

# Enhancing Accessibility for E-Commerce Applications

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**Abstract:** *Smartphones and tablets with touch screen have demonstrated a massive potential to support the needs of people with motor impairments like hand tremors. These individuals still face a huge challenge when it comes to conventional and traditional touchscreen gestures. These challenges are due to the fine precision requirement to disambiguate between targets on small screens. We have proposed an experimental feature called 'Aux-IN' to reduce the challenges faced by individuals suffering from hand tremors in combination with small touch targets on the screen. One of the main advantages of using this software feature is that we can significantly avoid any high-cost hardware.*

**Keywords:** User experience, User Interface, Design Thinking, E-Commerce, Specially Abled

## 1. Introduction

The use and development of mobile applications is a relatively new and fast-growing sector. In terms of mobile applications, people and societies in impoverished countries are improving. Mobile apps run on a small hand-held mobile device that can be quickly carried, utilized, and accessed from anywhere. Not only do these apps have an impact on users, but they also play an important role in business. Smartphone applications are providing revenue for a lot of enterprises. [1]

Times are changing. E-commerce will only get bigger and better as the world moves on. It will be aided in this endeavor by new technology. The coronavirus pandemic has changed things all over the world and it's expected that buying behavior is more likely to incline itself towards online methods as people are not willing to step out and risk exposure. E-commerce has changed the way people do business all around the world.

The importance of establishing an e-commerce business has indeed been reinforced by this quarantine, and now, it's easy to say that if you don't have an e-commerce business, you are missing out on an opportunity to scale up your business and earn good revenue. Due to its quick and convenient means of exchanging commodities and regional and worldwide services, e-commerce has grown in popularity dramatically over the previous few decades.

The mobile application runs in a mobile environment, and its usability is determined by factors such as screen resolution, hardware limitations, network issues, and limited interaction choices. Usability refers to a system's ease of use and suitability for a specific group of users. The user's performance and pleasure are influenced by the ease of use, whereas acceptability determines whether or not the product is used. Usability assessments entail planning a task, deciding on a method or process to use for the assessment, and determining what to evaluate. The mobile application

should be designed in such a way that users can efficiently engage with it. One of the critical success factors of such an application is the ability to use it in a small device effectively and with good interaction. Usability is defined as the extent to which a product can be used by specified users to achieve specific goals with minimal effort. [1] [4]

## 2. Literature Review

### 1) Design Thinking

Design thinking is a human-centered innovation method that focuses more on customer needs, prototyping quickly, and coming up with unique ideas that will change the way you manufacture goods, services, processes, and organizations. Design thinking empowers you to make decisions based on what customers genuinely want, rather than relying exclusively on past data or taking risks based on intuition and instinct rather than facts. Not only will the designers' judgment on the demands of the users be influenced by the accuracy and suitability of the data collected, but also the outcome of design thinking. Design thinking is the process used to develop a whole concept and design. It entails thinking in fresh ways and finding alternate solutions to diversify design themes. Designers can apply design thinking in document design to reimagine and innovate their work. During the design thinking process, it is vital to investigate the core needs of users from a significant amount of research data. [3]

### 2) User Experience

Our concerns have widened from usability to incorporate wider dimensions of people's encounters with technology as human-computer interaction (HCI) and interactive systems design have established a sense of people living with and through technologies. Leading HCI professionals are increasingly focused on the user experience. User experience refers to the internal and subjective feelings that a person feels when using a product or encountering a service. It is a comprehensive process that differs from person to person. User Experience Design (UXD) has risen

Volume 10 Issue 9, September 2021

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to prominence as an important component of product success. Determining how to measure user experience is one of the most important concerns in UXD. Affective aspects will undoubtedly play a big influence in the decision-making process. On the other hand, cognition-based models, which evaluate and replicate human perception based on user experience, are the most common computational models. [2][5]

### 3) UX for Specially abled

People with motor difficulties, such as spinal cord injury, limb loss or damage, cerebral palsy, muscular dystrophy, multiple sclerosis, etc. have trouble using their limbs or fingers. Using specific gestures or touching on a specific area of the screen will be exceedingly tough as a result of this difficulty. Physical buttons like the home, volume, and lock/power buttons might be difficult to use for these individuals. When it comes to the present state of touchscreen device accessibility, the scenario is far from ideal. On iOS, Apple has included Zoom, Assistive Touch, and Speak Selection functions, although they are all difficult to activate and use due to a mismatch between the required ability to use those features and the participants' actual abilities.

Android offers a screen magnification capability that is significantly easier to use than iOS's zooming, however, it is mostly for visually impaired people. The system default and in-browser magnification features on both iOS and Android are developed for and suited to the demands of individuals with vision impairments. Scanning-based interaction is accessible on iOS for users with severe motor impairments, but it is inefficient for individuals with gross or fine motor control. On non-direct touch devices, early research attempts proposed useful interaction strategies and techniques. [6]

## 3. Proposed Work

The proposed system is described as:

- a) Front-end Module
- b) Enhancing UX with additional accessibility
- c) Back-end Module

Here is a brief description of each of them.

### a) Front-end Module

The front-end module defines an application's user interface and builds a strong user experience to improve the client-side interaction. To apply design thinking and improve the UX of each step of a particular application, it is necessary to empathize with the user. A Banking Application's front-end must maintain design clarity by creating an appealing user interface and a solid user experience.

Let's have a deeper look:

**User Interface:** The user interface (UI) is the point at which a computer, website, or application interacts with humans. Users would be more likely to associate with the developer if the developer's colors, images, and branding were consistent. It eliminates issues, encourages user participation, improves functionality, and establishes a strong connection between the visitor and your program.

**User Experience:** The user experience (UX or UE) is how a user interacts with and experiences a product, system, or service. The user's perceptions of utility, the convenience of use, and efficiency are all included. The User Experience will leave a lasting impression on your users. User experience is significant since it aims to meet the needs of the user. Its goal is to deliver great experiences that encourage users to engage with a product or brand.

### b) Enhancing UX with additional Accessibility

With this proposed concept we aim to enhance the user experience by improving the overall accessibility of e-commerce applications. Aux-IN is a feature that puts a floating, virtual auxiliary button on your screen that you can drag wherever you want.

Aux-IN is a new interface that gives users quick access to certain commands.

With Aux-IN, an overlay menu is displayed that presents the user with commands that usually require certain physical actions, such as rotating or reaching out for the top of the screen. This new feature allows for the devices' touch to be more accessible to those who may not be able to accomplish these tasks.

Using Aux-IN, users can just tap the onscreen controls using just one finger. This instructs the operating system to do motions that would normally have the user performing a more complex activity, such as using two or three fingers.

Users can add up to 8 easy accessibility shortcuts in the overlay menu to accomplish some tasks that may be difficult. Along with these 8 shortcuts, the Aux-IN button shall respond to 2 gestures- Double Tap and Long Press. These gestures can be customized according to the user's preference from the variety of accessibility shortcuts provided in the Aux-IN menu.

### c) Back-end Module

Aux-IN could be built into mobile applications or e-commerce websites by implementing a layer over the frame. An ability to move the floating icon around would be enabled. A restriction could be executed for it to stick to the borders to avoid content being bothered. The floating icon would remain translucent allowing all content to be visible.

Aux-IN has a touch component revealing the various options and adding functionality to the proposed system.

## 4. Implementation and Analysis

With this implementation, we are able to implement the following features in our proposed system. The features are:

### a) Ability to change position

The users have the ability to move the floating icon along the border of the frame as per their comfort. This would allow users the flexibility to view the content and to easily navigate through the application or website.

**b) Timed opacity reduction**

The floating icon would be timed after each touch to lose its opacity allowing the content behind it to be visible to the user. The transparency would not disrupt the user experience while using the mobile application or the website.

**c) Shortcut elements**

Aux-IN could be equipped with a few elements to enhance the user experience with shortcuts and direct changes in the application for example:

- Reachability- A feature that shall enable the screen to roll down so that the bottom half of the screen disappears off the bottom and the top half is brought within reach. This feature eases one-handed access to apps and content as the top portion is within the thumb's reach.
- Help- A menu button that shall display Help options for the user to make navigation across the application easier.
- Home- A menu button that shall redirect the user to the home screen/parent screen of the application regardless of which screen the user was in before.
- Account- This button shall display the user details/account details on clicking.
- Your orders- The user can easily access their previous/current orders with a single tap on this menu button.
- Cart- A menu button that shall redirect the user to the application cart before proceeding to buy items.
- Wishlist- This menu button shall redirect the user to the list of items they have saved for later.
- Wallet- The user shall be able to access the wallet and complete transactions, redeem rewards, etc. using this menu button.
- Light/Dark Mode- This button shall help the user to toggle between light and dark themes as per the user's requirement.
- Voice Search/Assistant- Using the long-press gesture on the Aux-IN floating button shall enable a Voice Assistant that can search products for the user and answer their queries without having to use the keyboard.
- Back to Top- Using the double-tap feature on the Aux-IN floating button, the screen shall be scrolled to the top of the page.

**d) Voice accessibility for disabled users**

This feature would allow the disabled users to use the floating icon as a text to speech conversion indicator. This would allow blind users a refined way to interact with the mobile application or website.

**e) Additional usability**

This technique can be useful to customize methods to interact with the floating icon to add long-press functionality or double-tap usability linked to users' comfort to direct to a certain shortcut.

**5. Result and Discussion**

Figure 1: Aux-IN Floating icon



Figure 2: Opacity Reduction



Figure 3: Aux-IN Re-positioned



Figure 4: Aux-IN Menu

With the above implementation, the proposed system works as an additional feature and an add-on over the existing system.

## 6. Conclusion

Thus, with this implementation, we are not just proposing an e-commerce application but we are also Enhancing User Accessibility.

## 7. Future Scope

The proposed work can be implemented for other applications as well.

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