Team Google Glass "QuiCam"

Evaluation Report

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Executive Summary

Through our usability test, we've concluded that the interface has four main issues: the main menu, voice and toggle feedback, photo gallery, and overall interface. We found that the main menu was confusing to the user and often hard for them to find. The voice and toggle feedback was another frequent issue, due to the lack of feedback for the user to understand when and how they would use this action. Photo gallery was also hard to find and once users found the photo gallery, they couldn't seem to exit the gallery. Lastly, the overall interface felt inconsistent to the user, with ambiguous icons that were laid out in an arbitrary fashion.

After much analysis from our usability test, we took the initiative to conduct further research into improving our current application with the data we've collected. Since Google Glass is mostly voice and toggle based for primary navigation, our previous iteration fell flat at trying to help users navigate through our application. In our previous iteration, we took several precedence from existing phone applications and tried to utilize those design elements into Google Glass. What we didn't realize is that those design elements do not translate well onto the tiny canvas of Google Glass. Furthermore, the design structure of a smartphone application is meant for touch screen navigation, whereas the Google Glass navigation enters a totally different paradigm of voice control and toggle control. We realized that having a static interface with several options for the user may not be the best way for them to navigate through our application, and by having a dynamic interface that constantly flows with the users actions may be the key to creating a usable interface.

Scenario

QuiCam is a real time editing application that is built for Google Glass. The application is able to compile a user's interest and display those points of interests in augmented reality, giving live data such as, the user's distance from the point of interest and what might be interesting to the user. These points of interest is meant to give the user the ability to understand the environment around him in order for him to take pictures as quickly as possible so that he won't miss a moment. Once the user is ready to take a photo, the application has the ability to photo edit in real-time. This means that as the user is setting up for the perfect shot, he can start to change the color saturation of the image and the lighting, without even taking a single picture. This feature gives the user live feedback in photo editing, giving the user knowledge on how to take aesthetic compositions.

Our goal for our evaluation is to analyze different parts of our user interface and find key inefficiencies in our system. Once we find these inefficiencies, we will suggest improvements for better usability and implement these improvements into our second iteration. We are aiming our application to be user-focused with our objective to be thoughtful and insightful with our users needs and humanistic goals.

Methodology

To help evaluate the effectiveness of our application, an observational usability test was performed. For this usability test, we have selected five individuals that are unfamiliar with the system to evaluate the application. This usability test consists of three parts: pre-questionnaires, a set of tasks, and post-questionnaires. The pre-questionnaires were given to the set of individuals at the beginning of this test, to screen the individuals and provide additional data for analysis. From this consolidated data, we have determined that the demographic of the individuals that we have chosen are primarily between the ages of 18-25, educated, and an active participant in taking pictures. This screening process allows us to pick those who are most relevant and most familiar with cameras and similar applications. The series of tasks were conducted using a Think-Aloud[3] method where individual users are asked to talk as they are navigating and performing tasks from the application. This method allows us to highlight usability issues and potential frustrations that are in the application system.

As they moved through our tasks, we provided the participants with a paper prototype of our user interface and used a Wizard of Oz[2] method to feign the real actions of a computerized system. During the Think-Aloud[3] activity, we had one of our evaluation team members observe and write notes about the participants actions, dialogue and time keep, while another evaluation team member would be the facilitator in the usability test. The last two members of the evaluation team would help switch the interface dynamically as the participant invokes action. For the duration of this process, a Usability Test Protocol and Instruction Scripts were also used to ensure that each test was fair and consistent with the next. A System Usability Scale[1] post-questionnaire and general comments were provided afterwards to review the user's experience with the system. This data helps us determine any key issues that we may have overlooked or were not stated during the process by the user. After the usability test is complete, the team analyzed the data using an Affinity Diagram[4] method and found frequent problems that occurred in our system.

1. System Usability Scale
Using a ten item set of questions, we used the System Usability Scale (SUS) because it provides a measurement of system satisfaction on a global scale where scores are reliable even when usability tests offer smaller sample sizes. The System Usability Scale

is a reliable global scale due to the consistency it is used in over six hundred publications and becoming the industry standard for effective usability assessments. The SUS is completed in a set of post-questionnaires after the participant has completed the usability exercise. The Measurements of the usability test include effectiveness, efficiency, and satisfaction.

2. Wizard of Oz

The Wizard of Oz experiment is a method for designers to utilize paper prototypes to effectively test their user interface without having to actually build the entire system. The Wizard of Oz is a form of rapid prototyping to find key usability issues that occur in the system; it is made to proactively seeking out system inefficiencies in a formative assessment. While a participant moves through the paper prototype interface, a team member of the evaluation team is assigned to dynamically change the interface based on the actions of the participant. The person operating 'behind the scenes' and is meant to be unseen to the participant in order to simulate an autonomous computer system.

3. Think-Aloud

The Think-Aloud protocol involves a number of participant to perform a set of consistent tasks* and having the participant talk aloud about his or her thought processes while completing each task. This helps the evaluation team to observe the participants mental model and give the team a users perspective of the system. Members of the evaluation team are split into special roles to help moderate the usability assessment. The roles that were assigned were: Observer and Facilitator. The observer is meant to unobtrusively observe the participant while he or she is completing the tasks; taking notes as to what the participant is saying, what significant actions the participant is doing, and how long it takes for the participant to complete the task. The facilitator's job is to be the mediator between the usability protocol and participant. His primary objective is to make the participant feel comfortable and explain the exercise coherently to the participant.

*Task 1
Add 'Latte Art' in your current interest

Task 2
Edit a photo in real-time by changing your color saturation or lighting

Task 3
Share a photo to a social media account

4. Affinity Diagram

After the usability test had been completed, the team reconvened to begin an Affinity Diagram process. The Affinity Diagram is a tool to sort ideas and data into groups based on natural relationships, for review and analysis. The information from our usability test is written onto sticky notes and then organized into common relationships until we are left with a few clusters of information, where we group them into a common theme. These themes are our frequent issues that occur in our system that we need to resolve in order to improve on our user interface.

Results

In our results, we found that our average SUS score was 61.5 or 30% percentile, which was far from the average score of 68 or 50% percentile. The SUS didn't pinpoint where the inefficiencies lay, but we now know that there are clear system inefficiencies in our application.

System Usability Scale

	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
	2	3	3	1	3
	4	1	2	0	3
	3	2	2	1	4
	0	3	3	4	4
	2	3	1	0	3
	4	3	3	1	4
	4	4	3	3	3
	4	3	2	1	3
	3	0	1	2	3
	4	1	1	2	4
SUM x 2.5	75	57.5	52.5	37.5	85

SUS Score: 61.5

System Usability Scale
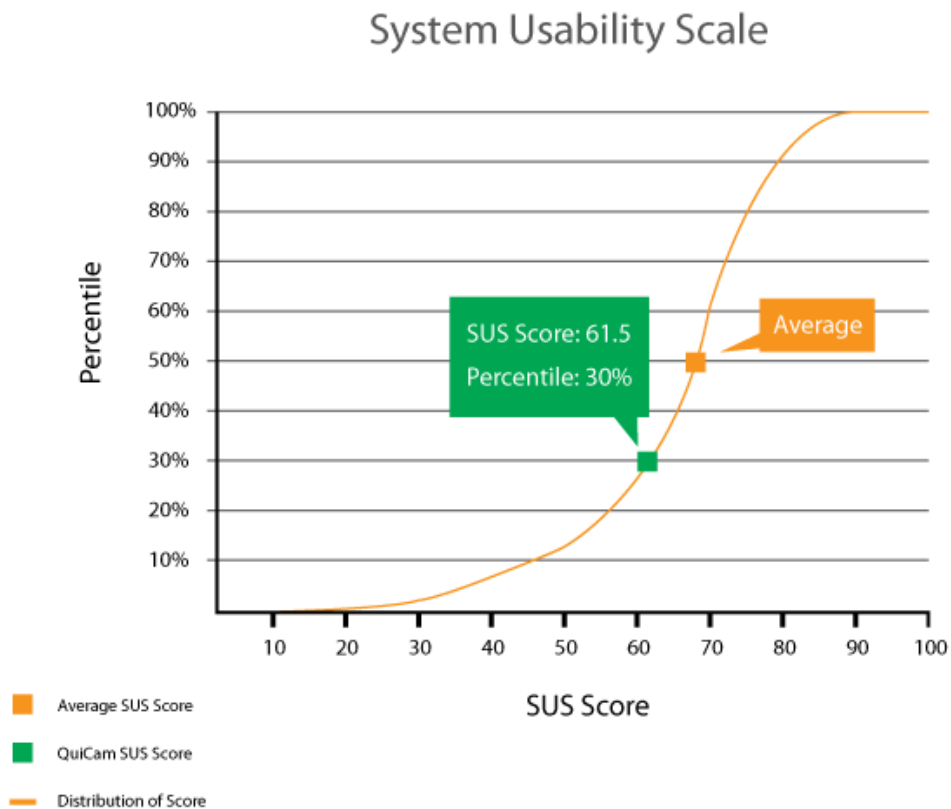
Problems

There were four main problems with our interface after our usability test, which we have categorized by the following: Menu, Voice and Toggle, Photo Gallery and our overall interface.

Menu

Similar to a smart phone, we designed the menu to be presented with an icon, which can then be opened up for more options. Unfortunately, most users weren't able to recognize our precedence from smart phones. They weren't sure how to select the menu options. [Menu 1]

"Menu is confusing and needed to be consistent. Would be nice to perform tasks with voice command." - participant

[Menu 1]

The highlighted icon is
the Main Menu that users
had a hard time finding and
figuring out.
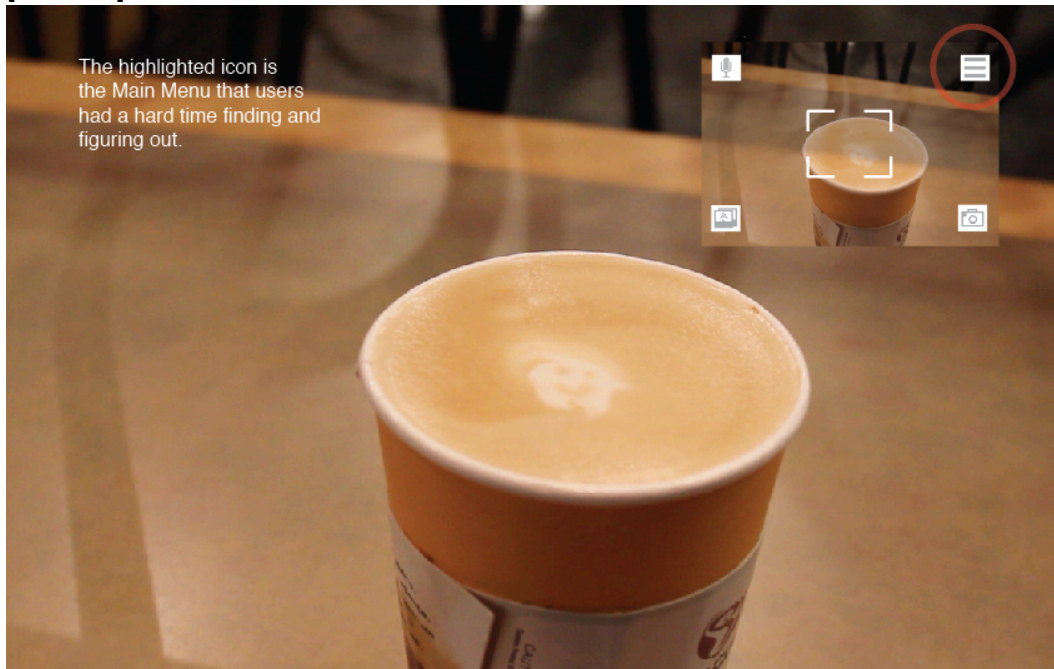
After finding the menu option, users found it to be confusing and inconsistent since it changes to whatever state that the users are in. Users assumed that the main menu is either static or it goes back to the very first screen that the application opens up to. [Menu 2]

[Menu 2]
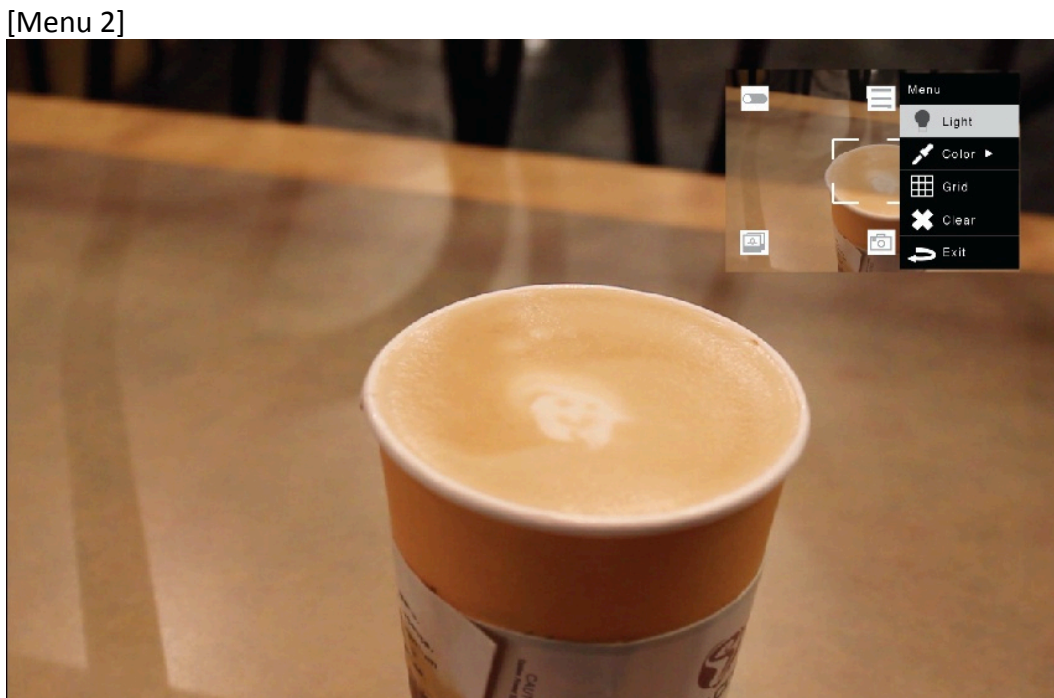
Voice and Toggle

On the top left corner of our interface, we designed voice and toggle icons to signify how the users can navigate through our interface between the two options. After the user testing, we found that users ignore these icons which is why they find themselves stuck in the state that they are in. [toggle1, voice1]

"When do I use voice commands? and not sure how to go backwards." - participant

[toggle1]

[voice1]

The highlighted icon is a reminder that users have voice command control in this state.
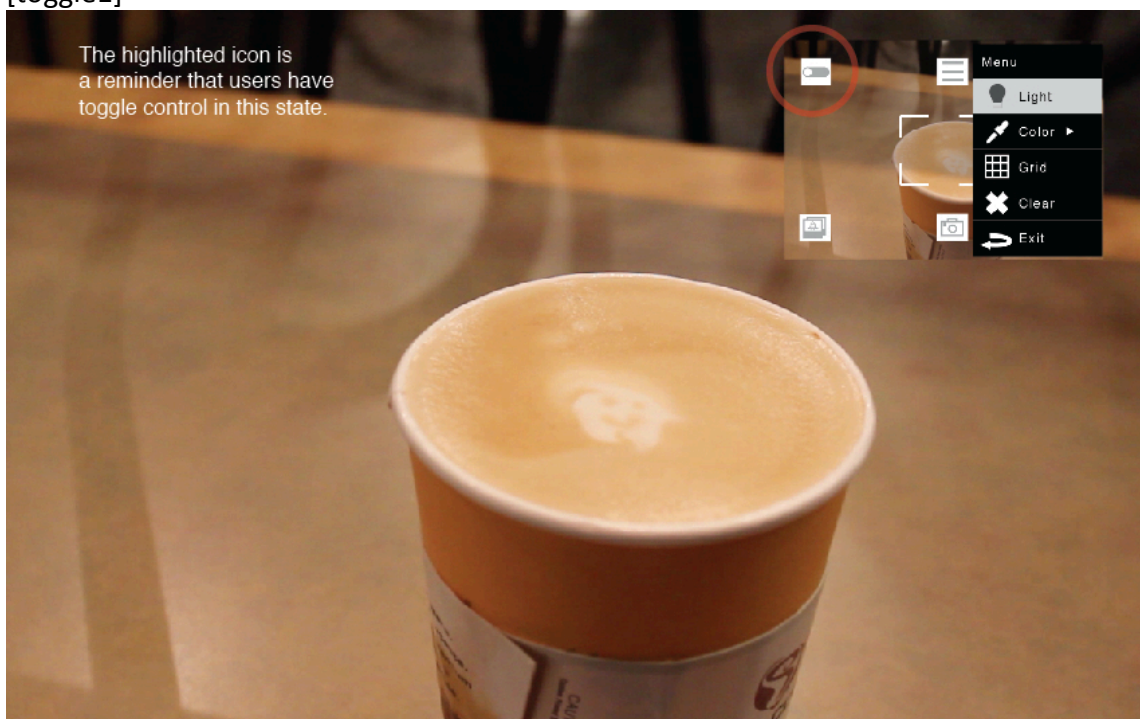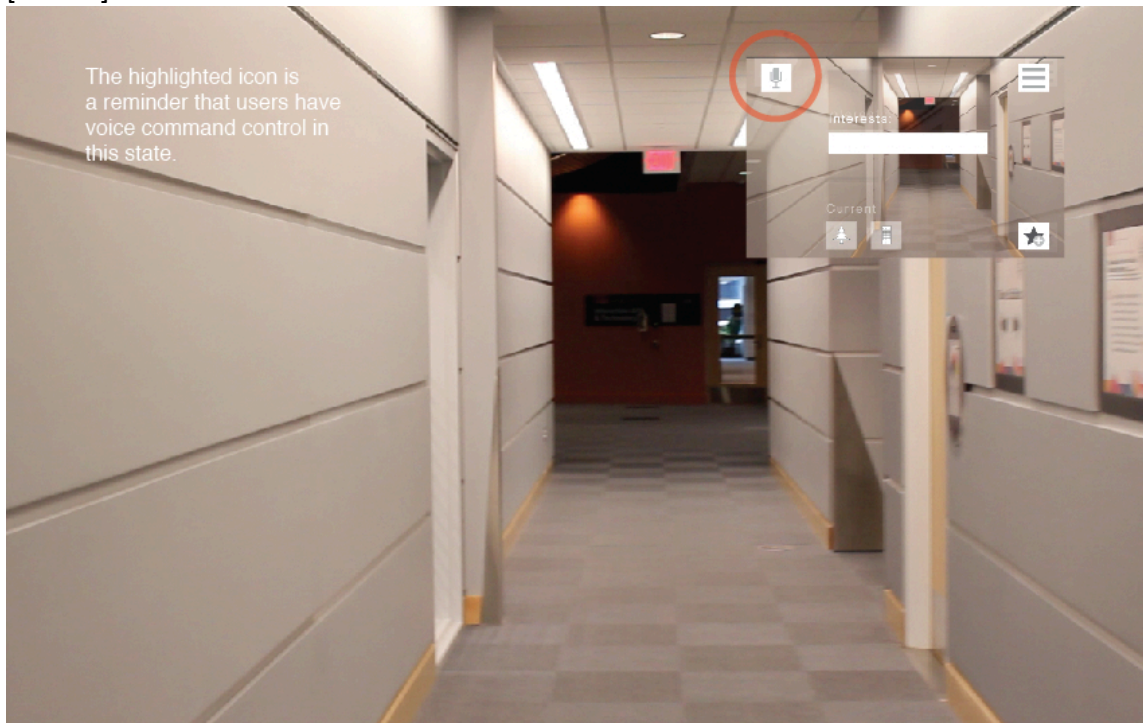
They also felt constrained by only having specific voice commands when using glass. Users were even more confused when inputting their own interests with voice command. Users also assumed that glass should be a more hands free system, which makes all the toggling required for our interface overwhelming and "felt a bit too much" for them. Toggling was even more complicated because there was no linear path for it.

Photo Gallery
The photo gallery and share features were found to be poorly thought out. There was no freedom and control for users. After entering the photo gallery, the interface didn't support an "exit" option in order to leave their unwanted state. [photo1]

"There is no back button for this page? I'm confused." - participant

[photo1]
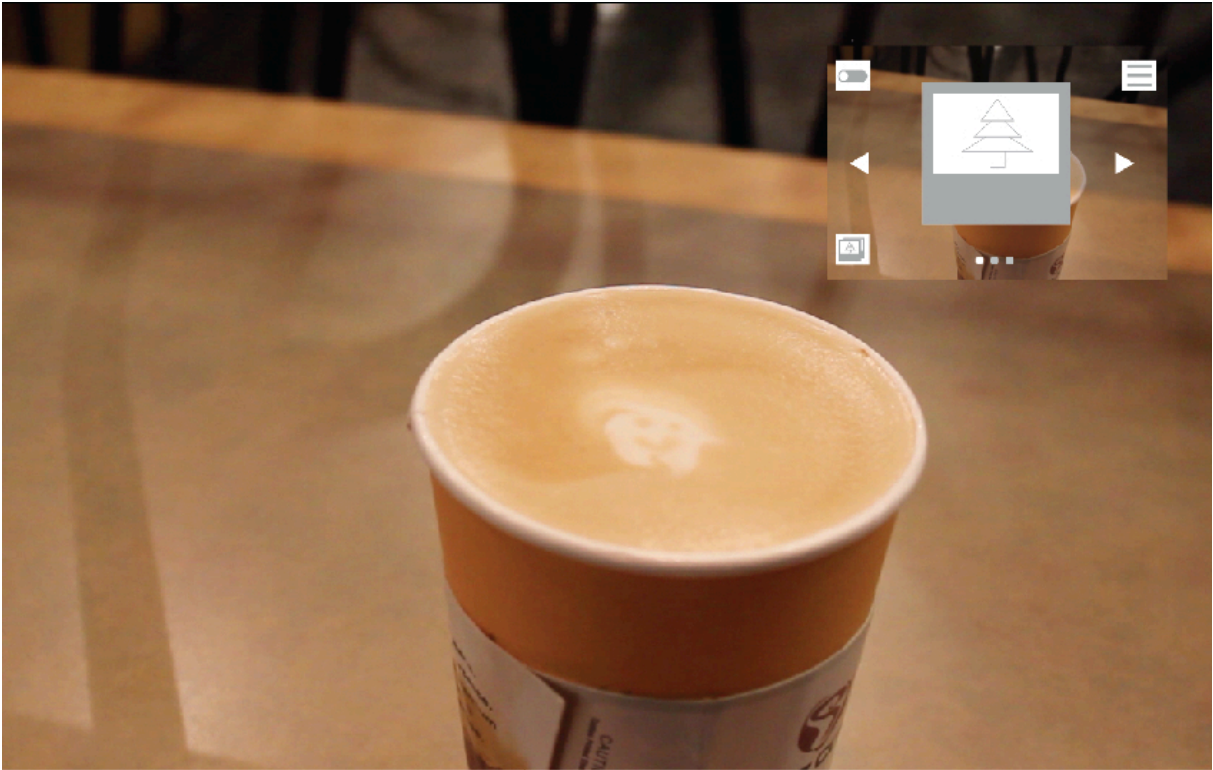
Users only have an option to exit the share function. Initially, we designed the share function to be accessed through the menu option which changes depending on the state they are in. However, users were hesitant to access the menu option because they assumed it will remain the same as one that they accessed from previous tasks. [share1]

[share1]

The highlighted area is the menu bar that changes based on the user's state in our interface.
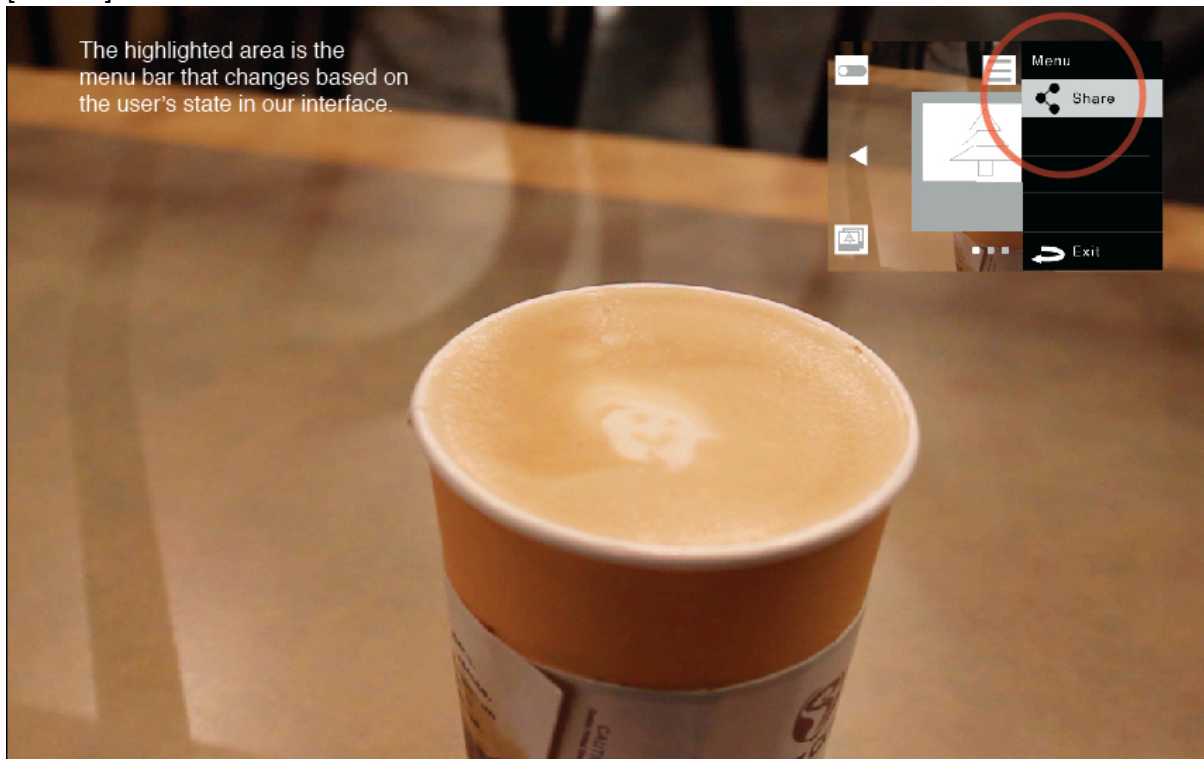
Interface

The overall framework of our interface was discovered to be inconsistent and required too many steps. With ambiguous icons and overall clutter on top of that, users found the interface very confusing. The problems we found on the main menu option, voice and toggle for navigation, and Photo Gallery were all contributors to the interfaces inconsistency. [interface1]

"It felt a bit cluttered but that might be just be the camera function or something." - participant

[interface1]
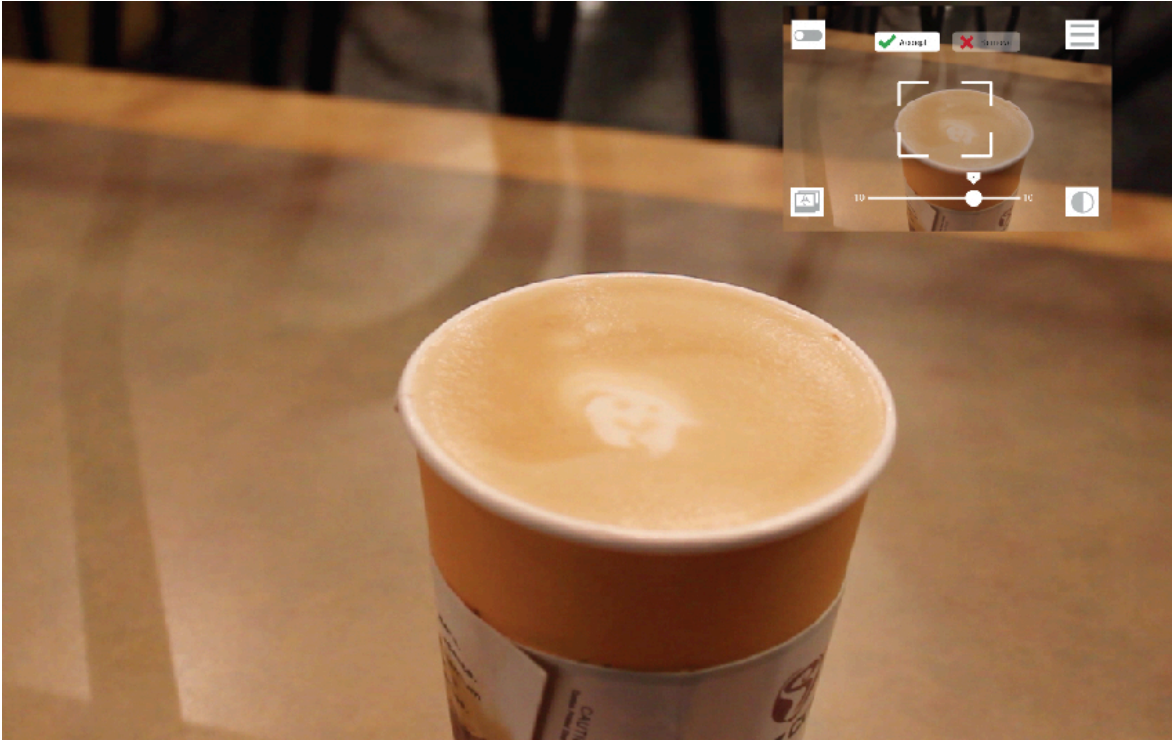
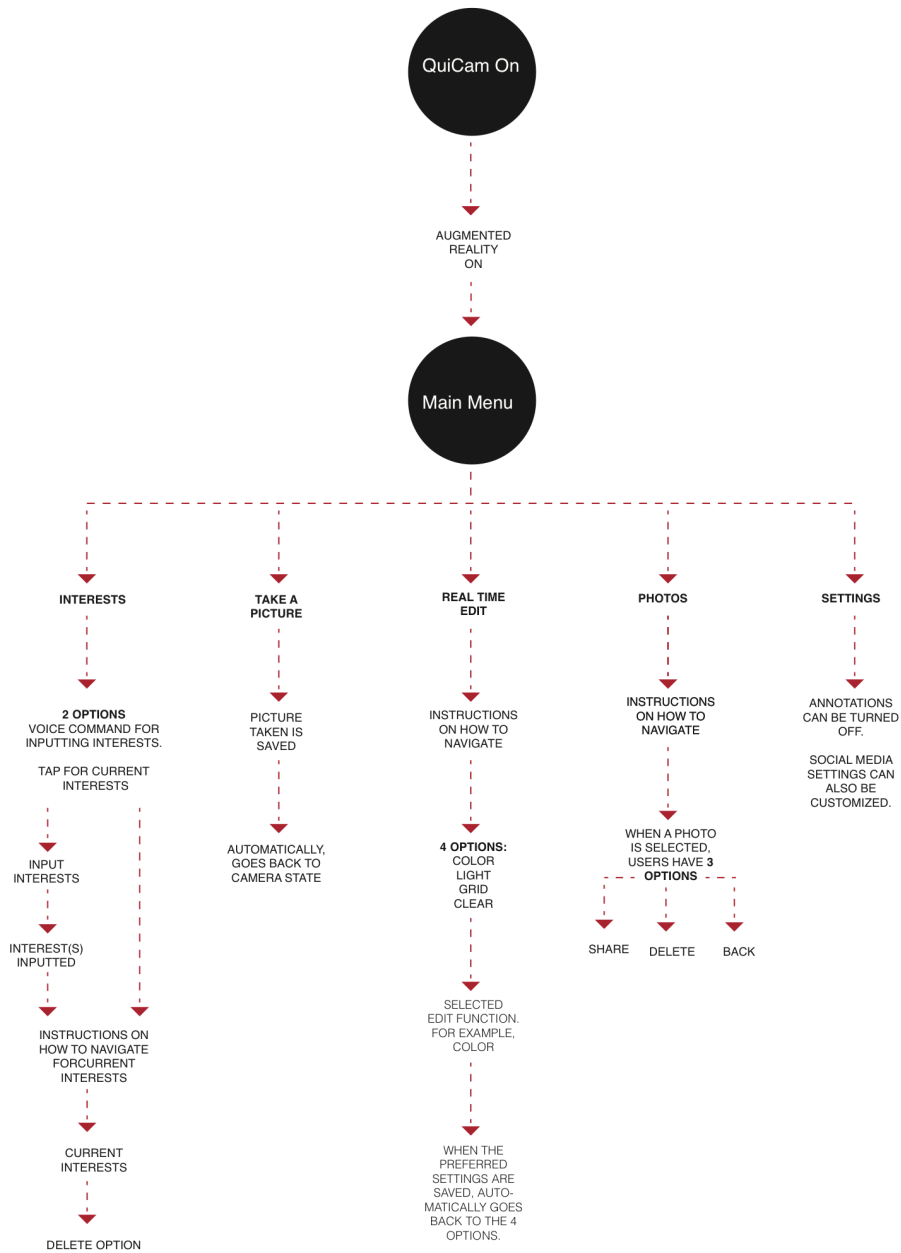## Improvements

In order to improve our interface, we concluded that a redesign is necessary to cater to the problems that we found from our user testing. We also realized that we needed to break away from the smartphone user interaction paradigm and take advantage of the paradigm shift that google glass is moving towards. A well thought out framework is implemented in our redesign. [framework]

[framework]

QuiCam On

AUGMENTED
REALITY
ON

Main Menu

| **INTERESTS** | **TAKE A PICTURE** | **REAL TIME EDIT** | **PHOTOS** | **SETTINGS** |

2 OPTIONS
VOICE COMMAND FOR
INPUTTING INTERESTS.

TAP FOR CURRENT
INTERESTS

PICTURE
TAKEN IS
SAVED

INSTRUCTIONS
ON HOW TO
NAVIGATE

INSTRUCTIONS
ON HOW TO
NAVIGATE

ANNOTATIONS
CAN BE TURNED
OFF.

SOCIAL MEDIA
SETTINGS CAN
ALSO BE
CUSTOMIZED.

INPUT
INTERESTS

AUTOMATICALLY,
GOES BACK TO
CAMERA STATE

4 OPTIONS:
COLOR
LIGHT
GRID
CLEAR

WHEN A PHOTO
IS SELECTED,
USERS HAVE **3
OPTIONS**

INTEREST(S)
INPUTTED

INSTRUCTIONS ON
HOW TO NAVIGATE
FORCURRENT
INTERESTS

SHARE   DELETE   BACK

SELECTED
EDIT FUNCTION.
FOR EXAMPLE,
COLOR

CURRENT
INTERESTS

WHEN THE
PREFERRED
SETTINGS ARE
SAVED, AUTO-
MATICALLY GOES
BACK TO THE 4
OPTIONS.

DELETE OPTION

We now have a static main menu that users can easily access in any state that they are in. The new design focuses on allowing users to have control and freedom at any time. By doing so, the menu and photo gallery problems are solved. [menu3]

[menu3]

The redesign prioritizes voice control as its primary navigation and toggle as secondary. We will help users differentiate and minimize users' confusion from using voice command and toggle by making their icons more visible. Instructions for use of the voice command and toggle are also visible at the beginning of every state that they are trying to access and eventually fades out. [menu4]

[menu4]
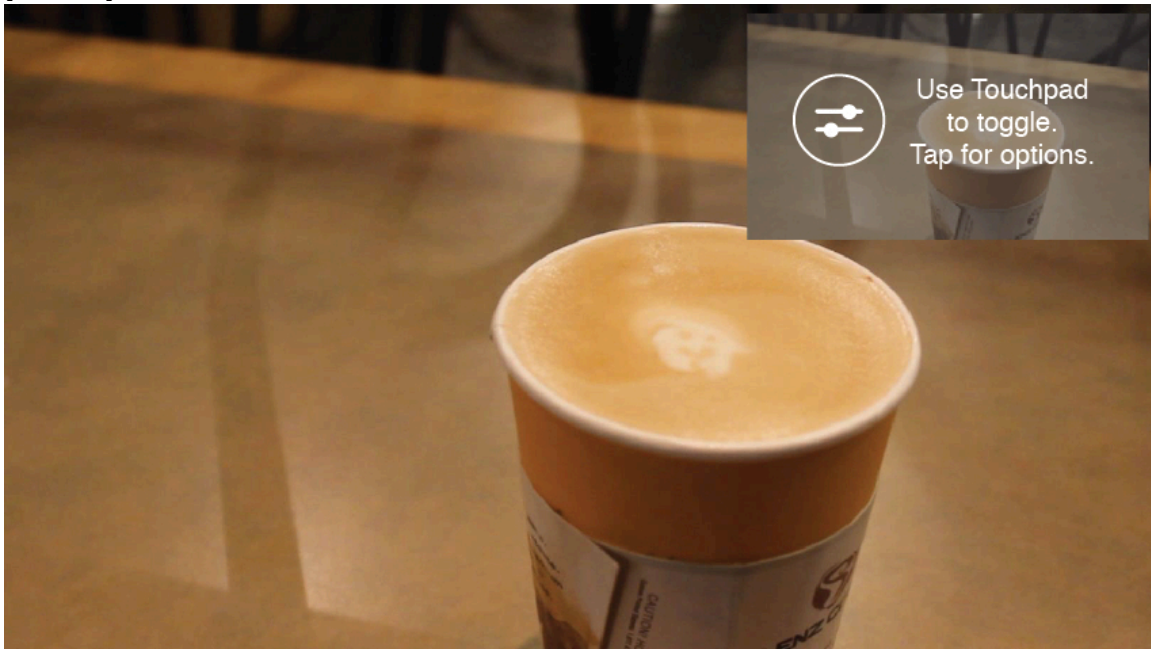
This is most helpful for beginners. Expert users may speed up their interaction by turning off the annotations under settings. Through this, we can cater to both inexperienced and experienced users.

To improve the interface's consistency, voice command and toggle for navigation remain the same in every state. Sub menu's also have similar aesthetics. We further simplified the interface and minimized clutter by using plain white texts for options and icons to act as a reminder for navigation.

Appendix

What did you like about the interface?
"Clean icons. The physical touch pad on the side would make it more simple/reliant rather than the motion gestures from the video."
"The use of slide and tap and choice of voice command."
"Taking pictures from my perspective and voice interface."
"Simplicity, not many things that get in the way."

What did you NOT like about the user interface?
"It felt a bit cluttered but that might be just be the camera function or something."

"When do I use voice commands? and not sure how to go backwards."

"Menu is confusing and needed to be consistent. Would be nice to perform tasks with voice command."

"Not much user interface is great."

What would you improve in the application?

"The side being used to move through the options felt a bit too much. It reminds me of hitting tab to scroll through options in a computer. However, I don't think I'm used to the interface yet to say it's a problem. The slide gesture with the finger reminds me of tablets or phones. (e.g. Nexus 4 menu)."

"Simplify menu options and less steps."

"Integrate sound more into the app. Should be able to understand more instead of sliding, as it's handsfree."

Observation Notes

USER 1

Task 1
1:34

User was confused whether to tap, toggle or not.

Task 2
1:53

Confused about voice command. But at this point, she knew how to use the slide/toggle option.

Task 3
0:21

By the time we got to task 3, interface is simple and user found it easy to use.

USER 2

Task 1
1:50

User thought that the voice commands were too specific. She was pretty confused at how the interface functions. She got a bit of direction about using ok glass and how to input latter art.

Task 2
2:57

User was confused about the concept of real time edit. She assumes that when editing a picture is taken already, which will then be edited. After task 1, she understood when to tap. However, she was confused about the "accept or remove" pop up.

Task 3
3:34+

User was confused because she had no option to share. She figured that she shouldn't go to the main menu since she already know how that looks like and there was no share option there. She felt stuck because she can't just say whatever she wants. She was so stuck that we had to tell her how to share. Afterwards, she said that the menu option should be static since she went to it before and assumed that it'll remain the same.

USER 3

Task 1
0:26

User was able to do this task very quickly since he found tapping very easy.

Task 2
1:11

For this task, the user "took a picture" first and then went into editing. He was worried that if he clicks the main menu, it'd go back to the very first page which was "camera + interests". The user suggested that using voice command for accept would be faster than tapping.

Task 3
0:26

User went to photo gallery first and then shared. He took a different route than what we intended.

USER 4

Task 1
0:42

Easy.

Task 2
1:50

User wasn't sure if he can toggle or not. He wasn't sure how to change settings. After changing settings, he said "take a picture" thinking that it would save the settings he just made.

Task 3
0:15
User was confused about the share menu showing up after he said, "share".

USER 5

Task 1
0:38

He started to toggle when inputting "latter art".

Task 2
2:34
User was not sure to tap or not after selecting camera option on the very first page that shows up. After, He went to photo gallery. he wasn't sure how to select menu options. There is also no way out of the gallery. He then took a picture. People are confused about the real time edit concept. He knew how to tap when selection saturation settings.

Task 3
0:12
Easy