Co-funded by the Erasmus+ Programme of the European Union

Project Code: 2021-1-EL01-KA220-HED-000027597

CREAMS

Scaffolding Creativity of Arts Students: Framework, Toolchain, and Educational Material on how to Create their Own Virtual Exhibitions

USER MANUAL

"Augmented Reality Outdoor Mobile Application"

Version 1.0

Table of Contents

List of Figures

List of Abbreviations

Abbreviation	Definition
API	Application Programming Interface
APK	Android Package Kit
AR	Augmented Reality
GPS	Global Positioning System
MB	Megabytes
URL	Uniform Resource Locator

1. General Information

1.1 Organization of the Manual

The user manual consists of the following four sections:

1. General information
2. System Summary
3. How to download the mobile application
4. Using the Mobile Application

General Information section explains in general terms, the mobile application overview, and the sections of the user manual. This section provides a description of the purpose and scope of the User Manual and the problems that will be solved by interacting with this.

System Summary section explains about the hardware and software requirements for accessing the mobile application and user access levels. This section provides an overview of the system's capabilities, functions, and operation, including the specific high-level functions performed by the system.

How to Download the Mobile Application section explains the options available to download/access the mobile application.

Using the Mobile Application section provides a detailed description of the mobile application's functionalities. This section describes each specific function of the system.

1.2 Mobile Application Overview

The Augmented Reality Outdoor Mobile Application Augmented Reality (AR) app has been developed for the CREAM's project and is currently in its high fidelity and final edition. Its objective is to augment the art students' artworks and galleries through the usage of a phone, enriching the outdoor exhibition experience.

The manual presents this application edition's requirements for installation and addresses all the possible obstacles and errors which might appear throughout the installation process and application's usage. By reading this manual, the user will be able to operate the application fully and liberally.

2. System Summary

This section explains about the hardware and software requirements for accessing application/software and user access levels.

2.1 Hardware and Software Requirements

This mobile application is developed for Android mobile phones only. The following prerequisites must be fulfilled to ensure its functionality:

Hardware:

- Functioning GPS receiver.
- Functioning Wi-Fi antenna.
- Functioning rear-facing (world) camera
- Mobile battery in good condition.
- Minimum 50MBs of free storage space.

Software:

- Minimum Application Programming Interface (API) Level: 27 (Oreo 8.1 Android Platform Version)
- ARCore supported device (the device list which included all the supported models by manufacturer can be found here)
- GPS service enabled.
- Internet connectivity.
- An updated internet browser.
- Google Maps installed and updated.

2.2 User Access Levels

The mobile application does not require any registration. Guest mode is the application's default mode of operation for the low fidelity version.

2.3 Privacy & Terms

No personal information is collected, and no registration/authentication is required for the AR mobile application usage. The application will require the user's location for its navigation process when Google Maps operates. This information is managed and processed by Google and is subject to its privacy policy. It will also require camera permission if the users want to augment artefacts. No identifying data is stored in the project's servers.

3. How to Download/Access the Mobile Application

This section presents the complete steps required for the installation of the AR mobile app. The prepared screenshots were taken during the installation procedure of the application in a Galaxy A32 5G phone device. It has an Android version of 13 installed, a 6.5 inches screen, internet access via Wi-Fi, its default browser is Chrome, GPS location is turned on and its battery level above 60%.

3.1 Download Process

The mobile app is available for downloading at this url: **https://creams-project.eu/creams-ar-outdoor.apk**. By visiting this URL, the following screen (Figure 1) will appear, indicating that the Android Package (APK) file is downloading and prompting you to open it to install it (Figure 2).

Figure 1 Screenshot from Chrome

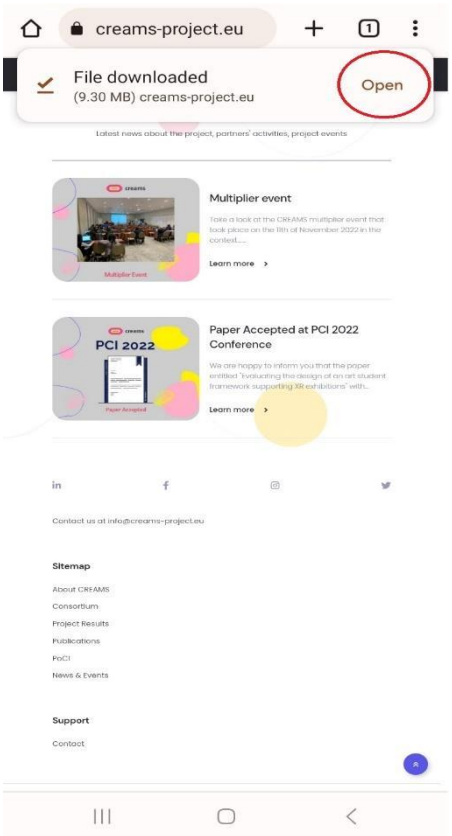

Figure 2 Screenshot from Chrome (Project's Website)

For facilitation, the APK file can also be found in your local storage folder (Figure 3).

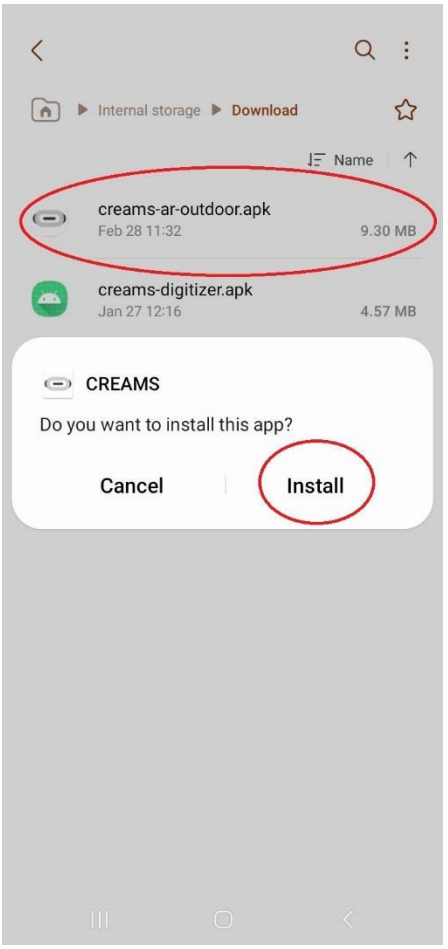

Figure 3 Android Package Installer

3.2 Installation Process

By opening the APK file, the system will either prompt you to install the CREAMS application (if you have already given permission to Chrome to install unknown apps from this source), or guide you to Settings, asking you to give permission to Chrome to install unknown applications (Figure 4 and Figure 5). Make sure the circled side bar is in the correct position (as seen in Figure 5). You can always revert this option by turning the same side bar on the opposite direction in the Settings.

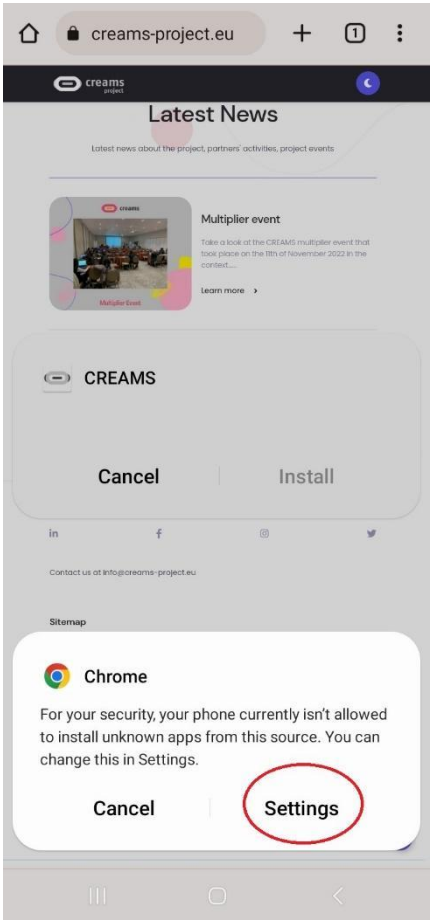

Figure 4 Chrome's Suggestion to Change Permission

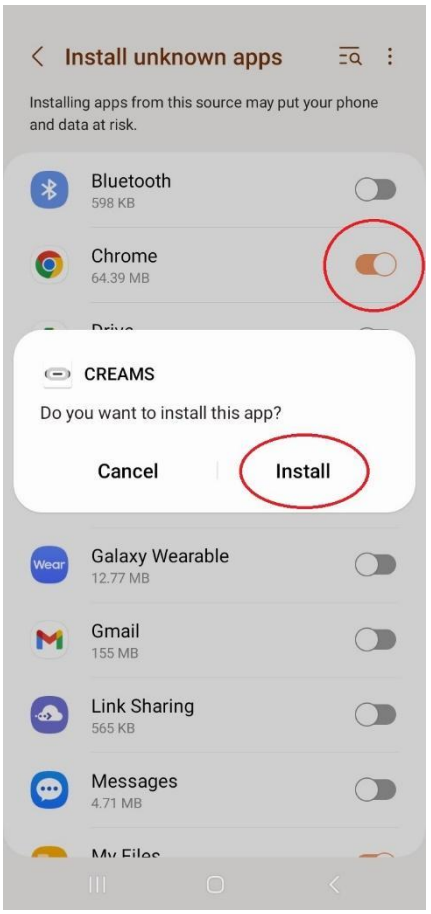

Figure 5 Package Installer Prompting Installation

Once the installation is complete, the screen in Figure 6 will appear, and the homepage of the CREAM's AR mobile application (Figure 7) will emerge.

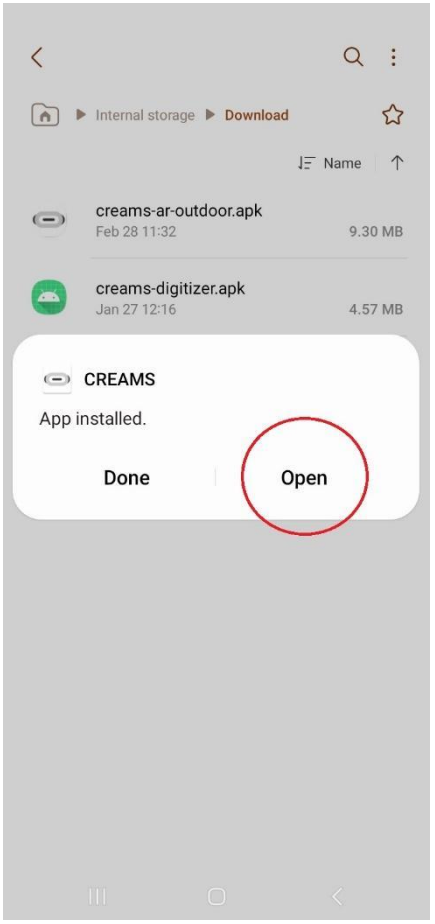

Figure 6 Final Package Installer Screen

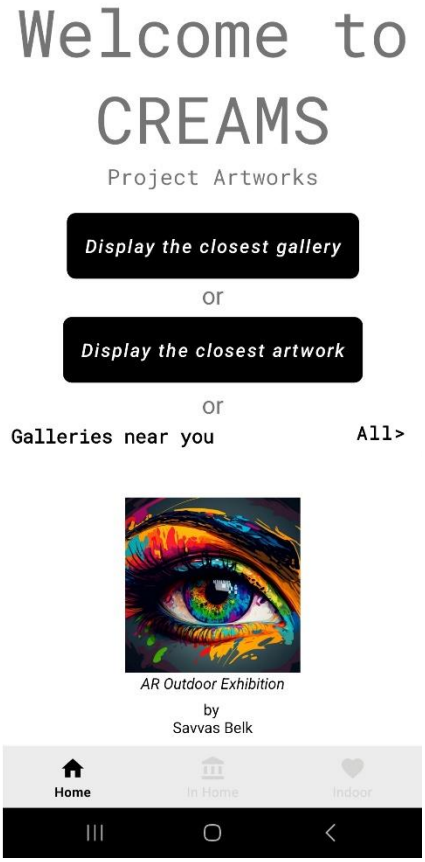

Figure 7 Application's Home Screen

4. Features/Functionalities (Low Fidelity Tool)

4.1 Home Tab

The application's homepage includes:

- Two buttons (circled in Figure 8).
- A recycler view.
- A bottom navigation menu.

The bottom navigation menu is situated at the bottom of the phone's screen. The user can navigate from the Home tab to the In Home tab and the Indoor tab.

The recycler view is situated above the bottom navigation menu. It is a horizontally-scrollable menu which displays all the published galleries. It rotates by swiping a finger towards the left.

The final feature in the home tab is the two black buttons. When pressed, the buttons will prompt the user to allow the CREAMS application to access the device's location. The user should select "While using the app" (Figure 9).

Figure 8 Closest Gallery and Closest Artwork Buttons in Home Screen

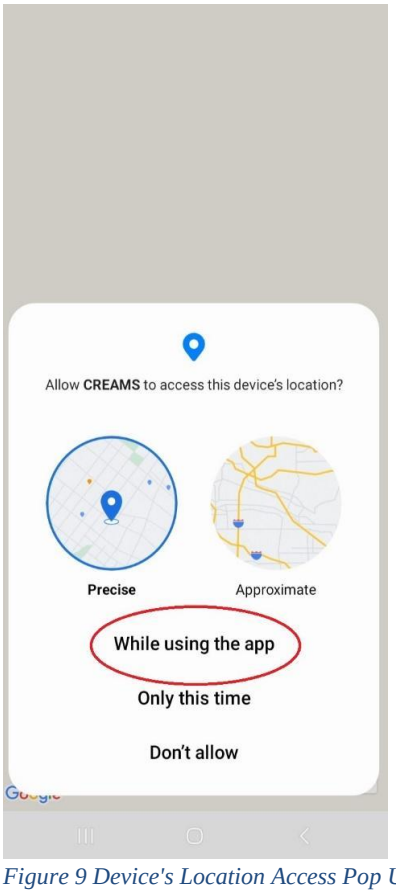

Figure 9 Device's Location Access Pop Up

After allowing the application to access the device's location, Google Map opens, zoomed in at the

user’s position (Figure 10). The closest gallery/artwork will be indicated with a red pin (or multiple in the case of a gallery with many artworks). By clicking on a pin, a thumbnail, the title, and the owner’s name appear in an info window (Figure 11).

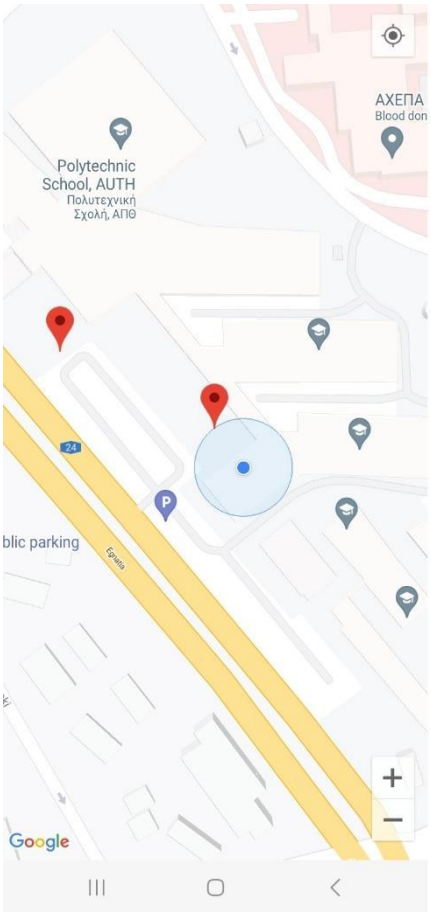

Figure 10 User's Current Position with Closest Artwork/Gallery in Red Pins

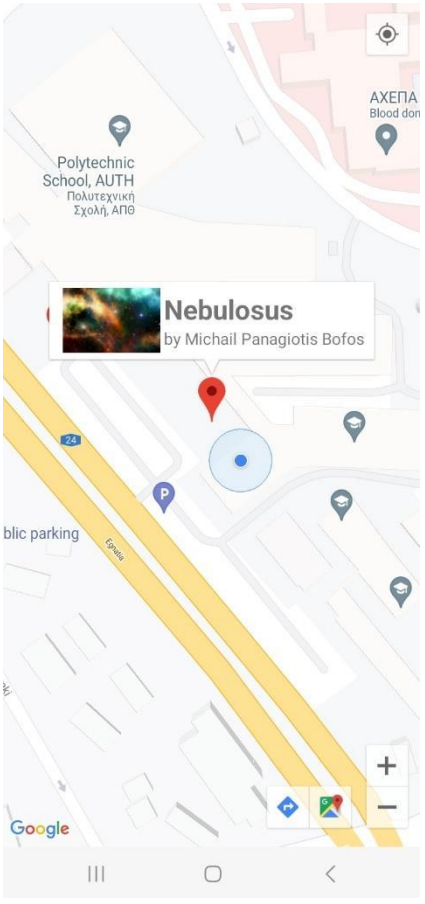

Figure 11 Info Window with Artwork's details

Navigation Mode:

The user can be navigated towards the closest artwork by pressing the navigation icon on the bottom right screen (circled in Figure 12). This action will open Google’s Map directions where you can decide on your conveyance towards the selected artwork (Figure 13).

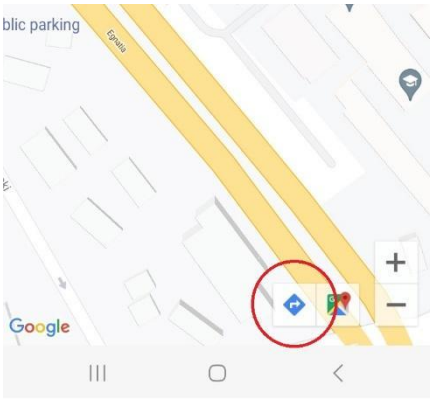

Figure 12 Navigation Icon

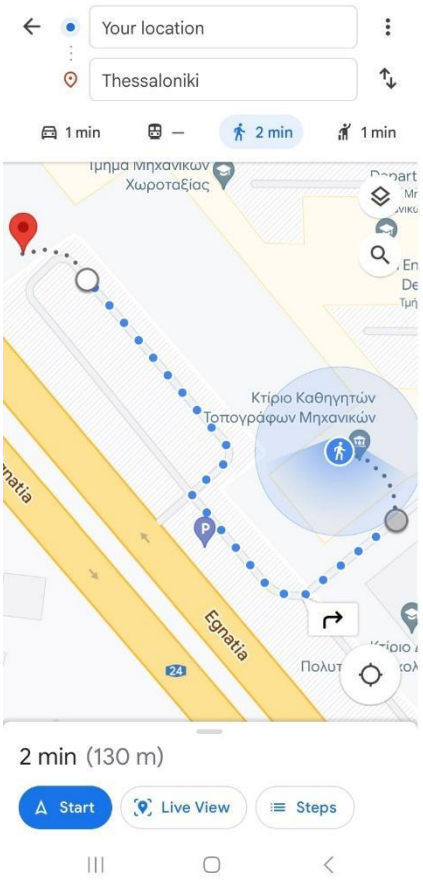

Figure 13 Directions towards the Artwork

Augmentation Mode:

If the user taps on the Info Window and their location is near the artwork, the phone's camera opens, and the application prompts the user to move the phone to find a suitable plane for augmenting the chosen artwork (Figure 14).

Figure 14 Snapshots of the application's Prompt to Move the Camera for Plane Detection.

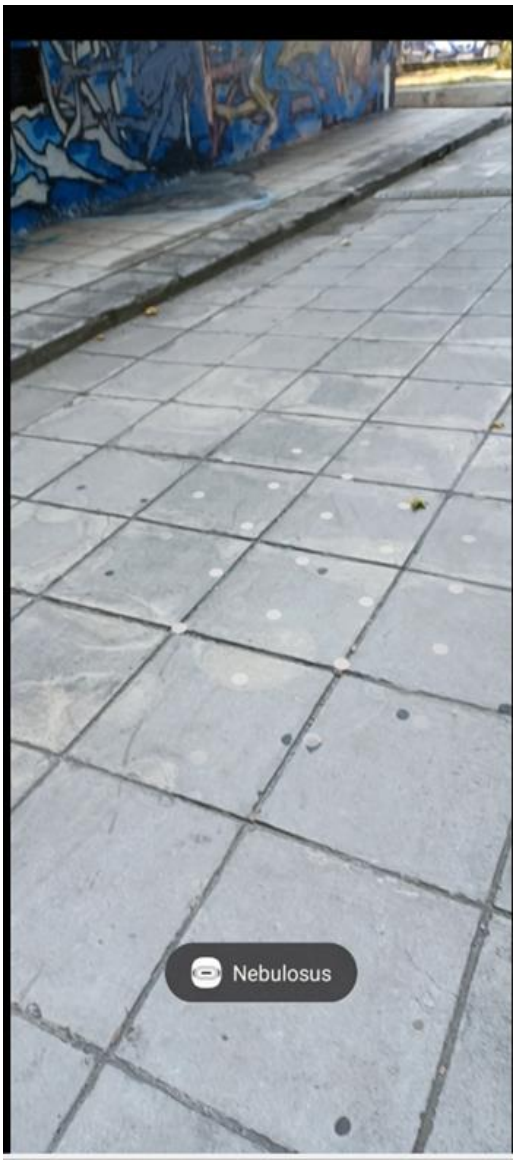

Figure 15 Snapshots of the application's Indication of Plane Detection.

Plane Detection: Dots appear when the application successfully identifies a plane on which it can augment the image. By tapping on the dots (Figure 15), the user can view the augmented artwork (Figure 16).

Distance Limitation: If the user is too far away from the artwork, the application displays a message indicating that they need to get closer to the pin for augmentation (Figure 17).

Figure 16 Snapshots of the application's Artwork Augmentation

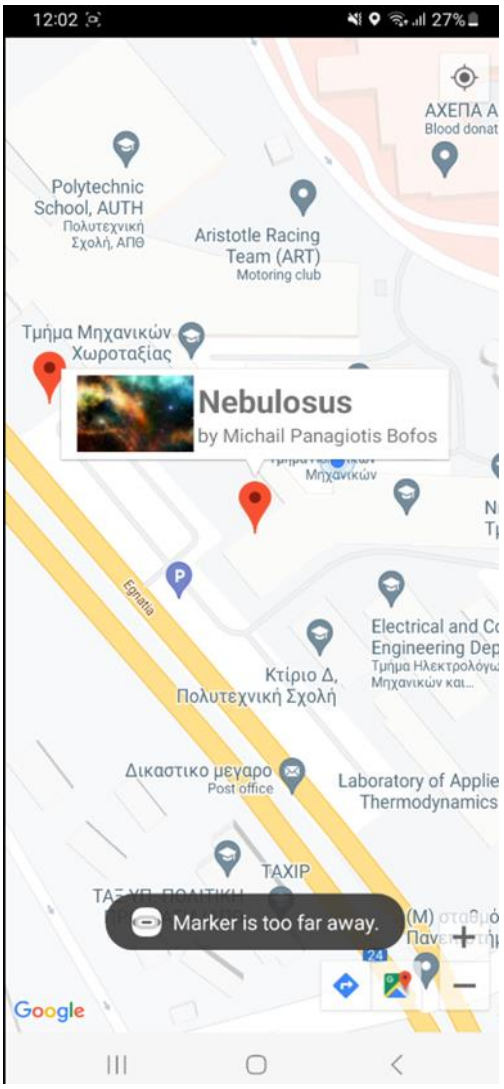

Figure 17 Snapshots of the application's Indication of the Marker being too far away

4.2 In Home Section

The second function of the application is In Home Augmentation. By clicking on the bottom navigation menu and selecting the In Home icon, users gain access to all available artworks that they can augment at their discretion (Figure 18).

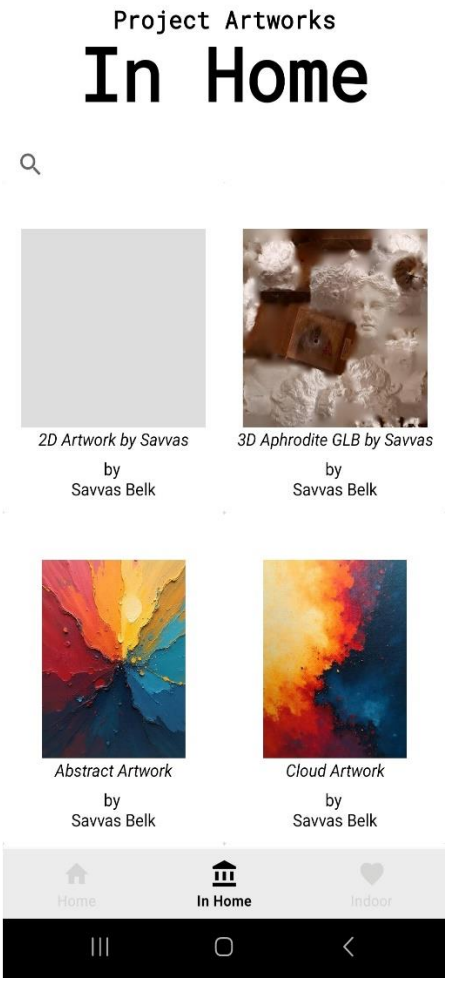

Figure 18 Snapshots of the application's In Home function

The augmentation process is the same as the one in the closest artwork/gallery augmentation mode, where the camera opens, the application seeks a suitable plane for augmentation, and upon successful detection (indicated by dots), the user can view the augmented artwork through their phone's camera.

4.3 Indoor Section

The final function of the application is Indoor Augmentation. By selecting the Indoor icon from the bottom navigation menu, users can click on the "SCAN QR CODE" button (Figure 19), which activates the phone's camera for scanning an available QR code.

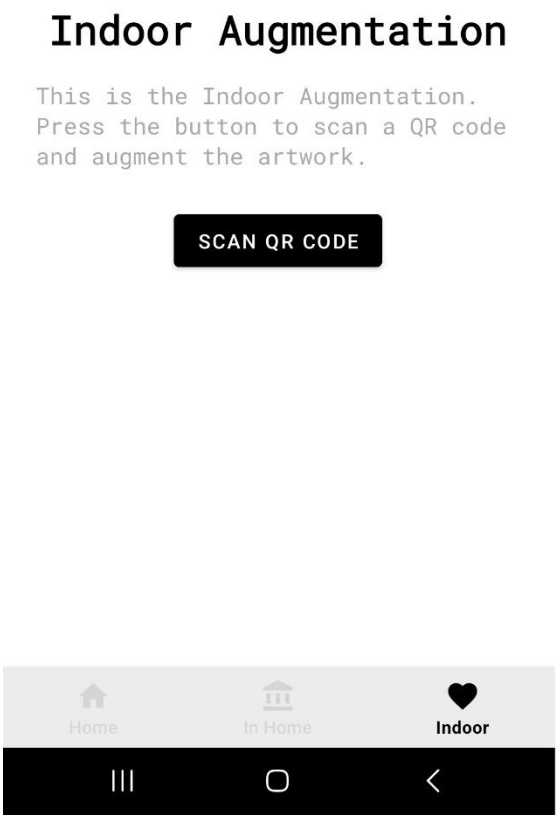

Figure 19 Snapshots of the application's Indoor function

The augmentation process begins when the QR code is successfully scanned. The camera opens, the application searches for an appropriate plane to augment, and when detected (indicated by dots), the user can view the augmented artwork through their phone's camera.