



Dipartimento di Ingegneria dell'Innovazione  
Università del Salento



Augmented and  
Virtual Reality Laboratory



## eXtended Reality Cultural Heritage – lecture 3

*Lucio Tommaso De Paolis*



***A RECONSTRUCTIVE HYPOTHESIS OF  
THE CHURCH OF SANT'ELIA IN  
RUGGIANO: MIXED REALITY AS AN  
INSTRUMENT OF FRUITION***

Benito Luigi Nuzzo

# *A reconstructive hypothesis of the church of Sant'Elia in Ruggiano: mixed reality as an instrument of fruition*

1

Augmented Reality, Mixed Reality and Photogrammetric Survey

2

Relatives work: the use of these technologies in the field of cultural heritage

3

Ruggiano and Sant'Elia Church

4

Materials, tools and 3D reconstruction of the church

5

CumeRA: the development phases

6

Testing of the application



# Augmented Reality

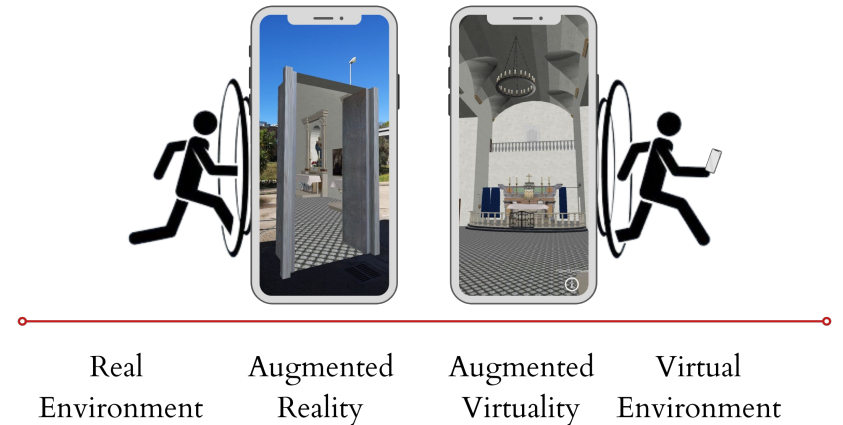


- Augmented Reality refers to the enrichment of the perception of reality through the use of devices.
- Such augmentation may mean either an addition of information, aimed at improving understanding and interaction with the space
- or the reduction of various sensory stimuli so that one can focus more on individual details.

# Mixed Reality

1

- Mixed reality is the junction between augmented and virtual reality
- this represents the next step up from the more classic augmented reality, allowing for better interaction with virtual elements
- in Mixed Reality, virtual objects are anchored to the surrounding reality, so that the user can interact with them, creating a particularly dynamic experience.





# An example of MR: Virtual Portals



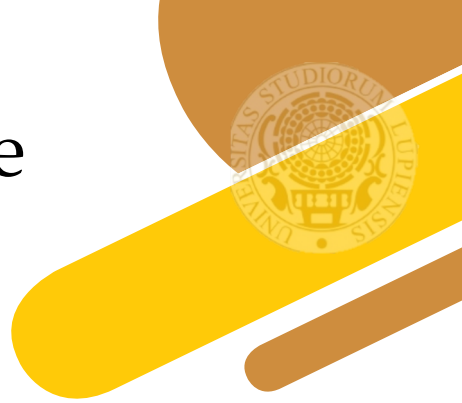
- Virtual portals are the means by which the user can move from reality (present) to virtuality (past) and vice versa. They are placed at a certain point of interest and are designed to give the user the perception of passing through different space-time dimensions.
- Virtual portals are very useful tools in the field of mixed reality applied to cultural heritage because they allow, through the use of one's smartphone, an experience similar to the real exploration of the cultural site under investigation.

# Photogrammetric survey

- Photogrammetry is a technology that, by processing images, allows the restitution of the real shapes and dimensions of an object.
- The advantage of this technology is that, based mainly on image processing, it does not affect the preservation of the artefact.
- Surveys are often carried out on archaeological excavations or monuments and are mainly for investigative or popular reasons, aided by the technical support of augmented or immersive reality.



# Relatives work: the use of these technologies in the field of cultural heritage



2

Augmented and Mixed Reality technologies used in the field of cultural heritage enhancement allow:

- the enjoyment of the asset, enriching reality with "augmented" information
- to relive the good in its original form, stimulating the imagination and emotions.

In addition, the possibility of visiting an archaeological site or a cultural monument from the comfort of one's own device makes it possible to create experiential cultural tours that enrich the user's cultural and historical knowledge.

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# Ruggiano and Sant'Elia Church

3

Ruggiano, a hamlet of Salve (Le), is a small village on the Salento peninsula. It stands in a valley inland from the Ionian coast and is 13 km north of Leuca.

The old church dedicated to St Elia the Prophet, the patron saint of the town, was built in 1586 and stood on what is now St Elia's Square, just opposite the palace.

It played the role assigned to it for about four centuries, at least until 1948, when it was closed to worship because it was seriously damaged and finally demolished in 1953.



# Ruggiano and Sant'Elia Church

3

For over seventy years now, the church of Sant'Elia has belonged only to the memories and oral tradition of the small hamlet, as there are no photographic documents to show what it really looked like.

The reconstruction included in the application was based on eyewitness accounts collected in the early stages of the project.

It should be pointed out that the model obtained is certainly the result of a reconstruction based on oral sources, but above all corroborated by documents kept in the Diocesan Historical Archive of Ugento.





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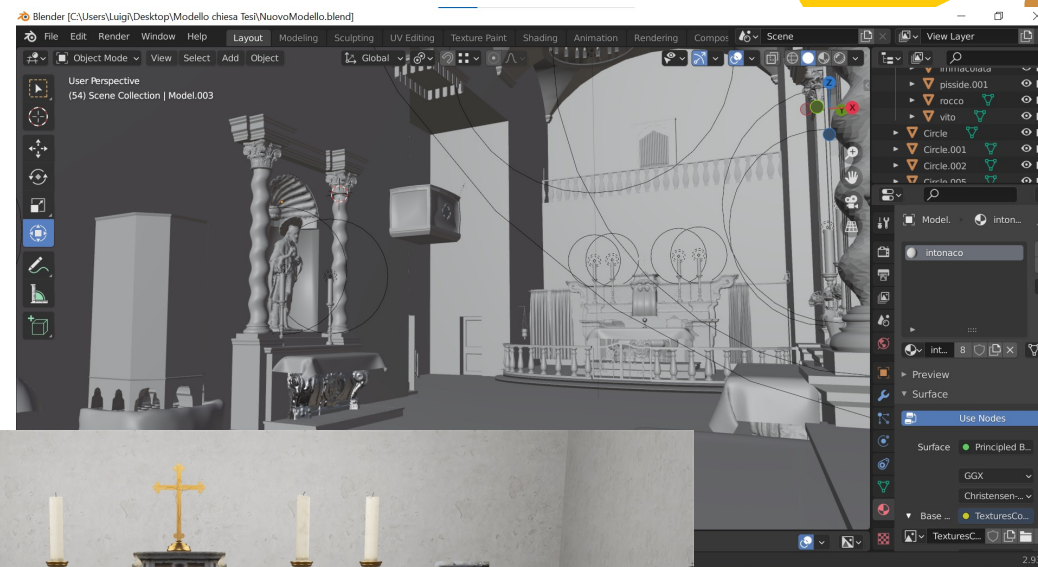
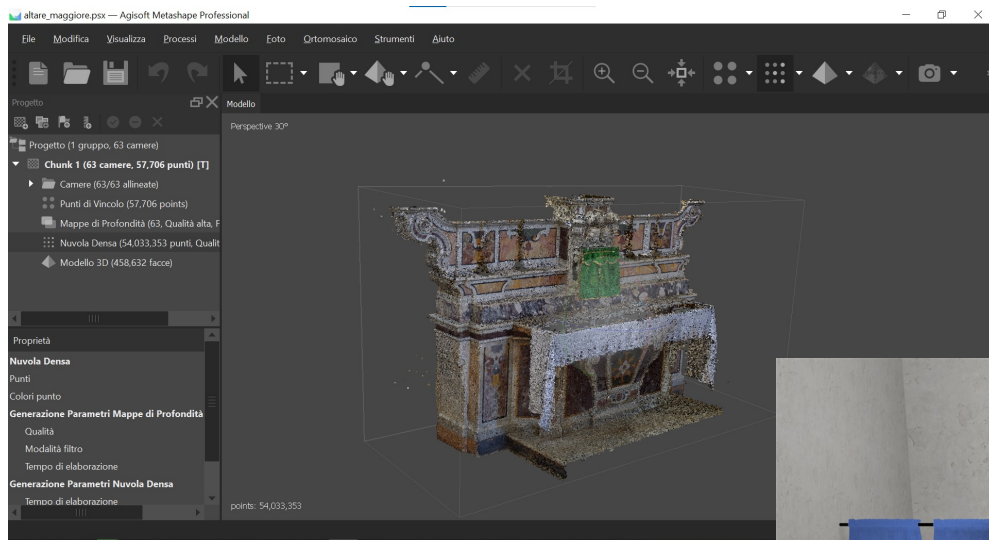
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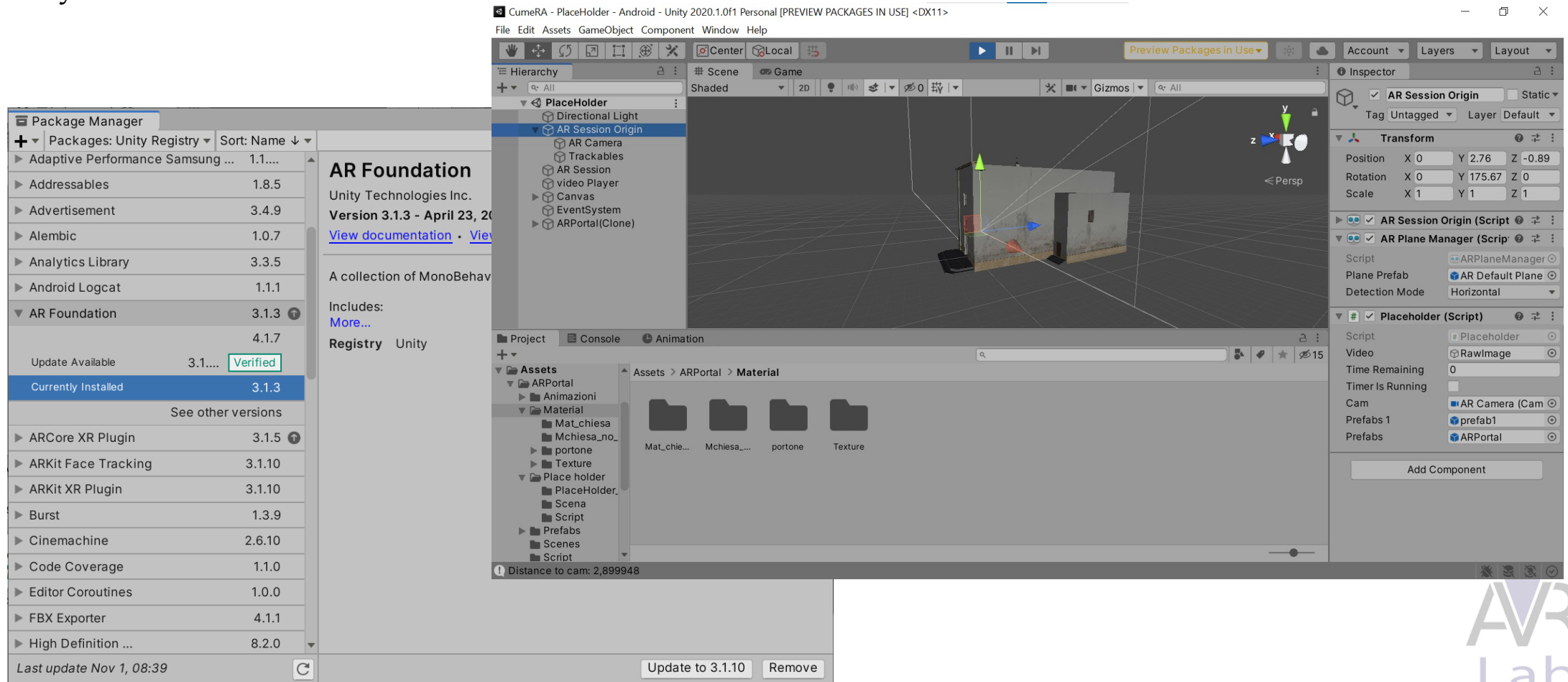
# Materials, tools and 3D reconstruction of the church

- Blender and photogrammetric surveying



# Materials, tools and 3D reconstruction of the church

- Unity 3D and AR Foundation





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# CumeRA: the development phases

CumeRA is an MR application aimed at supporting the use of a cultural asset that no longer exists.

Designed to be used directly on the site where the church of St. Elias once stood, it lends itself very well to being used on a different site, provided that there is sufficient room for movement to allow the reconstructed model to be fully visited.



CumeRA presents itself at start-up with a simple screen containing the navigation menu, through which you can navigate through the various information sections.

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# Testing of the application

1

The application was only tested on Android devices, since, having developed the project on a Windows PC, it was not possible to run a build on iOS devices because they were incompatible.

2

3

The test was structured in such a way that the questions could be answered with a score between 1 and 7 where 1 represents “I do not agree at all” and 7 “I agree completely”.

4

5

From the analysis of the data, it is possible to see CumeRA as a user-friendly and well-developed application, with positive responses at or close to 60% of the maximum score.

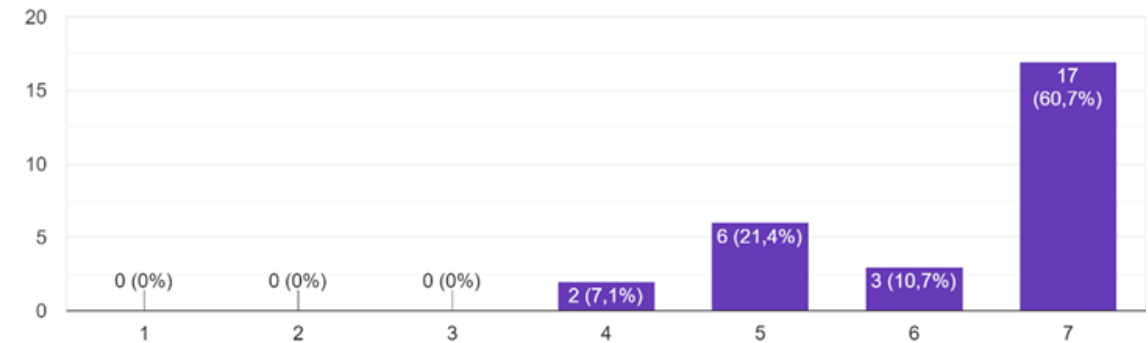
6

# Testing of the application

CumeRA appears to be a new and interesting type of experience, in fact, 67.9% of subjects responded positively to the novelty of the application with a score of 7.

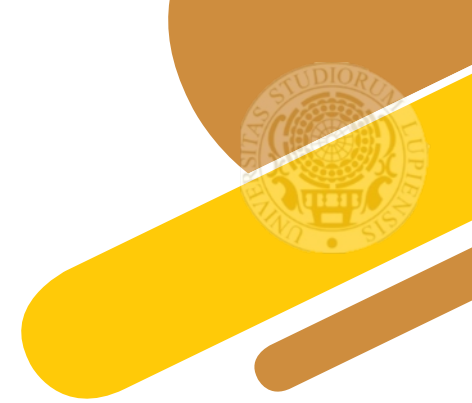
As regards the type of experience administered, the possibility of being able to relive a church building that no longer exists and the possibility of being able to enjoy it in its entirety seems to have struck the users positively, achieving an average score of 62% out of the maximum score.

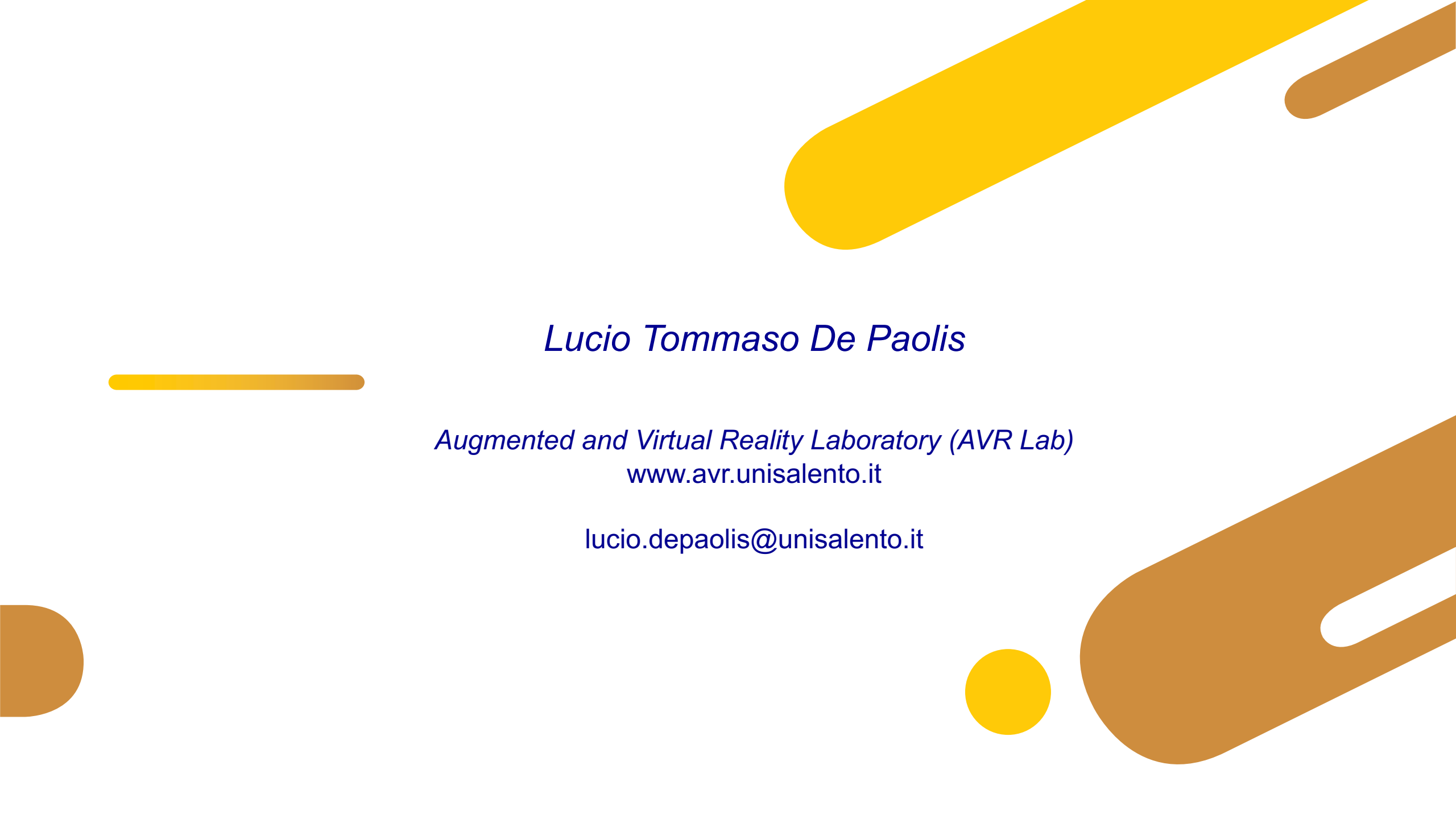
L'esperienza era così autentica che mi ha fatto pensare che gli oggetti virtuali esistessero davvero  
28 risposte





CumeRA





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