

The background image shows a dimly lit interior of a historic building. On the left, there is a small, arched window with a bright light coming through it. The walls are covered in aged, yellowish-brown plaster with some peeling and exposed brickwork. In the upper right, there is a large, arched mural depicting a landscape with mountains and a waterfall. The overall atmosphere is one of historical significance and architectural detail.

A *ugmented* R *eality*

Preserving Historical Transformation
San Boudelio de Berlanga

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Onera Prize Recipient
For Columbia GSAPP Dept. of Historic Preservation

Produced By:
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Location:
San Boudelio Hermitage
42367, Soria, Spain, Province of Soria
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*Transition of the wall painting *The Healing of the Blind Man and the Raising of Lazarus*, ca. 1129-34 from Canvas back onto the Hermitage walls. SOE Studio*

As a commitment to developing and implementing digital technologies in preservation practices, this project is a fresh approach to documenting, interpreting and preserving the transformations that architectural spaces endure over time.

Until 1926, colorful wall paintings covered the interior of the San Baudelio de Berlanga Hermitage, making it a masterpiece of medieval art and architecture. However, due to spoliation, these iconographic paintings were removed from the walls and sold to museums around the world. Now the monument stands in a plundered and dismantled state, giving visitors an incomplete and impoverished experience of the site.

Augmented Reality technology presents itself as the most viable and optimal preservation treatment for this monument. This non-invasive technique allows the monument to continue serving as a spiritual sanctuary, while documenting and preserving its transformation over time. Offering users such an immersive, interactive experience of the site blurs the line between the site's present remains and its digital restoration. This project will turn the Hermitage into a living document of the historical deterioration that architectural spaces suffer over time and thus redefine preservation practices as such.



*Historic photo showing the Healing of the Blind Man in its original location and condition, ca. 1920.
Historic Images provide valuable scientific evidence for creating digital restoration layers.
Juan Cabre Aguil*

Augmented Reality (AR) technology offers new opportunities to advance and redefine architectural preservation practices. However, there currently exist very few precedents for its application in the field. As a response, this project seeks to implement AR technology in the complex case of the San Baudelio de Berlanga Hermitage, becoming a paradigm for the use of AR technology in future preservation projects.

During the 20th century a strappato process was used to remove the wall paintings from the Hermitage's interior. Since the paintings are now scattered across museums around the globe, reintegration of them is impossible. However, AR technology offers an innovative method for restoring the paintings and the Hermitage to their original context. We are creating an AR application that uses digital overlays to put the paintings back on the walls of the Hermitage. These overlays are produced from digital data that will be recorded using the latest in three-dimensional scanners and cameras.

The concept driving this project is to consider, engage and communicate the tangible and intangible dimensions of the monument in its entirety,

including its historical transformations. By providing the user with graphic and approachable narrative content, we are creating an immersive, interactive experience of the Hermitage. By allowing users the freedom to adjust various visual parameters in the application, we are putting the site's current condition in dialogue with its original state. This will provide the researcher and layperson alike with a deeper understanding of the site as a whole.

As a powerful, non-invasive interpretive tool, AR technology allows us to preserve the Hermitage's current use as a spiritual sanctuary and its natural and artificial deterioration over time. Preserving the building in this way emphasizes its history, a history of plundering and deterioration. In this way, AR technology will redefine preservation practices because it allows preservationists to restore a monument to some previous state(s) without sacrificing or covering up its important historical transformations. Such an approach has far-reaching theoretical and practical consequences since it turns architectural spaces into the witnesses of their own complex historical unfolding.



The process to build the AR application for San Baudelio was separated into three main phases including design, development, and testing.

Design

1. Determined appropriate AR development SDK toolkit
2. Selected appropriate hardware and software for project needs
3. Created design guidelines
4. Mapped out application 'Storyboard'
5. Designed the User Interface (UI)
6. Prototyped the UI and Interactivity
7. Wrote the Application Text
8. Created a mock-up site navigation model



Development

1. Prepared Data (Site Target Images and Painting Overlay)
2. Created 3D Scene
3. Added scripting for image recognition and restored image rendering
4. Implemented UI
5. Added interactivity to UI

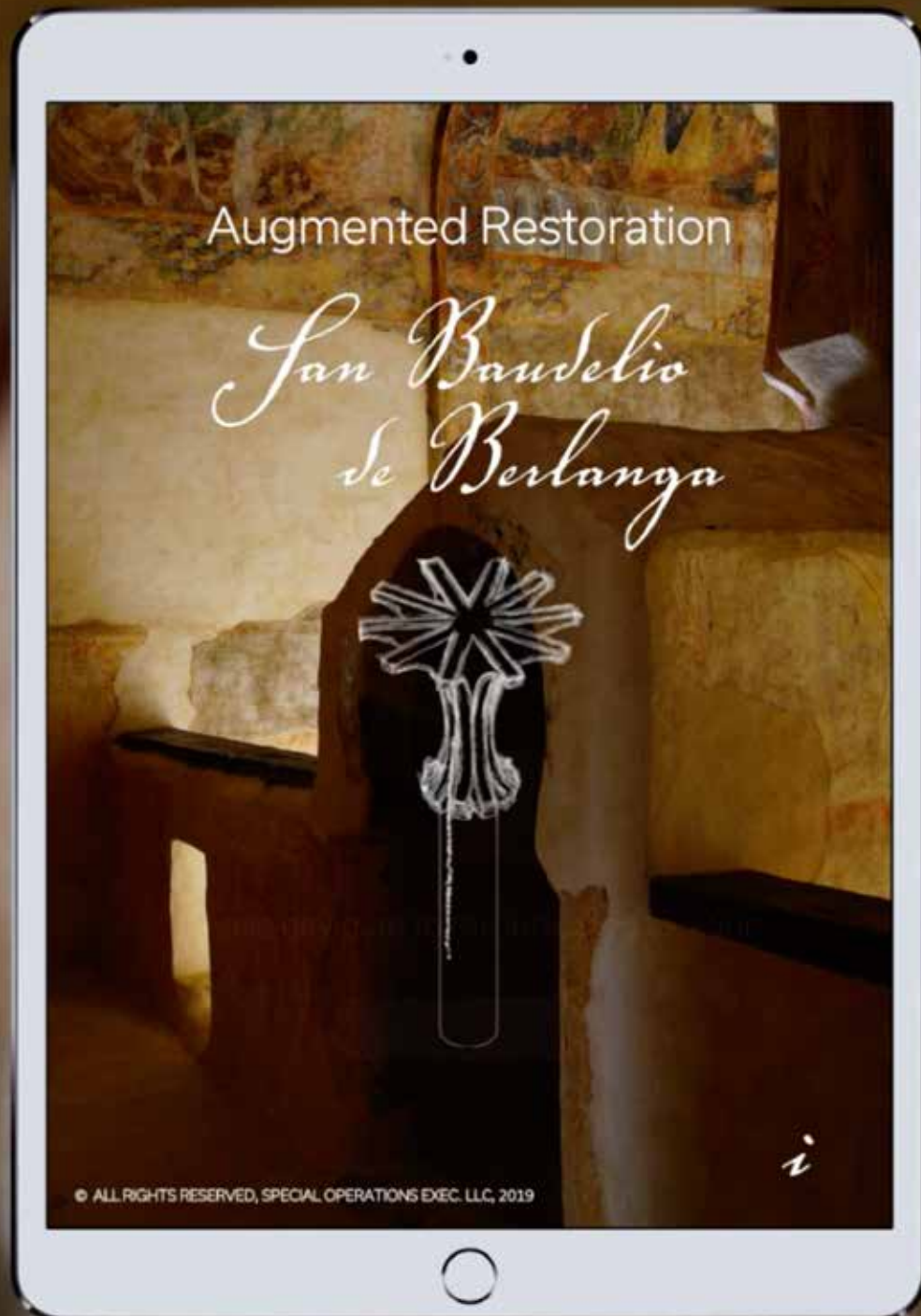
Testing

1. Printed 1/3 scale target images for off-site testing
2. Optimized data for higher quality / faster rendering time
3. Installed application onto multiple devices
4. Made available on Apple App Store (Coming May 2019)

Project

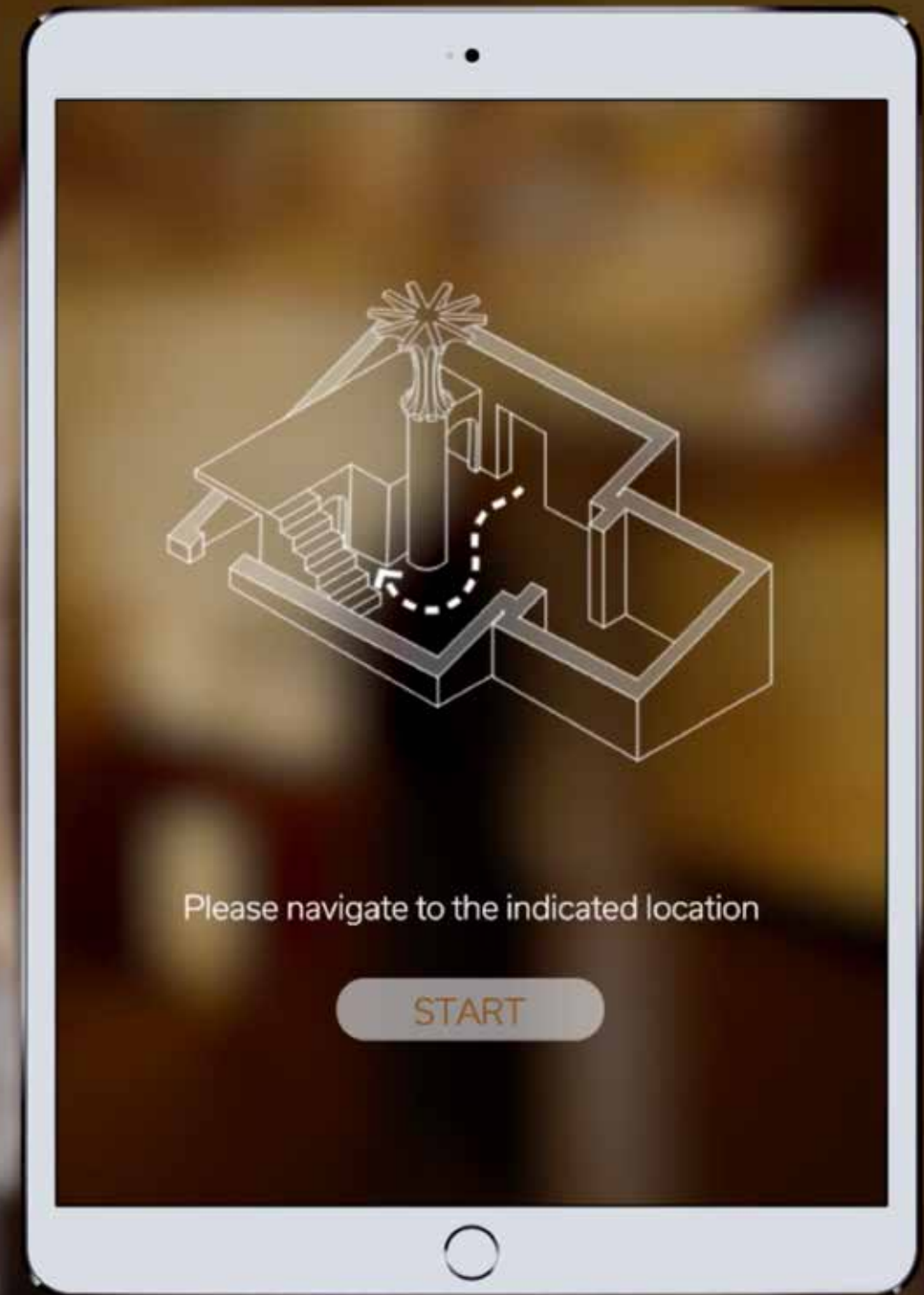
1

Application Home Screen



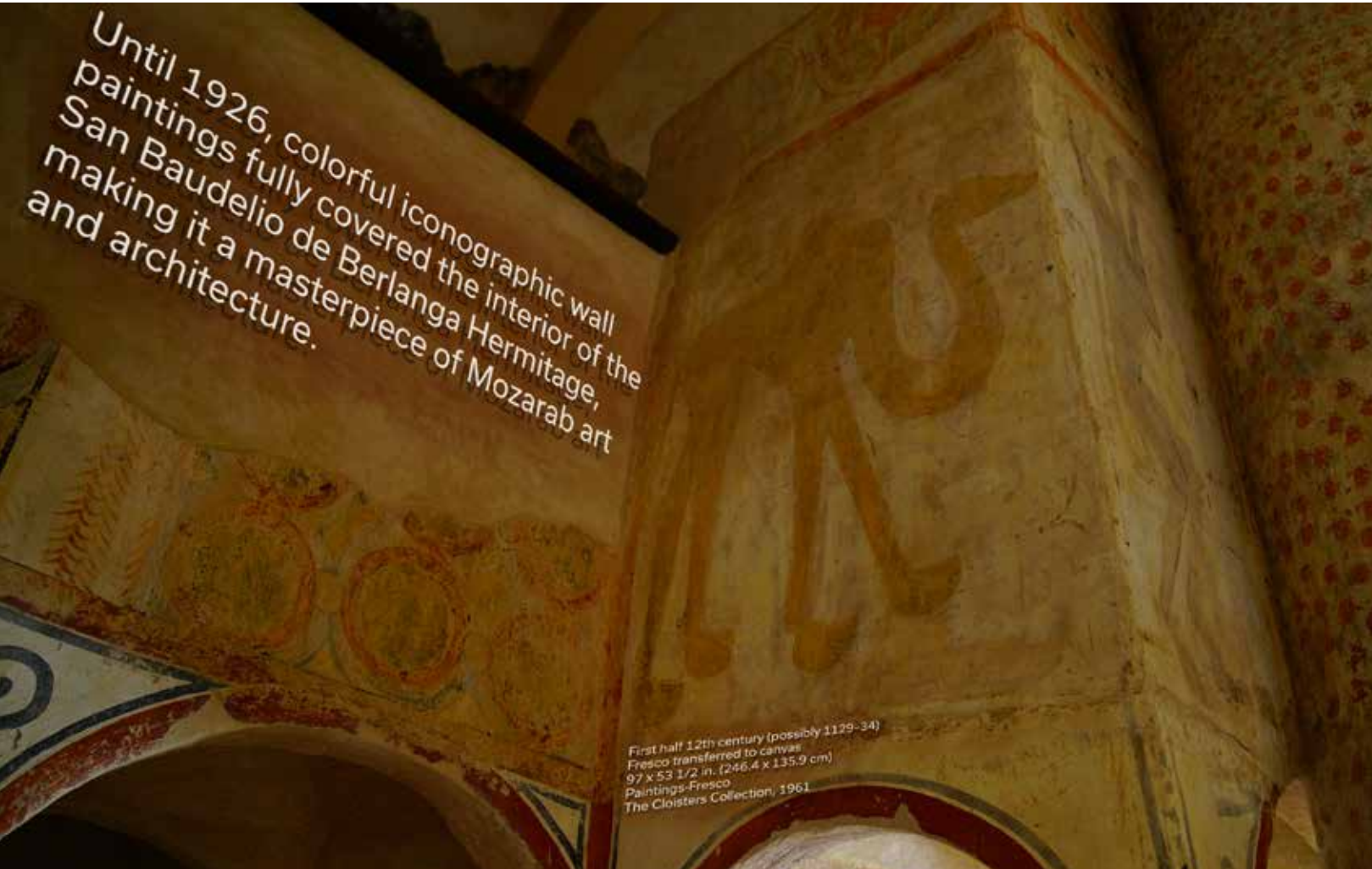
2

Instructions for Interactivity



3

Augmented Restoration Overlay



With the Onera Prize funding, SOE created an AR application that allows users visiting the San Baudelio Hermitage to overlay the *Camel* painting onto its remains in-situ. The final product serves as an initial prototype for developing a full version of the application that incorporates other paintings now on canvas at museums with additional layers of information for researchers and visitors alike. Using scaled printouts of the site, SOE developed the application in a manner that allows for off-site demonstration. The final product of this project is an AR tool for interpreting and preserving the historical transformation of the Hermitage. This approach may be applied to other historic sites that have faced similar plundering and deterioration over time. The Onera Prize for Historic Preservation provided the financial support to build a solid prototype of the AR application that SOE will use as a fundraising tool to further develop the project.

To see the AR application in action visit
<https://vimeo.com/312789010>

