AUGMENTED REALITY

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ABSTRACT

Already used in very specific areas such as in military and medical or academic research, in 2009 thanks to improved technology, augmented reality is to reach wider audiences and as information campaigns, advertising-augmented published in newspapers or on the network, and through a growing number of applications for mobile phones, particularly iPhone.

"The Augmented Reality on the desktop computer is based on the use of markers, or ARtags, and stylized drawings, which are shown to the webcam, are recognized by the PC, and which are overlaid in real-time multimedia content: video, audio , 3D objects, etc.. Normally, applications of augmented reality are based on Adobe Flash technology and therefore accessible from any standard Internet browser. Advertising is also known as Augmented exploded in 2009 for numerous communication campaigns for corporate brands such as Toyota, Lego, Mini, Kellogg's, General Electrics, singers like Eminem Johma Mayer or magazines such as Colors, Esquire Magazine and Wallpaper, etc.. "(See Wikipedia : the augmented reality).

In academia are several areas that are involved in the issues of augmented reality: that of representation, that science, that of the topography, the communication, and more.

The use of augmented reality has found great scope also and especially in the public bodies involved in the protection and enjoyment of the Cultural and Environmental Heritage, museums, natural parks, libraries, the return of a significant architectural heritage of historical value and cultural heritage which it wants to pass on the genesis of construction, the historical events related to it, the prestige of the decoration and the difficul
ties Roofing complex.

All this requires the contribution of different cognitive areas, in the opinion of the authors can not be extinguished only in an application myopic investing skills of a subject area. The story (from which everything branches off), topography (which each measure takes shape), the representation (from which everything is revealed), computer (from which everything is the correlation with itself and with the others), visual communication (from which everything rises to a value direct communication, streamlined, efficient), graphics (from which everything comes to beauty, aesthetics individual and collective).

The experience took place in Salinas Archaeological Museum of Palermo, now under renovation, has developed a compendium of the various sectors calibrated and synergistic and overcome the difficulties, sometimes substantially, on the location of the collections of art in it.

KEYWORDS
**AUGMENTED REALITY, MUSEUM, HERITAGE, REPRESENTATION, MARKERS.
NETWORKING THE WORLD: CONCEPTS, METHODS, DATA.**

1. INTRODUCTION

The augmented reality or mixed reality is a particular technology which allows adding sensations, images and information generated by a computer to the normally perceived reality. In particular, on special visors worn by the individual, images, writings and virtual objects are produced, thus providing additional information on the real environment. Therefore this is a hyper-environment, a tri-dimensional and interactive one, generated by the computer, made of real objects and virtual objects in which the person is immersed. The user perceives the world like everybody, but with additional information: texts, tri-dimensional, static or moving images, with which they can also interact by means of simple devices.

In a nutshell Augmented Reality is the digital overlaying of information or graphics on top of an image. In the past, it was reserved for expensive multimedia applications and television production, but now it is on the verge of becoming a ubiquitous technology that will be an integral part of video game consoles, smartphones (like Android phones and the iPhone) webcams, and pretty much anything that has an

embedded CCD chip that can take pictures or video. If you've seen video games where you can wave your arms and interact with things on the screen, you are seeing AR in action. At some point you will be encountering AR graffiti if you happen to be wearing augmented reality glasses or a "head up display" which could be a thin band of plastic that goes over your eyes. Since AR understands the user's 3D environment, you could conceivably run through a city and the images would always appear to be on the same walls and streets. Advertisers love the idea of AR because those blank spaces could be populated with customized messages. More recently, the Nintendo 3Ds has featured Augmented Reality cards that you can use to play games and add playable characters into realitic situations.

The international trials that have addressed the application of augmented reality are, nowadays, really interesting and rich of many surprises. However, the effects of such uses in the world of Cultural Heritage and Architecture, in general, are still developing. Below are considerations and applications of augmented reality on their own areas mentioned above.

Figure 1: The NBuilding in Kyoto in A/R.
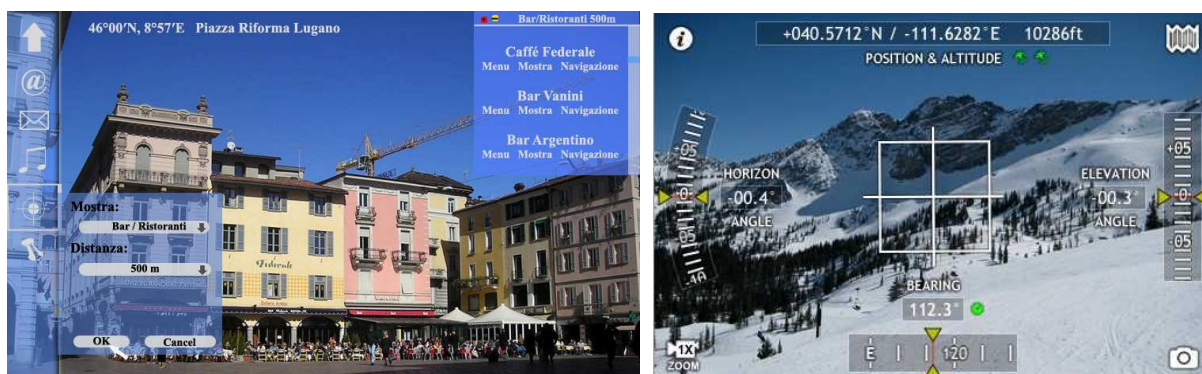
Figure 2: Riforma Square in Lugano in A/R and application of geo-referenced on a ski slope.

2. APPLICATION ON A DIGITAL MODEL.

Build, cinema, energy, experiments, events, face detection, film, flash, future, googles, iar2010, innovation, action, iPhone, ISMAR, mixed reality, shopping, social networking, total immersion, transformers, videogames, virtual graffiti, virtual reality, Wikitude ... live events and conventions, to impress the public and increase the effectiveness of presentations and web campaign, to raise the performance of conversion and click through, kiosk, for engaging experiences in promoting and marketing

cultural parks and museums, to live the experience of virtual environments increased, mobile projects, to use the smart-phone penetration in rural and total portability and always just in time ... this is what gives us even further augmented reality! If it is true that "intelligence can easily make any action, if not subjected to reality," famous quote by Marcel Proust, it becomes very difficult to dive and to understand the mechanisms of augmented reality where the dialectic can insurmountable adversity. Augmented Reality is an advanced interactive graphics system that allows real-time cross boundaries between reality and virtual. Thanks to special tracking devices and rendering, augmented reality allows the increase of the reality that surrounds us with spectacular interactive and multimedia elements.

The achievements of the technology in the field of graphics certainly were not conceivable and inconceivable until recently. It happens often, nowadays, to find himself catapulted into an incredible power electronics such as to be almost frightened. And just do a quick web browsing to get an idea a bit 'more closely. On YouTube, for example, you can watch movies in front of horrified children who play on fire or you shoot each other (usually a challenge to overcome the human potential!) ... All the result of augmented reality devices, and so while we try an approach inspired by the most noble intentions, the young owners of the means it already exceeded the application experience.

Certainly in the field of cinema special effects enjoy great savings both in time and in economic terms and this gives the central experimental augmented reality a highly topical. Thus, disasters, aliens, mutilations, burnings and other horrible things are easily overcome by building small devices and simple stylized designs. But with augmented reality you can do even more: we ourselves become the protagonists of the stage actors. You can physically be thrown into the reality of the scene video and go depending on where you want to run ... but over and over again!

The live event in Augmented Reality more spectacular, so-called total-immersion, where it is difficult to tell where reality stops and starts the virtual these days is available on the web and gives proof created by Patrick Kron (engineer and CEO Alstom, a leading railway and transport) which, when introduced by the presenter on the catwalk, with simple hand gestures, the snap of two fingers, a gesture with his hand, etc., brings interactive augmented reality and changed upon 'need, turns a simple antenna turning wind scale. ... and, as if this were not already impressive enough, pops, piercing the wall of background, a train with lights on intermittently whose own tracks based on the catwalk the show!

There are many applications on which proofs have ventured professionals and amateurs. So the interaction between real and virtual models, in which cars run through a virtual physical model, increasing reality, you change to an animated character that pops out of the stylized design imprinted on a shirt color or a beak of a duck juxtaposed the face of a visitor who finds himself projected onto a screen with the extension of a bill ... but a true bill, which moves with him, which rotates with him and that "lives" with him ...

The General Electric, made it possible for the user to be able to print the target, then, stand with a Web cam in front of their screens and through the movement of the target, see the virtual element in front of him. In this way, any user can make a great first trial of augmented reality.

Obviously you can interact with augmented reality, for example by blowing on the wind to speed up the rotation... or experiencing zero gravity, as proposed in the Toyota car just put on a card and letting it swing freely in accordance with the forced motion of the card, impenendone, however, the precipitation in the vertical positions... etc.

Probably in a few months we will all wake up from a message that appears on an imaginary screen that is always before us and transparency between us and the environment surrounding a custom message, which gives us a good morning ... we will live real-time links with the web, weather information, horoscopes, personal diary, news, links to virtual reality that we are imagining ... and we all have done a magnificent spectacle kit, bracelet and ear...

Yet there is another front, the "opposition", or those who show the imaginary collectively to a reality more realistic and futuristic at the same time. Ori Inbar, a professor at Graz University in Australia, free without rhetoric, from a famous quote by Marcel Proust "The only true voyage, the only bath of youth, would not have to go to new landscapes but in having new eyes, to see the universe through the eyes of another, a hundred others, to see the hundred universes that each of them sees that each of them is "warns the man in front of your work that threatens to bring the man himself rather than an evolution to a rapid decline that is incontrovertible and dwells in the solitude and the absence of reports social, and values and humanization.

Fears of Inbar, in fact, are not entirely unfounded, and, not surprisingly, there is more and more frequently to an impoverishment of the contents in danger of disappearing altogether if put into crisis by a deterioration of social relations.

But all this, it has and must have consequences in the field of architecture, engineering, representation, sustainable development? How do these tests may be an element added to the cultural growth, for the preservation, enjoyment, knowledge of the artistic, architectural, natural and man-made? What does it mean in terms of time, cost, software, upgrading of equipment actually increased through the use of these new technologies? It is within reach of all the augmented reality? Or just the few adepts? There is a substantial literature on the subject?

The answers to the many legitimate questions are not always available and just as often not comprehensive, however, the experiments conducted in our research, we were able to identify a methodological deployable and expandable, offering some interesting food for thought. In reality there is still much in the literature on augmented reality, more than anything else is an invasion of thousands of electronic experiments, applications, and various toys, all advanced by the premise: "... but more about that augmented reality is see better examples now ... " and tons of links to one another to present a phenomenon that is spreading in the network to enter our lives is that the scientific and human ones.

Asked if the augmented reality is everyone needs (maybe a little 'diplomatically) that depends on the purpose to be pursued. In fact, since the difficulty is not so much the use of dedicated software ... as has already been done by programmers! However, if the aim is to simulate an animation that depends on a target, then there are insurmountable difficulties, but if you want to interact in a synchronized manner with an augmented reality that meet the requirements of the particular question, then the degree of difficulty in 'several levels of salt application. Our applications so far have involved relatively manageable models, which did not lead to a strengthening of the machines already available. However, apart from the Linceo software, a webcam and a 3D mouse (which with a few hundred euro are of good quality) do not need expensive equipment and this makes the application at hand for any user. But so far what are the most important applications on the architecture in terms of enhancement of the intrinsic characteristics of a good thing?

A very significant example is made in Kyoto in the N Building. The video, of which there are a few pictures, show the N Building in Tokyo, a futuristic building in the projected size and deeply contemporary hybrid of Augmented Reality (A / R in the jargon). Some time ago we explored some scenarios of sensitive city, as the five skyscrapers in Stockholm or the emotional Dexia Tower of Brussels, very different from this project but united by several factors. Here's what provides the N Building. The experience in augmented reality involves the whole facade. As you can see in the picture, the windows are in fact the enormous QRcode. By downloading a special mobile application, walkers can aim his cell phone the N Building, photographing one or more windows (or one or more QRcode) and find the information contained in the building (offers, sales, items, etc.): also, if someone is tweeting at the time the passerby can see it and read what he's saying.
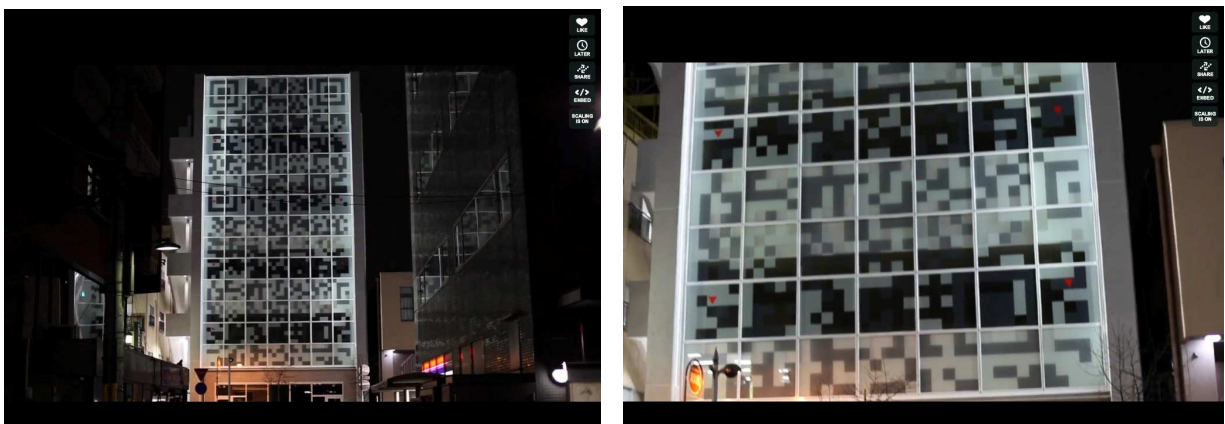
Figure 3: View of the skyscraper and detail of the facade of the markers.

The surface layer of the building incorporates an informational therefore, open, interactive and assumes a relational dimension and become "clickable" just like a web interface, offering an example of the "next big thing", the 'internet of things ". That is, to want to simplify in a nutshell, the ability to publish information about bodies, buildings and objects with enormous consequences. Try to think and disseminated aimaginare an internet and in the meantime, on this side, we will try to offer ideas, thoughts and examples of projects that will seize the emerging aspects of this process.

The Fraunhofer Institute for Computer Graphics Research IGD in Darmstadt has developed software that installed on a rotating column in the center of a room museum, you can display on a display and with the aid of a camera portions of paintings and sculptures on the premises. It also adds real-time information, captions, and a bit 'of history, the work also can be framed, for example, some fragments, an overlay that recreates the entire work as it was originally. The Fraunhofer Institute made an interesting project about the A / R, iTACITUS, installing software, virtual drive on a notebook and guiding tourists in the Royal Palace of Venaria near Turin, also recently has this sort of virtual guide has been produced at the Nell'Allard Pierson Museum Amsterdam.

The project commenced in September 2006 and finished July 2009. During this time iTacitus explored ways in which information technology could be employed to encourage cultural tourism.

Cultural heritage sites have huge amounts of information. However it can be difficult to present this information in a compelling way. iTacitus explored ways of using augmented reality to provide compelling experiences at cultural heritage sites. For example:

- Superimposed Environments: 3D objects are placed into the scene on the spot in order to overlay the real scene. Like missing paintings, statues or architecture models.
- Annotated Landscape: Abstract context sensitive information overlays showing images, texts and videos about a certain spot.
- Spatial Acoustic Overlays: Transporting a place's original ambiance by virtually placing spatial audio clips in the surroundings.

Being a tourist can sometimes be hard work. With a huge choice of things to do it can be challenging even deciding what you want to do even before you consider practical problems like transport, costs and opening times. iTacitus developed an interactive itinerary planning tool where the process is enjoyable rather than overwhelming since mundane issues like travel and finding things which match your interests are handled by the system automatically. In this way we hope to encourage tourists to explore more and visit attractions which are off the beaten track.

Contextual information. Have you ever had time to fill wanted to find out what there is to do within 20 minutes of your location? Have you ever you passed a ruin and wondered what it looked like when it was in use, who used the building, did anything of significance happen there? You probably have but you don't want to know this when you are running for a bus. iTacitus used contextual filtering based on the user's location, interests and history to determine what information to present to the the visitors mobile device.
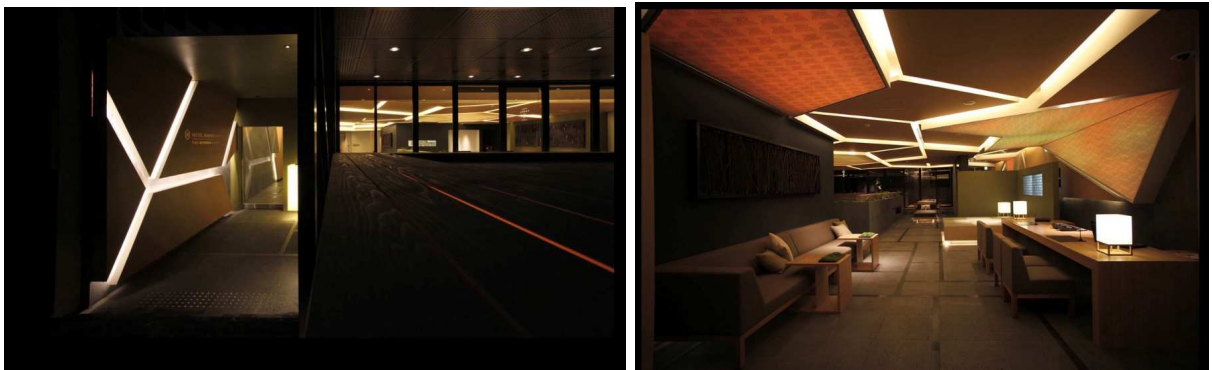

Figure 4: Royal Palace of Venaria near Turin in A / R, iTACITUS. 2010.
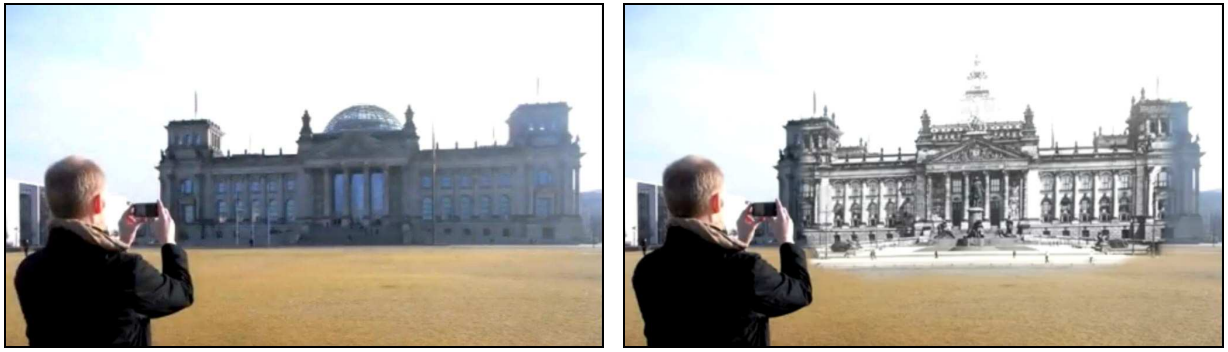
Figure 5: Fraunhofer IGD Royal Palace of Venaria near Turin in A / R, iTACITUS. 2010
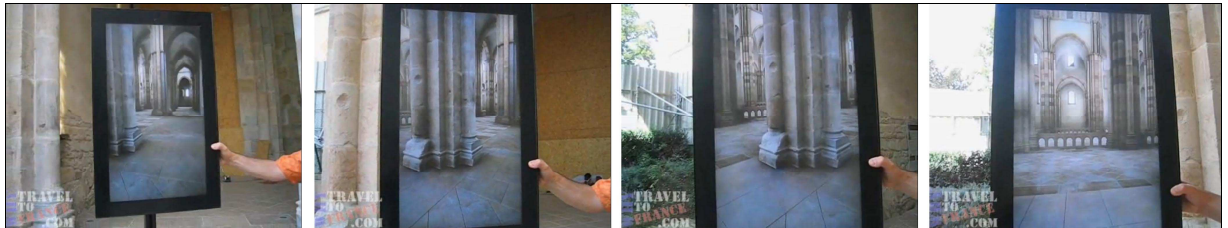
Figure 6: Reconstruction in A / R area of the transept of the Abbey of Cluny in France.

**Figure 7:** Applications A / R on the hotel's interior Kinra in Kyoto.

It's Brazil's biggest project Augmented Reality in the world made possible by Inglobe Technology. The Rossi Residencial, a development agency based in Vitoria, Espirito Santo decided to use augmented reality to help potential buyers to view their project, the only problem was that the project is the latest skyscraper to be built in town! To show potential buyers how the subdivision of fibras Connection was even before it is built, they created the biggest marker of augmented reality in the world (measuring marker 898.2 m²) and have located where the tower will be built physically. Then they rented a helicopter equipped with a notebook and camera to fly around the site.

Figure 8: The Rossi Residencial in A/R. Brazil

The starting point for experimental development of a methodological concern that advanced augmented reality has been to make an application to the Salinas Museum in Palermo. The museum currently has a site area for renovation. However, in the restoration project was not made a final position on the study of works of art which, he will consequently also planning an absence of light. The site should be delivered later this year and the Directorate of the museum has been in the logistic difficulties of establishing a hasty position, according to empirical parameters, a mosaic of large-scale repertoire in terms of both quality and quantity. It is precisely at this point that the management of the museum felt the need to have a virtual model that would allow a three-dimensional visualization of the various rooms of the museum so that you can, virtually always, test the positioning of the various works of art to ' interior of the rooms and check the actual and final location. She was born, a collaboration between the museum and the Laboratory of Salinas UniNetLab which in itself contains a representation of the area which directs its research activities from 2010.

Some might ask how augmented reality can be exceeded for a three-dimensional model can easily navigate and explore with animations already available through VRML and appropriately implemented through a library dedicated to works of art to be able to place, move, rotate, etc. . within the model. In reality there is an overrun, and is not indifferent. Let's face it in two ways: the first is the Deaprtment Direction of the museum and the second is the user.
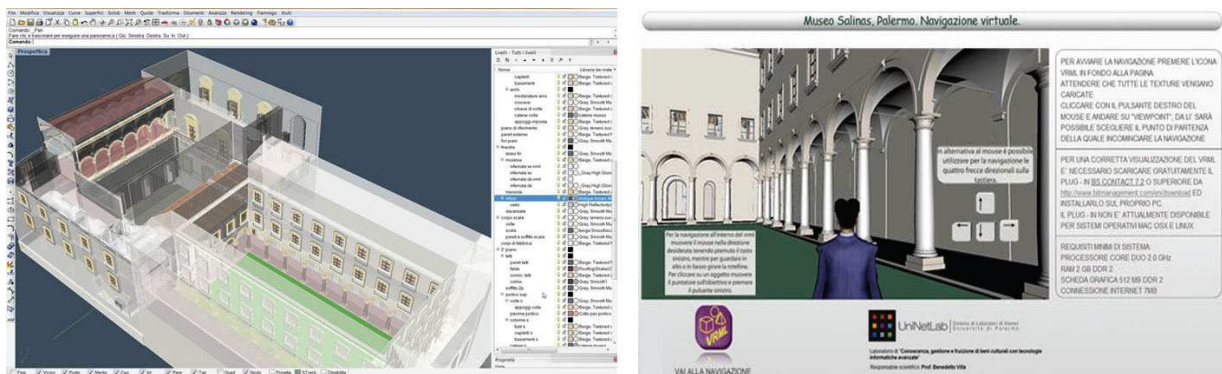

Figure 9: Virtual model of the Salinas Museum in Palermo by Francesco Di Paola.

This Department Direction, an application in terms of increased returns useful simulation of visitors flocking to time periods for periods of the year, works of art, for personnel management.

Obviously, to gain an advantage in terms of prestige and pride also in the presentation of the museum, released from the usual presentation of virtual paths sometimes ineffective.

To the visitor the benefits of augmented reality are a lot more. Meanwhile, has the opportunity to interact directly and simultaneously with the museum without being physically present and able to share the journey with other virtual visitors who are in other parts of the world, simply through the webcam and having printed the targets. Also, for visitors who enter the museum you can interrogate any work of art in context in revisiting his own home, in the historical period of origin. It may happen that more visitors in the same room should ask several works of art and also read different information in the same direction that virtually overlap but are not recognized by both. All through a pair of glasses, a headset and a remote control or target interrogated.

But not all. If you typed the model created with a certain scientific rigor and is, therefore, reflects the reality of the geometric and architectural works, and if any work of art in the museum is built with as much intellectual honesty and scientific and is linked to its housing ladder, you can make even the Linceo us scale the various components of the scene relate to each other and with the external environment. This allows you to query the model through the same sections, plans, floor plans, special views, geometric data, historical data, static data through a three-dimensional presentation in touch.
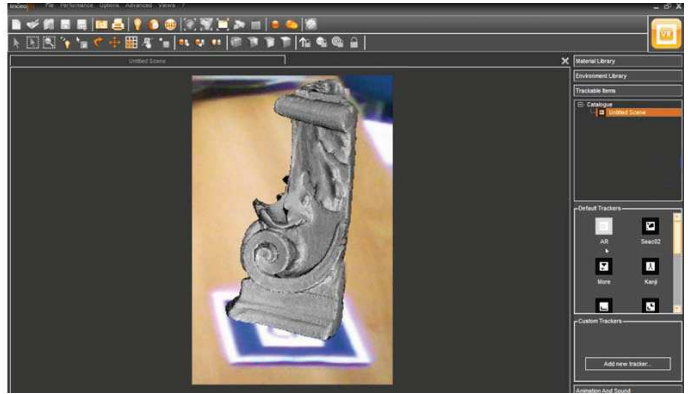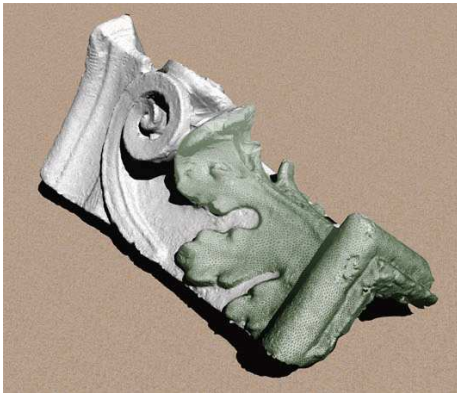
Figure 10: Applications A / R by Francesco Di Paola of a piece in the museum collection

Augmented reality has been so applied to a work of art, a 1:1 ratio, which represents a corner of a composite capitellino greek modern-designed and built by the school of G. Damiani Almeyda, and belonging to the 1859-1929 budget Basile. After having had a scan and have created a virtual model is printed on the target for augmented reality and, through the webcam if they have made the animation after having scaled the piece.

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