

User Interface Evaluation: Shazam Music Identification Mobile Application

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Abstract

How well thought out is the interface of an app meant for all types who listen to music? Shazam is the type of app that simplifies a problem that many people have, not being able to identify a song they hear. Naturally, in order to test the interface of such a piece of software, testing people who reflect the intended user base is important. This test should also examine some of the most common and useful of tasks that the software performs and evaluate the tasks to find areas for improvement. We performed such a test, and found that something as seemingly simple as the position of a navigation bar can have a big effect on a user's experience. We also found that a single very important feature of an app might make it difficult to balance the experience with other minor, but still useful, features.

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1. Introduction

The purpose of this paper is to evaluate the usability of the user interface of the Shazam app for smartphones. Shazam is an app designed mainly to recognize songs recorded through the phone's microphone. This is done by comparing the recorded "acoustic fingerprint," and searches a central database for a match. With its popularity, Shazam also will sometimes link to relevant websites for purchase or playback of a discovered song, and suggests users listen to more popular "trending" Shazams.

Since the goal of the app is to make a relatively difficult activity easy and the Perceived Ease of Use of the user interface is an important indicator of how often people will adopt a new mobile technology (Leong, 2011), the ease of use of Shazam will specifically be examined. The test should be designed to evaluate the overall difficulty level of the main features of the app. Since Shazam is an app designed for anyone to use, the participants should be chosen to reflect the lack of specialization of Shazam's market.

a. Test Goals

- Test the features of the app on a variety of people
- Highlight any characteristics of the software that fail to display accepted human/technology interaction standards
- Provide sufficient data to analyze possible improvements in the ease of use of the app.
- Specifically evaluate learnability, memorability, and error rate of the main app functions

2. Test Process

Testing was done in the library at UCF with all devices connected to the same wireless network. The participants each completed their tasks on an installation of Shazam on their personal phones. As such, some fluctuation of time to complete due to hardware differences is considered in our analysis. Each participant had the most recent version of the application downloaded onto their phones. Each participant was individually tested one on one and separated from each other so there was no ‘cheating’ and learning from the mistakes of other participants.

The tasks were based on the most popular functions of the application and were given written on a piece of paper for the participant to read. Since this application does not have a lot of depth to it, the tasks given covered about 90% of the functions that the application performs. The five tasks that the participants were asked to complete are as follows:

1. Record a song
2. Find out the name and artist of the song
3. Find “Top Tracks from around the world”
4. Find Trending Shazams
5. Use your camera to scan a QR code

After the participants completed all of the tasks, the times to complete each task in seconds, as well as, the number of errors encountered were recorded.

3. Participant Background Information

The test involved participants ages 18-23 given a number of tasks to complete using the mobile app Shazam. A group of 8 males were selected from the University of Central Florida with all different majors such as finance, electrical engineering, education, accounting, and psychology. Non-technology majors were chosen to meet requirements as well as to gain a wide

range of participants that don't necessarily have experience working around common software or UI errors.

Each participant was given a Personal Information sheet to fill out to provide some contextual data to aid in the evaluation of their performance. Each participant has regular Internet access and owns a personal smartphone. The following information was collected from the participants and recorded in Table 1:

- First Name
- Major
- Year in College
- Age Range
- How often do you use the Internet?
- Have you ever used Shazam Before?

First Name	Major	Year in College	Age Range	Internet Usage	Past Shazam Use
Jonathan	Gardener	Sophomore	17-20	Everyday	No
Kevin	Finance and Real Estate	Fifth year senior	21-22	Everyday	Yes
Sean	Finance	Senior	21-22	Always Connected	Yes
Brett	Electrical Engineering	Sophomore	17-20	Everyday	No
Korey	Accounting	Senior	21-22	Always Connected	Yes
Spencer	Mechanical Engineering	Senior	21-22	Everyday	No
Stuart	Accounting	Junior	17-20	Everyday	Yes
Alex	English Education	Junior	17-20	Everyday	Yes

Table 1. Participant Information

4. Test Record

Table 2 below displays the time to complete (seconds) and number of errors for each participant and task. Participant names are not displayed as per their wishes.

Tasks:

1. Record a song
2. Find out the name and artist of the song
3. Find “Top Tracks from around the world”
4. Find Trending Shazams
5. Use your camera to scan a QR code

Participant	Task 1	Task 2	Task 3	Task 4	Task 5
1	5 / 0	10 / 1	30 / 2	5 / 0	10 / 0
2	6 / 0	2 / 0	20 / 2	25 / 3	15 / 1
3	5 / 0	2 / 0	20 / 3	15 / 1	10 / 0
4	4 / 0	8 / 1	25 / 3	20 / 3	20 / 1
5	4 / 0	4 / 0	10 / 0	5 / 2	8 / 0
6	6 / 0	10 / 1	6 / 1	15 / 1	15 / 1
7	4 / 0	15 / 2	5 / 0	35 / 5	20 / 2
8	5 / 1	4 / 0	8 / 0	15 / 1	10 / 0

Table 2. Participant’s task completion time and number of errors. The first number is number of seconds to complete the task and second number is the number of errors for that task.

One participant said, “I know the mistakes I made now, if I would have went back to the home screen in between tasks I would have had no, maybe one, mistake. Shazam is built around the home page, every one of the tasks are from the home page. Once you go past the home page it becomes more difficult to complete certain tasks.”

One participant was surprised to notice the “Trending,” button on the navigation bar after completing the task, noting that that would have been easier than the way they completed it.

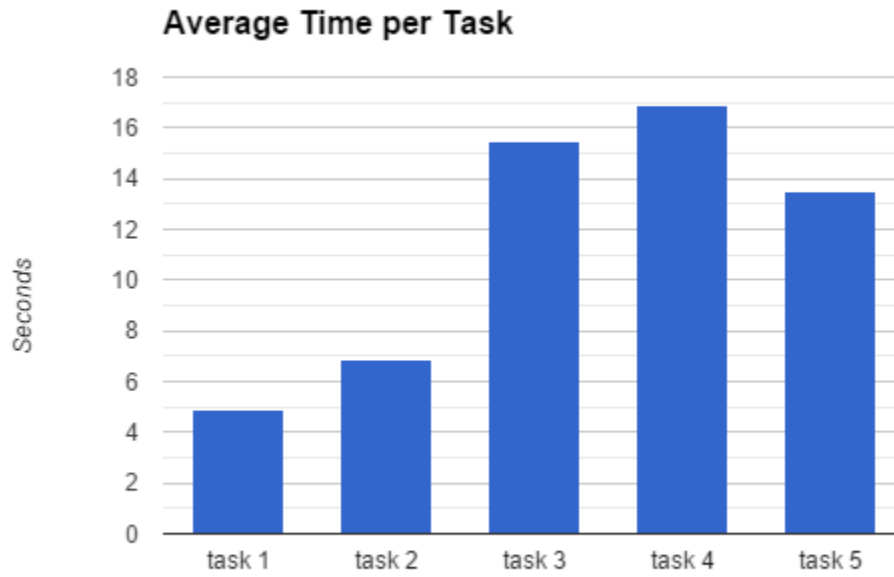


Figure 1. Average time to complete each task

This is as to be expected from such a popular application. The main use of this application is to identify a song by recording it off the radio. Task 4 took the longest likely because it is also the task with the highest error rate. This suggests an immediate area with room for improvement.

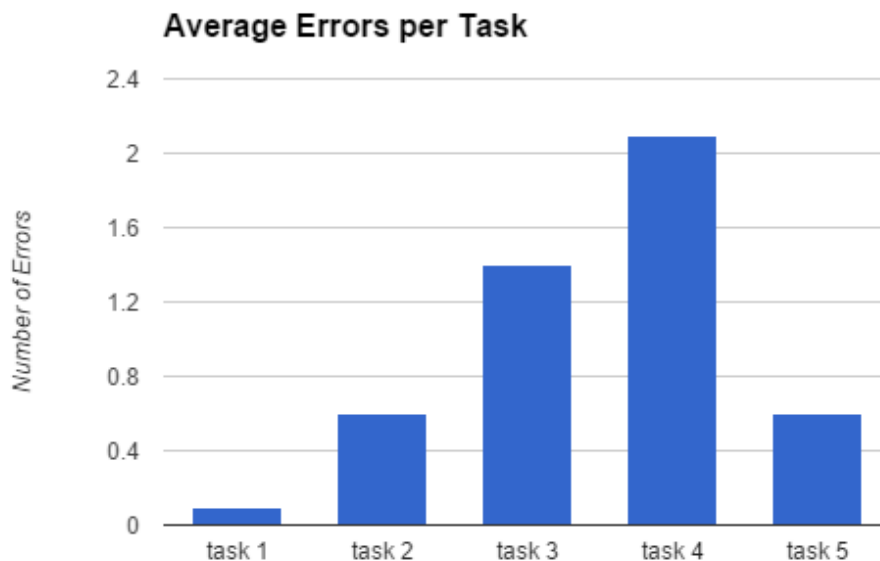


Figure 2. Average errors committed per task

one had an error on the very first task. Since the backgrounds of the participants vary, it is encouraging to see relative consistency among them for each task. This lends itself well to the

5. Data Analysis

As you can see from figure 1, task 1: record a song (which is the main function of the entire application) is by far the easiest and quickest to perform.

The graph to the left (figure 2) shows the average number of errors per task completed. Out of eight participants only

idea that there is room for improvement in the user interface and any difficulties that participants experienced was specific to their skill set.

Based on this information in figure 2, it would appear that tasks 3 and 4 are consistently harder for our participants to navigate to or use than the other parts of the application. From watching the participants go through this test, though they all made the same mistakes, they would not go back to the home page before continuing on to the next task. The participants would do them in sequential order and that is what made these tasks harder for the participants.

As the first quote from section 4 suggests, it may be easy in many cases to return to the homepage to access other features of the app. This feature may limit the users freedom in navigating the all of the app's features easily. The example where the user made note of the trending button after completing task 4 highlights the poor location of the navigation bar.

Since the experiments have background in technology, by comparison with the participants, they are able to navigate through these tasks easier than those with less professional experience with technology.

6. User Interface Modification

a. User Requirements

Based on the experiment conducted, there are a few interface changes that need to be implemented in order to improve the interface usability. First, in order to improve efficiency and effectiveness, the navigation bar needs to be moved from the bottom of the screen to the top. As Singh said, "a good user interface has to have a sense of plot and flow and the users are supposed to have a natural path through the parts of the interface." (Singh, 2004) When a user interface is designed the layout needs to take into consideration how the user interacts with the device. When using an app on a handheld device, many times you can cover up the bottom of the screen with

your thumb and not know that you are covering up important information. One of the tasks was to find trending Shazams. This should be an easy task since there is a trending button on the navigation bar. However, when holding your phone it is the easiest button to block on the navigation bar which lead to this simple task having the most errors. This is a good illustration of the need to consider human capabilities and characteristics when designing a user interface (Ritter, 1986). By simply moving it to the top of the screen, users will be able to see and read the navigation bar easier since it is harder to block with your fingers as well as the top being a more prominent part of the screen than the bottom.

Another issue that needs to be fixed with the Shazam application is that the home screen is too cluttered. For example, currently when you open up the Shazam app, half of the screen is a button to perform the main function of the application which is to listen to a song. This is perfect to make the app simple. However, the other half of the screen is a news feed of information that is not pertinent to the apps function. This information is irrelevant to the programs function and should be moved to another section of the app. According to Campos, avoiding clutter “consequently increases performance levels.”(Campos, 2013) By moving this information and changing the home screen to just contain important functions to perform the main basis of the app it will become a much more efficient app that is very easy to learn for users new to the application.

Additionally, an issue that is appearing in more applications than just Shazam is the abundance of advertisements present on every page. When using an app for the first time, every aspect of the application is new and can be confusing. When you add to the confusion by placing banner ads on every page and a large ad whenever a user performs a function, it can cause the user many problems. First, if the user accidentally clicks on it and get redirected somewhere they

didn't intend to go they can easily get lost and feel like the application isn't working or too hard for them to work. Second, an excess of advertisements can cause the user to not be able to find what they are looking for. When a user is using an application for the first time, the last thing they want is to not know how to use the app, which can quickly cause a user to delete the app and try a different one. Also, many ads today are very stealthy and made to look like functions within the app. For example, some ads look like arrows that would take you to the next page of the app, but in reality they are just picture baiting the user to click on it. When this happens to an unsuspecting user they could think that the app is just broken and decide to not use the app. Because of this, the number of ads within the Shazam app needs to be decreased to improve user safety, user learnability, and to improve error prevention.

b. Conceptual Design

User requirements and other technology interaction concepts in mind, a conceptual design can be developed. These design modifications aim to create a more user-friendly interface for Shazam. The main concern is clutter on the homepage and the location of the navigation bar. As stated in the user requirements section, the users want to be able to see the navigation bar so that it is easier for them to access the appropriate sections to complete tasks. In order to accomplish this, a simple readjustment of the sections on the homepage can be implemented.

This new design is recommended because of some basic principles of UI design. First is efficiency, Xiangqian Fu from Polytech University in China mentions in his journal article about UI design that, “interaction design aims to make products so that users can simply use [*sic*]” (Fu, 2010). This application's main purpose is to quickly listen and instantly identify the track name and artist name of a song that is playing somewhere in the user's environment; so, in order for that to be the most important factor when opening the app, it is advisable to put the large Shazam

listen button as close to the user's thumb as possible so they have quick access to the "Listen" function. Of course, there are other features this application has, but the main purpose should be the easiest to access, making it as efficient as possible to use the application.

Another important concept stemming from efficiency and ease of use is the removal of "clutter" from the home screen. Since this app is for mobile devices, the amount of real estate on the screen that a developer has to work with is limited. This means, the screen not only has give all the functionality that developers require but also keep the aesthetics of the screen appealing to the user. An overwhelmed screen is an overwhelmed user, this is because "emotion[s] play a large part in our interaction with objects" and a successful UI will invoke a "positive affective response from the user" (Jun, 2004). Originally, the home screen had new articles on the second half of the screen and the users would need to scroll up to view the articles. However, this made the screen cluttered and also took away from the main function of the app. Since, it is recommended that the listen function be as close to the user's thumbs for quick input of that command, the news articles section was moved to the top and the scrollability of this segment was inverted. Now, instead of the users moving their thumb bottom-to-top to scroll, they move them from top-to-bottom. This also means the order of the articles for this segment has to be inverted. Previously, the most recent article is at the top of the section and the earlier articles are below them; in the modified version, the most recent article is placed at the bottom of the segment and as the user scrolls down the earlier articles are available.

Staying with the theme of aesthetics and user emotions, one of the most troubling aspects of mobile application UI design is the use and placement of advertisements. The Shazam application has advertisement banner placed throughout various screens. As a standard, the advertisement banners are placed on the top of the screens after the title of the screen, as seen in

figure 3. Since one of the aspects is aesthetics, a banner ad that does not fit with the rest of the theme of the app is not recommended. Also, the navigation bar is being moved to the top of the screen (as described in the paragraph below), that advertisements will need to be moved somewhere else. It is not practical to not have any advertisements, since this is likely how a larger portion of revenue is generated from this application, it is advised that the advertisements appear with a close button so that it can be removed by the user if that is what they want to do, refer to figure 3.

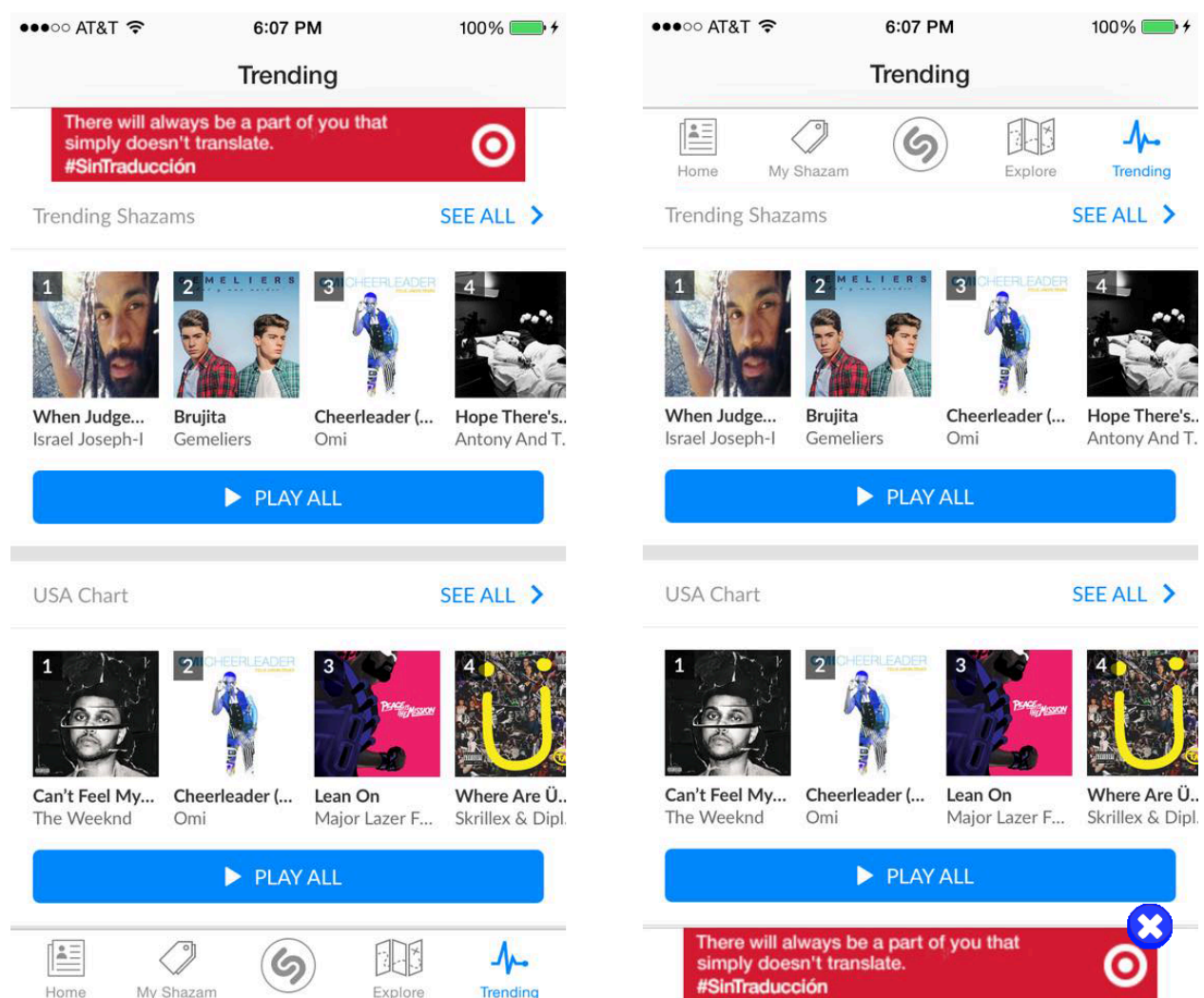


Figure 3. Original Trending Screen (left) and Modified Trending Screen (right). Notice the capability of exiting out of an advertisement.

Moving on to the navigation issue, one of the concerns mentioned in the user requirements is that the navigation is at the bottom and could potentially cover up the UI buttons by use of the user's thumbs. This makes it difficult to identify what is there easily and hinders visibility of the screen. So as seen in figure 4, the navigation bar has been moved to the top and will remain there for the other screens of the app as well. It was decided that this would be the new option since one of the users from the test replied that they had a difficult time navigating back to the home page after performing tasks or switching from one task to another. It should be noted that "reversal of actions" is a major part of UI design. Reversal of actions means that users are able to go back, whether it be to a previous screen or undo an action they have just taken. This reversal of actions is relative to flexibility and efficiency of UI design. Ghiduk describes flexibility as the ability to return to an item after navigating away from that item (Ghiduk, 2012). The clear visibility of the navigation bar at the top of the screen will allow the users to easily navigate to the page they require, so they are able to complete a task.

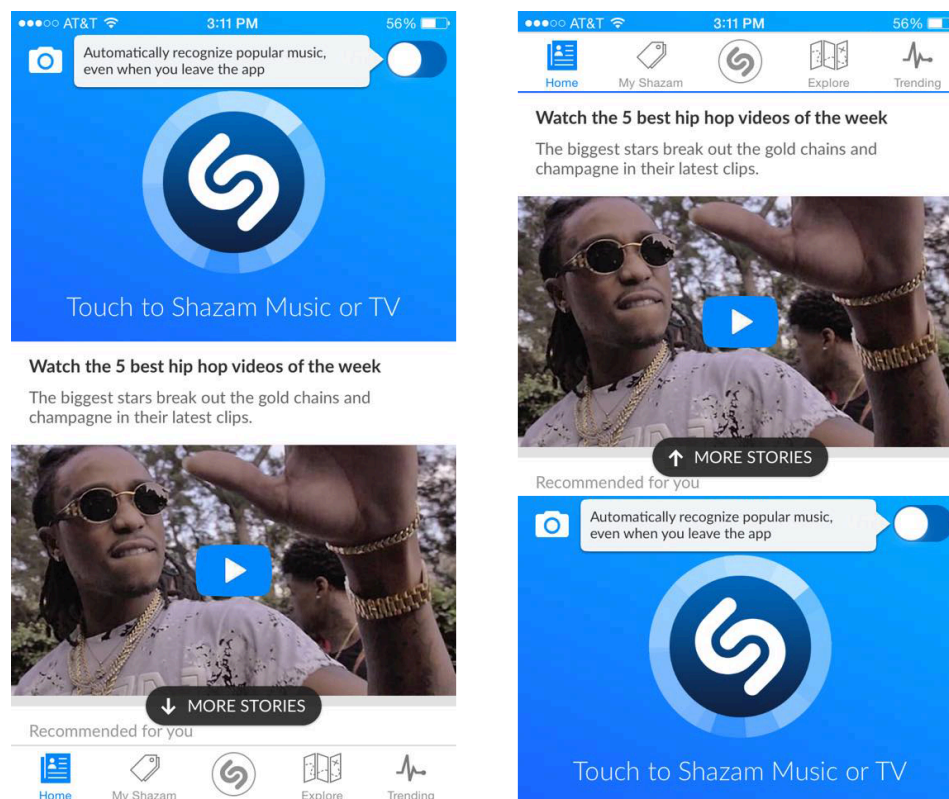


Figure 4. Original Home Screen (left) and Modified Home Screen (right).

7. Findings and Recommendations

Testing results suggest that there are two main issues with using Shazam: not returning to the home screen to complete tasks and underutilization of the navigation bar. The home screen of Shazam is where all actions can be accessed and initiated for the application. During testing, participants would attempt to perform the next action of the test without returning to the home screen to do so. This would lead to an error when performing the task or add time to the user's task performance. The navigation bar, which provides access to some actions without returning to the home screen, was also overlooked by participants during testing. Upon review of results, participants were unaware of the navigation bar to progress through the application. Tasks that were indicated with high error rates from the results gathered are directly affected by these two issues.

Improvements to Shazam should focus on streamlining the home screen, relocate the navigation bar from the bottom of the application to the top, and address the number of ads within the application itself.

The main purpose of Shazam is to identify a song being played. The interface provided by Shazam has been redone to make key features easier to access instead of forcing the user to scroll through to find them. Certain elements have been resized, such as the large Facebook login option or QR code scanner, or others removed all together to make the home screen easier to navigate for users. These changes present the user with a more minimalistic interface to work through and increases overall effectiveness of application usage.

The navigation bar is a key element for traversing the application and should be moved to a location that users are familiar with. By moving the navigation bar from the bottom to the top users are presented with an area they are more accustomed to for performing actions. Moving

the navigation bar from the bottom will also reduce the amount of errors that resting fingers produced, since thumbs and fingers are more likely to be resting towards the bottom of the phone. Efficiency of the application was bogged down by the location of the navigation bar and has been addressed to make certain functions easier to perform.

Advertisements are a way for Shazam to make money off of free application usage. However, the amount of ad space present in Shazam is staggering. While navigating through the application one or two banner ads are placed on every page and the home screen has a sponsored ad section. Banner ads are placed about a third of the way down the screen, leading to a disruption of the flow of information from the interface to the user. Shazam's modified interface should reduce the amount of advertisements or provide less of them throughout the application because it negatively affects how the user utilizes the application to begin with. By addressing the invasive advertisements, users are given a safer application that will not pull them away from the main function of the application itself.

8. Conclusion

During testing, participants had issues with accessing the home screen and using the navigation bar after completing tasks. Advertisements also negatively affected a user's experience while working with Shazam. Streamlining the application to accommodate for home screen use and shifting the navigation bar to the top of the application would increase the overall efficiency and effectiveness of Shazam.

9. References

1. Campos, P., Campos, F., & Pestana, J. (2013). Delineato: A Diagramming User Interface Designed Using a What You Get is What You Need Approach. *2013 IEEE 37th Annual Computer Software and Applications Conference*.
2. Fu, X. (2010). Mobile phone UI design principles in the design of human-machine interaction design. *2010 IEEE 11th International Conference on Computer-Aided Industrial Design & Conceptual Design 1*. Retrieved July 16, 2015, from <http://ieeexplore.ieee.org.ezproxy.net.ucf.edu/stamp/stamp.jsp?tp=&arnumber=5681254>
3. Ghiduk, A., & Elashiry, M. (2012). Design and Implementation of the User Interfaces and the Applications for Mobile Devices. *International Journal of Computer Applications*, 26(12). Retrieved July 16, 2015, from <http://research.ijcaonline.org/volume46/number12/pxc3879423.pdf>
4. Gong, J., & Tarasewich, P. (2004, November). Guidelines for handheld mobile device interface design. In *Proceedings of DSI 2004 Annual Meeting* (pp. 3751-3756).
5. Lazar, Jonathan, Jinjuan Heidi Feng, and Harry Hochheiser. *Research methods in human-computer interaction*. Chichester, West Sussex, U.K.: Wiley, 2010. Print.
6. Leong, L., Ooi, K., Chong, A., & Lin, B. (2011). Influence of individual characteristics, perceived usefulness and ease of use on mobile entertainment adoption. *International Journal of Mobile Communications*, Volume 9 (Issue 4), Pages 359-382.
7. Ritter, Frank, Gordon Baxter, and Elizabeth Churchill. *User-Centered Systems Design: A Brief History*. Erlbaum, NY: Hillsdale, 1986.
8. Rogers, Y., Sharp, H., & Preece, J. (2011). *Interaction Design: Beyond Human - Computer Interaction*. Hoboken: Wiley.

9. Rubin, J., & Chisnell, D. (2008). *Handbook of usability testing, how to plan, design, and conduct effective tests*. (2nd ed.). Wiley.
10. Singh, M., Rahmatabadi, G., & Ahamed, S. (2004). User Interface and application development experience on handheld devices. *IEEE Electro/Information Technology Conference*.