Heuristic Evaluation Report

Digital Solution for Blind and Visually Challenged Individuals

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### What is a heuristic evaluation?

Heuristic evaluation can be described as using a set of provided guidelines in order to determine whether or not an interface is user-friendly. Even though the evaluation is not as valuable as doing real-life user testing, it can still provide the designers with essential improvements, with very little resources spent.

This evaluation underscores the application's strengths in adhering to usability heuristics while pinpointing key areas for improvement to better serve visually impaired users. The evaluation will be performed based on the 10 guidelines proposed by Jakob Nielsen and Rolf Molich. Here is a list of them, with a short explanation for each heuristic:

* **Visibility of system status** - this principle emphasises the need to keep users informed about what's happening within the system, providing timely feedback.
* **Match between the system and real world** - the design should use language and concepts familiar to the user, reflecting real-world conventions.
* **User control and freedom** - users often make mistakes and need an easy way to reverse actions without a lengthy process.
* **Consistency and standards** - users should not be confused by differing words or actions that mean the same thing. Adhering to platform and industry conventions is important.
* **Error prevention** - good design should prevent problems from occurring in the first place, not just provide good error messages.
* **Recognition rather than recall** - minimise the user's memory load by making objects, actions, and options visible.
* **Flexibility and efficiency of use** - the design should cater to both inexperienced and experienced users, possibly through the use of shortcuts.
* **Aesthetic and minimalist design** - interfaces should not contain irrelevant or rarely needed information, focusing on essentials.
* **Help users recognize, diagnose and recover from errors** - error messages should be clear, expressed in plain language, and offer constructive solutions.
* **Help and documentation** - while the best designs are self-explanatory, it may be necessary to provide help and documentation.

Another important aspect to be taken into account is the fact that our application is designed for blind or visually impaired people. For that reason, the implementations of the given guidelines might not be the same as in other applications that we encounter on a daily basis.

### Preparing the shopping experience - Creating a shopping list, Choosing the store, Receiving information regarding sales

This particular set of tasks focuses on the first actions taken in order to start the shopping experience. They are in direct connection in the application’s flow and would most likely be completed by the user at the same moment in time.

#### Compliance with the heuristics

The flow formed by following the tasks is a rather short one - a total of 4 screens. Nonetheless, the interface aligns with several of the heuristics like providing clear system status, user control, and using real-world conventions.

**Visibility of system status** -The user is announced by audio of the option they have selected and also of the possible actions that can be taken further. This feature makes sure that they are aware of the state of the system at any time.

**Match with the real world** - In terms of terminology, the application proves to be user-friendly, using familiar terms like "shopping list" or “sales”. What is more, the flow of encountering sales is the same as in the real-life experience. If the sales are placed on display on the front aisle of the supermarket, the flow here stays the same and the user can find out about the current deals right from the start.

**Consistency and Standards** -The interface provides consistent placement for buttons that hold the same purpose. A good example is the position of the “yes” and “no” buttons. What is more, the audio description of the screens always enumerates the option top-bottom, starting from the left side.

**Error Prevention** -Error prevention is achieved through an additional step after each choice, in order to make sure that the push of the button was intentional. This leaves little room for mistakes.

**Recognition Rather than Recall** - The audio props are repeated each time the user reaches a screen, no matter if they had previously been on it. Moreover, the colour choices for the buttons - green for “yes” and red for “no” - is also based on what the users are familiar with on a day-to-day basis.

**Flexibility and Efficiency** -The user is firstly presented with the shops that are closest to their current location and the ones at which they had previously shopped at the most. This gives a personalised experience and also allows for a better UX, the user not having to wait for a long time until they hear the number of their favourite shop.

**Aesthetic and Minimalist Design** - Since the application is designed for visually impaired people, its design is optimised as much as possible, its functionality being more important than the visual aesthetics it gives off. What would otherwise be considered a beautiful design, might prove to be completely inefficient in this case.

**Help and documentation** -the always present audio guidance works helps the user at any step to understand the outcomes of selecting certain buttons.

#### Problems and solutions of the current interface design

The interface currently lacks error recognition and recovery systems. Even though the flow is rather straightforward and there is little room for mistakes, more specific error cases have not been treated. For example, in the case of an abrupt termination of the app, the user is not notified when they re-enter the app whether or not their progress has been saved.

Even though the system already has a check after each decision, which could easily work as a back button in a single step, that is not a scalable solution. Therefore, another problem is the lack of an undo button in addition to what the phone’s system already has. Even though that could work for certain users that are accustomed with their device, for others it might prove to be a problem in combination with the app’s buttons. One solution would be splitting the upper half of the screen in 2 and allocating the sloth on the left for a “back” button.

#### Possible improvements for the user’s experience

In order for the entire flow to be clearer for the user, a tutorial would be beneficial when they first download the app. After that, the actions are rather simple to perform, based on their repeated pattern.

Another improvement would be the option of creating shortcuts for favourite shops. This would make the experience more flexible and would skip some maybe unnecessary audios.

The current selection of the shop is done by introducing the shop’s number with the help of a numeric keypad. If for some possible clients this would be attainable, for blind people this could be an inconvenience. For this reason, the experience would benefit some more tailoring based on the individual’s needs, which could be inserted when their profile is created.

### Completing the shopping experience - Managing the shopping list, Verifying the shopping list, Choosing delivery or pick-up

The tasks from this group maintain most of the actual shopping, being more complex in comparison to the first three. Even more, if the user opts for the delivery option, the process itself stops here, the only thing left is for the client to wait for their order.

#### Compliance with the heuristics

Because the application is rather simple in terms of design and the same approach is followed all throughout it - regarding the vocal guidance and double checks, parts of heuristic evaluation from the previous group apply here as well. The same will hold true for the third group of tasks. The certain parts are related to visibility of system status, consistency and standards, error prevention and help and documentation.

**Visibility of system status** - Same as before, the user is constantly announced about the current state of the system.

**Match between the system and real world** - A great example for this group of tasks is the shopping flow. At a physical grocery store, it's common to go over your shopping basket and remove unneeded items before checkout. Similarly, in the application, the user can opt for going through their list again and delete any unwanted items. This ensures users can modify their virtual cart with the same flexibility, adjusting the final selection before completing the purchase.

**User control and freedom** - In comparison to the previous set of tasks, the current one has its own method of stopping the ongoing action - the “X” button in the bottom left corner of the screen. Based on the state the user is currently in, it can have more outcomes. If they press on “X” without anything in the process of being added, nothing happens. If the user was currently in the middle of adding an item, they are asked if they are sure they want to stop adding the item.

**Consistency and standards** - The screens used in this group are the same as the ones previously mentioned or follow the same guidelines. This, therefore, maintains consistency throughout the application.

**Recognition Rather than Recall** - Instead of allowing the user to vocally command what items to potentially be deleted from the shopping list, the user is walked through the entire list again.

**Flexibility and efficiency of use** - The application allows the user to tailor their experience based on their preferences - go through the shopping list at the end or not, select the delivery option or the pick-up one.

**Aesthetic and minimalist design** - The newly added screen maintains the rules already existent. The user is presented with 3 buttons: “X” - left bottom corner, “Add item” - right bottom corner, and “Finish list” - top half. Their positioning is also based on how likely the user is to press a button by mistake. By pushing “Finish order” unintentionally, the user would interrupt their normal flow for a bit. That is why it is placed more out of reach. Moreover, the buttons are positioned so that together they fill the whole screen and the user can tap on them correctly.

#### Problems and solutions of the current interface design

The positioning of the buttons in the newly added screen has been wrongly made on the assumption that the user is right-handed - placing, therefore, the “X” button more out of reach. This, however, can stir problems for the left-handed users. Therefore, a more personalised approach would increase the UX.

If the microphone on the user’s device is not working properly or they are in a loud environment, adding an item to the cart might be difficult, as the current implementation is solely based on vocal command from the user. A potential solution would be allowing both touchscreen commands similar to the already existing ones (using a numeric keypad) and vocal commands - as mentioning the product they are looking for would be a difficult command otherwise.

#### Possible improvements for the user’s experience

Since there are certain products that can almost always be found in the shopping cart, like bread, milk and eggs, it would be a nice feature for the user to be able to create pre-established packs and simply add them to the list. This would decrease the time spent composing the list significantly.

The delivery option could be further personalised so that it would allow the user to select the date and time for when the order to arrive.

### Physical guidance - Guidance to the shop, Navigation through the aisles, Checking items with the camera

The last group of items focuses on the actions that only happen provided that the user has selected the pick-up option. It includes navigation to and at the store.

#### Compliance with the heuristics

**Visibility of system status** - Whilst doing the physical shopping, the user is announced of the next item on list.

**Match between the system and real world** - In the case of this group of tasks, the system and the real world also interact directly. Moreover, the process of scanning an item with their camera is similar to already existing systems in supermarkets that allow for self-scanning.

**User control and freedom** - The users are able to go to the store whenever they would like, it doesn't have to be right after composing the shopping list. This, together with the option to order an uber or not, gives them more freedom.

**Consistency and standards** - The consistency here is given by the representative colours of the ailes from the map screen. A more detailed description for them can also be checked in the design subsection.

**Error prevention** - A special case for error prevention happens for these tasks. Before the user goes into the shop, the application generates the most efficient route for the user to take in order to grab the products on the list. If the user doesn’t follow it precisely, the application recalculates the route on the spot.

**Flexibility and efficiency of use** - In order to make it easier for the users to follow the correct path in the supermarket, the application also makes the device vibrate in certain patterns when the user needs to take a left-turn or a right-turn. This is particularly useful as supermarkets can get pretty busy and loud at times and people with impaired vision tend to be overwhelmed by this environment. Therefore, an additional guidance mechanism is particularly useful.

**Aesthetic and minimalist design** - The map the user is shown on the screen as they are walking through the store is designed so that they can recognise the aisles easier. For example, the meat aisle is red, while the one for fruits and vegetables is green. This makes it easier for the user to orientate in case they want to buy products in addition to what is already on their list.

#### Problems and solutions of the current interface design

The issue with the group is the lack of support regarding helping users recognize, diagnose and recover from errors. One big inconvenience in the current flow is the lack of a mechanism to ask for help in-store from an employee. As previously mentioned, shopping for groceries can easily turn into an anxious experience for a visually impaired person. For that reason, a simple button placed in the top right corner of the screen could solve the issue. Even though this feature was initially planned for the application, the final iteration doesn’t have it.

#### Possible improvements for the user’s experience

The current in-store experience would be more pleasant if the user would be able to still edit the shopping list as they are buying the items. That would mean helping users reach products added on the spot or delete items that are not wanted anymore.

Another efficient, yet simple improvement would be adding the option for the user’s shopping to be done before they reach the location by a store-employee.

### Conclusions

After the heuristic evaluation of the application, it's clear that the interface aligns well with Nielsen and Molich's usability principles. The application excels in providing clear system status through audio feedback, which is particularly beneficial for the target user group. The use of familiar terms and processes that mirror real-world experiences enhances user comfort and understanding.

The minimalist design approach, focusing on functionality over visual aesthetics, is crucial for accessibility, but brings unique challenges, especially in areas like error recovery. The evaluation highlights the need for more robust error recovery mechanisms and more personalised interface elements. For example, accommodating left-handed users in button placement is important for inclusivity. Further enhancing the shopping experience with features like pre-established packs for common items and personalised delivery options could streamline the process.