

Team E: Stage 4 Heuristic Evaluation

CPSC 481, FALL 2020

DATE: NOV. 23RD, 2020 TUTORIAL SECTION: T01 TEAM NUMBER: TEAM E

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1. Project Description

Our product, CARE, is an application for augmented reality (AR) glasses that would visually show a patient's relevant medical information to tending healthcare professionals. These healthcare professionals include doctors, nurses, EMTs, and any other healthcare worker who needs to see a patient's information quickly and hands-free. Users would interact with the system through specific hand movements such as swiping to close the app's windows as if interacting with a tablet or dragging a patient's name to the center of the screen to see a more detailed readout of their information. We expect our product to be used in various settings such as in hospitals, by paramedics responding to 911 calls, medical offices, and anywhere healthcare workers are needed. In a hospital setting, a doctor wearing the AR glasses would be able to quickly see a patient's information such as name, age, allergies, and reason for being in the hospital, while a paramedic could use the glasses to visualize the patient's vitals, condition, what first aid has been done already, and what first aid could possibly be done.

2. Updated User Tasks

Major User Tasks

These tasks are important to our project and have been prototyped vertically.

Task	Task Description
Display patient's vitals in real-time	Displaying in real-time a patient's current body temperature, pulse rate, respiration rate, and blood pressure.
Display patient's health history	Pulling up a patient's health history such as medication, allergies, previous surgeries, etc.
Check diagnostic test results	Viewing and interacting with recent and past diagnostic test results. Including diagnostic images and text information. E.g., X-rays, CT scans, Ultrasounds, Blood tests, etc.
Add notes and edit a to-do list	Adding notes about a patient's progress, prognosis, treatment, etc. and editing to-do lists for specific patients.

Minor User Tasks

These tasks have been postponed to stage 5 of our project.

Task	Task Description
Scanning a patient's wristband and closing the patient's profile	Entering a patient's unique ID through the HoloLens keyboard or scanning their hospital wristband to gain access to all their relevant information. Once you are done with a patient, you can clear the screen to close their profile.
Get visual notifications	Notifying that patients have asked for assistance through external systems and reminding users of scheduled tasks.

3. Heuristic Evaluation Discussion

Process

Due to the unique and complex UI we've chosen, we had to take a different approach for our heuristic evaluation. Time constraints made it redundant to make two videos showcasing the interactions with our AR app. Therefore, for our heuristic evaluation we evaluated an imagined UX with visuals from Adobe XD and following our lo-fi prototypes interactions. First, we split our group into three evaluators and two reviewers: Navjeet, Chevy, and Manny were evaluators, and Gaby and Kim were reviewers. Our evaluators looked at our prototype, evaluated, and commented on things they were concerned about and thought should be changed. After the evaluators had posted their findings in the chat, the reviewers separately went through all feedback and gave each comment a rank depending on severity. Once the reviewers were done, we gathered into a group call and went through each point one by one discussing what we believed was important and necessary to change.

Review and Findings

What we discovered through the heuristic evaluation was that we needed more clarity in our prototype. We realized that it was unclear for the user to see the current location they are navigating from, based on icon transparency. Therefore, we needed to add more defining colors to make it clearer and easier to see which section of the UI users are currently on. In addition, to ensure clarity we realized we should add tool tips on hover because we were unsure if users would immediately recognize what each icon was for.

A key discovery we made while discussing the heuristic reviews was the lack of basic hand gestures. Our prototypes failed to utilize AR technology's (I.e., Microsoft HoloLens) ability to track hand gestures, and instead had traditional clicking actions for closing windows. Our prototype only had one method to navigate the user back to the Main Patient View, which was through the back button. To resolve this issue, we decided to implement an addition swiping gesture to close items. This was especially helpful for the vitals task as there was no appropriate area to place the back button. The user now has the option to swipe left with their hand. For tasks that displayed a pop-up window, the user can close the window through the basic hand gesture or navigate using the back button. Having both options allows users with different AR tech abilities to use a UX that is most comfortable for them.

Our last major finding preventing user errors by adding error messages, verification massages, and bounds. In the case that user wants to delete a note, a notification would pop up asking if they are sure they would like to delete. We also realized that in our original prototype it was unclear that some elements were interactive so we added visual cues to indicate that more can be seen by clicking on the element such as including an arrow to the patient ID card to imply that you can drag it out for more information. Some of the less general findings consisted of realizing that it was unclear when clicking on test results and clicking on a subcategory that you were in a subcategory because there was no visual indication and both submenus looks identical. We decided to add an indicator to make it clearer. There was also no function to allow users to edit their notes and to-do lists, which is as an expectation with such features. We ended up adding in an edit feature so that changes can be made. Lastly, for patient vitals we created an arbitrary bound that would prevent users from moving elements in areas that are not permitted.

4. Reflection

Looking back at the work completed in stage four of our project there were certainly more positives than negatives. As a team we continue to communicate effectively, having productive work calls and keeping in touch when needed. Due to our effective communication, team members were able to work on what they wanted, and we were all able to be respectful of everyone's schedules. Before choosing a software to prototype our hi-fi in we had one of the team members test out both Figma and Adobe XD to decide what software better fit our needs. We ended up choosing Adobe XD due to its ability to save components and settings so that we could create a template of our stylings so that each member's work could look consistent and be easily slot together. The heuristic evaluations were comprehensive and detailed despite our differing approach. We went over each evaluator's and reviewer's notes as a group and made key decisions together, letting everyone give their input so we could compromise on important UI/UX decisions.

Though we still had some difficulties. Due to our elaborate design it was difficult to make an interactive hi-fi prototype, causing us to continue with our use of walkthrough video. We had difficulty getting started with our heuristic evaluation following that, causing us to take longer than anticipated. Despite our Adobe XD template there were still small miscommunications in design such as dates not matching across different team members' work and team members needing to make buttons that were not included in the template.

Taking these in, the biggest difference we would make if we could do this again would be our project management. Considering our complex project, starting the stage earlier would have ended up benefitted us. In addition, splitting up the work between group members more evenly would have helped too. Some of the hi-fi tasks required more time to complete compared to others. For example, Manny's task was to create a hi-fi prototype for test results. At first glance, we didn't anticipate the full workload of creating a fully interactive prototype for multiple test results of different types. If redone, we could have easily split the test results up into subtasks to balance out the workload. Lastly, we would modify our design of our keyboard so there is no overlap with the window and if there is, clearly mentioning the reason for the overlap.

Appendix

Appendix A: Website and Github repo

You can visit our team's progress at:

https://manols0398.wixsite.com/cpsc481-team-e

Repository

You can visit our public GitHub repository at:

https://github.com/gabyrgonz/CPSC481-F20-Tutorial1-TeamE.git

All our work for stage two can be found under the feature branch: stage_four.

Appendix B: Navjeet's Heuristic Evaluation

Heuristic Evaluation By Navjeet Hundal November 18, 2020

1. Visibility of System Status:

The visibility at times could be hard to see. For example, when viewing the UI menu icons at times it can be hard to see which page we're currently navigating. As its difficult to tell which icon is currently selected, since making something opaquer is hard to notice in an AR environment.

2. Match Between System and the Real World:

The terminology used is not fully appropriate to what it would be called in the real world. Also, the way notes are set up doesn't look like how notes are set/viewed in the real world.

3. User Control and Freedom:

Currently it doesn't look like the user can edit their notes, but it seems like they have to delete the old ones then add another to update it.

4. Consistency and Standards:

The UI is consistent, but the back button is in an odd location where it seems like its pointing towards the notification toggle bar, giving a false sense of what it might be for.

5. Error Prevention:

There seems to be no error prevention when deleting notes or task. This can cause a lot of problems if mis clicked and the user didn't notice or remember what they have deleted accidently.

6. Recognition Rather than Recall:

For a health care provider, the icons are recognizable where they don't necessarily have to memorize what each symbol means when navigating through the UI. For example, the plus icons show that pressing it add something, which the user recognizes instantly.

7. Flexibility and Efficiency of Use:

Efficiency is lacking in the sense of no real edit icon when viewing notes/ to do list.

8. Aesthetic and Minimalist Design:

The UI is very minimalistic and pleasing to look at. Having a main menu and then showing the subcategory creates a nice flow when traversing through the UI.

9. Help User Recognize, Diagnose, and Recover from Errors:

There is nothing in place that helps users know something went wrong. Error messages can be useful here. Also, an undo button for notes and to do list can be used here to recover from human errors.

10. Help and Documentation:

There is no help icon which could help if a user was having a problem. Adding a circle with contains an "I" can be used here to bring the user to a screen with common issues to help with their question/ issue.

Appendix C: Chevy's Heuristic Evaluation

Rule of Thumb	Comments		
Feedback on users interaction (ie. showing what a user has selected with their hand)	 Unsure what menu button is selected. Solidify the icon on scroll over, possibly add slight movement animation and audio. For the vital bubbles, let them kind of wiggle a little like bubbles so it is known that they can be moved. Make the inner test results screen look different so there is obvious change. 		
Match between system and the real world (ie. follows users reality, avoiding sensory overload)	 Avoids having too many items on the screen at once. For notifications, when viewing only allow 2 on screen at a time, hide the rest with a scrollbar). 		

User control and freedom (ie. so they can leave a screen anytime)	 Would likely not have a picture for the ID unless it's common to keep pics of patients? Maybe be broken up so the ID card isn't too heavy without picture. Make test results menu look like a neat collection of papers maybe? Bring in that physical vibe. Make sure it is clear how to leave a screen, maybe move the back button so it is larger and not competing with the view notifications switch. Make the back button from the Test Results right beside the test results rather than at the top. Let x-rays move in 3D space like an actual paper so you can set it down but only in the visible view Figure out a more intuitive method for adding in the bubbles to xray notes, it looks like it should be a drag and drop like photoshop.
Consistency and	Keep curves.
standards (ie.	 Make sure wording is consistent. le. patient's ID or wristband?
consistent buttons,	 Differentiate between what can be interacted with and what
menu, icons,	can't (ie. Clock vs. the patient card)
consistent with	 On xray note keyboard, have maybe "Save" instead of Select
other AR	
applications)	
,files and reports)	
Error prevention	 Hold hand still for a non-trivial amount of time or make specific
(ie. prevent errors,	hand motion to select something.
make give	
confirmation)	
Recognition rather	Symbols for the menu do this.
than recall (ie.	Could notifications be more clear on what they are being
symbols are simple,	notified of?
Things you want	Explanation to drag the patient card to see the history, maybe
are explained)	add in a shape such as a built in arrow to the card
Flexibility and	 Allow users to swipe away the notifications if they really don't
efficiency of use	want to see them.
(ie. can do shorthand motions	Allow users to move the ToDo and Notes around the screen so it is a to a social to
	it isn't in the middle.
when used to the movements)	
Aesthetic and	Licing a color that works over all hasters underlied dark light.
minimalist design	 Using a color that works over all backgrounds (ie. dark, light, contrasting).
(ie. not	 Not using a lot of pure white or black to avoid unwanted
overwhelming the	contrast.
view)	CONTRAST.
view)	

	 Make the vitals consistent with the vibe of it all and keep the images simple.
Help users recognize, diagnose and recover from errors	 Can you make errors on this? Like I mean syntax, wrong click, etc. errors?
Help and documentation	 On initial join to the main screen after login, small documentation bubbles for each menu can pop up and be swiped away with hand. On initial join, it isn't super clear that you need to scan a patient. Is the 'View Notifications" switch out of place? Could it be shorthanded but still legible?

Appendix D: Manny's Heuristic Evaluation

Heuristic Evaluation of cARe By Manny Rodriguez November 18, 2020

1) Visibility of System Status

Evaluation

Although the system function in which the user is utilizing has its icon bolded, the other menu options contain the same button outline. This could potentially add difficulty to some users differentiating the function in which they are currently utilizing.

When viewing a report or image from a test result there is nothing displaying to the user informing them which report or image they are currently viewing. For example, some photo galleries on devices will let you know the name of the image file you are viewing. If you tap on the image, then an outline will appear with the name of the file at the top or the outline will disappear if the outline was previously visible.

2) Match Between System and the Real World Evaluation

Some of the language on the patient card does not contain proper terminology of a healthcare practitioner. Instead of having "Reason for stay" on the card perhaps having a term related to "admittance" may be a better option for the user to add more familiarity to the system.

3) User Control and Freedom

Evaluation

The back button could be more clearly marked out and isolated away from the notifications. Might potentially want to consider following more standard conventions and put the back button on the very top left corner.

The system does not support a redo function. For example, when adding notes to a test, if the user accidently deletes it then they have to re-enter the note manually and go through the whole process.

4) Consistency and Standards

Evaluation

From my observation I do not see cases where certain similar words or gestures have different outcomes. Closest case that came to my mind was when closing or deleting a note from a test image or report. To close a note you tap the circle, to delete you press and hold but there is no indicator for how long it needs to be held.

If more functionality arises this heuristic needs to be carefully considered since there are only a certain amount gestures that can be easily differentiated and be tied to certain functionality.

5) Error Prevention

Evaluation

There is possibility for a user to mistakenly tap on the back button when they are trying to view their notifications. Also, the case they may mistap on the notifications when they are trying to use the back button.

When deleting a note, a small popup would be useful to assure the user that they indeed are wishing to delete a certain note.

6) Recognition Rather than Recall

Evaluation

The symbols used for the buttons on the menu seem appropriate for the setting. Practitioners should be to correlate the symbols to the functionality associated with them.

7) Flexibility and Efficiency of Use

Evaluation

The adding a note to a test image or report is not flexible in changing the size of the circle. Considering a case where the injury in small like a less severe fracture then a smaller circle would be more appropriate. When an injury is more severe then a bigger circle should be considered.

8) Aesthetic and Minimalist Design

Evaluation

There is a good mix of aesthetics and minimalist design. The minimalist design takes in good consideration that the healthcare practitioners need as much vision available to possible to be able to interact with the system while assisting their patients. The aesthetics is consistent with the color theme of the project.

To make the application more aesthetically pleasing, a monochromatic color theme with more tonality should be considered to be added. The components of the user interface could be upgraded to be more graphically advanced to have the appearance of an innovative project for healthcare workers.

9) Help Users Recognize, Diagnose, and Recover from Errors *Evaluation*

As of now the system does not show error messages indicating the problem to the user.

10) Help and Documentation

Evaluation

The system does not have a help feature. Similar to common help features, the application could use a question mark button which would display helpful information to the user. Documentation is not necessarily needed to be within the system, that is more of a user manual part of the project. The help feature would be valuable to new users and in a rarer extreme scenario, a nervous user who blanks out.

Appendix E: Review of Heuristic Evaluation

Legend		
Kim	Blue	
Gaby	Yellow	
Group	Purple	

Chevy

Rule of Thumb	Comments	Evaluation
Feedback on users interaction (ie. showing what a user has selected with their hand)	 Unsure what menu button is selected. Solidify the icon on scroll over, possibly add slight movement animation and audio. For the vital bubbles, let them kind of wiggle a little like bubbles so it is known that they can be moved. Make the inner test results screen look different so there is obvious change. 	 1, 2, 4 1, 1, 1 1, 2, 3
Match between system and the real world (ie. follows users reality, avoiding sensory overload)	 Avoids having too many items on the screen at once. For notifications, when viewing only allow 2 on screen at a time, hide the rest with a scrollbar). Would likely not have a picture for the ID unless it's common to keep pics of patients? Maybe be broken up so the ID card isn't too heavy without picture. Make test results menu look like a neat collection of papers maybe? Bring in that physical vibe. 	 3, 3, 1 2, 3, 3 3, 3, 0 2, 3, 3
User control and freedom (ie. so they can	 Make sure it is clear how to leave a screen, maybe move the back button so it is larger and not competing with the view notifications switch. 	3, 4, 42, 2, 40, 0, 0

Leave a screen anytime			
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and keep the images simple.		and keep the images simple.	

Help users recognize, diagnose and recover from errors	 Can you make errors on this? Like I mean syntax, wrong click, etc. errors? 	• 2, 2, 2
Help and documentation	 On initial join to the main screen after login, small documentation bubbles for each menu can pop up and be swiped away with hand. On initial join, it isn't super clear that you need to scan a patient. Is the 'View Notifications" switch out of place? Could it be shorthanded but still legible? 	2, 2, 33, 4, 34, 4, 1

Manny

1) Visibility of System Status

Evaluation

Although the system function in which the user is utilizing has its icon bolded, the other menu options contain the same button outline. This could potentially add difficulty to some users differentiating the function in which they are currently utilizing. 4 4 4

When viewing a report or image from a test result there is nothing displaying to the user informing them which report or image they are currently viewing. For example, some photo galleries on devices will let you know the name of the image file you are viewing. If you tap on the image, then an outline will appear with the name of the file at the top or the outline will disappear if the outline was previously visible. 4 4 4

2) Match Between System and the Real World Evaluation

Some of the language on the patient card does not contain proper terminology of a healthcare practitioner. Instead of having "Reason for stay" on the card perhaps having a term related to "admittance" may be a better option for the user to add more familiarity to the system. 4 3 3

3) User Control and Freedom

Evaluation

The back button could be more clearly marked out and isolated away from the notifications. Might potentially want to consider following more standard conventions and put the back button on the very top left corner. 4 4 4

The system does not support a redo function. For example, when adding notes to a test, if the user accidently deletes it then they have to re-enter the note manually and go through the whole process. 4 3 3

4) Consistency and Standards Evaluation

From my observation I do not see cases where certain similar words or gestures have different outcomes. Closest case that came to my mind was when closing or deleting a note from a test image or report. To close a note you tap the circle, to delete you press and hold but there is no indicator for how long it needs to be held. 4 3 2

If more functionality arises this heuristic needs to be carefully considered since there are only a certain amount gestures that can be easily differentiated and be tied to certain functionality. 4 32

5) Error Prevention

Evaluation

There is possibility for a user to mistakenly tap on the back button when they are trying to view their notifications. Also, the case they may mistap on the notifications when they are trying to use the back button. 4 3 4

When deleting a note, a small popup would be useful to assure the user that they indeed are wishing to delete a certain note. 4 3 4

6) Recognition Rather than Recall

Evaluation

The symbols used for the buttons on the menu seem appropriate for the setting. Practitioners should be able to correlate the symbols to the functionality associated with them. 3 4 4

7) Flexibility and Efficiency of Use

Evaluation

The adding a note to a test image or report is not flexible in changing the size of the circle. Considering a case where the injury in small like a less severe fracture then a smaller circle would be more appropriate. When an injury is more severe then a bigger circle should be considered. 4 2 2

8) Aesthetic and Minimalist Design

Evaluation

There is a good mix of aesthetics and minimalist design. The minimalist design takes in good consideration that the healthcare practitioners need as much vision available to possible to be able to interact with the system while assisting their patients. The aesthetics is consistent with the color theme of the project. $1\ 0\ 0$

To make the application more aesthetically pleasing, a monochromatic color theme with more tonality should be considered to be added. The components of the user interface could be upgraded to be more graphically advanced to have the appearance of an innovative project for healthcare workers. $1\,0\,0$

9) Help Users Recognize, Diagnose, and Recover from Errors *Evaluation*

As of now the system does not show error messages indicating the problem to the user. 4 3 3

10) Help and Documentation

Evaluation

The system does not have a help feature. Similar to common help features, the application could use a question mark button which would display helpful information to the user. Documentation is not necessarily needed to be within the system, that is more of a user manual part of the project. The help feature would be valuable to new users and in a rarer extreme scenario, a nervous user who blanks out. 4 4 ?

Navjeet

1. Visibility of System Status:

The visibility at times could be hard to see. For example, when viewing the UI menu icons at times it can be hard to see which page we're currently navigating. As its difficult to tell which icon is currently selected, since making something opaquer is hard to notice in an AR environment. 2 2 2

2. Match Between System and the Real World:

The terminology used is not fully appropriate to what it would be called in the real world. Also, the way notes are set up doesn't look like how notes are set/viewed in the real world. 3 2 2

3. User Control and Freedom:

Currently it doesn't look like the user can edit their notes, but it seems like they have to delete the old ones then add another to update it. 4 3 3

4. Consistency and Standards:

The UI is consistent, but the back button is in an odd location where it seems like its pointing towards the notification toggle bar, giving a false sense of what it might be for. 4 4 4

5. Error Prevention:

There seems to be no error prevention when deleting notes or task. This can cause a lot of problems if mis clicked and the user didn't notice or remember what they have deleted accidently. 4 3 4

6. Recognition Rather than Recall:

For a health care provider, the icons are recognizable where they don't necessarily have to memorize what each symbol means when navigating through the UI. For example, the plus icons show that pressing it add something, which the user recognizes instantly. 3 3 3

7. Flexibility and Efficiency of Use:

Efficiency is lacking in the sense of no real edit icon when viewing notes/ to do list. 4 3 3

8. Aesthetic and Minimalist Design:

The UI is very minimalistic and pleasing to look at. Having a main menu and then showing the subcategory creates a nice flow when traversing through the UI. $0\ 0\ 0$

9. Help User Recognize, Diagnose, and Recover from Errors:

There is nothing in place that helps users know something went wrong. Error messages can be useful here. Also, an undo button for notes and to do list can be used here to recover from human errors. 4 3 3

10. Help and Documentation:

There is no help icon which could help if a user was having a problem. Adding a circle with contains an I can be used here to bring the user to a screen with common issues to help with their question/ issue. 4 3 ?