

CPSC 481

# STAGE FOUR- TEAM L

## MUSEUM COMPANION APP

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## PROJECT ASSOCIATES:

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## Project Description

This project is an AR app aimed at people who visit museums. This app aims to replace the standard of looking at the physical plaque descriptions with being able to point your camera at an artifact, scanning it, and seeing or hearing the corresponding description in the app. The app also aims to provide AR models of artifacts with audio & visual descriptions and allows users to then take pictures with these AR models and post them to social media. The artifacts can also have relevant animations that users can view. This app aims to transform the typical museum experience into a more hands on and interactive one while also accommodating for people with disabilities or language barriers by providing multiple ways to consume information provided about the exhibits.

## List of User Tasks that were prototyped Horizontally:

- User signs up for an account with the app.
- User signs in to the app using Google/Facebook.
- User signs in as a Guest.
- User changes the app language from settings.
- User changes the font size of the text in the app.
- User selects a museum from listed nearby museums.
- User leaves the selected museum page.
- User signs out of the app.

## List of User Tasks that were prototyped Vertically:

- **User Scans an Artifact**
  - User listens to an audio description about the scanned artifact.
  - User reads a text description about the scanned artifact.
  - User selects Videos to watch related videos about the scanned artifact.
    - User selects one video from the list of related videos to watch.
  - User places an artifact in AR.
    - User listens to an audio description about the placed AR artifact.
    - User reads text based AR info on the placed AR model.
    - User views AR animation of the artifact.
    - User takes a picture with the AR artifact.
      - User shares the picture on social media.
- **User takes a time based tour**
  - User selects the desired end time of their tour.

- User selects the desired artifact to view.
  - User scans an artifact.
  - User views their current location on a mini map.
  - User pauses their tour.
  - User ends their tour.
- **User interacts with a virtual map of the museum.**
  - User marks visited areas on the map.
  - User unmarks accidentally marked areas on the map.
  - User clears all markings on the map.
  - User exits the map to go back to the museum home page.
- **User purchases museum tickets**
  - User chooses the ticket type.
  - User pays for the ticket.
  - User shows QR code to Cashier

## Heuristic Evaluation:

### Process

We started our Heuristic Evaluation process by dividing our team into three evaluators and two reviewers.

#### Evaluators:

As an evaluator when conducting the heuristic evaluation, we first started by ensuring we understood each rule of thumb very clearly before we moved on. Since we are conducting the evaluation on our own prototype due to Covid-19 restrictions, it is important that we have no bias when we evaluate the prototype. Afterwards, we check each rule of thumb and run our prototype checking to see if each rule applies. Next, we run through the prototype a second time checking each rule to see if there exist any violations. Lastly, we take a look at how each rule can further improve the usability, utility, and desirability of our prototype.

#### Reviewers:

As a reviewer when conducting the review of the heuristic evaluations, we first established the severity rating scale. Then we each conducted our own review of the problems expressed in each of the heuristic evaluations. We analyzed each problem brought up by the evaluators in their evaluation and assigned a severity rating from (0-4) and stated our reasoning behind the rating in our review report.

## Findings

After the heuristic evaluation of the prototype we were able to find several issues. Many of them were minor cosmetic issues, others were more drastic and needed more attention, we were able to identify this easily due to the severity ratings assigned to each problem. While developing the application, we were unaware of issues that a user might face but doing the heuristic evaluation allowed us to diagnose these usability issues easily. One major issue that we had failed to catch was error messages. Error messages are an integral part in every app, problems are bound to occur no matter what. Users cannot be expected to always know exactly how to use the app, and oftentimes they will stray away from the apps functionality. The developer must be ready for these issues, they must be able to anticipate issues to increase usability. An example of this was the AR scanning section, when scanning for an artifact there are a number of things that can go wrong. Even more so since the technology of AR is not commonly used. This can lead to several user errors that can frustrate the user and deter usability. By adding a quick error message if they cannot find the artifact, we begin to guide the user to how they should use the app. By doing this we increase usability, and improve user experience overall.

## Decisions that were made

We made decisions on what problems we could fix and then we brainstormed and discussed possible solutions for each of the problems and implemented the ones we determined to be the best solution.

## Reflection

**What went well:** Splitting our team into Evaluators and Reviewers helped us delegate tasks effectively. Doing a portion of the evaluation individually initially helped us ensure that all voices in the team were heard and aided in the visualisation of different viewpoints on the prototype. During the discussion stage after the evaluation our team had a variety of solutions to the problems we encountered and this helped us merge ideas and select the best solution to implement.

**What went poorly:** Our team found it difficult to evaluate the prototype from the user's perspective. Since we were the ones to make it if we saw any issues we fixed them immediately. Due to this when we had to evaluate the prototype, we ended up getting stuck several times. We could not help but to look at the prototype with biased eyes. And because of this it was more likely for us to have missed a vital piece of information.

**What would we do differently:** If we were to do the evaluation again, we believe it is in our best interest to have another group conduct the evaluation on our prototype, this would lead to a completely unbiased evaluation. It would be easier for other groups to discover problems since it will be from a completely different perspective.

# Appendix

**Repository:** <https://github.com/csj9703/CPSC-481-Project>

**Portfolio:** <https://csj9703.github.io/CPSC-481-Project/>

## Heuristic Evaluation 1 (Conducted by Amir Hussain)

Rule of Thumb	Is this rule being applied? How so?	Is this rule violated? How so?	How can this rule further improve usability, utility, and desirability?
1. Visibility of system status	The virtual map always shows where the user is. The time tour always demonstrates how much time is available clearly		
2. Match between system and the real world	Language consists of using generic icons such as the help being a '?', audio/video players using conventional controls, and the camera icon being generic as well.		
3. User control and freedom	A back key is implemented in most (all but time tour and ticket page) areas in case the user mis clicks	Ticket page does not allow for an escape if the wrong museum is picked.	The user should be able to get back to where he wishes easily if he has made a mistake.
4. Consistency and standards	Home, scan, and map are always available to the user to select.	The top left key is not always the same sometimes it is a menu other times it is a back key	Better consistency does not confuse the user

5. Error prevention		AR Scanning has no error prevention if they cannot scan the artifact properly	If they cannot scan, they cannot go forward
6. Recognition rather than recall	Help menus for timed tour and AR scanning help users who may be forgetful. Pictures of museum to help users identify issues	Timed tour exit is hidden away in a menu, it is not clear on how to exit without it.	Users being able to end the tour is an integral part of the tour. This leads to poor usability
7. Flexibility and efficiency of use	Users always have the options to switch between the most used functions (home, scan, and the map)		
8. Aesthetic and minimalist design	Help options readily available in multiple places. Icons used often to demonstrate functionality		
9. Help users recognize, diagnose, and recover from errors	Help menus available for AR scanning if the user cannot scan the AR		
10. Help and documentation	Help options are available in several locations if need be	Help options are missing in some locations specifically in related artifacts and have no indication on how to end the tour. And AR model does not show you can interact with the frame	Being lost in a new app is a common help button to guide the user will greatly increase usability.

## Heuristic Evaluation 2(Conducted by Jason Chen)

Rule of Thumb	Is this rule being applied? How so?	Is this rule violated? How so?	How can this rule further improve usability, utility, and desirability?
1. Visibility of system status	<ul style="list-style-type: none"> <li>- Time remaining on tour is displayed on the bottom of the screen.</li> <li>- Tickets page highlights the tickets chosen and displays the total on screen.</li> <li>- Top navigation bar indicates the user of the page they are currently in.</li> <li>- Live map highlights the user's visited location.</li> </ul>	<ul style="list-style-type: none"> <li>- Audio description does not display the title of the track the user is listening to.</li> </ul>	<ul style="list-style-type: none"> <li>- Users should know as much details as possible so they can use the product effectively.</li> </ul>
2. Match between system and the real world	<ul style="list-style-type: none"> <li>- Icons match the user's expectations (Back button goes back, and "?" button provides help).</li> </ul>	<ul style="list-style-type: none"> <li>- The icon for "Pay with Google pay" does not match.</li> </ul>	<ul style="list-style-type: none"> <li>- Icon should be the generic icon so as to not confuse the users.</li> </ul>
3. User control and freedom	<ul style="list-style-type: none"> <li>- Users can go back to the previous page through the back button whenever they want.</li> </ul>	<ul style="list-style-type: none"> <li>- The ticket purchase payment only has google pay as an option</li> <li>- "Sharing" panel only provides social media options but no local option like "save to device".</li> </ul>	<ul style="list-style-type: none"> <li>- Users will not be able to buy a ticket if they did not pay for a ticket.</li> <li>- Users will be able to have more freedom in the choice of sharing their photos.</li> </ul>
4. Consistency and standards	<ul style="list-style-type: none"> <li>- Help button is always top right, the back button is always top left.</li> <li>- The color scheme is consistent throughout all the panels.</li> </ul>	<ul style="list-style-type: none"> <li>- The help icon on the home screen looks like a button even though it is not interactable.</li> </ul>	

5. Error prevention		- No dialogue box for confirmation when the user clicks “End tour” button	- Confirmation on actions that are not discreet ensures the user is not left wondering.
6. Recognition rather than recall	- Displays related contents for the user during video playback. - Provides popular social media options on the “Social Media Sharing” panel.		
7. Flexibility and efficiency of use	- Users can navigate to the three most frequently visited pages through the bottom navigation bar.		
8. Aesthetic and minimalist design	- Help screen only shows what is essential, never over explains.	- The highlighted area on the live map makes it look cheap.	- Looking at the map simply looks odd and is not pleasant to look at.
9. Help users recognize, diagnose, and recover from errors		- Does not display any error message.	- Error messages help users with issues they may come up with.
10. Help and documentation	- Multiple help icons are on the top right of the app, and they provide helpful guides for the users.	- No guide on how to interact with the 3D model. - No guide on how to end the timed tour.	- Users should be helped when dealing with out of the ordinary tasks.



### Heuristic Evaluation 3(Conducted by Bhavan Pahuja)

Rule of Thumb	Is this rule being applied? How so?	Is this rule violated? How so?	How can this rule further improve usability, utility, and desirability?
1. Visibility of system status	<ul style="list-style-type: none"><li>- The “Buy Tickets” page highlights the user's current selection.</li><li>- Scanning reticles on screen to teach users how to properly scan a display item.</li><li>- Live map keeps the user updated of their current location and marks sections already visited.</li><li>- Status bar displaying the length of audio/video.</li><li>- Clock showing time left on tour.</li></ul>	<ul style="list-style-type: none"><li>- No prompt for users to notify them of successful ticket purchase.</li></ul>	<ul style="list-style-type: none"><li>- Makes users more aware of their ticket selection.</li><li>- Makes it easy for a new user to learn how to scan an item.</li><li>- Makes the user aware of their current location and helps them save time and avoid confusion.</li><li>- Users might be on a time constraint which makes the timer more desirable.</li></ul>

<p>2. Match between system and the real world</p>	<ul style="list-style-type: none"> <li>- Lets the user choose a museum by displaying name and image, followed by buying tickets or taking a tour just like in a physical setting.</li> <li>- Live map updates in real time.</li> <li>- Shows expected social media platforms when sharing.</li> <li>- Audio/Videos work in a similar fashion to existing apps.</li> </ul>	<ul style="list-style-type: none"> <li>- Users might not realize to swipe to look at related items (A next button might be better).</li> </ul>	<ul style="list-style-type: none"> <li>- Since this is a new app, it is important for the user to feel familiar with the system. Moreover, most people might not be familiar with AR which is why it's important that we avoid using system-specific terms.</li> </ul>
<p>3. User control and freedom</p>	<ul style="list-style-type: none"> <li>- Back button on most screens.</li> <li>- Option to go to the app home screen, scan an item or look at the live map always available.</li> </ul>	<ul style="list-style-type: none"> <li>- No back button on tickets page.</li> <li>- End tour button hidden.</li> <li>- No prompt for users when ending a tour.</li> <li>- Users should be able to take and share pictures with a display without having to place the 3D Model onto a flat surface.</li> </ul>	<ul style="list-style-type: none"> <li>- This is useful since it allows the user to achieve their objective and avoid frustration.</li> </ul>
<p>4. Consistency and standards</p>	<ul style="list-style-type: none"> <li>- Same font/style of buttons.</li> <li>- Similar color scheme throughout the app.</li> <li>- Static navigation bar.</li> </ul>	<ul style="list-style-type: none"> <li>- Timed tour prompts the user to choose end time but the clock suggests that they are choosing both the start and end time.</li> <li>- Some images might be cut due to rounded corners.</li> <li>- Different text sizes and punctuation</li> </ul>	<ul style="list-style-type: none"> <li>- It is important for any app to be consistent in its design. This makes the app more usable and desirable. The user is less likely to use an app with varying fonts/styles. The user should be able to easily figure out the functioning of the app.</li> </ul>

		<p>between “Tickets Page” and “Tickets Page 3”.</p> <p>-Text on some buttons (Videos and Pay with google pay) is inconsistent and looks off-centre.</p>	<p>- It is also wise to follow platform conventions since the user is used to them.</p>
5. Error prevention	<p>- The scanning reticle and text to make sure users can scan the item correctly.</p> <p>- A map pointer to show current location to avoid confusion.</p>	<p>- The reticle should be more compact.</p>	<p>- Errors discourage a user from using an application so it’s always wise to do our best to prevent them.</p>
6. Recognition rather than recall	<p>- Text on screen to guide users through the task.</p> <p>- Help buttons on most screens to help users with unfamiliar tasks.</p>	<p>- Users might not know what “Place 3D Model” means.</p>	<p>- It is important that the user be able to perform tasks smoothly. If they are not familiar with the system (like in this case), it is important that they are prompted with help when needed. This leads to faster learning and can avoid user frustration.</p>
7. Flexibility and efficiency of use	<p>- The scan button lets the user quickly scan an item without having to take a tour.</p> <p>- The user can use the live map even if they are not on a tour.</p>		<p>- Making the app more flexible makes it easier for both new and veteran users to enjoy the experience. It also reduces the number of steps a user must take to achieve a specific task (say scanning for example).</p>

8. Aesthetic and minimalist design	<ul style="list-style-type: none"> <li>- Users can choose to scan an item or look at a live map no matter where they are in the app.</li> <li>- Home screen only shows museum image and name alongside options to take tour or buy tickets.</li> <li>- Interactive buttons display information about specific parts of the display.</li> </ul>	<ul style="list-style-type: none"> <li>- Text on the AR Scanning screen is distracting.</li> <li>- Duplicate information on scanning help screens.</li> <li>- Buttons look outdated.</li> <li>- Color scheme is unpleasant to look at.</li> <li>- Mixture of rounded and flat icons and design.</li> </ul>	<ul style="list-style-type: none"> <li>- The look and feel of a system are very important since it can attract or repel users. It is important for a user to be able to perform their tasks but also not feel overwhelmed by what they are looking at. In our case, we want the user to be able to enjoy the fun of AR without feeling overwhelmed by new technology.</li> </ul>
9. Help users recognize, diagnose, and recover from errors	<ul style="list-style-type: none"> <li>- Text and overlay are displayed on screen to show users where to place items to scan.</li> </ul>	<ul style="list-style-type: none"> <li>- No error to let the user know if a scan fails and how to fix it.</li> </ul>	<ul style="list-style-type: none"> <li>- If a user is not able to recognize and recover from their errors in a relatively new system like ours, they will lean on the side of not using it. It makes a new technology much easier to use.</li> </ul>
10. Help and documentation	<ul style="list-style-type: none"> <li>- The help button on top of the screen displays information relevant to the task.</li> </ul>	<ul style="list-style-type: none"> <li>- Help button missing in a lot of screens.</li> </ul>	<ul style="list-style-type: none"> <li>- If a user ever gets stuck, it is important that they can access the documentation that'll help them get out of the situation. This can prove to provide a lot of utility to the user.</li> </ul>

# Heuristic Evaluation Review Report 1 (Conducted by Alex Stark)

## Heuristics Evaluation of AR Museum App

By Alex Stark

Date 11/20/20

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### 1. Visibility of system status

#### ***Evaluation***

It was found that some screens are missing title information when playing media. I give this a severity rating of 1 because it would not cause too much confusion for the reader.

It was also found that there is no indication when purchasing a ticket if the purchase completed successfully

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### 2. Match between system and the real world

#### ***Evaluation***

It was found that the "Google Pay" buttons are not consistent with other apps that have this feature. I give this a severity rating of 1 because the button does have a complete description of what it does so it would not cause too much confusion.

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### 3. User control and freedom

#### ***Evaluation***

It was found that most pages give the user the ability to back out of an unwanted state, but the option does not exist on the "Buy Tickets" page. I give this problem a severity rating of 4 because if a user found themselves in this state by mistake, they would need to restart the app to get out of it.

Another problem is that there is no option to pay for tickets with anything but "Google Pay". I give this problem a severity rating of 3 because it can prevent many users from being able to use this feature of the app.

There is also no option in the sharing screen to save a local copy. I give this problem a severity rating of 2 because it would be frustrating for a user to have to share to social media and then download from social media to their device, but it is not a major feature of the app.

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### 4. Consistency and standards

#### ***Evaluation***

It was found that the button in the top left corner of the screen is not consistent. In some cases it opens a menu, while in others it is a "back" button. I give this problem a severity rating of 2 because it can cause confusion and irritation, but it is easy for the user to undo the error and complete the task that they were originally trying to accomplish.

There was also one screen that has an icon that looks like a help button but is not clickable. I give this problem a severity rating of 2 because it can cause confusion and irritation, but is not related to a major feature of the app.

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### 5. Error prevention

#### ***Evaluation***

It was found that there is nothing preventing user errors when trying to scan an artifact. I give this problem a severity rating of 3 because it can cause confusion and irritation and inexperienced users may not be able to find a way around the problem, as well as this problem having to do with one of the key features of the app.

There is also no confirmation box when ending a timed tour. I give this problem a severity rating of 2 because it can cause a lot of frustration if the user accidentally ends a tour prematurely, but due to the fact that the option to end a tour is hidden in a menu, this problem is not likely to occur frequently.

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## **6. Recognition rather than recall**

### ***Evaluation***

It was found that the ability to exit a timed tour may be difficult for users due to the option being hidden in a menu. I give this problem a severity rating of 2 because it can cause confusion and irritation, but most users would think to look in a menu screen if they are searching for a button that they cannot find.

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## **7. Flexibility and efficiency of use**

### ***Evaluation***

It was found that the most common actions have quick access buttons and that there are no accelerators needed to cater to experienced users.

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## **8. Aesthetic and minimalist design**

### ***Evaluation***

It was found that the highlighted areas of the map do not look good and could take away from the overall aesthetic of the app. I give this problem a severity rating of 1 as it is purely a cosmetic issue with no effect on the functionality of the app.

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## **9. Help users recognize, diagnose, and recover from errors**

### ***Evaluation***

It has been found that no error messages are displayed. I give this problem a severity rating of 3 because allowing users to diagnose any error that they encounter so they know how to fix and/or avoid the error is a critical part of any technology.

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## **10. Help and documentation**

### ***Evaluation***

It was found that some screens are missing a help button, and some features are never mentioned and might never be found by the user. I give this problem a severity rating of 2 because it can cause some minor confusion, but does not have a large impact on the overall usability of the app. This problem can be solved simply by adding help buttons to screens that don't have them and mentioning all features of a screen in the help info for that screen.

## Heuristic Evaluation Review Report 2 (Conducted by Israa Farouk)

Problem	Severity Rating	Justification for Rating
Ticket page does not allow for an escape if the wrong museum is picked.	4 - usability catastrophe; must fix	This problem could lead to the user having to close the app and reopening just to undo an action.
The top left key is not always the same sometimes it is a menu other times it is a back key	2 - minor usability problem	This problem requires more attention from the user to pay attention to what they are clicking on rather than relying on prior knowledge.
AR Scanning has no error prevention if they cannot scan the artifact properly	4 - usability catastrophe; must fix	This problem could cause a user to stop using the app out of frustration of not knowing what they are doing wrong and why they are unable to progress
Timed tour exit is hidden away in a menu, it is not clear on how to exit without it.	3 -major usability problem; important to fix	This problem could cause a user to get stuck in the app or spend an unsuitable amount of time trying to exit the time tour.
Help options are missing in some locations specifically in the "Related Artifacts" screen has no indication on how to end the tour. And AR model does not show you can interact with the frame	2 - minor usability problem	This problem may not be encountered often and so may go unnoticed, however it should still be fixed.
Audio description does not display the title of the track the user is listening to	0 - Doesn't seem to be a usability problem	This problem may not arise as users may not care to know the title of the audio track they are listening to.
The icon for "Pay with Google pay" does not match.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Only has google pay as an option	3 - major usability	Not having more than

	problem; important to fix	one option to pay could cause some users to be unable to purchase tickets.
The help icon on the home screen looks like a button even though it is not interactable.	3 - major usability problem; important to fix	Users may click on it expecting help and become frustrated upon receiving none
No dialogue box for confirmation when the user clicks "End tour" button	2- minor usability problem	Users may have accidentally clicked on the button and would then have to start the tour again as a result.
"Sharing" panel only provides social media options but no local option like "save to device".	2 - minor usability problem	Users that do not want to share or do not have social media have no way of saving their pictures.
The highlighted area on the live map makes it look cheap.	1 - cosmetic problem	This problem is just a minor visual



		inconvenience to the user.
Does not display any error message.	3 - major usability problem; important to fix	Users may get frustrated and stuck in the app as a result of this problem.
No guide on how to interact with the 3D model.	3 - major usability problem; important to fix	Users may get frustrated and stuck in the app as a result of this problem.
No guide on how to end the timed tour.	3 -major usability problem; important to fix	Users may get frustrated and stuck in the app as a result of this problem.
No prompt for users to notify them of successful ticket purchase.	3 -major usability problem; important to fix	Users may repeat action if they think the purchase was not made.
Users might not know what “Place 3D Model” means.	2- minor usability problem	Some users may need more descriptive instructions to perform the task.
User might not realize to swipe to look at related items	2- minor usability problem	Some users may be able to figure out that swiping shows them related items faster than other users, this could lead to the feature being undiscovered.
No back button on tickets page.	4 - usability catastrophe; must fix	This problem could lead to the user having to close the app and reopening just to undo an action.
Timed tour prompts the user to choose end time but the clock suggests that they are choosing both.	2- minor usability problem	This problem may lead to confusion in some users. It may cause them to repeat actions or enter data incorrectly.
Some images might be cut due to rounded corners.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Different text sizes and punctuation between “Tickets Page” and “Tickets Page 3”.	1 - cosmetic problem	This problem is just a minor visual

		inconvenience to the user.
Text on some buttons (Videos and Pay with google pay) is inconsistent and looks off-centre.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Guide square should be more compact.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Users should be able to take and share pictures with a display without having to place the 3D Model onto a flat surface.	2- minor usability problem	This problem may cause some users to be unable to take a picture with the model.
Text on the AR Scanning screen is distracting.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Duplicate information on the scanning help screen.	2 - minor usability problem	This inconveniences the user slightly by making them read duplicated information
Buttons look outdated.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Color scheme is unpleasant to look at.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Mixture of rounded and flat icons and design.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.