New challenges for research and dissemination in virtual anthropology: applications to the case study of fossils and artifacts from Saccopastore (Rome, Italy)

Poster · September 2017

DOI: 10.13140/RG.2.2.30846.28483

CITATIONS
0

READS
147

9 authors, including:

Costantino Buzi
IPHES Catalan Institute for Human Palaeoecology and Social Evolution
35 PUBLICATIONS **142** CITATIONS
SEE PROFILE

Ileana Micarelli
University of Cambridge
32 PUBLICATIONS **88** CITATIONS
SEE PROFILE

Antonio Profico
Università di Pisa
155 PUBLICATIONS **830** CITATIONS
SEE PROFILE

Jacopo Conti
Sapienza University of Rome
38 PUBLICATIONS **105** CITATIONS
SEE PROFILE

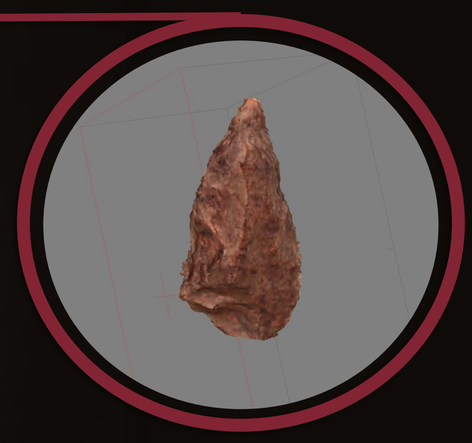
New challenges for research and dissemination in virtual anthropology: applications to the case study of fossils and artifacts from Saccopastore (Rome, Italy)

Costantino Buzi[1], Ileana Micarelli[2], Antonio Profico[1], Jacopo Conti[3], Roberto Grassetti[4], Walter Cristiano[5], Fabio Di Vincenzo[1], Mary Anne Tafuri[1], Giorgio Manzi[1]

1) Dipartimento di Biologia Ambientale, Sapienza Università di Roma, Rome (Italy)
2) Dipartimento di Scienze dell'Antichità, Sapienza Università di Roma, Rome (Italy)
3) Dipartimento di Scienze della Terra, Sapienza Università di Roma, Rome (Italy)
4) Museo di Antropologia "Giuseppe Sergi", Rome (Italy)
5) Dipartimento di Scienze biologiche, geologiche e ambientali – BIGEA, Università di Bologna (Italy)

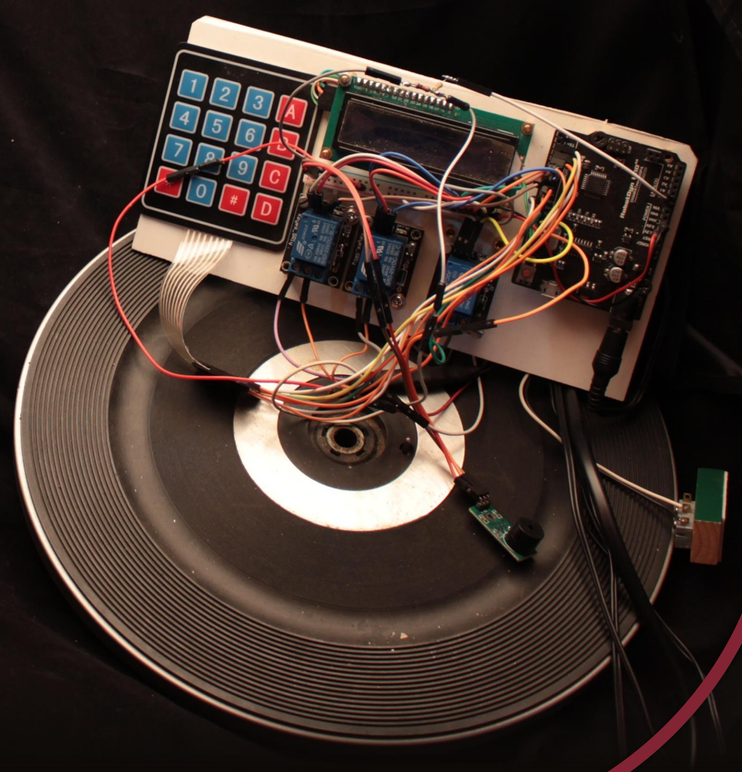
Introduction: Virtual anthropology has been rapidly developing in recent years. Innovative tools, as well as software and methodologies, allow the study of specimens with increased detail and limited physical intervention. The first step in a virtual anthropology study is represented by the acquisition, that can be carried out by different methods. The one that is becoming more and more common is the photogrammetry, because of its affordability, its ease of execution and its versatility in acquiring objects of different nature and composition. We chose, as a case study, three specimens presenting some of the challenges that can be find in an acquisition by photogrammetry (i.e. reflecting surfaces, flat or thin objects, complex portions). All the specimens come from the archeological context of Saccopastore (Rome, Italy) [1,2]: the Neanderthal cranium Saccopastore 1, a Mousterian point (F3 S7) and a bovid hemi-mandible (B7). The choice of the specimens has been driven by their peculiar morphology, reflecting the afore-mentioned issues, but also by the displaying purposes of this work.

Saccopastore 1
We put the specimen on the rotating platform. We set the microcontroller in order to shoot 40 pictures for each of the two chunks. The cranium was put on its base for the first chunk and on the posterior portion of the occipital bone for the second one. Finally, the 3D mesh of the cranium has been scaled by Agisoft Photoscan to the actual size of the specimen.



Mousterian point F3 S7
The Mousterian point was placed on the platform, surrounded by three coloured markers which represented the same geometrical landmarks for each photo. Three chunks were taken, respectively superiorly, inferiorly and laterally.

Hemi-mandible B7
To recreate the most accurate virtual model of the complex portion represented by the teeth, 56 photos were taken, divided in 3 photoset with different points of view: lateral, at a 30° angle and at a 60° angle. The rotation has been set to 15°.
Finally, the model was scaled by Agisoft Photoscan software.



The rotating platform
The platform was built starting from a record player deck.
Each specimen has been accommodated on it in a Havox lightbox 60x60x60cm.
The platform was synchronized with the camera via Arduino Uno SMDR3 microcontroller. Arduino was programmed to perform a sequence of rotation, camera focus and photo shoot: in this way, the acquisition has been automated.

Conclusions: Concerning the protection, conservation and restoration of the specimens of interest, photogrammetry is an easy process of acquisition, which allows the production of a 3D copy with limited costs. We presented some implementation of the procedure of photogrammetry, and among them a system for the automation of the acquisition which further limits the contact with valuable or fragile specimens. Moreover, since the texture of the objects as well as its shape are acquired, the 3D models can be scaled to different sizes and 3D printed for musealization and dissemination purposes, creating a wider access to specimens of interest for museums, schools, researchers and teachers worldwide.

References:

[1] Sergi S (1929) La Scoperta di un cranio del tipo di Neanderthal presso Roma: Società romana di antropologia.
[2] Bruner E, Manzi G (2006) Saccopastore 1: the earliest Neanderthal? A new look at an old cranium. Neanderthals revisited: new approaches and perspectives: Springer. pp. 23-36