

Heuristic Evaluation of Trove

1. Problem/Prototype Description

Trove is a location-based art mobile app that allows users to discover and create AR pieces hidden around the real world.

2. Violations Found

NOTE: These tasks are as listed in the README (which is different than in the slides). In addition, feedback for decorating an object is included in the 3rd task of navigating to an object, which relates to feedback on how the tasks are worded.

Task 1: Scanning an object

1. H8 Aesthetic & Minimalist Design / Severity: 1 / Found by: A

Task 1: Scanning an object

Description: The user's name and the flashing awards display are very large and take up a significant amount of space at the top of the screen, pushing down the map. Rationale: The user may be distracted by the header info at the top of the screen and may have difficulty finding the scan-an-item button.

Fix: Make the flashing states and profile name smaller, allowing the map to expand to cover the entire screen.

2. H6 Recognition not Recall / Severity: 3 / Found by B, A, C

Task 1: Scanning an object

Description: The two buttons on the bottom for scanning and viewing an object do not represent their function clearly and distinguishably enough.

Rationale: The user may not be able to recognize what button to click or what they are for and may struggle to complete the task

Fix: Either replace the icons with more pertinent ones or add some captions to the buttons.

3. H11 Accessible Design / Severity: 2 / Found by: A, C, B

Task 1: Scanning an object

Description: The process of scanning in an object is entirely visual.

Rationale: A person who is hard of sight and using a screen reader may not be able to finish scanning in an object.

Fix: Add captions describing how to move the phone to capture the object.

4. H3 User Control & Freedom / Severity: 2 / Found by: A,

Task 1: Scanning an object

Description: When scanning in an object, it scans the object independently of the environment, despite art pieces being set in the background of the environment.

Rationale: The user is unable to place the object how they would like to in the environment.

Fix: After scanning an object, allow the user to place it in the environment.

5. H10 Help & Documentation / Severity: 3 / Found by: A, B, C, D

Task 1: Scanning an object

Description: When scanning an object, only the “360” icon at the top provides information on what to do once you’ve started. The user can’t access the scanning tips after the scanning starts

Rationale: Users may be confused if they think they’ve scanned everything in, but the app wants the user to continue moving a certain direction. The user may find themselves failing the scan and want to see the tips again.

Fix: Include captions instructing the user to move right or left, up or down, etc. to provide clarity on what the app is expecting / waiting for the user to do.

6. H3 User Control & Freedom / Severity: 1 / Found by: A

Task 1: Scanning an object

Description: When making a post, the maximum duration is 30 days and the slider makes precise control over the duration difficult.

Rationale: The user may wish to create a permanent post, or a post a very specific amount of time.

Fix: Allow custom time entry

7. H8 Aesthetic & Minimalist Design / Severity: 1 / Found by: A, D

Task 1: Scanning an object

Description: When the user completes a scan, “Retake scan” is the brightest button (pink) and is above the “Continue with Entry button”. It is therefore the first read.

Rationale: It is tempting to click “retake scan” while trying to continue, thereby erasing the scan inadvertently.

Fix: Move retake scan below “Continue with entry” and make it a much more subtle design so the first read is “continue with entry”.

8. H3 User Control & Freedom / Severity: 1 / Found by: A,

Task 1: Scanning an object

Description: While scanning in an object, there is no button to restart or redo just a portion of the scan. One would have to click the ‘X’ and start over.

Rationale: Users may need to restart if or redo a portion of the object, and may be frustrated that they need to quit and start over from the home screen.

Fix: Add a restart button and the ability to redo portions upon selecting those regions.

9. H3 User Control & Freedom / Severity: 0 / Found by: A,
Task 1: Scanning an object
Description: While scanning in an object, there is no ability to pause, if you need to close the app and return to the scan.
Rationale: Users may be frustrated that there is no way to pause the scanning process once started without starting over.
Fix: Include a pause button.
10. H4 Consistency & Standards / Severity: 2 / Found by: A, D
Task 1: Scanning an object
Description: On the "Submission Details" page, the memory location is grayed out, implying that it can't be changed? Or that it's wrong?
Rationale: Having something grayed out usually means it is disabled or selected, but that did not seem to be the case with the field
Fix: Remove the entry box for memory location and include it as information presented below the "Created by you on..." line in a similar style.
11. H1 Visibility of System Status / Severity: 2 / Found by: A,
Task 1: Scanning an object
Description: After completing a "New Submission" it is unclear what "Decorate memory" does.
Rationale: The user just finalized this submission, and now there appears to be an option to change it?
Fix: If you can decorate the object you just scanned, allow the user to do that before they click "finish" on creating the object.
12. H4 Consistency & Standards / Severity: 2 / Found by: A, D, C
Task 1: Scanning an object
Description: The "Finish" button is in the top right, while all other continue flow buttons are at the bottom of the screen.
Rationale: The user may be confused why this button is different and struggle to find it for a moment.
Fix: Move the "Finish" button to the bottom of the screen and make it large like other continue flow buttons.
13. H4 Consistency & Standards / Severity: 1 / Found by: A,
Task 1: Scanning an object
Description: Sometimes objects are referred to as "treasures", other times "memories", and other times "objects".
Rationale: It is a little confusing what these terms mean and what they are referring

to. Fix: Standardize a single term to refer to the AR objects.

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14. H8: Aesthetic and minimalist design / Severity: 1 / Found by D
 - a. Task 1: Scan an object
 - b. Problem description: [Entry detail page] The text font weights are not standardized.
 - c. Rationale: Most are medium or bolded but there are a few spots, such as the profile picture's text on the home screen, where the text is very thin.
 - d. Suggested Fix: Having text styles in Figma can help standardizing text

15. H11: Accessible design / Severity 1 / Found by D
 - a. Task 1: Scan an object
 - b. Problem description: [Home screen] The text for "decorate memories" and the percentage is too small
 - c. Rationale: The text is 10px and has a light font weight, which makes it difficult to see.
 - d. Suggested Fix: increase the font size to 12px or larger

16. H4: Consistency and standards / Severity: 1 / Found by D
 - a. Task 1: Scan an object
 - b. Problem description: [Home screen] Some question marks are upright and others are not
 - c. Rationale: There is one question mark at the bottom of the home screen that is the only questions mark that is not upright
 - d. Suggested Fix: make them all upright

17. H11: Accessible design / Severity: 1 / Found by D, B
 - a. Task 1: Scan an object
 - b. Problem description: [Scanning tips screen] Accessibility color contrast c. Rationale: The lighter part of the gradient background may not have a strong enough contrast with the white text.
 - d. Suggested Fix: Make sure to check the accessibility contrast ratio

18. H11: Accessible design / Severity 2 / Found by D
 - a. Task 1: Scan an object
 - b. Problem description: [Camera Pre Scan Screen] Not accessible color contrast between icon and background
 - c. Rationale: The exit icon button is black, which may not form a good contrast with the background. It is also inconsistent with the white text
 - d. Suggested Fix: Make the text/icon color consistent and contrasting of the background

19. H1: Visibility of system status / Severity 3 / Found by D
 - a. Task 1: Scan an object
 - b. Problem description: [Camera Scan screen]Progress percentage display c.

Rationale: Right now the progress is reflected by a percentage number, which is not the most visual and intuitive

d. Suggested Fix: There could be a progress bar in addition to the number to reflect the scanning progress

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20. H2: Match between system and the real world / Severity: 3 / Found by: C
- Task 1: Scanning an object
 - Description: It is unclear what the purpose of scanning is; whether it is to share, keep for yourself, make the object customized by decorating...
 - Rationale: Because the user may be unfamiliar with the concept and motivation behind the app, it may be hard for them to understand why they would be scanning something, so providing the scanning tool with no more context or different wording other than 'Scan' may not be conducive to creating a map with a lot of art available.
 - Fix: Communicate the purpose first (Create your own Augmented Reality art / Share your AR art with friends), and then tell them the means to do that: Scan. This way, I expect the user to understand better why they are scanning objects, generate better content for the app, and motivate the user with a clear purpose
21. H3: User control and freedom / Severity: 3 / Found by: C
- Task 1: Scanning an object
 - Description: The artist is unable to limit (or expand) the options for decorations that people add to their art, or opt out of their art being decorated at all.
 - Rationale: The artist is limited to letting everyone who sees the art decorate it in any way they want
 - Fix: When the artist scans a new item, there should be options to specify how the artist envisions others interacting with the piece (maybe some just want comments, audio notes, music, or specific stickers to add).
22. H5: Error Prevention / Severity: 4 / Found by: C
- Task 1: Scanning an object
 - Description: The objects in the map seem like digitally produced, animated objects (iceberg, Among Us character), that could not exist in the real world (which makes sense as they are classified as AR art). However, when I scan an object, it seems like it must be something that is physical.
 - Rationale: It is confusing why others' objects seem digitally produced
 - Fix: Place more art on the map that seems like they were physical objects.
23. H7: Flexibility and efficiency of use / Severity: 4 / Found by A, C
- Task 1: Scanning an object
 - Description: The platform only permits the scanning of physical objects
 - Rationale: An advanced user may want to upload art they produce digitally for

others to view, whether 2D or 3D. This also applies for accessibility because scanning AR objects may be available on only some of the higher end mobile devices.

d. Fix: Give the option to upload art on the phone, not only scan physical objects

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24. H10: Help and Documentation / Severity: 3 / Found by C

a. Task 1: Scanning an object

b. Description: The app uses the abbreviation “AR”, instead of “Augmented Reality” in the scanner introduction page since the beginning

c. Rationale: Given that the target user is a beginner, they could be confused by the use of ‘AR’ without explanation if they haven’t been exposed to the technology before

d. Fix: Use the full word: Augmented Reality

25. H2: Match between system and the real world / Severity: 1 / Found by: B

a. Task 1: Scanning an object

b. Description: Regarding the scale on the map, there is a purple line with the darker purple segment on the left and lighter purple segment on the right. It is unclear what the actual distances corresponding to the segments are and why there are two different colors.

c. Rationale: Usually on the scale of a map, there would be actual distance represented by the line segment of a certain length. The scale on this app does not follow the real-world convention so would be confusing for users.

d. Fix: Use one color and note the actual distance represented by the line segment.

26. H2: Match between system and the real world / Severity: 2/ Found by: B

a. Task 1: Scanning an object

b. Description: For the achievement “Rank Top 3 out of friends,” it is unclear how a user could achieve “20%” of this task.

c. Rationale: We would usually think of “Rank Top 3 out of friends” as something that is either achieved or not achieved, but not in percentage.

d. Fix: Remove the percentage and notify the users when they rank top 20/10/5/3 out of their friends.

27. H8: Aesthetic and minimalist design / Severity: 1/ Found by: B

a. Task 1: Scanning an object

b. Description: On the “Scan Successful” and “New Submission” pages, under the picture of the scanned object, there is some filler text whose function is unclear. c.

Rationale: It might be that the designer intended to add something there and then

forgot. I don't see what role the filler text could play otherwise. Very minor problem and easy to fix, so I rated 1.

d. Fix: Remove the filler text.

28. H8: Aesthetic and minimalist design / Severity: 2/ Found by: B

a. Task 1: Scanning an object

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b. Description: On the "New Submission" page, the text "Share your memory with your friends" is not grouped with the three shared buttons, but with the image of the object.

c. Rationale: Based on the principle that things related are usually grouped together and separated from other less relevant things via white space, the suggestion of "Share your memory with your friends" should be grouped together with the three sharing-related icons. Yet currently, the text is contained in a box with the object image and the icons are outside the box and separated from the box by filler text.

This is against the UI design principle but is not a major problem, so I rated 2.

d. Fix: Move "Share your memory with your friends" out of the box to be closer to the icons or even box the text and the icons.

Task 2: Editing an entry in your Trove

29. H3 User Control & Freedom / Severity: 2 / Found by: A,

Task 2: Editing an entry in your Trove

Description: There are 4 set options for organizing your Trove, but there is no search function.

Rationale: It may be difficult to find the treasure you are looking for just with the options that are provided.

Fix: Include a search feature to be the first way to go through your trove.

30. H8: Aesthetic and minimalist design / Severity: 2 / Found by: A, B

Task 2: Editing an entry in your Trove

Description: The back button and clock with arrow icon are similar fonts around the title "My Trove". It appears that the clock with the arrow icon is an icon for "history", which I think is referring to the room we are currently in for "My Trove."

Rationale: It is unclear what this icon does or maybe this part has not been implemented. But it is very difficult for the user to tell from the icon itself.

Fix: Remove the clock with arrow icon.

31. H1 Visibility of System Status / Severity: 3 / Found by: A, D

Task 2: Editing an entry in your Trove

Description: When you click on a treasure in the trove, you enter a page where you can freely edit or change attributes of the object. There is no "edit" or "save" button, however.

Rationale: It is unclear to the user what state the app is in and how information is saved. Also, users may accidentally tap into the text field

Fix: Don't allow users to edit the description, for instance, just by tapping on it, and instead add an "edit" button above it on the right to edit it, with a button to "save" when you have finished editing it. (This does not necessarily apply to the Permission Settings — that seems standard and clear to be able to just tap a different option without edit and

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save buttons, though a "save" button that appears once you've made changes couldn't hurt there either)

32. H3 User Control & Freedom / Severity: 4 / Found by: A

Task 2: Editing an entry in your Trove

Description: When you are editing an entry in your trove, there is no way to actually edit the object itself.

Rationale: It is confusing why, while editing an item in the trove, you can't actually interact with or edit the item itself.

Fix: Add a button to edit the treasure itself. (Unless the task is only to edit the metadata of the treasure as opposed to the treasure itself — in which case, consider rewording the task to make that clear).

33. H4 Consistency & Standards / Severity: 2 / Found by: A

Task 2: Editing an entry in your Trove

Description: On the main map screen, when you are looking at the treasures you can see, they look like buttons, but are not actually tappable.

Rationale: Users may try to see more information about an uncovered treasure on the map by tapping it like they would a question mark, but it appears that that is not possible.

Fix: For uncovered treasures, allow the user to tap on them to pull up the information found by searching for that treasure in "My Trove"

34. H11: Accessible design / Severity 3 / Found by: D

a. Task 2: Editing an entry in your trove

b. Problem description: [My trove main screen] The text color in each card may not achieve the accessibility ratio

c. Rationale: The color is a purple on white background. The purple may not be dark enough.

d. Suggested Fix: check the ratio. If it doesn't pass, make it darker

35. H8: Aesthetic and minimalist design / Severity 1 / Found by: D

a. Task 2: Editing an entry in your trove

b. Problem description: [Entry detail page] The gradient in the cards gives an outdated design feeling and doesn't go with the rest of the visual design

c. Rationale: This kind of gradient reminds me of the old IOS. Most of the other UI is

relatively flat and minimalistic.

- d. Suggested Fix: remove the gradient. If you want contrast between the cards and background, maybe try making the background a light gray.
36. H8: Aesthetic and minimalist design / Severity 1 / Found by: D
- a. Task 2: Editing an entry in your trove
 - b. Problem description: [Entry detail page] Unequal sizing of icons
 - c. Rationale: The profile icon is stretched
 - d. Suggested Fix: Make sure the sizes of the icons are consistent
37. H4 Consistency and standards / Severity 1 / Found by: D
- a. Task 2: Editing an entry in your trove

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- b. Problem description: [Entry detail page]: Unstandardized UI for views, likes, and comments (and other metadata)
 - c. Rationale: The way views, likes, and comments are displayed here is not standardized with how it's displayed on the homescreen when the user clicks on a question mark: the font, the containers of the text, icons used.
 - d. Suggested Fix: Maybe choose one or the other.
38. H6: Recognition rather than recall / Severity: 3 / Found by: B
- a. Task: All Tasks but especially Task 2: Editing an entry in your Trove
 - b. Description: It is unclear whether the "Last edit" is by the owner of this trove or the creator of the memory or some other users.
 - c. Rationale: Since editing is the core part of the complex task, the user would want to know whether the memory has been changed by themselves or others and who the editor was. Not showing the editor information makes it hard for the user to recall this piece of information.
 - d. Fix: Specify the editor.
39. H4: Consistency and Standards / Severity: 1 / Found by: C
- a. Task 3
 - b. Description: The delete button for an art piece in the trove is very nested within the details of the task
 - c. Rationale: The standard for something as essential as a delete button for a memory (maybe the user want it to be ephemeral/ rediscover it later) is that it should be easily visible
 - d. Fix: Move the trash button to the first screen of the trove, instead of nested within the info page
40. H5: Error Prevention / Severity: 2 / Found by: C
- Task 1: Scanning an object
- Description: It is unclear what "Entry Duration" means in the trove -> details page
- Rationale: There is no prior context of why there is a duration, what the duration should be, or what it means. The user could enter a duration of 1 day or 2 months without knowing what they're doing
- Fix: If "Entry Duration" is not essential to your app (it doesn't seem to be), delete that feature, or explain what it can be used for / how to adjust based on your goals
41. H7: Flexibility and efficiency of use / Severity: 2 / Found by: C

- a. Task 3
 - b. Description: The app only includes the option to view the time required to get to the art object for walking
 - c. Rationale: The user may want to bike or drive to the art and may feel restricted to not have the option to do so
 - d. Fix: Add estimated time / alternate paths if the user wants to use other forms of transportation (ex. Drive, bike, take a bus)
42. H7: Flexibility and efficiency of use / Severity: 3 / Found by: C
- a. Task 3

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- b. Description: The trove entry doesn't allow you to view the progress of your art (what other people have added)
 - c. Rationale: The absence of an opt-in feature to view progress of the art limits its usability to an interactive artist. It may be essential to the nature of the art that the artist sees its evolution; even if the artist is just curious, the app should have the functionality to provide a timeline of what has happened within the trove.
 - d. Fix: Add the option to view the evolution of the art (almost like the time travel feature you have in view mode).
43. H7: Flexibility and efficiency of use / Severity: 2 / Found by: C
- a. Task 3
 - b. Description: The user is not able to relive the art through the full screen picture (like they were once able to), and cannot view the edits to the piece since then c.
 - c. Rationale: The user may want to recall how they felt watching art when far away from the original location.
 - d. Fix: Add an option to see the art full-screen like they once did and view timeline
44. H8: Aesthetic and Minimalist Design / Severity: 2 / Found by: C
- a. Task 3
 - b. Description: When clicking an item on the Trove, it brings up many options on the details page: description, all the details, entry duration, permission settings c.
 - c. Rationale: Too many options may distract the user from the key ones they should pay attention to
 - d. Fix: Move entry duration and permission settings to an icon to access only if necessary to adjust (it is not likely users will need to adjust this every time). Once the user fills out the description, adjust the box so that it doesn't take up as much space— you could even consider taking out the box entirely once the user fills out the description and leaving a white background.

Task 3: Navigating to nearby AR memory

45. H9 Help Users with Errors / Severity: 2 / Found by: A,

Task 3: Navigating to nearby AR memory

Description: When you tap the “scan object” button and you are not near an AR piece, it provides a helpful message explaining why that button doesn’t work. However, it does not include instructions on how to find an object to navigate to.

Rationale: Users may tap that button, see the message saying “Navigate to nearby AR memories!” and then not know what to do next.

Fix: Include instructions to click on a question mark to navigate to and uncover a new treasure, or even a button within the error message to navigate directly to the closest treasure.

46. H4 Consistency & Standards / Severity: 3 / Found by: A, D

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Task 3: Navigating to nearby AR memory

Description: After tapping on a question mark, the map changes to zoom in showing instructions. The way to exit is an ‘X’ about a quarter way up the screen on the right, which is different than either the traditional upper left location of a back button or the ‘X’ in the upper right on the screen when scanning an object.

Rationale: It took me a few moments to find a way to return to the map. I tried to pull down on the horizontal bar, but it expanded up, while the ‘X’ was hard to find. Fix: Remove the ‘X’ and either allow the bar to be swiped down or include a back button on the upper left of the map screen.

47. H8 Aesthetic & Minimalist Design / Severity: 2 / Found by: A, D

Task 3: Navigating to nearby AR memory

Description: When you click on a question mark, the menu that pops up is really busy, including multiple large buttons with saturated colors including from blue, pink, and purple, as well as mixtures of these colors. As for the caution page, the entire page is purple and is visually challenging to look at. Users may not know what is the primary information of the page.

Rationale: The user may be confused on what to do next with all the buttons and colors presented.

Fix: Consider limiting color use to one or maybe two colors for the buttons, and choose either flat or gradient button shading, but not both.

48. H5 Error Prevention / Severity: 3 / Found by: A, D, C

Task 3: Navigating to nearby AR memory

Description: Throughout every screen on the process of navigating to an object, the options to view an object and scan in an object are both still present and clickable, even though they would take you away from this flow.

Rationale: Users may tap those buttons by accident and be disrupted from the task of navigating to the AR component.

Fix: Remove the view-an-object and scan-in-an-object buttons from all screens other

than the main one.

49. H8 Aesthetic & Minimalist Design / Severity: 1 / Found by: A,
Task 3: Navigating to nearby AR memory
Description: After tapping a question mark, the “See Profile” button is pink and on the left while the navigate button is on the right. It is therefore the first read of that bottom row. Rationale: The “see profile” feature seems like the least significant button with respect to this task, yet it pops when the user looks at the bottom of the screen.
Fix: Remove the “See Profile” button all together and allow the user to tap the name (e.g. “Lucid Cascade”) to view the profile instead. Likewise, consider removing the “My Trove” and Profile buttons in this view as well.

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50. H4 Consistency & Standards / Severity: 2 / Found by: A,
Task 3: Navigating to nearby AR memory
Description: After tapping a question mark, the navigate button is in the bottom right.
Rationale: This is inconsistent with the continue flow buttons from the scanning-an-object flow.
Fix: Format the navigate button like the buttons in the other flow, where they take up the width of the screen.
51. H1 Visibility of System Status / Severity: 2 / Found by: A, B, C
Task 3: Navigating to nearby AR memory
Description: You can bookmark a question mark, but there is nowhere to bookmark undiscovered objects.
Rationale: It is unclear what bookmarking an unknown object means, and it is unclear where you can view those bookmarked objects which may lead the user to click bookmark expecting it to work some way, and then be confused when it does not meet their expectations. Users currently need to remember which treasure is bookmarked and which is not
Fix: Either remove the bookmark feature or build up support in the app to clearly see bookmarked unknown locations. (P.S. Can you bookmark discovered objects, i.e. the objects in your trove?)
52. H4 Consistency & Standards / Severity: 2 / Found by: A, C, D
Task 3: Navigating to nearby AR memory
Description: After clicking on a question mark, there is a bar showing “5 days ago” “25 likes” and “5 comments”. These, in addition to the “7 mins walk” appear to be buttons due to their colors.
Rationale: The user may try to click these (the “7 mins walk, especially, in an attempt to navigate) and get stuck.
Fix: Remove colored backgrounds in these instances.

53. H8 Aesthetic & Minimalist Design / Severity: 3 / Found by: A, C

Task 3: Navigating to nearby AR memory

Description: The “Caution!” page pops up when trying to navigate somewhere. It uses triangles with exclamation points and bright pink.

Rationale: The “caution!” page popup is distracting and could result in the user’s gaze being directed to their phone in confusion — which is the opposite of what it is intended to be doing. Additionally, the exclamation points are associated with an error that the user needs to address, exacerbating this problem.

Fix: Dial this page back a bit. Consider a notification style popup as opposed to an entire screen. Make it more subtle (i.e. no pink). Remove inconsistent triangles with exclamation points. Remove duplicate ways to exit from the screen (‘X’ and the other two buttons below) — these just add to the confusion of what is required of the user.

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54. H2 Match b/w System & World / Severity: 2 / Found by: A, B, C

Task 3: Navigating to nearby AR memory

Description: While navigating to an object, there is a button at the bottom titled “finish”. This appears to be the only way to exit from the navigation.

Rationale: “Finish” makes it seem like the user is marking that they arrived, when what is really meant is that the user wants to bail on the navigation.

Fix: Remove the “Finish” button and put a back arrow or “Cancel” button on the upper left of the screen.

55. H4 Consistency & Standards / Severity: 4 / Found by: A, B, D

Task 3: Navigating to nearby AR memory

Description: While navigating to an object, the finish button is pink and at the bottom of the screen, reminiscent of the continue flow buttons elsewhere throughout the app.

Rationale: The user may click on finish thinking that it’s finishing the navigation process or simply out of instinct, inadvertently canceling the task.

Fix: Remove the “finish” button (or drastically restyle it, moving it to a different part of the screen and not using a colored background).

56. H4 Consistency & Standards / Severity: 2 / Found by: A,

Task 3: Navigating to nearby AR memory

Description: After successfully navigating to the object, you get an alert that is in the style of the error message you get when attempting to tap on the grayed out view-an-object button when not near a piece.

Rationale: This may make the user think they’ve done something wrong. Fix: Reformat this message as a drop-down or pop up alert, for instance, and have it only announce that you have arrived, instead of providing instructions like they have to fix something or do something differently.

57. H10 Help & Documentation / Severity: 4 / Found by: A, D

Task 3: Navigating to nearby AR memory

Description: After successfully navigating to the object, you get an alert instructing you what to do next.

Rationale: Instead of instructing the user what to do in this instance, the design should be clear enough that they know what to do upon arrival.

Fix: Remove this alert and feature the view an object button more prominently, perhaps removing it and adding the square corner brackets to the question mark circle, allowing the user to tap on the question mark circle itself to view that question mark. Perhaps the view-an-object button could even open as soon as you get there instead of having the user to tap anything at all.

58. H4 Consistency & Standards / Severity: 2 / Found by: A, C

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Task 3: Navigating to nearby AR memory

Description: After successfully navigating to the object, “arrived” is displayed on a centered, gradient shaded, and colored background.

Rationale: The user may think Arrived is the button they must press here, even though it is not a button at all.

Fix: Remove the “arrived” item. Consider replacing it with simple text at the top with no or white background.

59. H1 Visibility of System Status / Severity: 4 / Found by: A,

Task 3: Navigating to nearby AR memory

Description: After arriving at an object, the user still has the option to scan in their own object.

Rationale: It is unclear if this means scanning in an alternative object in the same spot, adding a new scanned object to the existing art, or if this button is a mistake and should not be there.

Fix: Remove the button from this screen, as this screen is focused on the other art. If you want to incorporate building to existing art with new 3D scans, then add that option to the “decorate” button’s options.

60. H4 Consistency & Standards / Severity: 1 / Found by: A,

Task 3: Navigating to nearby AR memory

Description: While decorating the objects, the grayed-out undo and redo buttons look like options to scroll through the decoration due to their shape and difficult to read subscript.

Rationale: Users may click them attempting to navigate through and be confused when that doesn’t work. Or they may tap on it, meaning to scroll, and accidentally undo their work.

Fix: Change these icons to more traditional undo and redo icons. Use a white background box to make the subscript text more visible. (This ties in a bit with an accessibility issue, but is part of the same issue).

61. H7 Flexibility & Efficiency of Use / Severity: 2 / Found by: A

Task 3: Navigating to nearby AR memory

Description: When adding decorations, it seems that you can only have one of each category type.

Rationale: Users may wish to only add collages, and wish to favorite those decorations, instead of being restricted to the category buckets the app provides to which it limits 1 decoration.

Fix: Allow adding decorations to that scrolling menu from a full list of categorized options, but allowing whatever the user wants to be in that scrolling list, potentially caching that list between sessions and objects to make the system more flexible and efficient for people.

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62. H1 Visibility of System Status / Severity: 3 / Found by: A

Task 3: Navigating to nearby AR memory

Description: After decorating, the top right still says “done”.

Rationale: It is unclear if your edits are saved or if there is a way to Cancel. Fix:

Replace “Done” with “Save” and “Cancel” options after the user has made edits to an object.

63. H8: Aesthetic and minimalist design / Severity 1 / Found by D

a. Task 3: Navigate to nearby AR art

b. Problem description: The spacing, margin, and alignment between components is inconsistent

c. Rationale: This is specifically present in the slide up card between the art informations

d. Suggested Fix: use grid to standardize spacing

64. H8: Aesthetic and minimalist design / Severity 1 / Found by D

a. Task 3: Navigate to nearby AR art

b. Problem description: Unequal button size

c. Rationale: The see profile and navigate buttons are not the same size.

d. Suggested Fix: use grid to standardize sizing

65. H8: Aesthetic and minimalist design / Severity 1 / Found by D

a. Task 3: Navigate to nearby AR art

b. Problem description: Some buttons have icons but others don't for unclear reasons

c. Rationale: The navigate button has a right chevron icon to it, while the profile button has no icon.

d. Suggested Fix: Decide between either one.

66. H8: Aesthetic and minimalist design / Severity 1 / Found by D

a. Task 3: Navigate to nearby AR art

- b. Problem description: [Home Screen/Question mark selected] padding of the slide up card could be increased
 - c. Rationale: The top of the slide up card content is very close to the edge
 - d. Suggested Fix: Add some more padding
67. H4 Consistency and standards / Severity 1 / Found by D
- a. Task 3: Navigate to nearby AR art
 - b. Problem description: [Caution page] The button does not match the buttons from the rest of the prototype
 - c. Rationale: The button on this page is round and solid colored, while buttons in other pages are round edged rectangles with a gradient fill.
 - d. Suggested Fix: Use the same buttons as the others
68. H1: Visibility of system status / Severity 2 / Found by D
- a. Task 3: Navigate to nearby AR art
 - b. Problem description: [Entire navigation flow] Visual display of walk time length misrepresents if it's clickable or not
 - c. Rationale: The display area for how long the walk is has the same visual style as some of the previously seen action buttons. This may make it appear clickable while it is not.

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- d. Suggested Fix: Remove the primary brand color or make it look different from buttons
69. H11: Accessible design / Severity 3 / Found by D
- a. Task 3: Navigate to nearby AR art
 - b. Problem description: [View Screen] Many icon buttons' colors here are not standardized and do not have a good color contrast with the background.
 - c. Rationale: There is a red button, white button, and gradient buttons on stroke based icons. These icons are placed on the image of the outside, which can make it hard to see the icons.
 - d. Suggested Fix: Check accessibility color contrast ratio, make icons white and filled if necessary
70. H11: Accessible design / Severity 2 / Found by D
- a. Task 3: Navigate to nearby AR art
 - b. Problem description: [View Screen] The text for who the art is created by is too small
 - c. Rationale: I barely noticed the tag, especially when it is layered on a busy background of the real world.
 - d. Suggested Fix: Make the text at least 12px big
71. H8: Aesthetic and minimalist design / Severity 1 / Found by D
- a. Task 3: Navigate to nearby AR art
 - b. Problem description: [View Screen] The icon sizes are not standardized
 - c. Rationale: The time travel and warning icons seem to have different size
 - d. Suggested Fix: make them the same size
72. H5: Accessible design / Severity 3 / Found by: D
- a. Task 3: Navigate to nearby AR art
 - b. Problem description: The text in the decoration option cards is too small
 - c. Rationale: The text font is about 7px right now.

- d. Suggested Fix: Make the text at least 12px big.
- 73. H8: Aesthetic and minimalist design / Severity 1 / Found by: D
 - a. Task 3: Navigate to nearby AR art
 - b. Problem description: [browse decoration page] Card gallery not grid aligned and too small
 - c. Rationale: The current gallery for different decoration options is a collection of cards of different sizes that are not grid aligned. The entire gallery is at the bottom of the page; in combination with the small sizing, this could be hard for the user to browse and choose.
 - d. Suggested Fix: Increase the size of the gallery and each card, align them with grid structure.
- 74. H1 Visibility of System Status / Severity 2 / Found by: C
 - a. Task 3: Navigate to nearby AR art
 - b. Description: Badges seem like an important part of the app and in motivating users, but in the current prototype, the user can only partly see their badges in the progress bar on the map or when they finish decorating something
 - c. Rationale: If users are truly motivated by the badges, they may want to see how many / which badges they've collected, and which ones are left to complete the progress bar/ finish the challenge.

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- d. Fix: If you keep badges and gamification, add a badges / achievements page or include more information about that within the trove
- 75. H3. User control and freedom / Severity: 3 / Found by: C
 - a. Task 3: Navigate to nearby AR art
 - b. Description: There is no eraser for decorations, only undo
 - c. Rationale: Users may want to erase a decoration they did towards the beginning, which is only possible with undo if they delete most of their art
 - d. Fix: Add an eraser button to allow the user to edit their decorations to the art without erasing all their work
- 76. H7: Flexibility and Efficiency of Use / Severity: 3 / Found by: C
 - a. Task 3: Navigate to nearby AR art
 - b. Description: The user can see other peoples' comments when they are about to begin the navigation, but there is not a place (at least in this prototype) where they can add their own
 - c. Rationale: It limits the user's ability to interact with the art if they can't comment on it
 - d. Fix: Add a "New comment" option
- 77. H7: Flexibility and Efficiency of Use / Severity: 3 / Found by: C
 - a. Task 3: Navigate to nearby AR art
 - b. Description: When the user clicks on a question mark for art they want to discover, the info provides previous comments, like, # of edits etc, but doesn't provide the description of the art piece, or what feelings it evokes
 - c. Rationale: The user may care more about content and feelings than distance /

other people's input or opinions on the art. The app should provide more information on where they are heading because they are putting effort in traveling to a place

- d. Fix: Provide hints on how other users feel watching the piece, or what the piece evokes generally so the user has a better idea of why they are traveling to view the piece

78. H11: Accessible Design / Severity: 2 / Found by: C

- a. Task 3: Navigate to nearby AR art
- b. Description: Because the user has to be in the exact location the app was originally placed at, users that cannot mobilize long distance (physical / financial / logistical impairment) are unable to view art
- c. Rationale: The app not accessible for someone who can't travel or mobilize long distances by themselves
- d. Fix: Based on the capabilities of the user, place art in places that are closer to their location; make location of the art editable and transferrable

79. H12: Value Alignment and Inclusion / Severity: 2 / Found by: C

- a. Task 3: Navigate to nearby AR art
- b. Description: The motivation to earn badges (within the value of Community) may be misaligned with the goal to help people find art, reflect on their feelings, and add meaningful addition to others' art

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- c. Rationale: It seems like the app's purpose to help users remember their feelings when they see art requires deep reflection. This may be misaligned with the competitive energy that comes from gaining status in an app
- d. Fix: Users should not earn rewards for simply viewing art, but instead for their contribution.

80. H1. Visibility of system status / Severity: 2 / Found by: B

- a. Task 3: Navigate to nearby AR art
- b. Description: There is no confirmation or clear text or sign showing that the user has found the treasure that they are looking for.
- c. Rationale: The prototype goes directly from "View your surroundings to discover hidden treasures" page to "decorate your treasure" page, missing a notification that the user has found the treasure.
- d. Fix: Add some kind of confirmation that the object on the screen is the treasure that the user is looking for.

81. H2: Match between system and the real world / Severity: 2 / Found by: B

- a. Task 3: Navigate to nearby AR art
- b. Description: On the "Caution" page, it is unclear whether the app is cautioning the user against being distracted by the app on the way to find treasure or being distracted by other things while they are looking for treasure. Either way, we do not usually think of the result of getting distracted to be "serious bodily harm or death."
- c. Rationale: First, the warning itself is unclear as to what kind of distraction it warns

the user against. Second, the suggested result is of very small likelihood. I understand that the warning might be exaggerated to caution the users to prioritize safety, but this exaggeration might scare the users away from the task in question. Instead, we can just caution the users to pay attention to safety when looking for treasures.

d. Fix: Rephrase the warning to make it clear and realistic.

82. H3. User control and freedom / Severity: 2 / Found by: B

a. Task 3: Navigate to nearby AR art

b. Description: If the user misclick the “Decorate” button, clicking on “Done” would not get them out of the decorate state. So they have to finish decorating even though they don’t necessarily want to.

c. Rationale: Although there is a “Done” button, it is only effective after the user has decorated the object. So if the user would like to get out of the decorating mode without decorating the object, there is no way for them to do it.

d. Fix: Make the “Done” button effective whenever the user clicks on it.

83. H6: Recognition rather than recall / Severity: 2 / Found by: B

a. Task 3: Navigate to nearby AR art

b. Description: When the app is navigating the user to a certain treasure, the name and details of the treasure are not visible on the screen.

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c. Rationale: The treasure profile page only appears after the user clicks on the question mark. It disappears as soon as the user starts to walk toward the treasure. If the user wants to check the information about the treasure on the way there, they are not able to do so.

d. Fix: Keep the treasure profile page so that the user could pull up and view when navigating to the destination.

84. H8: Aesthetic and minimalist design / Severity: 2 / Found by: B

a. Task 3: Navigate to nearby AR art

b. Description: Out of the three icons on the top right of the map, the first and the third are both map compasses, so a bit repetitive.

c. Rationale: If these two icons both represent map compasses (as they conventionally do), then one of them is unnecessary and should be removed; if they have different functions, then the users might be confused about their actual functions and any difference between them. This does not concern any major functionality and is easy to fix, so I rated 2.

d. Fix: Remove either the first or the third icon.

85. H10. Help and documentation / Severity: 2 / Found by: B

- a. Task 3: Navigate to nearby AR art
- b. Description: After clicking on a question mark, we would be able to see some details about the object corresponding to the question mark. It is unclear what the “5 days ago” in the first column means.
- c. Rationale: The user would be confused by what this piece of temporal information actually means. Does it mean “created 5 days ago” or “visited by someone 5 days ago” or something else?
- d. Fix: Provide some textual explanation or add a verb to reduce ambiguity.

86. H10. Help and documentation / Severity: 2 / Found by: B

- a. Task 3: Navigate to nearby AR art
- b. Description: In the “Time Travel” section, it is confusing what the scale with “original” and “current” on the two ends means. What do the dots on the line stand for?
- c. Rationale: It is not clear that “original” and “current” refer to “what the object looks when it was first created” and “what the object looks at the moment.” Were it not for the clock sign the user clicks into this section with, I would not know that this is a scale for time.
- d. Fix: Provide some explanation on what the time travel function means and add temporal information to the scale.

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87. H12. Value alignment and inclusion / Severity: 3 / Found by: B

- a. Task 3: Navigate to nearby AR art
- b. Description: The achievement “Advanced Inner Circle” could be a bit exclusive for users who tend not to create many entries or walk a long distance to discover treasures.
- c. Rationale: People have different habits when it comes to saving memories. Some people only save very few memories that are most precious to them, so they would be ranked low in terms of the number of entries they create. There could also be users living in less populated areas and not in a convenient place to access treasures created by others. Then they would also rank below their friends who live in areas with many treasures nearby. The wording of the achievement would make these groups feel that they are not in the “inner circle” of the network that this app intends to create.
- d. Fix: Reword the name of the achievement and also specify what the ranking is based on. Be mindful when designing the ranking criteria so as not to exclude a particular group of users.

3. Summary of Violations

Category	# Viol.	# Viol.	# Viol.	# Viol.	# Viol.
	(sev 0)	(sev 1)	(sev 2)	(sev 3)	(sev 4)
H1: Visibility of Status	0	0	5	3	1
H2: Match Sys & World	0	1	3	1	0
H3: User Control	1	2	3	2	1
H4: Consistency & Standards	0	6	7	1	1
H5: Error Prevention	0	0	1	2	1
H6: Recognition not Recall	0	0	1	2	0
H7: Efficiency of Use	0	0	3	3	1
H8: Minimalist Design	0	1	3	1	0
H9: Help Users with Errors	0	0	1	0	0
H10: Help & Documentation	0	0	2	2	1
H11: Accessible	0	2	4	2	0
H12: Value Alignment & Inclusion	0	0	1	1	0
Total Violations by Severity	1	24	36	20	6
					87

Note: check your answer for the green box by making sure the sum of the last column is equal to the sum of the last row (not including the green box)

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4. Evaluation Statistics (in %)

Severity / Evaluator	Evaluator A Jamie Ullman	Evaluator B Xinyi Wang	Evaluator C Michelle Vinocour	Evaluator D Madison Fan
Sev. 0 Ex: Eval A count /	100%	0%	0%	0%

total sevs 0 in table #3			
Sev. 1 Ex: Eval A count / total sevs 1 in table #3	29%	12.5% 0%	62.5%
Sev. 2 Ex: Eval A count / total sevs 2 in table #3	47%	36% 39%	19.4%
Sev. 3 Ex: Eval A count / total sevs 3 in table #3	35%	20% 60%	40%
Sev. 4 Ex: Eval A count / total sevs 4 in table #3	83%	17% 33.3%	33%
Total (sevs. 3 & 4) Ex: Eval A = sum(sev 3: sev 4 counts) / sum(sev 3: sev 4 in table #3)	46%	20% 54%	38.4%
Total (all severity levels) Ex: Eval A total sev count / total sevs (green cell) in table #3	43%	25% 32%	36.8%

***Note that the bottom rows are *not* calculated by adding the numbers above it.**

5. Summary Recommendations

Great job with the Medium Fidelity Prototype! The idea behind this app is very novel and has the potential to transform how people memorize their emotions and save their memories related to objects, artworks or otherwise. You turned this idea into an interface that is aesthetically appealing to young people and easy for users to operate. So that is a great starting point to your project! We have some high level feedback about the Heuristic Violations:

1. I would think a bit more about how to use your app as an introductory tool to AR; as of now, it seems that your app is tailored for users with intermediate experience in AR (because there are no intro/ tutorials, little guidance on performing tasks, what AR is / why it is important, etc.), so I think it would be a good idea to step into the feet of the first-time user a bit more or test on people who have never heard of AR. Since you are introducing an unprecedented practice through this app, it is very important to make your design more straightforward so that new

users would find it intuitive to use and be willing to onboard. One suggestion is to add a high

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level documentation page or onboarding walkthrough on the homescreen. I notice that the meanings of some icons and textual information are unclear, and some designs are different from real-world conventions, which results in more violations of *H2: Match between System and World* and *H10: Help and Documentation*.

2. Additionally, since your app deals with **storing** personal or collaborative memories over time, it is important to resolve the issues with *H6. Recognition rather than Recall* and ensure that the users do not need to memorize more details about editors, bookmarked treasures, treasure information, etc. when using the app.

3. Another theme in my recommendations is the flexibility of the app; currently, the app seems very restrictive in what type of art it lets the user upload, the ways in which the user can view and interact with the app, and the autonomy it gives the artist in determining how users should interact. I think it is valuable to consider here what are the limitations of real art that technology allows to disrupt. For instance, a user's contribution to the piece could be auditory (like adding music). Given that one of your values is creative expression, I think there can be more creativity in the design and that the user should be given more freedom.

4. Suggestions on visual designs: The main things to improve on fall in visual design consistencies. I notice the padding, margin, and spacing for each component and the screen itself are not standardized with a grid structure. My suggestion for this is to look into Figma auto-layout: auto-layout can keep the spacing, margin, and padding consistent once you input the values. I also notice inconsistencies in typography styles. Sometimes the style seems too small and other times too big; text of the same hierarchy should have the same style. I suggest creating a set of typography styles (Heading 1, Heading 2, Paragraph, etc.) and stick with it. The UI structure of the same type of element should also be standardized (button, metadata, icon sizes, alert, etc.).

I also notice that color use can be more intentional, especially with your primary brand color. Usually, primary brand colors are seen on primary action buttons and high priority items. I see that your brand color is sometimes used as container background colors, but that may confuse users into thinking this is a high priority piece of information or it is clickable. It is important to keep color use consistent also in the sense of which color represents high priority information versus low priority. Overall, I also think the prototype could be more visually accessible by checking accessibility color ratio with all text and icon colors in comparison to its background. This is especially important for lighter items in your primary brand color (purple/pink), and items against picture backgrounds. Visual accessibility should also be checked with some of the text sizes: anything under 12px is pretty hard to read.

5. Though something that I noticed that wasn't related to a task was the badges and point system. This feature seemed to distract me and serve as a barrier when those screens would pop up while I was moving through the app. As a result, I would agree with the guests last Friday on suggesting trimming out the gamification feature. If you are interested in keeping it, though, then I would like to note that I found leaderboard stats at the top of the main page to be

too fast when switching through and unclear what happens when you click on it, so I think there is some room for redesign there.

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We also have some feedback that is not directly related to Heuristic Violations:

1. In the Simple Task of creating entries, if the user wants to create an entry at an improper location, say the middle of a road, there would not be any warning message from the app to prevent the user from doing so. Since the app is location-based, there should be a way to detect whether the user is creating an entry at an unsafe location. If so, the app should notify the user about the risk involved. This is strictly speaking not an error in carrying out the task, but could have a more serious impact by putting the safety of the user and other discoverers at risk.
2. On the current prototype, the user could only edit the information of items in the trove after they have added a newly discovered item to their trove. So if the user opens the app and clicks into "My Trove," they are not able to edit the information. This might be a missing implementation and should be fixed later.
3. I think there is a substantial amount of possibilities and further development that can go into designing for the creators (rather than the discoverers). For example, allowing them to upload virtual art, determine the tools to decorate, set decoration parameters, and set where they want their art to be found, if they want this to be different than their immediate location when they scan the object.
4. With regards to your tasks, to me, your medium task seems less common than the complex task and your simple task seems more complex than the complex task. I would suggest the following order of tasks: navigate to and view an object, edit an object in trove, scan in a new object. I added the underlined phrasing as well, because as it stands, viewing existing objects is not part of one of your tasks even though that is arguably the most common and simplest task a user would want to do on the app, so I lumped it in with the navigate task.

Overall, I enjoy playing around with your prototype and look forward to its further development!

Severity Ratings

- 0 - not a usability problem
- 1 - cosmetic problem
- 2 - minor usability problem
- 3 - major usability problem; important to fix
- 4 - usability catastrophe; imperative to fix

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Heuristics

H1: Visibility of System Status

- Keep users informed about what is going on

H2: Match Between System & Real World

- Speak the users' language
- Follow real world conventions

H3: User Control & Freedom

- "Exits" for mistaken choices, undo, redo
- Don't force down fixed paths

H4: Consistency & Standards

- Words, actions, and UI elements should be consistent across the entire platform ●
Follow platform and industry conventions

H5: Error Prevention

- Minimize error-prone conditions
- Remove memory burdens, support undoing, and warn your users when necessary

H6: Recognition Rather Than Recall

- Make objects, actions, options, & directions visible or easily retrievable

H7: Flexibility & Efficiency of Use

- Accelerators for experts (e.g., gestures, keyboard shortcuts)
- Allow users to tailor frequent actions (e.g., macros)

H8: Aesthetic & Minimalist Design

- No irrelevant information. Focus on the essentials.

H9: Help Users Recognize, Diagnose, & Recover from Errors

- Error messages in plain language
- Precisely indicate the problem
- Constructively suggest a solution

H10: Help & Documentation

- Easy to search
- Focused on the user's task
- List concrete steps to carry out
- Not too large

H11: Accessible

- Users can interact with the system using alternative input methods.
- Content is legible with distinguishable contrast and text size.
- Key information is upfront and not nested for screen readers.

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- Purely visual or auditory content has text-based alternatives for users with low vision and low hearing.

H12: Value Alignment and Inclusion

- The design should encode values that users can understand and relate to.
- It should make a diverse group of users feel included and respected.
- The design should prevent the reproduction of pre-existing inequities and not create additional burdens for members of disadvantaged populations.

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