap and flexible method: The technical base is currently a remote controlled Quadrocopter to lift a camera for generating high-resolution photos. The camera can be turned by a frame into various angles, from vertical to horizontal. The aircraft has a diameter of 60 cm and thus allows an easy transporting in an aluminum box. Furthermore the Quadrocopter is prepared within minutes, as just the propellers have to be mounted. With a digital reflex camera mounted, flight times about 10-15 minutes per battery charge are possible. The use of conventional RC-model components allows us, in contrast to other projects of this kind, to keep the costs for hardware comparatively low. Another major advantage of the small size and the lightweight design for archaeologists is the nearly everywhere use even within cities and yet buildings. One typical exception is i.e. the proximity of an airport. Every photo is usually taken at a low altitude not higher than 50-100 m along a given GPS based way-point track. As a second step they are stitched together semi-automatically to an high resolution digital aerial photograph. The used software also calculates the needed flight height and path. These values depend not only on the used camera and lens but also on the intended resolution. With ground applied target points it is possible to rectify the images and integrate them into existing excavation and architectural documentation. As an example of our work we will present results of an excavation near Ludwigshafen, Germany, and of a restauration project taking place in Banteay Chhmar, Cambodia. Recently we are documenting a castle near Heidelberg and two others in the Eifel. Due to the good results an implementation of other documentation methods like stereophotogrammetry is planned.